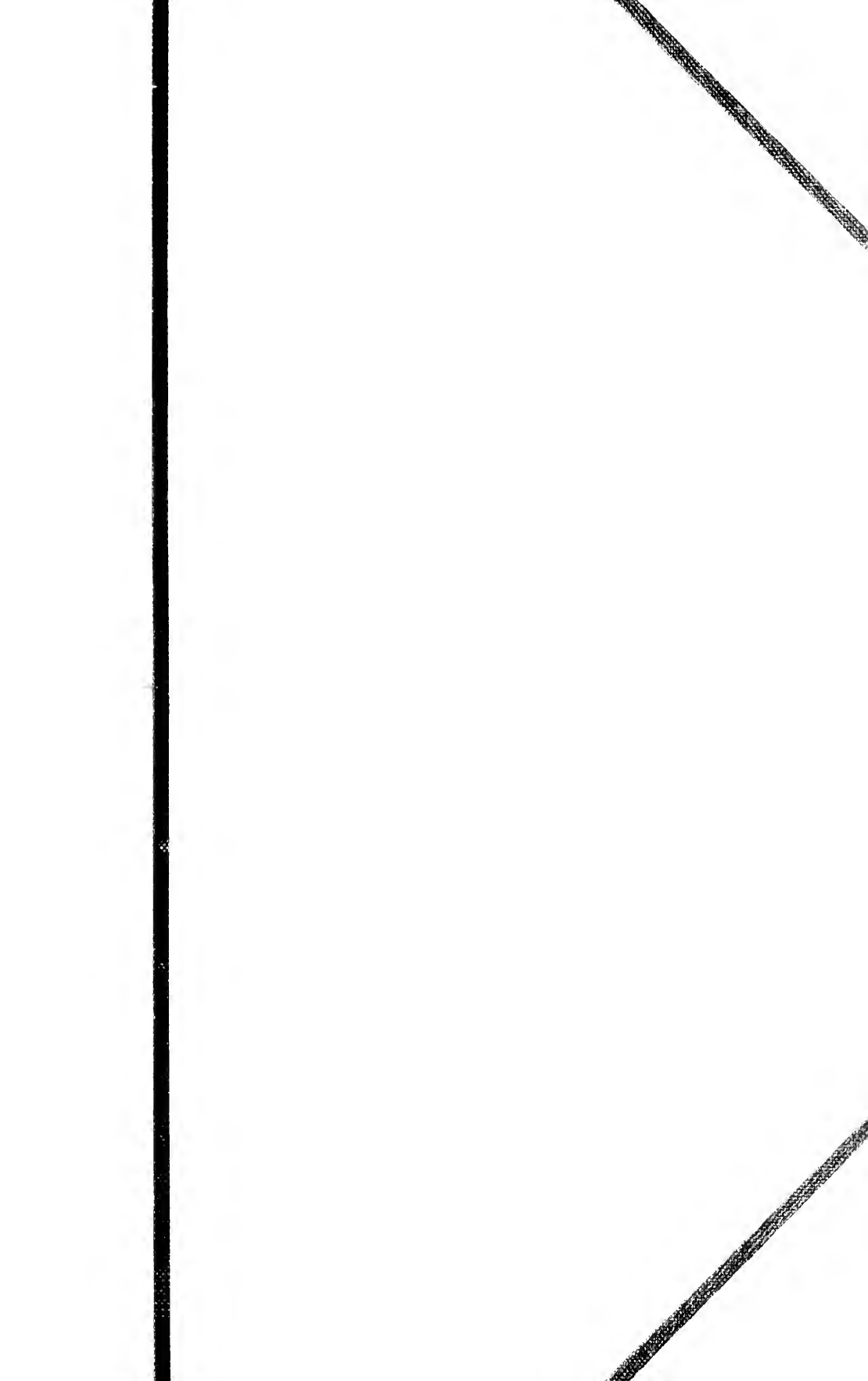

SESSIONAL PAPERS

VOLUME 27

SIXTH SESSION OF THE TWELFTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1916

VOLUME LI.

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TO THE

SESSIONAL PAPERS

OF THE

PARLIAMENT OF CANADA

SIXTH SESSION, TWELFTH PARLIAMENT, 1916.

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22. List of Shipping issued by the Department of Marine and Fisheries, being a list of vessels on the registry books of the Dominion of Canada on December 31, 1915. Presented by Hon. Mr. Hazen, 1916.. .. ..*Printed for distribution and sessional papers.*

23. Supplement to the Forty-eighth Annual Report of the Department of Marine and Fisheries for the fiscal year 1914-15. Marine.—Steamboat Inspection Report.
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26*a*. Summary Report of the Mines Branch for the calendar year 1914. Presented by Hon. Mr. Roche, 1916.. .. ..*Printed for distribution and sessional papers.*

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28. Report of the Royal Northwest Mounted Police, 1915. Presented by Sir Robert Borden, January 19, 1916.. .. ..*Printed for distribution and sessional papers.*

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29*a*. Report of the work of the Public Archives for the year 1914. Presented, 1916.
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34. Report of the Minister of Justice as to Penitentiaries of Canada for the fiscal year ending March 31, 1915.. .. ..*Printed for distribution and sessional papers.*

35. Report of the Militia Council for the Dominion of Canada, for the fiscal year ending March 31, 1915. Presented by Sir Sam Hughes, February 21, 1916.
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35*a*. Employment for the Expeditionary Forces after the war. Presented, 1916.
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36. Report of the Department of Labour for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Crothers, January 25, 1916.
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36*a*. Eighth Report of the Registrar of Boards of Conciliation and Investigations of the proceedings under "The Industrial Disputes Investigation Act, 1907," for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Crothers, January 25, 1916.
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38. Report of the Department of the Naval Service, for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Hazen, January 13, 1916.
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38*a*. Supplement to the Report of the Naval Service—Contributions to Canadian Biology, 1914-15. Presented by Hon. Mr. Hazen, 1916.
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38*b*. Natural History of the Herring. Presented, 1916.
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39. Forty-eighth Annual Report of the Fisheries Branch of the Department of the Naval Service, 1914-1915. Presented by Hon. Mr. Hazen, January 13, 1916.
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40. The Report of the Joint Librarians of Parliament. Presented by Hon. Mr. Speaker, January 13, 1916.. .. ..*Not printed.*

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P.C. 3009, dated 21st December, 1915, with reference to application of the Naval Discipline Act, etc., for the Government of the Naval Volunteer Force.

P.C. 63/422, dated 15th October, 1915, with reference to appointment of Assistant Paymasters in charge.

P.C. 2267, dated 25th September, 1915, with reference to regulations for payment of "Detained Pay."

P.C. 93/2151, dated 17th September, 1915, with reference to allowances to officers and men employed on coding and decoding duties, etc.

P.C. 1712, dated 21st July, 1915, with reference to scheme of pensions for officers and men of the Royal Canadian Forces, etc.

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131. Return to an Order of the House of the 7th February, 1916, for a copy of all letters, telegrams, evidence of witnesses at the investigation, and reports thereon, in relation to the claim of Alexandre D. Doucet, of Beresford, N.B., for cattle killed on the Intercolonial Railroad on May 25, 1915. Presented March 1, 1916.—*Mr. Turgeon.* *Not printed.*

132. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, correspondence and agreements between the Department of Railways and Canals, and any official thereof, including the officials of the Intercolonial Railway, regarding the installation of the McQueen Siding, so-called, at Shediac, in the province of New Brunswick, and the subsequent removal thereof. Presented March 1, 1916.—*Mr. Carvell*. . . . .*Not printed.*

132*a*. Supplementary Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, correspondence and agreements between the Department of Railways and Canals, and any official thereof, including the officials of the Intercolonial Railway, regarding the installation of the McQueen Siding, so-called, at Shediac, in the province of New Brunswick, and the subsequent removal thereof. Presented March 23, 1916.—*Mr. Carvell*. . . . .*Not printed.*

133. Return to an Order of the House of the 7th February, 1916, for a return showing:—1. The names, post office addresses, rate of wages and gross amount paid during the year 1915, to all engineers and employees of every description, engaged in connection with the survey of a branch line of the Intercolonial Railway in Guysborough County. 2. The gross expenditure in any way connected with the survey referred to in paragraph one since October, 1911. Presented March 1, 1916.—*Mr. Sinclair*. . . . .*Not printed.*

134. Return to an Order of the House of the 3rd February, 1916, for a copy of all documents, letters and petitions in the possession of the Railway Department relating to the dismissal of Wm. P. Mills, Bridge and Building Master of District Number 4, Intercolonial Railway; and also a copy of all letters, telegrams, petitions and documents of all kinds in the possession of the Government either in Ottawa or at Moncton, relating in any way to the application of said Wm. P. Mills for an investigation into the causes which led to his dismissal. Presented March 1, 1916.—*Mr. Chisholm (Inverness).* *Not printed.*

135. Return to an Order of the House of the 7th February, 1916, for a return showing the names and salaries of all the officials, assistants and clerks employed in the Intercolonial Railway offices in Moncton, including the assistant superintendent's office, dispatcher's office, station and freight house, the names and salaries of the foremen employed in each of the shops, and also the names of all officials, clerks, engine drivers and conductors who have been retired and placed on the pension list since the first of January, 1915, with the amount of the annual retiring allowance to each. Presented March 1, 1916.—*Mr. Copp*. . . . .*Not printed.*

136. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, papers, evidence, reports and all other documents relating to the investigation into certain alleged irregularities in the weighing of freight on the Intercolonial Railway at Stellarton and New Glasgow in 1914 and 1915, and the dismissal of Arthur McLean in connection therewith. Presented March 1, 1916.—*Mr. Macdonald*. . . . .*Not printed.*

137. Return to an Order of the House of 3rd February, 1916, for a copy of all telegrams, letters and other documents in connection with repairs to wharf at Shag Harbour, Shelburne County, N.S., during the years 1915 and 1916. Presented March 1, 1916.—*Mr. Law*. . . . .*Not printed.*

138. Return to an Order of the House of the 7th February, 1916, for a copy of all letters, telegrams and other papers or documents in the possession of the Department of Public Works relating to a request made by the Nova Scotia Historical Society for permission to place a memorial tablet commemorating the late Reverend Dr. James MacGregor, on the post office building, New Glasgow, N.S. Presented March 1, 1916.—*Mr. Sinclair.*

139. Return to an Order of the House of the 8th February, 1916, for a return showing:—1. Who had the contract or contracts for supplies, meats and other provisions required for the dredges of the Department of Public Works, working in the East River of Pictou or elsewhere in Pictou County, during the years 1914 and 1915, respectively. 2. Amounts paid respectively to each of said tenderers. Presented March 1, 1916.—*Mr. Macdonald*. . . . .*Not printed.*

140. Return to an Order of the House of the 7th February, 1916, for a return showing all sums of money expended during the present fiscal year to December 31, 1915, by the Department of Public Works, respectively, for public buildings, harbours and rivers, roads and bridges, telegraph and telephone lines, dredging, and for miscellaneous purposes, chargeable to income, showing said expenditure under the above headings and by provinces. Presented March 1, 1916.—*Mr. Maclean (Halifax)*. . . . . .*Not printed.*

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154. Return to an Order of the House of the 1st March, 1915, for a return showing the names and addresses of all persons who received bounty. Raid Bounty was paid in the county of Halifax, N.S., to date. Presented March 3, 1916.—*Mr. Maclean (Halifax).* *Not printed.*

155. Return to an Order of the House of the 31st March, 1915, for a copy of all applications received for Fenian Raid Bounty from residents of the county of Hants, N.S.; also the names of persons who have been paid the bounty and those who have been refused it in said county; with the reasons for refusal, and showing the number of applications that have not yet been dealt with. Presented March 3, 1916.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

156. Return to an Order of the House of the 22nd March, 1915, for a return showing the names and addresses of all persons who received bounty under the provisions of the Fenian Raid Volunteer Bounty Act, in respect of services rendered in the county of Richmond, Nova Scotia; and the names and addresses of all whose claims for bounty have been rejected, and the reasons for rejecting the same. Presented March 3, 1916.—*Mr. Kyte*.. .. ..*Not printed.*

157. Return to an Order of the House of the 23rd February, 1916, for a return showing the names of all shell inspectors employed in and about the Nova Scotia Steel Company, and the other factories producing shells at New Glasgow, in the county of Pictou. Presented March 3, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

158. Return to an Order of the House of the 16th February, 1916, for a list of the permanent and other employees on the Soulanges Canal in 1910, with the salary of each of them; also a list of the employees, permanent or otherwise, in 1915, and the salary of each of them. Presented March 3, 1916.—*Mr. Boyer*.. .. .. *Not printed.*

159. Unclaimed balances in the banks for patriotic purposes. Correspondence relating to. —*(Senate)*.. .. ..*Not printed.*

160. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams and other documents in connection with repairs, upkeep and watchman's services on patrol boat A, *Captain Blackford,* while laid up at Shelburne, N.S., during the month of December, 1914, and subsequent months until ready for sea in 1915. Presented March 6, 1916.—*Mr. Law*.. .. ..*Not printed.*

161. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams and other documents in detail, showing expenses, mileage and disbursements of Joseph W. V. Wilson, of Barrington, N.S., as fishery guardian in Shelburne, N.S., during year 1915. Presented March 6, 1916.—*Mr. Law*... .. ..*Not printed.*

162. Return to an Address to His Royal Highness the Governor General, of the 3rd February, 1916, for a copy of all Orders in Council, letters, telegrams, reports and other documents in connection with the commandeering of wheat about the 27th November, 1915, and in connection with the disposal of such wheat. Presented March 6, 1916.—*Mr. Knowles.* *Not printed*

162*a*. Supplementary Return to an Address to His Royal Higness the Governor General of the 3rd February, 1916, for a copy of all Orders in Council, letters, telegrams, reports and other documents in connection with the commandeering of wheat about the 27th November, 1915, and in connection with the disposal of such wheat. Presented March 10, 1916.—*Mr. Knowles*.. .. ..*Not printed.*

163. Return to an Order of the House of the 21st February, 1916, for a return showing the different rural mail routes in the constituency of Regina, their location and date of establishment, and all rural routes under consideration at the present time in said constituency. Presented March 7, 1916.—*Mr. Martin (Regina)*.. .. ..*Not printed.*

164. Return to an Order of the House of the 7th February, 1916, for a copy of all tenders, offers, letters, telegrams, engineer's reports and other documents relating to the construction of a breakwater or boat harbour at North Lake, Prince Edward Island. Presented March 7, 1916.—*Mr. Hughes, (Kings, P.E.I.)*.. .. ..*Not printed.*

165. Return to an Order of the House of the 23rd February, 1916, for a return showing the names of all persons who worked at the repairing of the wharf at Rivière Ouelle during the summer of 1915 with a statement of their occupations and the amounts paid to them, respectively. Presented March 7, 1916.—*Mr. Lapointe (Kamouraska)*.. ..*Not printed.*

166. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams and other documents relative to repairs on the *Hanlover* at Cape Negro, Shelburne County, N.S., in 1915. Presented March 7, 1916.—*Mr. Law*.. .. ..*Not printed.*

167. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, papers, pay-rolls, telegrams and correspondence in connection with the expenditure of, and receipts and vouchers for moneys paid for, the building of a wharf or blocking at the head of Belleville, Yarmouth County, N.S. Presented March 7, 1916.—*Mr. Law.* *Not printed.*

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254. Return to an Order of the House of the 21st February, 1916, for a copy of all letters, papers, telegrams and other documents relating to the survey in the harbour of Pictou, for a proposed new bridge, by the Railway Department; and also a statement showing the amounts paid in connection with said survey, the names of the persons to whom paid, and the purposes for which they were paid. Presented April 11, 1916.—*Mr. Macdonald*. . . . .*Not printed.*

255. Return to an Address of the Senate, dated 21st day of March, 1916, for:—A statement giving the following information as regards each of the following countries: Great Britain, France, Russia, Italy, Belgium, Servia, the Dominion of Canada, Australia, New Zealand, and the Confederation of South Africa, for each of the last three years for which the information may be at hand, namely:—

(*a*) The quantity and value of spirituous liquors produced or manufactured;
(*b*) The quantity and value imported;
(*c*) The quantity and value exported; and
(*d*) The quantity and value consumed, giving in each case, the information for each kind of spirituous liquors separately. Ordered, That the same do lie on the Table. —(*Senate*). . . . .*Not printed.*

256. Return to an Order of the House of the 16th March, 1916, for a return showing:—1. The number of medical doctors employed by the Militia Department at Halifax, N.S. 2. The name of each, and their rank and pay, respectively. 3. If the entire time of all or any is devoted to the militia service. 4. When not constantly employed in the militia service, the usual daily period of service. Presented April 12, 1916.—*Mr. Maclean (Halifax)*. . . . .*Not printed.*

257. Return to an Order of the House of the 3rd April, 1916, for a copy of the correspondence between Mr. J. Antime Roy, of l'Isle Verts, and the Federal Government, on the subject of a farm that might be sold or leased to the Government for the purposes of an experimental farm. Presented April 12, 1916.—*Mr. Paquet*. . . . .*Not printed.*

258. Return to an Order of the House of the 28th February, 1916, for a copy of the contract with the Amalgamated Dry Dock and Engineering Company for the construction of a dry dock at North Vancouver, B.C., together with the application for subsidy therefor, and also a copy of all reports of engineers' correspondence, and all other documents relating thereto. Presented April 12, 1916.—*Mr. Pugsley*. . . . .*Not printed.*

259. List of those in the Canadian Expeditionary Forces who had received decorations, medals and mentions in despatches, to 17th March, 1916. Presented by Hon. Mr. Kemp, April 12, 1916. . . . .*Printed for sessional papers only.*

259*a*. List of decorations and medals awarded to members of the Canadian Expeditionary Force and officers of the Canadian Militia to 17th March, 1915, checked with the London "Gazette" to the above date. Presented by Sir Robert Borden, May 2, 1916.*Not printed.*

260. Return to an Order of the House of the 13th March, 1916, for a return showing the names of all the medical examiners of recruits appointed since the war started to date. Presented April 13, 1916.—*Mr. Nesbitt*. . . . .*Not printed.*

261. Return showing:—1. How much overtime was paid to men in the Printing Bureau from 1st January, 1916, to 1st April, 1916. 2. The names of the men who were paid overtime. 3. Which were day men, and which night men. 4. What rate of overtime each man received, how much at 1½ day rate, and how much at double rate. Presented April 17, 1916.—*Mr. Turriff*. . . . .*Not printed.*

262. Return to an Address to His Royal Highness the Governor General of the 3rd February, 1916, for a copy of all Orders in Council, letters, telegrams, recommendations and other documents in connection with the Government's decision in September, 1915, to exact payment of one-half of the seed grain liens. Presented April 18, 1916.—*Mr. Knowles.* *Not printed.*

263. Return to an Order of the House of the 9th February, 1916, for a return showing the name, port of registry, tonnage and name of the master of all steam trawlers that cleared outwards from the port of Canso, Nova Scotia, in the year 1915. Also a copy of all reports and declarations under the hand of the master or chief officer of each of the said trawlers so clearing outward from said port since 16th April, 1915, required to be signed by such masters under the provisions of an Order in Council passed on the 16th April, 1915. Presented April 25, 1916.—*Mr. Sinclair*. . . . .*Not printed.*

264. Return to an Order of the House of the 7th February, 1916, for a statement showing the quantity of wheat shipped month by month, during the calendar years 1914 and 1915, from Winnipeg to Fort William and Port Arthur, and by what railways; to Duluth by the Canadian Northern Railway or allied system; to Minneapolis and St. Paul by the Canadian Pacific Railway, to the seaboard by rail over Canadian territory and to American ports over American railways. Presented April 25, 1916.—*Sir Wilfrid Laurier.* *Not printed.*

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ELEVENTH ANNUAL REPORT

OF THE

COMMISSIONERS OF THE TRANS-CONTINENTAL RAILWAY

BEING FOR THE

FISCAL YEAR ENDED MARCH 31

1915

PRINTED BY ORDER OF PARLIAMENT.

OTTAWA
PRINTED BY J. DE L. TACHÉ, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY.
1915

[No. 37—1916]

ELEVENTH ANNUAL REPORT

OF THE

COMMISSIONERS OF THE TRANSCONTINENTAL RAILWAY.

OTTAWA, September 27, 1915.

To Minister of Railways and Canals,
Ottawa.

SIR,—I have the honour to transmit through you, to His Royal Highness the Governor General in Council, the annual report of the Commissioners of the Transcontinental Railway, for the fiscal year ending March 31, 1915, setting forth the receipts and expenditures in connection with the Eastern Division of the National Transcontinental railway, and such other matters in relation to the said railway as appears to be of public interest.

Information as to the progress of the work will be found in the report of the chief engineer, and in the reports of the mechanical and bridge engineers and the accountant, hereto annexed.

The total expenditure, during the fiscal year, was $9,834,746.75, making the total expenditure, from the organization of this commission in 1904, to March 31, 1915, $152,802,745.77.

The total miles of track laid to March 31, 1915, has been as follows:—

	Miles.
Main line	1,803·445
Double track, and line from bridge to Quebec	19·610
Sidings, yards, pit spurs, etc.	529·531
Total track	2,352·586

Steel bridges were practically 100 per cent completed on March 31, 1915.

During the fiscal year, contracts, after having been duly advertised and sanctioned by the Governor in Council, as required by the National Transcontinental Railway Act, have been awarded in each case to the lowest tenderer complying with the requirements of the commission, as follows:—

ST. MALO LINE AND "Y."

Cavicchi & Pagano, Halifax, N.S.—For construction of a "Y" connecting the main line of the National Transcontinental railway, at a point about 2·5 miles west of the Quebec Bridge, with the line known as the St. Malo line, and for the re-tieing, etc., of this line. Estimated cost, on schedule of prices, $119,430.

ST. VITAL PIPE LINE.

Manitoba Engineering & Construction Co., Winnipeg, Man.—For construction of 12-inch cast-iron water main from pump house at St. Vital to reservoir, Transcona Division yard, a distance of approximately 31,100 feet, at price of $2.75 per lineal foot (with schedule for additions and deductions).

BUILDINGS.

Joseph Gosselin, Quebec, Que.—For erection of a station building, with platforms, shelter, etc., on site of Champlain market, in the city of Quebec, for the lump sum price of $45,386 for the building, and at a schedule of prices for tracklaying, etc.

Frederick Corbett, Hearst, Ont.—For construction of one trainmen's house at $8,573.62; two section houses at $2,857.50 each; one freight shed at $3,172.50; all at Hearst Division yard.

BRIDGES.

Dominion Bridge Company, Limited, Montreal, Que.—Superstructure for two steel railway bridges, viz., under-crossing of highway, St. Louis road; over-crossing St. Foye road; both on St. Malo line, Quebec.

Price: Steel 4 cents per pound for under-crossing, and 3·45 cents per pound for over-crossing. Timber, $40 per M b.m.

His Majesty The King.—For construction, by the Intercolonial Railway, of double-track bridge over under-crossing of National Transcontinental railway, three-quarter (¾) mile east of Chaudière curve, in place of single-track structure already built at said place—for actual cost less an allowance of 3 cents per pound for the present steel structure to be removed.

(Estimated cost, $21,600.)

MACHINERY.

Williams & Wilson, Montreal, Que.—Delivery and installation of one Harris air lift pump; one Harris patent booster; one Canadian Ingersoll-Rand steam-driven compressor, air receiver, etc., at bridge, Quebec, for lump sum price of $5,700.

The Goldie & McCulloch Co., Ltd., Galt, Ont.—Delivery, erection, and installation in the power-house of the "Leonard" shops, Quebec, three steam engines. Lump sum price of $18,500.

Delivery, erection, and installation of five water-tube boilers and stokers in power-house of the "Leonard" shops, Quebec. Lump sum price of $59,278.

The Canadian General Electric Co., Toronto, Ont.—Delivery, erection, and installation of electric generators, wiring system, and switchboard in the power-house of the "Leonard" shops, Quebec, for lump sum price of $38,995.

Dominion Bridge Co., Ltd., Montreal, Que.—Delivery and erection of nine (9) travelling cranes for locomotive and car shops plant of the "Leonard" shops, Quebec. Total price, $68,229.

TIES.

Macdonell & O'Brien, Montreal, Que.—Supply and delivery of 32,100 ties as follows: At "Cressman," 17,600 first-class; 4,500 second-class; at "Darey," 8,000 first-class, 2,000 second-class. Price, first-class, 55 cents each; second-class, 50 cents each.

L. N. Huart, Levis, Que.—Supply and delivery of 24,000 first-class cedar ties at yard of "Leonard" shops, Quebec. Price, 60 cents each.

The Harris Tie & Timber Co., Ottawa, Ont.—Supply and delivery of 114,000 cedar and jackpine ties, at "Leonard" shops, Quebec, and Cochrane, Ont., as follows: 65,000 first-class cedar at Quebec, at 64 cents each; 24,000 second-class cedar at Quebec, at 59 cents each; 25,000 jackpine at Cochrane at 45 cents each.

QUEBEC TERMINALS.

You were informed, in the last annual report of the commissioners, as follows:—

"An agreement was entered into under date of December 22, 1913, to which the parties respectively are: (1) His Majesty The King, represented by the Minister of Railways and Canals and the Commissioners of the Transcontinental Railway; (2) The Canadian Pacific Railway Company and the North Shore Railway Company; and (3) the city of Quebec. It provides for the erection and equipment by the Government, in the city of Quebec and the adjoining municipality, of railway workshops, and the erection by the Government and the said railway companies, together, of a union passenger station and freight houses and terminal facilities on the companies' property in Quebec. In consideration of these works the city grants certain concessions duly set forth in the agreement.

"An agreement was also entered into, under date 18th day of March, 1914, to which the parties, respectively, are: (1) Canadian Pacific Railway Company; and (2) His Majesty, represented by the Minister of Railways and Canals, and the Commissioners of the Transcontinental railway, by which provision is made, for the purposes of the Eastern Division of the National Transcontinental railway, and of all railways operated and controlled by the Government of Canada, while so operated and controlled, for the joint use by the parties to the agreement of a track connection between the said Eastern Division and the Canadian Pacific railway, and of the company's passenger and freight stations and terminal facilities in the city of Quebec, for the purposes of a union terminal and property."

Owing to unforeseen conditions regarding railway freight and passenger traffic being less for some years to come than was anticipated when these agreements were entered into with the Canadian Pacific Railway, these agreements have been re-drawn with a view of reducing the amount of real property to be acquired by this commission, and also with a view of including, in the joint agreement, property that had already been acquired by this commission, instead of acquiring additional property for the necessary additional facilities.

In connection with this agreement, two large freight sheds have been constructed, the joint passenger station is under construction, and the tracks in the freight and passenger yards have been rearranged.

It is expected that this work will all be completed next year, when Quebec will have an up-to-date passenger and freight station that will, under the joint supervision of both roads, be a source of convenience to the public, and effect a large saving in cost of operation for both the Government road and the Canadian Pacific Railway.

The whole respectfully submitted.

F. COCHRANE,
Commissioner.

CHIEF ENGINEER'S REPORT OF PROGRESS FROM MARCH 31, 1914, TO MARCH 31, 1915.

OTTAWA, ONT., September 27, 1915.

The Commissioners of the Transcontinental Railway,
Ottawa, Ontario.

SIRS,—I beg to submit the following report on progress of work from March 31, 1914, to March 31, 1915:—

District "A."—This district, as previously reported, was turned over to the Intercolonial Railway for operation on November 21, 1912.

District "B."—All work on this district was completed in November, 1914, with the exception of the Leonard shops and the Champlain Market station, in Quebec; the "Y" connection at Cap Rouge, and a few minor matters.

Owing to the present depression, as regards railway traffic, a considerable curtailment of the original programme for the Leonard shops has been effected, as it was considered advisable to keep the cost of construction and equipment to the minimum, particularly in the purchase of machinery that would not be required under present operating conditions, but all buildings, for which contract was let, will be completed by October 31 this year.

The contract for the construction of the Champlain Market Station building was let to Joseph Gosselin on June 19, 1914. Owing to foundation difficulties, at the beginning, the work was somewhat delayed, but it is expected that everything will be completed by the end of October.

A contract for a "Y" connecting the main line at Cap Rouge with the line known as the St. Malo line, and the re-tieing, etc., of this line, was let to Cavicchi & Pagano on August 31, 1914. Good progress has been made on this work, and it is expected that everything will be completed by October 31.

The mileage from Moncton, N.B., to the west side of Water street, Winnipeg, is 1,804·524 miles (including 1·10 mile as the length of the Quebec Bridge contract.)

Total track has been laid as follows:—

	Miles.
Main line	1,803·445
Double track and line from bridge to Quebec	19·610
Sidings, yards, pit spurs, etc.	529·531
Total track laid as per final estimate returns	2,352·586

I attach herewith reports from the mechanical and bridge engineers, which speak for themselves.

I also attach a list showing casualties which occurred during the year ending March 31, 1915.

The following photographs have been selected as being of interest, and are to accompany this report:—

Leonard shops, Quebec—

(1) Locomotive, forge shop, power-house, and lumber shed.

(2) Freight car shop.

(3) Storehouse.

Car Ferry *Leonard*.

Your obedient servant,

GORDON GRANT,
Chief Engineer.

CASUALTIES, MARCH 31, 1914, TO MARCH 31, 1915.

District "A."—None.

District "B."—October 11, 1914, collision of contractors' freight and work trains:—

Name.	Occupation.	Remarks.
W. Boisvert	Fireman	Killed instantly.
W. Boucher	Brakeman	" "
A. H. Johnston	Engineer	Died 4 hours after wreck.
O. Dion	Engineer	" 2 days "
J. E. Brilliant	Conductor	Severely injured.
L. Coughlin	Conductor	Slightly "
A. Bonville	Brakeman	" "
C. Rupert	Brakeman	" "
T. K. Kribbs	Mailman	" "

District "C-D."—None.

District "E."—April 17, 1914: Geo. Sunstrum, bridge foreman, killed while wrecking temporary trestle.

May 25, 1914: Philip Hordychuk, laborer, killed through careless handling of dynamite.

September 21, 1914: Unknown man committed suicide by throwing himself in front of moving ballast train.

District "F."—None.

MECHANICAL ENGINEER'S REPORT OF PROGRESS FROM MARCH 31, 1914, TO MARCH 31, 1915.

OTTAWA, September 27, 1915.

GORDON GRANT, Esq.,
Chief Engineer.

SIR,—I have the honour to submit the following report for the work done by the Mechanical Department of the National Transcontinental Railway for the period extending from March 31, 1914, to March 31, 1915.

TRANSCONA SHOPS.

The locomotive shop plant has been operated by the Grand Trunk Pacific Railway since January 13, 1913, while the car shop plant was finished in May, 1914, and immediately put into operation by the Grand Trunk Pacific.

Several minor items have since been completed and are now in service, viz., the sawdust and shavings exhaust system, machine and elevator guards, and an additional water tube boiler in the power-house.

DIVISIONAL POINTS.

The following terminals are practically fully equipped and completed, there being but a few minor details which are now being rapidly completed. All other buildings, viz., stations, freight sheds, storehouses, etc., and yard lighting, etc., are all finished and ready for operation.

No. 4, Armstrong, Ont.—A twelve-stall engine house, without machine shop.

No. 5, Grant, Ont.—A twelve-stall engine house, with machine shop.

No. 6, Hearst, Ont.—A twelve-stall engine house, without machine shop.

No. 7, Cochrane, Ont.—An eighteen-stall engine house, with machine shop.

No. 8, O'Brien, Que.—A twelve-stall engine house, without machine shop.

No. 9, Doucet, Que.—A twelve-stall engine house, without machine shop.

No. 10, Parent, Que.—A twelve-stall engine house with machine shop.

No. 11, Fitzpatrick, Que.—A twelve-stall engine house, without machine shop.

No. 12, Bridge, Que.—An eighteen-stall engine house, without machine shop.

No. 13, Monk, Que.—A twelve-stall engine house, without machine shop.

No. 14, Edmundston, N.B.—A twelve-stall engine house, without machine shop.

No. 15, Napadogan, N.B.—A twelve-stall engine house, with machine shop.

No. 16, Moncton, N.B.—A twelve-stall engine house, with machine shop.

LEONARD SHOPS, ST. MALO, QUE.

Locomotive shop.—This building is about 90 per cent complete, the reinforced heating ducts have yet to be poured, a considerable amount of glazing both in the skylights and in the window sash remains to be done, a small portion of the roof has yet to be covered. The interior painting and whitewashing is well under way.

The ground floor cannot be proceeded with until the wiring conduit and cables, live steam, return and exhaust mains and branches, industrial tracks, and machine tool foundations are arranged for and installed.

Forge shop.—This shop is practically complete, a little skylight and sash glazing as well as some painting and whitewashing remaining to be done.

Storehouse.—This building is nearly completed, the interior trim, such as counters, shelving, etc., and painting and whitewashing have yet to be done.

Oil house.—In about the same state as the storehouse.

Power-house.—This building is under cover, but the walls have yet to be painted and whitewashed, while the boiler foundations and smoke tunnel have yet to be built in the boiler room, while in the engine room the engines, generators, air compressor, switchboard, pumps, etc., have all been contracted for, and considerable foundation work has to be done before the concrete floors can be put in.

Chimney.—This item is entirely complete, together with the concrete smoke tunnel connecting same to the power-house.

Reservoir.—Complete with the exception of some special piping details.

Forge Stores and Scrap Bins.—This structure is nominally complete, a little painting to be touched up.

Indirect Heating Apparatus.—This equipment has been installed and erected, and arrangements are now being made to have the heater coils tested under working pressure.

Direct Heating System.—The radiation has been installed in place, and same will be tested out along with the indirect system.

Sewer system.—This portion of the contract is complete.

Water piping.—This installation has been laid, and is about ready for final test.

Midway Crane Runway.—The necessary rails and fastenings have yet to be installed and accurately aligned before this can be called complete.

Office Building.—The hardwood floors have to be laid, scraped, and oiled, interior trim to be stained and varnished, and a few doors to be fitted and hung before this building is ready.

Freight Carshop.—This shop is about 90 per cent complete. There yet remains the interior painting and whitewashing, several large doors to be glazed and hung, a small portion of the skylight and window sash to be glazed, while the floors cannot be put down until the electrical cables and conduits, furnaces, and machine tool foundations, also industrial tracks, have been arranged for and installed.

Planing Mill.—This building is about 90 per cent complete. Several large doors have to be glazed and painted, a small portion of the window sash and skylights have to be glazed. The interior whitewashing and painting is nearly all finished. The plumbing fixtures are roughed in. The floors cannot be put down until the industrial tracks, wiring conduits and cables, and machine tool foundations are arranged for and installed.

Dry Kiln.—The heating system and control apparatus have yet to be completely installed, and the whitewashing done before this building is finished.

Lumber Shed.—This building is now complete.

Crude Oil Storage.—The walls and floor have been completed, while the roof is well under way.

Pipe Tunnel.—The forms are all built and much of the concrete is poured.

Cranes.—Contracts have been awarded for the various travelling cranes and the necessary rails and fastenings for the runways have been ordered.

Power-house Equipment.—Contracts have been placed for the water tube boilers, feedwater heater, engines, generators, and switchboard, and all of the equipment is now being built.

Specifications and forms of tender are now being prepared covering the air compressor and necessary pumps.

Yours truly,

W. J. PRESS,
Mechanical Engineer.

ACTING BRIDGE ENGINEER'S REPORT OF PROGRESS FROM MARCH 31, 1914, TO MARCH 31, 1915.

OTTAWA, September 20, 1915.

GORDON GRANT, Esq.,
Chief Engineer.

SIR,—In reply to your letter of September 18, file No. 12,424, I hand you herewith in quadruplicate, the annual statement showing gross amounts paid on account of steel bridges to March 31, 1915. At that date all bridges were completed with the exception of a few in Districts "C" and "D," which required to be painted, and the two bridges on the St. Malo Cap Rouge branch.

Yours truly,

W. S. LAWSON,
Acting Bridge Engineer.

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915.

DISTRICT "A".

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber.	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft. b. m.	$ cts	$ cts.	$ cts.	
Over Xing Highway	8·5	1-18′ dk. pl. gr.	Dominion Bridge Co.	13,409	4·375	5,267	47 00	834 19	834 19	100
Canaan River Viaduct	21·6	5-30′, 5-60′, 1-80′ dk. pl. gr., and 5-30′ towers	Canada Foundry Co.	848,133	4·50	73,250	47 00	41,608 73	41,608 73	100
Over Xing Red Bank Rd.	54·6	1-66′ thro. pl. gr.	Dominion Bridge Co.	110,097	4·375	10,955	47 00	5,330 68	5,330 68	100
Salmon River (Chipman)	56·8	4-40′, 4-60′, 2-80′, dk. pl. gr., 4-40′ towers, and 4-150′ dk. truss	Canada Foundry Co.	2,178,372	4·65	154,110	47 00	108,537 47	108,537 47	100
Over Xing Salmon R. Rd	57·5	1-21′ 4″ dk. pl. gr.	W. P. McNeil	27,050	4·34	5,213	51 00	1,439 83	1,439 83	100
Newcastle Stream	67·2	4-40′, 6-60′, dk. pl. gr. 4-40′ towers and 1 rocker bent	Structural Steel Co.	1,000,095	3·95	72,020	37 00	42,168 50	42,168 50	100
Cains River	82·0	1-80′ dk. pl. gr.	W. P. McNeil	93,570	3·96	12,917	45 00	4,286 63	4,339 88	100
S. W. Miramichi	121·5	1-175′ thro. truss	Dominion Bridge Co.	491,911	4·17	21,983	47 00	21,545 89	21,545 89	100
N.Br. S.W. Miramichi	132·9	1-125′ thro. truss	" "	292,759	4 17	18,100	47 00	13,058 75	13,058 75	100
Juniper Brook	134·0	1-44′ thro. pl. gr.	W. P. McNeil	53,500	4·00	7,745	45 00	2,488 52	2,488 52	100
Odell Brook	150·0	1-44′ thro. pl. gr.	" "	70,700	4·00	7,060	45 00	3,145 70	3,145 70	100
Tobique River	161·9	3-140′ dk. truss, 2-100′ and 1-80′ dk. pl. gr.	Canada Foundry Co.	1,471,866	4·38	91,504	46 00	68,676 91	68,676 91	100
Over Xing Highway	165·3	1-22′ 7″ dk. pl. gr.	Dominion Bridge Co.	16,344	4·94	5,588	52 00	1,097 97	1,097 97	100
Graham Brook	180·4	3-60′, 3-50′ 5-40′ dk. pl. gr. and 5-40′ towers	" "	998,840	4·31	70,130	52 00	46,996 42	46,996 42	100
Caton Brook	181·6	11-60′, 10-40′ dk. pl. gr. and 10-40′ towers	" "	2,397,478	1·34	140,562	52 00	111,359 77	111,359 77	100
Under Xing Foley Brook Road	182·9	3-22′ I Beam	" "	31,134	4·89	6,850	52 00	1,878 65	1,878 65	100
Little Salmon River	184·3	25-100′-3″, 24-58′-9″ thro. pl. gr. and 24-58′-9″ towers	" "	13,991,310	4·68	518,041	46 00	678,623 20	678,623 20	100
Under Xing Falls Brook Road	190·0	1-99′ Pony truss	" "	72,886	4·94	10,476	52 00	4,144 33	4,144 33	100
Little River	191·6	11-40′, 9-60′, 2-80′ and 1-100′ dk. pl. gr. and 11-40′ towers	Structural Steel Co.	2,529,396	3·95	167,284	37 00	166,250 65	106,250 65	100
Four Mile Brook	197·2	6-30′, 1-59′ 7″, 5-60′, 1-75′, dk. pl. gr. and 6-30′ towers	W. P. McNeil	1,055,359 58,050	4·34 3·5	96,700	40 00	51,792 33	51,710 53	100
Grand River	207·2	2-88′ thro. pl. gr.	" "	312,222	3·94	25,840	42 00	13,386 83	13,386 83	100
Sigas River	209·6	1-80′ dk. pl. gr.	" "	94,028	3·89	12,917	42 00	4,200 20	4,200 20	100

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "A"—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber.	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	ft.b.m.	$ cts.	$ cts.	$ cts.	
Quisibis River	213·5	1-99′ thro. pl. gr.	Dominion Bridge Co.	191,778	4·39	15,422	47 00	9,143 88	9,143 88	100
Green River	219·6	2-77′ thro. pl. gr.	W. P. McNeil	246,239	4·07	22,343	42 00	10,960 33	10,968 28	100
Iroquois River	227·8	1-66′ thro. pl. gr.	Dominion Bridge Co.	98,949	4·39	11,256	47 00	4,872 89	4,872 89	100
Madawaska River	229.9	1-99′ and 1-83′ 6″ thro. pl. gr.	" "	337,235	4·39	26,179	47 00	16,034 94	16,034 94	100
Over Xing Ferry Rd.	230·3	1-33′ thro. pl. gr.	" "	33,473	4·625	6,610	47 00	1,858 80	1,858 80	100
Baker Brook	242·8	1-80′ dk. pl. gr.	W. P. McNeil	93,590	3·89	12,917	42 00	4,183 16	4,183 16	100
Under Xing Highway Baker Lake	251·8	1-40′ thro. pl. gr.	Dominion Bridge Co.	17,615	4·94	3,733	52 00	1,064 30	1,064 30	100

DISTRICT "B"—EAST.

Kitchen Brook	256·3	1-33′ thro. pl. gr.	Dominion Bridge Co.	33,924	4·15	4,452	52 00	1,639 35	1,639 35	100
Narrows Lac Long	265·1	1-66′ thro. pl. gr.	" "	98,733	3·97	8,020	52 00	4,336 74	4,336 74	100
Blue River	276·8	4-80′ dk. pl. gr. and 1-150′ dk. truss	" "	797,424	4·34	59,072	48 00	37,443 65	37,445 65	100
Nigger Brook	283·1	1-55′ thro. pl. gr.	" "	71,774	4·15	6,998	52 00	3,342 52	3,342 52	100
St. Francis River	285·8	2-55′ and 1-99′ thro. pl. gr.	" "	414,232	4·29	24,628	52 00	19,051 21	19,051 21	100
Boucanne River	292·5	1-150′ dk. truss, 4-60′, 3-56′, 2-40′, 5-30′ dk pl. gr., 5-30′ and 2-40′ towers	" "	1,826,122	4·56	104,740	52 00	88,717 64	88,717 64	100
Rochue River	300·6	1-35′ dk. pl. gr.	" "	27,694	3·95	4,576	52 00	1,331 86	1,331 86	100
Main Fourchue River	305·4	1-30′ dk. pl. gr.	" "	22,549	3·95	4,376	52 00	1,118 24	1,118 24	100
Little Black River	312·6	1-55′ thro. pl. gr.	" "	72,172	4·15	7,094	52 00	3,364 03	3,364 03	100
Manie River	316·6	1-50′ dk. pl. gr.	" "	50,531	3·95	7,398	52 00	2,380 67	2,380 67	100
River du Loup	323·1	2-60′ & 1-80′ dk. pl. gr.	W. P. McNeil	225,066	4·20	30,134	51 75	11,012 26	11,012 20	100
River Eau Chaude	332·3	1-60′ dk. pl. gr.	"	60,363	4·06	7,878	52 00	2,860 44	2,860 44	100
Outlet Lake Therrien	360·8	1-77′ thro. pl. gr.	"	122,900	4·24	9,326	52 00	5,695 91	5,695 91	100
Bras d'Apic, E. Br	369·3	1-60′ dk. pl. gr.	"	60,600	4 06	7,960	52 00	2,874 28	2,874 28	100
Bras d'Apic, W. Br.	370·1	1-60′ dk. pl. gr.	"	60,600	4·06	7,960	52 00	2,874 28	2,874 28	100
Mechant Pouce	375·1	1-60′ dk. pl. gr.	"	60,620	4·06	8,184	52 00	2,886 74	2,886 74	100
Fortin's Creek	375·6	1-60′ dk. pl. gr.	"	60,600	4 06	7,960	52 00	2,874 28	2,874 28	100
Bras St. Nicholas	380·1	1-33′ thro. pl. gr.	"	34,594	4·26	4,550	52 00	1,710 30	1,710 30	100

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "B" EAST—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb	Timber.	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft.b.m.	$ cts.	$ cts.	$ cts.	
Fourche du Pin	395·7	2-70′ dk. pl. gr. & 1-125′ dk. truss	Dominion Bridge Co.	173,501	4·47	33,453	52 00	22,905 19	22,905 19	100
Abenakis River	414·3	1-100′ & 2-60′ dk. pl. gr	W. P. McNeil	277,000	4·27	31,983	48 00	13,363 08	13,363 08	100
Etchemin River	420·2	2-100′ & 2-70′ dk. pl. gr	Dominion Bridge Co.	451,944	4·72	48,672	55 00	24,008 72	24,008 72	100
Over Xing, Q. C. Ry	433·2	1-66′ thro. pl. gr	" "	110,968	4·72	11,485	55 00	5,869 37	5,869 37	100
River le Bras	446·2	1-66′ thro. pl. gr	" "	100,332	4·72	8,119	55 00	5,426 90	5,426 90	100
			" "	45,720	0·53					
Creek Xing, M 13·2	446·9	1-40′ dk. pl. gr	" "	31,771	4·70	5,382	53 00	1,778 49	1,778 49	100
Under Xing, I. R. C.	457·5	1-88′ thro. pl. gr	" "	158,008	4·72	13,465	55 00	8,198 56	8,198 56	100
Highway Viaduct, Mile 2.17	457·9	1-50′ & 2-40′ dk. pl. gr	" "	66,110	4·72	11,656	55 00	3,761 47	3,811 47	100

DISTRICT "B"—WEST.

Cap Rouge Highway	463·0	1-89′2″ thro. truss swing	Dominion Bridge Co.	31,531	.....	5,950	.....	2,200 00	2,200 00	100
Cap Rouge Viaduct	463·1	32-40′; 27-61′ dk. pl. gr. 1-125′; 1-150′; 1-160′ dk. truss; 30-40′ Towers and 1 rocker bent	" "	8,456,297	3·94	613,122	42 00	358 929 22	362,329 22	100
River aux Pommes	479·1	1-50′ dk. pl. gr	" "	46,373	4·04	9,578	47 00	2,314 21	2,314 24	100
Jacques Cartier River	482·2	2-30′; 2-60′; 1-80′ dk. pl. gr; 1-100′ dk. truss; 2-30′ towers and 1 rocker bent	" "	832,881	4·19	50,040	50 00	37,399 71	38,259 71	100
Portneuf River	489·0	2-60′ and 1-100′ dk. pl. gr	" "	265,430	4·09	31,420	47 00	12,332 83	12,332 83	100
Grand Bras d'Arme	499·0	1-40′ dk. pl. gr	" "	33,278	4·44	5,442	52 50	1,763 25	1,763 25	100
Lachevrotiere River	500·0	1-33′ through pl. gr	" "	33,431	4·84	4,574	52 50	1,858 20	1,858 20	100
St. Anne River	503·6	2-70′ and 1-100′ dk. pl. gr	" "	413,280	4·09	45,044	47 00	20,247 22	20,247 22	100
River Noire	505·6	2-50′ dk. pl. gr. and 1-125′ dk. truss	" "	358,920	4·18	28,625	47 00	16,348 23	18,603 93	100
Nigerette River	506·1	1-30′ dk. pl. gr	" "	20,731	4·44	4,040	52 50	1,132 56	1,132 56	100
Charest River	510·8	4-30′; 1-45′; 3-50′; 1-75′ dk. pl. gr. and 4-30′ towers	" "	641,728	3·95					
				67,520	3·10	57,342	50 00	34,109 33	34,109 33	100
				126,695	3·60					

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "B"—WEST—*Continued.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber	Rate per M. ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft. b m.	$ cts.	$ cts.	$ cts.	
Bastican River	525·4	2-40′; 3-60′ dk. pl. gr.; 2-100′ 1-200′ dk. truss and 2-40′ towers	Dominion Bridge Co.	1,396,453	4·23	101,362	50 00	64,135 06	64,135 06	100
Bastican R. W. Span	525·4	1-80′ dk. pl. gr	" "	96,231	4·83	12,412	55 50	5,330 62	5,330 62	100
Under Xing, Highway	530·9	3 skewed	" "	33,277	4·72	7,200	47 00	1,909 07	1,909 07	100
Tawachiche River	543 1	1-14′ through pl. gr	" "	51,425	4·84	8,338	52 50	2,926 72	2,926 72	100
Roberge Creek	545·1	1-49′ 0 to 0 D.T. through pl. gr	" "	96,405	4·84	14,796	52 50	5,442 79	5,442 79	100
R. des Eaux Mortes	555·1	1-125′ dk. truss	" "	364,336	5·12	18,100	52 50	19,604 25	19,604 25	100
River du Milieu	556·9	5-40′; 6-60′; 3-75′; 2-90′ dk. pl. gr.; 1-225′ dk. truss; 2-60′ and 5-40′ towers	" "	3,409,062	4·93	163,570	52 50	176,654 17	176,654 17	100
1st Xing, Brochet R.	559·1	1-60′ dk. pl. gr	" "	58,995	4·44	10,164	52 50	3,152 99	3,152 99	100
2nd " "	561·6	1-55′ through pl. gr	" "	72,868	4·44	9,320	52 50	3,724 64	3,774 64	100
3rd " "	562·1	1-55′ " " "	" "	72,324	4·44	9,320	52 50	3,700 49	3,750 49	100
4th " "	568·6	1-33′ thro. pl. gr	" "	33,387	4·44	6,968	52 50	1,848 20	1,848 20	100
5th " "	569·7	1-36′ 10″ o to o thro. pl. gr	" "	60,789	4·44	6,220	52 50	3,025 58	3,025 58	100
Creek a Beance	575·1	1-40′ dk. pl. gr	" "	32,533	4·44	7,696	52 50	1,848 51	1,848 51	100
Over Xing Q. & L. St. John Ry	578·4	1-76′ o to o thro. pl. gr	" "	120,032	4·84	11,340	52 50	6,404 90	6,404 90	100
Little Bostonnais R.	579·6	2-60′ & 1-100′ dk. pl. gr	" "	310,486	4·84	35,230	52 50	16,877 10	16,877 10	100
Big " Riv	581·8	1-90′ dk. pl. gr	" "	519,204	4·84	51,882	52 50	27,853 28	27,853 28	100
Croche River	587·8	4-90′ skewed thro. pl. gr	" "	674,266	4·84	41,027	52 50	34,788 39	34,788 39	100
1st Xing St. Maurice R.	588·7	6-140′ thro. truss	" "	1,951,535	4·98	116,080	52 50	103,280 64	103,280 64	100
River au Lait	589·0	1-77′ thro. pl. gr	" "	122,719	4·84	12,450	52 50	6,593 22	6,593 22	100
Vermillion River	604·9	3-40′, 2-60′, 1-80′ dk. pl. gr., 2-125′, 2-225′ dk. truss & 3-40′ towers	" "	2,741,995	4·22	139,922	48 00	122,555 05	122,555 05	100
Flamand River	626·1	1-175′ thro. truss	" "	517,573	4·43	24,124	51 00	24,158 80	24,158 80	100
Little Flamand River	634·6	2-55′ & 1-99′ thro. pl. gr	" "	341,009	4·27	26,685	51 00	15,922 02	15,922 02	100
2nd Xing, St Maurice R.	648·0	3-200′ skewed thro. truss	" "	1,981,574	4·27	75,768	51 00	88,477 37	88,477 37	100
3rd " "	655·6	3-200′ " "	" "	1,957,375	4·27	74,006	51 00	87,354 22	87,354 22	100
Manuan River	657·4	3-180′ " "	" "	1,637,351	4·27	66,890	51 00	73,326 28	73,326 28	100
1st Xing, Ribbon R.	658·0	2-150′ thro. truss	" "	776,470	4·30	37,196	51 00	35,285 20	35,285 20	100
Atikmahik Creek	662·0	8-60′, 7-30′ dk. pl. gr. & 7-30′ towers	" "	985,457 (less) 126,695	4·22 3·00	91,875	51 00	42,566 91	42,566 91	100

STATEMENT showing approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "B"—WEST—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft.b.m.	$ cts.	$ cts.	$ cts.	
Minachin Creek	679·6	1-44′ thro. pl. gr.	Dominion Bridge Co.	52,419	4·39	5,978	54 00	2,624 00	2,624 00	100
2nd Xing, Ribbon R.	681·2	1-150′ thro. truss.	"	389,721	4·50	18,898	50 00	18,482 48	18,482 48	100
Picqui Creek	685·2	1-60′ dk. pl. gr.	"	62,525	4·14	8,101	53 00	3,017 89	3,017 89	100
Lake Travers	686·4	2 77′ thro. pl. gr	"	283,376	4·29	18,640	53 00	13,144 75	13,144 75	100
Upper Ribbon River	688·4	1 99′ thro. pl. gr.	"	226,188	4·29	12,024	53 00	10,340 73	10,340 73	100
Boucher Creek	695·2	1-44′ thro. pl. gr.	"	51,864	4 30	5,864	53 00	2,540 94	2,540 94	100
Gatineau R. E. Br.	706·9	2 70′ dk. pl. gr.	"	154,533	4 34	18,402	54 00	7,700 44	7,700 44	100
Marten River	710·3	9-55′; 8-30′, dk. pl. gr. and 8-30′ towers	"	998,420	4·32	98,209	54 00	48,435 02	48,435 02	100
Little Pitch Pine Creek	718·1	1-70′ and 2-35′ dk. pl. gr.	"	129,397	4·17	18,450	53 00	6,373 70	6,373 70	100
East Cache Creek	736·3	1-80′ and 2-40′ dk. pl. gr.	"	157,775	4·18	21,076	53 00	7,712 03	7,712 03	100
Oscelaneo River	738·8	1-50′ and 2-40′ dk. pl. gr.	"	109,157	4·19	17,326	53 00	5,491 96	5,491 96	100
Haycock Creek	744·1	1-70′ dk. pl. gr.	"	75,636	4·19	9,360	53 00	3,665 23	3,665 23	100
ST. MALO, CAP ROUGE (BRANCH).										
Under Xing St. Louis Road		1-40′ and 2 25′ I Beam	Dominion Bridge Co.	41,000	4·00	14,500	40 00	2,220 00	1,000 11	50
Over Xing. St. Foye Road		1-99′ skew thro. pl. gr.	"	230,000	3 45	16,000	40 00	8,575 00	8,253 86	99
DISTRICT "C" (taken over by "B").										
Susie River	764·2	1-90′ dk. pl. gr.	Dominion Bridge Co.	126,851	4·30	12,802	53 00	6,133 10	6,133 10	100
Dead Fox Creek	772·5	1-55′ thro. pl. gr.	Canadian Bridge Co.	76,909	5·49	7,228 less 7,228	55 00 48 00	4,203 69	4,095 40	98
Kekek River	775·9	1-77′ thro. pl. gr.	Canada Foundry Co.	124,728	5·35	9,556	50 00	7,150 75	7,150 75	100
Mamaguish River	783·4	1-80′; 5-60′; 4-40′ dk. pl. gr. 4-40′ towers and 1 rocker bent	Canadian Bridge Co.	727,691	5·12	72,626	55 00	41,252 21	41,252 21	100

STATEMENT showing Approximate Co t of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "C" (taken over by "B")—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber.	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft.b.m.	$ cts.	$ cts.	$ cts.	
Durant Lake	790·8	1-30′ dk. pl. gr.	Canada Foundry Co.	21,862	5·33	4,464	50 00	1,388 44	1,388 44	100
1st Xing, Atik River	795·0	1-80′ dk. pl. gr.	"	93,510	5·24	10,812	50 00	5,440 53	5,440 53	100
2nd " " "	800·3	1-80′ and 2-50′ dk. pl. gr.	"	189,195	5·14	23,584	50 00	10,919 24	10,919 24	100
3rd " " "	803·5	1-80′ and 2-60′ dk. pl. gr.	"	213,78[illegible]	5·14	26,112	50 00	12,293 99	12,293 99	100
4th " " "	806·5	1-80′ and 2-60′ dk. pl. gr.	"	213,781	5·15	26,112	50 00	12,293 94	12,293 94	100
Canyon Creek	811·3	1-80′; 5-60′; 4-40′ dk. pl. gr. 4 40′ towers and 1 rocker bent	"	844,188 less 57,807	5·12 / 3·00	72,416	55 00	45,471 10	45,471 10	100

DISTRICT "C" (taken over by "D").

1st. Xing, Megiskan River	820·0	2-125′ dk. truss and 2-100′ dk. pl. gr.	H.B.W. Co.	995,898	5·18	59,074	51 00	54,609 29	53,302 03	98
Sunday River	829·9	1-125′ thro. truss	Dominion Bridge Co.	296,623	4·87	15,224	53 00	15,252 41	15,252 41	100
2nd Xing Megiskan River	835·3	2-60′ dk. pl. gr. and 1-250′ through truss	H.B.W. Co.	1,081,350	5·18	47,226	51 00	58,422 46	56,826 98	98
Bell River	843·3	2-60′ dk. pl. gr. and 1-160′ thro. truss	Dominion Bridge Co.	537,880	5·57	35,318	54 00	31,867 09	31,867 09	100
Cedar Creek	855·5	1-39′ dk. pl. gr.	Can. Bridge Co.	32,505	5·00	5,244	55 00	1,913 67	1,913 67	100
Natagagan River	862·1	1-70′ dk. pl. gr.	" "	73,760	5·00	9,100	55 00	4,185 50	4,185 50	100
Peter Brown Creek	878·5	1-100′ and 2-40′ dk. pl. gr.	" "	212,735	4·68	24,032	54 00	11,253 73	11,253 73	100
Harricanaw River	887·4	1-300″ thro. truss and 2-70′ dk. pl. gr.	" "	1,431,004	4·93	54,728	54 00	73,503 81	73,503 81	100
Nawapitichin Forks	904·4	1-60′, 3-40′ dk. pl. gr. and 3-40′ towers	" "	458,983	4·96	48,033	54 00	25,359 34	25,359 34	100
Deer River	913·5	1-66′ thro. pl. gr.	" "	97,577	4·96	8,165	54 00	5,280 73	5,280 73	100
Robertson Lake	914·8	1-77′ thro. pl. gr.	" "	119,145	4·96	9,417	54 00	6,418 11	6,418 11	100
Kakameonan River	922·1	1-90′ and 2-50′ dk. pl. gr.	" "	216,508	4·64	25,575	54 00	11,427 02	11,427 02	100
Molesworth River	930·7	1-150′ thro. truss, 1-90′ and 1-40′ dk. pl. gr.	" "	523,415	4·96	36,307	54 00	27,921 96	27,921 96	100
3rd. Xing South River	940·2	1-59′ o to o dk. pl. gr.	" "	58,250	4·72	7,818	54 00	3,171 57	3,171 05	100
Whitefish River	942·3	1-275′ thro. truss	"	1,115,776	4·93	33,623	54 00	56,823 40	56,825 40	100

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued*

DISTRICT "C" (taken over by "D")—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft. b. m.	$ cts.	$ cts.	$ cts.	
Okikodasik River	956·1	1-200′ thro. truss and 1-80′ dk. pl. gr.	Can. Bridge Co.	806,020	4·88	45,107	54 00	41,769 56	41,769 56	100
Okikodasik River Approaches	956·1	2-65′, 7-50′, 6-40′ dk. pl. gr., 6-40′ towers and 1 rocker bent	" "	799,901	4·93	96,795	55 00	44,758 85	44,818 12	100

DISTRICT "D".

Departure Creek	971·5	2-80′, 1-60′, 3-50′, 5-40′ dk. pl. gr. and 5-40′ towers	Can. Bridge Co.	620,150	4·93	76,649	55 00	31,789 10	33,907 55	100
Circle River	986·9	1-200′ thro. truss	" "	616,284	4·35	24,081	50 00	28,012 40	28,012 40	100
Low Bush River	987·0	1-200′ thro. truss	Can. Bridge Co.	617,888	4·35	24,081	50 00	28,082 18	28,082 18	100
Little Mistongo R.	999·8	1-100′ dk. pl. gr.	" "	148,111	4·93	14,304	55 00	8,103 38	8,111 97	100
Mistongo River	1,001·4	11-30′, 11-60′, 1-80′ dk. pl. gr. and 11-30′ towers	H. B. W. Co.	1,785,239	3·58	145,120	51 00	71,312 67	71,312 67	100
Sucker Creek	1,010·1	1-30′ dk. pl. gr.	"	23,331	4·75	6,345	58 00	1,476 37	1,476 37	100
Abitibi River	1,019·6	4-30′; 2-57′ 10″, 3-60′ dk. pl gr., 2-210′ dk. truss and 4-30′ towers and 1 rocker bent	"	2,270,526	3·86	114,100	50 50	93,404 35	93,404 35	100
Brule Creek M. 99	1,023·6	1-60′ dk. pl. gr.	"	61,905	4·70	10,437	51 00	3,441 82	3,441 82	100
Frederichouse River	1,033·9	3-40′, 5-60′ dk. pl. gr., 1-200′ dk. truss and 3-40′ towers	"	1,341,480	4·60	88,251	51 00	66,055 88	66,055 88	100
Buskegow River	1,038·1	2-60′ and 1-90′ dk. pl. gr.	"	255,110	4·60	30,550	51 00	13,293 11	13,293 11	100
Driftwood River	1,048·1	2-50′ and 1-100 dk. pl. gr.	"	255,173	4·60	29,432	51 00	13,238 99	13,238 99	100
Mattagama River	1,059·2	2-260′ thro. truss	Can. Bridge Co.	2,018,062	4·30	67,201	50 00	90,136 72	90,136 72	100
Poplar Rapids River	1,066·2	2-50′ and 1-70′ dk. pl. gr.	H. B. W. Co	183,005	4·55	24,414	53 00	9,620 67	9,620 67	100
Wellington Creek	1,073·8	1-70′ dk. pl. gr.	"	80,213	4·55	11,523	53 00	4,260 67	4,260 67	100
Ground Hog River	1,078·1	2-250′ thro. truss	Can. Bridge Co.	1,934,180	4·57	63,264	54 00	91,808 29	91,808 29	100
Brule Creek, M. 156	1,080·6	1-55′ thro. pl. gr.	H. B. W. Co	74,055	4·75	9,333	58 00	4,058 92	4,058 92	100
Martin Creek	1,082·6	1-35′ dk. pl. gr.	"	26,080	4·75	7,190	58 00	1,655 82	1,655 82	100
Bass River	1,093·2	1-55″ thro. pl. gr.	Can. Bridge Co.	75,300	4·96	7,301	54 00	4,129 13	4,129 13	100
Kapuskasing River, E. Br.	1,097·6	2-100′ dk. pl. gr.	" "	297,966	4·55	27,607	54 00	15,048 23	15,048 23	100

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "D"—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber.	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft.b.m.	$ cts.	$ cts.	$ cts.	
Kapuskasing River, W. Br.	1,097·6	3-100′ dk. pl. gr.	Can. Bridge Co.	456,373	4·55	41,307	54 00	22,995 55	22,995 55	100
Lost River	1,106·1	1-100′ dk. pl. gr.	" "	147,966	4·61	14,051	54 00	7,579 98	7,579 98	110
Solomon Creek	1,111·6	1-30′ dk. pl. gr.	" "	20,732	4·82	4,327	54 00	1,232 94	1,232 94	100
Opazatika River	1,118·0	1-200′ thro. truss	" "	619,328	4·95	24,983	54 00	31,881 95	31,881 95	100
Montcalm Creek	1,122·9	1-44′ thro. pl. gr	" "	74,722	4·96	4,831	54 00	3,967 08	3,967 08	100
Crow Creek	1,128·6	1-44′ thro. pl. gr	" "	53,690	4·96	5,825	54 00	2,977 57	2,977 57	100
Missinabi River	1,138·2	7-100′ and 2-80′ dk. pl. gr.	H. B. W. Co.	1,360,648	4·41	116,722	54 50	63,719 92	63,719 92	100
McIlwarth Creek	1,153·6	1-50′ dk. pl. gr	Can. Bridge Co.	46,929	4·76	6,942	54 00	2,608 69	2,608 69	100
Nelles Creek	1,154·1	1-40′ dk. pl. gr.	" "	31,692	4·76	5,702	54 00	1,816 45	1,816 45	100
Mattawishquia River	1,155·4	2-40′, 2-90′ and 1-100′ dk. pl. gr.	" "	458,355	4·61	49,484	54 00	23,802 31	23,802 31	100
Valentine Creek	1,171·6	2-50′ and 1-80′ dk. pl. gr.	" "	189,322	4·68	23,560	54 00	10,132 51	10,132 51	100

DISTRICT "E" (taken over by "D").

St. Joseph River	1174·6	1-44′ thro. pl. gr	Canadian Bridge Co.	53,780	4·50	5,996	52 00	2,731 89	2,731 89	100
Kebinagagami River	1177·6	1-150′; 1-125′ dk. truss. 5-60′; 2-30′ dk. pl. gr. 2-30′ towers and 1 rocker bent	H. B. W. Co	1,254,432	4·55	83,745	53 00	61,378 64	61,378 64	100
Creek, Mile 15·5	1188·1	1-33′ thro. pl. gr.	"	33,720	4·55	4,984	53 00	1,798 41	1,798 41	100
Creek, Mile 17·21	1189·8	1-33′ thro. pl. gr.	"	33,720	4·55	4,984	53 00	1,798 41	1,798 41	100
White River	1195·7	2-100′ and 2-50′ dk. pl. gr	"	415,525	4·25	41,260	53 00	19,846 60	19,846 60	100
Skunk River	1196·3	2-100′; 3-60′; 5-40′ dk. pl. gr. and 4-40′ towers	"	1,053,335	4·55	78,370	53 00	52,080 35	52,080 35	100
Nagagami River	1197·4	2-100′; 1-60′; 3-50′ dk. pl. gr. and 5-30′ towers	"	983,511	4·55	75,470	53 00	48,749 66	48,749 66	100
Nagagami Branch	1205·2	2-60′ dk. pl. gr. and 1-125′ dk. truss	Canadian Bridge Co.	425,536	4·50	30,906	52 00	20,756 23	20,756 23	100
Bad River	1214·8	1-125′ thro. truss and 2-50′ dk. pl. gr.	H. B. W. Co.	401,065	4·75	28,912	54 00	20,611 84	20,611 84	100
Martin Creek	1220·5	1-55′ thro. pl. gr	Canadian Bridge Co.	76,489	4·55	7,168	52 00	3,852 99	3,852 99	100
Clarke Creek	1227·1	1-40′ dk. pl. gr.	H. B. W. Co.	31,855	4·40	5,840	54 00	1,716 98	1,716 98	100

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "E".

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber.	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	Ft.b.m.	$ cts.	$ cts.	$ cts.	
Pagwachuan River	1233·1	1-150′ dk. truss; 2-100′; 1-80′; 1-60 and 1-40 dk. pl. gr.	Canadian Bridge Co.	947,464	4·75	69,692	52 00	48,628 52	48,628 52	100
Midway Creek	1237·6	1-44′ thro. pl. gr.	" "	53,715	4·50	5,750	52 00	2,716 18	2,716 18	100
Dog River	1242·1	1-100′ dk. pl. gr.	H. B. W. Co.	159,260	4·35	14,600	54 00	7,716 21	7,716 21	100
Mahaffy Creek	1244·7	1-44′ thro. pl. gr.	Canadian Bridge Co.	53,740	4·50	5,750	52 00	2,717 30	2,717 30	100
Moose River	1248·5	1-90′ dk. pl. gr.	H. B. W. Co.	133,010	4·35	12,968	54 00	6,486 21	6,486 21	100
Flint River	1250·7	1-99′ thro. pl. gr.	"	194,020	4·50	12,290	51 00	9,394 56	9,394 56	100
Black Creek	1254·0	1-44′ thro. pl. gr.	Canadian Bridge Co.	53,755	4·50	5,976	52 00	2,729 73	2,729 73	100
Kenogami River	1254·1	4-65′; 1-30′ dk. pl. gr. 2-125′ dk. truss and 1-30′ tower.	"	945,057	4·55	69,764	52 00	46,627 74	46,627 74	100
Decaire Creek	1267·3	1-33′ thro. pl. gr.	"	34,518	5·12	4,612	52 00	2,007 14	2,007 14	100
Rabbit Creek	1274·1	1-90′ dk. pl. gr.	"	120,575	4·75	13,036	52 00	6,405 18	6,405 18	100
Beaver Creek	1285·2	1-40′ dk. pl. gr.	"	32,409	4·89	5,706	52 00	1,881 51	1,881 50	100
Twin River	1294·3	1-100′ dk. pl. gr.	"	146,875	4·75	14,312	52 00	7,720 78	7,720 78	100
McDonald Crk. E. Br.	1297·4	1-66′ thro. pl. gr.	"	98,313	4·95	8,256	52 00	5,295 80	5,295 81	100
McDonald Crk. W. Br.	1298·8	1-40′ dk. pl. gr.	"	32,299	4·89	5,706	52 00	1,876 13	1,876 13	100
Kawashkagama River	1317·0	2-30′ dk. pl. gr. & 1-160′ thro. truss	"	468,825	5·18	28,066	52 00	25,744 57	25,744 57	100
Trout Creek	1318·0	1-44′ thro. pl. gr.	"	53,232	5·10	5,752	52 00	3,013 94	3,013 94	100
Johnson Creek	1323·0	1-77′ thro. pl. gr.	"	120,349	4·95	9,284	52 00	6,440 05	6,440 03	100
Emilie Creek	1345·1	1-44′ thro. pl. gr.	Canada Foundry Co.	53,676	4·60	5,824	54 00	2,783 59	2,783 59	100
Spruce Creek	1349·6	1-55′ thro. pl. gr.	"	71,570	4·60	7,186	54 00	3,680 26	3,680 27	100
Ombabika River	1356·3	1-66′ thro. pl. gr.	"	101,039	4·60	8,262	54 00	5,093 94	5,126 31	100
Jackfish River	1379·8	1-100′; 6-60′; 5-40′ dk. pl. gr.; 5-40′ towers & 1 rocker bent	"	1,103,330	4·55	88,292	54 00	54,969 28	54,382 27	100
Mud River	1388·5	1-90′; 3-60′; 3-30′ dk. pl. gr. & 3-30′ towers	"	494,419	4·60	48,200	54 00	25,346 07	25,542 48	100
Rapid Creek	1397·2	1-55′ thro. pl. gr.	"	73,120	4·60	7,186	54 00	3,751 56	3,751 56	100
White Sand River	1404·1	1-99′ thro. pl. gr.	"	197,598	4·60	12,320	54 00	9,754 79	9,754 79	100

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued*,

DISTRICT "F"

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1915.	Percentage of work completed.
					cts.	F.b.m.	$ cts.	$ cts.	$ cts.	
Lookout River	1447·8	1-99′ thro. pl gr.	Canada Foundry Co.	184,000	4·80	13,160	54 00	9,539 40	9,952 70	100
Allan Water	1467·4	1-150′ thro. truss	"	370,000	4 90	19,600	54 00	19,188 40	18,867 82	100
Sturgeon R. M. 94	1521·3	1-220′ thro. truss	Canadian Bridge Co.	734,322	4·67	29,940	50 00	35,789 84	35,789 84	100
Sturgeon R. M. 119·5	1546·9	3 D. T. skewed thro. truss	"	2,313,234	4·67	98,543	50 00	112,955 18	112,955 18	100
Sioux Lookout River	1553·8	1-88′ thro. pl. gr. & 1-175′ thro. truss	"	675,429	4 67	35,470	50 00	33,316 03	33,346 19	100
1st Xing, E ith Creek	1587 8	1-24′ 4″ o to o dk. pl. gr	Canada Foundry Co.	15,224	5 07	5,700	48 00	1,045 46	1,045 46	100
2nd Xing, Edith Creek	1588·2	1-24′ 4″ o to o dk. pl. gr	"	15,224	5 07	5,700	48 00	1,045 46	1,045 46	100
Wabigoon River	1626·8	2-40′ & 1-93′ o to dk. pl. gr.	Canadian Bridge Co.	182,832	5·70	27,100	50 00	11,776 42	11,776 42	100
Creek Xing, M. 108	1,662·8	1-20′4″ o to o thro. pl. gr.	Canada Foundry Co.	20,016	4·90	4,720	48·00	1,207 34	1,207 34	100
Creek Xing, M. 118·25	1,673·1	1-20′4″ o to o thro pl. gr.	" "	20,016	4·90	4,720	48·00	1,207 34	1,207 34	100
Macfarlane River	1,684·3	1-100′ dk. pl. gr	" "	147,384	4 70	16,310	48·00	7,709 93	7,709 93	100
Winnipeg River	1,689·6	1-100′ dk. pl. gr	Canada Bridge Co.	146,450	4·70	58,869	50·00	93,822 21	93,822 21	100
		1-300′ thro. truss		1,196,103	6·90					
Creek Xing, M. 158 75	1,713·6	1-20′ 4″ o to o thro. pl. gr.	Canada Foundry Co.	20,016	4·90	4,720	48·00	1,207 34	1,207 34	100
Over Xing, C.P.R.	1,736·0	2-50′ dk. pl. gr. and 1-78′ thro. pl. gr.	Canadian Bridge Co.	228,390	5·70	26,636	50·00	14,350 03	14,350 03	100
Whitemouth River	1,748·9	2-90′ dk. pl. gr.	" "	231,474	5·70	27,812	50·00	14,584 62	14,584 62	100
Brokenhead River, East Branch	1,763·9	1-89′ 10″ o to o thro. pl. gr.	" "	173,989	5·70	12,603	50·00	10,547 52	10,547 52	100
Brokenhead River, West Branch	1,770·5	1-59′ 10″ o to o thro. pl. gr.	" "	98,562	5·70	9,250	50·00	6,077 11	6,077 11	100
Over Xing, Poulin Str.	1,802 4	1-55′ D.T. dk. pl. gr.	" "	176,139	4·40	56′ concrete at $23 per lin. ft.		9,038 11	9,038 11	100
		Waterproofing	C. M. R. Co.			1539·625 sq. ft. at 8 cents			123 17	
		Downspouts, &c	Jackson & Goldie						66 31	
Over Xing, Russell St.	1,802 6	1-55′ D.T. Dk. pl. gr.	Canadian Bridge Co.	141,055	4 40	56′ concrete at $23 per lin. ft.		7,471 42	7,471 42	100
		Waterproofing	C. M. R. Co			1,539·625 sq. ft. at 8 cents			123 17	
		Downspouts, &c	Jackson & Goldie						73 66	

STATEMENT showing Approximate Cost of Steel Bridges and Gross Amounts Paid on Contracts to March 31, 1915—*Continued.*

DISTRICT "F"—*Concluded.*

Name.	Through Mileage.	Number and Description of Spans.	Contractor.	Estimated Weight of steel in pounds.	Rate per lb.	Timber	Rate per M ft. b.m.	Total estimated cost of superstructure.	Paid to March 31, 1914.	Percentage of work completed.
					cts.	Ft.b.m.	$ cts.	$ cts.	$ cts.	
Over Xing, C.P.R. and Bickerton Street	1,802·9	1-100′ D.T. Pony truss, 4-31′ 9″; 1-67′ D.T. dk. pl. gr. and 2-31′ 9″ towers	Canadian Bridge Co.	918,462	4·60	52,908	52 00	46,549 06	46,549 06	100
						67·33′ concrete at $23 per l.n. ft.				
		Waterproofing	C. M. R. Co.			1,866·625 sq. ft. at 8 cents			149 32	
Over Xing, Archibald Street	1,802·9	Downspouts, &c	Jackson & Goldie						95 09	
		1-81′ D.T. dk. pl. gr	Canadian Bridge Co.	246,506	4·40	82·5′ concrete at $23 per lin. ft.		12,743 76	12,743 76	100
		2-50′ D.T. dk. pl. gr	" "	188,876	4·65	21,312	50 00	9,848 33	9,848 33	100
		Waterproofing	C. M. R. Co.			2,248·125 sq. ft. at 8 cents			179 85	
		Downspouts, &c	Jackson & Goldie						107 17	
Seine River	1,803·2	1-100′; 4-50′ and 2-30′ dk. pl. gr. and 2-30′ Towers	Canadian Bridge Co.	819,178	4·45	75,891	52 00	41,219 09	41,219 09	100
Over Xing, Highway	1803·2	4-71′ 8″ D.T. dk. pl. gr	C.B. & E. Co.	161,173	4·50	15,912	40 00	8,317 22	8,317 22	100
Over Xing, C. N. R.	1803·6	Viaduct	" "	702,446	4·50	62,424	40 00	34,107 03	34,107 03	100
Over Xing, St. Joseph	1804·0	4-71′ D.T. dk. pl. gr	Canadian Bridge Co.	192,205	4·40	72·5 concrete at $23 per l. ft.		10,124 52	10,124 52	100
		Water proofing	C. M. R. Co.			1,927 sq. ft. at 8 cents			158 96	
		Downspouts, etc	Jackson & Goldie						96 38	
Over Xing, Tache Ave	1804·2	1-71′ 4″ D.T. dk. pl. gr	Dominion Bridge Co.	215,261	4·70	Concrete, 81,087.50		9,256 22	9,256 22	100
		Waterproofing	C. M. R. Co.			1,987 sq. ft. at 8 cents			158 96	
		Downspouts	Jackson & Goldie						84 77	
Over Xing C. N. R. Red River Bridge	1804·2 1804·5	1-55′ 4″ D.T. thro. pl. gr. 4-150′ D.T. thro. truss. 1 lift span and viaduct. Electrical equipment $23,383 06	Dominion Bridge Co.	6,272,005	4·70	177,088	35 00	301,613 38	301,015 38	100
				99,401	11·00					
		Waterproofing crossings over Notre Dame Ave., Water St. and Mill St.	H. W. Sanderson			9,633 sq. ft. at 7 cents			674 31	

OTTAWA, ONT., September 20th, 1915

W. S. LAWSON, *Acting Bridge Engineer.*

SESSIONAL PAPER No. 37

STATEMENT OF ACCOUNTANT.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

CHEQUES ISSUED.

Year.	Contracts.	Accounts Payable.	Pay Rolls.
1914.	$ cts.	$ cts.	$ cts.
April		6,584 80	9,668 78
May	227,874 72	376,375 38	46,880 72
June	299,853 36	166,999 33	46,838 24
July	724,273 33	215,110 40	49,081 51
August	688,756 00	368,744 56	47,287 32
September	682,181 16	267,117 85	41,800 96
October	640,856 34	165,489 42	39,692 93
November	339,073 63	429,633 11	35,058 63
December	259,191 50	249,757 69	25,943 10
1315.			
January	158,597 93	91,039 55	21,586 37
February	184,786 03	454,459 14	21,193 05
March	330,448 54	935,987 82	20,224 99
April	886,682 75	286,930 88	7,451 70
	5,522,575 29	4,014,229 93	412,708 30

SUMMARY.

Cheques issued for Contracts			$5,522,575 29
" " Accounts Payable			4,014,229 93
" " Pay Rolls			412,708 30
Gross Expenditure for fiscal year 1914-15			$9,949,513 52
Less amount deposited to credit of Receiver General			117,206 27†
Total Cash Expenditure for fiscal year 1914-15			$9,832,307 25
Adjustments with the Department of Railways and Canals covering the following items, viz:—			
Debits—Year 1903-04	$ 6,249 40		
" 1904-05	127 65		
" 1905-06	10,006 45		
		$16,383 50	
Credits—Year 1909-10	$ 350 30		
" 1913-14	13,593 70		
		13,944 00	
			2,439 50‡
			$9,834,746 75

† This amount is made up from receipts of account on sales of old material, rent of buildings, etc., etc.

‡ This is the difference between certain debits and credits which were taken direct into the books of the Department of Railways and Canals, and are now adjusted with the books of the Commissioners of the Transcontinental Railway.

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

Headquarters	$ 169,997 33
District "A"—Construction	23,477 33
" "B"— "	5,597,607 86
" "C"— "	763,013 54
" "D"— "	993,642 04
" "E"— "	1,590,971 90
" "F"— "	696,036 75
Total	$ 9,834,746 75

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

HEADQUARTERS.

	Dr.	Cr.
Accounting Department	$ 11,223 34	
Purchasing Department	12,222 81	
Commissioners' Department	5,499 98	
Engineering Department	62,829 77	
Interim Account	13,000 00	
Supplies and stationery	845 16	
Furniture and fixtures	.....	$ 190 30
Freight and express	304 35	
Telegraph and telephone	1,996 16	
Rent and taxes	9,245 80	
Insurance	337 04	
Travelling expenses	5,363 53	
Advance account	.....	2,000 00
Right of way and station grounds	2,065 95	
General expenses	17,890 37	
Legal expenses	19,139 19	
Stock account	9,351 60	
Per diem charges	0 95	
Outstanding wages ($16.35) and accounts payable ($59.05)	.....	75 40
Car "Empire"	640 09	
Car "Transcona"	306 94	
	$ 172,263 03	$ 2,265 70
Less credit	2,265 70	
Total	$ 169,997 33	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

DISTRICT "A."

	Dr.	Cr.
General expenses	$ 99 95	
Engineering	.....	$ 3,139 22
Insurance	460 27	
Ties	.....	3,302 35
Tracklaying and surfacing	97 60	
Telegraph lines	124 92	
Ballast and ballasting	1,486 42	
Rails	.....	2,109 47
Track fastenings	37 37	
Frogs and switches	219 00	
Right of way and station grounds	29,324 40	
Station buildings and fixtures	605 33	
Shops, roundhouses and turntables	1,972 40	
Shop machinery and tools	8,582 35	
Bridges, trestles and culverts	453 58	
Revenue during construction	.....	203 19
Contract reserve	2,361 67	
	$ 45,825 26	$ 8,754 23
Less credit	8,754 23	
	$ 37,071 03	
Less credit to cost of operation, District "A"	13,593 70	
Total	$ 23,477 33	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

DISTRICT "B."

	Dr.	Cr.
Supplies	$ 9,429 65	
Camp outfit	.....	$ 72 58
General expenses	29,264 23	
Freight and express	3,039 87	
Engineering	83,130 23	
Insurance	2,774 31	
St. Malo line	39,914 55	
Grading	1,267,065 03	
Clearing	12,060 68	
Grubbing	2,656 61	
Overhaul	68,865 48	
Ties	39,787 65	
Tracklaying and surfacing	38,693 22	
Fencing right of way	27,473 70	
Crossings, cattle-guards and signs	32,095 10	
Tunnels	4,655 13	
Telegraph lines	30,787 26	
Interlocking and signals	3,170 00	
Ballast and ballasting	96,474 08	
Water stations	100,398 41	
Rails	34,370 08	
Track fastenings	4,743 04	
Frogs and switches	9,185 09	
Right of way and station grounds	34,137 08	
Station buildings and fixtures	151,322 70	
Miscellaneous structures	587 35	
Shops, roundhouses and turntables	117,086 07	
Shop machinery and tools	57,987 33	
Fuel stations	93,355 47	
Yards and terminals	216,493 84	
Joint terminals in Quebec	176,227 91	
Floating equipment	140,024 71	
Docks and wharves	41,955 77	
Bridges, trestles and culverts	351,967 43	
Revenue during construction	.....	6,088 81
Operation	8,500 00	
Time cheques	19 35	
Contract reserve	327,049 43	
Quebec Bridge approaches	832,845 81	
Furniture	.....	416 84
Leonard shops	800,322 01	
Re-tieing and replacement	307,113 48	
Car ferry *Leonard* expenses	7,156 95	
	$ 5,604,186 09	$ 6,578 23
Less credit	6,578 23	
Total	$ 5,597,607 86	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

DISTRICT "C."

	Dr.	Cr.
Supplies	$ 3,753 66	
Camp outfit	.....	$ 69 50
General expenses	4,476 70	
Freight and express	1,394 72	
Engineering	23,521 25	
Insurance	194 27	
Grading	235,211 55	
Clearing	3,004 20	
Grubbing	.....	47 60
Overhaul	10,340 35	
Ties	.....	6,244 88
Tracklaying and surfacing	1,329 40	
Crossings, cattle-guards and signs	2,580 00	
Telegraph lines	1,295 30	
Ballast and ballasting	49,034 03	
Water stations	609 12	
Rails	21,085 34	
Track fastenings	3,548 41	
Frogs and switches	432 40	
Station buildings and fixtures	55,110 28	
Shops, roundhouses and turntables	31,206 28	
Shop machinery and tools	10,224 45	
Fuel stations	31,558 66	
Yards and terminals	14 05	
Bridges, trestles and culverts	178,904 71	
Operation	16,794 75	
Time cheques	60 00	
Contract reserve	83,691 64	
	$ 769,375 52	$ 6,361 98
Less credit	6,361 98	
Total	$ 763,013 54	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

DISTRICT "D."

	Dr.	Cr.
Supplies	$ 5,011 86	
Camp outfit	.....	$ 18 45
General expenses	15,758 52	
Freight and express	2,584 96	
Engineering	33,455 17	
Insurance	471 58	
Grading	545,578 82	
Clearing	2,662 11	
Grubbing	1,175 10	
Overhaul	54,436 35	
Ties	12,279 25	
Tracklaying and surfacing	3,831 02	
Crossings, cattle-guards and signs	840 00	
Telegraph lines	8,015 13	
Ballast and ballasting	65,062 47	
Water stations	15,010 41	
Rails	.....	1,209 85
Track fastenings	....	5,595 17
Frogs and switches	.....	291 40
Right of way and station grounds	28 19	
Station buildings and fixtures	35,130 11	
Miscellaneous structures	2,725 00	
Shops, roundhouses and turntables	14,285 39	
Shop machinery and tools	7,650 01	
Fuel stations	1,570 83	
Yards and terminals	.....	668 66
Bridges, trestles and culverts	56,561 05	
Revenue during construction	.....	381 75
Operation	61,954 49	
Time cheques	11 95	
Contract reserve	50,974 14	
Furniture	.....	46 00
Re-tieing and replacement	4,789 41	
	$1,001,853 32	$ 8,211 28
Less credit	8,211 28	
Total	$ 993,642 04	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915

DISTRICT "E."

	Dr.	Cr.
Supplies	$ 5,725 04	
General expenses	4,723 03	
Freight and express	1,145 08	
Engineering	34,566 26	
Insurance	1,976 44	
Grading	806,381 29	
Clearing	4,142 75	
Grubbing	957 93	
Overhaul	13,246 85	
Ties	35,292 93	
Tracklaying and surfacing	5,229 75	
Crossings, cattle-guards and signs	1,236 00	
Telegraph lines	23,654 52	
Ballast and ballasting	123,634 23	
Water stations	68,226 36	
Rails	53,415 71	
Track fastenings	5,104 67	
Frogs and switches	598 88	
Station buildings and fixtures	28,256 25	
Miscellaneous structures	1,276 00	
Shops, roundhouses and turntables	34,347 26	
Shop machinery and tools	24,215 08	
Fuel stations	665 90	
Yards and terminals	6,888 90	
Bridges, trestles and culverts	47,425 37	
Revenue during construction	.....	$ 178 12
Time cheques	174 04	
Contract reserve	258,643 50	
	$ 1,591,150 02	$ 178 12
Less credit	178 12	
Total	$ 1,590,971 90	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure for the fiscal year ended March 31, 1915.

DISTRICT "F."

	Dr.	Cr.
Legal expenses	$ 136 65	
Supplies	788 07	
General expenses	11,133 15	
Freight and express	.....	$ 1,127 73
Engineering	16,050 69	
Insurance	8,275 66	
Grading	.....	13,544 67
Clearing	.....	1,325 00
Grubbing	.....	91 12
Overhaul	3,306 19	
Ties	.....	21,703 40
Tracklaying and surfacing	.....	262 98
Fencing right of way	.....	2,100 00
Crossings, cattle-guards and signs	.....	26 00
Tunnels	.....	482 49
Telegraph lines	.....	50 00
Interlocking and signals	6,700 00	
Ballast and ballasting	31,428 49	
Water stations	.....	17,056 27
Rails	1,494 02	
Track fastenings	6,782 83	
Frogs and switches	.....	344 28
Right of way and station grounds	242,001 02	
Station buildings and fixtures	.....	31,650 70
Miscellaneous structures	7,535 98	
Shops, roundhouses and turntables	161,624 65	
Shop machinery and tools	42,554 92	
Fuel stations	19,372 70	
Yards and terminals	251 71	
Bridges, trestles and culverts	28,043 60	
Operation	332 28	
Time cheques	366 20	
Contract reserve	160,274 12	
Furniture	.....	101 88
Rent, Winnipeg terminals	24,062 50	
Interest, Winnipeg terminals	13,387 84	
	$ 785,903 27	$ 89,866 52
Less credit	89,866 52	
Total	$ 696,036 75	

E. L. PARENT,
Accountant.

STATEMENT of Liabilities on March 31, 1915.

Ten per cent reserved on contracts:—		
District "A"	$ 12,469 14	
" "B"	149,720 51	
" "C"	139,522 52	
" "D"	38,488 09	
" "E"	82,155 19	
" "F"	50,121 37	
		$ 472,476 82
Outstanding time cheques		509 01
Outstanding wages and accounts payable		271 88
Total		$ 473,257 71

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

CHEQUES ISSUED.

	Contracts.	Accounts payable.	Pay rolls.
	$ cts.	$ cts.	$ cts.
Year 1904-05		385,445 79	428,225 66
" 1905-06	51,239 08	714,771 65	761,942 45
" 1906-07	3,993,640 06	954,692 38	646,924 55
" 1907-08	15,637,591 05	2,346,786 77	1,002,535 82
" 1908-09	21,129,957 36	2,627,644 48	1,215,423 52
" 1909-10	16,694,267 68	2,174,880 67	1,202,445 12
" 1910-11	18,678,176 31	3,700,007 96	1,187,151 09
" 1911-12	15,115,638 77	5,031,187 29	1,059,630 64
" 1912-13	10,679,342 09	2,210,270 41	924,777 13
" 1913-14	8,083,579 13	4,065,374 73	676,766 87
" 1914-15	5,522,575 29	4,030,613 43	412,708 30
Total	115,586,006 82	28,241,675 56	9,518,531 15

SUMMARY.

Cheques issued for contracts	$115,586,006 82
" " accounts payable	28,241,675 56
" " pay rolls	9,518,531 15
	$153,346,213 53
Less amount deposited to credit of Receiver General	918,248 70
	$152,427,964 83
Special item paid by the Finance Department in 1905, for surveys made by the Grand Trunk Pacific Railway Company, east of Winnipeg	352,191 73
	$152,780,156 56
Cost of operation, District "A," for the year 1912-13	22,589 21
Total	$152,802,745 77

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

From September, 1904, to June 30, 1905 (including amount paid by the Finance Department to the Grand Trunk Pacific Railway Company, for surveys, east of Winnipeg, taken over by the Commissioners, viz., $352,191.73)	$ 1,130,555 36
For the year ended June 30, 1906	1,479,071 77
For the nine months ended March 31, 1907	5,537,867 50
For the year ended March 31, 1908	18,910,449 41
" " " March 31, 1909	24,892,772 98
" " " March 31, 1910	19,968,126 86
" " " March 31, 1911	23,487,853 73
" " " March 31, 1912	21,110,993 90
" " " March 31, 1913	13,729,461 44
" " " March 31, 1914	12,684,663 16
" " " March 31, 1915	9,818,340 45
	$152,780,156 56
Cost of operation, District "A," for the year 1912-13	22,589 21
Total	$152,802,745 77

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

Headquarters		$ 1,986,944 52
Location—District "A"	$ 304,367 85	
" " "B"	569,488 50	
" " "C"	529,261 81	
" " "D"	446,018 32	
" " "E"	257,543 94	
" " "F"	836,648 43	
		2,943,328 85
Construction—District "A"	$ 17,855,382 22	
" " "B"	53,302,694 64	
" " "C"	7,030,039 71	
" " "D"	17,329,669 60	
" " "E"	11,512,972 35	
" " "F"	39,788,223 26	
		146,818,981 78
Transport—District "B"	92,898 10	
" " "C"	330,642 92	
" " "D"	294,163 01	
" " "E"	213,935 89	
" " "F"	99,461 49	
		1,030,901 41
		$152,780,156 56
Cost of operation, District "A," for the year 1912-13		22,589 21
Total		$152,802,745 77

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

HEADQUARTERS.

	DR.	CR.
Commissioners' department	$ 222,105 60	
Accounting department	177,760 40	
Engineering department	567,208 56	
Purchasing department	121,274 81	
Car *Empire*	38,779 39	
Car *Transcona*	23,246 52	
Supplies and stationery	50,215 81	
Furniture	24,700 85	
Freight and express	14,844 28	
Telegraph and telephone	28,681 15	
Rent and taxes	115,288 40	
Insurance	18,073 39	
Travelling expenses	57,034 33	
General expenses	423,252 79	
Right-of-way and station grounds	15,880 33	
Outstanding wages and accounts payable	.....	$271 88
Legal expenses	69,773 30	
Transport	6,482 15	
Medical service	6,613 39	
Per diem charges	95	
Interim account	6,000 00	
	$1,987,216 40	$271 88
Less credit	271 88	
Total	$1,986,944 52	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

DISTRICT "A."

	Dr.	Cr.
Legal expenses	$ 2,421 84	
Supplies	122,816 07	
Camp outfit	10,517 59	
General expenses	215,531 01	
Freight and express	11,814 46	
Medical service	804 03	
Engineering	1,004,483 75	
Insurance	6,284 65	
Grading	7,585,612 26	
Clearing	158,641 83	
Grubbing	100,186 90	
Overhaul	659,809 84	
Ties	474,132 58	
Track laying and surfacing	165,843 86	
Fencing right-of-way	130,331 78	
Crossings, cattle-guards and signs	24,566 62	
Tunnels	51,150 71	
Telegraph lines	74,836 65	
Interlocking and signals	21,272 25	
Ballast and ballasting	532,233 78	
Water stations	167,319 79	
Rails	1,490,691 70	
Track fastenings	226,927 60	
Frogs and switches	37,649 29	
Right of way and station grounds	571,037 26	
Station buildings and fixtures	181,889 52	
Miscellaneous structures	33,679 97	
Shops, roundhouses and turntables	280,256 95	
Shop machinery and tools	98,755 17	
Fuel stations	61,057 44	
Yards and terminals	92,765 34	
Bridges, trestles and culverts	3,573,845 37	
Revenue during construction	.....	$ 406 38
Contract reserve	.....	12,469 14
Furniture	3,457 73	
	$18,172,625 59	$12,875 52
Less credit	12,875 52	
	$18,159,750 07	
Cost of operation for the year 1912-13	22,589 21	
Total	$18,182,339 28	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

DISTRICT "B."

	DR.	CR.
Legal expenses	$ 688 53	
Supplies	339,368 68	
Camp outfit	50,318 54	
General expenses	403,379 40	
Freight and express	54,186 29	
Medical service	2,434 06	
Engineering	2,111,436 71	
Insurance	4,615 81	
Transport	92,698 10	
Grading	25,781,387 03	
Clearing	412,114 89	
Grubbing	124,308 89	
Overhaul	731,480 91	
Ties	1,164,971 57	
Track laying and surfacing	550,613 51	
Fencing right-of-way	240,615 73	
Crossings, cattle-guards and signs	71,680 39	
Tunnels	74,670 38	
Telegraph lines	146,004 22	
Interlocking and signals	30,842 55	
Ballast and ballasting	952,394 27	
Water stations	360,641 36	
Rails	3,452,849 00	
Track fastenings	566,863 71	
Frogs and switches	89,848 56	
Right of way and station grounds	1,184,499 62	
Station buildings and fixtures	592,002 49	
Miscellaneous structures	69,230 18	
Shops, roundhouses and turntables	520,020 85	
Shop machinery and tools	151,951 13	
Fuel stations	95,190 07	
Yards and terminals	1,949,812 99	
Joint terminals in Quebec	377,650 36	
Floating equipment	596,258 75	
Docks and wharves	287,529 49	
Bridges, trestles and culverts	7,975,569 40	
Revenue during construction	.....	$ 8,750 93
Operation	42,500 00	
Time cheques	.....	81 10
Contract reserve	.....	149,720 51
Furniture	13,354 91	
Re-tieing and replacement	307,113 48	
Leonard shops	1,270,419 66	
St. Malo line	39,914 55	
Quebec bridge approaches	832,845 81	
Car ferry "Leonard" expenses	7,156 95	
	$54,123,433 78	$158,552 54
Less credit	158,552 54	
Total	$53,964,881 24	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

DISTRICT "C."

	DR.	CR.
Legal expenses	$ 291 73	
Supplies	140,856 12	
Camp outfit	30,649 43	
General expenses	57,427 71	
Freight and express	17,626 24	
Medical service	3,351 71	
Engineering	903,722 57	
Insurance	657 81	
Transport	330,642 92	
Grading	2,829,481 07	
Clearing	175,889 50	
Grubbing	103,991 96	
Overhaul	142,983 43	
Ties	247,638 92	
Track laying and surfacing	107,416 05	
Crossings, cattle-guards and signs	2,580 00	
Telegraph lines	38,324 45	
Ballast and ballasting	187,939 14	
Water stations	37,006 67	
Rails	458,787 60	
Track fastenings	60,817 78	
Frogs and switches	6,845 42	
Station buildings and fixtures	135,098 52	
Miscellaneous structures	22,717 84	
Shops, roundhouses and turntables	88,210 37	
Shop machinery and tools	11,286 03	
Fuel stations	33,546 29	
Yards and terminals	1,104 44	
Bridges, trestles and culverts	1,834,549 43	
Operation	16,794 75	
Time cheques	.....	$ 19 57
Contract reserve	.....	139,522 52
Furniture	1,250 63	
	$8,029,486 53	$139,542 09
Less credit	139,542 09	
Total	$7,889,944 44	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

DISTRICT "D."

	DR.	CR.
Legal expenses	$ 87 50	
Supplies	186,892 07	
Camp outfit	40,303 79	
General expenses	197,050 68	
Freight and express	26,904 30	
Medical service	6,405 74	
Engineering	1,135,901 42	
Insurance	4,967 30	
Transport	294,163 01	
Grading	7,066,656 97	
Clearing	323,374 20	
Grubbing	239,487 15	
Overhaul	364,889 08	
Ties	641,057 21	
Track laying and surfacing	181,794 87	
Crossings, cattle-guards and signs	2,300 75	
Tunnels	4,985 13	
Telegraph lines	75,157 67	
Interlocking and signals	2,969 97	
Ballast and ballasting	563,082 64	
Water stations	101,561 52	
Rails	2,119,952 75	
Track fastenings	323,440 58	
Frogs and switches	46,012 76	
Right-of-way and station grounds	4,811 57	
Station buildings and fixtures	257,790 63	
Miscellaneous structures	46,253 17	
Shops, roundhouses and turntables	219,785 02	
Shop machinery and tools	57,191 71	
Fuel stations	55,982 26	
Yards and terminals	66,499 54	
Bridges, trestles and culverts	3,291,401 51	
Revenue during construction	.....	$ 706 52
Operation	152,282 36	
Time cheques	.....	115 72
Contract reserve	.....	38,488 09
Furniture	2,975 02	
Re-tieing and replacement	4,789 41	
	$18,109,161 26	$39,310 33
Less credit	39,310 33	
Total	$18,069,850 93	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1901, to March 31, 1915.

DISTRICT "E."

	DR.	CR.
Supplies	$ 97,649 04	
Camp outfit	14,092 12	
General expenses	71,687 67	
Freight and express	16,054 07	
Medical service	2,629 31	
Engineering	662,111 25	
Insurance	3,355 02	
Transport	213,935 89	
Grading	5,657,794 91	
Clearing	221,555 91	
Grubbing	154,657 01	
Overhaul	126,806 48	
Ties	429,824 44	
Track laying and surfacing	129,374 65	
Crossings, cattle-guards and signs	1,236 00	
Tunnels	2,094 00	
Telegraph lines	44,529 36	
Ballast and ballasting	391,618 69	
Water stations	155,767 97	
Rails	1,108,510 29	
Track fastenings	151,882 33	
Frogs and switches	19,427 82	
Right-of-way and station grounds	345 11	
Station buildings and fixtures	216,716 47	
Miscellaneous structures	56,203 41	
Shops, roundhouses and turntables	213,586 66	
Shop machinery and tools	44,895 62	
Fuel stations	40,872 30	
Yards and terminals	9,070 39	
Bridges, trestles and culverts	1,798,322 26	
Revenue during construction	.....	$ 272 47
Operation	9,613 39	
Time cheques	.....	88 62
Contract reserve	.....	82,155 19
Furniture	748 62	
	$12,066,968 46	$82,516 28
Less credit	82,516 28	
Total	$11,984,452 18	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

DISTRICT "F."

	DR.	CR.
Legal expenses	$ 2,170 93	
Supplies	324,038 64	
Camp outfit	30,689 95	
General expenses	315,520 80	
Freight and express	41,725 97	
Medical service	2,827 02	
Engineering	1,615,097 61	
Insurance	23,115 51	
Transport	99,461 49	
Grading	20,780,894 82	
Clearing	357,459 96	
Grubbing	71,350 77	
Overhaul	529,490 87	
Ties	1,007,364 63	
Track laying and surfacing	265,129 63	
Fencing right-of-way	41,348 74	
Crossings, cattle-guards and signs	3,821 94	
Tunnels	195,190 97	
Telegraph lines	103,007 63	
Interlocking and signals	20,892 03	
Ballast and ballasting	704,059 44	
Water stations	348,272 79	
Rails	2,486,596 74	
Track fastenings	415,783 87	
Frogs and switches	88,163 39	
Right-of-way and station grounds	1,158,755 40	
Station buildings and fixtures	304,816 85	
Miscellaneous structures	127,734 30	
Shops, roundhouses and turntables	3,457,484 84	
Shop machinery and tools	1,306,369 75	
Fuel stations	87,793 73	
Yards and terminals	227,977 37	
Bridges, trestles and culverts	3,503,137 16	
Operation	15,419 06	
Time cheques	.....	$ 204 00
Contract reserve	.....	50,121 37
Furniture	2,946 08	
Rent, Winnipeg terminals	216,562 50	
Interest, Winnipeg terminals	139,993 64	
	$40,422,466 82	$50,325 37
Less credit	50,325 37	
Total	$40,372,141 45	

E. L. PARENT,
Accountant.

STATEMENT of Expenditure from September, 1904, to March 31, 1915.

RECAPITULATION.

	Dr.	Cr.
Legal expenses	$ 5,660 53	
Supplies	1,211,620 02	
Camp outfit	176,571 42	
General expenses	1,260,597 27	
Freight and express	168,311 33	
Medical service	18,451 87	
Engineering	7,432,753 31	
Special item paid in year 1905 by Finance Department, for surveys made by the Grand Trunk Pacific Railway Company, east of Winnipeg	352,191 73	
Insurance	42,996 10	
Grading	69,701,827 06	
Clearing	1,649,036 29	
Grubbing	793,982 68	
Overhaul	2,555,460 61	
Ties	3,964,989 35	
Track laying and surfacing	1,400,172 57	
Fencing right-of-way	412,296 25	
Crossings, cattle-guards and signs	106,185 70	
Tunnels	328,091 19	
Telegraph lines	481,859 98	
Interlocking and signals	75,976 80	
Ballast and ballasting	3,331,327 96	
Water stations	1,170,570 10	
Rails	11,117,388 08	
Track fastenings	1,745,715 87	
Frogs and switches	287,947 24	
Right-of-way and station grounds	2,919,448 96	
Station buildings and fixtures	1,688,314 48	
Miscellaneous structures	355,818 87	
Shops, roundhouses and turntables	4,779,344 69	
Shop machinery and tools	1,670,449 41	
Fuel stations	374,442 09	
Yards and terminals	2,347,230 07	
Joint terminals in Quebec	377,650 36	
Floating equipment	596,258 75	
Docks and wharves	287,529 49	
Bridges, trestles and culverts	21,976,825 13	
Revenue during construction	.....	$10,136 30
Operation	236,609 56	
Time cheques	.....	509 01
Furniture	24,732 99	
Re-tieing and replacement	311,902 89	
Leonard shops	1,270,419 66	
St. Malo Line	39,914 55	
Quebec bridge approaches	832,845 81	
Car ferry "Leonard" expenses	7,156 95	
Rent, Winnipeg terminals	216,562 50	
Interest, Winnipeg terminals	139,993 64	
	$150,245,432 76	$10,645 31
Less credit	10,645 31	
	$150,234,787 45	
Less contract reserve	472,476 82	
	$149,762,310 63	
Headquarters	1,986,944 52	
Transport	1,030,901 41	
	$152,780,156 56	
Cost of operation, District "A," for the year 1912-13.	22,589 21	
Total	**$152,802,745 77**	

E. L. PARENT,
Accountant.

REPORT

OF THE

DEPARTMENT OF THE NAVAL SERVICE

FOR THE

FISCAL YEAR ENDING MARCH 31, 1915

PRINTED BY ORDER OF PARLIAMENT.

PRINTED BY J. DE L. TACHÉ, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY
1915

[No. 38—1916]

To Field Marshal, His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and of Strathearn, K.G., K.T., K.P., etc., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR ROYAL HIGHNESS:

I have the honour to submit herewith for the information of Your Royal Highness and the Parliament of Canada, the fifth Annual Report of the Department of the Naval Service, being for the year ended March 31, 1915, except the Fisheries Branch, reported in a separate publication.

I have the honour to be,
Your Royal Highness's most obedient servant,

J. D. HAZEN,
Minister of the Naval Service.

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REPORT

OF THE

DEPARTMENT OF THE NAVAL SERVICE

FOR THE

FISCAL YEAR ENDING MARCH 31, 1915

OTTAWA, September 1, 1915.

Hon. J. D. HAZEN,
Minister of the Naval Service,
Ottawa.

SIR,—I have the honour to report on the Department of the Naval Service for the year ending March 31, 1915, under the following headings:—

1. Naval Service.
2. Fisheries Protection.
3. Survey of Tides and Currents.
4. Hydrographic Surveys.
5. Canadian Arctic Expedition.
6. Life Saving Service.
7. Radiotelegraphs.

1.—NAVAL SERVICE.

The cadets in the college and the midshipmen at sea, in both Canadian and Imperial ships, continue to be well reported upon and to give satisfaction to their superior officers.

Eight cadets were entered after the usual annual examination, in May 1914.

The four sub-Lieutenants have all been promoted to Lieutenants during the course of the fiscal year, and are serving in ships in the Royal Navy; as are the Engineer-Lieutenants with the exception of one who is in the Royal Canadian Naval College at Halifax. The activities and organization of the Naval Service have, owing to the outbreak of war, been much increased and expanded. The preparations previously made have been carried out and enlarged to meet the contingencies which have arisen.

The "*Niobe*" and "*Rainbow*" were placed in full commission, and placed at the disposal of the Admiralty, as were also the two submarines purchased, shortly before the outbreak of war, the sloop "*Shearwater*" being used as a parent ship for the latter by the permission of the Admiralty. A considerable

number of other vessels have also been commissioned and used for various subsidiary purposes. The dockyards at Esquimalt and Halifax have been used for work in connection with the repair and upkeep both of Canadian and imperial ships, and in obtaining and issuing supplies of stores of all descriptions to imperial vessels as well as meeting our own needs in this respect. The arrangements for the transport of stores and supplies to England have also been handled by this department to a large extent.

The department has acted as recruiting agent for the Admiralty and has been in close co-operation with the imperial naval authorities in all matters coming within its sphere of activities in relation to the state of hostilities.

The R.N.C.V.R. chiefly recruited at Esquimalt have been actively and usefully employed both ashore and afloat and have shewn, both officers and men, commendable zeal in the performance of their duties.

A Naval Intelligence Branch was established on the outbreak of war, which works in co-operation with the Admiralty.

Regulations have been passed providing special rates of pay for men enlisted for the period of the war and for the payment of separation allowance to the dependents of those serving in the Royal Canadian Navy.

NAVAL DOCKYARDS.

The work at the naval dockyards at Halifax and Esquimalt has increased materially during the year.

The nature of the work done is purely repairs, the only new work being boats of a small type.

In view however of the increased requirements of a naval character, since the outbreak of hostilities it has become absolutely necessary, in order to cope with the repair of vessels of the fleet, to consider certain additions to the workshop accommodation, additions to the shop machinery and also increased berthing accommodation and storage facilities.

With this object, plans and specifications were prepared for increasing the berthing accommodation at No. 4 wharf at Halifax. Tenders were called for and the necessary work is now in progress. An additional workshop is being erected for dealing with torpedo work and providing increased facilities for repair to boilers. An additional store has also been erected to accommodate the necessary victualling stores for the vessels in commission. Tenders have also been obtained for a 30-ton steam wharf crane for No. 4 wharf with a view of having available suitable lifting appliance for hoisting out damaged parts of warships, should the necessity arise.

At Esquimalt yard it has been found necessary to fit out an additional workshop to provide facilities for repairs to the machinery of the submarine boats, this being largely of a special nature. Other additions to the workshop machinery have also been made and a set of sheerlegs has been erected at the Dockyard wharf. Berthing accommodation at this yard is very limited, and negotiations are in progress with the Department of Militia and Defence with a view of utilizing the existing submarine mining station as a submarine depot.

Halifax is being used at the present time as the principal base for vessels of the North Atlantic fleet and the naval yard is being utilized to carry out the repairs of these vessels, which include "*Niobe*," this vessel being employed as one of the patrol vessels of this squadron.

Esquimalt dockyard is being similarly utilized on the Pacific coast, and the dockyard has carried out repairs to various vessels in the imperial fleet employed in these waters including *Rainbow*, *Newcastle* and also work on H.I.J.M.S. *Idzuma*.

In addition to the repairs to the vessels of the fighting fleet, the dockyards are carrying out the large number of small items of repairs needed to the various vessels now employed for auxiliary purposes for patrol and other defensive work of the Coasts.

Having regard to the facilities available, this work has been carried out satisfactorily. Considerable overtime has been necessary in order to expedite the completion of the repairs.

Subsidiary work in the nature of repairs and refits of the various vessels belonging to the different branches of the Naval Service have been undertaken during the year, and repairs of vessels of other departments of the Government have also been effected. Repairs to buildings and plant incidental to the upkeep of the establishment in accordance with conditions of transfer have also been completed.

The officers and staff of the dockyards have carried out their duties in a zealous and conscientious manner, which has enabled the urgent work necessary in these yards during the period of the war to be satisfactorily and expeditiously completed.

The undermentioned vessels have been under repair during the year:

HALIFAX.

General repairs.—H.M. Ships *Glory, Suffolk, Coronia, Princess Royal' Essex, Leviathan.* H.M.C. Ships *Niobe, Canada, Tuna* and *Margaret.*

Refits and repairs.—To C.G. Ships *Acadia, Constance, Petrel, Curlew, Speedy* and *Alfreeda.*

Minor repairs under repayment.—To *Premier, Sable I* and other trawlers, also the steamboats and motor-boats attached to port for service.

ESQUIMALT.

General repairs.—To H.M. ship *Newcastle,* also to H.M.C. ships *Rainbow, C.C.-1, C.C.-2, Shearwater* and Japanese Cruiser *Idzuma.*

Refits and repairs.—To C.G. ships *Malaspina, Galiano, Lillooett, Newington* and *Falcon.*

Minor repairs.—To other vessels attached to the port for naval service.

The report of the Director of the Naval Service on the Naval Branch is appended at page 61.

2.—FISHERIES PROTECTION.

The following vessels were employed in the districts named on Fisheries Protection Service from the time of commissioning until the outbreak of war, when those operating on the east and west coasts were ordered to Halifax and Esquimalt, respectively, for war service.

EAST COAST.

Canada, Curlew, Constance, Petrel, Gulnare.

GREAT LAKES.

Vigilant.

WEST COAST.

Malaspina, Restless, Newington, Galiano.

The fisheries protection vessels on the east coast are employed in patrolling the regions wherein the United States and French fishing fleets operate. As the law prohibits these fishing vessels from fishing within the three-mile limit, the greatest vigilance is required from the fisheries protection vessels. The vessels encountered very little illegal fishing. The fishing season was reported to be below the average.

The *Vigilant* was commissioned on April 17th to enforce the international regulations in Lake Erie. While on her official duties she was also used for the inspection of life saving stations, when convenient. 576 nets belonging to United States fishermen and used contrary to the law were seized during the season.

On the west coast, the fisheries protection vessels carried on patrol work until the outbreak of war, when they were sent to Esquimalt for war service. Several seizures of vessels for infractions of the law were made.

C.G.S. *Malaspina*, a new fisheries protection cruiser was put in commission late in 1914. C.G.S. *Galiano* a new fisheries protection cruiser of 700 tons, built by the Dublin Dockyard Company in Ireland, was added to the service during the season of 1915.

The fisheries protection vessels on several occasions rendered assistance to other ships.

The report of Vice-Admiral C. E. Kingsmill on the fisheries protection service is appended at page 63.

3.—SURVEY OF TIDES AND CURRENTS.

The survey of tides and currents of waters of the Dominion of Canada was begun in 1886. The object of the work undertaken is to assist in the navigation of waters where the irregularity of tides and currents renders navigation difficult. The work of this branch of the service consists in the prediction of tides and the scientific investigation of the currents of navigable waters. Tide stations are located at convenient places, where observations are taken. From these observations are predicted the variations of the tides for future years. The work of predicting tides is carried out scientifically by the Tidal and Current Survey staff, the stations being used to obtain the information necessary for the work. When sufficient observations have been taken at a particular station to enable the tides of the future to be accurately calculated without its further use the station is said to be established. By connecting up established stations along the coasts and rivers, the officers of this branch have succeeded in predicting the tides of a considerable portion of the navigable waters of Canada. The result of this work, published in the "Tide Tables," is of great value to mariners, as it enables them to know the exact time of high and low water in those regions where the rise and fall of the tide materially affect navigation.

This branch of the service has also investigated the principal currents of Canadian waters. The information obtained from these investigations enables mariners to contend with the difficulties resulting from currents, particularly in the British Columbia narrows, where they are most pronounced.

The work of the branch has been carried on throughout the past year in an efficient manner, several new tide stations having been established. On account of the importance of accurate information in connection with the tides of the Bay of Fundy, the tide station of St. John, N.B., which has been in operation since 1894, has been rebuilt.

Revised methods for the calculation of slack water have been devised and applied to actual operations in the British Columbia narrows. By means of the information supplied mariners are now able to know exactly the time when these narrows are navigable.

Much valuable information has been obtained from co-operation with other surveys. The department supplies instruments by which the members of such surveys are enabled to take observations, and obtain data which are utilized by this branch.

Observations in connection with the passes of British Columbia, particularly Sansum narrows, Dodd narrows and Porlier pass, have been carried on with most satisfactory results. The reduction of observations of the Gordon expeditions of 1884–5–6 in Hudson bay and strait have also been completed. Regular work has also been carried out in the St. Lawrence river and Gulf and in the Bay of Fundy.

Requests for information in connection with tide levels are yearly increasing. This information is found to be most useful to other departments in connection with their leveling operations.

Tidal observations and predictions are published in two sets, one for the eastern coast and one for the Pacific coast. The tide tables for the eastern coast are published in two editions, one for Quebec and the St. Lawrence and one for St. John and the Bay of Fundy.

A pocket edition of the Tide Tables is also published.

That the information therein contained is very useful to mariners and to the fishermen along the coast, is evident from the fact that 10,000 copies of the Pacific coast edition and 15,000 copies of the Eastern edition are required to supply the demand.

The report of Dr. W. Bell Dawson, Superintendent of Tidal and Current Surveys, is appended at page 69.

4.—HYDROGRAPHIC SURVEYS.

The work of this branch in charge of Mr. W. J. Stewart, C.E., Chief Hydrographer, was carried on successfully throughout the year, under the following divisions, viz.: 1, Hudson bay party; 2, Pacific coast party; 3, Lower St. Lawrence river party; 4, Lake Ontario party; 5, Lake Superior party; 6, James bay party; 7, automatic gauges. The branch was considerably handicapped in the latter part of 1914 through the enlistment for overseas service of some of the most useful members of the different parties and also on account of some of the survey ships being required for examination service in connection with the war.

The Hudson bay party in charge of Captain F. Anderson on board C.G.S. *Acadia* left Halifax on the 11th of July. The party experienced great difficulty in making a landing to carry on the work on account of the heavy ice encountered. They began operations in Hudson strait on the 12th August. Survey work was carried on around the islands in Hudson strait until the 10th September. The party then proceeded to Port Nelson. Survey work was carried on along the south shore of Hudson bay as far east as Cape Henrietta Maria.

On the return voyage from Port Nelson, survey work on the south shore of Mansel island in Hudson strait and also soundings and coast line work were carried out. As a result of the season's work the chart of Hudson bay will be rendered more accurate and plans of Charles inlet harbour, Savage harbour and Acadia cove harbour, will be published. 400 miles were traversed and 300 miles were checked up, 900 miles were sounded and observations for latitude, longitude and azimuth were taken at ten different points during the season.

The Pacific coast party in charge of Lt.-Commander P. C. Musgrave in C.G.S. *Lillooett* and the schooner *Naden* carried on survey work at Dall Patch, Seaforth channel, Skeena river east of De Horsey island and as far as Tyee; and also the North Skeena river passage, Laredo channel and Surf inlet, Naas river, Granby bay, Dixon entrance and Queen Charlotte islands. During the

season 81 miles of coast line were traversed and 205 square miles of soundings were taken. Lt. J. H. Knight and Mr. Turner, of this survey, enlisted for active service and their absence was keenly felt in carrying out the work.

The following charts were completed:—Skeena river (Telegraph passage to Raspberry island), Skeena river (North Skeena passage, Dominion cannery to Clara point), Laredo channel (northern portion and approaches to Surf inlet), ort Lewis and approaches, Fisherman cove, Ursula channel, Dixon entrance (soundings), Hecate strait (soundings), Bar of Nass river (soundings).

The Lake Ontario party in charge of Mr. G. A. Bachand in C.G.S. *Bayfield*, carried on survey work between Toronto and Niagara river throughout the season. The survey of this portion of Lake Ontario will be completed early in the season of 1915. During the season 48 miles of traversing, 830 miles of soundings from boats and 1,000 miles of soundings from the ship, extending over an area of 530 square miles, were completed. The weather conditions were more favourable for the work than for the past season.

The Lower St. Lawrence party, in charge of Mr. Charles Savary in C.G.S. *Cartier*, carried on survey work between Sanday bay on the south shore and Point à Paradis on the north shore until the outbreak of war, when C.G.S. *Cartier* was utilized for examination service at Quebec. In October the vessel was again placed at the disposal of the party to enable them to obtain the necessary triangulation to permit them to carry on the winter's work.

A new chart of the south shore as far east as Matane and the north shore as far east as Pointe des Monts will be published shortly.

The Lake Superior party, in charge of Mr. H. D. Parizeau in C.G.S. *La Canadienne*, carried out survey work between Pic island and Otter head. A plan of Peninsula harbour and Port Munro has also been completed and submitted to the engraver. This plan will be published shortly. A re-survey of Little Current was also carried out. Weather conditions, however, rendered the season's work difficult and limited to a great extent the season's operations.

During the season 135 miles of shore line were traversed and 500 miles of soundings from boats and 125 miles from the ship were taken.

The James bay party, in charge of Mr. Paul Jobin, proceeded to the field of their operations by way of Cochrane. An examination of the shore in the vicinity of Mount Sherrick was carried out, and an excellent location for a harbour was found. Charlton and Strutton islands and Strutton harbour were also surveyed.

The triangulation of the previous season was carried as far as the east end of Trodeley island and the exact position of Lisbon shoal was determined. A survey was successfully carried out for the waters extending from Moose river to North Bluff beacon. Hazy weather hindered the party during a considerable part of the season.

The automatic gauges party, in charge of Mr. C. A. Price, carried out the season's operations in a very successful manner. A list of the automatic gauges in operation is contained in the report of Mr. W. J. Stewart, C.E., Chief Hydrographer. A complete list of new charts issued during the year is given in the same report. The report of Mr. W. J. Stewart, C.E., Chief Hydrographer, is appended at page 78.

5.—CANADIAN ARCTIC EXPEDITION.

In February, 1913, Mr. Vilhjalmur Stefansson, a prominent Arctic explorer, approached the Canadian Government to obtain assistance in conducting an expedition to the arctic regions for the purpose of exploration and to obtain scientific information. The Government agreed to finance the expedition and it was organized under the leadership of Mr. Stefansson. The Departments of the Naval Service, Geological Survey, Marine and Fisheries, Interior and

Customs, all being interested in the results to be obtained, co-operated in fitting out and providing the personnel of the expedition. Its general direction was entrusted to the Department of the Naval Service.

The *Karluk*, a wooden auxiliary brigantine, was purchased and placed under command of Captain R. A. Bartlett for the use of the members of the expedition. As, however, the accommodation available in this ship was insufficient for the party and for the extensive supplies and personal effects required, it was found necessary to purchase two additional ships for the expedition. The *Alaska* and *Mary Sachs* being the most suitable vessels offered, were accordingly purchased.

The work to be undertaken was so varied both in the nature of the investigations and the territory to be explored, that it was decided to divide the expedition into two parties. The northern party, in C.G.S. *Karluk* were to proceed to Herschel island and there leave any members and supplies of the southern party thus far transported in the vessel. They were then to proceed north to explore the Beaufort sea and establish themselves in winter quarters in the vicinity of Banks Land or Prince Patrick island. The *Karluk* was then to proceed south for the winter. If it were found impossible to send the ship south before winter, it was to be sent the following spring. The *Karluk* was to return for the party in the summer of 1915.

The work of the northern party was to extend through a period of three years. The party were to explore the Beaufort sea and they were also to carry on investigations into the animal life of this region and take soundings in the districts investigated. They were also to ascertain if lands hitherto unknown exist and to definitely mark any found.

Following is the personnel of the party which sailed in C.G.S. *Karluk* from Nome, Alaska, on the 20th July, 1913.

MEMBERS OF THE NORTHERN PARTY.

Vilhjalmur Stefansson, in command. (Mr. Stefansson was born in Canada in 1879. He led two former expeditions to the arctic regions; the first under the auspices of Toronto and Harvard Universities; the second, under the auspices of the Geological Survey and The American Museum of Natural Science.) James Murray, oceanographer; George Malloch, geologist; B. M. McConnell, meteorologist; Dr. Forbes Mackay, surgeon; Bjarne Mamen, assistant to G. Malloch; Captain R. A. Bartlett, in command of vessel.

MEMBERS OF THE SOUTHERN PARTY.

D. Jenness, anthropologist; B. M. Wilkins, photographer; H. Beauchat, anthropologist; V. McKinley, magnetician.

REPORT ON OPERATIONS OF THE PARTY IN C.G.S. *Karluk* AND LOSS OF THAT SHIP.

The party in C.G.S. *Karluk* sailed from Nome, Alaska, on the 20th July, 1913. Good progress was made until the 2nd August when the ship was caught in the ice 30 miles S.W. of Barrow and 6 miles from the shore. On the 7th August clear water was gained. The party proceeded on their route to Herschel island until the 12th August, when the *Karluk* was caught hard in the ice from which it was not afterwards able to clear. The party drifted about with the ice for several weeks without making any progress.

On the 20th September, as the floe on which the party were carried had not moved for several weeks, it was decided that the ship was frozen in for the winter.

To increase the supply of fresh meat, V. Stefansson accompanied by B. M. McConnell, B. M. Wilkins and D. Jenness undertook a hunting trip to the mainland which was visible in the distance. On their way they were overtaken by a northeast gale which forced them to seek shelter on Thetis island. This gale drove the ice floe in which the *Karluk* party were frozen far to the westward leaving the ocean in the vicinity of Thetis island free from ice. The hunting party were unable to gain the mainland for some days on this account.

As no trace of the *Karluk* could be seen, the party decided to travel west along the coast. They set out on the 5th October. From information obtained from Eskimos along the route the party learned that the southern division of the expedition were wintering at Collinson point. With assistance received from the natives, whom V. Stefansson knew from previous expeditions, they were able to push forward to Point Barrow, Alaska, from which place Mr. Stefansson sent a full report of his movements to the Department of the Naval Service. On the 8th November the party left Barrow, Mr. Jenness remaining to carry on scientific research at Harris bay. They arrived at Collinson point on the 14th December, where they joined the southern party.

C.G.S. *KARLUK*.

For nearly four months after the party headed by V. Stefansson left the *Karluk*, the vessel and party were carried about in the floe. During the whole period of drifting the prevalent winds were northeasterly, which accounts for the westward motion of the ice in which they were caught. On the 21st August the party were about twenty miles north of Flaxman island (Lat. N. 70° 28′, approx. long. W. 145° 30′). From that date until the 5th October they drifted in a westerly direction as far as Point Barrow. From this point they drifted in a northerly direction until the 22nd October, the most northerly point reached being N. Lat. 72° 30′. Throughout November the south east gales caused the drift to be for the most part westerly. The weather in November and December was very cold. The prevailing winds caused heavy falls of snow which made travelling over the ice exceedingly difficult and dangerous. The same conditions existed up to the time the *Karluk* was crushed by the ice.

Throughout the entire drift the party were busy dredging and taking soundings. The dredging operations led to many interesting and instructive discoveries. Specimens hitherto unknown were discovered and much information concerning the animal life of the region was brought to light. It is to be regretted that, as all the data and specimens obtained were lost with the sinking of the *Karluk* the results of the scientific research of this division of the expedition cannot be published. Under the circumstances, however, this is unavoidable.

Life on board during the period of drift was uneventful. The time and attention of the men were taken up in building sledges, making fur clothing and preparing iglows on the flow to accommodate the party in the event of the ship having to be abandoned. An abundance of fresh meat was obtained, many seals and a polar bear having been shot.

On the 11th January, 1914, the ship was crushed by the ice. The party, however, were fully prepared to take up their quarters in the iglows which they had previously built. The ice pierced the ship in the boiler room, putting the pumps out of commission. The *Karluk* sank in 38 fathoms of water (N. Lat. 72° 8′, W. Long. 173° 50′). This position is a short distance from Herald island.

All supplies necessary for the maintenance of the party had previously been transferred to the ice. In this locality during the winter months the sun does not appear above the horizon and almost total darkness prevails. The proper course, therefore, for the shipwrecked party was to remain in the quarters prepared on the ice until the return of the light. Some of the members however,

chafed under the inaction and expressed a strong desire to proceed to land. Accordingly, on the 21st January, an advance party, composed of Alex. Anderson, Charles Barker, John Brady, and A. King, set out from camp to effect a landing on Wrangel island. On the 3rd February, B. Mamen and two Eskimos, who had acted as supporting party, returned to camp. They stated that the party had arrived to within three miles of the land but were then stopped by open water. It was also discovered that the land supposed to be Wrangel island was in reality Herald island.

On the 5th February Dr. F. Mackay, James Murray, H. Beauchat and T. S. Morris left camp for land with fifty days' provisions. It was agreed that this party were to take full responsibility for their own safety and an agreement was signed by them to that effect.

Early in February E. F. Chafe, with two Eskimos, was sent with supplies which he was instructed to land on Herald island. He was then to return to camp. Chafe and the natives returned to camp on the 16th February having been unable to land on the island owing to open water a short distance from the shore. He reported that he was unable to see any signs of life on the island, although he examined the shores carefully with powerful field glasses and spent two days in the vicinity endeavouring to effect a landing. He also reported that he had met the Mackay party about 20 miles from the island on his return trip. Beauchat's hands were frozen and the party were in poor condition for arctic travel, but they refused all offers of assistance and transportation back to camp. Nothing has since been heard of these parties.

The light having improved, the remaining members decided on the 19th February to attempt an advance to land and a party composed of G. Malloch, John Hadley, Robert Williamson, George Breddy, E. F. Chafe, John Munro, F. W. Maurer, and H. Williams set out for Wrangel island over the same trail which had previously led to Herald Island. On the 24th February Captain R. A. Bartlett with the remaining members of the division followed this advance party. On the 12th March the whole party landed on Wrangel island, where camping facilities were easily obtained. All supplies were transferred to the Island.

On the 18th March Captain Bartlett, accompanied by an Eskimo, started for the Siberian coast, a distance of 160 miles, to obtain assistance for the party on Wrangel island. He carefully followed the shore of the island and kept a close lookout in the hope of locating the missing men, but no evidence of their presence could be found.

On his journey over the ice Captain Bartlett encountered strong gales, heavy rafters of ice and snow, with countless leads of open water, which necessitated much roundabout travel. The journey to land took 17 days. He arrived in Siberia about 50 miles west of North Cape on the 4th April. On his journey from this point to East Cape he passed through several Eskimo villages, the inhabitants of which treated him most kindly. At East Cape he met Baron Kleist, the Russian Government representative in charge of Eastern Siberia. Baron Kleist was most considerate to Captain Bartlett and invited him to his home at Emma harbour, at which place they arrived on the 16th May.

From Emma harbour, Captain Bartlett sent out word to the various native settlements, asking them to notify the captain of any whaling or trading vessel which they might see of his whereabouts.

On the 21st May, Captain Peterson of the steam whaler *Herman* called upon him. When Captain Peterson heard that the *Karluk* party were stranded on Wrangel island he left his whaling and trading business and proceeded with Captain Bartlett toward Nome, Alaska. Unable to land there on account of ice conditions, they made St. Michaels, Alaska, from which point Captain

Bartlett communicated to the department the loss of the *Karluk* and the whereabouts of the survivors.

The department took immediate action for the relief of the party on Wrangel island. The services of four vessels were obtained for relief work. The United States revenue cutter *Bear*, through the courtesy of the United States government, was sent to endeavour to reach Wrangel island. The Russian government sent the *Taimyr* in charge of Commander Vilkitski, to the rescue of the shipwrecked party. The *King and Wing*, a trading vessel, and the *Corwin*, the property of Messrs. H. Liebes & Co. of San Francisco, the latter through the generosity of Jafet Lendeberg of Nome, Alaska, were sent for the same purpose.

On the 7th September, 1914, the *King and Wing* succeeded in rescuing the party from Wrangel island. They were later transferred to the *Bear* and landed in Victoria, B.C. Medical attendance was provided by the government for those of the party who had suffered from the hardships endured during their sojourn on Wrangel island.

The survivors were:—John Munro, R. Williamson, W. McKinley, F. E. Maurer, John Hadley, R. Templeman, H. Williams, and E. F. Chafe. B. Mamen and G. Malloch died from nephritis and George Breddy was accidentally shot while on Wrangel island.

From circumstantial evidence obtained the department has concluded that the first two parties to leave shipwreck camp have perished and has given up all hope of their recovery. That the first party did not land on Herald island is apparent. B. Mamen, who accompanied the party to within three miles of the Island, reported that the party were unable to land on account of open water. The party on Wrangel island also made two trips across the ice to the vicinity of Herald island without finding any trace of the missing men. This party also searched Wrangel island and ascertained that they were not located there. The Russian vessel *Taimyr*, on its way to Wrangel island, passed close to Herald island and, although a close watch was kept for members of the party, no evidences of their presence there were seen. Reports of the condition of Herald island indicate that it is uninhabitable. The shores are very steep, as a result of which no drift wood (indispensable for lengthy sojourns on northern islands) is to be obtained. The conditions of the shores render landing on the island extremely difficult. In view of this evidence it is to be regretted that all hope of their recovery must be abandoned. The diary of Captain R. A. Bartlett and a chart shewing the drift of the *Karluk*, are appended hereto.

REPORT OF OPERATIONS OF SOUTHERN DIVISION.

The following members of the southern division of the expedition sailed from Nome in the *Alaska* and *Mary Sachs*. Dr. R. M. Anderson in command:—J. J. O'Neill, geologist; Kenneth G. Chipman, topographer; J. R. Cox, topographer; F. Johansen, biologist. The *Alaska* and *Mary Sachs* sailed from Nome on the 19th July and 20th July respectively. The *Mary Sachs* party arrived off Collinson point on the 27th July. Owing to ice conditions they were unable to proceed further. The party in the *Alaska* had proceeded as far as Flaxman island on the 6th September, but were forced to return on account of heavy ice which hindered further progress. They returned to Collinson point, where in company with the members from the *Mary Sachs* they went into winter quarters. The work of the southern division was to comprise the investigation and areal mapping of the copper-bearing and associated rocks of the mainland between Cape Parry and Kent peninsula, and, for approximately 100 miles inland and on the southern and eastern shores of Victoria island.

The party immediately began winter operations. K. G. Chipman and J. R. Cox, topographers, took a large number of astronomical observations, solar

and stellar, including a series of lunar occultations at Collinson point. J. J. O'Neill proceeded from Collinson point in February, 1914, to carry on his geological work by a reconnaissance of Herschel Island river, in which work he was very successful. K. G. Chipman and J. R. Cox left Collinson point on the 16th March and proceeded to Demarkation point. From that place they ran a survey line to Herschel island, thus succeeding in tying in Herschel with the surveys of the international boundary party of 1912, who, on account of weather conditions, had failed to do so. Mr. Cox then made a trip up Herschel Island river and located the necessary positions for the completion of Mr. O'Neill's geological work. Mr. Chipman and Mr. O'Neill proceeded to the west branch of the Mackenzie delta, where they carried on survey work until June. They then proceeded to Herschel island to join the party on board the *Alaska*. From Herschel island Mr. Cox proceeded to survey the coast as far east as Escape reef. He then surveyed the west channel of the Mackenzie delta. The above work was carried out in a most efficient manner and very valuable information has been obtained.

Mr. Johansen spent the winter at Demarkation point at which place he took tidal observations, at the same time paying attention to his other lines of botany and entomology.

D. Jenness, enthologist of the party, who had come ashore with V. Stefansson from the *Karluk*, spent the winter working among the Eskimos at Harris bay, Cape Halkett and Point Barrow. He later returned to Collinson point to carry on archæological work there. He carried on similar work on Barker island until he was taken on board the *Alaska* for the summer operations.

V. Stefansson, upon his arrival at Collinson Point from the *Karluk*, purchased the *North Star* to replace that ship. (Although the fate of the *Karluk* was at that time unknown, Mr. Stefansson realized that the members of the expedition could not count on having it at their disposal.) He also planned a trip over the ice, to the north, which was to take about three weeks. The supplies on the *North Star* were ample to supply him with provisions. He left full instructions as to the course to be pursued in the event of his not returning at the time specified.

V. Stefansson left Martin point for his trip over the ice on the 22nd March, accompanied by six men. The advance party was composed of V. Stefansson, in command, Storker T. Storkerson and Aurnout Castel. The supporting party, to return after ten days' travel, were James R. Crawford, Fritz Johansen, Geo. H. Wilkins, and B. M. McConnell. For the first two days no serious obstacles to the progress of the party were encountered. The ice over which the party were proceeding then began to drift and they were carried far to the eastward. The two parties separated on the 7th April, 1914. The supporting party returned to Collinson point on April 23rd and gave a full report of the movements of Mr. Stefannson and his companions. No report has since been received of the ice party.

On the 11th August B. M. Wilkins, in charge of the party in the *Mary Sachs*, sailed from Herschel island for Banks land. This party purposed to erect beacons and to leave caches of provisions well marked in prominent places along the coast of Banks land likely to be seen by the Stefansson party if they should be in the vicinity. They expected to winter in Banks land whence they were to carry on expeditions in search of the ice party. This party, under the zealous leadership of Mr. Wilkins, will neglect no opportunity to bring assistance to Mr. Stefansson and his companions. Upon their location, the vessel is to be used as a base for the Northern division.

On the 17th August, 1914, Dr. R. M. Anderson, in charge of the party in C.G.S. *Alaska*, sailed from Herschel island for Dauphin and Union Straits. The *North Star*, Mr. Cox in command, sailed for the same locality on the 18th

August. Both vessels proceeded as far as Chantry island where they arrived on the 24th August. The parties entered a small landlocked harbour, not indicated on the charts, which is situated about fifteen miles east of Cockburn point. As the protection afforded is favourable for wintering and also for carrying on the operations of the expedition, they decided to establish themselves in winter quarters there.

R. M. Anderson, leaving the scientific party with the *North Star* at the new winter base, returned in the *Alaska* to Herschel island for supplies and fuel. He arrived at Herschel island on the 11th September. On the 13th September he started on his return voyage. He proceeded as far as Bailey island where his ship was caught in the ice and frozen in. Leaving Captain Sweeney, Engineer Blue and an Eskimo to take care of the ship, Dr. Anderson set out across the ice to join the party wintering at Chantry island.

As the southern division have safely arrived on the ground of the season's operations, the results of operations should be particularly successful. The southern party are located in the centre of the area they were to investigate, and the department expects the next report, which should be received in the fall of 1915, to be most satisfactory.

The health of the expedition, as reported by Dr. Anderson on his last trip to Herschel island, 11th September, 1914, is very good.

The weather conditions throughout the summer of 1914 were exceptionally mild as a result of which very little ice was encountered during the summer months.

6.—LIFE SAVING SERVICE.

The life saving service of Canada was transferred from the Department of Marine to the Department of the Naval Service on 1st May, 1914.

The object of this service is to render assistance to ships in distress and to rescue lives from wrecked vessels on the Canadian coast.

There are in operation in Canada 42 life-saving stations of which 27 are situated on the Atlantic coast, 11 on the great lakes and 4 on the Pacific coast.

The different life saving stations have been efficiently maintained throughout the Dominion of Canada for the past year, the crews being appointed in accordance with the requirements of each particular section in which a life saving station has been established. In some localities it is found necessary to keep a crew permanently appointed. Other stations are run in charge of a permanent coxswain, who has a volunteer crew for service when required. Motor boats have now replaced the row boats of the past in many of the life-saving stations and they prove to be not only safer for the life saving crews, but also are of much greater assistance to those in danger, on account of their superiority in speed and handling.

The inspection of the life saving stations is carried out at regular intervals to ascertain that they are in an efficient condition.

The department undertakes to reward bravery in life saving at sea. Life saving in the rivers and on the coast should be brought to the attention of the Royal Canadian Humane Society, Hamilton, Ont., with a view of obtaining reward, as this department does not deal with such cases.

Particulars of services rendered by individual stations are given in the report of Vice-Admiral C. E. Kingsmill on the life saving service, which is appended at page 110.

7.—RADIOTELEGRAPHY.

The radiotelegraph branch was established in 1906 under the Department of Marine and Fisheries.

Although stations were in operation for some years previous their inspection and control was not carried out in a regular manner. Upon the establishment of this branch, all radiotelegraph matters in the Dominion and the control of all stations whether government-owned or not were vested therein. In 1910 the branch was transferred to the Department of the Naval Service.

Under the Radiotelegraph Act, no wireless station is permitted to carry on operations without a license, and no operator is allowed to enter the service without a certificate of proficiency from this department.

The department holds examinations at different points throughout the Dominion to ascertain the qualifications of wireless operators. Application for admission to these examinations should be made to the Deputy Minister of the Naval Service.

During the past year one hundred and thirty-three candidates were examined. Out of this number fifty-three were successful.

The department has established a regular system of inspection to insure efficient service in all radiotelegraph stations.

The range of the Cape Race station has been increased to 500 miles by the erection of new steel tubular masts. As this station is located on the east coast of Newfoundland and is the first point of communication by wireless from ships at sea, the improvement thereof has been of great assistance to navigation.

On the east coast a complete chain of stations extends from Cape Race and Halifax to Port Arthur, Ont., a distance of over 2,000 miles. As a result ships are in range of communication by wireless from the time they approach within 500 miles of the east coast of Newfoundland until they arrive at Port Arthur.

The official acceptance test of the equipment at Port Nelson station, on the Hudson bay chain has been carried out and the station has been put in operation. The services of this station are very valuable to the Department of Railways and Canals for communicating with their officials carrying on operations in the Hudson Bay district and also to ships entering Hudson bay, which by wireless communication with Port Nelson and Le Pas stations are enabled to keep in constant touch with their home ports.

On the Pacific coast, stations forming a complete chain from Victoria to Prince Rupert not only provide means of communication with ships, but are also used to a great extent for commercial correspondence. All the Pacific coast stations are owned and operated by the department.

The number of radiotelegraph stations in the Dominion and on board Canadian ships has increased by 78, and is now 247. The following table shows the number of stations in operation and the corresponding number last year:

——	1913-14.	1.14-15	Increase.
Government commercial stations	1	1	—
Coast stations	42	42	—
Government ship stations	21	24	3
Licensed ship stations	50	68	18
Licensed commercial stations	8	16	8
Licensed amateur stations	47	95	48
Licensed experimental stations	—	1	1
	169	247	78

On the 31st March, 1915, the Marconi Wireless Telegraph Company transferred to this department by agreement, the Sable Island and Camperdown Radiotelegraph stations.

The total number of stations now owned by the Dominion Government is as follows:

On east coast chain	21
On great lakes chain	8
On west coast chain	10
On Hudson bay chain	2

The range of these stations varies from 100 to 500 miles. In addition to these the Marconi Wireless Telegraph Co. owns and operates under agreement, stations at Pictou, N.S. (range 100 miles), and at North Sydney (range 100 miles), and under license a trans-Atlantic station at Glace bay. The Universal Radio Syndicate operate under license a trans-Atlantic station at Newcastle, N.B.

The messages handled by the coast stations as compared with last year shew a decrease. This decrease is directly attributable to the war and to the placing of the coast stations on a war basis. Following is a comparative statement of messages handled by coast stations.

Service.	1913-14		1914-15		Comparison with 1913-14.		
	Messages.	Words.	Messages.	Words.	Increase or Decrease.	Messages.	Words.
East coast	145,605	2,443,145	59,846	1,196,512	Decrease	85,759	1,246,633
Great lakes	9,601	219,786	15,785	326,505	Increase	6,184	106,719
West coast	157,354	2,206,331	98,386	1,532,526	Decrease	58,968	673,805
Totals	312,560	4,869,262	174,017	3,055,543	Not dec'ed	138,543	1,813,719

The number of messages handled by the ten west coast stations (operated directly by the department) is greater than that of the thirty east coast and great lakes stations combined, the figures being as follows:

West coast	Messages,	98,386
East coast and great lakes	"	75,631

ASSISTANCE RENDERED TO SHIPS.

The value of an efficient radiotelegraph service was demonstrated on many occasions throughout the year, assistance rendered to disabled ships by means of this service having resulted in the saving of many lives and ships. Individual cases of assistance are cited in the report of the radiotelegraph branch.

CONSTRUCTION AND REPAIRS.

East coast.—A site for a proposed new station at Montreal has been purchased in the parish of Côte Saint-Michel and construction work will be undertaken during the coming year.

The reception range of the stations on the river and Gulf of St. Lawrence and on the east coast was increased by the installation of modern type receiving apparatus. A modern transmitting apparatus has also been installed in the Quebec station.

Great lakes.— Repairs and improvements to the dwellings and sites in connection with the radiotelegraph stations at Kingston, Midland, Port Burwell and Toronto island have been carried out during the year.

West coast.—Improvements both to the apparatus and sites of the stations on the west coast have been made. Particulars of work done are given in the report of the radiotelegraph branch.

Hudson bay and straits.—A suitable site for a new station has been located on Mansel island in Hudson straits. Construction work will be undertaken during the coming year.

Personnel.—The total number of persons employed in connection with the radiotelegraph service is 327.

The report of C. P. Edwards, general superintendent of the radiotelegraph service is appended at page 116.

GENERAL.

Considerable inconvenience has been experienced in the different branches by the enlistment of employees, particularly those entrusted with technical work.

I have much pleasure in expressing my satisfaction at the efficient manner in which officers of the department have carried out their duties during the year.

I have the honour to be, sir,
Your obedient servant,

G. J. DESBARATS,
Deputy Minister.

The Deputy Minister,
Department of Naval Service,
Ottawa.

18th Nov. 1914.

SIR,—I have the honour to forward herewith Account of my diary for the northern expedition, from Nome till my return to Esquimalt.

I am, sir,
Respectfully,
CAPT. BARTLETT.

DIARY OF CAPTAIN BARTLETT.

Sunday, July 13th, 1913.—2 a.m. Came off to ship, having spent the previous day superintending the collection of supplies on Sesnon dock.

6 a.m. Lighter came off with gasoline, lumber, skins, etc.

Secured some stevedores from shore to work cargo.

8 a.m. Went on shore using life-saving launch.

2.30 p.m. Came on board.

3.30 p.m. Weighed anchor, proceeding to Teller, where we are to blow down boiler, overhaul engines, and fill up with fresh water.

At Nome 100 tons of coal taken on board with about sixty tons in sacks on deck, the balance going in the bunkers. A complete steering gear tackle was installed.

Sent on shore fireman Wiseman, he leaving of his own accord. Mr. Phillips took care of him. Stefansson and Phillips accompanied us for a short distance, returning to Nome on *Defiance*. Weather fine and clear, wind moderate. SW.

The scientists accompaning us were:—McKinley, Mamen, Mallock, Beauchat, Jeness, Doctor McKay.

A Mr. Corwin was a passenger to Teller.

7 p.m. Sledge island abeam, shape course for Cape York. Fine and clear, moderate W. wind.

July 14.—8 a.m. Close under the land, north side Port Clarence. Shape course to run down coast.

Noon. Came to anchor off Reindeer station, an ideal place to water ship. Mr. Breviek is in charge of this station. Shortly after anchoring went on shore and finding that I could come nearer shore, weighed anchor, moving ship within a quarter of a mile of station. Immediately began filling water-tanks, blew down boiler, and overhauling machinery. Used whale-boats to fill water.

July 15th.—Fine and clear through day, no wind, watering ship, some of the scientists on shore hunting.

July 16th.—Finished watering ship, also filling boiler. Sailors and some of the scientists restowing cargo in fore-hold. Also hold under dining-room, and lazarette. Quite a lot of stores had been shifted in Nome, and others taken on board at that place. I thought it a good opportunity to locate and get a line on where things actually were.

July 17th.—Blowing strong wind north; sailors overhauling running gear and bending winter suits of sails. Some of the scientists on shore.

July 18th.—Light N.W. wind; as day advanced fresh breeze. All hands employed shifting coal sacks on deck and endeavouring to make room for one to walk. Engineers overhauling machinery.

July 19th.—Overhauled deer skins, sealskins and sheep-skins, that were obtained in Nome, and that owing to rush of getting things on board were mixed up with other supplies, the idea being to have a place for everything and easy to get at when required.

Secured three reindeer carcasses from deermen at Teller, paying them with supplies from ship. Lost whale-boat in strong wind this morning. Wind strong SW. Big surf on beach.

July 20th.—Blowing strong wind south; dropped second anchor veering out sixty fathoms on starboard, and thirty on port anchor.

July 21st.—Weather conditions similar to yesterday.

July 22nd.—Calm, with rain-showers. Stefansson telephoned from Nome to Teller asking me for some information loading ship. A man with motor launch delivered message. I returned with him to Teller and had conversation with Stefansson over phone. During the afternoon ship's boat came for me.

July 23rd.—Light variable winds. Rainshowers. Several scientists on shore, cutting grass for to use later on in foot wear. Watering ship.

Alaska arrived in Teller, heard *Mary Sachs* left Nome for Teller last night.

July 24th.—1 a.m. *Mary Sachs* alongside. Doctor Anderson came on board.

6 a.m. Transferred eleven sledges and various articles to *Karluk*. *Mary Sachs* proceeding to Teller. I forgot to mention yesterday Captain of *Alaska* asked me if I could spare second engineer to help make repairs to *Alaska's* engine. This morning despatched second engineer on *Sachs* to Teller for that purpose.

July 25th.—Calm, fine and clear. SS. *Corwin* alongside. Stefansson on board. Transferred 28 dogs from *Corwin* to *Karluk*, dogs obtained in Nome, also various other things were transferred. Watered ship to-day.

July 26th.—I went on shore with scientist—hunting; two members of party looking for Eskimo skulls. During afternoon raining. Stefansson telephoned from Teller to be ready for sea in four hours.

5 p.m. Second engineer came back from Teller, also note from Stefansson wanting to change *Karluk* sailor for another man. Later order rescinded. *Mary Sachs* alongside midnight.

July 27th.—Transfer 8 dogs from *Mary Sachs*, two sledges, one motor-whaleboat, and various other things.

3 a.m. Proceeded to sea. *Mary Sachs* in company. On *Karluk* beside officers and crew were Stefansson, Murray, McKay, Mamen, Mallock, Jeness, Beauchat, McKinley, McConnell, and a dog driver; when abreast Tin City a boat seen putting off from shore and making signals attracting our attention, changed ship's course, and was soon alongside boat which had a message from aviator Fowler, asking permission to bring his aeroplane on board *Karluk:* permission not granted.

2 p.m. Cape Prince of Wales abeam; shape course to round shoal off Cape; wind strong W. *Mary Sachs* some distance astern. Steam back meeting *Mary Sachs*. Wilkins was transferred from *Mary Sachs* to *Karluk*. *Karluk* then proceeded on her course. Wind strong with rising sea, and thick fog. Ship making poor way. Set mainstaysail, putting ship on starboard tack with her head toward Siberian coast.

July 28th.—Dense fog, strong W. wind, moderate sea.

2 a.m. Steering gear gave out, soon had it repaired.

8 a.m. Set reef mainstaysail and forestaysail. Put ship on port tack with her head toward the American shore. Ship making good way. Wind hauling to N.N.W.

July 29th.—Early morning fresh breeze, north increasing as day wore on. Noon—moderate gale, dense fog, took in second reef mainstaysail. During afternoon, sun breaking through fog bank. Fog thinning overhead, wind moderating a little, rough sea. Ship making good weather.

July 30th.—4 a.m. Fog lifting, wind strong NNE. Land two points on weatherbow.

11 a.m. Fine and clear, close under Cape Thompson. Steaming northwards for Point Hope.

10 p.m. Anchored to the eastward of the village. Eskimo on board trading. Shortly before midnight weighed anchor, moved nearer to village. Stefansson trading for furs and skin boats, etc.

July 31st.—Early hours in morning Stefansson went on shore, and at this place two native boys came on board to join the expedition.

7.15 a.m. Weighed anchor, steaming to north side Point Hope where some more trading was done.

9. a.m. Proceeded to the eastward, set all sail. Wind fresh SSE.

11.30 a.m. Cape Lisburne abeam. Squally. Shape course to go ten miles outside Blossom shoals.

Aug. 1st.—Early hours of morning wind hauled to NE. Made fast all sail. Water getting smooth. Indications of ice on our weather.

6 p.m. Ice two miles on weather bow. For some time the ice blink and the colour of the water, the temperature as well, gave indications of the nearness of ice.

11 p.m. Ship could not lay her course. Ice running toward land.

11.30 p.m. Ice close to land. Turned around steamed back to westward in open water.

Aug. 2nd.—During the early hours of morning ice opened, steamed to the eastward among loose ice.

8 a.m. Ice getting closer. Turned round, steamed back to open water again. During the afternoon ice loosened up, made another attempt to get to the eastward, shot polar bear this afternoon. Calm, dull and cloudy.

Aug. 3rd.—Wind SSWS.

6 a.m. Further progress to the eastward barred. We are now about four miles off Seahorse island.

11 a.m. Stefansson with two Eskimos, one sledge and dogs went on shore; we are only two miles from land. Doctor and dog-driver accompanied him; midnight—the two Eskimos and dog-driver returned to ship. Stefansson and McKay walking to Cape Smythe. Wind moderate SW., ship moving in floe eastward.

Aug. 4th.—Ship jammed all day, and slowly moving with pack to the eastward. No pressure of ice to ship. Watered ship from floe.

Aug. 5th.—Wind S.W. Ship still jammed, but moving with floe to the eastward.

8 p.m. Wind N.W. fresh—lanes of water making parallel to shore. A little before midnight snowing.

Aug. 6th.—2 a.m. Under way. Shortly afterwards carried away tiller. Bent a new one, and proceeded on our way at 4 a.m. Ice loose, ship making fair progress.

10 a.m. One mile from Cape Smythe. Ice tight between ship and shore. Midnight Stefansson, Hadley, Eskimo family (husband, wife and two children) and Katektovick (Eskimo) came on board to become members of expedition.

The dog-driver wanted his discharge and was sent on shore. Mail was also sent on shore. From here we obtained three skin boats, two kayaks, also a number of skins. Kurillick brought along three of his own dogs.

Aug. 7th.—During early hours of the morning, the ship still being beset in ice began to move with the floe to the eastward, and on getting clear of the grounded floes off Point Barrow began moving in a NW. direction. To the eastward of the Point, a good deal of open water visible. The ice that we are in is light and smashed up a good deal. We are about three miles from the edge of the water.

Aug. 8th.—Ship jammed all day. Open water three miles from us. This afternoon Point Barrow bearing SE. by S. ten miles. Light variable winds. Fine and clear. Watered ship from floe.

Aug. 9th.—7 a.m. Fine and clear, ice opened. Ship under way at 8 a.m. Little difficulty getting to open water.

9 a.m. In open water. Ice close packed on port side, which tended to bring us close to shore, using hand lead continuously. As we steamed eastward parallel with shore and at times barely enough water, ice became looser. Lead going continuously, navigation precarious.

Aug. 10th.—Steaming in loose, light ice and lanes of water. Ice close to shore. One has to go very near shore, therefore, at times in shallow water, lead going constantly.

10 a.m. Ship grounded, but an hour afterwards floated without any assistance. Ice close to the Thetis islands, here followed the straight edge until at length a point of ice ran close in shore and was grounded. In trying to negotiate it, ship grounded again—backed her off and now tried to cut through the point or tongue of ice. Ice was very light, and broken up, but notwithstanding all this it was a heartbreaking task to get the ship through. As a matter of fact, it was only two hundred yards wide. At length reached open water; then steamed eastward, following edge of pack on port side for some hours—lead going constantly; toward Cross island ice looser, but heavier.

Aug. 11th.—Calm, ice loose, ship making good way.

9 a.m. had to make a detour back to SW. and try to negotiate passage to the north of Cross island.

5 p.m. Ice close-packed on our port side. Turn ship in shore. Latter worked ship inside of line reef. Several members of expedition on shore. Inside the reef loose ice, shallow water; strong currents keep ice moving.

Aug. 12th.—Wind moderate, NW. varying to SW. Ice opening to the NE. Ship under way 3 p.m. and steaming in loose ice in a NE. direction. We have some of the stem plates loose, and below the water-line two are gone.

8 p.m. Ship stopped; Flaxman Island bore SW. twenty miles. No open water to the eastward. The ice where we are is light, and holes of water all through it, but ship is not equal to forcing her way through it. Whilst we stopped Murray used the dredge.

Aug. 13th.—Fast in ice. Calm, light, variable winds. Open water of yesterday closed up. Ship and ice stationary.

Aug. 14th.—Light variable winds.

7 p.m. Made an attempt to force our way toward land, but unable to do anything with it.

Aug. 15th.—Similar weather conditions as yesterday. Ship stationary.

Aug. 16th.—Ship still in same position.

Aug 17th.—Calm, ship still in same position.

Aug. 18th.—Light north wind. Snowing. No ice moving.

Aug. 19th.—Ship same position as yesterday. Similar weather.

Aug. 20th.—Calm and hazy. Ship in same position.

Aug. 21st.—Light east wind. Later moderate NE. Leads of water about one mile from ship, trending toward shore. Water-sky visible to the eastward. Romanzoff and Franklin Mountains visible about thirty miles.

Aug. 22nd.—Moderate north wind—Stefansson decided to send Jeness and Beauchat on shore.

Aug. 23rd.—Moderate north wind, making preparations for departure Jeness and Beauchat. The dogs which were on deck placed on the ice.

Aug. 24th.—Variable winds, squally at intervals, ice opening to the eastward. Lanes of water about two miles from ship and running at right angles to the shore. Very little difference in ship's position.

Aug. 25th.—Light variable winds, no water seen.

Aug. 26th.—Light north wind, ship changed position moving a few miles to the westward.

Aug. 27th.—Light variable winds, thick snow falling. Toward the afternoon wind moderate east, ship in pack moving westward.

Aug. 28th.—Wind light west. Fine and clear. Romanzoff and Franklin Mountains visible.

Aug. 29th.—Wind light WSW. During afternoon south.

11 a.m. Jeness and Beauchat left ship for land which is about ten miles distant. One sledge and 7 dogs carried provisions. One sledge and 7 dogs carried skin boat. The supporting party consisted of Wilkins, McConnell, and McKay. Three Eskimos went along with them, when about two miles from ship Stefansson met them and he decided owing to the rough ice that they should come back and, further, that they had in that short distance so damaged the skin boat that it was necessary to return and repair it.

Aug. 30th.—Wind south to SW. Foggy at intervals.

Ship in ice slowly moving to the west.

Aug. 31st.—Variable winds, cloudy towards land. Soundings to-day 19 fathoms, pebbles and mud. Clear at night.

Sept. 1st.—Strong NE. wind, fine and clear, ship moving with pack westward. The stores which had been left by the shore party removed to the ship.

Sept. 2nd.—Strong ENE. gale, no water visible, fine and clear. Ship moving in pack to westward.

Sept. 3rd.—Moderate gale, ENE. wind, open water; distance two miles; hazy, thick snow during afternoon.

Sept. 4th.—Gale still continues, weather cloudy, Eskimo and members of expedition hunting; four seals shot today, also quite a number of ducks.

Sept. 5th.—Wind moderating, noon—fresh breezes; dense fog. Eskimo shot four seals, and a few ducks.

Sept. 6th.—Ship is drifted considerable to the WSW. Can see from aloft the lowland on our port side, about five to seven miles distance. Fine, clear and calm. Foggy during night.

Sept. 7th.—Calm and foggy all day. Winds light and variable. One seal shot.

Sept. 8th.—Light airs, fog and snow.

Sept. 9th.—Ship moving with flow to the SW., soundings, 12 fathoms. Thetis island about five miles on port beam. Eskimo shot five seals, but recovered only three, they having sunk.

Sept. 10th.—Light and variable winds, ship stationary, one seal shot to-day.

Sept. 30.—9.30 a.m. Fine, sky overcast. Thermometer freezing. The open water being about 1½ miles from ship, decided to take a canoe and hunt birds. The single-barrel shot guns were too light. What I mean is that one could not get near enough to shoot with good effect, and the amount of the charge in shot guns is not sufficient to kill at a long distance, especially ducks, for as we know, these birds are well feathered. However, we managed to get about fifty birds.

6 p.m. Returned to ship. A beautiful day, all through. Ship and ice practically stationary.

Sept. 12th.—Sky overcast, dull and cloudy. Some of us used ski in walking to the lead, and found the travelling good. Light snow. The light to-day very bad to travel. Wind moderate NNE. Ice moving toward land. Late this evening water closed up. Eskimo shot several seals.

Sept. 13th.—3 a.m. Fine and clear, very frosty, wind fresh NE. Some of us early this morning went hunting, but could find no open water, the ice having raftered with the wind last night. Latitude by observation 70°48′. Put up stove in dinning-room.

Sept. 14th.—Dull and cloudy, wind NNE. Ship stationary. Some of us duck shooting. Killed quite a number of birds, had great difficulty in getting them owing to young ice in lead water.

Sept. 15th.—6 a.m. Dull and cloudy, a good deal of condensation to-day. Several members of party hunting. We used ski in our going about.

Sept. 16th.—A number of members out hunting. Some of them going a long distance from ship, and return late in the evening. Some were very successful, while others were not so fortunate.

Sept. 17th.—Fine, clear and calm. All hands hunting to-day.

5 p.m. All hands on board. Lighted the lamp for the first time in dining-room. Ship stationary.

Sept. 18th.—Calm. Very spring-like. Several seal shot, latitude 70°46′40″, Long. 150° 20′ West.

Sept. 19th.—Fine and clear, strong NE. wind, Lat. 70°47′14″—Long. 150°12′ W. Thermometer 8. Ship stationary.

Sept. 20th.—Begin strong E. wind. Sky overcast. Noon—sunshine.

1.30 p.m. Stefansson with two Eskimos McConnell, Wilkins, Jeness, and twelve dogs, two sledges, with the following supplies left for the land:—

2 Burberry tents.
1 stove and piping.
2 axes.
1 dozen candles.
4 gal. alcohol.
1 alcohol stove.
1 box dog biscuit.
6 tins tabloid tea.
10 lb. sugar.
Matches.
3 sleeping bags.
Sheepskins for sleeping robes.
2 floor canvas for tents.
4 slabs of bacon.
10 lb. lard.
120 lb. fish.
20 lb. rice.
1 box tin beef.
5 lb. salt.
1 case Underwood man pemmican.
15 lb. chocolate.
1 box biscuits.
Mannlicker rifle and shot gun.
Ammunition (not quite sure amount)
1 camp cooking set.
6 seal floats.

He left the following instructions with me:—

C. G. S. *Karluk*,
Sept. 20th, 1913.

DEAR CAPT. BARTLETT,—On the trip for which I am leaving the *Karluk* to-day, I expect to make land on the largest second from the west of the Jones islands (Thetis island). If the ice is strong enough I expect to cross thence to near Beechy point to hunt cariboo. If feasible, I may go on to the mouth of Itkuilik river known to the Eskimos as Itkilhkpe to see if fish can be purchased there from the natives. Should the *Karluk* during our absence be driven from her present position it will be well for you so soon as she has come to a stop again, and as soon as it appears safe to send party ashore to erect one or more beacons, giving information of the ship's location if she goes east. The beacon should be erected on accessible islands; if west, they should be at Cape Halkett, Pitt point, or Point Simpson, to facilitate the finding of the ship in fog or a blizzard by our party coming from shore or by hunters who are overtaken by thick weather.

While away from the ship, it will be well to have established four lines of beacons, running in the four cardinal directions from the ship to as great a distance as practicable. There should be some arrangement by which these beacons indicate in what direction the ship is from each of them; and some of them should have the distance of the ship marked upon them. These beacons need not be large, but should not be over 100 yards apart, to be used in thick weather. Flags or other fluttering things should not be used, for bears might be scared away by them. On days when an unsure wind is blowing, it might be desirable that McKay run line of soundings in various directions from the ship. If it becomes practicable to send off Mallock and Mamen for surveying purposes, McKinley should accompany them, for the purpose of establishing magnetic stations in connection with Mallock's survey; Mallock locating the stations for McKinley, so as to save unnecessary duplications of instruments.

Except for some special reason, the Eskimo woman Keruk should be kept busy sewing boots for the winter, sea-ice type, deer legs and ugoug soles. It is likely that we shall be back to the ship in ten days if no accident happens.

(Signed) STEFANSSON.

McKinley rigged up an anemometer in crow-nest.

Sept. 21st.—Begins with strong E. wind, dull and cloudy, more wind as day wore on. Temperature—27. Began making clothes and preparing for departure of Mallock and Mamen, using sewing machine at tents.

Sept. 22nd.—Dull and cloudy all day. Late in afternoon sleet. Set up tidal gauge. Ship still stationary.

Sept. 23rd.—Begins strong E. wind, increasing to moderate gale.

10 a.m. Ship and ice pack began moving westward. I had been watching all morning, using the lead as a guide. During afternoon snowing, very mild. The canoe which was by the side of the lead taken on board.

Sept. 24th.—Wind moderating. Noon light ESS. wind, very mild all day. Eskimo killed three seal. A good deal of water to the NE. Very little drift this afternoon. Late in evening wind increasing to moderate gale, NNE.

Sept. 25th.— Begins with NNE. gale, a good deal of snowdrift on ice. Noon—during a clear-up caught sight of land, soon after thick snow. Ship rapidly driving in ice path. A good deal of open water to the SE. Had all the dogs taken on board, also sledges. The ship during all this time remains firm in ice, and the sheet we are in unbroken, although at times water all around.

Sept. 26th.—4 a.m. Wind moderating, varying to NW. Water closing up, sky overcast, snowdrift. Put dogs onto ice again. Soundings 8 a.m., $18\frac{3}{4}$

fathoms. According to the chart, we are a little to the eastward of Point Barrow. Eskimo shot three seal. Other members of expedition hunting. Very mild all day. Filled water from ice floe.

Sept. 27th.—Wind, light NW., mild and spring-like. Good deal open water to the NW., and as far as East; from aloft grounded ice plainly to be seen on our port side. Shot four seal.

Sept. 28th.—Begins with light snow, wind moderate NE. Weather mild. Soundings 8 a.m., 11½ fathoms. Ship slowly driving with pack to the westward. Began to-day making fur clothing in order to have warm clothes in the event of having to leave the ship. From time to time we have been making preparations for such contingency, and have the whale-boats provisioned for twenty days, and a couple of months' supply on deck ready to throw overboard at any moment. All the jaeger underwear I have packed in canvas bags. Lat. 71° 10′ 55″—Long. 154° 6′ 45″ W.

Sept. 29th.—Moderate NE. wind. Wind light, snowing, Restowed boxes in forward hold, so as to make room for carpenter shop. Installed stove which makes it quite comfortable; made up all the tan deerskins in small bundles so that they could be handled readily, placing them on deck.

4 p.m. Weather cleared up, but not clear enough to see far.

Sept. 30th.—Began fine and clear, calm.

8 a.m. Sky overcast. Ship slowly driving in pack to the westward. Can see distinctly the lowland of Copper island. Began building sledges designed after the Peary sledge of 1909.

Oct. 1st.—Dull and cloudy.

6 a.m. Water made short distance from ship, the narrow lane running east and west.

8 a.m. Snowing; strong NE. wind and snowdrift. Ship driving fast in pack. During the afternoon lead closed up. Owing to the snow filling the boats in the davits, we were forced to put on the canvas covers. The boats are provisioned 20 days rations for eight people, each boat.

Oct. 2nd.—Daylight, wind moderating and shortly afterwards veered to the SE. Noon—sun came out. Lat 71° 17′. Afternoon clear up. Land about five miles bearing from S.E. by S.S.W. Some water to the NW.

3.30 p.m. Ship and pack began setting to NE. Sounding 8 fathoms. Long. 155° 12′ W.

Oct. 3rd.—Wind fresh NE., fine and clear. Lowland bearing from E. to W., no water under land. Afternoon wind stronger, open water in a few places. The lead near the ship opened a little. Up to 3 p.m. ship moving with pack slowly westward. After this drift more rapid. Lat. 71° 14′, Long. 155°.

Oct. 4th.—2 a.m. Wind lulled. Daylight—moderate SE. wind, dull and cloudy. Noon—raining, open water to the SE. A brilliant sunset. Eskimo shot two seal. Shifted coals from poop to port bunker.

Oct. 5th.—Begins fine and clear, moderate SE. wind. Bright sunshine. Open water visible from NW. to N. Killed three seal. Lat. 71° 26′. Long. 154° W.

Oct. 6th.— Moderate SE. wind. As day advanced wind increasing to moderate gale. Ship in pack rapidly moving to the NW.

7 a.m. Soundings 28 fathoms. The dredge finds a different kind of sea fauna—now that we are outside the 20 fathom curve. Day very mild. We are getting soft shell crabs, coral, etc., and losing the mud and silt. Lat. Noon 71° 37′—Long. 154° 38′ W. Midnight Lat. 71° 38′—Long. 154° 10′ W.

Oct. 7th.—Fresh SE. wind—horizon clear.

6 a.m. Condensation, lasting up till noon. Sun shining, condensation drying up. Gave sailors jaeger underclothing, Burberry overhauls, mitts and stockings, and two sheepskins a man.

8 a.m. Soundings 25 fathoms. Lat. 71° 38′ W—Long. 154° 5′ W.

Oct. 8th.—Beginning day—strong NE. wind. All day similar weather—late in afternoon clearing. Water sky to S. and W. Lat. 71° 39′. Soundings 26 fathoms.

Oct. 9th.—4 a.m. Strong NNE. wind, ship in pack rapidly driving westward. Soundings 56 fathoms.

8 a.m. 68 fathoms.

10 a.m. 72 fathoms.

11 a.m. 77 fathoms.

Lat. Noon—71° 47′—Long. 154° 19′ W.

2 p.m. Wind hauling to NW., snow squalls, ice rafting, and breaking up. The sheet that we are in still remains unbroken. Soundings 85 fathoms 4 p.m. Ice under great pressure. No movement of ship; using dredge all day. Very little result. Probably we are drifting too rapidly.

5 p.m. Sounding 86 fathoms.

9 p.m. 95 fathoms. Hard bottom. Sky overcast, air filled with condensation.

Oct. 10th.—Begins fine and clear, hard frost, no water visible. Soundings 3 a.m., 180 fathoms—no bottom. We are now on the downward slope of the Continental shelf.

7 a.m. No bottom, 140.

8 a.m. No bottom, 270.

Lat. at Noon—72° 18′. Cold, clear and frosty. Noon—bent on 300 fathoms. more wire to Kelvin machine; no bottom 500 fathoms. Wind NNE. veering back to north. Getting the Locus machine together and installing it on ice near the ship. Wind also appears to moderate.

6 p.m. Lat. by altair—72° 12′—Long. 154° 21′ W. Eskimo woman finished 15 pairs deerskin boots.

Oct. 11th.—Begins fine and clear. Temperature –6.

9 a.m. Sky overcast. Air growing milder. Light snow. The dog which strayed away yesterday came back. I appreciate its return. Dogs with us are at a premium. Return the dogs onto the ice. Noon—Locus machine gave 1,000 fathoms. Mud and sand; getting the dredge ready. Filled fresh water tank by melting ice in tank from steam. Eskimo woman sewing skin clothing. Heavy pressure ridge about 1,000 yards stern of ship.

Oct. 12th.—Begins dull and cloudy, little or no wind. Gave scientist outfit skin clothing. Noon—sounding 1,215 fathoms. Brown mud and sand. To the NE. and E. water sky visible wind light SE. Thermometer 16. Have ceased to tie up the dogs, letting them run around. The great trouble is that when running around loose they quarrel a good deal, and the weak succumb to the stronger. Under the present circumstances, we cannot take any chances of thus losing the few dogs we have, although the dogs would be much better loose.

Oct. 13th.—Dull and cloudy, air mild, wind light SE. Dredge has been down but does not seem to fish well. Began cutting out ship. When the ship was first frozen in the ice, which was about the middle of August, she at that time was very heavy in the water. Since then we have burned quite a lot of coal, also removed the deck load which makes the ship two feet lighter. In the event of ice pressure, the ship can have a better chance and by now floating her can be raised at least two feet out of the water, and by cutting up small pieces of ice and placing it between the ship's side and the rim of the ice cradle, she in this way has a good cushion to protect her in the event of a squeeze. About twenty

yards on our port quarter is a small heavy blue floe, about one-quarter of an acre in size. I have placed on this the following:—

250 sacks coal;
33 cases gasoline;
6 cases codfish;
3 large cases cod steak;
5 drums of alcohol;
4 cases of eggs;
114 cases of biscuit;
5 barrels of beef;
19 barrels of molasses;
9 sledges;
2,000 feet lumber;
3 coal stoves;
2 wood stoves;
About 90 ft. of piping;
1 suit sails belonging to ship;
2 Peterboro canoes.

With these things one can make a pretty comfortable house, using the sacks of coal, cases of biscuit, and barrels, etc., to make the walls, and the lumber for flooring, the scantling for a roof, and the sails to cover all. Further, the outbreak of fire on the ship was always imminent, although, we had made ample provision to safeguard that. Soundings at noon—1,200 fathoms, mud. Used to-day a lead made by the engineers.

4 p.m. The dredge again was lowered with 1,500 fathoms of rope attached. This rope belonged to the ship. The dredge remained down all night.

10 p.m. Lat. by altair 72° 23′ 30″—Long. 155° 3′ W. Wind SW. light.

Oct. 14th.—Begins dull, and cloudy. Laying crushed ice along ship. Cut away the hard piece of ice under the port quarter; also freed propeller and rudder. Hauled up dredge, rope broke, 300 fathoms from dredge. This afternoon lowered another, attached 1,300 fathoms rope. Wind NW, ship driving S. in pack. Open water visible to the S. To-night discontinued the usual routine of watch and watch; instead appointed a night and day watchman.

Oct. 15th.—Fresh NW. wind. Sky overcast. Air filled with condensation.

9 a.m. Hauled dredge, owing to its being fouled it was empty on reaching the surface. Noon—sounding 1,165 fathoms. Soft mud.

4 p.m. Lowered dredge. This was a larger and a better one; the engineer department making it. The bottom of netting contained fine mosquito netting so as to hold any minute animal life. Crew banking up ship. I notice the mud core when taken from the buchanan tube the top has a brownish colour, whereas the bottom is bluish. Lat. 3 p.m., 72° 23′—Long. 155° 13′ W.

Oct. 16th.—Dull and cloudy, wind moderate SE. Noon hauled dredge. Had two animals, one a brittle starfish, the other a spherical shape creature unknown to Murray. During the afternoon, wind strong NW. Leads making near ship.

8 p.m. Shifted the dredge line to ship. Fine, clear. Brilliant moonlight. Lat. 6 p.m. 72° 23′—Long. 155° 21′ W.

Oct. 17th.—Fine and clear. Moderate NW. wind. Thermometer —4. Lat. Noon 72° 19′, Long. 155° 24′ W. 6 p.m. Lat. 72° 20′—Long. 155° 5′ W. Collected all the skins left after giving the men an outfit, and put them in canvas bags. Had the sailors start in and sew up the Underwood pemmican in 48 lb. packages. Of course, the tins were taken out of the wooden case. The canvas was very light, and only strong enough to keep the tins together.

8 p.m. Cloudy and calm. Thermometer rising. Murray repairing dredge.

Oct. 18th.—Fine and clear. Temperature 4. Wind NE. Sounding 955 fathoms. Put down dredge, down all day. Lat. 72° 26′—Long. 155° 4′ W.

Oct. 19th.—Early this morning fine and clear. Lat. 72° 27′. Long. 155° 27′ W. Wind strong NNE. A narrow lead water made short distance from ship. Eskimo shot four seal. Noon—hauled up dredge, had one starfish.

6 p.m. Lat. 72° 29′—Long. 155° 51′ W. Gave out sheepskins all on board. Noon sounding 940 fathoms.

Oct. 20th.—Fine and clear. Light NNE. wind. Noon lowered dredge. Sounding 940 fathoms. Lat. 72° 31′. Eskimo shot two seal. Saw bear track near ship. Installed a 100-gal. galvanized boiler in galley to hold melting ice. It was made by the engineer department.

Oct. 21st.—After breakfast hauled dredge. 1,300 fathoms of line out. Dredge unsuccessful.

11 a.m. Soundings, 750 fathoms. Lat. at noon 72° 30′. Lost one of the dogs in a fight last night. Eskimo made small sledge for canoe. Lowered dredge this afternoon.

Oct. 22nd.—Dull and cloudy. Wind SSE. Hauled dredge. Nothing in it. Sounding 968 fathoms. Noon—wind strong SSE. 8 p.m. Sky clear, Lat. 72° 33′—Long. 156° 56′ W. Midnight.

Oct. 23rd.—Blowing a gale SSE.

4 a.m. Wind let up a little, and veered to the NW. Still blowing strong. In narrow lane of water, a short distance from ship, Eskimo shot two seal. Soundings, 920 fathoms. This afternoon Eskimo shot six seal, eight for day. To-day, soundings made a depth of 500 fathoms to ascertain temperature, gave following:—

Surface—1.07 Centigrade.
100 fathoms—1.02 Centigrade.
500 fathoms—1.14 Centigrade.

Oct. 24th.—Begins wind strong S. Snowing. All the leads of water closed. Eskimo obtained no seal, soundings 1,001 fathoms. Temperature at bottom—0.45 Centigrade. Late afternoon, wind light; fine and clear.

Oct. 25th.—Dull and cloudy up to noon. Noon soundings, no bottom at 1,000 fathoms. Murray to-day used a fish net, securing several specimens. A few small leads of water in which Eskimo secured several seal. Lat. 4 p.m. 72° 34′—Long. 155° 40′.

Oct. 26th.—Dull and cloudy, moderate S. wind. During the night three bears visited the ship. Strange the dogs did not scent the presence of the bears. The young ice in the leads near the ship rafting. No water to-day, and no seals shot, although Eskimo had been scouting round searching for water-holes. Sounding, 1,115 fathoms, blue mud. It may seem strange in speaking about Eskimo always killing the seal, yet the members of the expedition at times are out, but were not so successful as the natives.

Oct. 27th.—No water to-day, and no seals. Started in on two meals. Breakfast 9 a.m. Dinner, 4.30 p.m. A cup of tea can be obtained about one o'clock, and before retiring, should any one care they can have tea or coffee or cocoa, or chocolate. Blew down the boiler, wind NW. all day. Thermometer plus 24.

7 p.m. Lat. 72° 32′—Long. 155° 35′.

Oct. 28th.—Dull and cloudy. Little sun shining at intervals during the day. Making preparations to unhang rudder. Wind light WNE.

11 p.m. Lat. 72° 30′—Long. 155° 35′ W.

Oct. 29th.—Fine, clear and calm. Temperature—24. Rudder all ready to unship. Evidently this rudder has never been shifted since first it was installed on the ship. Magnificent aurora display, beginning at 7.30 p.m., lasting till 11 p.m. Lat. 4 p.m. 72° 24′ N.—Long. 155° 37′ W.

Oct. 30th.—Begins gale NE. increased into hurricane as day wore on, attended by blinding snowdrift.

8 p.m. Ice cracked with a loud report from stem of ship. Shortly afterwards another crack about 50 feet on port quarter, running parallel with ship.

Soon had all the dogs on board, also the two sounding machines. About that time the crack closed again, the ship did not feel the least motion; there was no lateral movement of ice. Had all hands standing by the rest of the night. Toward midnight, wind veered to ENE. Clear. Theremometer—24. Lat. 72° 21′—Long. 155° 42′ W.

Oct. 31st.—Strong gale and low thermometer. It is intensely cold; blinding snowdrift; ice open a little, but again closed.

8 p.m. Wind moderate. Auroral display to-night. Lat. 10 p.m., 72° 19′—Long. 156° 39′.

Nov. 1st.—Begins with renewed violence of gale. Toward 8 a.m., squally; when light enough, I walked around the ship; only one crack in ice to be seen. A greater distance from the ship conditions were unchanged.

10 a.m. Soundings. 105 fathoms. A pronounced NW. drift. As day wore on wind moderating. Pump ship with hand pump in engine room. Have been doing it on deck, but with great difficulty, owing to it being so cold. With the boiler blown down, we have a stove in engine room which keeps the temperature above freezing. A clear sky, in fact, it is unusually clear; a magnificent display of aurora.

8 p.m. A living gale, with rising thermometer. The dredge has been out since the gale started, and when the wind moderated, we began dragging it in, and found that the line had parted several hundred fathoms from the dredge. We now bent another and lowered it again. It was down about an hour, and when hauled it had one starfish. Lat. 10 p.m., 72° 13′—Long. 157° 5′ W. Have built an observatory for Mallock, covering in the bridge with boards and sails. Mallock has his transit erected here, and is untiring in his efforts to get observations.

Nov. 2nd.—Wind shows no sign of letting up.

9.30 a.m. Soundings, 36 fathoms. Wind a living gale, and getting stronger as day wore on. Air filled with blinding snowdrift.

10 p.m. Wind moderating and hauling to the eastward. In the dredge good catches were obtained. As to quality, doubtful. Number of specimens not already found were secured. Amongst them some examples of starfish. All hands busily employed sewing skin clothing.

Nov. 3rd.—Begins, still blowing hard, with snowdrift. Toward daylight, wind let up a little. Sky overcast, still thick with snowdrift. Sounding 10 a.m., 36 fathoms. We are using the Kelvin glass tubes in our soundings; using dredge but not successful as yesterday.

Nov. 4th.—During early hours of morning, wind moderating, snowdrift as bad as ever. Sounding 10 a.m., 28 fathoms. Weather clearing up. Wind moderating. Afternoon, wind N. moderate breeze. Later on, wind began with renewed violence; using dredge; discovered a new animal. Murray does not know what it is. Gave deerskin boots to McKay, Mamen, Murray, and Beauchat. Lat. 71° 51′ 6 p.m.

Nov. 5th.—Clear, overcast sky, wind light ENE.

9.30 a.m. Sounding, 24 fathoms. Latter part of day fresh wind. Open water about two miles from ship; using dredge.

4 p.m. Lat. 72° 12′—11 p.m. 72° 15′—Long. 159° 10′ W.

Nov. 6th.—Sounding, 9.30 a.m., 25 fathoms. Fine and clear; wind, light NE. Using dredge. Good catches. Engineers chipping inside boiler.

Nov. 7th.—Sounding, 9.30 a.m., 23½ fathoms. Dull, overcast sky. Light variable winds. Open water two miles from ship. Eskimo shot ten seal. Wind fresh E. with condensation. Lat. 72° 16′—Long. 159° 18′ W. Using dredge.

Nov. 8th.—Fine, moderate, east wind. Eskimo brought in the seals shot yesterday. During afternoon, strong ESE. wind. The lead of open water seen yesterday and where the seals were shot, is closed up.

Sounding, 9.30 a.m., 24 fathoms. 11 p.m. Lat. 72.27—Long. 159.51 W.

Nov. 9th.—ESE. gale. Horizon clear. Overcast sky. Sounding 10 a.m., 23 fathoms. Ship moving fast in ice pack, NW. Noon—wind, moderate gale, SE. Thick snowdrift; using dredge.

Nov. 10th.—Light SE. wind. Fine and clear.

9.30 a.m. Sounding 27 fathoms. Fine and clear.

1 p.m. Fresh S. wind. A spring-like day. Temperature, 23. Late afternoon, strong wind. Eskimo killed six seal three miles from ship, also young polar bear. Mate reports ship making more water than usual. Put clean snow on deck. Removed the gang-way, making a road level with deck to the ice. Lat. 4 p.m. 72° 45′—Long. 160° 45′ W.

Nov. 11th.—Strong S. wind and snowdrift. Daylight snowing; wind moderating.

9.30 a.m. Sounding, 29 fathoms. Eskimo brought in seal killed yesterday, also bear, and killed three more seal to-day. Lat. 4 p.m., 72° 53′—Long 161° 4′ W.; wind, moderate and hauling to SW. Fine and mild all day. Using dredge. The sun leaves us to-day.

8 p.m. Fresh NW. wind.

Nov. 12th.—9.30 a.m. Fresh NW. wind. Dull and cloudy. Eskimo returned early. No water and no seal. Had to tie up dogs owing to their fighting.

10 a.m. Soundings, 29 fathoms. Lat. 4 p.m. 72° 53′—Long. 161° 32′.

Nov. 13th.—Strong NW. wind. Sounding, 9.30 a.m., 22 fathoms. Fine and clear. Had the Eskimo block up starboard door and cover in skylights with snow blocks. Brilliant moonlight. Wonderful display of aurora. Put clean snow on deck. Lat. 72° 46′—Long. 161° 34′ at 4 p.m. Using dredge.

Nov. 14th.—Wind W NW. fresh. Fine and clear. Later, squally.

9.30 a.m. Sounding, 22½ fathoms. Blue mud.

Noon—Saw a little of the sun's upper limb. This, of course, was owing to the big refraction. Eskimo cutting snow blocks and banking up sides of ship. Also building snow shelters on deck against the entrance to dining-room. Using dredge. Temperature —18. Lat. 72° 39′—Long. 161° 29′ W.

Nov. 15th.—10 a.m. Light SW. wind. Fine and clear. Sounding, 20 fathoms.

3 p.m. Wind, SE. increasing to gale. Snowdrift on ice. Sky overcast.

8 p.m. Wind moderating. Thermometer +15°. Getting the ship banked round with a couple of feet of snow. It makes an awful lot of difference to the temperature inside, beside a great saving in coal. Had the Eskimo hunting. They return without getting anything and report no open water.

Nov. 16th.—Strong SE. gale. 4 a.m. moderating a little. Soundings, 10 a.m., 24½ fathoms. Eskimo set several fox traps. They report no leads and no game.

6 p.m. Wind S. Temperature +23.

Nov. 17th.—9.30 a.m. Light S. wind. Dull and cloudy, Sounding, 50 fathoms. Soft mud. Lost dredge net; soon had it replaced with another. Cleared away the ice around stern of ship so as to make the water hole larger for sounding and dredging, especially to facilitate the dredge work. The dredge today at different times was filled with a great variety of sea fauna and flora, some of which was new to Murray. Eskimo trapped one white fox. It was very small. Hadley finished the second sledge. Calm and mild all through day. Lat. 6 p.m. 72°.59′—Long. 162°.7′ W.

Nov. 18th.—Moderate NW. wind. Fine and clear.

9.30 a.m. Soundings, 48 fathoms, rock bottom. Dredge filled with round pebbles and nothing else.

4 p.m. Latitude 72° 55′—Long. 162° 32′. Fresh NW. wind and snowdrift. Dull and cloudy. During the late afternoon, fine and clear. Brilliant moonlight. Temperature —9.

Nov. 19th.—Fine, clear and frosty. Wind light NW. Sounding, 10 a.m. 39 fathoms. Lost lead and tube of Kelvin machine. Fine day, no wind. Temperature—19.

11.30 a.m. Hauled dredge. In our sounding this morning we drifted over a place which was altogether blue mud. Now in the dredge, we get nothing but small, smooth round pebbles. Eskimo brought in three white foxes. Open water not near enough to do any seal hunting. We had three hours of good light today. Lat. 72° 52′ 27″—Long. 162° 48′ W. 4.30 p.m.

Nov. 20th.—Begins ESE. wind, and veering to East. Blowing moderate gale.

10 a.m. Sounding, 36 fathoms. Hauled dredge. Had a few specimens, also some small stones. During the last 24 hours we have been getting stones, some of which are very large, and then again some portions of the sea-bottom gives us quite a luxuriant growth of flora, also a large variety of fauna. Noon—blowing a gale, E. by S. Blinding snowdrift. Dredge doing remarkably well. Temperature—9. Lat. 4 p.m., 72° 54′—Long. 163° 3′ W.

Nov. 21st.—Blowing a whole gale, ENE. Blinding snowdrift.

10 a.m. Sounding, 36 fathoms. Dredge today secured an octopus. Stars shining very brightly. At 6 p.m., overcast sky. Lat. 72° 56′—Long. 163° 54′ W. at 5 p.m.

Nov. 22nd.—Blowing a whole gale. I rather think the wind is stronger than yesterday. This incessant wind is devilish. Sounding 10 a.m., 32 fathoms. Wind, NE. by E. Murray told me he had gathered eleven new specimens of sea fauna yesterday. Finished building snow igloo over the dredge hole.

Nov. 23rd.—10 a.m. No let up in wind. Soundings, 28½ fathoms, 6 p.m. Wind moderating at last, and at midnight it is quite decent with the stars shining.

2 a.m. Lat. 72° 56′—Long. 164° 59′ W.; 10 p.m. 72° 56′ 30″—Long. 165° 26′ W.

Nov. 24th.—Fine and clear, moderate N. wind.

10 a.m. Sounding, 26 fathoms, temperature—20. Mallock said he could read the transit at noon without artificial light. This, of course, is owing to the especially clear sky to the S. Today is a rare treat. Just before midnight a change again. Temp. going up. Sky overcast. Wind rising and veering to the W. Lat. 11 a.m., 72° 53′, Long. 165° 38′ W. 4 p.m. Lat., 72° 54′—Long. 165° 45′ W.

Nov. 25th.—Wind W., gale.

8 a.m. Hurricane.

9.30 a.m Soundings, 26 fathoms. Eskimo finished banking up starboard side.

4 p.m. Lat. 72.15. Long. 165.30 W.

Nov. 26th—During early hours, calm.

9.30 a.m. Soundings, 25 fathoms.

11 a.m. Gale, W by N. Dull and cloudy. Watersky to the N. Late in the afternoon, clearing overhead, wind moderating, still snowdrift on ice.

4 p.m. Lat. 72° 34′. Long. 164° 57′ W.

Nov. 27th.—9.30 am.. Soundings, 24 fathoms. Light W. by N. wind. Fine and clear. Lat. 72° 26′. Long. 164° 50′ W. Using dredge.

Nov. 28th.—Moderate N. wind. Fine and clear. Sounding, 22½ fathoms.

10 a.m. Lat. 72° 26′. Long. 164° 48′ W.

Nov. 29th.—Moderate NE. wind. Rising temperature.

10 a.m. 25 fathoms. Afternoon wind blowing moderate gale. Lat. 72° 28′ Long. 165° W. 9 p.m.

Nov. 30th.—Moderate NE. gale. 10 a.m. Sounding, 24 fathoms. Miserable day.

Dec. 1st.—A whole gale. Wind, NE. Temperature—18.5

Soundings 9.30 a.m., 22½ fathoms. Lat. at 5 a.m. 72° 30′ Long. 165° 45′ W. Lat. 10 p.m. 72° 26′—Long. 166° 13′ W. Using dredge all day.

Dec. 2nd.—No let up in wind. 10 a.m. Sounding, 23 fathoms. 10.30 a.m. Lat. 72° 24′—Long. 166° 32′ W. 8 p.m. Wind moderating.

Dec. 3rd.—Begins with wind moderating. 10 a.m. calm. Sounding, 23 fathoms. Afternoon—strong NE. wind. Fine and clear. Sent Eskimo hunting. Of course they cannot go far away as the twilight only lasts an hour or two. We put the clock to get all the working use we could of the light. That is, from breakfast to dinner, so that the men can see to work out of doors. The Engineer department has the engine apart, and giving the boiler a thorough overhauling. Ice pressure a short distance from the ship. We felt nothing of it on the ship. Lat. 72.20. Long. 167 W. 4 p.m.

Dec. 4th.—Fine and clear all through the day. Wind moderate NW.

10 a.m. Sounding, 22 fathoms. Temperature varies from —26 to —16 Lat. 72° 16′—Long. 167° 30′ W. at 10 a.m.

Dec. 5th.—10 a.m. Fresh W. wind. Fine and clear. Sounding, 22 fathoms. Lat. 72° 10′—Long. 166° 48′ W. Fresh to moderate W. wind all through day.

Dec. 6th.—10 a.m. Sounding, 23½ fathoms. Fine and clear.

10.30 a.m. Lat. 72° 6′—Long. 166° 46′ W. moderate N. by W. wind.

Dec. 7th.—10 a.m. Wind light NNW. Soundings, 23 fathoms.

10.30 a.m. Lat. 72° 2′—Long. 167° W.

Dec. 8th.—Fine and clear. Moderate N. by E. wind.

10.30 a.m. Sounding 23 fathoms. Lat. 71° 54′ 22″—Long. 167° 19′ W.

Dec. 9th.—Light N. by W. wind. Fine and clear.

10.30 a.m. Sounding, 23½ fathoms. Afternoon, fresh NW. wind. Dull and cloudy.

Dec. 10th.—10 a.m. Sounding, 24 fathoms. Wind fresh N. by W. A little before noon a narrow ribbon of water showed itself on port quarter, about 200 yards away. Latter part of day overcast sky. Light WNW. wind. No alteration in newly opened lead. 8 p.m. Lat. 71° 43′—Long. 167° 15′ W.

Dec. 11th.—Fresh W. by N. wind. Sky overcast. Had the Eskimo build a large snow igloo on the floe where we have the stores placed. Later on we can use it for either ourselves or for the dogs. Finished a third Peary sledge today. Soundings 11 a.m., 24 fathoms. Moderate wind. The lead of water has been opening and closing. No lateral movement, however. Late this evening it remained open. Lat. 71° 36′ 9″; making wooden boxes to hold primus stove.

Dec. 12th.—Fresh NW. wind, sky overcast. Dull and cloudy.

10 a.m. Sounding 24 fathoms, wind fresh, NW. by W. Lat., 4 p.m., 71° 32′—Long. 166° 54′ W.

Dec. 13th.—Fine and clear. Wind light NW. by W. Temperature —29. Sounding 10.30 a.m., 22 fathoms. Moderate NW. by W. wind. Fine and clear. Eskimo hunting, found no water. Lat., 10 a.m., 71° 27′—Long. 166° 54′ W. This is the first continuous 24 hours of fine weather for many days. Ice rafting near ship.

Dec. 14th.—Fine and clear. Temperature —29.8.

10.30 a.m. Sounding 22½ fathoms. Light WNW. wind. Fine and clear. There has been a big pressure, some few hundred yards astern of ship, yet, we did not feel any of it on the ship. The pressure ridge runs NW. and SE. Lat. 71° 23′ 25″—Long. 166° 57′ W. Midnight, Lat. 71° 23′—Long. 166° 56′ W.

Dec. 15th.—Fresh NW. by W. wind. Overcast sky.

10 a.m. Sounding 22½ fathoms. During latter part of day fine and clear. Wind changing from NW. to S. Lat. 71° 22′—Long. 166° 52′ W. at 9.30 p.m.

Dec. 16th.—Light NW. wind. Clear.

10 a.m. Sounding 22 fathoms. The Eskimo finished the dog-house near the ship. The walls were constructed of snow blocks. Had the sailors cover in the roof with boards and old sails, spreading ashes over the floor. Overhauled seal cache, and find that we have 41 seal left, giving each carcass an average of 40 lbs., it will aggregate to 1,640 lbs. That given to 25 people at a lb. a day will last us 67 days. We have seal meat on the table both in the dining room and forecastle once a day. We will, therefore, have plenty of fresh meat until the sun returns. Temperature —30.

Dec. 17th.—Begins fine and clear. Light NW. wind. Sounding 10 a.m., 23 fathoms. Dull and cloudy, light variable winds. Latter part moderate N. by E. Stars shining very brightly in heavens all through day. Lat. 71° 25′—Long. 166° 49′ W.

Dec. 18th.—Strong N. by E. wind. Sounding 10 a.m., 22 fathoms. Blowing a whole gale. Hard snowdrift. Fine and clear overhead. Bitterly cold. Lost dredge, the line parting a few fathoms below the surface; chief engineer making another. Day ends, no let up in wind. 4 p.m. Lat. 71° 26′.

Dec. 19th.—A whole gale NE. wind and snowdrift.

10 a.m. Sounding 23 fathoms. Noon, strong gale. Wind veering to the eastward. 5 p.m., a living gale. 9 p.m. Lat. 71° 35′—Long. 167° 48′. Midnight, no let up in wind which is now ENE. New dredge finished, and put down.

Dec. 20th.—Begins with a gale ENE. wind. Sounding, 10 a.m., 23 fathoms. End of day, weather conditions similar. Lat. 71° 42′ 49″—Long. 168° 49′ W.

Dec. 21st.—A living gale, blinding snowdrift. Huge snowdrifts piled 30 to 60 ft. high around ship. Fine and clear overhead. The strong wind blew in the walls of the dog-house. Had Eskimo fix it up.

6 p.m. Lat. 71° 49′—Long. 169° 18′.

10 a.m. Sounding 25½ fathoms.

Dec. 22nd.—No let up in wind. 10 a.m. Sounding 26 fathoms. The barometer which has been unsteady for the last few hours has assumed the normal again. All hands employed clearing away the snow that has drifted around the ship. Lat. 71° 57′—Long. 170° 16′ W. During afternoon wind moderating. Fine and clear.

Dec. 23rd.—Begins strong wind and squally. Soundings, 10.30 a.m., 28 fathoms. One of the dogs badly bitten in a fight. Required a good deal of sewing up. Am afraid dog will not live. Had it removed to a corner in carpenter shop, where it will receive good attention. Mr. Hadley undertaking the looking after of it. Had the Eskimo build a number of dog kennels, in one of the snow banks, so that we can put each dog by itself. A narrow lead of water made short distance from ship, but closed up. Squally all through day.

Dec. 24th.—Begins with a little lull in the storm. Intensely dark all through day. Blinding snow. Sounding, 10.30, a.m. 27 fathoms. Late in day wind moderating.

Dec. 25th.—Begins fine. Weather clearing. Calm, temperature —20.

9.30 a.m. Lat. 72° 4′—Long. 172° 48′ W. Soundings 29 fathoms.

Dec. 26th.—Dull and cloudy. Fresh NNE. wind.

10 a.m. Sounding 27 fathoms. This morning a crack made from waist of ship toward the stern, and then running off starboard bow for about 100 yards. The crack did not open. A slight tremor was felt on ship. Toward close of day wind moderating. Lat., 5.30 p.m., 72° 5′—Long. 173° 11′ W.

Dec. 27th.—Sounding, 10 a.m., 25 fathoms. The soundings do not agree with our position on chart. We are making every preparation to leave the ship if we have to. Men have been sewing and making sledging outfit. Engineers

making oil tins, boiler for stoves, pick axes and everything that one requires for a sledge trip over Arctic ice. We can lay our hands upon things required at a moment's notice. 10.30 a.m., Lat. 72° 7′—Long. 173° 31′ W.

Dec. 28th.—Wind moderate NE.

10 a.m. Soundings, 25 fathoms. Stars shining brightly. Wind moderate NE. Lat. 72° 8′—Long. 173° 48′ W.

Dec. 29th.—Light NE. wind. Fine and clear. Sounding, 10 a.m., 23½ fathoms. Lat., 10 a.m., 72° 5′—Long. 174° 8′ W. Can see a blue bank bearing S. by W. magnetic, which I feel sure to be land. According to our soundings it should be Wrangell island, but am rather inclined to think it is Herald. The light not being good enough to distinguish it plainly. Our observations would bring us to the north of Herald island. Of course, one cannot tell what error in our chronometers.

Dec. 30th.—Fine and clear. Moderate NNE. wind.

10 a.m. Sounding 26 fathoms. A crack broke today about one hundred yards from ship, remaining open for about 10 inches, and then closing. No lateral movement was noticed. Fine and clear all day. The land bearing S. by W. Lat. 72° 6′—Long. 174° 9′ W.

Dec. 31st.—Fine and clear. Wind moderate NNE. Soundings, 10 a.m., 25 fathoms. Lat. 72° 5′—Long. 174° 5′ W.

January 1st, 1914.—Fine and clear. Light N. wind.

10.30 a.m. Soundings, 26¼ fathoms. Lat. 72° 5′—Long. 174° 8′ W.

Jan. 2nd.—Fine and clear. Calm. Ship and ice stationary. Sounding, 10.30 a.m., 26 fathoms. Noon—dull and cloudy. A rumbly noise can be heard inside the ship similar to that which one often hears over telegraph and telephone wires. Evidently the ice is brought up on Wrangell island, and the running ice on our outside keeps pressing the ice that we are in firm on the island. Although near the ship, no indications of ice pressure, yet this rumbling booming noise indicates such to be the case. Lat. 72° 3′—Long. 174° 5′ W.

Jan. 3rd.—Fine, clear and calm. Ship stationary.

Sounding, 10 a.m., 26 fathoms. Moderate N. Wind. The rumbling noise of yesterday still keeps up. The wind fresh N. with snow. All hands on ship fitted out with fur clothing.

Jan. 4th.—Sky overcast. Dull and cloudy. Wind light east. Sounding, 10 a.m., 26 fathoms. Lat. 72° 4′—Long. 174° 13′ W.

Jan. 5th.—Wind NNE. light. Fine and clear.

Sounding. 10 a.m. 26 fathoms. During afternoon, cloudy. Light snow falling. Wind hauling to east. Midnight hurricane. Lat. 72° 4′—Long. 174° 12′.

Jan. 6th.—Wind still keeps up. ESE. Temperature+16. Very mild. Lat. 72° 10′—Long. 174° 33′ W.

Jan. 7th.—Sounding 10 a.m., 27 fathoms. Dull and cloudy. Wind light ENE. Noon—sky clearing, getting colder as day wore on. Lat. 72° 11′—Long. 174° 36′ at 6 p.m.

Jan. 8th.—Sounding 10 a.m., 25½ fathoms. Dull and cloudy. Wind fresh ESE.

6 p.m. squally. Wind hauling to SSE.

Jan. 9th.—Begins clear, moderate SSE. wind.

10 a.m., soundings, 25½ fathoms.

4 pm.. Moderate SW. wind. Put up six boxes tabloid tea in tin cases, using 72 boxes for the 12 cases, a total of 14,400 tablets; also sewed with canvas 1,000 Mannlicker cartridges in 50 lot packages, and 1,000 twenty-two's in 250 package lots. These were put in hermetically sealed tins.

Jan. 10th.—5 a.m. Was awakened by a loud report as if a rifle had been shot off, and then a tremor all through the ship. Immediately I was on deck. The watchman and myself going overboard, walked to the bow and found a

crack in the ice leading from the stem for about 200 yards in a NW. direction. Shortly afterwards the crack began to widen; the ship remained fast in the ice on port side. The sheet on starboard side began slowly moving astern. After widening for about 2 feet it stopped, but at different times during the day it kept moving astern, a little at a time.

Up until 7.30 p.m. the ship received no pressure, only slight shocks. The wind during earlier part of day was N. and light. During the afternoon it hauled to the NW. increasing in force, followed with blinding snowdrift. Began making preparations to leave ship should occasion arise. Had all the snow removed from deck, and the banking around skylights and outer walls of cabin to make ship lighter. Had the snow house on the floe fixed up all ready for persons to go in.

7.30 p.m. Blowing a gale NW. and blinding snow. The night intensely dark. The sheet of ice passing on starboard side lifted ship, heeling her to port when the point of this sheet on port side penetrated the planking and timbers in engine room, ripping off all the pump fixtures and putting the pumping out of commission. The chief engineer and myself were in the engine room, and seeing the water rushing in and knowing it was useless to make any attemps to rig temporary pumps I gave the order to abandon ship. The pressure was not at all heavy.

We soon had all the emergency supplies on the ice. Some ten thousand pounds of pemmican, furs, clothing, rifles and cartridges were thrown overboard. At 10.45 p.m. eleven feet of water in engine room. At this stage the ice kept the ship from going down; as the two points astern had broken and this gave the ice a chance to close more on the ship, and keep her up. All hands work well. I had sent the Eskimo woman and her two children to the big snow igloo, she having started a fire in the stove, and of course could keep the place warm. I kept the steward in the galley; and hot coffee and food on tap. When I saw that we had sufficient supplies overboard I told the men to get the sledges and haul the supplies to the solid floe, where our camp was. Midnight—men hauling the supplies to the floe, wind and weather still the same.

Jan. 11th.—2.30 a.m. Men finished sledging supplies to floe. In the snow igloo were the following men:—McKinley, Mamen, Williams, King, Chafe, Eskimo family, Beauchat, Murray, and Doctor.

In the box house: Munro, Williamson, Breddy, Hadley, Templeman, Maurer, Brady, Anderson, Barker, Mallock, and myself.

I told the men to all turn in and I would stay on the ship myself. Remaining there until she left me. My reason for not saving luxuries was that it was altogether useless, with biscuit, pemmican, and tea, for our sledging we could get along nicely. I had used the same things before for 120 days at a stretch, and found it ample. Another thing I did not want the men to take souvenirs or useless things. This all amongst 25 people would mean useless weight to carry on the sledges. Even tobacco was cut out, very little saved; and not an ounce left the camp to go with the men. I like tobacco just as well as any man, but I knew in the near future we would have to do without it, so it was just as well to begin right here.

3.15 p.m. Ship began to get lower in the water. At this stage the bow sprit and quarter held her for awhile.

4 p.m. With the blue ensign at the main topmast head, the *Karluk* disappeared, going down in 38 fathoms of water. Lat. 72° 8′—Long. 173° 50′ W. approximately. 60 miles North by east of Herald island. After the ship sank, I turned in, sleeping in the box house. The weather began to clear up although still blowing very hard.

Jan. 12th.—Wind fresh W. by N. Snowdrift on ice; clear overhead. It must be remembered that we had not seen the sun as yet, the only light we could

get being in the middle of the day from twilight. As soon as it was fairly light, I had all hands pick up odds and ends scattered round on ice. In the box igloo or house had a place for the galley, so that the cooking could be done, and the steward to himself. Also erected a tent. In the tent I had the following articles:—

70 suits jaeger underwear.
6 sweaters.
3 doz. wool shirts.
200 pairs stockings.
100 pairs mitts.
3 bolts of gabaderine.
6 fleece suits.
4 Burberry hunting suits.
2 large sacks deer legs.
2 large sacks waterskin boots.
100 pr. Mukluks.
100 fawn skins.
1 doz. hair sealskins.
2 ugruk skins.
20 reindeer skins.
6 large winter reindeer skins.
50 jaeger blankets.
20 mattresses.

On the floe was 4,056 lb. Underwood pemmican.
5,222 lb. Hudson Bay pemmican.
3 drums coal oil.
15 cases coal oil.
2 boxes tea.
200 tins milk.
250 lb. sugar.
2 boxes chocolate.
2 boxes butter.
1 box cocoa.
Candles and matches.

Jan. 13th.—Wind W. moderate breeze, fine and clear. Noon—sounding, 32 fathoms.

4 p.m. Lat. 72° 1′.

We saved one chronometer, but the abuse it received makes it worthless for time, hence the reason for no longitude. Land bore S. by W. All hands sewing fur clothing.

Jan. 14th.—Fine and clear. Wind W. Temperature—38. Soundings. 11 a.m., 34 fathoms. Land bore S. by W. half W. Men making foot bags. I told each man he was to have at least four pairs of deerskin or sheepskin stockings, and three pairs deerskin boots.

Jan. 15th.—Dull and cloudy. Wind N. Temperature—37. Land bore S. by W. Soundings, 38 fathoms. Lost one of our dogs, in a scrap last night. We can ill afford to lose our dogs as they are at a premium.

Jan. 16th.—Dull and cloudy. Fresh NE. wind. Overhauled primus stove. We have eight lovett pattern, and two Swedish. Before leaving the ship had them put in wooden boxes. Toward close of day wind NE. Soundings, 10 a.m., 37½ fathoms. Men busy sewing. The Eskimo woman cutting out the clothes and the men sewing.

I decided today to send a party of four men to the land, ostensibly for game and definite information regarding drift wood, and to find out ice conditions. Also to blaze a road over the sea ice. I would rather have waited

another week for the light would be better for travelling. I did not feel like taking the whole party to the land without supplies for at least four months. Further, the men have been living on the ship and were not inured to the cold and the privations that they would have to undergo. They were not also conversant with the ways of taking care of themselves in travelling over the Arctic ice during the small amount of light and during the low temperature that we for at least a month will have to contend with. I have noticed that our drift for the past week or so has been slow, and that by making a road or trail to the land it would enable us to get a good deal of supply on shore, and in doing this, the men would be able, from day to day, to get accustomed to the work, and travel; also as the days lengthened we could accomplish more. We could have permanent snow igloos built along the trail, and with a permanent camp on Wrangell island, and the big camp here, the men could dry out their foot gear; especially if plenty of drift wood was obtained at Wrangell, and sea-ice is altogether different from land travelling. On the sea-ice looking for a good road and building it consumes a lot of time. Once the road is made, especially from here to the island, I don't think we would have any trouble to keep it open, and by keeping up relays the faults in the road could be easily bridged. We are handicapped by the lack of dogs. Man power does not count very much on sea-ice; the dogs are the great thing for success. By adopting the relay system we can at least get enough supplies to land, to last us till the birds return, and the ice breaks up. McKinley, Mallock and Mamen doing all in their power to help and assist. In a day or two I am sending Mr. Anderson, Mr. Barker, sailors King and Breddy, to Wrangell island. Today McKinley overhauled the primus stoves; to find out how well they can behave. Also we want to know just how long a gallon of oil can last, and how many meals it can cook, and how much tea can be made in a given length of time. We found with great care, one Imperial gallon of oil can last 14 days, but I allowed one gallon for 10 days, a safe margin for tenderfeet.

Dull overcast sky. Noon weather clearing, land bore S. by W. Wind light north. Soundings, 37 fathoms.

Jan. 18th.—Begins moderate NE. wind. Strong gale. Blinding snow-drift. Packed three sledges. Those that could be spared I sent to make trail, so that the party going to the island could have a good start. Unfortunately the day was so bad that they had to return early to camp.

Jan. 19th.—Mr. Anderson, McKinley and myself, checked over the supplies on sledges. Wind moderate NNW. Land bears S. half W., hazy toward land. Soundings, 38 fathoms. Have all ready for tomorrow's start. Mamen and the two Eskimos go as the supporting party. They are to come back to Shipwreck camp when they have landed the mate's party on the island.

Jan. 20th.—Watchman called me at 4 a.m. Wind a gale, SW. Thick snow, and drift.

5 a.m. Called cook.

8 a.m. Had breakfast.

No change in weather. Party did not leave.

2 p.m. Weather clearing. Land bore S. half W. Wind light, S.W. Midnight, fine, clear and calm.

Jan. 21st.—5 a.m. Dull and cloudy. Wind light E.

9.30 a.m. Mr. Anderson, Mr. Barker, sailors King and Breddy, Mamen, and two Eskimos, left for Wrangell island. My orders to Mr. Anderson were:—

Shipwreck Camp,
Arctic Ocean, Jan. 20th, 1914.

You will leave tomorrow morning with Mamen, three sledges, 18 dogs, Mr. Barker, sailors King and Breddy, and the two Eskimos. The sledges are loaded with pemmican, biscuit, and oil. You will find list of articles on sledge attached

to this. When you reach Berry Point, Wrangell island, you will be in charge of supplies. Kindly pay special attention to uses of them. The rations are:—

1 lb. pemmican;
1 lb. biscuits;
with tea, per day;
1 gallon of oil will last ten days.

Mamen will leave one sledge, also the tent, taking back with him enough supplies to carry him to shipwreck. Whilst on the island, you will endeavour to find game. Be sure and bring it to your camp. Also collect all the driftwood you can find.

I also gave him verbal instructions about ice conditions, and in the event of open water to return to Shipwreck camp.

Sledge loads as follows:—

1st sledge:

4 cases of man pemmican,
1 tin H. B.,
10 gallons coal oil,
2,400 tea tablets,
1 tent and fly,
1 primus stove,
46 lb. biscuits.
500 .22 cartridges,
1 .22 rifle,
Candles, matches, pick axes,
1 sledge cover.

2nd sledge:

25 lb. sugar,
4 cases dog pemmican,
7 tins H. B.,
Two cases of biscuit,
1 doz. milk,
1 primus stove,
100 .30-30 cartridges,
1 .30-30 Winchester rifle,
Candles, matches, pick axe, hatchets,
1 sledge cover.

3rd sledge:

4 cases of dog pemmican,
2 cases of man pemmican,
7 tins H. B.,
250 Mannlicker cartridges,
1 Mannlicker rifle,
1 gal. coal oil,
2 bottles alcohol,
Pick axe, hatchets, shovels, rope, sleeping robes, and personal outfit,
1 pair skis,
1 pair snow-shoes,
1 sledge cover.

1.20 p.m. The men who went to assist the party returned. They had gone about five miles. Wind strong east with snowdrift.

10 p.m. Weather clearing. Wind light E. and mild.

10.30 p.m. Calm.

Jan. 22nd.—Begins moderate SW. wind.

4 a.m. Light S. wind.

10 a.m. Fine. Wind light SW. Hazy to the south. Sent out Chafe and Williams with pemmican tins, the idea being to place the tins on high pinnacles as marks along the trail, more particularly where faults in ice occur. The tins are painted blue and red and form a striking picture against the white background. They can be seen for quite a long distance.

6 p.m. Sky overcast, wind NE. light.

Jan. 23rd.—Dull and cloudy. Moderate NE. wind. Air spring-like. Open leads of water to the south, about two miles distant. Made the box house larger, and a bit more comfortable.

Jan. 24th.—Fine and clear overhead. Hazy to the south. Wind NW. light. Overhauled Eskimo shack, making it more comfortable for the family. The men that were sent out to note alterations in trail, if any, returned late, reporting no change.

Jan 25th.—Fine and clear. Temperature —32°. Land bore SSW.

4,15 p.m. Lat. 71° 57′. Sun came back to us today, being absent for 71 days.

Jan. 26th.—Fine and clear, except in direction of land. Probably open water to the south. Good deal of condensation in that direction. Temperature —24°. It seems much colder. Set up two tents to see if they were all right for use later on. These two tents were made on the ship.

Jan. 27th.—Fine and clear. Can see the lower limb of the sun above the ice today. Land bore S. by W. seeing it quite distinctly. This is really the first good sight we have had of it. It is not Wrangell island. Wind E. Lat. 71° 59′.

Jan. 28th.—Fine, clear and frosty. Light NE. wind. Made two flys for tents. The men that were sent over the trail returned late reporting that there has been a little alteration in the trail, and that they could not find the trail again on the south side.

Jan. 29th.—Fine and clear. Sent Hadley with three men that were out yesterday. Hadley returned saying he had no difficulty in finding trail, and that it was good going. We made a big fire on the ice, using gasoline, coal, and a whale boat. The idea being should Mamen in coming out have trouble to find trail he may see the smoke and a little after night he could see the flames. I had told Mamen that an hour before dark, and an hour after dark on this day I would make a fire.

Jan. 30th.—Chafe, Williams, and Maurier, walked to second camp and then an hour and a half beyond that camp. When they turned they left a flag.

4.30 p.m. They arrived back to camp, and reported no changes in trail. Temperature today about zero. Fine and spring-like. The two engineers have been soldering and fixing up oil tins. The chief engineer using a sewing-machine. He can do it almost as good as a woman. Gave MacKay, Murray, and Beauchat, one Burberry suit each.

Jan. 31st.—Had Chafe, Williams, Maurier, Breddy, and Hadley, scouting over the trail today. They went to the third camp. and returned long after night. They could see the fire at Shipwreck four miles away. MacKay and Murray came to me this morning asking for supplies to go to the land. They want 50 days' supplies for four men, and are going to pull a sledge with man-power. I told them if they signed an agreement to absolve me from all blame later on and to cut themselves loose from our party, I would give them the supplies wanted, and further, told them if at any time they wanted to come back to camp they were perfectly welcome here. Also if they required assistance later on and it was possible I would render the assistance they would deem necessary. (Mr. G. J. Desbarats has a copy of the letter with supplies and signed by the four men.)

Feb. 1st.—Dull, overcast sky. Wind light SW. Snowing. Fixed up floors of box house. Lat. Sunset by Saturn, 72° 3′.

Feb. 2nd.—Fine and clear. Light wind NE. Sailor Morris came to me asking for permission to go with the MacKay party, permission granted. McKinley getting supplies ready for Mackay party.

Feb. 3rd.—Fine and clear. A few narrow leads of water near Shipwreck camp.

8.30 a.m. Chafe and Williams left with Peary sledge, 4 dogs, and the following supplies:—

8 tins H. B. Pemmican,
1 case dog Underwood Pemmican,
2 cases of biscuits,
1 case coal oil.

Beside food for themselves and dogs for 7 days, and camping outfit.

These supplies are to be left at the fourth camp. They also carry several flags which are to be placed at conspicuous points, especially on the high rafter near any faults.

4 p.m. Mamen and the two Eskimos came in. Mamen reports that he did not reach Wrangell island, but on Jan. 31st, eleven marches from Shipwreck camp, they were stopped by open water, three miles from Herald island. The mate decided he would land on the island when a chance would offer. Mamen stayed with them for a day, then left for Shipwreck. Up to the time Mamen left, there was no chance to land upon the island, and he, Mamen, did not think that they could land there. Herald island is no place for a party to land upon. It is inaccessible, and further, no driftwood on its shores, owing to the precipitous cliffs, all around the island. It is only three and a half miles long, half a mile wide, twelve hundred feet high. Mamen left the party on the 1st of Feb.

Feb. 4th.—Moderate east wind. Air filled with condensation. Temperature —27. Mamen and his party drying out clothes. Hadley and Williams, making dog harness. Just as soon as Mamen's clothes are dried out, he is going back to the island, and locate the mate. Murray came, informing me that they were leaving tomorrow morning.

Feb. 5th.—Fine, clear and calm. Chafe and Williams came in, having landed their loads safely at No. 4 Camp. Mackay, Murray, Beauchat, sailor Morris, left this morning. They are to be sent later on up the trail.

Feb. 6th.—Overcast sky. Loaded four sledges for tomorrow's journey. Wind light NNW.

Feb. 7th.—4 a.m. Called cook. Breakfast 5.30 a.m.

6.15 a.m. Chafe and Williams with first sledge load consisting of one case dog pemmican, five tins H. B. Pemmican, 1 case oil, 1 case of man pemmican, beside 7 days' food supplies for themselves and dogs, and camping outfit.—These supplies are to be left at the fifth camp.

7 a.m. Mamen and two Eskimos got away with three sledges and 17 dogs. The following supplies on the three sledges:

4 cases Man Pemmican.
3 " dog "
3 " oil,
10 " biscuits,
16 tins H. B.

Mamen was to go to the island and locate mate's party; if the mate was still there, he was to leave all the supplies with him and come right back to Shipwreck camp. If he did not find the mate, who would no doubt have gone to Wrangell island, he was to leave the supplies along the trail. I presumed

that should he not find the mate that he had gone on to Wrangell. My plan was to get all the supplies as near to the land as possible, at the same time endeavouring to keep the trail open.

About 2 p.m. Mamen came back, having dislocated his knee-cap. Chafe now took over the leadership of the party, going on with the two Eskimos. Williams, who was with Chafe, had fallen in the water. He came back with Mamen. I then sent Mr. Munro and Williams, who had changed his clothes, to overtake Chafe, but owing to darkness and a lead of open water, they did not catch up with him. If they did not catch up with Chafe they were to carry Chafe's load to 5th camp, and return.

Feb. 8th.—Dull with overcast sky. Wind moderate North. Mamen has a lot of trouble to get knee-cap in place. Williamson is attending to it, giving it his special attention. We have at Shipwreck, up to date 5,000 lb. of Pemmican left. We use no pemmican when in camp. We have lots of seal meat and other things.

Feb. 9th.—Fine and clear. Light N. wind. Thermometer —40.

12.40 p.m. Mr. Munro and Williams came in. Met open water between second and third camp. Next day they had trouble again with open water. Reaching fourth camp and shortly afterwards, the ice closed, so that they could go on again. At the fifth camp they could not find a good place to build a cache, so they returned to No. 4, which is a very fine place, and here they put off their load. Land today bore south. We are slowly moving to the west.

Feb. 10th.—Fine and clear. Wind moderate NE. Mamen's knee-cap in place, have it bandaged. Williamson looking after it. Men drying out clothes and repairing harness and sledges.

Feb. 11th.—Begins fair and clear. Wind moderate NNE.

4.15 a.m. Called cook.

5.30 a.m. Mallock and Munro with four dogs, the Peary sledge, and seven cases of dog Pemmican, and food for seven days with camping outfit, left for the 4th igloo, but if the travelling beyond the 5th igloo was good, they were to leave the Pemmican at the best place beyond the 5th camp. Temperature —38. Fine and clear.

Feb. 12th.—Dull and cloudy. Wind fresh NE. Latter part of day, wind strong east. Chronometer stopped.

Feb. 13th.—Fresh east wind. Dull and cloudy. Sunset fine and clear.

Feb. 14th.—Fine, clear and calm. Land appeared very high and today we could see Wrangell island. Mallock and Munro came in at noon. In crossing a lead of young ice, the sledge broke through; they had to cut the dogs from the sledge, also the pemmican. All their sleeping gear was saturated with water; their tent as well. It will take them two or three days to dry out and I feel very happy of their lucky escape. It is a lucky chance for them Shipwreck camp is so near.

Feb. 15th.—Fine and clear. Light N. wind. Repairing harness, also making a complete new set. Sent Maurier and Breddy with six cases of dog pemmican, and one case of man pemmican to the 4th igloo.

Feb. 16th.—Dull and cloudy. Wind NE.

4 p.m. Chafe and the two Eskimos came in. Chafe reports that he did not get nearer than three miles of Herald island, and stayed round for two days, and kept a good look-out with binoculars, but could not see any person or tent on the island. I presume the mate had gone to Wrangell island. The Eskimo in Chafe's party, shot four seal, and saw three walrus; coming back they had difficulty in finding the trail, and near the island were adrift on single pieces of ice. On the way back, when about twenty miles from Herald island, they passed the MacKay party. The sledge was drawn by Murray, McKay and Morris. Beauchat was some distance astern with feet and hands

frozen, and from Chafe's report in a bad way. Sailor Morris had blood poison in his left hand. They appeared also to be in bad shape. Chafe offered assistance; they refused and said they were bound for Wrangell island. They, however, accepted some seal meat that Chafe had. Chafe left all supplies at the 6th camp, with the exception of enough to bring him to Shipwreck. On this trip, they lost one dog, also a sledge was broken and left behind. Maurier and Breddy came in about the same time, having left their load safely at No. 4 camp.

Feb. 17th.—Blowing a gale NE. all day.

Men drying out clothes. Getting two parties ready for Wrangell island.

Feb. 18th.—Fresh NE. wind. Fine overhead, but drift on ice. The last day or two we have moved to the west. Herald island this a.m. bearing SE. by S. half S. The Hadley, Munro party, ready for tomorrow.

Feb. 19th.—Called cook 4 a.m. Two sledge parties leaving for Wrangell island. In the first sledge party are Mallock, Hadley, Williamson, and Breddy. In the second, Munro, Maurier, Williams, and Chafe. They take four dogs to each sledge, and of course man-harness for themselves. On Mallock's sledge are the following supplies:—

6 cases of man pemmican.
2 cases of biscuit,
2 gal. oil.
84 tins milk,
2,400 tea tablets in hermetically sealed tins.
1 Mannlicker rifle,
250 rounds ammunition,
1 Ross revolver (Mallock's own),
400 rounds ammunition,
1 primus stove,
Matches, pick axe, hatchets, tent, sleeping robes.
1 gal. alcohol,
500 ·22 cartridges,
1 ·401 Winchester,
100 rounds ammunition,
1 pair skis.

Munro sledge:—

5 cases man pemmican,
2 cases biscuit,
84 tins milk,
2 gals. oil,
1 gal. alcohol,
2,400 tea tablets in hermetically sealed tins,
1 primus stove,
Matches, piek-axe, hatchets, tent, sleeping robes,
1 Mannlicker rifle,
250 rounds ammunition,
1 pair snow-shoes,
Snow knives, candles, and tracing of map, Wrangell island.

They are to pick up more supplies which have been cached along the trail, the idea being to keep full loads all the time, and in this way keep moving supplies further in shore. Gave each man one new suit jaeger underwear.

Feb. 20th.—Blowing a gale, snowdrift. Wind E. Kuralik's back troubling him a good deal. I was going to leave today with the remaining party, but will remain till the Eskimo is all right. We have two lame dogs, and this will give them a chance to recuperate. One of them has a bad tear in its leg. Put nine stitches in it yesterday.

Feb. 21st.—No let up in wind. Eskimo's back no better. In any case the weather is too bad for travel, and it is better under the circumstances to be eating our supplies at the camp, than further along the trail. The two dogs are also improving.

Feb. 22nd.—No let up in wind. Eskimo fitting up harpoon and spears. We still have several seal left. We are giving the dogs seal meat, in fact, whilst the dogs are at the camp they get all the seal meat and pemmican that they can eat, for we have plenty of pemmican.

Feb. 23rd.—Storm breaking. Huge banks of snow accumulated around the camp, in fact, we are all snowed in. I had two of the crippled dogs in our igloo, the others in the big igloo that had been occupied by the party who have gone into the island. It took us nearly all day to dig our way to where the dogs are.

Feb. 24th.—4 a.m. Began loading sledges; with the Eskimo Kuralik are his wife and two children. The baby was carried on the mother's back from the camp to Wrangell. The little girl, ten years old, walking. Templeman goes with them.

The following supplies on Kuralik's sledge:—

4 cases man pemmican,
48 tins milk,
2 tins biscuit,
1 case oil,
2,400 tea tablets in hermetically sealed tins,
1 ·30-30 Winchester rifle,
200 rounds ammunition,
1 tent,
1 primus stove,
1 axe, two pick-axes, candles,
1 gal. alcohol,
Matches, snow-knives, and sleeping robes.

His sledge was drawn by five dogs.

Katktakovik's sledge drawn by three dogs, had the following supplies:—

3 cases man pemmican,
36 tins milk,
2 cases biscuit,
10 gals. oil.
2,400 tea tablets.

My own sledge. drawn by four dogs, had the following supplies:—

4 cases man pemmican,
2 cases biscuit,
36 tins milk,
12 tins coal oil,
2,400 tea tablets,
1 tent, matches, primus stove,
1 axe, two pick-axes, candles, matches, snow-knives,
1 gal. alcohol,
1 pair snow-shoes,
1 pair skis,
1 Mannlicker,
250 cartridges,
1 Colt revolver,
100 rounds ammunition,
Rope, and spare harness, sleeping robes.

In my own party were: McKinley, Mamen, Kataktektovik.

Mamen was nursing a dislocated knee-cap, and of course, could not assist in pulling the sledge. McKinley helped me with my sledge.

We got away just before noon, and left the British ensign flying over the camp. Two transits about 3,000 lbs., pemmican, 80 cases biscuit, 200 sacks coal, 10 cases of gasoline, 2 drums coal oil, and odds and ends were left behind. At nightfall, we pitched the tent a little beyond second camp. We intended to build an igloo, but it was so dark, and we were so tired that we did not do it. Spent a miserable night under canvas.

Feb. 25th.—At dawning broke camp. Wind NE. light. Fine and clear. 4th camp found note from Munro saying they had shot a bear and were held up by bad weather, also the trail beyond here was badly smashed, and some of the supplies could not be located.

4.15 p.m. Caught up with Kuralik. Owing to our oil that we were to get having been destroyed by the ice running over the cache, I decided to send McKinley and Kataktekovik tomorrow back to Shipwreck for oil. We now built an igloo, and whilst building the igloo I tried to locate the trail which had been destroyed in the previous storm. In some places I could pick it up. Returned back to camp at dark.

Feb. 26th.—McKinley, with Eskimo, one sledge, and all the dogs, left this morning at dawning for Shipwreck. During the night ice broke through the centre Eskimo igloo, fortunately they got out in time. We had in our igloo the same trouble. All hands up all night. Today with Eskimo did some scouting, could not locate any of the caches. From here on we can follow the trail made by the Munro party. The big storm has sent the ice well to the west, and today Herald Island bears ESE., Wrangell SSW.

Feb. 27th.—Ice rafting all night. Wind N. by W. Eskimo family had to build another igloo. The one we are in still standing. At times we were all afloat. This afternoon in the distance we saw two men, belonging to the Munro party.

3.30 p.m. McKinley came back from Shipwreck, 15 gals. oil, two tins alcohol, 6,000 tea tablets, some fawn skins, and twelve seal skins.

Feb. 28th.—Daylight. With the two Eskimos broke camp; going over the trail made by the Munro party. Will leave behind at this cache two cases biscuit, and some alcohol.

1 p.m. Came up with Munro and the Mallock party. A huge rafter from 25 to 100 ft. high and about 3 miles wide barred further progress toward the land. The last storm has caused all this trouble, and there is no way to get around this, as it runs parallel with the island.

3 p.m. I told all hands to start in and build their igloos, and tomorrow with pick-axes we will begin to make a road through this rafter. Whilst they were building the igloo I made reconnaissance of the ice, returning to camp at dark.

March 1st.—Daylight sent back Chafe and Mamen for biscuit, that was left at the cache. All the others with pick axes began making road through rafter. Mallock and Maurer frozen feet. Wind NNW. cloudy. Late this afternoon Chafe and Mamen returned with biscuit.

March 2nd.—Daylight McKinley, Hadley, and Chafe left for shipwreck camp, taking 14 dogs, and one sledge. They are to get another sledge from Shipwreck, and to bring up full loads to us here. The remainder of the crowd working at road through rafter.

3 p.m. Through the big rafter and on to a small level floe. One of the men in going back to our camp lost himself, but fortunately we located him before dark. Sky overcast, light N. wind.

March 3rd.—Daylight, Munro and myself with two teams working supplies through rafter; sent the others to work through small rafter beyond the small level floe. We made three trips during the day, through the rafter. In the after-

noon sent two Eskimos toward land, they returned with report of better travelling when we get through the rafter, that we have been working at today. Fine, hazy toward the land.

March 4th.—Shifted camp to the S. side of rafter. Mamen, Eskimo, and myself, moving camp. The others working with pick-axe. About 4 o'clock finished working through the rafter, so we all went back to camp, and at 8 p.m. had supplies moved to the new camps on the south side of rafter. The two Eskimos building the three igloos. Wind NW. Sky overcast.

March 5th.—Daylight. Sent Munro and crowd to meet McKinley party. I went with the Eskimo toward the island, and laid out track for tomorrow. Long after dark Munro party returned. Did not meet the McKinley party.

March 6th.—Daylight, sent the others back to meet McKinley party. I went with the two Eskimos and the two Peary sledges and dogs, light loads, to a distance of about seven miles, where we threw off the loads, finding a large floe which would later on make a good camping ground. McKinley and party reached camp 4.30 p.m., having shot three bear on the road in. They brought the following supplies:

6 cases dog pemmican;
16 tins H. B. pemmican;
30 gals. gasoline;
Hatchets and snow knives.

They left at No. 1 cache, 4 cases dog pemmican, ten tins H. B. pemmican.

March 7th.—McKinley, Hadley and Mamen, went back for bear meat, the rest of the crowd ahead making trail, and working up supplies. Fine and clear. No wind. Temperature low. We have no thermometer, but the coal oil is quite thick, which shows that it is pretty cold. We welcome this cold weather for it means fine travelling weather.

March 8th.—Daylight, broke camp. All hands moving supplies to the big floe about seven miles away. Arriving here three of us went back for second load, leaving the others to build igloos. Fine, clear and calm all day.

March 9th.—Dawning, left with one Eskimo to blaze trail, leaving the others to move along supplies. For a while we had a good deal of picking, later a little better. Stone dark we all returned to camp of yesterday, having moved all our supplies ten miles along the trail. Two bears destroyed one case coal oil, and scattered two tins biscuits round the ice. The oil was all wasted, and a good deal of the biscuits were recovered, so it's not only the elements one has to contend with, but the polar bear as well.

March 10th.—Daylight, sent all hands with light load through bad piece of going. When that was negotiated they returned and took another load to the same piece of rough going. On getting through, built igloos; leaving the Eskimo to build the igloos, all hands returned and brought up balance of supplies. We now have all the supplies at this camp. Fine, clear, calm and frosty. Splendid working weather.

March 11th.—All hands working moving along supplies.

March 12th.—Dawning, left with two Eskimos and light loads. The others coming after.

1 p.m. Landed at ice spit, Wrangell Island. Found lots of driftwood. Later on in the evening the balance of the party turned up. Here we built three igloos; a beautiful day.

March 13th.—Munro, Chafe, Breddy, and Williams, with all the dogs and the sledges went back to fetch up the supplies. They made two loads to the spit, finishing at dark. We now have all supplies on the land. Sent Kurallik for a scout in a NW. direction along the island, to see if the mate's party or the MacKay party had landed. Also to find out if any new bear tracks along the

coast. He saw nothing of the other parties, and reported seeing nothing alive in the shape of game.

March 14th.—We are all drying out our foot gear. We can do this readily because we have plenty of fuel. I sent the Eskimo for a scout on the land, thinking there may possibly be reindeer. He returned late in the afternoon saying he had seen nothing, and that owing to there being so much snow on the land that cariboo were not on the island. He saw no fox tracks, nor hare tracks. He thought later on that it would be a good place for ptarmigan. Wind fresh SE.

March 15th.—Blowing a gale ESE. and snowdrift. We are all drying out our clothes. Mamen's leg bothers him a good deal today.

March 16th.—4 a.m. Light NW. wind, cloudy.

8 a.m. Blowing a gale.

Munro, Breddy, and Williams were to start back to Shipwreck for more supplies. The weather being too bad they gave it up. Mamen's leg causing him a good deal of suffering.

March 17th.—Light NW. wind.

8 a.m. Munro, Breddy, and Williams, with one sledge and 16 dogs, left for Shipwreck. I intend to-morrow to leave with Eskimo for the Siberian coast, and thence to journey eastward to the East Cape, and then get in touch with the Naval Service at Ottawa, leaving the men on the island. McKinley and I getting together supplies and equipment for my journey. Had the Eskimo build an igloo, and late this afternoon McKinley, Mamen, with the Eskimo and myself moved in.

March 18th.—8 a.m. Wind NW. Snowdrift. Before leaving I left instructions with McKinley for Mr. Munro. Mr. Munro, the chief engineer, is in charge during my absence. I also had McKinley go over with me a list of the supplies left on the island. My instructions to Mr. Munro and the list of supplies left on the island are in possession of the Deputy Minister, Mr. G. J. Desbarats.

Before leaving, I told the men to write a short note to their friends, which was done. I am taking with me the Peary sledge, seven dogs, and the Eskimo boy, Kataktekovik. Shortly after leaving strong NW. wind and snowdrift. We followed the coast to the SE. and keeping a sharp look-out for any traces of the mate's party and the MacKay party.

6.30 p.m. Built an igloo near Skeleton island.

March 19th.—8 a.m. Gale NW. wind, and blinding snowdrift. Broke camp and followed the shore.

11 a.m. Passed Hooper cairn.

5.30 p.m. Built igloo. Fine and clear. The dogs pulling fairly good. The going all that one could desire. I notice after rounding Bruit spit and then following the south coast of the island little or no driftwood.

March 20th.—7 a.m. Strong NW. wind. Blinding snowdrift. It was my intention of now going out on the sea-ice, and making a bee-line across long Strait for Cape North on the Siberian coast, a distance of 160 miles. I found, however, that the ice was piled up at this place that it would take me days to work my way through. The snow was also very deep and soft. I now followed the shore crossing over the Rodgers Harbour spit in to Rodgers harbour to see if the mate's or the MacKay party were there. I then followed the coast westward to Hunt point. Dark—built igloo.

March 21st.—Dawning, broke camp, wind fresh east, snowdrift. Sometimes followed the shore, and then again on the ice close to the shore. Travelling on the land being bad, owing to the high winds blowing the snow on to the ice, whilst on the ice we had the deep soft snow to contend with. Dark, built igloo.

Mar. 22nd.—Dawning, broke camp. Made another effort to get on the sea-ice. Deep soft snow and heavy rafters blocked the way. In returning back to the land, broke the sledge, which necessitated a couple of hours delay to repair. On getting back to the land, we found better going, and then again getting on the ice near the shore, the going improved. We followed the shore to the Blossom point. It has been foggy all day, and the poor light bothers us a good deal.

Mar. 23rd.—Broke camp at dawning. Shortly after leaving broke our sledge, but soon had it repaired. While the Eskimo was repairing the sledge, I went ahead with the pick-axe. We are now making a road from Blossom point to the running ice, the distance being about five miles. Wind fresh W. Overcast sky. The poor light bothers us a good deal and makes the finding of a good road very hard indeed. Late this afternoon we reached the edge of the still ice and spent two hours making a road through the edge of the rafter. This evening we built the igloo on the still ice. Tomorrow will see us on the running ice.

Mar. 24th.—Dawning broke camp. Worked our way through the rough going in the rafter and let ourselves onto the running ice. Owing to strong gale west wind and open water, we have a good deal of condensation. A good deal of criss-cross travelling was done today. The road to the south being blocked by open water. We saw a seal in an open lead, but at the time our attention was taken up in trying to get our sledge off thin ice, so we did not bother with an attempt to secure it.

Mar. 25th.—Dawning, a howling gale from the west, and blinding snow-drift. The young ice and open water necessitates our going at right angles to a true south course. Several times the sledge has broken through, and the dogs evidently do not appreciate the water, and are very much frightened. Unfortunately, our sleeping gear wet. We saw bear tracks.

5 o'clock built igloo. Although we have been hard at it all day, I don't think the distance made good will exceed four miles.

Mar. 26th.—Dawning, fine, wind light east. Shortly after leaving, shot seal. Had a good deal of trouble getting it. But with a line attached to a weight the Eskimo managed to lasso it. Crossed a wide lead young ice, then on to a large rough heavy old floe, using a pick-axe. Later wind blowing a living gale from the east. Open water. Air thick, condensation, bad light, built igloo. Distance made good about five miles.

Mar. 27th.—Shortly after midnight wind hauled to the west, blowing a gale. It unroofed the igloo, resulting in our getting a good snow-bath. We had to turn out and fix it. Dawning we left. It is just as well to be on the road as in the igloo, although the weather is beastly. One of the dogs broke his trace and got away. Shortly afterwards secured it.

10 a.m. Stopped by a big open lead of water running east and west. We travelled two hours to the eastward, and found a large piece of ice, which had broken off. On this we placed the sledge and dogs and ferried across to the opposite shore.

March 28th.—7 a.m. Broke camp. Miserable light for travelling. Got our sledge and ourselves in water. Fortunately the two of us managed to get out without getting very wet, and saving the sledge before it disappeared. All our clothes and sleeping robes more or less saturated with water. Late this afternoon. Wind moderating. Nice and clear. Also spring-like.

6 p.m. Built igloo. Camped for the first time on an old floe, and could make tea from ice. Before this, we had to use snow.

Mar. 29th.—Shot a bear near camp this morning.

7 a.m. Finally got away from camp and was soon held up by open water. We followed the edge until noon in a SE. to ESE. direction. Shot one seal, saw several more. Crossed the lead, noon. Dark, built igloo. I think we have made ten miles good today. Wind fresh.

Mar. 30th.—The first fine day for a long time.

6 a.m. Broke camp. Encountering leads of open water all day. On young ice for some time without getting to the opposite shore. Another lead we had to make four trips to get across. Wind south to east. Just before sunset saw land, bearing SW.

Mar. 31st.—Fine and clear. Wind light east. Shortly after leaving strong wind. Better luck negotiating leads. Noon a narrow lead which ran a long distance at right angles to our course we could not cross. Sledged for two hours along edge to the east. At last the distance was small enough to admit of us unloading our sledge and throwing the things we had on the sledge the other side. Our dogs are playing out, and three of them are very sick. This evening can see land quite distinctly.

April 1st.—Wind east. Waiting for dawn to get under way. For two hours good going.

11 a.m. Leads open water gave us some trouble. Later on heavy ice. Using pick-axe.

4 p.m. Strong wind. Dark, built igloo. Dogs very tired.

April 2nd and 3rd.—Dawning got away. Encountered open water. At last we struck some good going, and then some old floes and rafters. Dark, camped near land. Midnight the ice split right through the igloo, opening for about two feet. Up all night. Daylight calm. Ice moving in all directions. Very bad light, which worries us a good deal. Dogs very poor.

6 p.m. Built igloo. Our eyes bother us.

April 4th.—6 a.m. Eskimo and myself started in using the pick-axe to make road. A very nice morning.

10 a.m. Went back, hitched up the dogs, bringing them over the trail. Whilst I went back, Eskimo kept working with pick-axe. 4 p.m. We reach the end of the rough ice and on to a level floe which brings us to the Tundra of the Siberian shore.

April 5th.—I did not exactly know our position on landing. Later on I found we had landed some sixty miles west of North cape. Dawning we went back over the trail of yesterday, and picked up some things that we had left. The light was awful, and although we had yesterday's trail to go over, at times we could hardly locate it.

9 a.m. Returned to igloo on shore with balance of things.

10 a.m. We left following the Tundra to the east. Thick snow so we cannot see far.

1 p.m. Reach three Eskimo igloos and were made comfortable.

April 6th.—Spent all day in the igloo drying out our clothes. We had some deer meat. Of course, these people have no flour or biscuit.

April 7th.—10 a.m. Left the igloo. An Eskimo with one dog and a sledge going with us as far as the North Cape. Fine and clear. Our dogs can just move along. Two of them are almost dead. Dark—built igloo. Two dogs perished today.

April 8th.—Dawning, left igloo following edge of Tundra. The Eskimo loaned me his dog. Dark, reached Cape North. Here I met two Russian traders. One can speak a little English. I spent the night with some Eskimos and was very comfortable.

April 9th.—Dawning, strong wind and drift.

10 a.m. Clearing, still blowing hard. We got away from the igloo. They gave us one dog. We have now five. Dark, built igloo.

April 10th.—8 a.m. Broke camp. Bright sunshine. Light east wind. Eskimo complains of his hands and feet. I suffer a good deal of pain in my arms. Noon—came to two igloos. Here I traded a Colt revolver and some cartridges for a dog. Two of our dogs lay down. One perished, the other one I carried on the sledge. Left this igloo at two p.m., reached two more igloos, where a man told me I could have a dog on condition that I would send him two hundred Remington cartridges by a trader some time next summer. Here we got some dog meat also.

April 11th.—Broke camp, but found two of the dogs had eaten their harness, and went back to the place where they belonged. Sent Eskimo back with a sledge to locate dog. He turned up some hours afterwards with the man who had traded the dog with me for the Colt revolver. The other dog he did not see. We went on with that dog, and at dark we built an igloo. We brought one of the dogs in the igloo with us, thinking he was secure.

April 12th.—The dog got away from us during the night, chewed his harness and burrowed his way through the igloo. The distance was too great to go back and look for it.

6 a.m. Broke camp, and at dark we built our igloo. Good going all day.

April 13th.—5 a.m. Broke camp, and toward evening spoke to an Eskimo picking up driftwood. Later on he overtook us, and gave us a lift. Sunset built igloo, the Eskimo coming in with us. Shortly afterwards, three large teams of dogs came along, and to my surprise and joy they brought the dog that had strayed away from us. It was the dog that I traded the Colt revolver for, and the man knew of our predicament and sent the dog back by these men.

April 14th.—Wind a gale, west. The other Eskimo getting away before we did. They said that our dogs were very slow, and it was no use for them to wait. I wanted to trade a rifle, but I had no cartridges, so of course I could not get the dogs. Long after dark, we reached an igloo with three people in it, and here we spent the night.

April 15th.—6 a.m. Left igloo. Beautiful morning. Good going. 5 p.m. Reached Cape Wankarim. I am almost blind.

April 16th.—Dawning, left Wankarim. The man who owned the igloo we slept in last night said he would come to two igloos about ten miles away, giving us a lift with his team. Dark. That night reached a solitary igloo inhabited by two very old people, who were very hard up for food.

April 17th.—Just before dawn got away from the igloo, and late tonight made Eoliuchan Island. From the time we left the igloo this morning, until dark, we did not see a thing along the trail, owing to the thick weather, and were right on the island before we saw it.

April 18th.—Forced to give ourselves a rest, and dry out our foot gear. I gave ten dollars to a fellow for a dog. The dog was not of much use, but better than nothing. People treated us very kindly.

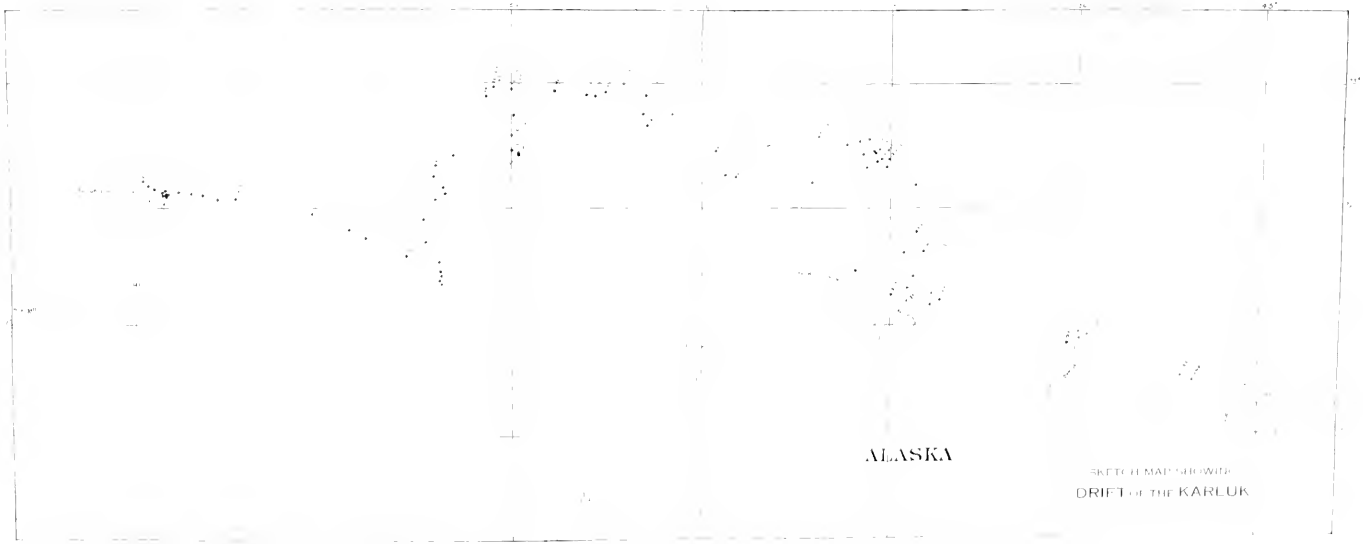
April 19th.—8 a.m. Got away from the Island. An old man with a team going to Koliuchan gave us a lift.

April 20th.—Late in the afternoon reached a trader's place at Koliuchan. Here I obtained some flour and a little bacon. The first we had had for some time.

April 21st—After a good long sleep pulled out with two teams I secured from Olsen. Late in the afternoon we put up at an igloo.

April 22nd.—Little after midnight we got away from the igloo, and at 3 p.m. reached Cape Serdge. Here I met Mr. Wall who was very kind. I secured a team from Mr. Wall for myself and another one for the Eskimo, and on April 24 reached East cape, where I put up with a Russian trader, Mr. Caraifaff. On May 16 I reached Emma harbour. Baron Kleist, the supervisor of the

North-east Peninsula of Siberia, accompanying me from the East Cape to his home at Emma harbour. He extended to me the hospitality of his home. His doctor treated my legs so that I could in a few days be my own self again. Whilst here we heard that a steam-whaler was in the vicinity, and later found out that it was the *Herman*, Captain Peterson. I sent several letters in the hope of intercepting the *Herman* and on the 21st May the *Herman* arrived at Emma harbour. Capt. Peterson kindly offered to land me either at Nome or St. Michael. Arriving off Nome owing to ice he could not get in to shore, but landed me at St. Michael, Alaska, Thursday evening, 7 o'clock, May 28. The next day I sent a telegram to Mr. G. J. Desbarats, Naval Service, Ottawa, apprising him of the loss of the *Karluk*, and my return to St. Michael. Stayed in St. Michael until end of June, and in July, reached Nome, and on the evening of July 23, joined U.S.R.C. *Bear* at Nome, the Naval Service securing her assistance to go and rescue the men on Wrangell island. On the evening of Aug. 25 we were about ten or fifteen miles from Wrangell island. Thick weather and the *Bear* having run short of coal, her Captain decided to go back and secure coal at Nome. On Sept. 8, at 1,30 p.m. when about 75 miles south of Rodgers harbour, Wrangell island, came up with the *King and Wing*, with Munro, Williamson, McKinley, Chafe, Williams, Templeman, Hadley, Maurier, on board, Mallock, Mamen and Breddy having died on the island. The survivors were transferred to the *Bear*. The *Bear* then proceeded to Herald Island; on the morning of Sept. 9 we were about 12 miles from the Island with no chance owing to heavy ice in getting nearer. The *Bear's* Captain decided to go to Nome, reaching that place on Sept. 13. On Oct. 25 the survivors were landed at the Navy yard, Esquimalt.



SKETCH MAP SHOWING
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The Deputy Minister,
Department of the Naval Service,
Ottawa, Ont. July 23, 1915.

SIR,—I have the honour to submit herewith a financial statement showing the expenditure under the various appropriations and the revenue received by the department during the fiscal year ended March 31, 1915.

The expenditure on account of H.M.C.S. *Niobe* and H.M.C.S. *Rainbow* up to the outbreak of the war (August 4, 1914) has been charged to the Naval Service Appropriation, and after that date to the War Appropriation.

Several of the Fisheries Protection Service and Hydrographic Survey steamers were used at different periods as auxiliary war vessels and the expenditure incurred during such periods has been charged to the War Appropriation. This accounts for the decreased expenditure under the Fisheries Protection Service and Hydrographic Appropriations as compared with Fiscal Year 1913–14.

The figures given in connection with the Fisheries Appropriations and Revenues are for the whole of the fiscal year, including the first three months while under the Department of Marine and Fisheries.

A statement of stores supplied, work done and advances made on behalf of the British, Japanese and Russian Governments, etc., also submitted. These disbursements amounting in all to $708,996.46 are not included in the amounts charged to War and Naval Appropriations, but are carried forward in Suspense to Fiscal Year 1915-16.

I have the honour to be, sir, your obedient servant,

L. J. BEAUSOLEIL,
Chief Accountant.

STATEMENT of Appropriation Accounts for fiscal year 1914-1915

Service.	Appropriation	Expenditure.	Balance Unexpended.
	$	$	$
Naval service	1,000,000 00	512,805 66	487,194 34
Fisheries protection service	375,000 00	144,055 42	230,944 58
Hydrographic surveys	390,000 00	213,392 39	176,607 61
Radiotelegraph service	370,000 00	219,006 95	150,993 05
Tidal service	45,000 00	20,177 70	24,822 30
Patrol of the Northern waters of Canada	100,000 00	95,172 16	4,827 84
New Fisheries Protection steamers	230,000 00	5,422 54	224,577 46
Rewards for saving life, including life saving stations	125,400 00	103,622 78	21,777 22
Fisheries.	2,635,400 00	1,313,655 60	1,321,744 40
Salaries and disbursements of fishery officers	290,000 00	275,950 71	14,049 29
Building fishways and clearing rivers	30,000 00	9,670 37	20,329 63
Legal and incidental expenses	4,000 00	3,737 87	262 13
Canadian Fisheries museum	16,000 00	6,086 08	9,913 92
Oyster culture	6,000 00	5,998 93	1 07
Cold storage and transportation of fresh fish	150 000 00	71,873 96	78,126 04
Dogfish reduction works	60,000 00	37,882 91	22,117 09
Services of Customs officers *re* Modus Vivendi licenses	900 00	478 80	421 20
Fisheries Intelligence bureau	10,000 00	6,102 22	3,897 78
Fisheries Patrol service	180,000 00	162,949 86	17,050 14
Exhibit of fresh and cured fish (Toronto Exhibition)	15,000 00	12,417 89	2,582 11
Fish breeding establishment	400 000 00	370,093 17	29,906 83
Inspection of canned and pickled fish	50,000 00	4,891 75	45,108 25
Building fisheries patrol boats	40,000 00	12,079 44	27,920 56
Fisheries Patrol steamer for Lake Winnipeg	184,400 00	163,183 51	21,216 49
Removal of obstructions Fraser River	110,000 00	109,918 85	81 15
Investigation of Hudson Bay Fisheries	15,000 00	14,275 43	724 57
Compensation to families of drowned fishermen	2,400 00	2,400 00	.....
International Fisheries Commission	5,000 00	.....	5,000 00
Expenses investigating claims for compensation under the Pelagic Sealing Treaty	15,000 00	14,784 76	215 24
Marine Biological stations and investigations	21,000 00	21,000 00	.....
	1,604,700 00	1,305,776 51	298,923 49

STATEMENT of Appropriation Accounts for fiscal year 1914-1915—*Concluded.*

Service.	Appropriation	Expenditure.	Balance unexpended.
	$	$	$
Civil Government salaries	107,600 00	85,964 87	21,635 13
Contingencies	37,000 00	34,003 60	2,996 40
	144,600 00	119,968 47	24,631 53
Fishing bounty	160,000 00	159,584 14	415 86
Recapitulation.			
Naval Service	2,635,400 00	1,313,655 60	1,321,744 40
Fisheries	1,604,700 00	1,305,776 51	298,923 49
Civil government	107,600 00	85,964 87	21,635 13
Contingencies	37,000 00	34,003 60	2,996 40
	4,384,700 00	2,739,400 58	1,645,299 42
Fishing bounty	160,000 00	159,584 14	415 86
War appropriation		3,096,125 35	
Total expenditure from appropriations fiscal year 1914-15		5,995,110 07	
Suspense Account (recoverable) transferred to 1915-16 being amount due for stores supplied and work done on behalf of the British Admiralty, Japanese and Russian Governments, etc.		708,996 46	
		$6,704,106 53	

STATEMENT of Revenue of the Department of the Naval Service for Fiscal year ended March 31, 1915.

Royal Naval College—College fees, 12 cadets		$ 1,200 00
Fisheries revenue		92,757 02
Modus Vivendi (licenses to United States fishing vessels)		8,878 75
Casual revenue		19,749 68
Miscellaneous revenue		1,212 39
Wireless apparatus licenses		310 07
Wireless operators examination fees		185 00
Radiotelegraph revenue—		
Alert Bay Station	$ 572 10	
Cape Lazo Station	356 85	
Dead Tree Point Station	569 53	
Digby Island Station	2,[illegible]47 89	
Estevan Station	1,841 60	
Gonzales Hill Station	2,940 92	
Ikeda Head Station	101 92	
Pachena Point Station	1[illegible]8 01	
Point Grey Station	729 01	
Triangle Island Station	1,281 60	
Magdalen Islands Station	322 99	
Midland Station	2 31	
Point Edward Station	11 35	
Port Arthur Station	17 71	
Sault Ste Marie Station	15 04	
Tobermory Station	42	
Kingston Station	1 61	
Port Burwell Station	5 60	
Toronto Station	31 8	11,738 35
		$ 136,031 23

FISHERIES Revenue for fiscal year ended March 31, 1915.

Provinces.	Amount Collected	Refunds.	Net amount.
	$	$	$
Ontario	918 80		918 80
Quebec	7,639 75		7,639 75
New Brunswick	14,273 99	10 00	14,263 99
Nova Scotia	7,415 80		7,415 80
Prince Edward Island	2,046 50		2,046 50
Manitoba	8,312 08		8,312 08
Saskatchewan	4,346 65	17 00	4,329 65
Alberta	6,168 50	66 00	6,102 50
British Columbia	41,673 95	250 00	41,423 95
Yukon	304 00		304 00
	93,100 02	343 00	92,757 02
Modus Vivendi licenses	8,973 50	94 75	8 878 75
Grand total			101,635 77

Statement of amounts outstanding in respect to stores supplied, work done, and advances made on behalf of the British, Japanese, and Russian Governments, etc., at end of fiscal year 1914-1915.

British Admiralty	$	633,979 57
British War Office		27,477 46
Japanese Government		23,640 54
Russian Government		18,575 28
Militia and Defence Dept		1,062 48
Miscellaneous		4,261 13
		708,996 46

STATEMENTS of Expenditure under the Naval Service and War Appro-

		H.M.C.S. *Niobe.*	H.M.S.C. *Rainbow.*	Halifax dockyard.	Esquimalt dockyard.	Royal Naval College.	Submarines and depots.
		$	$	$	$	$	$
1	Pay and allowance	239,498 99	91,345 47	.....	1,461 03	43,304 56	35,697 69
2	Stores and allowances	146,354 67	124,364 66	161,589 70	161,291 59	15,323 27	24,516 34
3	Medical services	248 15	819 90	30 00	892 00	179 60	659 20
4	Cadets in training ships	.....	.....	.....	.....	320 26	.....
5	Repairs and maintenance	34,186 00	14,737 24	40,334 53	46,858 72	9,563 44	13,342 45
6	Works, lands, bldgs., etc	.....	.....	8,786 98	126 65	.....	.....
7	Misc. effective services	18,704 10	12,116 22	4,289 16	8,369 70	8,431 46	7,542 91
8	Headquarters	.....	.....	.....	.....	.....	.....
9	Noneffective pay	7,869 58	3,471 45	.....	.....	622 95	.....
10	Coast and Harbour defences	.....	.....	.....	.....	.....	.....
11	Recruiting expenses	769 88	2 00	.....	.....	.....	.....
12	Cost of New ships	.....	.....	.....	.....	.....	1,150,000 00
13	Separation allowances	27,067 52	4,448 82	.....	.....	.....	2,526 25
14	Examination service	.....	.....	.....	.....	.....	.....
15	Mine sweeping and patrol	.....	.....	.....	.....	.....	.....
16	Naval intelligence	.....	.....	.....	.....	.....	.....
17	Suspense account†	.....	.....	.....	.....	.....	.....
18	Subsistance of prisoners	.....	173 80	.....	.....	.....	.....
	Grand total	474,698 89	251,479 56	215,030 37	218,999 69	77,745 54	1,234,284 84
	Less.						
	Arisings, etc	.....	.....	1,788 47	1,180 82	.....	.....
	DONATIONS,—						
	Brandram Henderson Ltd. 3,092 50						
	Martin Semour Co. 2,500 00	.....	.....	.....	.....	.....	.....
	Cowan Co., Ltd. (chocolate)						
	604 80	.....	.....	.....	.....	.....	.....
		.....	.....	.....	.....	.....	.....
		474,698 89	251,479 56	213,241 90	217,818 87	77,745 54	1,234,284 84
	Proportion chargeable to,—						
	Naval appropriation	*73,802 86	*47,454 28	202,703 84	90,537 67	77,745 54	.....
	War appropriation	400,896 03	204,025 28	10,538 06	127,281 20	.....	1,234,284 84

*Expenditure to outbreak of war only

†Marine and Fisheries.....$ 1,085 87
Railways and Canals..... 3 60

priations for fiscal year ending March 31, 1915.

H.M.C.S. *Shearwater* Depot.	H.M.C.S. *Prince George* Hospital.	H.M.C.S. *Protesilaus.*	H.M.C.S. *Diana* (depot)	Atlantic Coast Defence.	Pacific Coast Defence.	Barrington Wireless Station.	General account.	Total.	
$	$	$	$	$	$	$	$	$	
65,060 38	6,573 35	.....	54,269 56	10,798 23	.....	.....	17,211 48	565,220 74	1
55,601 67	9,928 36	14,739 59	40,705 01	11,737 64	.....	.....	27,165 97	793,318 47	2
772 15	3 00	.....	776 52	33 00	.....	.....	106 50	4,520 12	3
.....	.....	.....	.....	.....	.....	.....	.....	320 26	4
11,886 90	5,467 15	.....	1,582 52	1,153 22	.....	.....	34 60	179,146 77	5
.....	.....	.....	.....	.....	.....	40,857 34	.....	49,770 97	6
5,337 73	25,597 66	2,533 94	11,501 18	726 93	.....	.....	55,804 38	160,955 37	7
.....	.....	.....	.....	.....	.....	.....	20,932 73	20,932 73	8
.....	.....	.....	.....	.....	.....	.....	205 70	12,169 68	9
.....	.....	.....	.....	59,762 22	71,820 55	.....	.....	131,582 77	10
53 00	.....	.....	6 00	.....	.....	.....	259,83	1,090 71	11
.....	.....	.....	.....	.....	.....	.....	.....	1,150,000 00	12
4,112 60	.....	.....	7,033 05	.....	.....	.....	.....	45,188 24	13
.....	.....	.....	.....	123,572 15	135,266 97	.....	.....	258,839 12	14
.....	.....	.....	.....	226,205 90	11,313 83	.....	.....	237,519 73	15
.....	.....	.....	.....	1,321 56	4,700 09	.....	.....	6,021 65	16
.....	.....	.....	.....	.....	.....	.....	1,089 47	1,089 47	17
192 10	.....	.....	45 00	.....	.....	.....	.....	410 90	18
143,016 53	47,569 52	17,273 53	115,918 84	435,310 85	223,101 44	40,857 34	122,810 66	3,618,097 70	19
.....	.....	.....	.....	.....	.....	.....	.....	2,969 29	..
.....	.....	.....	.....	.....	.....	.....	.....	.....	..
.....	.....	.....	.....	.....	.....	.....	6,197 30	6,197 30	
.....	.....	.....	.....	.....	.....	.....	.....	.....	..
143,016 53	47,569 52	17,273 53	115,918 84	435,310 85	223,101 44	40,857 34	116,613 36	3,608,931 11	
.....	.....	.....	.....	305 42	98 93	.....	20,157 12	512,805 66	
143,016 53	47,569 52	17,273 53	115,918 84	435,005 43	223,002 51	40,857 34	96,456 24	3,096,125 35	

STATEMENT of Jobs Completed in the Workshops and Stores Supplied at the Halifax and Esquimalt Dockyards during fiscal year 1914–1915.

Service.	Halifax.	Esquimalt.
Naval service	$ 322,695 33	$ 254,554 17
Fisheries protection service	36,726 39	40,820 46
Hydrographic surveys	18,821 14	10,835 76
Life saving service	1,451 85	1,248 10
Radiotelegraph service	588 93	7,616 38
Fishery patrol service	4,423 97	.....
Dept. of Militia and Defence	7,463 22	210 27
Dept. of Marine	3,790 34	5,511 50
Dept. of Railways and Canals	106,73	.....
Dept. of Customs	188 53	.....
British Admiralty	85,887 37	128,305 65
Japanese Government	.....	31,244 65
Patrol of Northern Waters of Canada	.....	1,341 07
Sundries	.....	896 89
	$ 482,143 80	$ 482,584 90
Wages paid	$ 119,569 48	$ 119,696 65
Salaries	$ 25,668 25	$ 23,057 47

NAVAL SERVICE.

OTTAWA, April 1, 1915.

The Deputy Minister,
Department of Naval Service,
Ottawa, Ont.

SIR,—I have the honour to report regarding the Naval Service for the fiscal year ending March 31, 1915.

The progress, both mental and physical of the cadets at the Royal Naval College at Halifax still proves most satisfactory.

An examination for the entry of cadets to the college was held in May, 1914, and eight candidates were entered. The officers of the college continue to report most favourably on the cadets, and the senior cadets and midshipmen who have been serving in ships of the Royal Navy and H.M.C.S. *Niobe* and other Canadian vessels since the outbreak of the war have also been most favourably reported upon and have proved themselves capable and efficient.

Four midshipmen: Messrs. Silver, Palmer, Hatheway and Cann, were unfortunately lost in H.M.S. *Good Hope* when that vessel was sunk in action.

With regard to the activities of the Naval Service Department in relation to the war, preparations having previously been made to meet all contingencies which could be foreseen, it was only necessary to carry out or expand these preparations when war appeared imminent.

At the time *Rainbow* had been commissioned for patrol duty in Behring Sea and was therefore ready for immediate service, whilst *Niobe* was laid up at Halifax with a care and maintenance crew on board, which ensured her being kept in such a condition as would enable her to be placed in commission at short notice.

On the declaration of war *Niobe* and *Rainbow* and the officers and men serving in them, were placed at the disposal of the Admiralty. Both these vessels since that time, have been employed upon continuous and arduous duties at sea.

Arrangements were immediately made to commission *Niobe* and to complete her crew to full sea-going requirements. This was done partly by the transfer of the Imperial officers and men of the sloops *Algerine* and *Shearwater*, which, owing to their small fighting value, had been ordered by the Admiralty to pay off at Esquimalt, and partly by the inclusion of one hundred Newfoundland naval reserve men; the remainder of the crew being recruited from men who had served in the British navy and were resident in the Dominion. A large number of these volunteered their services and as many as necessary were entered for service during the period of the war.

The Dominion Government shortly before the outbreak of war purchased two submarines which were building at Seattle for the Chilean government. The crews were recruited from officers and men in the Dominion, the government being fortunate in this respect in obtaining the services of two retired officers of the Royal navy who had previous experience in submarines. These vessels also were placed at the disposal of the Admiralty.

Permission was also obtained from the Admiralty to use the *Shearwater* as a depot ship for the submarines.

These three vessels have all been actively employed in the defence of the British Columbia coast.

Naval depots have been established at Halifax and Esquimalt, in the former place for the accommodation of supernumerary ratings awaiting draft, and in the latter for the training of the Royal Naval Canadian Volunteer Reserve officers and men.

A large number of other vessels are being used for various subsidiary duties.

The Ice-breaker *Earl Grey*, on her sale to the Russian Government, was transferred to this department to be sent to Archangel. A crew of naval ratings was provided and the vessel was successfully navigated to her destination, the voyage of 3,000 miles being completed in fourteen days.

On arrival at Archangel she was turned over to the Russian authorities. The crew returned by ordinary steamer.

Personnel.—Recruiting has been actively carried on to complete *Niobe's* crew as previously stated and to obtain the requisite crews for the other vessels employed on subsidiary duties, preference being given to men with previous naval experience.

The naval volunteers which were established just previous to the outbreak of war, developed largely in the West, where some three to four hundred officers and men are enrolled. Steps are now being taken to enroll volunteer officers and men for the Atlantic division to meet requirements of ships and establishments on the east coast.

These volunteers have done good service both ashore and afloat, a considerable number having served continuously in the *Rainbow* since the outbreak of hostilities, and for other purposes as requisite. Their training is being continuously carried on.

The department has acted as recruiting agent for the Admiralty. A large number of Imperial Service officers and men have been reached and arrangements made for their transportation from all parts of the Dominion to England.

The health of the officers and men of the Canadian Navy has continued to be satisfactory.

I have the honour to be, sir,
Your obedient servant,

C. E. KINGSMILL,
Vice-Admiral-Director of the Naval Service.

FISHERIES PROTECTION SERVICE.

May 1, 1915.

The Deputy Minister,
Department of Naval Service,
Ottawa, Ont.

SIR,—I have the honour to report regarding the Fisheries Protection Service for the fiscal year ending March 31, 1915, as to the number of vessels and men employed, the whereabouts of the different vessels, the names of the commanding officers and brief descriptions of the vessels.

Extracts from the reports of the various commanding officers are included to give some idea of the work carried out during the season.

On the outbreak of war in August all the Fisheries Protection vessels on the east and west coasts were immediately required for examination service, mine-sweeping and other duties as laid down in the schemes of defence for Halifax and Esquimalt and, with the exception of one or two instances where they have been sent to investigate complaints of fishermen, they have continued to carry out these duties up to the present time.

The Fisheries Protection Service consisted of ten vessels last season, under the direct supervision of the Department of the Naval Service.

NAMES OF VESSELS AND THEIR COMMANDING OFFICERS.

Canada.—Lieutenant C. J. Stuart, R.N.R.
Curlew.—W. J. Milne.
Constance.—J. E. Morris.
Petrel.—Clement Barkhouse.
Gulnare.—C. T. Knowlton.
Vigilant.—P. C. Robinson.
Galiano.—Lieutenant R. M. Pope, R.N.R.
Malaspina.—Holmes Newcomb.
Restless.—Charles Moore.
Newington (Chartered).—P. J. Ledwell (Fishery Officer).

C.G.S. "CANADA"

Is a twin-screw steel ship, whose length is 206 feet, beam 25 feet, draught 11 feet 2 inches, registered tonnage 411 tons and speed 16 knots. She is armed with two 12-pdr. Q.F., and two 3-pdr. Hotchkiss guns, is electrically lighted throughout, and is fitted with a powerful searchlight. Her complement is 60 officers and men all told, and she was built by Vikers Sons & Maxim, Ltd., England, in 1904. She is commanded by Lieutenant Charles J. Stuart, R.N.R.

Canada was re-commissioned on the 1st April, 1914, at Shelburne, where she had gone on the completion of her annual refit. She left Shelburne on the 14th, arrived Halifax on the 18th and on the 21st took the Dominion Defence Committee to the mouth of the Harbour, where the various forts were inspected.

From the 29th to the 7th May ship cruised to the westward and on the 9th May proceeded to the Magdalen islands. After being delayed at Port Hawkesbury and Souris by drift ice she arrived at the Magdalen islands on the evening of the 16th May and, during the next two days, saw the fishing fleet arrive and depart. She left the Islands on the 19th May for Bay St. Lawrence where the lobster factory was inspected; on the 22nd coaled at North Sydney and returned cruising around Cape North to watch the schooners which had remained in that vicinity to fish. The life saving station at Cheticamp was inspected and on the 29th May *Canada* went to the assistance of an American schooner *Centennial* off Green point and towed her into the Gut of Canso.

On the 1st June ship arrived at Halifax, where some minor repairs were taken in hand, and on the 9th she left to cruise with the United States mackerel fleet. On arrival at Neil's harbour, C.B., on the 18th June, *Canada*, with the customs officer of that port, investigated complaints of local fishermen against the United States schooner *Laverna* trawling within the three mile limit, and on the 23rd left Louisburg and cruised west with the last of the mackerel fleet, arriving Halifax on the 26th June.

During the greater part of July ship was in dockyard hands, after which she proceeded to arrange for the annual practice in examination service, and on the outbreak of hostilities she was at once taken over for war service. On the 7th October she was returned to the Fisheries Protection service for a short time and sent to relieve *Constance* and watch the United States seiners off Port Hood, N.S. Ship cruised between Port Hood, Pictou and Summerside till the 11th October, only sighting one trawler, and then proceeded up the Miramichi river to Newcastle where the director of naval service embarked, and she proceeded to Cheticamp. *Canada* then left for Halifax and on the 20th, after coaling, proceeded to Yarmouth and once more embarked the director of naval service, who inspected the life saving station at Digby, and left the ship. Ship then returned to Halifax and war service, under which service she remained for the rest of the year.

C.G.S. "CURLEW"

Is a composite, single-screw vessel, whose length is 116 feet 3 inches, beam 19 feet 8 inches, draught 11 feet, speed $10\frac{1}{4}$ knots and registered tonnage 157.85 tons. Her complement is 22 officers and men all told, and she is commanded by Captain W. J. Milne.

The 1st April 1914 found the ship in commission at Yarmouth, watching the United States fishing vessels, several of which were using Yarmouth harbour.

On the 5th *Curlew* went to the assistance of a Canadian schooner, *Curlew*, which grounded in the harbour and on the 8th, the U.S. vessels having changed their harbour farther eastward, she cruised north to St. Mary's Bay, Westport, Digby and St. John; found all branches of the fisheries dull and bait scarce. Ship returned via Campobello and Grand Manan and found all fisheries, except the lobster, behind their usual condition, owing to the cold season. On the 27th April she cruised to Passamaquoddy bay and Grand Manan.

The pollock commenced schooling early in May to the southward of Grand Manan and were said to be more plentiful than they had been for twenty years. On 6th May *Curlew* visited Bay View and on the 9th, Little Wood island; at the latter place finding the life boat in need of repair, towed her to St. John and back. A fishing boat, *Hattie L.*, was taken in charge on 15th May for breaking the fishery laws in the pollock grounds off Grand Manan and after trial by the inspector of fisheries the occupants were heavily fined. Whenever opportunity occurred during the season ship cruised to St. John and along the St. John County shores in search of illegal fishing. On the 20th June the shores

from St. John westward were searched for illegal lobster fishing but none was found, and on the 27th *Curlew* located an uncharted shoal off Green island, Grand Manan.

On 1st July ship cruised the St. Croix river and on the 8th to Seal island to watch the United States fishing vessels fishing for lobsters outside territorial waters. The shores of Digby county were searched on 14th July and on the 30th *Curlew* received orders to proceed to Halifax, where she was placed on war duty which continued till the end of the fiscal year.

C.G.S. "CONSTANCE."

Is a single screw composite steamer, whose length is 115 feet 6 inches, beam 19 feet 6 inches, draught 11 feet 6 inches, and registered tonnage 125 tons. Her complement is 23 officers and men all told, and she is commanded by Captain J. E. Morris.

Constance was in dockyard hands undergoing repairs until the 2nd June, when she commissioned, swung for adjustment of compasses, and on the 3rd proceeded to sea cruising with the American seiners until the 10th June. On the 16th passed through the Gut of Canso to take up duties on station around Cape North and Prince Edward island. Ship visited Cheticamp on the 23rd and on the 24th arrived at Pictou. After conveying a member of the dockyard staff from Pictou to Cheticamp she proceeded cruising on her station until 2nd July. On the 3rd July she embarked the Minister of Militia and party at Charlottetown and conveyed them to Pictou, after which cruising was continued until the 9th. On the 10th ship proceeded to Richibucto with stores for the life saving station and then carried out fisheries duties in the Straits of Northumberland until the 28th. On the 29th *Constance* conveyed the Minister of Railways and Canals from Pictou to Cape Tormentine, Carleton point and Point du Chene, sailing from the latter place on the 31st July for Halifax, where ship was put on war service until 7th September, on which date she proceeded to Murray harbour. Here the reports received regarding beam trawlers operating inside the three-mile limit were thoroughly investigated and ship sailed for Georgetown, thence to Port Hawkesbury, and arrived at Halifax on the 12th. On the 13th she again sailed for Prince Edward island and continued cruising on station in company with the American seiners, boarding all vessels arriving in port, till 13th October. On the 14th October the seiners left for home waters and ship cruised westward towards Halifax, arriving there on the 15th. *Constance* was then taken over for war service again and continued until the end of the fiscal year in that service.

C.G.S. "PETREL."

Is a steel, single-screw ship, whose length is 116 feet, beam 22 feet, draught 9 feet, speed 11 knots, and registered tonnage 191 tons. Her complement is twenty-four officers and men all told, and she is commanded by Captain Clement Barkhouse.

This ship was undergoing repairs at Halifax until May 5th, when she proceeded to Liverpool, where she was hauled on the marine railway for cleaning and painting bottom. On the 14th she proceeded west to meet the American mackerel fleet and took up station off Shelburne. On the 20th May the first of the fleet arrived and *Petrel* cruised east with them, calling at Lockeport, Liverpool, La Have river, Lunenburg, Chester, Prospect and Terrance bay. The first fish were taken on the 29th May off Pearl island. Ship continued cruising with the fleet as it proceeded eastward until 19th June, when she was relieved

by *Canada* off Louisburg, and then proceeded to North Sydney, watching for stragglers. On the 22nd June she cruised through the Bras d'Or lakes towards Canso and then west calling at Isaac harbour, and arriving at Halifax on the 26th. *Petrel* then took up her station on the western division until the 30th June when she proceeded to Seal island and on July 3rd investigated the wreck of the *Alice Gertrude*, afterwards cruising on her station until 30th July on which date she was ordered to Halifax for war duty, since which time she has not been able to undertake fisheries patrol.

The spring mackerel fishing was reported the best in years; ninety-eight American fishing vessels worked on the division patrolled by *Petrel*, which ship boarded and examined them 162 times.

C.G.S. "GULNARE."

Is a steel, single-screw vessel, whose length is 137 feet, beam 20 feet 5 inches, draught 12 feet, registered tonnage 262 tons. Her complement is twenty-five officers and men all told, and she is commanded by Captain C. T. Knowlton.

Gulnare was in Dockyard hands until 7th July, a large amount of work being necessary, including the installation of a new boiler. On the 17th July ship proceeded on fisheries service, anchoring in entrance to the North West Arm until the 20th, owing to fog. She then cruised eastward and on the 24th off Cape North met a heavy west wind and anchored in Aspy bay, later proceeding to Chetieamp and thence to Pictou on the 25th. Georgetown was reached on the 27th and on the 28th ship proceeded in a southerly direction towards Halifax where she arrived on the 30th July and was immediately gotten ready for war service on which she has since been employed.

C.G.S. "VIGILANT."

Is a twin-screw steel ship, whose length is 177 feet, beam 22 feet, draught 9 feet 6 inches, registered tonnage 242 tons and speed 16 knots. She is electrically lighted throughout and fitted with a powerful searchlight. Her complement is thirty officers and men, all told, and she is commanded by Captain P. C. Robinson.

The necessary repairs having been made during the winter, ship commissioned on 1st April, but owing to delay in inclining her, did not put to sea until the 17th, when she commenced cruising on station and also visited several life saving stations and inspected them. Very little poaching was found during the spring fishing.

On 9th July ship embarked the Director of Naval Service at Cobourg and conveyed him on a trip of inspection to the life saving stations at Port Hope, Long Point, Point Pelee, Goderich, Kincardine and Southampton, the Director of Naval Service leaving the ship at Penetanguishene on the 16th. *Vigilant* then docked at Collingwood for necessa y repairs till the 28th, when the Consulting Naval Engineer came aboard and *Vigilant*, proceeded to Kincardine, thence to Port Dover, where the Consulting Naval Engineer disembarked.

During August and September United States fishermen were active in the vicinity of Long Point and a sharp watch was kept to prevent poaching, a considerable quantity of nets being taken. The greater part of October was spent in assisting to repair the telephone line between Long Point life saving station and Port Rowan. November was so stormy as to prevent cruising to any great extent and on the 22nd orders were received at Kingsville to return to Port Dover and put ship in winter quarters. On the 24th November the commanding officer and part of the crew left for Toronto where they took

charge of C.G.S. *Speedy* as far as Quebec, the first officer being left to put *Vigilant* in winter quarters, which was done by the 30th November. During the winter ship was overhauled and repaired in preparation for the re-opening of navigation.

Vigilant steamed 6,855 miles during the season of 1914 and seized 576 nets.

C.G.S. "MALASPINA."

Is a steel single-screw vessel, whose length is 160 feet, beam 26½ feet, draught 12½ feet, speed 14½ knots, and displacement 700 tons. She is electrically lighted throughout, fitted with a powerful searchlight and armed with one 6-pdr. Q.F. Gun. Her complement is thirty-three officers and men all told and she was built by the Dublin Dockyard Co., Dublin, Ireland, in 1913. She is commanded by Captain Holmes Newcomb.

At the beginning of the fiscal year *Malaspina* was cruising in the Hecate straits and on 3rd April seized the United States schooner *Prince Olaf* of Seattle, found fishing within the three mile limit near Zays Island; she was towed to Prince Rupert, her fish sold and the vessel handed over to the agent of the Marine Department.

Ship then continued cruising until the 22nd April when she returned to Esquimalt for repairs. On the 14th May she was docked and on coming out on the 23rd, embarked the Director of the Naval Service and cruised northward, calling at various places en route. At Hecate cove while the Director of the Naval Service inspected the *Galiano*, the officers of *Malaspina* located an uncharted rock near Limestone island. All the principal ports on the west coast of Vancouver island were inspected and also the life saving stations on this trip and ship returned to Esquimalt on 8th June.

From the 9th to the 21st June *Malaspina* underwent changes and alterations and on the 22nd she proceeded to sea to test quick-firing gun.

The month of July was spent cruising as necessary until 1st August, when ship was ordered to return to Esquimalt for war service.

C.G.S. "GALIANO."

Is a steel, single-screw vessel, whose length is 160 feet, beam 26½ feet, draught 12½ feet, speed 14½ knots, and displacement 700 tons. She is electrically lighted throughout, fitted with a powerful searchlight and is armed with one 6-pdr. Q.F. gun. Her complement is thirty-three officers and men all told and she was built at Dublin, Ireland, by the Dublin Dockyard Co., in 1913. She is under the command of Lieutenant R. M. Pope, R.N.R.

Galiano left Esquimalt on the 25th April on her first commission after being turned over to the Canadian Government, and, after coaling at Union and communicating with the Fisheries Overseer at Alert bay, she proceeded cruising in the Hecate strait, thence to Queen Charlotte islands, visiting the banks off Scudder point, Aristazabal and Estevan islands, finally arriving at Prince Rupert on the 8th May. After coaling, cruising was continued in the Hecate strait and Dixon entrance until May 31st, when ship proceeded to Bull harbour to meet *Restless*, with which ship she cruised to Hecate cove, where *Galiano* was inspected by the Director of Naval Service and then proceeded to Clayoquot and Barkley Sounds, calling at Port Alberni for mail. She continued cruising among the islands for some time, finally returning to Esquimalt on the 26th June.

On 12th July she again left Esquimalt and proceeded to Captain cove to meet *Malaspina*; then cruised in the vicinity of the Queen Charlotte islands and

on to Prince Rupert, where the commanding officer met the chief inspector of fisheries. Left Prince Rupert on the 22nd July to cruise around the islands until, at Naden Harbour, orders were received to report at Esquimalt, where ship arrived on 1st August and at once proceeded on war service, which duty she continued until the 12th March, 1915. On that date she left Esquimalt for Prince Rupert and after interviewing the fishery overseer proceeded cruising in Hecate strait, returning to Prince Rupert on the 26th March for stores. Left Prince Rupert on the 29th and that afternoon received orders by wireless to return to Esquimalt.

C.G.S. "RESTLESS."

Length 71 feet, beam 17 feet, draught 7 feet, is under the command of Captain Charles Moore, and, at the beginning of the fiscal year was on patrol duty on the northern coast of British Columbia with headquatrers at Prince Rupert. On the 8th April she returned to Esquima t for repairs, which were commenced on the 14th and completed on the 22nd May, ship leaving on that day for Union where she coaled and then proceeded north to Bull harbour to report to the Director of Naval Service. From Bull narbour she proceeded to Prince Rupert and resumed patrol duty in the northern district between Milbank sound and the Dundas islands, at which duty she continued until the 29th July when she received orders to return to Esquimalt, and arrived there on the 3rd August. *Restless* then proceeded on war duty.

C.G.S. "NEWINGTON."

Fisheries officer P. J. Ledwell, was in dockyard hands until the 28th April, when she proceeded to Triangle island with coal for the wireless station there, at the same time conveying two fisheries inspection launches to Alberni and Clayoquot, after which she cruised on the west coast of Vancouver island, watching the American fishermen. On the 17th May the commanding officer interviewed the fisheries inspector at Alert bay, then cruised again, finally arriving at Union bay on the 6th June, where boiler was washed out and minor repairs made. Ship again proceeded cruising on her station on the 9th June and continued for the remainder of the month, returning to Victoria on the 30th and leaving again on the 6th July. Cruising on the west coast of Vancouver island was resumed during July, but on the outbreak of war *Newington* was told off for other duties.

Since the sinking of the German Asiatic squadron, which did away, to a great extent, with the danger of an attack on the west coast of British Columbia, the fisheries protection ships on that coast have, in turn, gone about their regular duties, *Galiano* and *Malispana* also visiting the several wireless stations with stores, etc.

I have the honour to be, sir,
Your obedient servant,

C. E. KINGSMILL,
Vice-Admiral, Director of Naval Service.

REPORT OF THE SURVEY OF TIDES AND CURRENTS.

OTTAWA, March 31, 1915.

The Deputy Minister,
Department of the Naval Service,
Ottawa.

SIR,—I have the honour to submit the following report regarding the Survey of Tides and Currents during the twelve months ending March 31, 1915.

There are several directions in which progress has been made, in addition to the regular work of maintaining the tidal stations and publishing tide tables. In British Columbia, revised methods have been devised for the calculation of slack water in the more important narrows; and these methods have also been applied in the reduction of the new observations which have been obtained. This places the whole question of slack water, which is so important to navigation, upon an improved basis. Similar progress has been made in Hudson bay and the strait leading to it. The best results which can be secured, have now been deduced from the observations taken in Hudson strait during the Gordon expeditions. Recent observations at Nelson and in James bay have also enabled satisfactory tide tables to be prepared, accompanied with further data. In eastern Canada one of the most complex regions in the Gulf of St. Lawrence has been investigated with good result. The valuable tide levels, deduced from the investigations of this survey, are now much in demand as a basis for extended levels which are being carried out by several departments. The foresight in providing for accurate tide levels from the beginning of this survey, twenty years ago, is thus bearing fruit.

TIDAL OBSERVATIONS.

The principal tide stations have been maintained in continuous operation throughout the year, and one of them has been rebuilt. The tide column at St. John, N.B., which was placed in 1894, has demanded considerable repair in recent years; and on account of the large amount of work now in progress in St. John harbour, it was decided to rebuild it entirely. To do so, it was necessary to place a vertical steel cylinder filled with concrete as a foundation, extending from the bottom to low water, a height of 25 feet. Supported by this cylinder is an upper length of 31 feet, which extends from low water to the wharf level. This upper cylinder, built of heavy plate to withstand the water pressure, contains the tide pipes and encloses a space around them in which heating is provided in winter to prevent them from freezing. The cylinder is also lined with a wood sheathing to keep out the cold. The total height of the two cylinders is 56 feet; and upon them the tide-house is set, which contains the registering instrument and the floating scale, by which the tide levels are accurately maintained. This construction work was carried out under the supervision of Mr. H. W. Jones, who met with a number of rather troublesome difficulties from sunken timbers in placing the foundation. The expense of this re-construction is fully justified in view of the need for tide levels for the extensive works which are in progress in St. John harbour, without speaking of the main object of obtaining tidal data for the calculation of the

tide tables. The tides throughout the whole extent of the Bay of Fundy, where the rise is so great, can be referred with the best advantage to St. John, as a port of reference; so that these tide tables are the basis for this region.

The tidal record dealt with during the year was from the three leading tidal stations in British Columbia. Seven years in all have been tabulated, and submitted to harmonic analysis. This analysis will improve the basis for the calculation of the tide tables. This is an important step, as the tables of slack water are deduced in turn from the time of high water and low water in the tide tables.

In Eastern Canada, tidal stations were maintained during the summer at Bathurst, Point Sapin at the entrance to Miramichi bay, Richibucto and Shediac bay. At these harbours a large outlay has been incurred for dredging, or for breakwaters that have been built, which amply justifies the trouble and expense of obtaining tidal information for them. The observations at Bathurst will afford tidal data for that harbour, which is rapidly developing, because of the deepening of the entrance which is in progress. The region between Miramichi bay and Cape Tormentine is a very complex one, because of tidal interference. As a solution has now been found for these complexities, it may be of interest to record the result briefly, because of the light that it will throw on tidal questions.

The tide which enters the Gulf of St. Lawrence through Cabot strait, develops a marked diurnal inequality in its progress along Northumberland strait. By the time it reaches Charlottetown, the two tides of the day are more different in range than average springs and neaps. This inequality follows the declination of the moon, and only disappears when the moon is on the equator. Beyond Cape Tormentine in the region of Shediac bay, the inequality reaches its maximum development; a result which may in part be due to the interference of the tide which comes around the west end of Prince Edward island, and meets it there. The outcome is that the tide has a pronounced range once only in the day. At Richibucto it is the rise which is pronounced, and the other tides remain near the low-water level. In Shediac bay the fall is pronounced, with little variation from the high-water level at the other tides. At these two places, less than forty miles apart, the time of the tide is entirely out of relation; and the problem was to find any reference station with which the difference in time would be constant. The similarity of the tide in Shediac bay to the Strait of Georgia was strangely evident, as the tide there varies little from the high-water level except once in the day, when there is a decided fall to low water. When trial was made, it was discovered that the difference in time between Shediac bay and Sand Heads in the Strait of Georgia was more constant than with any tidal station in Eastern Canada. This corroborates the view that it is possible to correlate the tides at distant places, provided that they are of the same type, even if the range is very different. It is thus the features of the tide and not its range, which have the most weight. In this case, the tide in these two localities may be described as a declination-tide of a pronounced type.

For practical purposes, it is the tide that has the greater rise or greater fall for which it is more needful to have data. The tide at Richibucto can be referred to St. Paul island, which serves as a reference station for the region extending northward and including Miramichi bay. The tide in Shediac bay can be referred to Charlottetown, with fairly good result. We have thus an indication of the proper dividing line between the western limit of Northumberland strait and the open Gulf of St. Lawrence, as regards tidal characteristics.

Assistance was given in obtaining the tidal information required for the Ferry service to P.E.I., which is under construction between Cape Tormentine and Carleton point opposite. The tide levels at Cape Tormentine, which have resulted from earlier observations, were connected with new bench marks through co-operation with Mr. A. E. Fripp. These leve s will thus be preserved

for reference, which will be a valuable advantage for the work. A tide gauge was also placed at Carleton point, to obtain the relation of the tide to Pictou which is the reference station for this part of the strait. Simultaneous observations were obtained during the autumn months at these two places and they will be continued next season. The tidal data thus secured will complete the necessary information for this project; as the currents in the narrows at Cape Tormentine have already been investigated and the results published. The time of the maximum strength of the currents in each direction, which has thus been determined, will be of value in the operation of the Ferry service.

CO-OPERATION WITH OTHER SURVEYS.

In addition to the tidal observations obtained by this Survey, some information of value has been secured through co-operation with others. Six registering gauges have been supplied to other Surveys with complete outfits, and instructions for operating them. These have been furnished to the Hydrographic Survey for use on the lower St. Lawrence, in British Columbia, and in James bay; to the Department of Railways and Canals for Port Nelson; and to the Public Works Department, for use in the St. John river. The information thus obtained is indirectly useful for the purposes of this Survey, and in some cases observations are secured from new localities. The registering instruments thus supplied are an important economy to these Surveys, in saving time and the need of employing men to take readings on fixed scales, which would otherwise be required.

INVESTIGATION OF THE CURRENTS.

Further observations of the time of slack water in the passes of British Columbia have been obtained during last season. The passes investigated were Sansum narrows and Dodd narrows on the costal route along the east side of Vancouver island from Nanaimo to Victoria. Further observations were also taken in Porlier pass, and a tide gauge was established at Caulfeilds, near Point Atkinson, to obtain the tide of the Strait of Georgia for comparison. Later in the season observations of slack water were made in Seechelt rapids, at the entrance to an extended inlet which is becoming a lumber region of consequence

Observations at Porlier pass were taken by the lightkeeper, as the lighthouse stands at the narrows where the turn of the current is well seen. It was only necessary to provide him with a chronometer for accurate time. At Sansum narrows and Dodd narrows there are no habitations in the vicinity from which the turn of the current can be observed. Positions were selected where fresh water could be obtained, and temporary shacks were erected for the accomodation of the observers. At Dodd narrows, the shelter was of more substantial construction to serve during the ensuing winter. At Seechelt rapids similar arrangements were made, as the shores in the vicinity of the rapids are uninhabited. It was difficult to land material and supplies in this vicinity because of the violence of the current and the short duration of slack. This emphasizes all the more, the need of some method of knowing the time of slack water in getting out lumber from the inlet. The essential for these observations is accurate time; and there was no means of obtaining it at any of these localities except by the use of chronometers. Mr. S. C. Hayden supervised this work as well as the erection of the tide gauge at Caulfeilds, and he took the opportunity, during the season, of inspecting the permanent tidal stations where this was necessary.

In regard to the passes of the Pacific coast, a very important advance has been made during the year in the method of calculation of slack water, for

Seymour narrows, and also for several passes which open off the Strait of Georgia. The early investigations in Seymour narrows showed that the time of slack water had no constant relation to the tide in the locality, but that it stood related to the tide of the open Pacific. The reason of this appears to be that the flow of water in the narrows is influenced by the tide which comes around both ends of Vancouver island. The best reference station for the tide on the open coast, is Port Simpson. The tide of the Pacific may be characterized as a declination-tide in which the leading characteristic is an alternation in range with the upper and lower transits of the moon, which gives rise to diurnal inequality. It was eventually ascertained that high water slack could be found by means of a constant difference with Port Simpson, and low water slack by a difference with the next following low water there. The low water difference was not constant, however, but showed a marked alternation with the large and half tides. The variation amounted on an average to nearly thirty minutes. With allowance for this variation, values were obtained which have given satisfactory results for the calculation of slack water tables for Seymour narrows. The calculations were correct so long as the tides were pronounced in their rise and fall; but it was found that shortly after the moon crossed the equator, when the diurnal inequality disappeared and the tides for a time were nearly equal, that the values gave irregular results. It is true that the current is not so strong at this period as when the tides of more pronounced range occur, but an endeavour was made to overcome the difficulty.

It would be quite technical to describe the investigation which was required to secure better results, and one of the chief difficulties resulted from the observations giving slack water in the day time only, so that one series of tides was wanting. There were however, observations during nine months in three different years as a basis, which afforded a large number of observations; and tidal record for Port Simpson was available throughout these years for comparison. The investigation showed a reason for the main difficulty which had been encountered; as it was found that the point in the series of values where the variation in the difference fell to zero, was at an interval of eight tides from the moon's crossing of the equator. The reason for the discordant results given by the former method for the tides immediately after the crossing of the equator was thus explained. It was also ascertained that the best result could be secured by following the upper and lower transits of the moon, instead of the large and half tides. The variation between these shows increasing divergence from the eighth tide above mentioned, until it attains a maximum variation which exceeds one hour. A series of values was finally arrived at, to cover the change in the difference, as thus ascertained. This method for the calculation of low water slack will be used for future years; and it is not likely that it can further be improved upon, because of the long series of observations on which it is now based.

In dealing with the northern passes in the region of Seymour narrows, it was found that the time of slack water in them could be obtained by the use of a difference from Seymour narrows. With this indication, an endeavour was made to obtain a similar result for the southern passes off the Strait of Georgia. This has resulted in a new method of dealing with them; for it is found that the variations between slack water and the time of the tide are concordant in similarly situated passes. The difference in time of slack water between two corresponding passes may thus prove to be nearly constant, as the variations with the time of the tide are the same, and therefore disappear. This method has been applied to the new observations in Dodd narrows, Sansum narrows and Seechelt rapids; as it is found advantageous to deduce the time of slack water in these from Porlier pass, Active pass and First narrows respectively. For these three passes full tables of slack water are published;

and the differences for the new passes are applied to these in the same manner that ordinary tidal differences are applied to the tide tables. The values required will be given in the tide tables for next year; and meanwhile a Notice to Mariners has been issued with advance information for the purpose. The data for the other passes in this region have been revised to accord with this method.

The observations at Porlier pass and Dodd narrows will be continued until next season. The object of this is two-fold; to obtain the best possible values for Dodd narrows and to improve the basis of calculation for Porlier pass. This will be done by means of the comparison with the tide near Point Atkinson already mentioned; as the tide there is found to be practically identical with the original tide station at Sand Heads, which has been discontinued; as the lighthouse is replaced by a lightship.

HUDSON BAY AND STRAIT.

In Hudson strait the reduction of the extended observations obtained during the Gordon expeditions of 1884, 1885 and 1886 have been carried to completion. The general method which was followed, was to obtain a relation between Ashe inlet at the middle of the strait and some good reference station for which tide tables are calculated. At Ashe inlet also, the longest series of observations was obtained, extending over parts of three years. The total length available was seven months of day and night observations and eleven months in the day time only. These were compared with St. John, N.B., by means of tide tables for those years which were recalculated for the purpose. An excellent difference of time with St. John was thus established, which will enable the time of the tide at Ashe inlet to be known. The time of the tide is of primary importance for practical purposes, to afford a basis of comparison with the strong tidal streams in this strait.

With this basis for the middle of the strait at the narrow part where the width is 70 miles, the remaining localities were brought into relation with Ashe inlet. These are Port Burwell, Stupart bay, DeBoucherville and Port Laperriere. The observations available made it possible to obtain simultaneous comparisons with Ashe inlet during three to seven months for all of these localities except Laperriere, which it was necessary to compare in the first place with DeBoucherville. It was found as a result, that the time of the tide is from half an hour earlier to an hour and a half later, as compared with Ashe inlet. The precise results will be given in the tide tables for next year. The investigation completes the tidal data throughout the extent of Hudson strait, which comprises a length of 540 miles. Tide tables for Nelson for the coming season have been calculated by the method explained in the last report which has been found very satisfactory when checked with observations taken there.

With these tables data are given for Churchill and also for Moose Factory in James bay. The range of the tide at Moose Factory in relation to Nelson has been worked out at the request of the Timiskaming and Northern Ontario railway to throw light on the design of the proposed terminal works there.

It is hoped to obtain further observations at Nelson through the Railways and Canals Department, to which registering gauges have been supplied for the purpose. Some observations have also been secured in James Bay, in co-operation with the Hydrographic Survey. Tidal data will thus be available for other localities in James bay when they become necessary.

An accurate value for mean sea level at Nelson was desired by the Topographical Surveys Branch of the Interior Department, as a check upon the end of their extended line of levels from Winnipeg to Hudson bay. For this purpose three months of observations were selected, during which there was no

wind disturbance of consequence; and the record is continuous day and night without any break. The three months are exact lunar periods to balance the springs and neaps, and they are in two different years. The results agreed closely with each other, and the level obtained is referred to the bench mark which defines the low-water datum of the chart.

INFORMATION SUPPLIED AND TIDE LEVELS.

The work done under this heading is on the increase from year to year; and the information asked for, has been largely of the nature of tide levels and other data required as a basis for levelling operations, which are now being carried out in several regions by different departments. To supply this information it often entails a considerable amount of special work to obtain results in the form desired. The character of the information may serve to illustrate the value of the results of this survey to other departments, in addition to its primary service to navigation.

The only satisfactory basis for extended levelling, is the mean level of the sea, and this is used for a general reference datum in all civilized countries. It is evident that this can only be determined by means of tidal observations. From the outset of this survey, twenty years ago, bench marks were established for reference at all the principal tidal stations where observations were obtained continuously day and night throughout the year. As all the tide gauges are on timber structures, with one exception, it was necessary to check the levels at the station with the bench mark at least once a year. During the winter the height of the tide could only be observed by means of a floating scale, in the protection of the gauge house. This careful levelling during many years is now bearing fruit in providing a basis for precise levels throughout the country, where they connect with the sea-coast on the Atlantic or Pacific.

The value of mean sea level at any of the tidal stations is found in the first place for a period of one continuous year at a time. It is based upon the height of the tide for every hour, day and night, taken from the records obtained with the registering tide gauge; and the value for each year is thus the average of 8,760 individual measurements. When any interruption occurs, a fresh beginning is made. The values obtained from three or more such years may be considered as highly accurate. The series of levels at the tidal stations serves also to define the low water datum of the charts, and the zero of the tide tables.

The value of mean sea level at Halifax as determined from observations during nine years, has been adopted by the Public Works Department as a basis for their extended levels. The other end of the primary line connects with mean sea level at Father Point, determined from observations during ten years. There is thus a line of levels from Nova Scotia to the St. Lawrence, across three provinces, accurately checked at both ends by the mean level of the sea. From this line, the levels extend along the St. Lawrence to Quebec and Montreal, and westward.

At the request of the Dominion Observatory, mean sea levels at Halifax and Yarmouth were supplied for the two ends of a line of precise levels between those cities, through southwest Nova Scotia. The value of mean sea level at Yarmouth was worked out from one complete year of observations, which were reduced for the purpose with relation to a bench mark established in Yarmouth by this Survey.

In British Columbia a committee on standard datum has under consideration the adoption of a general plan of reference for levels in the province It is evident that mean sea level is the best basis for such a datum. It is also clear that for various points along the coast or at the heads of inlets, which may become railway terminals, the determination of mean sea level will furnish a more

accurate elevation than could be determined by means of land lines from one point on the coast to another, through so mountainous a country. At the request of the chairman of this committee, the value of mean sea level was supplied for Vancouver from seven complete years of tidal observations; for New Westminster from six years; and for Victoria from five years. There are no levels north of San Francisco which have so high an accuracy.

The levels from Victoria can be extended throughout Vancouver island and they may be eventually connected with tidal stations which have been in operation for a series of years on the west coast and at the northern end of the island. The value of mean sea level at Victoria has already been utilized by the Geological Survey for their contoured map of the southern end of Vancouver island.

Mean sea level at Vancouver was also furnished to the Dominion Observatory at their request, for precise levels in that region. The tide levels in Vancouver were originally referred to a Canadian Pacific Railway bench mark on the station building; by which the low water datum of the chart, as well as the railway levels, were defined. Before the station building was demolished, reference marks were established on masonry buildings, by this Survey, to preserve these invaluable levels. A new bench mark was also placed by the C.P.R. engineers at the suggestion of this Survey. The accurate value of mean sea level, as determined from seven complete years of observations at Vancouver, has thus been preserved.

At the request of the Topographical Surveys Branch of the Interior Department, mean sea levels at Vancouver and Prince Rupert were furnished, with which they propose to connect their interior levels on reaching the coast. At Prince Rupert, much difficulty has been experienced in maintaining the tide levels with accuracy; as bench marks were frequently destroyed on account of changes due to new construction. Some periods of tidal observations there have been lost on this account or because of other interruptions; but since 1906 four complete years of record have been secured for the determination of mean sea level. From the beginning, the tide levels have been kept in relation with the original harbour datum; and the datum for the chart more recently established, is the same as the zero level in the tide tables. The maintenance of these levels is a satisfactory achievement in the circumstances.

The tide levels at Vancouver have proved of service to the Burrard Peninsula Joint Sewerage Board. For their purpose, the levels were reduced to the C.P.R. datum and the Vancouver city datum.

Information regarding all the bench marks established by this Survey on the mainland around the Gulf of St. Lawrence, has been supplied to the Public Works Department for the revised edition of their geodetic levels now in preparation. This includes a series along the north shore of the Gulf, the lower St. Lawrence and the maritime provinces. The low water datum and other tide levels are given with reference to these wherever they have been determined; and also the valuable tide levels at the head of the Bay of Fundy, from the days of the Baie Verte Canal, which have been preserved by this Survey. Good observations were obtained there as far back as 1870, and later by the engineers of the Chignecto Marine Railway. A bench mark was established in 1901 to preserve these levels, which now enables them to be connected with the new bench marks of the Geodetic Survey. The levels thus established are invaluable with reference to the flooding of the dyked marshes in this region, as the levels reached by exceptionally high tides during recent years have been determined with reference to these permanent marks.

During the tidal observations of last season, along the coast of New Brunswick, the tide levels were kept in relation with any earlier observations which had been secured; and the Public Works datum for low water was utilized

wherever it was possible to do so. This will make the tidal observations more serviceable for construction purposes in the various harbours where they have been obtained.

PUBLICATIONS.

The tidal information for Canada is published in two sets of tide tables; one for the eastern coasts for which 8,000 are now provided, and the other for the Pacific coast amounting to 10,000. For Eastern Canada two abridged editions are issued of pocket size, one for Quebec and the St. Lawrence, and the other for St. John, N.B., and the Bay of Fundy. These abridged editions are much appreciated as they are used by all classes, from pilots to fishermen. The total edition of these now amounts to 15,000.

In British Columbia there is a large demand for local tide tables for Vancouver and the Fraser river, and the region extending thence to Victoria. To meet this, it was decided to issue a pocket edition containing the tide tables and the time of slack water in two of the passes. These were First narrows, at the entrance to Vancouver harbour, and Active pass. The edition of 6,000 which was issued for the present year has been increased to 9,000 for the coming year. This pocket edition is much appreciated by the pilots and fishermen, and is often found to be very convenient for motor launches.

The tide tables are supplied without charge to all the steamship companies, and they are largely circulated through the agencies of the Marine Department, shipping masters and customs officers. They are also sent free on request to all applicants. It results that a large proportion of the tide tables are mailed individually from our mailing lists or in reply to requests received. It is interesting to find that many manufacturing establishments and other industries on the coast have constant use for them in addition to the shipping interests. The tide tables for British Columbia are highly valued by the lumbering industry, as it is essential to know the time of slack water in the passes leading to lumbering districts, in connection with the towing of rafts and booms of logs.

The tide tables for the more important harbours in Eastern Canada and on the Pacific coast, eight in all, are now republished by the British Admiralty, and with these they now give tidal differences for a large number of our seaports. Tidal information for the St. Lawrence is also furnished to the Department of Marine and Fisheries for their publication on the St. Lawrence Ship Channel for the use of pilots. The information thus furnished has now been modified in order to give, in the space available, fuller information from Lake St. Peter to the Traverse. For the estuary of the St. Lawrence below there, the complete tables issued by this Survey are referrred to. It is hoped that this modification will be more helpful to those requiring local information in the region above and below Quebec. Some of our tide tables are included in two leading almanacs in Canada; and in these various ways the information attains a very wide circulation, and should reach all who require it.

STAFF.

The staff of this Survey, for the office and field work, comprises only four in addition to the superintendent; together with the outside tidal observers, who number six in Eastern Canada and five on the Pacific coast, at the permanent stations. In addition to this, several others are usually employed locally in the summer season in the observation of tides and currents; and there are engineers on other Surveys who give their co-operation. On the permanent staff, Mr. S. C. Hayden has supervised the observations of the currents in the passes of British Columbia and has inspected the tidal stations on that coast.

Mr. H. W. Jones has carried out the construction work at St. John already referred to, and has supervised the erection of several summer stations on the New Brunswick coast, and in Northumberland strait. The other assistants are Mr. R. B. Lee, and Miss N. R. Carter, stenographer. In addition to the outside work in the summer season, this staff carries on in the winter, the reduction of the observations and the calculation of tide tables, as well as the ordinary office work and correspondence.

I have the honour to be, sir,
Your obedient servant,

W. BELL DAWSON,
Superintendent of Tidal Surveys.

HYDROGRAPHIC SURVEY.

OTTAWA, July 6, 1915.

Deputy Minister,
Department of Naval Service,
Ottawa.

SIR,—I have the honour to submit my report upon the work of the Hydrographic Survey for the fiscal year 1914–1915.

During the year no additional equipment was added to that of the survey but what we had has been kept in first-class condition.

Owing to the outbreak of hostilities in Europe, it was found necessary for the examination service connected with the department, to take over the steamer *Cartier*, of the St. Lawrence River Survey, early in August, and on this account the amount of work done was curtailed. Further loss was sustained by several officers entering the service of the Admiralty, the War Office and the Canadian overseas contingents.

The following parties were in the field during the season:

1st. Hudson bay party, working between Port Nelson and James bay, as well as making surveys of some harbours in Hudson Straits.

2nd. Pacific coast party working along the coast and islands of British Columbia

3rd Lower St. Lawrence river party, working in the Lower St. Lawrence about Matane.

4th. Lake Ontario party, working in the west end of the Lake, between Toronto and Niagara river.

5th. Lake Superior party, working between Jackfish bay and Otter head.

6th. James bay party, working in the southeast corner of the bay.

7th. Party looking after the automatic gauges in the Great Lakes and St. Lawrence river.

HUDSON BAY PARTY.

As in previous years, this party was in charge of Captain F. Anderson, using the steamer *Acadia*. As his experiences and his report upon the conditions pertaining in that part of the world are of considerable interest to the country in general, his report is given in detail (Appendix I), both to show the amount of work done and also to convey some idea of the hardships to be encountered both in surveying that remote region and in navigating Hudson straits.

The steamer left Halifax on the 11th of July, and Belle Isle was cleared on the 15th when ice was encountered for the first time, but by shaping a course well off the land, the icefields were cleared until the 19th. When about 90 miles southeast of Cape Chidley, heavy winter and Arctic ice was encountered, and this condition continued until about 31st July, when the ice opened up. As it was intended to do some surveying around the entrance to Hudson straits, it was not possible to get ashore until 12th August, when a landing was effected on the Lower Savage island, and survey work on various islands in the straits continued until the 10th September, when the vessel left for Port Nelson.

Work was taken up along the south shore of Hudson bay, as far east as Cape Henrietta Maria. On 8th October, the party left Port Nelson for Hudson strait, arriving off Mansel island on the 11th in very cold weather. A survey

was made of its southeastern shore, and on the 14th, whilst passing from the north end of the island to Diggs island, ice was encountered, and the steamer was forced to heave to in closely-packed heavy Fox channel ice, where she was held all next day, getting cleared about 7 p.m. on the 15th.

Considerable surveying in the way of coast-line and sounding was done in the next few days in the strait, and on 2nd November the steamer cleared the strait for home, arriving at Halifax on the morning of the 10th.

It will be seen upon the perusal of the report that ice was first encountered on 19th July, when it was so bad that the *Acadia* suffered some damage to her rudder, and the vessel was still bothered by ice as late as 12th August, when the party was able to make its first landing. On the way out, she was completely surrounded on the 14th of October.

Admitting that it is possible that she might have avoided the ice in both instances, the report shows that it was a danger that any vessel entering the bay might have encountered, and vessels reaching the vicinity of these ice-fields, are quite unable to keep clear because the ice does not remain stationary but moves quite rapidly with the very strong tidal currents experienced in the strait.

Further, to show the seriousness of this ice condition, I might state that, as a result of her contact with the ice, the *Acadia* sustained damage to the extent of $25,000.

As a result of the season's work, some improvements will be made to the chart of Hudson bay, and plans were made of the following harbours, which are being engraved for future use:

Charles inlet.
Savage harbour.
Acadia cove.

During the season, this party traversed from the ship, launch, gigs and on foot, 400 miles and checked up some 300 miles more They sounded from the ship and gigs, 900 miles, and made observations for latitude, longitude and azimuth at 10 points.

PACIFIC COAST SURVEY.

This party was in command of Lieutenant-Commander P. C. Musgrave, R. N., and he had as assistants Lieutenant John Knight, R. N., retired, Messrs. L. R. Davies, J. A. Turner and O. Parker.

This party worked from the steamer *Lillooet* and the schooner *Naden*, both of which were commissioned at Esquimalt on 15th April, the latter in charge of Lieutenant Knight.

After coaling at Nanaimo, the first work undertaken was the location of the wharves and the wireless station at Alert bay, afterward proceeding to the examination of Dall Patch, Seaforth channel.

The Skeena river was reached on the 29th of April, and Mr. Knight, with the schooner *Naden*, detached to make a survey of that portion of the river, eastward of De Horsey island, as far as Tyee on the Grand Trunk Pacific. This was completed on the 11th July, when the party was moved to Laredo channel for work there and in the approaches to Surf inlet. This work was completed on 19th September.

On the outbreak of war Lieut. Knight left the *Naden* and proceeded to Esquimalt to join the *Rainbow*, and is still in that service. Mr. Turner, being a graduate of the Royal Military College, also felt it his duty to volunteer for service in Europe, and joined the first Canadian expeditionary force, thus seriously reducing the staff. Upon Mr. Knight's retirement, or from about the middle of August, Mr. Davies was put in charge of the schooner.

Upon the completion of the work at Laredo channel, the schooner was moved back to Inverness, at the mouth of Skeena river, to complete the survey work of the north Skeena passage to connect the survey work of 1907 with that performed by Mr. Knight in 1914.

The main party, after leaving the *Naden* at Claxton, proceeded north to Naas river, where the positions of all the canneries were located and the Bar sounded out. An unsuccessful search for the rock on which the *Vadso* was reported to have been wrecked was made.

Granby bay was reached on 7th May, and a survey made between that date and the 13th.

Between the latter date and the 29th October, the main party was engaged in work in Dixon entrance and around Queen Charlotte islands. The party reached Esquimalt on 2nd November and the ships were immediately paid off.

The work of drawing the fair sheets for the engravers was immediately taken in hand in the offices in the dockyard.

During the season 81 miles of coast line were traversed, and 205 square miles of sounding done.

Out of a total of 169 working days, 66 were lost through bad weather, 33 of them being rain.

The following charts and plans were completed this season:—

Skeena river, Telegraph passage to Raspberry island, on a scale of 3″ to the mile;

Skeena river, north Skeena passage, Dominion cannery to Clara Point, on a scale of 3″ to the mile;

Laredo channel, northern portion, and approaches to Surf inlet, on a scale of 1″ to the mile;

Port Louis and approaches, on a scale of 4″ to the mile;

Fisherman cove, Ursula channel, on a scale of 6″ to the mile;

Soundings at entrance of Dixon entrance, on a scale of 1″ to the mile;

Soundings in northern portion of Hecate strait, on a scale of 1″ to the mile;

Soundings on Bar of Naas river, etc.

No extraordinary expenses were incurred in connection with the maintenance of the equipment of this survey. The vessels received the usual overhauling necessary to keep them in first class condition.

LAKE ONTARIO PARTY.

This party, with the steamer *Bayfield*, in charge of Mr. G. A. Bachand, having for assistants Messrs. J. U. Beauchemin, E. B. McColl and W. K. Willis, left their headquarters at Prescott on 30th April and proceeded to the west end of Lake Ontario where work was carried out between Toronto and the mouth of Niagara river. Although this area was taken in hand, it was not possible to complete it entirely, but it will be early in the season of 1915.

A survey on a scale of 6″ to the mile was made of the Niagara bar, showing that the silt from the river has created quite a new condition over that existing at the time of the last survey by the United States corps of engineers. A plan of this has been prepared and submitted to the engravers for publication. Surveys were also made of the approaches to the Burlington canal, Bronte Harbour and Port Credit.

No new shoals were discovered during the season.

The work performed consisted of 48 miles of traversing, 830 miles of sounding from boats, and 1,000 miles sounding from the deck of the ship, extending over an area of 530 square miles.

The ship returned to the headquarters at Prescott on 30th October. She sustained no damage during the season and no extensive work was carried out on her, except that her hull was very carefully cleaned by sand blasting inside and paint remover outside, so that at the present time it is in fair shape.

On the whole, this party was more fortunate than in the season of 1913. The weather was a great improvement, there being less rain and less thick weather, which may possibly be accounted for by the fact that she was further from the Toronto smoke.

LOWER ST. LAWRENCE RIVER PARTY.

This party, with the steamer *Cartier*, was in charge of Mr. Charles Savary, having for his assistants Messrs. A. J. Pinet, Edward Ghysens, M. A. McKinnon and H. T. Bate. The latter, however, left to join the *Niobe* upon the outbreak of hostilities in Europe.

The party left Quebec on 9th May and worked between Sandy bay, on the south shore, and Pointe à Paradis, on the north shore, but a comparatively small amount of work was done, amounting to 25 miles of traversing, 300 miles of sounding from boats, and 350 miles from the deck of the ship.

Upon the outbreak of hostilities the ship was sent for examination service at Quebec, where she arrived on 10th August, but it was loaned to us again for a short period between the 7th and the end of October to get some necessary triangulation in order that the party might be kept busy during the winter.

The work in this district has now been completed along the south shore as far east as Matane, and along the north shore as far as Pointe des Monts. The chart of the former work will be given to the printer this summer, and, it is hoped, a new chart issued at the opening of navigation of 1916.

The steamer has also received the usual overhauling, but she is in very excellent condition.

LAKE SUPERIOR PARTY.

This party, with the steamer *La Canadienne*, and in command of Mr. H. D. Parizeau, left Owen Sound on 6th May, having for assistants Messrs. H. H. Lawson, F. R. Mortimer and H. L. Leadman, but the former took sick from pneumonia almost immediately after reaching Lake Superior and was invalided during the balance of the season. Shortly after his return to duty in the autumn, he joined the second overseas contingent and has left for Europe. His place was taken temporarily by Mr. McKinnon, of Mr. Savary's staff.

Work on Lake Superior was carried on between Pic island and Otter head, on a scale of $1\frac{1}{2}''$ to the nautical mile, with plans of Peninsula harbour and Port Munro on a scale of 6″ to the mile. This plan has been submitted to the engraver for publication.

An attempt was made to connect the triangulation of this portion of the lake with that of the United States corps of engineers at station Tip-top, but so far weather conditions have hindered Mr. Parizeau getting the long sights necessary.

On 17th September it was deemed advisable to move the steamer and party into more sheltered water, and they reached Little Current on the 19th, where some re-surveying was found to be necessary. On 1st October the party reached Byng inlet, and immediately started the preparation of a large scale plan of that harbour and approaches. Owing to bad weather, however, it was impossible to complete this, although the party remained there until the 8th November. It is hoped to have this completed early in 1915.

During the season the party traversed 135 miles of shore line, did 500 miles of sounding from boats, and 125 miles from the deck of the ship.

I regret to say that during the season, the party experienced a great deal of thick weather through fog and forest fires on Lake Superior. The party reached Owen Sound on 8th of November, and the vessel was immediately laid up.

La Canadienne, although a very old boat, had no heavy expenditures made upon her. She is in fairly good condition, but owing to her small power and poor speed has to be carefully watched in heavy weather.

JAMES BAY PARTY.

This party, in charge of Mr. Paul Jobin and assisted by Messrs R. J. Fraser, R. T. Bowes and eight men, left Cochrane on 24th May and arrived at Moose Factory on the 29th.

The next month was spent in fitting out the launch and the chartered schooner *Annie E. Geede*, which proved to be of no use except as a houseboat.

An examination was made of the shore in the vicinity of Mount Sherrick with a view to finding a suitable locality for a harbour, and I am glad to say it offers quite an excellent location.

Surveys were made of the Charlton and Strutton group of islands and of Strutton harbour.

The triangulation of the previous season was carried as far as the east end of Trodeley island, and a better determination was made of the position of Lisbon shoal.

On the 18th September, the party returned to Moose river and continued the survey of that water as far north as the North Bluff beacon.

On 13th October the party left Moose Factory and arrived at Cochrane on the 21st.

The break up, in both the Rupert and the Moose rivers, was quiet.

On the 6th of June ice could still be seen off the mouth of the Moose river, but generally speaking the season was open; the SS. *Adventure* came into Strutton on the 19th of August, having seen no ice after leaving Port Harrison on the 14th of August.

No temperature record was kept because the only thermometer we had was accidentally broken, but the summer was appreciably warmer than the preceding two; there was little bad weather, but the draught and the prevailing south winds were responsible for a great deal of hazy and smoky weather which interfered greatly with sounding and triangulation.

AUTOMATIC GAUGE PARTY.

These gauges are looked after by Mr. C. A. Price, who had for assistants during the year Messrs C. Smith, W. J. Miller and A. R. Lee, but upon the opening of hostilities in Europe, Mr. Miller joined the first overseas contingent and left the office early in August.

The investigation into the levels of the St. Lawrence river being still in hand, guages were maintained at the following places for the season of navigation:

Foot of Lachine canal.
Longue Pointe.
Verchères.
Varennes.
Lanoraie.
Sorel.

Lighthouse in Lake St. Peter.
Three Rivers.
Batiscan.
Pointe Platon.
Neuville.
St. Nicholas.
St. Romuald.

On the Great Lakes, the usual gauges were maintained at Kingston, Port Dalhousie, Port Colborne, Fighting island (Detroit river), Ile aux Pêches (Detroit river), Goderich, Soo canal (both above and below the lock), and Port Arthur.

With the exception of the gauges at Collingwood, Goderich and Port Dalhousie, the lake gauges are maintained during the whole year and give complete yearly records.

During the season of 1915, it was intended to increase the number of gauges by placing one in Lake St. Louis and a new one at Michipicoten in Lake Superior in accordance with the request of the International Joint Commission to furnish data for the proper handling of the new sluice gates at Sault Ste. Marie.

Attached are the following appendices, giving records obtained from the gauges:—

III. Table of water levels of the Great Lakes, 1914.
IV. Description of bench-marks established by automatic gauges and elevations thereof determined by water surface transfer and by precise levelling (instrumental).
V. Table showing yearly water surface transfer and elevations of bench-marks.
VI. Daily mean elevations of St. Lawrence river at Montreal.
VII. " " " " Longue Pointe.
VIII. " " " " Varennes.
IX. " " " " Verchères.
X. " " " " Lanoraie.
XI. " " " " Sorel.
XII. " " " " Lake St. Peter.

List of New Charts.

The following new charts were issued during the year:
No. 52, Lake St. Francis, Coteau Landing to Lancaster.
406, Cape Tatnam to Port Nelson.
105, Jackfish bay.

The following new editions were issued:
No. 10, Foot of Lake St. Peter.
No. 1, Montreal to Longue Pointe.
No. 14, Batiscan to Cap Levrard.
No. 7A, Berthierville to Lake St. Peter.
No. 302, Digby island to Kennedy island (Chatham sound).
No. 301, Prince Rupert harbour.
No. 12, Becancour to Champlain.
No. 3, Ile à l'Aigle to Ile Marie.
No. 4, Ile Marie to foot of Ile Bouchard.
No. 5, Ile Bouchard to Ile St. Ours.
No. 11, Three Rivers to Becancour.
No. 15, Cap Levrard to Ste. Emmelie.

During the season the new edition of the St. Lawrence Pilot below Quebec was issued to the public, and the "Georgian Bay and North Channel Pilot" was combined with the "Sailing Directions of the Canadian shores of Lake Huron" by Captain Boulton, R.N., retired, and issued to the public at the close of the year. These two works are quite valuable and the demand for them is very great.

In closing this report I have to thank the various members of the staff for the valuable service they have rendered during the past year, and all are using their best endeavour to follow the interest of the work they have in hand.

I have the honour to be, sir,
Your obedient servant,

WM. J. STEWART,
Hydrographer.

APPENDIX I.

OTTAWA, 6th April, 1915.

The Chief Hydrographer,
Department of Naval Service,
Ottawa.

SIR,—I beg to submit the following report on the survey work carried out during the past season in Hudson bay and strait, with an account of the passage to and from the bay, paying particular attention to the ice conditions.

The steamer *Acadia* was again employed for this expedition. Although many of her steel plates had been considerably dented in the ice leaving Hudson bay during the autumn of 1913, extensive repairs were not required, leaking rivets and minor matters only receiving attention.

Before proceeding north, a preliminary trip was taken to Lockeport, on the southeast coast of Nova Scotia and about one hundred miles southwest from Halifax, to search for an uncharted rock, reported in the entrance to the harbour. Halifax was cleared at 6 p.m. on the 6th July, arriving off Lockeport at 7 next morning. The weather being foggy, with considerable wind and sea from the southeast, shelter was taken in the entrance to Shelburne harbour. On the following morning, the fog having lifted, the ship moved to Lockeport and anchored off Laurier rock gas buoy. A shoal with 2¼ fathoms least water over it was discovered about 75 yards west of the gas buoy, with deep water about it. Nothing further was found in the immediate vicinity, and as considerable sea was running, a more careful examination was impossible.

Shortly after clearing the entrance to the harbour, the ship struck an unknown rock in mid-channel about 1¼ miles northeast off Gull lighthouse. This shaol was found to have only 11 feet of water over it, and it is remarkable that it had not given trouble earlier, as ships entering and leaving must have passed close by it.

Halifax was again reached at 8 a.m. on Thursday, the 9th, and final arrangements completed before departing for the north.

The ship's company consisted of the following:—

Captain F. Anderson	In command.
Captain W. A. Robson	Sailing Master and Pilot.
Lieut. C. B. Shaw, R.N.	Surveyor.
Mr. L. C. Prittie	"
Mr. J. L. Foreman	"
Mr. C. B. R. MacDonald	"
Mr. J. E. MacDonald	1st Officer.
Mr. Alfred Langlois	2nd "
Mr. J. S. Dickson, M.D.	Physician and Surgeon.
Mr. J. C. Kelly	Chief Engineer.
Mr. Clifford Crease	2nd "
Mr. Jas. Pace	3rd "
Mr. C. W. Browne	Wireless Operator.

with Quartermasters, Seamen, Firemen and Stewards, a total of 51 persons on board.

Halifax harbour was cleared on the morning of the 11th of July and course laid to the eastward along the coast of Nova Scotia, arriving at North Sydney next morning. Time signals were received at the Western Union cable station from St. John at 2 p.m. for rating the chronometers.

Easterly wind accompanied by heavy fog and rain prevailed. On the following morning, time was again obtained, and being the last port of call, all mail was landed and the harbour cleared at 3 p.m. With the wind fresh from the north, a speed of 7½ knots was maintained against the head sea, and Belle Isle was reached at 6 p.m. on Wednesday, the 15th. On the trip up no ice had been seen, but after passing Belle Isle, many fields were met with. Course was shaped to pass through the thinnest, to carry us well off shore, and all ice was cleared about mid-night.

Wireless reports were sent to Ottawa before losing connection with Belle Isle, and this proved to be our last connection with the shore, because to clear the ice pack it was necessary to hold well off shore, beyond the range of the low powered stations on the Labrador coast.

After clearing the ice about Belle Isle, the course followed was from 75 to 100 miles off shore and little or no ice was seen until we hauled in for Cape Chidley, on Sunday the 19th. At 3 a.m. light winter ice was entered and passed through without difficulty until 7 a.m., when about 90 miles southeast from Cape Chidley and 60 miles off shore, heavy winter and Arctic ice was entered, making progress slow and hazardous. Later in the day, the rudder received damage by coming in contact with a large pan while "backing up" and the ship was hove to for repairs. It was found that the rudder stock had been twisted, necessitating the removal of the quadrant and cutting a new key slot. This operation took the remainder of the day and the night.

The ice fields appeared very extensive, no open water being visible from the mast-head. The steamer *Bonaventure*, chartered by the Department of Railways and Canals for carrying supplies to the Hudson Bay terminus at Port Nelson, was picked up by wireless and reported that she was icebound about 25 miles southeast of the Button islands, that no open water was visible, and conditions had been much the same since the 9th, when she first appeared upon the scene. On the following morning, Monday, 20th, a move was attempted, but with little success, as it was not safe to try and force a passage in such heavy ice and so closely packed.

We made fast to a large pan and filled up the fresh water tanks from pools on the ice. During this operation, tests of the water had to be frequently made as it was found that, though perfectly fresh on the surface, it might be quite salt a little below.

The steamer *Bonaventure* reported that they were doing likewise, also that the crew were playing football on the ice pack.

From this date until the 30th of the month, the ship was more or less hemmed in by the ice pack, which apparently extended to the land. Though able to make an occasional move of a few miles, there was little gained as the southerly Arctic current would carry the ship back again. The general position was about 40 miles off shore and 60 miles S.E. of Cape Chidley. During a gale from the south-east, considerable swell entered the ice pack and made a very uncomfortable berth with huge pans of ice bumping and scraping against the sides of the ship. However, we finally succeeded in securing the ship to a large pan in such a way as to afford protection to the propellor and rudder.

Although no serious mishap took place, minor damages were received. A leak developed in the forepeak tank, necessitating pumping out frequently, and the shell plates were much dented, especially at the turn of the bow, breaking connection inside and causing leaks, but we were lucky enough to get them stopped up. Daily communication was kept up with the steamer *Bonaventure* in case of accident and for ice reports.

The weather on the whole was fine, though very foggy, occasional rain and constant easterly wind tending to hold the ice pack together until 31st of July, when a moderate gale came down from the northwest, opening up the ice pack and improving conditions. Had it been our intention to pass directly through the strait and enter Hudson bay, it could have been accomplished without any more difficulty or damage than from remaining in this locality, but considerable work had been done and the great difficulty was to secure a landing or a harbour. About this time the steamer *Minto* and schooner *Burleigh* were reported.

On 1st August the ship was swung for compass error, care being taken to dodge the ice. Next day an attempt was made to make the Button islands, but we were obliged to heave to about 20 miles off. The steamer *Adventure*, carrying supplies for the Revillon Frères fur trading posts, appeared on the scene and was held fast for some hours but managed to push through on the change of tide. Later in the day we approached the Buttons but found the passage to the anchorage completely blocked by ice. When about two miles to the northeast of the islands, the ship was caught in heavy flood tide rips and completely hemmed in by heavy pans continually opening and closing and whirling about. We again sought safety by securing to a large pan, affording protection to the propellor and rudder. It was clearly seen that the Button islands should receive a wide berth in the presence of ice.

On the following day, the steamers *Bonaventure* and *Sheba* reported about 120 miles off, accompanied by the tug *Yates* with two steam barges in tow. They were advised to hold towards the north shore and Resolution island.

On Friday, 7th August, we had a moderate gale from the southeast, accompanied by rain, and although Resolution island was reached, weather conditions prevented our hunting for a harbour. As appearances indicated easterly weather for some days, an attempt was made to enter Port Burwell, but this had to be abandoned, as the ice off the southside was found much heavier, more formidable and packed more closely, especially on the flood tide. The weather was disagreeable in the extreme, rainy and foggy for the most part with much heavy ice about, and the ship was carried back and forth with each tide. Another attempt was made to land on Resolution island on Wednesday the 12th August, but the coast was found completely ice bound and any harbour inaccessible.

On the following morning a landing was effected on the southeast part of Lower Savage island to take observations. Later, having discovered a small harbour in the northeastern part of the island, the ship came to in the evening. This was the first time we had cast anchor since leaving Sydney, and needless to say it was a great relief after so many days drifting about.

Savage island harbour, situated in the northeast part of the island affords good shelter from all winds. Limited anchorage is available over an area of about half-a-mile long and one-quarter of a mile across with a depth of 22 fathoms over mud bottom.

Observations were taken for latitude and longitude and azimuth on an island in the south part of the harbour, which was sketched and sounded out. The whole island was later sketched from the launch and soundings taken. A narrow boat channel cutting the island in two connects the harbour with the south side.

Lower Savage island is quite different from that shown on Canadian Chart No. 405. It lies with its southeast point N 57° E about 16 miles from the position shown. It is almost an equilateral triangle in shape with sides of about 8 miles; quite bare-like the surrounding country and from 200 to 800 feet in height. It is separated from the southeast part of Baffin Land by a strait about 3½ miles in width and of some 125 fathoms deep.

The flood and ebb tides sweep through at about 4 or 5 knots, causing heavy tide rips.

The southeast part of Baffin Land about East Bluff is about 10 miles to the northeastward of that shown on the chart. Very little snow or ice was found on the rocks in this locality.

Near midnight, on the 16th, the steamer *Sheba*, picked up by wireless half way across Hudson bay, over 600 miles away, reported no ice about.

On the morning of the 17th, we left Savage harbour at 5 a.m. bound for Hatton headland at the southeast part of Resolution island. We passed through much drift ice without difficulty as it was honeycombed and soft.

A small harbour was discovered just north of the west point of Hatton headland, where the ship came to anchor at 3 p.m. This harbour called "Acadia anchorage" is formed by a number of islands, giving good shelter from all winds in 20 fathoms of water over an area of about one-tenth of a square mile. Shore observations were taken in the northeast corner of the harbour for latitude and longitude and azimuth. The harbour and vicinity were sketched and soundings taken. A suitable site for a wireless station is available on a hill in the northeast part of the harbour and about $\frac{1}{3}$ mile back from the shore line with convenient gullies leading to the base of the hill.

On Wednesday, the 19th, the first news of the European war was received by wireless from the steamer *Sharon*, having just arrived from Halifax.

Hatton headland was found to be S. 64° E. about 8 miles from the position shown on the charts.

Strong tidal currents of from 4 to 5 knots an hour and heavy tide rips were found in this locality.

The C.G.S. *Minto* reported the safe arrival at Port Burwell of the schooner *Effie M. Morrissay* with coal for us. This was welcome news, because owing to the ice conditions grave fears had been entertained for her safety. It was learned later that this little auxiliary schooner had had a very hard trip up along the Labrador coast, and a very narrow escape from disaster while rounding Cape Chidley. The strong tidal currents swept her through the passages behind the islands at the point at great speed, but although very near the rocks at times she escaped serious injury.

On Friday, the 21st, with easterly wind and rain, the anchorage was cleared at 9 a.m. for the Button islands about 40 miles distant. The course laid off proved good, and the islands were picked up when about a couple of miles ahead and Port Burwell reached at 7.30 p.m.

During the passage we encountered many fields of ice, but being neither heavy nor closely packed, they gave little trouble.

It was particularly noticeable that a fog bank hung about the entrance to the strait between Button islands and Hatton headland, but did not extend any distance inside this line and it was comparatively clear about Port Burwell. This condition lasted for some days, the fog bank being clearly seen about the islands from the highland.

In Port Burwell harbour were found the C.G.S. *Minto*, *Effie M. Morrissay*, auxiliary schooner *George B. Cluett* of the Carnegie Institute of Terrestrial Magnetism of Washington, and a Hudsons Bay Company schooner from Fort Chino, Ungava bay. The following day, with rain and generally disagreeable, was occupied coaling from the *Morrissay*.

On Sunday, Mr. Peters, officer in charge, and staff of the *George B. Cluett*, dined on board the *Acadia*.

A message was received from Ottawa via Port Nelson and steamer *Bonaventure*, passing out bound for Halifax, and reports were sent by her.

On Monday, the 24th, much the same weather, coaling was proceeded with and finished in the evening. Examination made about the harbour and vicinity

for a suitable coaling station, revealed nothing very satisfactory, but sufficient information has been obtained of the best place in sight, near the observation spot, to prepare plans if required.

We cleared Port Burwell at 5 a.m. on the following morning, the 25th, the weather showing little improvement, for Charles island, maintaining a speed of 8.5 knots on a consumption of 10 tons of coal in 24 hours.

On Thursday morning the ship was brought to anchor in a small inlet formed by a narrow island off the south side of Charles island, in 15 fathoms of water over sand bottom. Good shelter can be found here from most winds, except an easterly gale, when considerable swell would likely enter. The anchorage space, in from 10 to 18 fathoms of water, extends over an area of about a mile east and west, and 1½ to 3 cables in width.

Observations were taken for latitude and longitude and azimuth. Charles island and Cape Weggs were sketched from the launch, soundings taken and the former connected up to the latter by triangulation. The water was found to be very deep off the Cape, but good anchorage and shelter from southeast winds, in from 10 to 15 fathoms over sand bottom, can be had just west of it.

The east end of Charles island was found to be correct in latitude, but lies eight miles further to the westward, and the west end is N. 60 W. distant, 14 miles from the position shown on the chart.

The island is 22 miles long west by north and east by south and 5 miles across at the widest part towards the east end. It is devoid of vegetation and no natives live there. The eastern part of the island is high and bold on the north and east sides, rising to a height of from 200 to 600 feet above high water, with deep water close by. To the westward it terminates in a low flat boulder point a couple of feet above high water and fringed with a boulder bank for one-quarter of a mile. Ten fathoms will be found about three-quarters of a mile off.

We left Charles island on Tuesday evening, September 1, arriving off the north end of Mansel island at 3 p.m. on the following afternoon. Fair anchorage was found about 7 cables off the north end of the island in 7 fathoms of water over sand bottom and about 7 cables west of a boulder spit, making off the north point about a mile in a northwesterly direction. Shore operations were at once started for latitude, longitude, azimuth and traversing the north end of the island, but a full gale came down from the north on the 4th, preventing further work in such an exposed locality, and we were forced to let go and run for shelter. As it was intended to visit Cary's Swan Nest point (Coate's island), the ship was headed in that direction, where we arrived at 7.30 p.m. A comfortable berth was found in five fathoms of water over limestone gravel bottom about six miles northwest from Cary's Swan Nest point and three miles off shore.

The shore line was traversed for five miles to the northeastward and 10 miles to the northwestward of the point and soundings taken.

Shore observations were taken for latitude, longitude and azimuth, at a point N. 30 W. about five miles from the extreme of the point on a limestone gravel ridge about 20 feet above high water. The observation spot is about 50 feet back from the edge of the bank, which is steep to a high water mark. Cary's Swan Nest point was found in much the same position as shown on Canadian Chart No. 405. The point is composed of limestone gravel ridges not over 50 feet above high water and having many small fresh water lakes.

The west shore is swampy above high water mark and fringed by a boulder bank, drying at low water for a distance of half a mile until the most southerly part of the point is reached where the boulder bank extends out a couple of miles in a general S.S.W. direction where less than 6 feet of water will be found with the 3-fathom bank half a mile further off, but beyond this the water is good. The eastern shore is much cleaner, the boulder bank extending out only a short distance.

Plenty of game of all sorts was seen there, i.e. polar bears, deer, Arctic fox, eider duck, swans, also numerous wild flowers.

The weather having moderated, a move was made on Sunday evening, the 6th, arriving again off the north end of Mansel island on the following morning and shore work was at once proceeded with. At 11 p.m. Lieut. C. B. Shaw, of the survey staff, at his request was transferred to the Railways and Canals steamer *Sheba* bound for Halifax, that he might offer his services to the Admiralty. During the next few days the north end of Mansel island was traversed on shore and the west side from the launch, the ship carrying a line of soundings off shore. Observations were taken for latitude, longitude and azimuth at the north point on a limestone gravel ridge about 40 feet above high water and 300 feet inland. Similar observations were also taken at a point on the west side about 25 miles north of the south point of the island. On the return trip later in the season the east shore was traversed from the ship.

Mansel island is about pear shaped, 54 miles long north and south and 28 miles across at the widest part, which is about one-third the length from the north end.

It is formed of limestone gravel ridges which are from 10 to 40 feet in height on the west side and about 100 feet high on the east side. There are no trees of any kind and the game to be found consists chiefly of polar bears.

The most northerly point was found to be in much the same position as shown on Canadian Chart No. 405, but the shore does not turn to the southward as abruptly as shown. From the north point the shore trends in a W. 10° S. direction for 10 miles thence S. 31° W. for 15 miles. A boulder reef extends about one mile in a northwesterly direction from the north point but a short distance outside this reef the water is good. Shoal water extends for 1½ miles off the south end of the island and north of this point for about 15 miles on the west side a shoal bank makes out about 5 miles. The remainder of the island can be approached to within 1½ miles with safety.

Departure was taken from the south end for Port Nelson on Tuesday evening 10th September, arriving off Nelson shoal on Sunday morning the 13th, and a few hours later we came to anchor in the channel at Port Nelson, a couple of miles outside the Hudson bay terminus.

During the trip across the bay, the weather was very disagreeable, fresh easterly winds and heavy seas for the most part, gradually moderating as the west shore was approached. Though foggy and not being able to see more than a couple of miles, by the constant use of the submarine sentry no difficulty was experienced in approaching and picking up Nelson shoal, and then by following along the shore bank the entrance to the river was finally reached.

The air was found to be much clearer in the river than outside. While at Port Nelson, time signals sent out from Arlington, Virginia, were obtained at the wireless station for rating the chronometers.

Oiler Herbert Hillier, who had been reported very ill, was operated on by the ship's surgeon, assisted by Dr. Marcellus from the Hudson bay terminus. The operation was as successful as could be expected considering the condition of the patient and little hope was entertained for his recovery. Port Nelson was cleared at 6.30 a.m. on Thursday the 17th and the ship came to anchor off the Hayes river at 9 a.m. A visit was paid to York Factory to collect some instruments we had been forced to leave behind last autumn by extremely bad weather and ice conditions. The officer-in-charge of the Hudson's Bay Company reported a very severe winter, in fact the worst for years. The ice left Nelson river about the middle of June.

On the following morning, steam was taken at 5 a.m. and Cape Tatnam reached at 9.30, and from this point of departure the coast was traversed

from the ship, where possible, to Cape Henrietta Maria, a distance of some 300 miles, where we arrived on the 26th. During the trip the weather was on the whole fair and permitted landing at Fort Severn and Winisk for shore observations. At the above point the shore was found to be some 50 miles out in longitude but about correct in latitude as shown on Canadian Chart No. 405.

Observations were taken at Cape Henrietta Maria for latitude, longitude and azimuth. The point was traversed and soundings taken. It was found to be about correct in latitude but 10 miles to the westward in longitude from the position shown on the chart. On the east side the water was found to be good, giving a depth of from 6 to 8 fathoms of water one mile off shore. Shoal water extends off the north point in a N.N.W. direction some 10 miles and a considerable distance to the westward.

This locality was found to be much the same formation as Coates and Mansel islands, limestone gravel ridges about 10 ft. high.

I regret to report the death of Herbert Hillier at 9.20 a.m. on Tuesday, the 29th September. As already stated, little hope was entertained for his recovery at the time of the operation, and everything possible was done to relieve him. He was buried with due ceremony on Cape Henrietta Maria on the following day. Complete reports have already been forwarded concerning this occurrence.

We departed from Cape Henrietta Maria at noon on Saturday, 3rd October, with northeast wind accompanied by snow squalls. A line of soundings was carried to Cape Tatnam, and as the season was getting very late, sounding was carried on all night by arranging lights on deck and the crew working in three watches that no time would be lost. Cape Tatnam was reached at noon on the 5th and Port Nelson at 7.30 p.m.

Time signals were again obtained from Arlington, Virginia, at the wireless station to check the chronometers.

Coal was received from the Department of Railways and Canals coaling barge *Ben Mare*.

Final reports being despatched to Ottawa, Port Nelson was cleared on the morning of the 8th October, during a moderate gale from the northwest accompanied by snow and the thermometer at 16° F.

Sounding was carried on with difficulty owing to the heavy sea running and finally had to be dropped as there was danger of having men washed overboard when backing up to take a cast. We arrived off the south end of Mansel island on Sunday, the 11th, and came to anchor 1½ miles due east of the south point in 15 fathoms of water over gravel bottom.

The island was well covered with snow and the continual heavy snow storms gave an appearance of winter, the thermometer standing at 16° F.

On the morning of the 13th, a move was made and the east side traversed from the ship and soundings taken. Great difficulty was found in accomplishing the above on account of the frequent heavy snow storms, but the north end was finally reached on Wednesday, the 14th, and we squared away for Diggs islands.

About 3.30 p.m. scattered ice fields were passed through, and by 11 p.m. we were forced to heave to in the closely-packed extremely heavy Fox channel ice. In the morning, the ice having opened on the change of the tide, a move was made and all ice cleared by 7 p.m. about 10 miles past Eric cove, and Charles island was reached at noon on the 16th.

Although the *Acadia* managed to get through this ice without injury, it was quite sufficient to cause serious trouble to any ordinary freight steamer.

On the following day, a fierce gale from the E.N.E. prevailed, accompanied by snow squalls with thermometer at 16° F., preventing any work.

We cleared Charles inlet on the 18th, carrying a line of soundings from the east point of Charles island, Cape Moses Oates, to Bluff point, Baffin land, inside Lower Savage island, where we arrived on the 19th.

On the following day we sketched the adjacent shore and came to for the night in Savage harbour.

Next day a line of soundings was carried to Resolution island, and the southwest point of the island sketched from the ship. Acadia cove was reached on the 22nd.

On the following morning, a line of soundings was carried to the Button islands, where we came to anchor at 5.30 p.m.

On Tuesday, the 25th, the *Sheba* and *Bellaventure* passed out bound for Halifax and messages were sent to be mailed from the first port of call. On Wednesday, the 28th, a move was made, coming to anchor in the evening at Port Burwell, after attempting to accomplish some work between snow squalls.

The period from October 22nd to November 2nd was employed connecting the Button islands with Cape Chidley by triangulation and also awaiting an opportunity to sketch the latter. This was not an easy task at the time of year, owing to the inclement weather, moderate to heavy gales, accompanied by snow, prevailing—with the thermometer registering 16° F. to 26 °F. Cape Chidley was finally cleared for the season, on Monday, 2nd November, and we arrived at North Sydney on the morning of the 7th. During the trip down we had fresh northerly winds and snow squalls and a few icebergs were seen.

Time signals from St. John were obtained at the Western Union cable station.

Sydney was cleared on Sunday morning, 6th November, but owing to heavy winds encountered outside from the W.S.W. shelter was taken at Louisbourg until the next morning. Halifax was reached on the morning of the 10th.

The crew was paid to date, and those willing to serve were retained on board.

The Survey staff returned to Ottawa to plot the season's work, except Mr. C. B. R. MacDonald, who having obtained permission, left the Survey staff at Halifax and accepted a commission in the British army.

I beg to thank the Survey staff and also the sailing master and first officer of the ship for their close attention to duty during the past season.

I have the honour to remain, sir,

Your obedient servant,

F. ANDERSON,

Officer-in-Charge of Hudson Bay Survey.

APPENDIX II.

Ice Conditions in Hudson Bay and Strait, Season of 1914.

The Arctic current setting south along the east shore of Baffin land carries great masses of Arctic field ice and icebergs across the eastern entrance to Hudson strait and along the Labrador coast. This generally occurs between last week of November to the first week in January, blocking the entrance to the strait to a greater or less extent until the following July. A certain amount is forced through Gabriel strait and carried to the westward by the current setting west along the north shore. Icebergs have been seen about Nottingham island and Cape Wolstenholm, but as a rule they do not enter Hudson bay. If not grounded, these are carried out again by the current setting east along the south shore of the strait.

When the *Acadia* arrived off Cape Chidley, on the 19th of July, open water was visible from aloft, and the Str. *Bonaventure*, some miles to the northward, reported similar conditions. The ice, for the most part, appeared to be winter ice, probably from Hudson and Ungava bays. Although occasional bergs and arctic ice were seen, the main pack of arctic ice had passed to the southward. "Winter ice" means ice one year old, but "Arctic" or "polar" ice may be two or many years old, and consequently much heavier and harder.

The constant easterly winds held the field ice packed, making further progress impossible until 31st July, when the wind veered to the westward and finally blew a full gale from the N.N.West, opening up the pack. Conditions were not so severe after this date. but until the latter part of August, great fields were continually passing out, part of which returned with the flood tide, partially obstructing the passage.

It was specially noticed that the greater portion of this heavy pack ice drifted towards the south side of the entrance about Cape Chidley and the Button islands, rather than to Resolution island, and, with the strong tidal currents, making it a dangerous locality for any steamer attempting a passage. During the ebb tide the ice pack may become well opened, affording good leads, but on the change of tide it would close up with great pressure in places.

A couple of years ago, a powerful Newfoundland steel sealing steamer was caught and received a very bad nip.

During July, 1913, a small auxiliary schooner, being caught in this locality, received such pressure that oil tanks in her hold were burst. The crew abandoned the ship and took refuge on the ice, but on the change of tide, when the pressure slackened, the ice opened up again, and as the ship appeared still sea-worthy, owing to her staunch construction, the crew returned on board and managed to clear the ice pack before the next tide.

On the other hand, towards the north side of the entrance, about Resolution island, although the tidal currents were found just as strong, the ice appeared lighter and much honeycombed, probably some that had been carrried out on the south side by one tide and returned by the next.

Entering with much ice, about the best passage has generally been found close to Hatton headland and along the north shore. Careful note should be taken of the direction of the wind. A fresh south wind would drive the ice to the northward when a mid-channel course would be the better one to take.

As already mentioned, navigation would have been greatly impeded by ice until the end of August for vessels entering the strait from the east, and

from early in October entering from the west, because Fox channel ice began to appear at the west entrance about the latter date, greatly interfering with vessels.

The *Acadia* leaving Hudson bay on October 15th found the passage between Diggs and Nottingham islands about closed, and was forced to pass the night in the ice pack. On the following morning, the change of tide opened the pack sufficiently to allow passage, and all ice was cleared about ten miles past Eric cove. Cape Chidley was cleared for the season on the 2nd of November with no ice in sight.

During the past season, after the middle of September, snow storms were the order of the day, and this taken in conjunction with the ice condition detailed above, rendered the period during which ordinary tramp steamers could have navigated the strait with safety very limited.

Owing to the great masses of ice to be encountered and the difficulty of finding the best lead, hydroplanes operated in connection with the wireless stations might be used with good results, to inform captains concerning the disposition of the ice and where they may find open leads. These would be particularly useful in the autumn at the passage between Diggs and Nottingham islands. It is submitted that they might be more useful than the seagoing tugs hitherto suggested. The information would be obtained much more quickly with no danger of being caught in the ice. On the other hand there would be the danger of an accident occurring and the crew of the machine being cast away on an ice flow. In the autumn frequent snow storms and heavy winds might hamper the operation of these machines, and in the spring fogs caused by the sun on ice fields would certainly be a drawback.

ICE CONDITIONS IN JAMES BAY.

The prevailing northerly winds in Hudson bay during the early summer drive all the field ice to the south end of the bay very effectually closing up the entrance to James bay until the latter part of August or first of September. This ice consists chiefly of *winter ice*, although icebergs and Fox channel ice have been found. During the season of 1912 the powerful steel sealing steamer *Beothic* reported having encountered heavy Fox channel ice and many bergs in this locality about the middle of August, and a period of 8 days was spent in forcing a passage. Strong northerly currents were also reported when abreast Cape Henrietta Maria, making considerable motion in the ice fields that greatly increased the danger. It is quite unusual to find strong currents in this locality, but they were probably caused by a constant northerly wind forcing the water into James bay.

An ordinary tramp steamer would stand a poor chance of escaping injury under similar circumstances, and it would not be well to attempt this region until the latter part of August or early in September. The closing of James bay, for the season, may be taken about the middle of November, as weather conditions are much similar to Hudson bay.

Attached to this report are the following:

Meteorological observations taken on board the *Acadia*.

I am, sir, your obedient servant,

F. ANDERSON,

Officer in charge Hudson Bay Survey.

Meteorological Observations taken on Board C.G.S. *Acadia*.

Date.	Barometer.			Thermometer.			Wind.			Locality.		Remarks.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Direction.	Force.	Clouds.	Lat. N.	Long. W.	
1914.												
July 11	31·00	30·10	30·55	59F	46F	52·5F	SSE.	1	4	44 28	63–13	Left Halifax at 10 30 a.m.; p.m., fog.
" 12	30·10	29·60	29·85	53	49	52·0	SSW.	2	10	North Sydney...		Fog; p.m., rain
" 13	29·60	29·88	29·74	51	49	50·0	NNE.	3	4	North Sydney...		Left N. Sydney 2 30 p.m..fog; p.m., clear.
" 14	29·90	29·60	29·75	60	47	53·5	SSE.	3	1	28–50	59–20	A.M., clear; p.m., overcast.
" 15	29·60	29·96	29·78	51	34	42·5	NNE.	3	0	51–34	56–30	Encountered ice field p.m. Few icebergs.
" 16	29·96	29·50	29·73	38	32	35·0	E.	2	2	53 13	53–58	Loose field ice, few icebergs.
" 17	29·58	29·40	29·49	39	36	37·5	NNE.	5	5	56 15	55 30	Fog; overcast; few icebergs.
" 18	29·80	29·56	29·68	36	30	33·0	NNE.	3	2	58–31	58–26	Overcast, few icebergs.
" 19	29·80	30·00	29·90	33	26	29·5	S.	1	0	59–56	61–31	Clear and fine; packed drift ice
" 20	30·00	29·86	29·93	46	30	38·0	Calm.	0	0	59–49	61–16	Clear and fine; in packed field ice.
" 21	30·24	29·86	30·05	36	28	32·0	E.	2	5	59–55	62–28	Loose field ice, numerous bergs; p.m., clear.
" 22	30·24	30·20	30·22	56	30	43·0	Calm.	0	0	59–52	62–29	Clear and fine. Packed heavy ice.
" 23	30·18	30·04	30·11	38	30	34·0	SE	1	4	59–54	63–27	Clear; p.m., rain; heavy field ice.
" 24	30·04	29·96	30·00	36	30	33·0	SE.	1	10	60–04	63–17	Fog. Few bergs, close field ice
" 25	29·96	29·64	29·80	34	30	32·0	E.	2	10	60–10	63–18	Fog. Close packed field ice.
" 26	30·02	29·80	29·91	35	31	33·0	NNE.	2	10	60–10	63–18	Fog. Packed winter and polar ice. Icebergs.
" 27	30·10	30·02	30·06	52	32	42·0	NNW	1	4	60–05	62–38	Clear and fine. Fog, packed winter ice.
" 28	30·10	29·90	30·00	52	32	42·0	NNW.	2	0	59–50	62–20	Clear and fine. Packed winter and polar ice.
" 29	29·90	29·78	29·84	49	33	41·0	WSW.	4	10	59–50	62–30	Rain. Loose to packed winter ice.
" 30	29·78	29·62	29·70	48	34	41·0	NNW.	2	10	59–45	62–33	Rain. In packed ice (some polar ice).
" 31	29·62	29·64	29·63	44	32	38·0	W.	5	10	59–52	62–52	Rain. In loose winter ice, few icebergs.
Aug. 1	29·64	29·60	29·62	48	34	41·0	W.	2	5	60·–24	63 30	Rain. P.M., clear. Scattered field, winter, and polar ice.
" 2	29·64	29·60	29·62	51	32	41·5	SW.	1	0	60 24	64 30	Clear. Loose and packed ice fields. Few bergs.

Meteorological Observations taken on Board C.G.S. *Acadia—Continued.*

Date.	Barometer.			Thermometer.			Wind.			Locality.		Remarks.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Direction.	Force.	Clouds.	Lat.	Long.	
1914.												
Aug. 3	29·74	29·64	29·69	44	34	39·0	NW.	4	5	Lacey Island (Buttons)		Fog. P.M., fine and clear. Loose ice.
" 4	29·76	29·52	29·64	46	34	40·0	SSW.	4	4	60–38	63–52	Clear. P.M., rain; loose and packed field ice.
" 5	29·70	29·40	29·55	45	28	36·5	NW.	6	8	60–29	63–32	Rain. Packed fields, winter ice.
" 6	30·00	29·70	29·85	46	32	39·0	WNW.	5	6	60–23	62–30	Rain. P.M., clear. Loose winter ice.
" 7	30·00	29·60	29·80	40	31	35·5	E.	6	8	61–19	64–50	Fog, overcast; scattered field ice.
" 8	29·78	29·60	29·69	34	30	32·0	S.	3	6	60–40	65–00	Rain. Loose and packed winter ice.
" 9	29·78	29·72	29·75	44	32	38·0	E.	5	5	60–54	65–21	Rain. P.M clear. Loose field ice.
" 10	29·72	29·50	29·61	34	32	33·0	SE.	5	7	61–20	65–40	Rain. Loose ice floes.
" 11	29·50	29·24	29·37	36	33	34·5	S.	7	4	61–20	64–50	Fog. P.M., overcast. Loose ice.
" 12	29·74	29·50	29·62	38	27	32·5	SW.	6	4	Hatton	Headl'nd	Clear. P.M., fog; packed winter ice. Few icebergs.
" 13	29·82	29·74	29·78	46	32	39·0	W.	3	2	61–45·2	65–40·9	Fog. P.M., clear. At south end Savage island.
" 14	30·00	29·82	29·91	42	28	35·0	E.	2	0	61–50·2	65–46	Clear and fine. At Savage isd. harbour.
" 15	29·98	29·96	29·97	43	35	39·0	SSW.	2	0	Savage	Harbour	Clear and fine.
" 16	29·94	29·94	29·94	52	38	45·0	SSW.	2	0	Savage	Harbour	Clear and fine.
" 17	29·94	29·88	29·91	44	28	36·0	SSE.	1	0	61–20	64–53·6	Clear and fine. At Hatton headland, Resolution island Scattered field ice.
" 18	29·88	29·88	29·88	58	30	44·0	WNW.	3	0	Acadia Cove		Clear and fine.
" 19	29·88	29·80	29·84	34	29	31·5	E.	7	8	Acadia Cove.		Fog.
" 20	29·96	20·80	29·88	39	29	34·0	SE.	4	4	Acadia Cove		Rain-fog p.m. Overcast.
" 21	29·96	29·66	29·81	36	28	32·0	SSE.	6	8	Port Burwell		Fog., p.m., rain. Scattered ice floes.
" 22	29·70	20·66	20·68	37	29	33·0	SE.	2	10	Port Burwell		Rain.
" 23	29·73	29·69	29·71	40	30	35·0	E.	6	4	Port Burwell		Fog., p.m., overcast.
" 24	29·80	20·76	29·78	37	30	33·5	NE.	4	2	Port Burwell		Overcast.
" 25	29·82	20·80	29·81	36	29	32·5	NNW.	3	7	60–49	66–24	Clear; p.m., fog. Scattered ice; few bergs.

Aug.	26	29·82	29·68	29·75	40	29	34·5	W.	3	4	62-24	71-57	Clear, p.m. fog. Scattered pans of ice.
"	27	29·68	29·56	29·62	40	28	34·0	WNW.	6	8	62-35·3	73-59·8	Rain. At Charles Island harb.
"	28	29·80	29·64	29·72	37	28	32·5	W.	6	2	Charles Inlet		Clear and fine.
"	29	29·72	29·50	29·61	31	28	31·0	WSW.	5	4	Charles Inlet		Snowstorm., p.m., overcast.
"	30	29·88	29·72	29·80	35	29	32·0	ESE.	4	0	Cape Weggs		Clear and fine. Clear of ice.
"	31	30·02	29·88	29·95	46	31	38·5	NW.	4	0	Charles Inlet		Clear and fine.
Sept.	1	30·10	30·02	30·06	46	30	38·0	WSW.	2	0	Charles Inlet		Clear and fine.
"	2	30·10	29·95	30·02	58	32	45·0	NW.	1	0	62-26	79-36	Clear and fine. North of Mansel island.
"	3	29·95	29·75	29·85	44	30	37·0	ENE.	1	1	62-26	79-36	Overcast.
"	4	29·95	29·75	29·85	41	30	35·5	N.	10	1	62-10	83-12	Overcast. At Cary's Swan Nest, Coats island.
"	5	30·03	29·95	29·99	42	31	36·5	NNE.	8	1	62-10	83-12	Clear and fine; p.m., hazy.
"	6	30·05	30·03	30·04	49	31	40·0	NNW.	3	0	62-10	83-12	Clear and fine.
"	7	30·04	30·00	30·02	48	33	40·5	NW.	4	0	62-26	79-36	Clear and fine. North of Mansel island.
"	8	30·16	30·00	30·08	38	34	36·0	WNW.	4	5	62-26	79-36	Overcast; p.m., fog.
"	9	30·28	30·16	30·22	49	34	41·5	W.	2	0	62-26	79-36	Clear and fine.
"	10	30·28	29·96	30·12	46	34	40·0	SSW.	4	3	61-54	80-20	Clear. P.M., fog.
"	11	29·95	29·70	29·83	39	34	36·5	S.	6	6	60-25	84-15	Fog. Clear in evening.
"	12	29·80	29·70	29·75	48	35	41·5	SE.	3	6	58-57	89-25	Clear. P.M., rain.
"	13	29·80	29·68	29·74	64	42	53·0	ENE.	4	4	Port Nelson		Clear. Rain in evening.
"	14	29·68	29·24	29·46	58	52	55·0	SSW.	5	3	Port Nelson		Showers. Clearing in evening aurora.
"	15	29·40	29·32	29·36	65	50	57·5	SW.	7	0	Port Nelson		Clear and fine.
"	16	29·82	29·40	29·61	61	52	56·5	WSW.	3	4	Port Nelson		Rain. Clear in evening aurora.
"	17	30·34	29·82	30·08	56	42	49·0	WNW.	2	1	57-12	92-06	Clear and fine. P.M., overcast.
"	18	30·22	30·04	30·13	58	44	51·0	SE.	3	2	57-04	90-11	Clear and fine. Midnight, fog.
"	19	30·06	29·48	20·77	44	34	39·0	ENE.	6	10	56-49	88-17	Fog. P.M., rain and sleet.
"	20	29·76	29·42	29·59	60	40	50·0	NNW.	4	1	56-14	87-39	Clear and fine. Off Fort Severn.
"	21	29·72	29·80	29·76	49	38	43·5	NE.	3	10	56-14	87-39	Fog and rain.
"	22	29·96	29·80	29·88	46	34	40·0	NE.	4	10	56-22	87-27	Rain.
"	23	30·00	29·96	29·98	48	34	41·0	SW.	2	1	55-30	85-21	Clear and fine. Off Winisk.
"	24	30·24	30·00	30·12	52	41	46·5	ESE.	2	3	55-23	85-11	Clear. Rain in evening.
"	25	30·24	30·22	30·23	40	38	39·0	SW.	6	10	55-23	84-17	Rain.
Sept.	26	30·50	30·22	30·36	39	34	36·5	E.	6	3	55-08	82-18	Showers; p.m., clear. Off Cape Henrietta Maria.
"	27	30·66	30·50	30·58	44	36	40·0	ENE.	2	1	55-10	82-14	Overcast; p.m., clear and fine.
"	28	30·60	29·96	30·28	44	35	39·5	SSE.	9	1	55-10	82-14	Clear and fine. Midnight, heavy rains.
"	29	30·18	29·80	29·99	46	39	42·5	NNW.	8	7	55-10	82-14	Rain-fog. Afternoon overcast.
"	30	30·20	30·00	30·10	42	38	40·0	W.	4	0	55-10	82-14	Clear and fine.
Oct.	1	30·04	29·90	29·97	43	37	40·0	ESE.	4	8	55-10	82-14	Fog.
"	2	30·10	29·68	29·89	46	34	40·0	NW.	6	1	55-10	82-14	Overcast.
"	3	30·40	30·04	30·22	41	34	37·5	NE.	4	6	55-10	82-14	Snow squalls.
"	4	30 24	30·84	30·54	41	35	38·0	ESE.	6	5	56-27	86-15	Rain and sleet. Clearing in evening.
"	5	30·44	30·24	30·34	44	34	39·0	N.	4	0	57-20	90-50	Clear and fine.
"	6	30·32	29·98	30·15	44	36	40·0	S.	2	1	Port Nelson		Clear and fine.

METEOROLOGICAL OBSERVATIONS taken on Board C.G.S. *Acadia—Concluded.*

Date.	Barometer.			Thermometer.			Wind.			Locality.		Remarks.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Direction.	Force.	Clouds.	Lat.	Long.	
1914.												
Oct. 7	30·02	29·94	29·98	48	44	46·0	S.W.	2	4	Port Nelson		Fog. P.M., overcast.
" 8	29·94	29·70	29·82	48	36	42·0	SSW.	1	0	57–25	92–00	Clear and fine. Aurora.
" 9	30·20	29·76	29·98	36	32	34·0	NNW.	9	1	58–58	88–08	Clear and fine.
" 10	30·38	29·94	30·16	34	32	33·0	NNW.	7	3	60–34	84–23	Clear. P.M., snow squalls.
" 11	29·96	29·80	29·88	26	18	22·0	NNW.	9	10	61–31	79–43	Snow squalls. Anchored S.E. Mansel island.
" 12	29·94	29·80	29·87	22	20	21·0	N.	10	10	61–31	79–43	Snow flurries. Young ice.
" 13	30·00	29·64	29·82	28	20	24·0	NW.	5	2	61–31	79–43	Snow squalls. P.M., clear.
" 14	29·64	29·26	29·45	32	25	28·5	ENE.	6	8	62–27	79–21	Snow squalls. Encountered packed polar field ice.
" 15	29·56	29·36	29·46	27	18	22·5	NNE.	6	10	62–42	77–27	Snow squalls. Loose polar field ice.
" 16	29·70	29·56	29·63	20	18	19·0	WNW.	5	8	Charles inlet		Snow storm. Young ice.
" 17	29·66	29·48	29·57	20	16	18·0	NE.	5	5	Charles inlet		Snow squalls. P.M., clear.
" 18	29·94	29·66	29·80	26	15	20·5	NW.	6	10	62–33	73–35	Snow squalls.
" 19	30·02	29·86	29·94	26	23	24·5	NW.	5	1	61–21	67–55	Clear and fine. Aurora.
" 20	29·86	29·68	29·77	25	22	23·5	NE.	6	2	Off Savage island		Clear. Snow in evening. Few bergs.
" 21	29·88	28·72	29·80	28	25	26·5	N.	5	2	Off Savage Harb'r		Overcast. P.M., clear.
" 22	29·90	29·78	29·84	28	23	25·5	NW.	6	1	Acadia cove		Clear. P.M., overcast. Resolution island.
" 23	29·88	29·32	29·60	32	24	28·0	SSW.	5	8	Minro Anchorage		Button islands. Overcast. P.M., snowstorm.
" 24	29·46	29·24	29·35	30	14	22·0	WNW.	7	10	Minto Anchorage		Snow-storm.
" 25	29·50	29·38	29·44	26	18	22·0	WSW.	8	5	Minto Anchorage		Blizzard. P.M., clear.
" 26	29·58	29·50	29·54	34	24	29·0	SE.	7	6	Minto Anchorage		Overcast. P.M., snow squalls.
" 27	20·50	29·38	29·44	34	18	26·0	SW.	7	5	Minto Anchorage		Snow squalls. P.M., clear.
" 28	29·44	28·82	29·13	24	18	21·0	NW.	5	3	Port Burwell		Clear and fine. P.M., snow.
" 29	29·64	28·82	29·23	25	23	24·0	WNW.	10	8	Port Burwell		Snow squalls.
" 30	29·68	29·62	29·65	31	25	28·0	WSW.	6	8	Port Burwell		Snow squalls.
" 31	29·76	29·46	29·61	28	27	27·5	SSW.	6	2	Port Burwell		Overcast.
Nov. 1	29·58	29·34	29·46	30	26	28·0	SSE.	5	6	Gray Straits		A.M., overcast; p.m., snow squalls.
" 2	29·76	29·58	29·67	25	19	22·0	NW.	6	5	Minto Anchorage		Snow squalls; overcast.
" 3	29·84	29·76	29·80	29	24	26·5	NW.	9	1	59–00	60–48	Clear. P.M., overcast.
" 4	29·84	29·44	29·64	34	30	32·0	NNW.	10	8	55–48	57–23	Snow squalls. Few icebergs.
" 5	29.62	29.44	29.53	32	30	31·0	NW.	10	6	52–24	54–57	Snow squalls.

Nov. 6	29·84	29·62	29·73	36	32	34·0	NNE.	6	1	49–34	58–40	Clear. P.M., overcast. Ice-berg.
" 7	30·12	29·84	29·98	38	31	34·5	NNW.	5	4	North Sydney		Snow squalls. P.M., overcast.
" 8	30·12	29·60	29·86	50	32	41·0	SSW.	6	4	46–20	60–01	Overcast. Rain in evening.
" 9	29·84	29·60	29·72	46	38	42·0	NW.	5	4	45–30	60–26	Rain. P.M., overcast.
" 10	29·82	29·72	29·77	42	32	37·0	NNE.	5	2	Halifax.		Arrived at 8 a.m. Overcast.

APPENDIX III.

WATER SURFACE ELEVATIONS OF "GREAT LAKES" FOR 1914, referred to United States Standard datum or Mean Sea-level.

For Elevations of Bench Marks used see page 102.

Location.		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
		Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
Lake Superior	Port Arthur	..	..	..	..	602·29 7th	602·47	602·66	602·71	602·80	602·67	602·33	601·96	602·49
St. Mary's river	Above locks	601·61	601·36	601·07 19 days	601·11	601·64	601·73	601·92	602·03	602·04	601·88	601·74	601·50	601·64
	Below locks	582·00	582·52 20 days	581·93	581·29	581·74	581·86	582·20	582·25	582·29 21 days	582·27	581·96	581·44	581·98
Georgian bay	Collingwood	..	..	..	..	580·35 20th	580·44	580·59	580·51	580·47	580·19	580·05	579·56 14th	580·27
Lake Huron	Goderich	..	..	..	..	580·32 16th	580·49	580·65	580·58	580·49	580·25	580·01	579·70 14th	580·31
Detroit river	Isle aux Peches	573·92	573·63 8 days	573·51 22 days	574·46	575·12	575·26	575·26	575·06	574·89	574·06	574·06	574·56	574·53
	Fighting island	573·46	573·35	573·20	573·87	574·55	574·69	574·66	574·43	574·28	573·99	573·35	573·80	573·97
Lake Erie	Port Colborne	572·10	571·42	571·32	572·04	572·78	572·95	572·76	572·51	572·22	572·00	571·80	571·34	572·10
Lake Ontario	Port Dalhousie	..	..	..	..	246·90 13th	246·88	246·71	246·34	246·03	245·56	245·12	244·90 16th	246·06
	Kingston	245·51	245·59	245·59	246·39	256·77	246·77	246·59	246·21	245·95	245·47	245·17	244·76	245·90

APPENDIX IV.

DESCRIPTIONS OF BENCH-MARKS established by Automatic Water Gauges with Elevations determined by Water Surface Transfers, and precise Levelling.

Location.	Description.	Elev. in feet by	
		Water Surface Transfer.	Precise Levels, Instrumental.
	Lake Superior.		
Port Arthur, Ontario.	Port Arthur Bench-mark is the top of a steel rivet set vertically into foundation stone, first course above ground, situated at S.W. corner of C.P. Ry. freight office on Arthur street. W. S. transfer 1907–14 (inc.)	616·154	.....
	Georgian Bay.		
Collingwood, Ontario.	Collingwood Bench-mark No. 668½ is the top of a steel rivet set vertically into the top of the plinth course N.E. corner of Collingwood Ship Building Co's pump-house. W. S. transfer 1906–11 and 14	587·858	587·40
French River.	French River Bench-mark No. 26 is the top of iron ring-bolt set in solid rock about 250 feet S.W. of Ontario Lumber Co's wharf. W. S. transfer 1906 and 1907	591·585	590·628
	Lake Huron.		
Goderich.	Goderich Bench-mark is the top of a steel rivet set vertically into cement foundation S.E. corner of chimney of Goderich water works, S. side harbour. W. S. transfer 1910–14 (inc.)	588·579	.....
	Lake Erie.		
Port Colborne. Ontario.	Port Colborne Bench-mark is the top of a steel rivet set vertically into coping N. side of W. abutment of swing-bridge over S. entrance walls to guard lock of Welland canal. W. S. transfer 1911–14 (inc.)	584·688	584·657
Port Stanley, Ontario.	Port Stanley Bench-mark is the top of a steel rivet set vertically into top course of stone abutment on N. side and at E. end of steel bridge over Kettle creek. W.S. transfer 1908–11 (inc.)	586·998	.....
	Lake Ontario.		
Kingston, Ontario.	Kingston Bench-mark is the top of a steel rivet set vertically into top of plinth course, S.W. corner of pump-house at Kingston dry dock, transfer 1909–14 (inc.)	252·721	252·892
Brighton, Ontario.	Brighton Bench-mark is the top of a steel rivet set vertically into a bastard marble rock about 1,000 feet N.W. of wharf and about 400 feet from shore; letters B.M. cut in rock. W. S. transfer 1908 and 109	256·572	
Toronto, Ontario.	Toronto Bench-mark No. 646½ is the top of a steel rivet set vertically into top of coping stone on S.E. corner of large arched portal of Garrison creek sewer, about 800 feet N. of W. end Queen's wharf. W. S. transfer 1906–09 (inc.)	254·210	254·150
Port Dalhousie, Ontario.	Port Dalhousie Bench-mark is the top of a 2-inch nut on 1-inch iron bolt set vertically in concrete wharf, about 1 foot from inner face and close to automatic gauge house on S. side of approach to Welland canal. W. S. transfer 1910–14 (inc.)	250·442	250·803

APPENDIX V.

Bench-marks established by Automatic Water Gauges, and Elevations determined by Water Transfer.

Year.	Lake Ontario.				Lake Erie.			Lake Huron.		Georgian Bay.				Superior.
	Kingston B.M.	Brighton B.M. MCXCVIII.	Toronto B.M. 646½	Port Dalhousie B.M.	Port Stanley B.M.	Port Colborne B.M.		Goderich B.M.		Collingwood B.M. 668½		French River B.M. Peter's 26.		Port Arthur B.M.
	Trans. from Tibbett's Point.				Cleveland.	Buffalo.	Cleveland.	Harbour Beach.	Mackinaw City.	Harbour Beach.	Mackinaw City.	Harbour Beach.	Mackinaw City.	Marquette.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1906	.....	.....	254·361	.....	.....	.....	.....	.....	.....	587·903	587·856	591·629	591·631	.....
1907	.....	.....	254·202	.....	.....	.....	.....	.....	.....	587·801	587·781	591·552	591·529	616·148
1908	.....	256·649	254·173	.....	587·011	.....	.....	.....	.....	587·852	587·886	.....	.....	616·119
1909	252·683	256·495	254·105	.....	586·941	.....	.....	.....	.....	587·873	587·833	.....	.....	616·127
1910	252·782	.....	.....	250·525	586·923	.....	.....	588·512	588·529	587·875	587·852	.....	.....	616·143
1911	252·731	.....	.....	250·454	587·117	584·592	584·516	588·562	588·565	587·861	587·842	.....	.....	616·112
1912	252·690	.....	.....	250·429	.....	584·731	584·744	588·599	588·609	.....	.....	.....	.....	616·199
1913	252·718	.....	.....	250·408	.....	584·704	584·790	588·595	588·585	.....	.....	.....	.....	616·203
1914	252·720	.....	.....	250·394	.....	584·678	584·748	588·566	588·640	587·882	587·917	.....	.....	616·183
Mean	252·721	256·572	254·210	250·442	586·998	584·688		588·579		587·858		591·585		616·154

Elevations are in feet and referred to United States Standard datum or mean sea-level.

APPENDIX VI.

DAILY MEAN ELEVATIONS of Lower St. Lawrence at Montreal, Que. Year 1914. Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	22·05	21·72	20·13	19·70	18·96	18·48
2	.....	21·98	21·69	20·09	19·74	18·90	18·70
3	.....	21·82	21·60	20·22	19·79	18·80	18·92
4	.....	21·84	21·41	20·17	19·80	18·78	18·89
5	.....	21·84	21·36	20·09	19·76	18·91	18·91
6	24·00	21·64	21·38	20·00	19·78	19·12	19·12
7	24·04	21·53	21·45	19·98	19·94	18·85	18·94
8	24·11	21·82*	21·38*	20·06	20·11	18·72	18·74
9	24·28	21·87	21·47	19·97	20·02	18·83	18·74
10	26·26	21·75	21·38	19·97	19·88	18·81	18·71
11	24·44	21·72	21·22	19·97	19·74	18·61	18·58
12	24·49	21·72	21·16	20·01	19·57	18·82	18·51
13	24·18	21·67	21·13	19·84	19·41	18·90	18·63*
14	23·99	21·48	21·01	19·73	19·35	18·70	18·47*
15	23·95	21·33	20·87	19·72	19·33	18·50	18·55
16	23·77	21·44	20·78	19·69	19·28	18·65	18·72
17	23·62	21·21	20·69	19·69	19·24	18·72	18·27*
18	23·38	21·08	20·71	19·64*	19·27	18·80	19·35
19	23·22	21·03	20·68	19·76*	19·27	19·38	19·33
20	23·09	21·10	20·53	19·75	19·17	19·31	19·86
21	22·97	20·93	20·53	19·72	19·21	19·21	19·41
22	22·81	21·06	20·54	19·79	19·30	19·33	19·02
23	22·74	21·15	20·55	19·81	19·34	19·16	18·97*
24	22·55	21·25	20·55	19·94	19·41	18·98	.....
25	22·39	21·41	20·49	19·91	19·41	18·73	18·71*
26	22·22	21·48	20·60	19·84	19·29	18·72	18·69
27	22·23	21·47	20·66	19·75	19·15	18·82	18·90
28	22·37	21·49	20·66	19·64	19·23	18·59	18·84
29	22·31	21·51	20·64	19·62	19·08	18·64	18·69*
30	22·12	21·84	20·47	19·74	19·02	18·78	.....
31	22·04	.....	20·27	19·69	.....	18·76	.....
Mean	23·29	21·52	20·95	19·87	19·49	18·86	18·88

* Denotes that mean is of less than 24 hourly readings.

APPENDIX VII.

Daily Mean Elevations of Lower St. Lawrence at Longue Pointe, Que, 1914.

Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	Feet	Feet	Feet.	Feet.	Feet.	Feet.	Feet.
1	.....	20·71	20·47	18·88	18·45	17·82	17·52
2	.....	20·64	20·43	18·82	18·48	17·77	17·63
3	.....	20·49	20·31	18·93*	18·54	17·66	17·82
4	.....	20·53	20·13	18·88	18·55	17·66	17·84
5	.....	20·56	20·07	18·82	18·53	17·76	17·84
6	22·80*	20·38	20·08	18·74	18·56	17·97	18·06
7	22·85	20·24	20·14	18·71	18·71	17·73	17·91
8	22·95	20·54	20·07	18·79	18·89	17·58	17·69
9	23·11	20·61	20·19	18·73	18·82	17·70	17·66
10	23·12	20·45	20·11	18·72	18·69	17·70	17·66
11	23·28	20·41	19·95	18·71	18·56	17·57	17·51*
12	23·35	20·41	19·89	18·73	18·39	17·66	17·41*
13	23·05	20·36	19·84	18·57	18·24	17·76	17·52
14	22·84	20·16	19·72	18·47	18·14	17·59	17·37
15	22·75	19·98	19·56	18·45	18·10	17·38	17·52
16	22·53	20·09	19·46	18·42	18·05	17·49	17·65*
17	22·39	19·88	19·35	18·40	18·02	17·64	17·98
18	22·12	19·71	19·37	18·37	18·08	17·76	18·25
19	21·94	19·65	19·34	18·46	18·12	18·37	18·28
20	21·78	19·73	19·20	18·48	18·03	18·33	18·82
21	21·66	19·60	19·19	18·45	18·07	18·16	18·43
22	21·49	19·70	19·22	18·54	18·17	18·27	18·02
23	21·45	19·80	19·25	18·58	18·20	18·13	17·89*
24	21·26	19·92	19·27	18·69	18·27	17·92	.....
25	21·09	20·07	19·23	18·68	18·27	17·69	17·54*
26	20·90	20·17	19·34	18·60	18·15	17·61	17·56
27	20·92	20·16	19·38	18·51	18·06	17·68	17·76
28	21·04	20·22	19·38	18·42	18·08	17·43	17·76
29	21·00	20·29	19·38	18·43	17·92	17·48	.....
30	20·81	20·62	19·24	18·53*	17·86	17·64	.....
31	20·72	.....	19·03	18·46	.....	17·65	.....
Mean	22·05	20·20	19·66	18·61	18·30	17·76	17·81

*Denotes that mean is of less than 24 hourly readings.

APPENDIX VIII.

DAILY MEAN ELEVATION of Lower St. Lawrence at Varennes, Que., Year 1914. Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1	.....	19·37	19·19	17·47	16·97	16·59*	.....
2	.....	19·31	19·13	17·39	16·98	.....	.....
3	.....	19·14	19·00	17·47	17·05	.....	.....
4	.....	19·19	18·81	17·45	17·08	.....	.....
5	.....	19·25	18·73	17·41	17·06	.....	.....
6	.....	19·09	18·74	17·33	17·11	16·65*	16·70
7	21·69*	18·64	18·78	17·30	17·25	.....	.....
8	21·81	19·26	18·72	17·37	17·45	.....	.....
9	22·02	19·32*	18·86	17·32	17·40	.....	.....
10	22·06*	19·16	18·81	17·30	17·27	.....	.....
11	22·20	19·11	18·63	17·27	17·13	.....	.....
12	22·25	19·08	18·56	17·28	16·95	.....	.....
13	21·95	19·03	18·49	17·13	16·80	.....	.....
14	21·70	18·82	18·36	17·01	16·67	.....	.....
15	21·59	18·60	18·18	16·95	16·59	.....	.....
16	21·33*	18·69	18·06	16·90	16·58	.....	.....
17	21·18	18·48	17·92	16·87	16·58	.....	16·71*
18	20·86	18·28	17·95	16·84	16·60	16·64*	16·85*
19	20·65	18·21	17·92	16·95	16·71	17·08	16·98*
20	20·49*	18·27	17·75	16·99	16·64	17·04	17·56
21	20·38	18·17	17·73	16·99	16·62	16·83	17·20
22	20·20*	18·28	17·76	17·08	16·75	16·94	16·78
23	20·17	18·42	17·82	17·14	16·80	16·79	.....
24	20·00	18·56	17·85	17·24	16·86	16·59	.....
25	19·81	18·72	17·82	17·24	16·86	.....	.....
26	19·59	18·82	17·94	17·16	16·79	.....	.....
27	19·55*	18·84	17·99	17·08	16·71	.....	.....
28	19·70	18·95	17·99	16·98	16·72	.....	.....
29	19·69	19·03	18·02	17·02	16·60	.....	.....
30	19·46*	19·35	17·89	17·12	16·59	.....	.....
31	19·35*	.....	17·64	17·00	.....	.....	.....
Mean	20·79	18·86	18·29	17·16	16·87	16·79	.....

* Denotes that mean is of less than 24 hourly readings.

APPENDIX IX.

DAILY MEAN ELEVATIONS of Lower St. Lawrence at Verchères, Que., Year 1914. Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1	.....	17·75	17·64	15·92	15·43	14·78	14·58
2	.....	17·68	17·55	15·82	15·46	14·75	14·64
3	.....	17·54	17·42	15·89	15·54	14·67	14·91
4	.....	17·58	17·22	15·88	15·57	14·69	15·00
5	.....	17·64	17·13	15·85	15·55	14·82	14·98
6	.....	17·52	17·13	15·81	15·62	15·04	15·23
7	.....	17·37	17·17	15·79	15·77	14·84	15·11
8	20·52*	17·70	17·13	15·85	15·95	14·66	14·84
9	20·63	17·90	17·27	15·78	15·91	14·77	14·75
10	20·69*	17·68	17·24	15·77	15·78	14·79	14·72
11	20·80*	17·61	17·07	15·73	15·64	14·69	14·60
12	20·84*	17·59	16·98	15·73	15·46	14·63	14·43
13	20·58*	17·52	16·90	15·59	15·29	14·72	14·63
14	20·22*	17·28	16·74	15·47	15·12	14·58	14·40
15	20·11	17·06	16·57	15·39	15·03	14·39	14·64
16	19·85	17·11	16·44	15·33	14·96	14·45	14·80
17	19·66	16·90	16·29	15·27	14·96	14·71	15·12*
18	19·32	16·70	16·33	15·25	15·06	14·92	.....
19	19·08	16·62	16·27	15·36	15·18	15·70	15·38*
20	18·89	16·65	16·10	15·41	15·12	15·69	16·03
21	18·77	16·57	16·07	15·44	15·18	15·44	15·74
22	18·63	16·67	16·13	15·56	15·28	15·53	15·27*
23	18·61	16·83	16·21	15·66	15·32	15·37	.....
24	18·43	16·98	16·26	15·74	15·40	15·09	.....
25	18·24	17·14	16·27	15·75	15·40	14·83	.....
26	18·01*	17·25	16·40	15·68	15·26	14·66	14·44*
27	18·02	17·27	16·44	15·59	15·13	14·68	14·68
28	18·13	17·41	16·45	15·50	15·09	14·42	14·80*
29	18·13	17·51	16·48	15·53	14·91	14·42	.....
30	17·94*	17·84	16·36	15·62	14·82	14·63	.....
31	17·82*	.....	16·10	15·48	.....	14·69	.....
Mean	19·25	17·30	16·70	15·63	15·34	14·84	14·90

* Sign denotes that mean is of less than 24 hourly readings.

APPENDIX X.

DAILY MEAN ELEVATIONS of Lower St. Lawrence at Lanoraie, Que., Year 1914. Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1	18·47	16·04	15·88	14·13	13·62	13·01	12·94
2	18·34	15·94	15·78	13·99	13·69	13·03	12·96
3	18·25	15·82	15·60	14·04	13·82	12·99	13·29
4	18·19	15·86	15·42	14·06	13·83	13·04	13·39
5	18·36	15·93	15·32	14·07	13·82	13·18	13·48
6	18·51	15·88	15·31	14·06	13·91	13·32	13·57
7	18·60	15·72	15·34	14·07	14·09	13·21	13·45
8	18·78	16·07	15·36	14·10	14·26	13·01	13·32
9	19·07	16·31	15·50	14·06	14·21	13·12	13·06
10	19·20	16·07	15·50	14·04	14·07	13·15	12·98
11	19·32	15·95	15·34	13·99	13·92	13·10	12·90
12	19·28	15·94	15·22	13·95	13·73	12·92	12·66*
13	19·02	15·81	15·11	13·83	13·53	12·92	12·87
14	18·72	15·51	14·94	13·69	13·30	12·80	12·77
15	18·49	15·30	14·73	13·60	13·16	12·63	12·97
16	18·18	15·25	14·59	13·46	13·11	12·67	13·18
17	17·94	15·08	14·42	13·37	13·13	13·03	13·48
18	17·58	14·87	14·40	13·40	13·27	13·33	.....
19	17·30	14·77	14·30	13·52	13·46	14·20	.....
20	17·11	14·72	14·18	13·60	13·49	14·27	.....
21	17·01	14·72	14·14	13·70	13·59	13·99	.....
22	16·91	14·81	14·23	13·87	13·69	14·00	.....
23	16·91	15·01	14·37	13·99	13·73	13·88	.....
24	16·74	15·21	14·45	14·06	13·79	13·50	.....
25	16·56	15·37	14·53	14·06	13·78	13·21	.....
26	16·37	15·47	14·66	13·99	13·62	13·01	.....
27	16·35	15·47	14·69	13·91	13·44	12·93	.....
28	16·45	15·64	14·71	13·78	13·29	12·66	.....
29	16·45	15·81	14·76	13·83	13·14	12·64	.....
30	16·29	16·09	14·63	13·87	13·01	12·88	.....
31	16·13	.....	14·35	13·73	.....	13·00	.....
Mean	17·77	15·55	14·90	13·87	13·62	13·18	13·13

* Denotes that mean is of less than 24 hourly readings.

APPENDIX XI.

DAILY MEAN ELEVATIONS of Lower St. Lawrence at Sorel, Que., Year 1914. Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1	.....	17·93	15·53	15·44	13·73	13·24	12·65	12·56
2	.....	17·78	15·41	15·34	13·59	13·31	12·67	12·60
3	.....	17·70	15·32	15·16	13·64	13·44	12·63	12·93*
4	.....	17·64	15·36	14·98	13·67	13·45	12·68	13·12*
5	.....	17·82	15·43	14·88	13·68	13·44	12·83	.....
6	.....	17·96	15·41	14·87	13·67	13·47*	12·97	.....
7	.....	18·08	15·27	14·90	13·68	13·74*	12·86	13·09*
8	.....	18·27	15·59	14·92	13·71	13·88	12·66	12·87
9	.....	18·57	15·82	15·06	13·67	13·83	12·72*	12·71
10	.....	18·73	15·58	15·05	13·65	13·69	12·79*	12·63
11	.....	18·83	15·47	14·91	13·60	13·54	12·75	12·54
12	.....	18·80	15·46	14·79	13·56	13·35	12·56	12·32*
13	.....	18·55	15·34	14·67	13·44	13·15	12·56	12·43
14	.....	18·23	15·04	14·51	13·30	12·92	12·44	12·42*
15	.....	17·97	14·84	14·30	13·21	12·78	12·27	12·62
16	.....	17·68	14·79	14·16	13·08	12·73	12·31	12·83*
17	.....	17·43	14·63	14·00	12·99	12·76	12·66*	13·13
18	.....	17·06	14·42	13·98	13·02	12·90	13·03*	.....
19	.....	16·76	14·32	13·88	13·14	13·09	13·83	.....
20	.....	16·57	14·28	13·76	13·22	13·12	13·90	.....
21	.....	16·47	14·29	13·72	13·32	13·22	13·62	.....
22	.....	16·37	14·38	13·82	13·49	13·32	13·63	.....
23	.....	16·36	14·58	13·96	13·61	13·36	13·51	.....
24	.....	16·21	14·78	14·04	13·68	13·42	13·13	.....
25	.....	16·02	14·94	14·12	13·68	13·41	12·84	.....
26	.....	15·85	15·03	14·25	13·61	13·25	12·64	.....
27	17·96*	15·83	15·04	14·28	13·53	13·08	12·56	.....
28	17·87	15·94	15·21	14·30	13·40	12·93	12·30	.....
29	18·01	15·94	15·38	14·36	13·45	12·78	12·28	.....
30	18·02	15·77	15·65	14·23	13·49	12·65	12·50*	.....
31	.....	15·62	.....	13·95	13·35	.....	12·64*	.....
Mean	17·96	17·25	15·09	14·47	13·48	13·24	12·82	12·72

* Sign denotes that mean is of less than 24 hourly readings.

APPENDIX XII.

DAILY MEAN ELEVATIONS of Lower St. Lawrence at Light No. 2 Lake St. Peter, Que., Year 1914. Elevations refer to mean sea-level which is 6.13 above Steckel's datum.

Days.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	Feet.	Feet.	Feet	Feet.	Feet.	Feet	Feet.
1	.....	14·63	14·50	12·54	11·96	11·33	11·65
2	.....	14·49	14·32	12·37	12·09	11·38	11·67
3	.....	14·44	14·15	12·36	12·32	11·38	12·04
4	.....	14·46	14·00	12·44	12·32	11·46	12·22
5	.....	14·49	13·89	12·48	12·29	11·63	12·39
6	.....	14·57	13·87	12·51	12·37	11·68	12·49
7	.....	14·44	13·89	12·54	12·61	11·71	12·35
8	.....	14·69	13·94	12·55	12·78	11·47	12·05
9	.....	14·98	14·03	12·52	12·68	11·57	11·75
10	.....	14·82	14·05	12·47	12·54	11·65	11·68
11	.....	14·65	13·95	12·40	12·33	11·68	11·57
12	.....	14·62	13·79	12·29	12·11	11·38	11·37
13	17·83*	14·47	13·62	12·15	11·85	11·28	11·45
14	17·49	14·15	13·43	12·02	11·56	11·17	11·55
15	17·16	13·91	13·19	11·89	11·37	10·99	11·64
16	16·83	13·77	13·03	11·70	11·33	11·07	12·07*
17	16·53	13·68	12·86	11·55	11·40	11·57	12·40*
18	16·21	13·46	12·75	11·64	11·59	12·00	12·58
19	15·88	13·34	12·64	11·78	11·86	12·80	.....
20	15·66	13·31	12·56	11·90	12·02	13·08	.....
21	15·55	13·37	12·50	12·08	12·14	12·88	.....
22	15·47	13·42	12·64	12·34	12·26	12·77	.....
23	15·48	13·67	12·83	12·49	12·31	12·69	.....
24	15·38	13·88	12·93	12·57	12·34	12·21	.....
25	15·19	14·04	13·02	12·55	12·32	11·90	.....
26	15·06	14·11	13·16	12·47	12·09	11·62	.....
27	15·01	14·09	13·20	12·37	11·85	11·47*	.....
28	15·05	14·17	13·18	12·23	11·58	11·26	.....
29	15·06	14·35	13·20	12·18	11·47	11·20	.....
30	14·94	14·60	13·10	12·21	11·28	11·51	.....
31	14·78	.....	12·80	12·10	.....	11·72	.....
Mean	15·82	14·17	13·39	12·25	12·03	11·73	11·94

* Denotes that mean is less than 24 hourly readings.

LIFE SAVING SERVICE.

OTTAWA, May 1, 1915.

The Deputy Minister,
Department of Naval Service,
Ottawa.

SIR,—I have the honour to report as follows regarding the Life Saving Service for the year ending 31st March, 1915.

With the advent of the gasoline boat and the gradual disappearance of sailing vessels, the work of most of these stations has considerably decreased, as the motor boats are not so easily capsized and among the fishing communities they are so numerous that the occupants are able to render assistance to one another in case of engines breaking down, etc.

NOVA SCOTIA.

Bay View.—The permanent crew employed at this station have rendered assistance in various ways to many fishing boats during the year, as well as to two schooners.

Canso.—Volunteer crew. The schooner *J. L. Coreall* ran ashore on the 20th November and was completely wrecked; crew of six were rescued by life-boat.

On January 8, 1915, the steamer *Kilkeel*, loaded with coal, was wrecked on a rock just off Canso, and the life-boat was successful in saving the crew.

Cheticamp.—Permanent crew. The disabled motor and fishing boats towed into harbour or otherwise assisted by the crew during the year were very numerous. Members of the crew also acted as pilots on various occasions as required.

Clark's Harbour.—Volunteer crew. The *Clarence H. Venner* was wrecked off Cape Sable on 18th July, 1914, but on arrival of the life-boat it was found that she had already been abandoned by the crew.

Duncan's Cove.—Volunteer crew. On 8th June two fishermen were rescued from a fishing smack *Merry Widow*, which ran ashore on Duncan's Reef.

Scatarie.—Volunteer crew. This crew has been of assistance to three vessels within the year just ended. On the 27th May the schooner *Alice M.* was becalmed and obliged to anchor on the margin of the breakers, and as there was a heavy swell at the time, it was necessary for the life-boat to go out and bring them to a safe anchorage.

On the 18th July the schooner *Harold C. Beecher* was completely wrecked off Tin Cove, and on the 20th July the Cuban s. s. *Cienfuegos* off South Point. The life-boat rendered all assistance possible on both these occasions and no lives were lost.

Seal Island.—Subsidized volunteer crew. The schooner *Alice Gertrude* was wrecked on the rocks at Crowell Cove on 25th May. The lifeboat crew went out to her but were unable to do anything with her, though they worked for some time.

On 8th August the *Nellie C. Davis*, a schooner from Portland, Maine, ran ashore on the south end of Seal island in a dense fog. The crew went ashore in their own boats before the life-boat reached her. The life-saving crew, however, succeeded in saving considerable gear, stores, etc.

Westport, Brier Island.—Volunteer crew. Only one wreck was reported from this vicinity during the fiscal year. This was the schooner *Grace Darling*, which became a total wreck on Dartmouth Ledge. Crew saved.

PRINCE EDWARD ISLAND.

Cascumpeque.—Volunteer crew. On 15th November, 1914, this crew were able to be of assistance to the schooner *Loring B. Haskell* for a second time. The vessel grounded on the bar in entering the harbour and sprang a leak. The life-boat crew went out, boarded the vessel and gave every assistance in pumping, etc., and when the tide rose helped to bring her safely into the harbour.

NEW BRUNSWICK.

Little Wood Island.—Permanent crew. During the year they have rendered assistance to various disabled fishing and motor boats. On 29th January the life-boat went to Gannet rock and conveyed the light keeper's wife, who was very ill, to Seal island. On 10th April they went to the assistance of a schooner which ran ashore on Ledge Tern, took the crew and captain's wife off and looked after them for two days. They also succeeded in floating the vessel.

Richibucto.—Permanent crew. Various fishing boats with broken down engines or otherwise disabled were towed into harbour by this crew. They also assisted in refloating two schooners which went ashore off Richibucto.

QUEBEC.

Entry Island.—No crew; the coxswain calls for volunteers in the case of a wreck occurring. On the 11th April, 1915, a volunteer crew went out to look for two men who had gone out among the drift ice, and, after considerable search, found them in an exhausted condition.

On the 20th May, a volunteer crew went to the assistance of the schooner *Marion Emma*, which had run ashore on the southwest of Entry island. After bringing the crew ashore, they returned to the vessel and succeeded in floating her and bringing her into Amherst harbour.

ONTARIO.

Goderich.—Volunteer crew. This crew, on the 11th March, 1915, with great difficulty, rescued five fishermen whose boat was caught in an ice jam in lake Huron.

Long Point.—Permanent crew. On the 27th June, 1914, a gasoline launch, *Coquinta*, ran ashore in a heavy northeast storm, and on the 1st July a sailing yacht, *Eldro*, also ran ashore. The life-boat crew gave assistance in floating both these vessels.

Point Pelee.—Permanent crew. The steamer *Bulgaria*, loaded with coal, was sunk off Point Pelee on the 13th October last and eighteen lives were saved by the life-saving crew.

Port Hope.—Volunteer crew. On the 11th March, 1915, the life-boat went out to Gull light and brought back two boys who had drifted there in a canoe.

Toronto.—Permanent crew. This station is a very well equipped one and the calls upon it are numerous as there are such large numbers of pleasure boats, etc., in the vicinity. During the past season of navigation one hundred and fifty-four calls were answered, first aid treatment and other assistance being given where necessary.

BRITISH COLUMBIA.

Banfield.—Permanent crew. On the 24th June 1914, crew went to the assistance of the fishing schooner *Jessie*, which had been disabled off Cape Beale. She was towed into anchorage and arrangement made for a tug to go to her assistance.

The sloop *Emu* went ashore at the entrance to the Pachena River on the 2nd November, and after three days' work the Life Saving crew succeeded in floating her.

Clayoquot.—Permanent crew during winter. On the 13th August crew went to the assistance of the gasoline launch *Annie*, which was caught in a storm, and succeeded in bringing her in safely after a long search.

The crew has also been of assistance to various disabled fishing boats.

Ucluelot.—Permanent crew. The life boat at this station has been of considerable service to fishing boats, etc. In June 1914 she assisted the Banfield crew in their efforts to save the schooner *Jessie* and in September assisted the Clayoquet crew in their search for a motor boat.

On 6th November 1914, she went out to Fisheries Launch No. 1, which was drifting off the mouth of the harbour, her machinery having gone wrong, and managed to pick her up as she was drifting onto a dangerous rock.

I have the honour to be, sir,
Your obedient servant,

C. E. KINGSMILL,
Vice Admiral, Director of the Naval Service.

Statement of Expenditure.

Rewards, Saving Life, 1914, 1915.

	$ cts.	$ cts.
General Account		2,078 65
Rewards		863 30
Nova Scotia—		
Baker's Cove	327 75	
Bay View	7,166 88	
Blanche	371 06	
Canso	503 75	
Cheticamp	4,266 65	
Clark's Harbour	407 08	
Devil's Island	735 78	
Duncan's Cove	1,007 56	
Herring Cove	716 04	
Pictou	271 00	
Port Mouton	398 01	
Sable Island	289 20	
St. Paul's Island	6 26	
Seatari	493 67	
Seal Island	1,251 69	
West Port	605 00	
Whitehead	289 75	
		19,107 13
Prince Edward Island—		
Alberton	440 17	
Cascumpec	419 96	
Charlottetown	466 00	
Priest Pond	378 58	
Souris	611 25	
		2,315 96
New Brunswick—		
Cape Tormentine	285 00	
Escuminac	300 23	
Little Wood Island	7,714 72	
Richibucto	3,887 81	
		12,187 76
Quebec—		
Entry Island	25 00	
		25 00
Ontario—		
Cobourg	428 25	
Collingwood	416 62	
Consecon	382 25	
Goderich	559 51	
Kincardine	287 00	
Long Point	6,839 86	
Point Pelee	4,878 51	
Port Hope	390 26	
Port Stanley	444 27	
Southampton	476 87	
Toronto	19,273 58	
		34,376 96
British Columbia—		
Banfield Creek	11,612 06	
Clayoquot	6,515 26	
Cloose	60 00	
Ucluelet	12,650 43	
West Coast Trail	1,830 25	
		32,668 00
		103,622 78

No.	Stations.	Established.	Coxswain.	Crew.	Description of Boat.
	New Brunswick.				
1	Little Wood Island	1910	Harry Harvey	8	Beebe-McLellan twin screw, motor boat.
2	Richibucto	1907	L. A. Hains	7	Race Point surf-boat, 24 feet long.
3	Point Escuminac	1908	E. F. Flieger	7	Beebe-McLellan self-bailing.
4	Cape Tormentine	1912	I. Allen	7	" " "
	Nova Scotia.				
5	Bak r's Cove	1886	R. L. Baker	7	Dobbin's pattern self-righting, 28 feet long.
6	Blanche	1889	Edgar Swaine	7	Beebe-McLellan surf-boat, self-bailing, 25 ft. long.
7	Clark Harbour	1900	W. D. Attwood	7	Beebe-McLellan self-bailing, 25 ft. long, low ends.
8	Canso		J. J. Berrigan	7	Dobbin's pattern surf-boat, self-bailing, 25 ft. long.
9	Devil's Island	1885	B. H. Hennebery	7	Beebe-McLellan surf-boat, self-bailing, 25 ft. long.
10	Duncan Cove	1886	J. W. Holland	7	" " "
11	Herring Cove	1885	Edw. V. Dempsey	7	Dobbin's pattern self-righting and bailing, 25 ft. long.
12	Pictou Island	1889	Duncan McCallum	7	" " "
13	Port Mouton	1889	Walter Cooke	7	Beebe-McLelland surf-boat, self-bailing, 25 ft. long.
14	Scattarie	1885	Jas. Nearing	7	Beebe-McLellan boat on East side.
15	Seal Island	1880	Smyth G. Penney	7	Beebe-McLellan boat on West side.
16	St. Paul Island	1885	Supt. Humane Establishment.	3	Beebe-McLellan self-bailing, 25 ft. long, low ends.
17	Whitehead	1890	John Phalen	7	Dobbin's pattern surf-boat, self-bailing, 25 ft. long.
18	Sable Island	1885	Douglas Henneberry and Jas. Ritcey.	.....	Two Dobbin's pattern, self-righting and bailing, and one Beebe-McLellan, self-bailing.
19	Cheticamp	1911	L. J. Aucoin	7	Beebe-McLellan twin screw, motor boat.
20	Bay View (Digby County.)	1911	J. W. Hayden.	7	36 ft. self-bailing, self-righting power boat.
	P. E. Island.				
21	Priest Pond	1909	Chas. Campbell	12	Board of Trade rocket apparatus.
22	Charlottetown	1907	E. White	6	Beebe-McLellan self-bailing.
23	Souris	1907	Pius Cheverie	7	" " "
24	Alberton	1907	Gordon Bennett	12	" " "
25	Cascumpeque		Joshua Hutt	8	Board of Trade rocket apparatus.
	British Columbia.				
26	Banfield	{1909 1907}	Geo. Murray	11	Self-righting, self-bailing, 36 ft. power boat.
27	Ucluelet	1908	W. L. Thompson	9	Doherty's Improved Beebe-McLellan, 25 ft. long.
28	Clayoquot	1908	J. McLeod	8	" " "
	Ontario. Great Lakes.				
29	Cobourg	1882	D. Rooney	8	Dobbin's pattern, self-righting and bailing.

No.	Stations.	Established.	Coxswain.	Crew.	Description of Boat.
	Ontario. Great Lakes.				
30	Collingwood	1885	G. F. Watts	7	Beebe-McLellan self-bailing surf-boat.
31	Goderich	1886	Malc. McDonald	7	Surf-boat.
32	Kincardine	1903	Thos. McGaw	7	Beebe-McLellan self-bailing surf-boat.
33	Long Point	1902	Jas. Smith	9	Surf-boat.
34	Point Pelee	1900	L. Wilkinson	7	"
35	Port Hope	1889	John McMahon	7	Dobbin's pattern, self-righting and bailing.
36	Port Stanley	1885	J. R. Rose	7	Beebe-McLellan surf-boat, self-bailing, 25 ft. long.
37	Toronto Island	1883	W. F. Chapman	14	Dobbin's pattern, self-righting and bailing.
38	Consecon	1898	R. Bedford	7	" " "
39	Southampton	1907	Hector McLeod	7	Beebe-McLellan surf-boat, self-bailing.

ANNUAL REPORT OF RADIOTELEGRAPH BRANCH, 1914-15.

The Deputy Minister,
Department of the Naval Service,
Ottawa.

SIR,—I have the honour to present herewith the Annual Report of the Radiotelegraph Branch for the fiscal year ending March 31, 1915.

There has been an increase of 78 in the number of radiotelegraph stations established in Canada and on Canadian ships during the year, as follows:—

Government Ship Stations	3
Licensed Ship Stations	18
Licensed Commercial Stations	8
Licensed Amateur Stations	48
Licensed Experimental Station	1

The total number of stations now in operation is as follows:—

	1913-14.	1914-15.	Increase.
Government Commercial Stations	1	1	.....
Coast Stations	42	42	.....
Government Ship Stations	21	24	3
Licensed Ship Stations	50	68	18
Licensed Commercial Stations	8	16	8
Licensed Amateur Stations	47	95	48
Licensed Experimental Station	.....	1	1
	169	247	78

The following list shows the location of the land and coast stations in Canada their range, call signals, owners and by whom they are operated:—

Coast Stations for Communication with Ships.

EAST COAST.

Name.	Where Situated.	Owned by.	Operated by.	Range in nautical miles.	Call Signal.
Belle Isle, Nfld.	Belle Isle Straits.	Dominion Government.	Marconi Wireless Tel. Co. of Canada.	250	VCM
Pt. Amour, Nfld.	" "	"	"	150	VCL
Pt. Riche, Nfld.	Gulf of St. Lawrence.	"	"	250	VCH
Harrington, P.Q.	"	"	"	150	VCJ
Heath Pt., P.Q.	Gulf of St. Lawrence (Anticosti Isld.).	"	"	250	VCI
Cape Ray, Nfld.	Cabot Straits.	"	"	350	VCR
Cape Race, Nfld.	North Atlantic.	"	"	400	VCE
Grindstone Island, P.Q.	Gulf of St. Lawrence (Magdalen Isld.).	"	"	200	VCN
Fame Pt., P.Q.	Gulf of St. Lawrence.	"	"	250	VCG
Clarke City, P.Q.	"	"	"	250	VCK
Father Pt., P.Q.	River St. Lawrence.	"	"	250	VCF
Grosse Isle, P.Q.	"	"	"	100	VCD
Quebec, P.Q.	"	"	"	150	VCC
Three Rivers, P.Q.	"	"	"	150	VCB
Montreal, P.Q.	"	"	"	200	VCA
Cape Sable, N.S.	North Atlantic.	"	"	250	VCU
Partridge Isld., St. John, N.B.	Entrance St. John Harbour, N.B.	"	"	250	VCV
Cape Bear, P.E.I.	Northumberland Strait.	"	"	150	VCP
Camperdown, N.S.	Entrance to Halifax Harbour..	"	"	250	VCS
Sable Island, N.S.	North Atlantic.	"	"	300	VCT
Halifax, N.S.	Halifax Dockyard.	"	Department of the Naval Service.	100	VAA
Pictou, N.S.	Northumberland Strait.	Marconi Wireless Tel. Co. of Canada.	Marconi Wireless Tel. Co. of Canada.	100	VCQ
North Sydney, C.B.	North Sydney, C.B.	"	"	100	VCO

GREAT LAKES.

Port Arthur, Ont.	Port Arthur, Ont.	Dominion Government.	Marconi Wireless Tel. Co. of Canada.	350	VBA
Sault Ste. Marie, Ont.	Sault Ste. Marie, Ont.	"	"	350	VBB
Tobermory, Ont.	Entrance Georgian Bay.	"	"	350	VBD
Midland, Ont.	Georgian Bay.	"	"	350	VBC
Point Edward, Ont.	Lake Huron.	"	"	350	VBE
Port Burwell, Ont.	Lake Erie.	"	"	350	VBF
Toronto, Ont.	Toronto Island, Ont.	"	"	350	VBG
Kingston, Ont.	Barriefield Common.	"	"	350	VBH

Coast Stations for Communication with Ships—*Concluded.*

WEST COAST.

Name.	Where Situated.	Owned by.	Operated by.	Range in nautical miles.	Call Signal.
Gonzales Hill, B.C. (Victoria).	Victoria, B.C.	Dominion Government.	Department of the Naval Service.	250	VAK
Pt. Grey, B.C. (Vancouver)	Entrance Vancouver Harbour.	"	"	150	VAB
Cape Lazo, B.C.	Strait Georgia, near Comox, B.C.	"	"	350	VAC
Pachena Pt., B.C.	West Coast Vancouver Isld.	"	"	500	VAD
Estevan Pt., B.C.	" "	"	"	500	VAE
Triangle Isld., B.C.	South of Hecate Str.	"	"	450	VAG
Ikeda Head, B.C.	South of Moresby Island, Q.C.I.	"	"	250	VAI
Dead Tree Pt., B.C.	South of Graham Isld., Q.C.I.	"	"	200	VAH
Digby Island, B.C., Prince Rupert.	Digby Isld., Entrance Prince Rupert Har.	"	"	250	VAJ
Alert Bay, B.C.	Cormorant Isld., B.C.	"	"	350	VAF

HUDSON BAY.

Port Nelson	Hudson Bay	Dominion Government.	Department of the Naval Service.	750	VBN

LAND STATIONS.

Le Pas, Man.	For communication with Port Nelson only.	Dominion Government.	Department of the Naval Service.	750	VBM

Licensed Commercial Stations.

Name.	Where Situated.	Owned by.	Operated by.	Range in nautical miles.	Call Signal.
Public Commercial.					
Glace Bay, C.B.	Near Glace Bay, C.B.	Marconi Wireless Tel. Co. of Can., Ltd.	Owners	3,000	GB.
Louisburg, C.B.	Cape Breton	" "	"	Reception	only.
Newcastle, N.B	New Brunswick	Universal Radio Synd.	"	2,500	CL
Private Commercial.					
Bowen Island, B.C.	Bowen Island, B.C. Strait of Georgia.	Can. Explosives Co.	Owners	30	CB
Ocean Falls, B.C.	Ocean Falls, B.C.	Ocean Falls	"	150	CD.
Powell River, B.C.	Powell River, B.C.	Powell River Co.	"	30	CH
Glengarry, Alta.	Glengarry Sub. Calgary.	Alberta Oil Co.	"	50	CJ
Section 11, Township 23	Sec. 11, Township 23	" "	"	50	CK
" 31, " 5	" 31 " 5	Baskins Ltd.	"	50	CM
" 23 " 20	" 23 " 20	" "	"	50	CN
Calgary, Alta.	Calgary, Alta.	" "	"	50	CO
Edmonton, Alta.	Edmonton, Alta.	M. S. Berkeley	"	300	CR
Calgary, Alta.	Calgary, Alta.	" "	"	200	CP
Fort MacKay, Alta.	Fort MacKay, Alta.	" "	"	300	CS
Fort Chipewyan, Alta.	Fort Chipewyan, Alta.	" "	"	200	CT
Fort Vermilion, Alta.	Fort Vermilion, Alta.	" "	"	200	CU

Licensed Experimental Station.

Name.	Where Situated.	Owned by.	Call Signal.
Marconi Test Room	Rodney St., Montreal	Marconi Wireless Telegraph Co. of Canada, Ltd.	XWA

Licensed Amateur Stations.

Name.	Address.	Call Signal.
Anderson, A. O.	Buckingham, P.Q.	X C N
Rogers, W. P.	Hamilton, Ont.	X C O
Jarest, J. D.	Levis, P.Q.	X C P
Stethem, Hubert	St. Johns, P.Q.	X C Q
Trepanier, A. N.	Chutes Shawinigan, P.Q.	Reception only.
Phelps, F. W.	Chatham, Ont.	X B U
Sylvestre, L. Adolphe	Montreal, P.Q.	X C E
Jeune, H. H.	Victoria, B.C.	X A W
Murphy, Nicholas	Three Rivers, P.Q.	X B Z
Heroux, Charles E.	Trois Rivieres, P.Q.	Reception only.
Brooks, Stanley	Hamilton, Ont.	X C R
Johns, Clarence	Victoria, B.C.	X C B
Cuthbert, D.	Bamfield, B.C.	Reception only.
Hewitt, R. F.	Guelph, Ont.	X C S
McClennan, B. A.	Wheatley, Ont.	X C T
Bethune, S. T.	Montreal, P.Q.	X C U
Frinault, L.	Caraquet, N.B.	Reception only.
Morris, J. V. L.	Shawinigan Falls, P.Q.	Reception only.
Kirby, K. C.	Victoria, B.C.	X B L
Bryant, L. D.	Mission City, B.C.	X C V
Thompson, T. C.	Montreal, P.Q.	X B E
Boxer, Arthur	Westmount, P.Q.	X C W
Allen, Creagh	Victoria, B.C.	Reception only.
Barnsley, Jack	Victoria, B.C.	X B K
Tuckett, C. P.	Guelph, Ont.	X C I
Gray, Wm. M.	Chatham, Ont.	X C X
Reading, Harry	Halifax, N.S.	X C J
Thomas, A. M.	Toronto, Ont.	X C M
Norris, G. B.	Oshawa, Ont.	Reception only.
Renouf, Robt.	Victoria, B.C.	X B R
Thomas, G. D.	Toronto, Ont.	X C L
Strabel, Carl	Victoria, B. C.	X C Y
Gosnell, G. D.	Victoria, B.C.	X B M
Baltzer, C. E.	Preston, Ont.	X C Z
Giroux, A. W.	Montreal, P.Q.	X B W
Logan, C. P.	St. John, N.B.	X B S
Marshall, E.	Vancouver, B.C.	X B I
Owens, W. E.	Montreal, P.Q.	X C K
Robitaille, H. G.	Montreal, P.Q.	X B P
McCall, J. D.	Montreal, P.Q.	X B D
Gilmour, H.	Montreal, P.Q.	X D A
Natalie, Father	Three Rivers, P.Q.	X B N
Rogers, K. S.	Charlottetown, P.E.I.	X A R
Telmosse, J. G.	Shawinigan Falls, P.Q.	Reception only.
Ecole Polytechnique	Montreal, P.Q.	X B T
Meerbegen, Gabriel	Shawinigan Falls, P.Q.	X C F
Lennox, Ernest	Vancouver, B.C.	X D B
Navaret, Brother	Hull, P.Q.	X B Y
Scott, J. B.	Montreal, P.Q.	X B X
Gibson, J. E.	Prince Rupert, B.C.	X D C
Colville, Miss M. S.	Bowmanville, Ont.	X D D
Folger, H. P.	Kingston, Ont.	X C D
Barnes, G. H.	Meighs Corners, P.Q.	X A S
Hebert, D. D.	Trois Rivieres, P.Q.	X D E
Fowler, W. D.	Montreal, P.Q.	X A M
Hobday, F.	Hamilton, Ont.	X D F
Griffiths, C.	Victoria, B.C.	X D G
Langby, A. R.	Victoria, B. C.	Reception only.
Beique, H. Alexandre	Shawinigan Falls, P.Q.	X C G
Vaughan, H. P.	Montreal, P.Q.	X C C
Elliott, S.	Victoria, B.C.	X B Q
O'Hanley, C. J.	Yarmouth, N.S.	X A K
Elder, H. M.	Westmount, Montreal.	X D H
Crowell, Geo. D.	Sydney, N.S.	X C A
Laecrte, J. Aug.	Yamachiche, P.Q.	Reception only.
Peirce, W. A.	Victoria, B.C.	X A Y
Caley, J. J.	North Bay, Ont.	X D I
Rousseau, T. D.	Levis, P.Q.	X D J
Fortin, Ulric	Levis, P.Q.	X D K
Trorey, L. G. S.	Vancouver, B.C.	X D L

LICENSED Amateur Stations—*Concluded.*

Name.	Address.	Call Signal.
Elliott, F. L.	Toronto, Ont.	X D M
Dougall, S. D.	Montreal, P.Q.	X D N
Coward, K.	Kingston, Ont.	Reception only.
Sheepwash, W. J.	Victoria, B.C.	X D O
Saint Jacques, Romeo.	Montreal, P.Q.	X D P
Morrish, William.	Gravenhurst, Ont.	X D Q
Parent, Fred.	Matane, P.Q.	X D R
Mitchell, W. K.	Brantford, Ont.	X D S
VonGunten, A. H.	Chatham, Ont.	Reception only.
Jones, Percy.	Cape Breton.	X D T
Nason, H. R.	Toronto, Ont.	X D U
McKay, Wm. M.	Ingersoll, Ont.	Reception only.
Whyte, A. K.	Toronto, Ont.	X D V
Rogers, W. P.	Hamilton, Ont.	X C O
Zufelt, Lynn C.	Beachville, Ont.	Reception only.
Giles, J. C.	Kingston, Ont.	X D W
Cuming, Richard.	Toronto, Ont.	X D X
Duff, C. K.	Hamilton, Ont.	X D Y
Darling, Clyde.	Westmount, Montreal, P.Q.	X C H
Ratcliff, J. H.	Stouffville, Ont.	Reception only.
Restall, B. A. B.	Victoria, B.C.	X B J
Anderson, F. A.	Portage la Prairie, Man.	X D Z
Crowther, C. D.	Cobourg, Ont.	X E A
Camerlain, H. V.	St. Hubert Station, P.Q.	Reception only.
Sawlor, R. H.	Amherst, N.S.	X E B

Licensed Ship Stations.

The following list shows the vessels of Canadian register which are equipped with radiotelegraph apparatus, their call signal and by whom they are owned and operated:—

Name of Ship.	Port of Registry.	Name of Owners.	Name of Company operating the Station.	Call Signal.
S.S. Assiniboia	Montreal, P.Q	Can. Pacific Railway.	Marconi Wireless Tel. Co. of Can	VGI
" Alberta	"	"	"	VFQ
" Athabaska	"	"	"	VGG
" Manitoba	"	"	"	VGH
" Keewatin	"	"	"	VGC
" Boston	Yarmouth, N.S	"	"	VFS
" Hamonic	Collingwood, Ont	Northern Nav. Co	"	VGD
" Huronic	"	"	"	VGE
" Province	Port Arthur, Ont	Great Lakes Towing & Wrecking Company	"	VFR
" Empire	"	"	"	VFP
" Salvor	Victoria, B.C	B.C. Salvage Co	Owners	VFV
" Prince Albert	Prince Rupert, B.C	Grand Trunk Pac. Ry	"	VFL
" Prince John	"	"	"	VFM
" Florence	Toronto, Ont	T. Eaton	Marconi Wireless Tel. Co. of Canada	VFT
" Princess Beatrice	Victoria, B.C	Can. Pacific Railway.	"	VFC
" Princess Charlotte	"	"	"	VFE
" Princess May	Vancouver, B.C	"	"	VFH
" Princess Royal	Victoria, B.C	"	"	VFG
" Tees	"	"	"	VFK
" Camosun	Vancouver, B.C	Union Steamship Co.	Owners	VFZ
" Princess Adelaide	Victoria, B.C	Can. Pacific Railway.	Marconi Wireless Tel. Co. of Canada	VFA
" Princess Mary	"	"	"	VFB
" Princess Alice	"	"	"	VFD
" Princess Ena	"	"	"	VFJ
" Princess Sophia	"	"	"	VFI
" Saronic	Sarnia, Ont	Northern Nav. Co	"	VGF
" Lord Strathcona	Quebec, P.Q	Quebec Salvage Co	"	VFX
" A. W. Perry	Halifax, N.S	Plant Line	"	VFW
" Royal Edward	Toronto, Ont	Canadian NothernS.S.	"	VGB
" Royal George	"	"	"	VGA
S.Y. Aquilo	Vancouver, B.C	B. J. Rogers	Owners	VFU
S.S. St. Ignace	Port Arthur, Ont	Great Lakes Towing and Wrecking Co	Marconi Wireless Tel. Co. of Canada	VGL
" Chelohsin	Vancouver, B.C	Union Steamship Co.	Owenrs	VGN
" Morwenna	Montreal, P.Q	The N.Y. Nfld. Halifax Shipping Co	Marconi Wireless Tel. Co. of Canada	VFN
" Prince Arthur	Yarmouth, N.S	Boston and Yarmouth S.S. Co.	"	VGJ
" Prince George	"	"	"	VGK
" Evangeline	Windsor, N.S	Can. Atlantic & Plant Steamship Co	"	VGO
" Halifax	Halifax, N.S	"	"	VGP
" Robert Dollar	Victoria, B.C	Dollar S.S. Lines	"	VGM
" Everett G. Griggs	"	Everett G. Griggs Co.	Owners	VGQ
" Douglas H. Thomas	Sydney, C.B	Dom. Coal Co	Marconi Wireless Tel. Co. of Canada.	VGR
S.Y. Solgar	Toronto, Ont	G. P. Grant	"	VGS
S.S. Princess Maquinna	Victoria, B.C	Can. Pacific Railway.	"	VGT
Car Ferry "Ontario No. 1"	Montreal, P.Q	Ont. Car Ferry Co	Radio Elec. Co	VGU
S.S. Naronic	Port Arthur, Ont	Northern Nav. Co	Marconi Wireless Tel. Co. of Canada	VGW
" Seal	Windsor, N.S	Halifax Trading and Sealing Co.	"	VGV
" Deliverance	Liverpool, N.S	Southern Salvage Co.	Owners	VFF
" Bessie Dollar	Victoria, B.C	Dollar S.S. Lines	M. W. T. Co	VFO
" Venture	Vancouver, B.C	Union S.S. Co	Owners	VGX
" Yarmouth	Yarmouth, N.S	C.P.R	M. W. T. Co	VGY
" Princess Patricia	Victoria, B.C	"	Owners	VGZ

LICENSED SHIP STATIONS—*Concluded.*

Name of Ship.	Port of Registry.	Name of Owners.	Name of Company operating the Station.	Call Signal.
S.S. Dalhousie City	Toronto, Ont	N. St. C. & T. N. Co.	M. W. T. Co	VEA
" Corona	"	C. S.S. Lines	"	VEB
" Kingston	"	"	"	VEC
" Toronto	"	"	"	VED
" Hazel Dollar	Victoria, B.C	Dollar S.S. Lines	"	VEE
" Syracuse	Pieton, Ont	C. S.S. Lines	Radio E. Co	VEF
" Rapids King	Montreal, P.Q	"	"	VEG
" Chippewa	Toronto, Ont	"	M. W. T. Co	VEH
" Garden City	"	N. St. C. & T. N. Co.	"	VEI
" Chicora	Halifax, N.S	C. S.S. Lines	"	VEJ
" Macassar	Hamilton, Ont	"	"	VEK
" Cayuga	Toronto, Ont	"	"	VEL
" Majestic	Collingwood, Ont	"	"	VEM
" Turbinia	Hamilton, Ont	"	Radio E. Co	VEN
" Cascapedia	Quebec, P.Q	"	M. W. T. Co	VEO
" Desola	Montreal, P.Q	Atlantic Fruit Co	"	VEP
" Princess Margaret	Victoria, B.C	C.P.R	"	VEQ

GOVERNMENT STEAMERS EQUIPPED WITH RADIOTELEGRAPH INSTALLATIONS.

Name.	Range.	Call Signal.
H.M.C.S. *Niobe*	400 miles	VDA
" *Rainbow*	250 "	VDB
C. G. S. *Canada*	150 "	VDC
" *Acadia*	200 "	VDT
" *Malaspina*	200 "	VDU
" *Galiano*	200 "	VDV

OPERATED by the Department of Marine and Fisheries.

Name.	Range.	Call Signal.
C. G. S. *Minto*	150 miles.	VDD
" *Stanley*	150 "	VDE
" *Lady Laurier*	150 "	VDF
" *Aberdeen*	100 "	VDG
" *Druid*	100 "	VDH
" *Montcalm*	150 "	VDJ
" *Lady Grey*	100 "	VDL
" *Quadra*	100 "	VDM
" *Estevan*	200 "	VDN
" *Dollard*	150 "	VDO
" *Newington*	100 "	VDP
" *Lurcher Lightship*	100 "	VDR
" *Simcoe*	100 "	VDS
" *Aranmore*	200 "	VDQ

OPERATED by the Department of Railways and Canals.

Name.	Range.	Call Signal.
C. G. S. *Durley Chine*	200 miles.	VDQ
" *Sheba*	200 "	VDZ

OPERATED by the Post Office Department.

Name.	Range.	Call Signal.
C. G. S. *Lady Evelyn*	100 miles.	VDX

Operated by the Customs Department.

Name.	Range.	Call Signal.
C. G. S. *Margaret*	200 miles.	VDW

OPERATION OF THE COAST STATION SERVICES.

On August 4, 1914, all the radiotelegraph stations in the Dominion were placed on a war basis. The amount of business handled by the East Coast system (operated by the Marconi Wireless Telegraph Company of Canada, Limited, under contract), shows a decrease from last year's business, amounting to 85,759 messages containing 1,246,633 words.

The Great Lakes system (also operated by the Marconi Wireless Telegraph Company of Canada, Limited, under contract), shows an increase of 6,184 messages containing 106,719 words.

The West Coast system (operated directly by this Department) shows a decrease of 58,968 messages containing 673,805 words.

For comparative statement of business handled by the Coast Station systems during the last five years, see Table 1.

An agreement was entered into with the Department of Railways and Canals whereby this Department assumed responsibility for the operation of the Le Pas and Port Nelson stations on November 10, 1914; the cost of the same being borne by that Department. The arrangement is proving satisfactory to all parties concerned.

The communication has proved of great value to the Department of Railways and Canals in connection with their construction work at Port Nelson.

During the season of navigation Port Nelson also operates as a coast station, a small set of ½ K.W. power, using a 600 metre wavelength, being specially installed for this purpose; this set has a range of approximately 200 nautical miles.

A constant watch is maintained on this set except during the periods when communication is in progress with Le Pas, and communication is established with all vessels fitted with radiotelegraph apparatus plying to and from Port Nelson.

Table 7 shows the amount of business handled by the Stations.

TABLE No. 1—COMPARATIVE STATEMENT of Business handled by the Coast Stations Systems during the last Five Years.

Service.	1910–11.		1911–12.		1912–13.		1913–14.		1914–15.		Comparison with 1913–14.		
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Increase or Decrease.	Messages.	Words.
East Coast.....	71,594	1,179,434	119,049	1,824,450	153,843	2,704,411	145,605	2,443,145	59,846	1,196,512	Decrease.	85,759	1,246,633
Great Lakes.....	Nil.	.....	1,043	17,095	2,750	52,422	9,601	219,786	15,785	326,505	Increase.	6,184	106,719
West Coast.....	48,074	647,461	76,158	997,900	115,494	1,518,926	157,354	2,206,331	98,386	1,532,526	Decrease.	58,968	673,805
Totals.....	119,668	1,826,895	196,250	2,839,445	272,087	4,275,759	312,560	4,869,262	174,017	3,055,543	Net Decrease.	138,543	1,813,719

REVENUE.

On account of the war and the placing of the Coast Stations on a war basis the total revenue accruing to the Department from tolls on messages handled by the different stations shows a net decrease of $4,600.32.

The total revenue collected during the year amounts to $11,738.35, against $16,338.67 in 1913-14; The West Coast service shows a decrease of $4,663.26; the Great Lakes an increase of $58.37, and the East Coast an increase of $4.57.

TABLE No. 2.—Comparative Statement of Revenue received by the Coast Stations Services during the past Six Years.

	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
East Coast	Nil.	Nil.	229 57	475 00	318 42	322 99
Great Lakes	Nil.	Nil.	Nil.	17 08	27 55	85 92
West Coast	Nil.	3,108 63	4,484 77	9,928 40	15,992 70	11,329 44
Totals	Nil.	3,108 63	4,714 34	10,420 48	16,338 67	11,738 35

TABLE No. 3. — Detailed Statement of Business handled by the Ten Stations on the Pacific Coast owned and operated directly by this Department.

Name of Station.	Private Business to and from Ships.		Private Business between Stations.		Business to and from Government Ships.		Government business between Stations.		Service Messages.		Retransmitted Messages.		Cost of Maintenance.	Revenue.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.		
													$ cts.	$ cts.
Gonzales Hill (Victoria).	1,836	24,546	4,602	90,425	1,907	96,989	5,426	157,531	15,208	184,992	55	1,096	4,296 03	2,940·93
Pachena Point	120	1,808	163	3,168	530	17,603	700	33,050	1,927	15,872	4,629	80,233	4,330 15	188·01
Estevan Point	1,273	14,955	21	328	81	3,676	185	1,387	3,375	30,273	10,585	157,037	3,469 29	1,841·60
Dead Tree Point	8	132	1,211	27,231	7	99	2	22	1,712	16,208			1,466 98	569·53
Ikeda Head	8	81	170	2,392	3	53	10	111	1,081	7,348	6	78	2,312 74	101·92
Triangle Island	953	11,416	44	874	245	6,242	659	4,119	4,100	34,311	9,330	143,164	4,266 04	1,281·60
Point Grey	800	11,501	974	17,309	343	1,383	139	781	2,516	45,163			2,435 35	729·01
Digby Island(Pr.Rupert)	654	8,603	4,199	88,137	239	5,323	957	8,975	2,909	31,357	22	503	4,247 68	2,747·89
Cape Lazo	340	5·331	136	1,935	177	3,925	273	3,876	2,848	21,222	5,961	77,227	4,205 21	356·85
Alert Bay	229	2,619	700	8,966	165	3,649	65	1,738	1,555	14,059	13	103	3,313 80	572·10
District Office at Victoria													5,935 93	
General Account (including charter of steamers, Esquimalt, Workshop, etc.)													3,960 07	
Totals	6,221	80,992	12,220	240,756	3,697	138,942	8,416	211,590	37,231	400,805	30,601	459,441	44,239 27	11,329·44

Total number of messages handled 98,386
Total number of words handled 1,532,526
Total cost of maintenance of statistics (including district office, workshop, etc.) $44,239 27
Total revenue $11,329 44

TABLE No. 4.—Detailed Statement of Business handled by the Eight Stations on the Great Lakes, owned by the Department of the Naval Service, and operated by the Marconi Wireless Telegraph Company of Canada, Limited.

Name of Station.	Private Business to and from Ships.		Private Business between Stations.		Business to and from Government Ships.		Government business between Stations.		Messages.		Messages.		Cost of Maintenance.	Government percentage of Revenue.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	$ cts.	$ cts.
Port Arthur	394	10,816	1	8	235	4,659	14	246	1,273	26,318	316	4,569	3,500 00	17·71
Sault Ste. Marie	719	12,312	.....	.....	557	13,828	10	191	1,927	33,187	1,281	23,830	3,500 00	15·04
Tobermory	137	2,362	11	197	89	2,801	3	55	643	10,692	1,500	35,504	3,500 00	·42
Midland	100	1,724	8	158	248	7,560	.....	.....	781	13,451	668	18,371	3,500 00	2·31
Point Edward	272	4,635	2	51	161	5,801	.....	.....	546	10,950	412	7,899	3,519 99	11·35
Port Burwell	269	3,534	1	8	37	961	.....	.....	239	5,909	33	924	3,500 00	5·60
Toronto	1,113	17,444	8	105	91	1,609	.....	.....	1,294	33,887	112	2,845	3,500 00	31·88
Kingston	80	1,476	1	25	24	493	.....	.....	155	4,710	20	400	3,427 08	1·61
Total	3,084	54,303	32	552	1,442	37,712	27	492	6,858	139,104	4,342	94,342	27,947 07	85·92

Total number of messages handled	15,785
Total number of words handled	326,505
Total cost of maintenance	$27,947 07
Total revenue	$ 85 92

TABLE No. 5.—Detailed Statement of Business handled by the Twenty Stations in the Gulf and River St. Lawrence and East Coast, owned by this Department and operated by the Marconi Wireless Telegraph Co. of Canada, Limited, under contract.

Name of Station.	Private Business to and from Ships.		Private Business between Stations.		Business to and from Government Ships.		Government business between Stations.		Service Messages.		Retransmitted Messages.		Cost of Maintenance.	Government per centage of Revenue.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.		
													$ cts.	$ cts.
Cape Sable	644	7,651	1	8	230	4,706	735	5,344	890	11,517			3,778 33	
Partridge Isld. (St. John, N.B.)	136	2,279			471	12,144	108	1,388	151	2,405	34	1,004	3,758 40	
Cape Race	6,556	96,189	97	552	323	7,274	59	655	2,666	60,123	5	189	3,760 90	
Grindstone Island	77	1,652	830	23,909	69	1,767	265	2,052	375	5,055	444	7,458	1,200 00	322 99
Cape Bear	42	700	49	1,063	794	17,852	16	194	73	1,391	1,601	62,803	2,757 72	
Point Riche	2	42	5	98	21	499	4	30	68	805	392	8,392	3,500 00	
Point Amour	564	10,866	250	4,751	191	4,506	420	12,863	1,998	54,930	195	4,612	4,013 00	
Belle Isle*	48	613	39	1,176	76	1,677	643	4,970	397	5,882	2,463	42,749	5,014 35	
Cape Ray	409	5,611	54	1,336	217	5,166	586	5,093	1,560	27,230	591	8,316	3,758 43	
Harrington	1	30	6	99			39	263	95	683			2,500 00	
Heath Point	416	7,338	119	3,057	254	5,597	441	12,435	721	14,145	4,440	75,036	3,756 50	
Fame Point	564	10,866	250	4,751	194	4,506	420	12,863	1,998	54,930	195	4,612	3,756 50	
Clarke City	87	2,858	459	15,458	16	387	74	670	447	7,414	899	22,237	3,500 00	
Father Point	466	8,062	221	6,431	183	4,672	12	127	626	11,922	42	1,640	3,500 00	
Grosse Isle	75	1,508	59	1,374	339	5,320	385	4,309	173	3,217	312	6,471	2,500 00	
Quebec	823	14,524	48	748	537	14,374	241	9,218	651	13,410	198	3,698	2,500 00	
Three Rivers	112	2,014			408	10,242	1	53	113	2,157	920	18,760	3,757 20	
Montreal	398	8,803	1	16	18	412			377	6,693	14	330	3,500 90	
Sable Island	2,443	33,810	860	9,022	305	3,253	1	7	1,014	15,623				
Camperdown (Halifax)	2,301	56,225	277	3,722	469	10,229	40	606	1,164	21,128				
Total	16,134	271,041	3,625	77,571	5,118	114,583	4,490	73,140	15,557	320 660	12,745	268,307	60,812 23	322 99

Total number of messages handled		57 669
Total number of words handled		1,125,302
Total cost of maintenance	$	60,812 23
Total Revenue	$	322 99

* Includes returns from April 1, 1914 to October 31, 1914 only.

TABLE No. 6.—Detailed Statement of Business handled by the Two Stations on the East Coast owned and operated by the Marconi Wireless Telegraph Company of Canada, Limited, under contract with the Department of the Naval Service.

Name of Station.	Private Business to and from Ships.		Private Business between Stations.		Business to and from Government Ships.		Government business between Stations.		Service Messages.		Retransmitted Messages.		Cost of Maintenance.	Revenue.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.		
													$ cts.	$ cts.
North Sydney...../....	73	1,315	1	7	166	5,167	145	1,260	412	8,211	.....	.....	1,750 00	.....
Pictou.....	51	638	458	35,134	512	12,199	86	1,590	247	4,921	26	768	1,750 00	.....
Total.....	124	1,953	459	35,141	678	17,366	231	2,850	659	13,132	26	768	3,500 00	.....

Total number of messages handled.....	2,177
Total number of words handled.....	71,210
Total cost of maintenance.....	$ 3,500 00
Total revenue.....	Nil.

TABLE No. 7.—Detailed Statement of Business handled by Le Pas and Port Nelson Radiotelegraph Stations, owned by the Department of Railways and Canals.

Name of Station.	Private Business to and from Ships.		Private Business between Stations.		Business to and from Government Ships.		Government business between Stations.		Service Messages.		Retransmitted Messages.	
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.
Le Pas	.....	.....	804	17,634	.....	.....	1,213	125,152	278	9,714	.....	.....
Port Nelson	1	11	926	20,293	245	6,493	1,395	134,411	360	11,333	37	920
Total	1	11	1,730	37,927	245	6,493	2,608	259,563	638	21,047	37	920

Total number of messages handled 5,259
Total number of words handled 325,961

The cost of maintenance of these stations is borne by the Department of Railways and Canals and all revenue collected accrues to that Department.

Examinations for Certificates of Proficiency in Radiotelegraphy.

133 Operators were examined during the year, including 36 re-examinations. 53 candidates were successful and 80 failed.

The following list shows the names of the successful candidates for Certificates of Proficiency in Radiotelegraphy.

Number of Certificate.	Date of Certificate.	Name.	Grade of Certificate.	Where Examination held.
36	May 27, 1914	Maxwell, Geo	1st Class Ship	Victoria, B.C.
37	May 19, 1914	Kelk, E. W	1st Class Ship	Port Burwell, Ont.
38	May 26, 1914	Young, H. G	1st Class Ship	Midland, Ont.
39	June 12, 1914	Hickmott, W. R	1st Class Coast and Ship	Ottawa, Ont.
40	May 16, 1914	Whitby, A. G	1st Class Coast and Ship	Point Edward, Ont.
41	May 27, 1914	Blackburn, G. W	1st Class Coast	Midland, Ont.
42	May 22, 1914	Eaton, G. F	1st Class Coast	Toronto, Ont.
43	May 14, 1914	Lawton, A. T	1st Class Coast and Ship	Sault Ste. Marie, Ont.
44	May 26, 1914	Simpson, W. E	1st Class Coast	Midland, Ont.
45	May 16, 1914	Beebe, V. C	1st Class Coast and Ship	Point Edward, Ont.
46	May 16, 1914	Sundstrom, A. I	1st Class Coast and Ship	Point Edward, Ont.
47	May 16, 1914	Gray, W. J	1st Class Coast	Sault Ste. Marie, Ont.
48	June 10, 1914	Tee, H. D	1st Class Ship	Victoria, B.C.
49	June 19, 1914	Wikstrom, W. G	1st Class Ship	Victoria, B. C.
51	July 22, 1914	Newberg, C. G	1st Class Ship	Halifax, N.S.
52	July 7, 1914	Daniel, J	1st Class Ship	Victoria, B.C.
53	July 7, 1914	Farthing, L. G	1st Class Ship	Victoria, B.C.
54	July 22, 1914	Leonard, P	1st Class Ship	Victoria, B.C.
55	Sept. 8, 1914	Sutherland, A	1st Class Coast	Ottawa, Ont.
56	Oct. 13, 1914	Periard, M. R	1st Class Ship	Victoria, B.C.
57	Sept. 10, 1914	Craig, T	1st Class Coast	Port Nelson, Man.
58	July 18, 1914	Emmerson, R. G	1st Class Ship	Halifax, N.S.
59	Nov. 11, 1914	Currie, S	1st Class Coast	Cape Sable, N.S.
60	Nov. 11, 1914	Senior, B	1st Class Coast and Ship	Cape Sable, N.S.
61	Nov. 12, 1914	Leslie, H. G	1st Class Coast and Ship	Cape Sable, N.S.
62	Nov. 14, 1914	Hood, H. A	1st Class Coast	Cape Sable, N.S.
63	Nov. 12, 1914	Rennie, B. A	1st Class Coast	Cape Sable, N.S.
64	Dec. 4, 1914	Peirce, W. A	1st Class Ship	Victoria, B.C.
65	Dec. 14, 1914	Raine, T. C	1st Class Snip	Victoria, B.C.
66	Dec. 16, 1914	Stirling, J. A	1st Class Ship	Victoria, B.C.
67	Jan. 8, 1915	MacDonald, J. H	1st Class Ship	Victoria, B.C.
68	Jan. 20, 1915	Fenwick, J. R	1st Class Ship	Toronto, Ont.
69	Jan. 20, 1915	Downer, J. H	1st Class Ship	Toronto, Ont.
70	Jan. 14, 1915	Irvine, B	1st Class Ship	Victoria, B.C.
71	Jan. 20, 1915	King, A. A	1st Class Ship	Victoria, B. C
72	Jan. 18, 1915	Newberg, J	1st Class Ship	Victoria, B.C.
73	Jan. 25, 1915	Robson, A. H	1st Class Ship	Victoria, B.C.
74	Feb. 8, 1915	Letts, R	1st Class Coast and Ship	Ottawa, Ont.
75	Feb. 1, 1915	Cope, G. E	1st Class Coast and Ship	Halifax, N.S.
76	Feb. 5, 1915	Hayman, E. D	1st Class Coast	Barrington, N.S.
77	Feb. 26, 1915	McWatters, R	1st Class Coast	Ottawa, Ont.
78	Feb. 22, 1915	Wright, A. G	1st Class Coast	Cape Ray, Nfld.
79	Feb. 26, 1915	MacGillivray, P. P	1st Class Coast	Camperdown, N.S.
80	Feb. 26, 1915	Spracklin, C. R	1st Class Ship	Camperdown, N.S.
81	Feb. 26, 1915	Dodds, P. E	1st Class Coast	Camperdown, N.S.
82	Feb. 15, 1915	Kerton, J. W	1st Class Coast and Ship	Cape Race, Nfld.
83	Mar. 2, 1915	Coade, H. A	1st Class Coast	Halifax, N.S.
84	Mar. 22, 1915	McCormack, G. N	1st Class Coast	Ottawa, Ont.
85	Mar. 17, 1915	Tufts, E. S	1st Class Ship	Pictou, N.S.
86	Mar. 10, 1915	Nevin, W. B	1st Class Ship	Victoria, B.C.
87	Mar. 10, 1915	McAllister, J. C	1st Class Ship	Victoria, B.C.
88	Mar. 23, 1915	Lucas, L. A	1st Class Ship	Victoria, B.C.
89	Mar. 22, 1915	Woods, M. J	1st Class Ship	Victoria, B.C.

ASSISTANCE RENDERED TO SHIPS DURING THE YEAR BY THE GOVERNMENT RADIO TELEGRAPH SERVICE.

West Coast.

SS. *Prince Albert.*—On April 19, 1914 the ss. *Prince Albert* bound for Prince Rupert from Vancouver ran ashore on the Union Bar at 3.00 a.m. The vessel remained in this position until 2.20 a.m. on April 20 when she floated off the bar and proceeded on her journey to Prince Rupert.

The Cape Lazo station was in constant communication with the *Prince Albert* and all telegrams to and from the vessel were promptly dealt with.

SS. *Prince Albert.*—On August 18, 1914, the Dead Tree Point Station picked up distress signals from the ss. *Prince Albert* at 9.30 p.m., the vessel reported being ashore on Butterworth Rock outside Browne's Passage. The *Prince Albert* also established communication with the Digby island (Prince Rupert) station, which station immediately got in touch with the captains of the ss. *Prince John* and C.G.S. *Lillolet* when these vessels proceeded to the assistance of the *Prince Albert.*

Schooner *Victoria.*—On November 6, 1914, the C.G.S. *Newington* reported by radiotelegraphy from Cape Lazo station that the schooner *Victoria* was broken down off Oyster bay and required assistance. The agents of the schooner were at once informed of the accident and a tug was despatched to the assistance of the schooner.

SS. *Princess Royal.*—On November 27, 1914, the ss. *Princess Royal* reported to her agents in Victoria by radiotelegraphy through the Cape Lazo station that she was ashore on Jedidah island making water and requiring assistance. The ss. *Princess May* was sent to the scene of the disaster and stood by until assistance was no longer required. Communication between the agents and captains of both vessels was maintained throughout the whole proceedings without delay.

East Coast.

SS. *Columbian.*—On May 4, 1914, a fire broke out on the ss. *Columbian* in mid-Atlantic and the vessel had to be abandoned, the crew taking to the ship's boats. An explosion having destroyed the radiotelegraph apparatus, it was impossible for the *Columbian* to obtain assistance from any vessels in her vicinity. Later, however, the ss. *Seydlitz* notified the Sable Island station that she had sighted a burning hulk. This information was sent out by the Sable Island station to all ships in range, with the result that the ss. *Franconia* on receipt of the same altered her course and picked up one of the *Columbian's* boats.

SS. *Empress of Ireland.*—On May 29, 1914, the *Empress of Ireland* and the ss. *Storstad* were in collision in the river St. Lawrence. Radiotelegraph communication was at once established with the Father Point station, which immediately advised all vessels at hand of the accident. Owing to the short time which elapsed between the collision and the foundering of the *Empress of Ireland* only 477 out of the total of 1,504 persons on board were saved.

SS. *Sacha.*—On July 22, 1914, the ss. *Royal George* when in the gulf of St. Lawrence picked up a distress call from the French steamer *Sacha.* Radiotelegraph communication was immediately established between the two vessels and the *Royal George* proceeded at full speed towards the position given by the *Sacha* which was just off the island of St. Pierre, Newfoundland. After proceeding in that direction for a short time the *Sacha* advised the *Royal George* that she was out of danger. A serious fire had broken out on the *Sacha,* which, however, the crew had eventually been able to master.

S.S. *Denver*.—On March 23, 1915, the ss *Denver* of the Mallory Line, which was leaking badly some 1,500 miles from Cape Race, sent out calls for assistance, which were answered by several vessels in her vicinity and also by the Cape Race station. The Cape Race station kept in communication with the vessels engaged in rescue work until all on board the *Denver* had been taken off.

Great Lakes.

One or two vessels grounded at different points on the Great Lakes during the season; the cases were, however, not serious and the vessels were refloated without trouble. On all occasions radiotelegraph communication was immediately established with the Government radiotelegraph coast stations in the vicinity.

NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS.

East Coast.

In pursuance of the policy of Government ownership of Radiotelegraph Coast stations, an agreement was entered into with the Marconi Wireless Telegraph Company of Canada whereby the Sable Island and Camperdown stations have been transferred to the department by the Marconi Wireless Telegraph Company of Canada, Limited, on March 31, 1915.

During the year all the stations on the river and gulf of St. Lawrence and on the East Coast were equipped with a modern type receiving apparatus of the same design as that supplied to the Kingston, Toronto and Port Burwell stations on the Great Lakes. The installation of these receivers has resulted in considerably increasing the reception range of the stations and has proved a good investment.

Quebec.

The power of the Quebec station has been increased by the installation of new transmitting apparatus of 2 K.W. power. The set operates from the city power supply and a musical spark is obtained by means of a non-synchronous disc discharger; the total cost of the installation amounted to $895.74.

Montreal.

A suitable site for the proposed new station at Montreal was secured in the parish of Cote St. Michel, Cote Nord; the area of the site is nine arpents and the purchase price was $1,400 per arpent.

Cape Race.

In order to increase the range of the Cape Race station to 500 miles, an agreement was entered into with the Marconi Wireless Telegraph Company of Canada to replace the two 160 ft. wood housing masts by two 253 ft. steel tubular masts; this work was completed in October, 1914, the department's share of the cost of the same amounting to $8,000. The Cape Race station is now able to communicate with vessels plying on the southern track between New York and Europe, and its value as an aid to navigation, particularly in view of ice conditions applying in that vicinity, has been considerably enhanced by the installation of the new masts.

GREAT LAKES.

Kingston.

The installation of a bored pipe well, with pump and necessary pipe connections to the operating house and double dwelling house, was completed at the Kingston station. The total cost of this work, including $75 paid out of last year's vote, was $592.97. The site of the station was fenced in and a board walk laid down for the sum of $272.84.

A water closet was installed in each house of the double dwelling at a cost of $98.

Midland.

Arrangements were made with the corporation of Midland to have the radiotelegraph station connected to the town water supply; the work of continuing the supply mains to a point opposite the station was duly carried out by the corporation, the department contributing the sum of $200 towards the cost of the same. The necessary pipe-work to connect the double dwelling and operating house to the supply mains was installed at a cost of $323.88. Public tenders were called for the installation of a septic tank and drainage at the Midland station. The contract was awarded to Messrs. Armstrong, Brothers & Frank of Midland, who submitted the lowest tender of $452.

Port Burwell.

The site of the radiotelegraph station at Port Burwell was fenced in at a cost of $165.

A bored pipe well was installed at this station for the sum of $685.

Toronto Island.

A septic tank was installed at the Toronto island station at a cost of $228.

WEST COAST.

Cape Lazo.

A battery driven 1½ k.w. transmitting set was installed at the Cape Lazo station for the purpose of working with the Point Grey and Powell River stations and with ships in the gulf of Georgia, thus saving the running of the large transmitting sets for short distance communication.

Improvements were made to the existing earth system and a septic tank and drainage system was installed and the necessary plumbing work in connection therewith carried out. Three acres of the site were stumped and ploughed. The total cost of the above work amounted to $3,826.

Digby Island (Prince Rupert).

Public tenders were invited for the erection of a double dwelling house at the Digby Island station and the contract was awarded to Mr. John Hilditch of Prince Rupert, B.C., who submitted the lowest tender of $9,200 for the work. The building was completed in December, 1914.

Three and three-quarter acres of the site were cleared and stumped at a cost of $1,294.08. This work was carried out by the local engineer of the Department of Public Works for this department.

Esquimalt Workshop.

Two wooden housing masts, 200 feet and 136 feet high respectively, were installed in the dockyard at Esquimalt in connection with our experimental and test room at that point, and additional testing instruments were purchased. We are now in a position to test all apparatus under working conditions.

A 10 horse power three-phase motor and two transformers were also installed in connection with the test room; a standard ground connection was put down.

The total cost of the above work was $4,554.34.

Point Grey.

Two standard 185-foot housing masts were erected at the Point Grey station; three acres of the site were cleared and the old tree mast dismantled at a cost of $4,591.74.

Estevan Point.

In order to increase the range of the Estevan Point station the height of the mast was increased to 220 feet and a new mast 250 feet high was installed, using an existing tree for the lower mast; this work entailed the installation of additional guy anchorages and considerable clearing. Improvements were made to the existing ground connection. The total cost of the above work was $5,164.81.

Gonzales Hill (Victoria).

A 6 k.w. 60-cycle transformer was supplied to the Gonzales Hill station at a cost of $314.35. The drainage from the station buildings was connected up with the city sewage system; the total cost amounted to $990, of which $555 was borne by this department, the balance being borne by the Meteorological Branch of the Department of Marine, whose local observatory was connected on the same system.

HUDSON BAY AND STRAITS.

The official acceptance test of the Port Nelson radiotelegraph equipment was made by an officer of the department on September 10, 1914.

Location of Sites for Stations of Hudson Bay System.

An engineer was despatched to Hudson strait in the C.G.S. *Minto* last summer and locations on Charles island, Big island and Mansel island in Hudson straits were reported on.

A suitable site was located on Mansel island and construction on this station will be commenced during the coming summer.

PERSONNEL.

The personnel of the radiotelegraph service in the Dominion is as follows:—

	Government.				Commercial.			
	Headquarters.	Coast Stations.	Commercial Stations.	Ship Stations.	Headquarters.	Coast Stations.	Commercial Stations.	Ship Stations.
Engineers and officers-in-charge	3	13	2	24	8	24	24	51
Operators		22	4			43	12	34
Other employees	4	5	1		4			
Executive officials and inspectors	2	1			2			4
	9	41	7	24	54	67	36	89

Total personnel, 327

I am pleased to report that the staff directly in the employ of this department at Headquarters, at the British Columbia coast stations, and on board departmental ships, have taken great interest in their work and have carried out their duties in a satisfactory and efficient manner.

The placing of certain stations on a naval basis has required the enlistment of a number of the men in the R.N.C.V.R.; there has been no lack of volunteers in this reference. A considerable number of men have also volunteered for active service with the different overseas contingents.

I have the honour to be, sir,
Your obedient servant,

C. P. EDWARDS,
General Superintendent Government Radiotelegraph Service.

SUPPLEMENT

TO THE

5th ANNUAL REPORT OF THE DEPARTMENT OF NAVAL SERVICE, FISHERIES BRANCH

CONTRIBUTIONS

TO

CANADIAN BIOLOGY

BEING STUDIES FROM THE

BIOLOGICAL STATIONS OF CANADA

1914-1915

OTTAWA

PRINTED BY J. DE L. TACHÉ, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY.

1916.

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CONTENTS

PREFACE.

By Prof. Edward E. Prince, LL.D., D.Sc., F.R.S.C., *Dominion Commissioner of Fisheries, Chairman of the Biological Board of Canada, Member of the British Science Guild, London, Vice-President International Fisheries Congress, Washington, D.C., 1907, Chairman of International Relations, American Fisheries Society, etc.*

A selection of the reports prepared by members of the scientific staff at the Biological Stations of Canada, on the Atlantic and Pacific coasts, is now presented as an appendix to the 5th annual report of the Naval Service Department, Fisheries' Branch.

Of the seventeen papers, seven of them are zoological, and have a direct practical bearing upon the fisheries. Four of them relate to fish culture, especially lobster, oyster and shellfish culture generally. Two of them are of a botanical and chemical character, and have special reference to the utilization of important seaweed resources, which yield chemical products of extreme value. One report describes a disease, epidemic in fishes, and adds another to the series of papers on fish epidemics which have appeared in previous volumes of "Contributions to Canadian Biology." Three of the papers are hydrographic and physical, and comprise researches which must be regarded as preliminary to surveys of the fishing areas to which they have special reference.

It is not necessary to point out that the Biological Stations, maintained by the Dominion Government, must prove of great benefit to the fishing industries, nor to affirm that university students, and members of the staffs of the various universities in the Dominion, have unequalled opportunities now afforded for carrying on the highest researches into the life of the sea, which formerly were supplied only by foreign Biological Stations. The opportunity is being taken advantage of more and more as the years advance, and during the last season or two the tables at the Marine Biological Stations of Canada have been fully occupied, and the laboratories at times have been somewhat overcrowded. There is a growing desire on the part of the biologists, both junior investigators and senior members of university staffs, to aid in contributing to our knowledge of the valuable fishery and other resources of our prolific Dominion waters.

Apart from the work actually carried on at the stations, the Biological Board entered upon an investigation in 1914 of a very special character, namely, the herring fisheries of the gulf of St. Lawrence and the Atlantic coast of Canada generally. An eminent expert, Dr. Johan Hjort, Director of Fisheries, Norway, consented to conduct an elaborate series of researches with the aid of a staff of trained Canadian biologists. The parliamentary vote provided annually for the purposes of the Biological Stations was wholly insufficient to meet the expenditures involved in this extensive herring scheme, and a special appropriation, with the consent of the Honourable the Minister, was generously provided, which assisted materially in enabling the Biological Board to carry through the researches successfully. Professor Willey, McGill University, Montreal; Dr. A. G. Huntsman, University of Toronto, Toronto; Professor J. W. Mavor, University of Wisconsin, Madison; Dr. Bjerkan, of Bergen, Norway, and others, assisted Dr. Hjort, and a preliminary report was completed, and issued early this year, to be followed by a more elaborate and detailed report which will be issued in the course of a few months. The board has been indebted, in connection with this work, to the University of Toronto for the use of laboratories, and assistance by various members of the university staff, and to Principal Sexton, Halifax Technical College, Nova Scotia, the Biological Board was also indebted for many courtesies.

The Minister of Naval Service, the Hon. J. D. Hazen, took very great personal interest in this important work, which has aroused unusual interest amongst the leading men engaged in the fisheries all along the Atlantic coast of the Dominion.

It has been suggested, in order to facilitate reference to the papers comprising the present volume, that a brief popular resumé of the chief points set forth in these papers should form the preface by the chairman of the board. I have therefore summarized some of the principal features in the seventeen papers which follow, and in this summary I follow the order of the papers seratim.

I.—PACIFIC HALIBUT FISHERIES (PROF. WILLEY).

Professor Willey in his report on "The Pacific Halibut Fisheries," after describing the Indian methods of fishing, lays stress on the lack of information upon the spawning peculiarities and habits of the halibut generally, although the evidence seems to indicate that the fish deposits its eggs, probably during the winter, on the Pacific coast. The eggs of the halibut were described by Mr. E. W. Holt, and Professor W. C. McIntosh, in 1892, and are large, transparent eggs ⅛ inch in diameter, destitute of an oil-globule and, without doubt, very buoyant. Dr. Willey ventures the opinion that halibut eggs do not float near the surface, but are most probably bathypelagic. The deep-sea argentine, a fish allied to the smelt, produces a bathypelagic egg about the same size as the halibut's egg, and they occur in water layers at great depths. The larva, on hatching out, measures 7·7 mm., but small specimens have been obtained in the sea measuring 10¼ mm., while one of 28 mm. has been taken at a depth of over 270 fathoms, and another specimen 50 mm. long was taken in water of over 550 fathoms. The striking correspondence in size, etc., as Dr. Willey points out, indicates that the halibut has probably a bathypelagic egg. A concise narrative follows of a three and a half months' expedition around Queen Charlotte islands, Goose island, the Alaskan shores, and other halibut grounds. The fish captured fall into three classes: chicken halibut (20 to 29 inches long), medium (30 to 39 inches), and large halibut (40 inches and upwards). The size varies with the age, and a 28-inch fish is probably eleven years old. The migrations from the shallows (15 fathoms) where it feeds), to greater depths of 150 fathoms, where it probably spawns, appear to be the main movements, rather than extensive north-and-south migrations.

There is urgent need of more statistical information, and detailed records of halibut captures, and of international co-operation, so that a recognized basis may be established for restrictions, if necessary, although the aggregate catches on the banks show no signs of permanent exhaustion. Indeed the thinning out of the banks may improve the quality of the supplies of fish that remain. In view of the success of plaice hatching, Dr. Willey favours experimental halibut hatching operations. Towards the close of his report, Dr. Willey points out the terrible waste of good food fish captured by the halibut boats but thrown away because inferior to the halibut in commercial value.

II.—THE EGG OF THE HALIBUT, ETC. (PROF. PRINCE).

The second report, which is by myself, on "The Egg of the Halibut, etc.," gives in detail the more important observations on the features of the halibut eggs so far as known. The ripe, unfertilized eggs obtained by Professor McIntosh at the Scottish Marine Laboratory at St. Andrews, and Mr. E. W. L. Holt's account, and Dr. H. C. Williamson's description of the ripe eggs (especially the double envelope described by the latter author), are first referred to, and it is pointed out that the spawning season of halibut, in Europe, extends over many months, from January to May. Dr. Gilpin found in Nova Scotia ripe "running" fish in June, but the fertilized ovum has not yet been studied by any expert. The young larval halibut are then described, includ-

ing various doubtful specimens obtained in the North sea and North Atlantic. The smallest specimens, wormlike in form, range from $\frac{1}{2}$ inch to $\frac{2}{3}$ inch in length, and when pigment appears, it forms four indefinite rows of black spots along the body, on each side, and extends over the median unpaired fins. The flattened form is gradually assumed, and when the length of 1 inch in reached, coloured cross bands, seven in number, appear on the two large median fin-expansions. Dr. Schmidt, the Danish biologist, obtained specimens of the last-named size in 60 fathoms in the month of May. The fish at 34 mm. ($1\frac{1}{3}$ inch) though still more flattened, continue to swim on edge, and on the right side the dark colour is more pronounced. A mottled arrangement of colour is soon assumed, and this is a feature which is characteristic of the halibut during post-larval life. At the length of 5 inches the full-grown features are assumed, and specimens of that size were obtained by Professor Verrill in the straits of Canso, and Scottish specimens, 12 inches in length, are recorded by Professor McIntosh on the east coast of Scotland; and halibut rather smaller (10 inches long) are common in shallow waters around Iceland. Dr. Wemyss Fulton is of the opinion that small halibut move into deep water in the late summer, and in October he obtained Scottish specimens, $17\frac{1}{2}$ to 30 inches long, at a depth of 65 fathoms.

The less common species of halibut (*Hippoglossus hippoglossoides,* Walb.) is distinguished in its youngest stages by lack of colour, and when $\frac{1}{2}$ inch long is still very sparingly spotted, in contrast to the familiar species *H. hippoglossus.*

III.—BRITISH COLUMBIA KELP BEDS (PROF. A. T. CAMERON).

The third report on "The Kelp Beds of British Columbia," by Professor Cameron, Winnipeg, presents an account of an important research, treating specially of the two most valuable species, the bull-kelp and the sea-ivy, or long bladder kelp. These two species of Laminaria are commercially valuable as they yield more potash than Fuci and other rock-weeds, and can be more easily harvested. The former, the bull-kelp, occurs all round the British Columbia coast, but the latter, the sea-ivy or flag-weed, is absent in regions where the water is of diminished salinity. Both require a rocky shore for firm attachment, and a tidal flow, three to five knots per hour, a salinity not less than two-thirds ocean salinity (mean density, 1·019), and a suitable temperature.

The bull-kelp grows in spring, but decays rapidly after July, the crop being thickest from July to October. The beds are visible, however, all the year, as new plants attain some size before the old plants die. They spread asexually by spores. Possibly in late July, harvesting of the beds should commence, after the spores have been discharged.

The sea-ivy has a life longer than a year, and spores are produced on fronds towards the base or root, and the species can thus be more readily harvested than the bull-kelp.

Dr. Cameron estimates the extent of available Pacific beds, and indicates their location on a map specially prepared by him. He describes as "thick beds" those on which there is at least one plant to a square yard; though there may be three, four, or more. The portions commercially available in each plant range from 5 to 8 pounds to 24 pounds, the average being about 12 pounds per plant, and one mile of coast line should yield 245 tons, or a total British Columbia harvest annually of considerably more than 400,000 tons of kelp. Some areas are more productive than others. On Queen Charlotte islands, each plant would yield 15 to 20 pounds of raw material. The amount of water in the tissues of kelp is, of course, large, namely, 92 per cent, in the fronds, with 8 per cent dry matter; the stock, $87\frac{1}{3}$; and $12\frac{2}{3}$ dry matter; root or holdfast, $87\frac{1}{5}$ and $12\frac{4}{5}$ dry matter. The air-bladder contains 94 per cent of water and only 6 per cent dry matter. Assuming that the potassium chloride is 30 per cent and valued at $50 per ton, and the iodine ·12 per cent and valued at $38.75, the total value per annum would, for the former, be $11,750,000, and for the latter $3,680,000, or a total

of $15,000,000. Possibly some districts, as the author points out, could not be readily exploited at present, but large areas are certainly available for profitable utilization. Further experiments are urgently needed, and a scheme of leasing and of turning the kelp-beds to account might be advantageously devised without delay.

IV.—GOVERNMENT LOBSTER POND, N.S. (PROFESSOR KNIGHT).

The problem of impounding breeding lobsters, hatching them out and rearing the fry, in inclosed waters, form the main subjects of Professor Knight's laborious "Researches at the Lobster Pond, Long Beach, Digby Neck, N.S." His results are difficult to summarize, but the conclusions reached are that an ideal lobster pond should be—

(1) Accessible for easy transportation of lobsters and fry.
(2) Of a temperature appropriate, and not too cold.
(3) Of a suitable depth.
(4) Not subject to excessive vegetable growths, diatoms, etc.
(5) Open to ample sunshine influence.
(6) Provided with sheltered areas.
(7) Of suitable salinity.

The last two conditions only are satisfactorily provided at Long Beach. According to Dr. Knight's investigations, the average temperature it appears was 60·8° F., and far too cold for the growth of lobster fry, which became clothed with parasitic plant growths during their retarded development, and in consequence unable to feed properly, so that they died before reaching the fourth stage. The fourth stage is usually attained in the second or third week, when the larval features are lost and the fry descend to the bottom. In addition to the coldness of the water, cloudy weather, and microbes, all affecting the delicate young fry, there appeared vast numbers of shrimp-like enemies (*Mysis idotea*), etc. One specimen of *Mysis* was placed in a basin of water with ten lobster larvæ, and in two hours eight were killed and partly devoured.

Dr. Knight confined a number of male and female lobsters in limited inclosures, and found that 70 per cent of the females extruded eggs before the end of September, in contrast to the conditions in the open sea where a large number of female lobsters never find males; hence the small percentage of females found by fishermen carrying eggs in St. Mary's bay and the bay of Fundy. The sexes are too widely scattered, and Dr. Knight lays emphasis on the necessity of providing inclosed mating grounds under official superintendence. The details of the rearing plant and the machinery used are included in the report and are of considerable interest. The Long Beach pound in most respects does not appear to be favourable for the objects sought by the department.

V.—BARREN OYSTER BOTTOMS, P.E.I. (MR. A. D. ROBERTSON).

Mr. A. D. Robertson's report on "Barren Oyster Beds, P.E.I." indicates the large amount of investigation desirable in order to ascertain the possibilities of expanding oyster culture. The bottom of these "barren areas" was found to be red sand, with rocky sandstone patches and soft mud, while in some places dense layers of oyster and clam shells covered the soft portions. Eel grass occurred from a depth of 8 to 12 feet out from shore, and seaweeds usually clothed the rocky surfaces. The channels, 2 to 30 or even 40 feet, frequently presented abrupt edges on which oyster spat settled. Salinities and temperatures were taken at 126 places, both at the top and bottom of the water, and specific gravity, percentage of chlorine and of solids were the features ascertained. The densities are most suitable for oyster growth. The floating food diatoms, etc.) was studied, and samples submitted to Dr. A. H. MacKay, of Halifax.

for later report. There is an outflow over the oyster areas of fresh water in spring, but it is inconsiderable during the summer. Mr. Robertson calls attention to the abundance of enemies of the oyster, such as starfish, the drill (*Urosalpinx*), limpets, boring sponges (*Cliona*), while frost and ice are very detrimental. Poaching is frequent, and a very serious menace. The areas were formerly productive, as is seen from the extensive beds of dead shells remaining. Spat collectors were erected in August, consisting of shells held in place by upright wire cylinders, but the deposit of spat was light, though it occurred in all parts of Richmond bay. Spatting was late in 1914, and oyster fry were observed from August 1 to the 29th, but not later. The "set" was best in the shallows warmed by the sun, and free from eel grass.

The general conclusion reached is that the oyster beds are in bad shape, owing less to unfavourable physical conditions than to over-fishing.

It is necessary—

(1) To enforce proper laws.
(2) To carry out a three years' close season.
(3) Lease spatting grounds to fishermen out from shore to a depth of 4 feet.

VI.—SUPPOSED DISEASE OF QUAHAUGS IN N.B. (PROF P. COX).

Professor Cox, of Fredericton, N.B., contributes three papers embodying researches carried on as a member of the staff of the station. His first report, No. VI, on "A Supposed Disease of the Quahaug (*Venus mercenaria*)," aimed to determine the cause of a deterioration in this valuable shellfish, observed by the shippers when transporting them to Chicago and other markets from Buctouche, N.B. Dr. Cox gives a full account of the conditions on the beds and the methods of fishing, and describes the storing of the shellfish in floating trays 14 by 18 feet and 18 inches deep, which trays are filled to a depth of 6 inches to 18 inches with quahaugs, and often stored for a period of several months. They are then packed in sacks of 1½ bushels capacity, and shipped in box cars, which are iced at each end. The temperature is probably 68° to 70° F. in the winter (and lowered to 45° to 50° F. in the cars), and then on reaching Chicago they are probably exposed to a temperature of 80° or upwards. These changes of temperature, and the lack of ventilation during shipment, must be detrimental, and many do not survive these extreme conditions.

To test the effect of these sudden changes, eight clams were put in the ice-house at the station for three days, the temperature being 45° to 48° F., and then exposed to the open air at 60°, or in one instance 70° F. At the end of three days, all were dead, excepting one. In another lot of ten, taken from the trays and exposed to the open air for fourteen days, it was found that all survived. A number of other interesting experiments are detailed in the report, and Dr. Cox suggests that possibly a percentage of adult clams normally die each year after the breeding season. He suggests avoidance of rough handling, securing of proper ventilation, and uniformity of temperature. The deterioration and death of clams are in his opinion not due to disease, but to unfavourable conditions; and the paper closes with some practical suggestions for shippers, and with the statement of four biological problems which still await investigation respecting the quahaug industry.

VII.—HERRING DISEASE (PROF. P. COX).

A very important investigation carried on by Professor Cox forms the subject of report No. VII, namely, the "Disease of the Herring in the Gulf of St. Lawrence in 1914." There was an epidemic amongst the herring, which resulted in great mortality from the middle of June to about the middle of July.

In 1913 a similar epidemic was observed; vast numbers of dead and dying fish being noticed in June by the fishermen, before the annual run of spawning herring had left the coast. Fishermen recalled a similar condition sixteen years ago. The herring affected appeared to be the oceanic form, which visits Northumberland strait in July for spawning purposes. The season was colder than usual, and the littoral schools of herring were scarce. The diseased fish showed lateral sores in the tail region, and a cavity was hollowed out beneath the "lateral line," and open in places on the surface. Examination proved the presence of a *Neosporidium,* one of the *Myxosporidia,* which spread by means of spores called "sporonts." Each sporont is enveloped in a dense wall which dissolves in the stomach of the fish, after it has been swallowed, and an "amœbula" emerges, which finds its way into the blood, and finally to the various tissues and they thus become infected. The sporont appears to develop into a multinucleate plasmodium, which breaks up into "meronts," by a process of budding, rather than by fission. The sporonts abound where the tissue is in a state of disintegration, the planonts in the blood, liver, etc., and the meronts in the least affected regions. Doubtless the sporont is the means, concludes Dr. Cox, of contamination amongst the herring schools.

VIII.—LIFE OF THE HAKE, A SCALE STUDY (MR. E. HORNE CRAIGIE).

Mr. Horne Craigie, Toronto, reports on the life-history of the hake as determined by the scales. These scales differ from those of the cod, and bear some resemblance to those of the salmon, the centre of the scale being usually a ring with a small anterior break, or else it is a short spiral. It is probable that the lines of periodic growth are annual, but that is undetermined. Most specimens seem to be three years old, and the curves appearing in the "graphs" constructed during the researches, show fairly uniform growth, greatest in the first year and decreasing in later years. Hake appear to spawn mainly in the fourth year and onwards, the spawning period being always one of decrease in the rate of growth.

Females are longer than the males, and are far more numerous; unless the latter associate in separate schools. Of 942 specimens examined only 214 were males.

IX.—GROWTH OF THE HADDOCK—A SCALE STUDY (MISS D. DUFF).

Miss Dorothy Duff, McGill University, summarizes her study on "The Growth of the Haddock," in a report which presents many points of interest. The haddock, as in other allied fish, spawns when it reaches its fourth, or possibly, its fifth year. The rings on the scale, which indicate rapid growth under summer conditions, are wide, but in winter narrower and more compressed. Each band of summer and winter growth represents one year, and by counting the winter rings, the age can be estimated. Growth of the scale is proportional to the growth of the body. Interesting results were obtained when determining the weight of certain organs at different stages of growth. The liver, for example, was $2\frac{1}{4}$ per cent of the total weight in some instances, but in others, less than 1 per cent, and again in others 4 per cent.

The size of the egg was studied, and it bears no proportion to the size of the ovary, large eggs often occurring in a very small ovary. The eggs in a 4-year-old fish were $\frac{1}{125}$ inch in diameter; in 6-year-old fish they were a fifth larger, namely, $\frac{1}{100}$ inch. The table at the end of Miss Duff's report is interesting, and shows that a 1-year-old fish may grow to double, or even treble, its length by its second year, and similarly in its third year, but increases only one-seventh or one-tenth in the fourth year; while in the fifth year the increase may be one-eighth or one-fifth, and still less in the sixth and seventh years. One specimen in its eighth year was one-thirteenth longer than in its seventh year, and nearly six times the size it attained in its first year.

SESSIONAL PAPER No. 38a

X.—GROWTH OF THE COD—A SCALE STUDY (MR. R. P. WODEHOUSE).

Mr. Wodehouse made a similar "Study of the Cod," which is embodied in report No. X. He examined 376 cod from various parts of Passamaquoddy bay, during the period from June 12 to August 12, and while he points out that the scales are a guide to the rate of growth, a retardation in springtime introduces a confusing factor.

It is almost impossible, he says, at times to decide with certainty the age of old cod which have spawned repeatedly. Other factors add to the difficulty, such as the scarcity of food, temporary inability of the fish t osecure ample food for itself, and other conditions which affect the scale-growth. Mr. Wodehouse gives an interesting comparison between some young cod, less than one year old (two batches of them), taken five weeks apart, and showing in that time a growth of slightly less than 1½ inch. By summarizing the tables and striking an average for each year, the author finds that the size of the cod at the following ages may be taken to be: one year, 5·70 inches long; two years, 14·13 inches long; three years old, 19·6 inches; four years old, 25·6 inches; five years old, 32·3 inches; six years old, 35·62 inches; seven years old, 39·09 inches; and eight years old, 45·27 inches.

There is, of course, individual variation. Indeed the author states that "scarcely any two fish have the same life-history."

XI.—DETERRENT EFFECTS OF LIGHT ON MIGRATING EELS (PROF. P. COX).

Professor Cox has completed his third report, contributed to the present series, upon an interesting subject, namely, "The Deterrent Effects of Light on Ascending Eels in Rivers." The theory has been mooted that eels, which are a pest in some rivers, might be excluded by the use of strings of lights suspended across the channels up which they migrate. The experiments were conducted at the end of July, in the tanks of the laboratory at St. Andrews, and later, at the exit of Bocabec lake, New Brunswick. The details are interesting, and show that eels, afraid of the lights at first, hasten back into the darkness but seem to become accustomed after three or four nights' experience, and linger for a longer time in the luminous area. Moving lights were effective for one or two nights, but later they paid little attention to them. Dr. Cox calls attention to the abnormal conditions under which the experiments were conducted.

The usual time for migration of eels was passed, and the fish were transferred from salt water to fresh and *vice versa,* and moreover the fish were penned, not free, in order to facilitate the observations. The conclusion reached is that such lights do not deter migrating eels.

XII.—POSSIBLE AREAS FOR LOBSTER BREEDING IN BRITISH COLUMBIA (DR. MCLEAN FRASER).

Dr. McLean Fraser gives an account of his "Examination of Possible Lobster-Breeding Areas on the east coast of Vancouver Island, B.C.," and in a very full report furnishes details on the nature of the bottom, depth, temperature, density, salinity, etc., of the waters examined from Victoria on the south, to Texada and Lasqueti islands on the north. After referring to the several shipments of lobsters and lobster eggs, by the Dominion Government, from the Atlantic to the Pacific coast, the author expresses the opinion that the temperature in the straits of Georgia is never too high to incommode lobsters, and he found in July, 1914, that the temperatures were as follows:—

63·1° F. at the surface,
56·3° F. at 5 fathoms,
51·0° F. at 20 fathoms,
50·7° F. at 25 fathoms,

while in October the corresponding temperatures were—

52·9° at the surface,
48·65° at 10 fathoms, and
48·49° at 20 fathoms.

The salinity is not very favourable, but is about 80 per cent of that in Passamaquoddy bay, or at Woods Hole, Mass., where lobsters naturally abound.

The suggestion is made that lobsters might be placed in some inclosed inlet where the results could be checked for two to six or eight years, or they could be impounded in a stone or wood inclosure and supplied with food, while under observation, and he specifies six suitable locations.

XIII.—VARIATIONS IN DENSITY AND TEMPERATURE IN BRITISH COLUMBIA WATERS (PROF. CAMERON AND DR. MCLEAN FRASER).

Dr. A. T. Cameron and Dr. Fraser summarize the results of an elaborate investigation into the "Density and Temperature Variations in the Coastal Waters of British Columbia."

For four months the authors made continuous observations at the station, Departure bay, the results of which are lucidly set forth, accompanied by tables, a map and two charts. The distribution of fishes, and marine fauna generally, depends chiefly upon the temperature and salinity of the water, and they point out that the immense outflow of fresh water from the Fraser river affects the straits of Georgia over a great area. With a flood tide the river water is taken in a strong current, in calm weather. to the north, and with the ebb-tide sweeps towards Gabriola pass, Vancouver island, and southward, and, as surface-water, may pass almost unchanged into Departure bay under favourable conditions. High winds and heavy seas with a strong north or south current causes a mingling with the deeper salt water, and the fresh water does not then reach Departure bay. Howe sound on the mainland is influenced by its own fresh-water outflow from Squamish river, not the Fraser river, as is shown by the conditions in Vancouver harbour, and the low values obtaining there. Similarly large bodies of fresh water influence the salinity of Alberni canal, and Barkley sound, on the west side of Vancouver island. These results, say the authors, indicate that in every large inlet along the coast, similar conditions obtain, and much research would be necessary before the relative value of the local streams and of the Fraser river, in different localities, can be stated. An interesting point stated is that bull-kelp flourishes where there is a higher salinity (as the growth, length and weight of the plants, as well as the extent of the beds, increase with the salinity), and the same applies, though in a less degree, to the sea-ivy. The curious ear shell, *Haliotis* (the Abalone) finds most favourable a salinity and depth of water practically identical with those under which the sea-ivy flourishes; that is not below a mean density of 1·019 to 1·020. The authors add that it is desirable in order to find to what depths the sudden fluctuations in Departure bay and vicinity extend, and what are the effects upon plant and animal life (in order to compare these with the regular changes observed near the St. Andrews Station on the Atlantic coast), that investigations should be made over a more extended period than has hitherto been possible.

XIV.—PHYSICAL STUDIES IN SOME NEW BRUNSWICK BAYS (DR. MAVOR AND MESSRS. CRAIGIE AND DETWEILER).

Dr. J. W. Mavor and Messrs. Craigie and Detweiler, in a short paper, summarize their "Investigations of Certain Bays between St. Croix River and St. John, N.B.," with regard to suggested oyster culture.

At the twenty stations where they carried on temperature and density observations, the air temperature ranged from 14·4° C. up to 30·1° C., ranging on the whole between 16° and 17° C. The depths were 1½ to 3 fathoms, to 5, 7, or 10 fathoms. The bottom temperature ranged from 9·4° C. to 15° C., but chiefly ranged about 10°, 11°, or 12° C. The bottom density varied from 1·0085 to 1·02498. The paper concludes with a list of mollusks obtained from the bottom when dredging at seven of the stations.

XV.—HYDROGRAPHIC INVESTIGATIONS, PASSAMAQUODY BAY (MR. HORNE CRAIGIE).

Mr. E. Horne Craigie continued the "Hydrographic Investigations in Passamaquoddy Bay," which previous workers had carried on in former seasons. He selected nineteen stations, so arranged as to give four vertical sections of the area examined: two on the St. Croix river, one of Passamaquoddy bay from Tongue Shoal light to Pendleton island, and one of the western passage.

As the paper itself is a very condensed account of the observations made, it is difficult to give a synopsis, and the twenty-three "graphs" with accompanying explanation require to be consulted, along with the data of sections, and the table of densities, with which the paper concludes.

XVI.—HYDROGRAPHIC SECTION OF BAY OF FUNDY (MR. HORNE CRAIGIE).

Mr. E. Horne Craigie summarizes his "Hydrographic Investigations in the Bay of Fundy in 1914," in a paper illustrated with a chart, five graphs and a table of data, affording information as to the temperatures, movements of the water, densities, etc., in a hydrographic section of the bay, this section extending from East Quoddy Head, N.B., to Digby Gut, N.S.

XVII.—IODINE, ETC., IN CERTAIN BRITISH COLUMBIA KELPS (PROF. A. T. CAMERON).

The concluding paper of the series, by Professor A. T. Cameron, Winnipeg, treats of the "Iodine and Water Contents of Six Species of Kelp on the Pacific Coast," and the tables which are included in the paper are interesting as showing the effect of age and of the period of the year, upon the chemical composition of these algæ. The general results show that the percentage of iodine is almost always less and the water greater in the float of the bull-kelp than in the fronds, or in the stipe. Young plants of that sea-weed contain more iodine than full-grown ones. Yet as the total bulk of the plant increases during the final stages of growth, the full-grown plants yield a greater total of iodine, although the average content be less. An elaborate analysis of eight species of British Columbia kelps is given by Dr. Cameron.

CONCLUSION.

It only remains to add that a further series of valuable reports has been nearly completed by the staff of the Atlantic and Pacific stations, and that a new volume of "Contributions to Canadian Biology" will, it is hoped, be ready for issue within a few months.

The work of the stations is rapidly extending and the interest of scientific investigators in marine researches at the various universities is growing year by year. Increasingly valuable results will, without doubt, follow. The stations so generously supported by the Dominion Government are still able to carry on their important work without salaried officers as the staff conduct their valuable work without compensation. The only exceptions are certain assistants, and the main expenditures therefore are those involved in the operation of the stations, boats, cost of apparatus, chemicals, etc., and the travelling and boarding arrangements which it has been found necessary to provide for the workers at St. Andrews, N.B., and at Departure bay, B.C.

INVESTIGATION INTO THE PACIFIC HALIBUT FISHERIES, BRITISH COLUMBIA.

By Professor Arthur Willey, D.Sc., F.R.S., F.R.S.C.,
McGill University, Montreal.

PART I.—INTRODUCTION.

It is known that the halibut has already passed the zenith of its productivity in the north Atlantic and is now far outclassed in industrial importance by the Pacific race which belongs to the same species. Yet the critical periods of its life and growth, spawning, metamorphosis, and migrations have thus far eluded the efforts of the international commission for the exploitation of the sea, which has accomplished so much in other fields.

The economic history of the halibut fishery on the northwest coast of the American continent may be said to have begun with Indian tradition, and to have culminated in the competitive industry of to-day. The sign of the halibut was used as a crest by the Haidas of the Queen Charlotte islands in the days when that tribe was in the ascendant. Dr. C. F. Newcombe, of Victoria, who is a great authority on Indian antiquities in British Columbia, showed me an illustration of a Haida communal grave house from Cumshewa, which had been installed in the Department of Anthropology of the Field Columbian Museum (see publication 98, report series, vol. ii, No. 4, annual report for 1903-04, Chicago, October, 1904, plate liii, opposite p. 281). The house measures 17 by 20 feet, and in the middle of its facing boards there is a carved post portraying in its entirety the halibut crest, a very rare example. The figure of the halibut may sometimes be recognized in Indian rock-carvings or petroglyphs. An exceptionally interesting animal scene, which ought to be protected from the class of visitors who cut their names or initials on all objects of beauty and rarity, is to be found a little to the south of the town of Nanaimo, carved on a sandstone knoll above a gravel pit off the main road between the Indian reservation and the Chase river. It deserves to be kept as one of the sights of Nanaimo, but will soon be destroyed unless it is cared for by those in authority. Mr. George Waddington, of Nanaimo, kindly gave me a print from a photograph of it which he had taken after chalking over the deeply incised lines. The original, without chalk, does not give the impression of crudeness in its sylvan surroundings, but of typical aboriginal decorative art. The halibut can be seen to the left of the middle of the picture. This petrograph has also been described and illustrated by Mr. Harlan J. Smith and by Dr. C. F. Newcombe.

Accounts of eye-witnesses of the old Indian methods of fishing for halibut have been written by J. J. Lord and G. M. Dawson. Lord, the author of the "Naturalist in Vancouver Island and British Columbia" (two vols., London, 1866), gave a vivid description of his experience in a fishing canoe off the northern end of Vancouver island. He surmised correctly that the species was identical with *Pleuronectes hippoglossus* Linnæ (1758), inhabiting the North Atlantic ocean. This specific determination was subsequently corroborated by Dr. Tarleton H. Bean ("On the occurrence of *Hippoglossus vulgaris* Flem., at Unalaska and St. Michaels, Alaska," Proc. U.S. Nat. Mus., vol. ii, 1879, pp. 63-66). It may be explained that the systematic name of the halibut as given by Jordan and Evermann (Fishes of North America, part iii, 1898, p. 2611) is, in accordance with the rules of priority, *Hippoglossus hippoglossus*. The Linnæan species was promoted to generic rank by Cuvier (1817) and was called *Hippoglossus vulgaris* by Fleming (1828).

In the summary of his anthropological observations on the Haida Indians, published as Appendix A to his report on the Queen Charlotte islands (Report of Progress for 1878, Geological Survey of Canada, Montreal, 1880), Dr. G. M. Dawson referred to the halibut in these words: "The halibut fishery is systematically pursued, and the main villages are so situated as to be within easy reach of the banks along the open coast on which the fish abounds. The halibut is found in great numbers in all suitable localities from cape Flattery northward, but is perhaps nowhere finer, more abundant, and more easily caught than in the vicinity of the Queen Charlotte islands. It may be taken in most of the waters at almost any season, though more numerous on certain banks at times well known to the Indians. About Skidegate, however, it is only caught in large numbers during a few months in the spring and early summer. When the fish are most plentiful the Haidas take them in large quantities, fishing with hook and line from their canoes, which are anchored by stones attached to cedar-bark ropes of sufficient length. They still employ either a wooden hook armed with an iron—formerly bone—barb, or a peculiarly curved iron hook of their own manufacture, in preference to the ordinary fish-hook. The halibut brought to the shore are handed over by the men to the women, who rapidly clean the fish, removing the larger bones, head, fins, and tail, and then cutting it into long flakes. These are next hung on the poles of a wooden framework, where, without salt—by the sun alone, or sometimes aided by a slow fire beneath the erection—they are dried, and eventually packed away in boxes for future use."

The historical aspect of the fishery has been touched upon more recently by Capt. H. B. Joyce, of Seattle, who is known as a pioneer in the halibut fishery of the Pacific coast, and inventor of the net in which the fish are hoisted on deck from the dories. In his "Introductory Notes on the Halibut Fishery" (Bureau of Fisheries, Doc. No. 763, Washington, 1912), Captain Joyce has the following paragraph: "In the early history of the Pacific halibut fishery a large portion of the catch was taken in waters on the south side of Dixon entrance, in Hecate strait, between Queen Charlotte islands and the islands fringing the coast of British Columbia on the east side of the strait. The Indians of this region had fished in these waters from time immemorial, obtaining an ample supply of fish for their needs, and they furnished the first information to the white man of the abundance of halibut on grounds adjacent to their villages. They were instinctively very reluctant to impart the information desired, and with good reason, but constant persuasion on the part of white fishermen and a promise of 50 cents a fish to the Indians for all the latter might catch were inducements too great for the Indians to resist. Fish were furnished by these people which were never paid for; and in a very short time the white fishermen had acquired full knowledge of all the local grounds pointed out by the Indians, and all others which they could locate."

The discovery of fish banks or feeding grounds, where the halibut assembles at times in great schools, is the reward of successful exploration on the part of the master and crew of a fishing vessel. When such a spot has been found, an endeavour is naturally made to keep it quiet rather than to noise it abroad. But no way has yet been hit upon to tie the tongues of fishermen when ashore in convivial humour. All becomes known, new vessels arrive, and the days of full fares and easy trips are soon numbered. The marvel is that the stock of halibut will stand for so long the constant drain that is put upon it. Notwithstanding the enormous fecundity of food-fishes, the necessity of looking ahead and of conserving an adequate stock of breeding fishes in the various species has been engaging the attention of administrators, marine biologists, fishery experts, and others in recent years.

The natural history of the halibut in North American waters, so far as it is known, has been written by Dr. George Brown Goode in "The Fisheries and Fishery Industries of the United States (section I, pp. 189-197, Washington, 1884). He points out that the halibut is a cold-water species, its geographic range approximately

coinciding with that of the codfish. But whereas the spawning of the codfish, as well as that of many other species that discharge pelagic floating eggs, has become well known since modern fishery investigations were inaugurated during the years 1864-66 by Prof. G. O. Sars, operating on behalf of the Norwegian Government in the neighbourhood of the Lofoten islands, that of the halibut has so far baffled all attempts to solve the problem.

With regard to the difficult subject of the migrations of the halibut, which have not yet been investigated by the laborious method of marking, liberating, and recapturing the fishes, it is necessary to distinguish between feeding and spawning migrations. It is certain that they come inshore to feed, but it is not definitely proved that they move into deeper water to spawn. Goode (*op. cit.* p. 195) observes that on the coast of Newfoundland, Anticosti, and Labrador, halibut frequently run inshore in summer after capelin, often swimming to the surface. A. B. Alexander, in his "Preliminary Examination of Halibut Fishing Grounds of the Pacific coast" (Bureau of Fisheries, Document No. 763, Washington, 1912), referring to the locality of Chignik bay, Alaska, says: "It is not uncommon to find halibut in the salmon traps here during the season, and occasionally large individuals are taken in the harbour and lagoon close to the wharves, being attracted from offshore grounds by the offal from the canneries."

The U.S.S. *Albatross*, thoroughly equipped for special service, spent the season from May 25 to August 29, 1911, investigating the commercial possibilities of the halibut grounds off the coast of Alaska, without including the question of propagation in the scope of the inquiry. Even with this restriction, the experience showed that "to cover the fishing banks of Alaska thoroughly and indicate accurately the areas where halibut exist in commercial quantities would require several seasons of active work," but on the other hand, "the phenomenal catches landed in the last few years suggest no stringency of supply on grounds now fished, and this fact will doubtless delay the expansion of the fishery" (A. B. Alexander, *op. cit.*). The *Pacific Fisherman* (Seattle, July 5, 1914, p. 28) contains the following significant market report: "On June 30 [1914] the halibut industry closed another disastrous (from a financial standpoint) month. The independent schooners brought in the largest quantity they ever delivered in Seattle, with the exception of May, 1913, in any one previous month. The company vessels also brought in the largest catch since August, 1913. It is very evident that there can be no permanent improvement in the fishery unless the market for halibut is extended considerably, or the output materially decreased."

Evidence is forthcoming from various sources that the Atlantic halibut is a summer-spawning fish. As for the east coast of America, one of Dr. Goode's informants told him that on the Grand Banks of Newfoundland in August, 1878, he found many with the spawn already run out. This was confirmed by another fishing master who had often seen halibut in July and August, up to the first of September, with ova and milt exuding, at which time very little food is found in their stomachs. But the value of such explicit statements as these is discounted by the absence of preserved material and accessory data.

An early description of the ripe, detached, though not deposited eggs of the Atlantic halibut was given by E. W. L. Holt, whose account is summarized by J. T. Cunningham in "The Natural History of the Marketable Marine Fishes of the British Islands" (London, 1896, see p. 243): "On April 30, 1892, Mr. Holt obtained some ripe ova by pressing the abdomen of a female [halibut] in the market at Grimsby. The eggs were dead, but the transparency and uniform character of the yolk showed that they were ripe. These eggs were 3·07 to 3·81 mm. in diameter. The yolk was like that of the plaice or flounder, colourless, transparent, and undivided, and there was no oil globule. It was evident that the eggs were of the floating kind, although not being alive they did not float. No floating eggs so large as this have

yet been taken in the surface nets at sea..... In the same year, Professor McIntosh examined two samples of ripe eggs of the halibut * * *. The fertilized eggs have not yet been obtained, nor any of the larval or very young stages" (up to 1892).

In "The Life-histories of the British Marine Food-fishes" by W. C. McIntosh and A. T. Masterman (London, 1897, p. 316), it is stated that: "On the coast of Sweden the spawning season is given as from June to August. On the [Atlantic] shores of North America it lasts till September." On the contrary there are some indications that on the Pacific coast the halibut is a winter-spawning fish. Firstly, there is the conspicuous absence of spawning female halibut from the usual summer catches. If there had been clear evidence of spawning during the experimental hauls made by the *Albatross* in the summer of 1911, notice would have been taken of it. Only in one instance, on July 20, was it mentioned that the eggs "had the appearance of being well developed." I have found the same range of maturation phases during the months of May (west coast of Queen Charlotte islands and Hecate strait) and August (gulf of Alaska), the final stage, ripe for spawning, being always lacking. Of course this might be due in part to the circumstance that the female halibut, like the plaice, does not feed much during the spawning period, and consequently will not readily take the bait. But the possibility of retirement into deeper water (between 150 and 200 fathoms) for the purpose of spawning has to be remembered. It is a curious fact, however, for which there is no accounting at present, that the larger fish are to be found within the 3-mile limit, amongst the rocks in 15 to 30 fathoms, and again at the outer edge of the continental shelf, whilst smaller fish occur in schools on the intervening banks. Here it may be remarked that dory-fishing is best adapted for the inshore zone, line-hauling for the deep sea.

Captain Holmes Newcomb of C.G.S. *Malaspina*, under date September 6, 1914, has furnished me with the following information regarding the question of halibut spawning. He writes: "During the year 1913 I examined from 250 to 550 fish per month; from 28th February to 1st October I found no ripe fish. I took the best samples I could get each month from the best developed fish, averaging from 40 to 50 pounds. These samples were collected from all over the coast; I still have them, and you are welcome to them if of any use. My own opinion is that these fish spawn during the fall and winter months, say from the latter end of October to the first or middle of February."

At Ucluelet on July 16, 1914, I obtained a female halibut weighing 36 pounds, estimated from the scales to be about 10 years old, whose ovaries appeared to be in a spent condition, but after preservation in 10 per cent formalin, they proved to be regenerating, and might well have been spent during the previous winter season. It is the only example of the kind that I observed. How long it takes for a halibut to regenerate after spawning is entirely unknown. The estimation of the age of this specimen is based on a comparison with the figures published by Prof. Playfair McMurrich in his "Notes on the Scale-markings of the Halibut and their bearing on questions connected with the conservation of the fishery" (Trans. R y. Soc., Canada, series 3, vol. vii, sec. iv, Ottawa, 1913).

It is quite probable that the spawn and fry of the halibut are to be sought for in the deeper layers of water; in other words, that they are bathypelagic, and therefore will not be taken in the surface tow-net. The newly hatched halibut larva has never been obtained. The first recorded post-larval stage was described in 1893 by Dr. C. G. J. Petersen ("On the Biology of our Flatfishes," Rep. Danish Biol. Station iv, 1914, pp. 1-146, two pls. See p. 130 pl. ii, f. 20) whose work I have not seen. His figure of the young pelagic stage is reproduced by McIntosh and Masterman (*op. cit.* pl. xii, f. 10). The specimen was 32 mm. long; the migration of the left eye had hardly begun, and the fin-rays were absent from the pectoral and ventral fins.

The only other alleged post-larval stages that had been examined before 1900 were two young pleuronectids taken in the bottom net in the Moray Firth in August, 1896.

There was some doubt as to their identification, inasmuch as another deep-sea flatfish, having the same number of fin-rays in the median fins as the halibut, also occurs in the Moray Firth, this is the pole dab or pole flounder *Pleuronectes* (*Glyptocephalus*) *cynoglossus*. The large mouth and depression above the snout led to the conclusion that they belonged to the halibut species. These two Moray Firth specimens were 12 and 14 mm. long; they were described, with a figure, by Dr. H. M. Kyle [Notes and Memoranda. Halibut (*Hippoglossus vulgaris* Flem.) or Pole-Dab (*Pleuronectes cynoglossus* Linn.). Journ. Mar. Biol. Ass. Plymouth, vi, Dec., 1903, pp. 618-621, pl. ii, f. 2.]. The metamorphosis had hardly begun, the left eye not having commenced its migration; eighteen fin-rays had appeared in the caudal fin, but in the marginal fins the rays could only be detected after being cleared in xylol and mounted in balsam. The spawning seasons of halibut and pole dab overlap in the North Atlantic; but whereas the ripe egg of the halibut measures 3.0 to 4.0 mm. in diameter, that of the pole dab varies between 1.15 and 1.70 mm. The examination of ripe females in British and Icelandic waters has led to the conclusion that the European halibut is a summer-spawning fish (April to August).

Under the provisional assumption that the eggs of the halibut may prove to be bathypelagic, i.e. adrift in deep water, it may be useful to quote the case of *Argentina* as affording the first example of a bathypelagic egg to be made known. *Argentina* is a genus of deep-sea salmonoid fishes belonging to the smelt family, the eggs and fry of which were taken by the Danish steamer *Thor* in deep water in the Atlantic and in the Skager Rak during the years 1903-6. They were described by Dr. Johs. Schmidt (On the larval and post-larval development of the Argentines. Meddelelser fra Kommissionen for Havsundersögelser. Fiskeri Bd. II, No. 4 Copenhagen, 1906). The eggs of *Argentina silus* occur in large quantities floating in water-layers far from the surface over great depth. These pelagic eggs are of large size, 3 to 3.5 mm. in diameter, resembling Murænoid eggs, from which they differ in lacking a large perivitelline space. The yolk, like that of Clupeoids and Murænoids, is not homogeneous but is segmented, i.e. it shows a vesicular structure, composed of numerous small cell-like spheres; it contains a large plano-convex oil-globule, with major diameter of 1.0 mm. Eggs were taken in the young fish trawl on June 24, 1906, with 800 metres of wire-rope out, over a total depth of 910 metres. The larvæ hatched out on board and were preserved the same day; their average length was 7.7 mm. The youngest larva taken in the sea with the young-fish trawl measured about 10¼ mm. One of 28 mm. was taken on July 25, 1905, with 500 metres of wire out, over a depth of 512 metres; another of 50 mm. was taken on September 1, 1905, in the young-fish trawl with 75 metres of wire out, over an average depth of 1000 metres.

The striking coincidence in point of size between the pelagic eggs of *Argentina* and the ripe eggs of the halibut seems to give further ground for the presumption that the latter may be found to be bathypelagic. The proving of this detail will spell a notable advance in the knowledge of the life-history of the halibut, and will justify a great deal of trouble.*

PART II.—NARRATIVE.

In pursuance of the inquiry, which lasted from May to September, I made trips round the Queen Charlotte islands, to the west coast of Vancouver island, to Victoria, and to the gulf of Alaska. I was thus able to see something of four methods of halibut fishing, namely, by canoes, by small gasolene launches, by dories from gasolene schooners, and line-hauling by steamers.

Soon after my arrival at the Biological Station, Departure bay, I called on Mr. W. Hamar Greenwood, managing director of the Skeena River Fisheries, Limited, at Vancouver, to whom I had been recommended by Prof. A. B. Macallum. Mr. Greenwood at once gave me permission to accompany one of the company's

* Since the above was written I have received by the courtesy of the author Dr. Johs. Semidt's paper on the post-larval halibut collected by the Danish steamer *Thor* published in the Danish Fishery Reports, 1904.

schooners operating from the cold storage establishment at Haysport on the Skeena river. I reached Haysport by way of Prince Rupert on May 16, and was met by Mr. Harry Sheere, the manager. The schooner *Roosevelt* had just come in with a catch of about 40,000 pounds of halibut, which were being landed and rapidly decapitated before being weighed. After some delay, due to slight engine trouble, the ship weighed anchor on May 19 at 11.30 a.m., and by sunset at 8.50 p.m. on the same day had gained the middle of Dixon's entrance. Next morning we made the Parry passage between Graham island and North island, and set a course to the SSW. of Frederick island, where we sounded in 33 fathoms on a gravelly bottom, and made the first set. The schooner carried four dories, each dory putting out several skates of gear. A skate consists of seven lines joined together, each line carrying thirty hooks. The catch comprised, besides halibut, red cod (*Sebastodes ruberrimus*), ling cod or blue cod (*Ophiodon elongatus*), and the North Pacific chimæroid or ratfish (*Hydrolagus colliei*).

Red cod and ling cod have nothing to do with true codfish, but they are valuable food-fishes. Nevertheless, in consequence of market exigencies, they have to be rejected by the halibut vessels, and a trial of bright red fish floating dead behind a dory, each with an attendant gull, is a common spectacle. They (i.e., the red cod) have the peculiar property common to other deep-sea fish, though not possessed by the ling cod, halibut, nor true gray cod, of becoming blown out when brought to the surface; the eyes start from their sockets and the stomach is often pushed inside out into the throat. The large bladder-like ovaries of the first red cod which I examined were full of loose eggs in a viscous fluid, like sago. These eggs were transparent, with translucent yolk and a single bright yellow oil drop; they had the usual dimensions of pelagic eggs, not exceeding one mm. in diameter, and I was astonished to observe that each egg contained an embryo coiled round the yolk, with black pigment in its eyes. On stirring up a quantity of the fresh eggs some of the embryos were freed from the membranes, but I saw no twitching of tails. On placing a small cohering mass of them in sea-water, they readily shook apart and sank slowly in the still water, with the oil drops up. I made a rough estimate that each ovary contained 225,000 eggs.

It was known that the Scorpænidæ or rock fishes, to which family *Sebastodes* belongs, are viviparous, but my first acquaintance with the phenomenon surprised me greatly, because in other cases of fishes which incubate their eggs within the body of one of the parents, whether it is in a brood-pouch of the body of either parent, or in the mouth of the male, or in the ovaries of the female, the eggs are relatively few in number, sometimes large in size, and do not exhibit the characteristics of pelagic eggs. Carl H. Eigenmann ("On the viviparous Fishes of the Pacific Coast of North America," Bull. U. S. Fish Commission for 1892, Washington, 1894, pp. 381-478, pls. 92-118) states that in the largest of the Scorpænidæ, *Sebastodes levis*, attaining the length of 2 to 3 feet and weight of 29 pounds, found in deep waters along the coast of California from San Diego to Monterey, and occasionally seen in the markets of Los Angeles, the ripe eggs, about 1 mm. in diameter, would fill about two quarts, each egg developing into a larva before its discharge from the ovary. He adds that there is no month in the year during which the developing eggs of viviparous fishes cannot be procured at San Diego. Over 30 per cent of the bony fishes found at San Diego are viviparous, and all of them belong to one of two families, Embiotocidae and Scorpænidæ. Eigenmann further distinguishes two types of viviparity in fishes: (1) Those in which the yolk furnishes all the intraovarian food, e.g., *Poecilia, Gambusia,* Scorpænidæ; in these the number of young is not reduced; (2) Those in which the greater part of the food is furnished by the ovary, e.g., *Blennius, Zoarces, Anableps,* and Embiotocidæ; in these the number of young is reduced and bears a relation to the size and age of the parent.

The wasteful destruction of red cod and their unborn fry, which is incidental to the halibut fishery, is enormous and reacts upon the latter to this extent, that halibut and ling cod feed upon the red cod, and both are considered superior to the latter on the local markets. But, as already mentioned, the red cod itself is an excellent table fish, particularly after having been split and salted. Jordan and Evermann also state that this species is abundant from San Diego to Puget sound, and is an important food fish. Of five red cod from Hecate strait examined on May 26, one was a spawning female with loose egg-embryos in the ovaries, the others were spent males. Throughout the summer the males exceeded the females in number and size, the exact converse being true of the halibut.

The viviparous perches or Embiotocidæ, to which reference has been made, are shore-frequenting fishes, and their viviparity is quite distinct from that of the rockfishes or Scorpænidæ. In these we find intraovarian incubation of pelagic eggs, whereas in the perches we have an example of the intraovarian incubation of demersal eggs. This difference is of great interest and bears indirectly upon the problem of the spawning of the halibut which inhabits the same waters as the red cod and possibly produces bathypelagic eggs. On the other hand, it is well known that the ling cod deposits huge clumps of demersal eggs inshore. Dr. C. McLean Fraser informed me that he had found the egg-masses on the rocks near the Biological Station, Nanaimo.

Near midnight on May 21 the anchor was dropped in 18 fathoms in Tassoo harbour, on the west coast of Moresby island, an extensive inlet with a narrow entrance difficult to negotiate on a dark night. On entering it we were assailed with a delicate pine-scented land breeze and greeted by a great chorus of gulls, some of which were nesting and had just laid their eggs on a rocky islet in the harbour. The depth descends to 70 fathoms, and as it was too rough on the following day to fish outside, a set was made at 20 to 40 fathoms in the calm water of the lagoon. The result was not encouraging, but two of the halibut were of large size, 4 feet and 5 feet long. I went out in one of the dories and hitched a pelagic tow-net on to the buoy-line 3 or 4 fathoms above the anchor in 23 fathoms. Besides the usual complement of Medusæ, Ctenophores, and Siphonophores, one young fish was caught. The hooks, baited as usual with herring which had been frozen, brought up ling cod, red cod, rock cod (*Sebastodes caurinus*), halibut, starfishes, sea-lilies, and sea-anemones. The total number of fish captured was small, and it may be stated, as a general rule, that the inlets and inside channels, despite their great depths, are not suitable for halibut life and propagation. Near the shore at the head of Tassoo harbour there were numerous egg-ribbons of the giant-whelk and a luxuriant growth of eel-grass covered with hydroids which were subsequently identified by Dr. C. M. Fraser as *Obelia longissima*, very common also on the piles of the wharf at the Biological Station.

Shortly after noon on May 22 we left Tassoo harbour and sailed south before the wind, which was blowing harder than ever from the northwest. It was said that the rough weather we experienced was unusual at this time of the year. At five o'clock we arrived off the mouth of another large inlet, with a string of low rocks stretching far across from each point, not named on the chart. It lies south of the San Christoval mountains on Moresby island, opposite to Juan Perez sound. Here we sounded in 120 and 90 fathoms, within a mile of the shore, and put into the inlet for the night. In the evening I rowed round a point of land with the skipper and saw quantities of small crustacea, calanoid copepods, which he recognized at once with his Norwegian experience as "herring feed." They were rising to the surface amongst the kelp, one by one, then swimming round in spirals, clockwise, causing distinct widening ripples at the surface. The same species formed an important constituent of the outside plankton. They may be regarded as forging a link in the chain of metabolism which culminates in the life of the halibut, inasmuch as they subsist upon a vegetable diet (algæ), herrings feed upon them, octopus and rockfish

upon the herring, whilst halibut prey upon octopus, rockfish, herrings, and launces, as well as upon crabs, prawns, and rock-oysters (*Anomia*).

May 23 opened with a gale of wind from the west, and we did not get under weigh until the afternoon. A succession of soundings three-quarters of a mile offshore gave deep water, with bottom shelving abruptly to 200 fathoms (found no bottom at 170 fathoms). The limit of the continental shelf lies approximately at the line of 150 fathoms; this line may be 30 or 40 miles offshore, or it may be within territorial waters. At the position where we sounded, the available stretch was too short to venture a set. A flock of "whale birds" or shearwaters came in sight and disappeared one by one under the water, soon afterwards reappearing swimming on the surface. Immense flocks of these birds are sometimes seen, and their presence is welcomed as an indication of abundant food and life in the sea. The wind was succeeded by rain as we entered the Houston Stewart channel and came to anchor in Rose harbour at 8.30.

Next morning, the weather having moderated, we got under weigh at dawn and made a set outside the channel in 50 fathoms, leaving the lines out for three hours, getting about equal numbers of halibut and red cod. In the afternoon another set was made in 100 fathoms, resulting in the capture of the largest halibut of the trip, a female 74 inches long, estimated to weigh 100 pounds. The ovaries were 17 inches long, and together weighed 4½ pounds; they contained under-sized eggs, apparently requiring several more months to reach maturity. Another halibut had the remains of a red cod in its stomach. The hooks also brought up a magnificent scarlet fan-coral (Gorgonid) 4 feet high, with thick anastomosing branches and horny axis 1½ inches in diameter near the base. Attached to the basal portion of the stem was another encrusting colony of Alcyonarian polyps belonging to the genus *Clavularia*, with whitish polyp stems and roseate polyp-heads. I submitted samples of both species to Prof. S. J. Hickson, of Victoria University, Manchester, England, who favoured me with the following information about them: "The large Gorgonid is probably *Primnoa pacifica* which was described by Kinoshita in 1907 (J. Coll. Sci. Japan, xxiii) from the Japanese coasts. He describes this species when alive as being rosy red in colour. To be perfectly certain that this is a correct identification, I should have to examine a large dried specimen so as to compare them as regards the mode of branching, but I have little doubt that it is this species. The *Clavularia* appears to be *Clavularia pacifica* of Kükenthal (Zool. Jahrb. Syst. xxxv, 1913, p. 237), but it differs from this species as regards the spicules. The spicules of your specimen are similar, but much more numerous. They are very much the same shape, but are not so large, and inclined to become club shaped. I have noticed also that there are not so many arranged transversely in the region of the calyx."

This closed the exploration of the west coast of the Queen Charlotte islands. In the evening we were crossing the southern end of Hecate strait in the direction east half south. During the night a succession of heavy squalls with rain struck the ship from the south, causing the skipper to heave to. About 10 a.m. on the following day we encountered enormous numbers of "whale birds" flying to windward, accompanied by smaller flocks of little black divers with white bellies, which commonly sport like herrings at the surface, called "bull birds" by the sailors, and Mother Carey's chickens (stormy petrels). The petrels fluttered about floating matter at the surface of the sea like swallow-tailed butterflies on moist ground. In rough weather they alight on the surface momentarily without closing their wings; they may dive for an instant below the surface, rising again at the same spot and continuing their flight. In the middle of the strait fur seals were seen bobbing vertically in the water, then diving with a curvet like a porpoise; hair seals were seen from time to time during the voyage close to the shore in various inlets; and sea-lions off the western entrance to Houston Stewart channel. After many soundings and changings of the course we anchored in mid-channel in 57 fathoms. The *Roosevelt* rolled terribly, rendering the

recumbent attitude in an athwartships bunk very unstable. In the evening, however, the sea began to go down gradually, and after supper a Seattle schooner hove in sight and anchored close by.

On May 26, 27, and 28, we were fishing over the Goose Islands halibut grounds, which cover an area some 30 miles square to the west of Goose islands in the southern part of Hecate strait. This is an extensive gravel patch at a depth varying from about 28 to 50 fathoms. Living half buried in the bottom are numerous orange red sea-pens (Pennatulids) called "Stickfish," amongst other nautical designations. Their length averages 4 inches, and their presence is hailed as a sign of good halibut feeding ground. At the outside edge of the bank the depth descends rapidly to 90 fathoms, and here the fishing was not so good, only a few halibut, black cod (*Anoplopoma fimbria*) and a species of flounder being taken. Several other vessels, including a steamer, were now working the same ground. A set which we made in 45 to 50 fathoms yielded a total catch of 225 halibut, representing an aggregate weight of about 2000 pounds, none being larger than medium. It is characteristic of the summer schools of halibut that they consist mainly of comparatively small and immature fish. On the 28th we suffered a repetition of heavy rain and southeast squalls, making dory-fishing precarious, and we wound up the day by finding an anchorage in St. John harbour, Bardswell group, to the south of Millbank sound. The Vancouver steamer which has been referred to had already reached this haven of refuge.

May 30 was the first really fine day of our voyage. Up till now the skipper said the weather had been as bad as he had ever known it in winter. At daybreak we steered west by south half west across Millbank sound towards the Outer islands below Price island, and made a set across the wind from 50 to 60 fathoms on the Price Island ground about 8 miles WSW. of Price island. Amongst the halibut there were two large fish. I made an oblique haul of the tow-net over this ground, finding many calanoid copepods, but phytoplankton (*Algæ*) predominated, and there were no fish eggs. In the afternoon we steered to the northwest across Laredo sound towards entrance island at the south end of Aristazable island. Here a set was made in 30 fathoms about three-quarters of a mile from the shore, amongst rocks. Some large halibut were taken, a male ling cod, which milted freely on deck, many red cod, and a few variegated black and yellow rock fish (*Sebastodes nebulosus*). The halibut averaged a good deal larger than those from the gravel patch of the Goose Islands ground.

The Horseshoe bank was broached on May the 31st, a set being made in 40 to 50 fathoms on a sandy bottom. The position is midway between Lyell island (Queen Charlotte group) and Estevan island below Banks island, both points of land being visible in the distance on a clear day. A mark buoy was put out near the southern end of the set and the four dories lowered their lines in parallel strings about half a mile apart, in such a way that the first line of hooks lay towards the southeast, the last line towards the northwest. The catches made by the individual dories, commencing with the most southerly, were the following: No. 1 caught 107 halibut; No. 2, 117; No. 3, 57; No. 4, 18. This is instructive in exhibiting the schooling habits of the halibut, fairly large numbers being taken at one end of the set, few at the other end. Some of the halibut had been feeding on sand launces (*Ammodytes personatus*). The hooks also brought up a so-called bastard halibut (*Atheresthes stomias*), sometimes wrongly called "turbot," four true grey codfish, and the empty egg-capsule of a large skate. Altogether, three sets were made on this day, the total catch for the day amounting to 580 halibut, about 7,000 pounds. After supper the men were busy dressing the fish and packing them in the ice hold. We anchored in 35 fathoms at a good distance from the mark buoy, and on the following day resumed the fishing on the same ground. The catch included a medium-sized male halibut, whose large-lobed testes contained ripe fluid milt. The maturity of the male is no guide to the incidence of spawning. It was the only case of the kind which came under my obser-

vation as regards the halibut, but is comparable to the case of the male ling cod noted on May 30. With reference to the latter, I applied to Dr. C. McLean Fraser at the Biological Station, Departure bay, for information concerning the date at which he had found the spawn. Dr. Fraser has a paper in the press dealing with the development of the ling cod, shortly to appear in the Transactions of the Royal Canadian Institute, but he kindly writes in advance as follows: "The earliest date I have recorded for attached spawn of *Ophiodon* was January 27. I do not think these eggs could have been laid more than a couple of days, as I had been around the spot several times not very long previous. Shortly after this the bunches of eggs became common, and I should think that the most of them that I have seen were laid in the early days of February, say before the 15th. As they take so long to hatch out, and since there is so little change in external appearance except when the eyes show through, it is impossible with a casual glance at least to tell the old from the new, and hence it is of little value to record any but the early ones. Those that were first seen hatched out on March 25, so that the period of hatching must be about two months."

The trip of the *Roosevelt* came to an end on June 2, whereupon I returned to Nanaimo. There seemed to be a good chance to procure samples of halibut from the west coast of Vancouver island and have them delivered at the laboratory, where I could have examined them with a great deal of convenience. Unfortunately, the negotiations to this end fell through owing to the difficulty of transporting whole fish from the deep-sea fisheries to Vancouver and again from Vancouver to Nanaimo. Accordingly I called on Mr. E. G. Taylor, Inspector of Fisheries at Nanaimo, with the intention of paying a visit to the fishing centre of Ucluelet at the mouth of the Alberni canal. Mr. Taylor advised me to go first to Clayoquot and to take in Ucluelet on the way back. I left Port Alberni on July 9 on board the *Princess Maquinna*, where I met Dr. C. F. Newcombe, of Victoria, whose knowledge of the west coast of British Columbia, its peoples and products, is unrivalled. At Clayoquot I lost no time in getting into touch with Mr. John Grice, the fishery overseer of that district, who did all in his power to assist me.

At my request, Mr. Grice took me to the Indian village of Opatsat on Mears island, where only two families remained, the rest having gone for the season to the Kennedy River salmon cannery, and elsewhere. At Opatsat I saw strips of halibut drying on lines in the open air, as described by Dr. G. M. Dawson, and also in the dwelling-house. Here an agreement was made to secure the services of an expert Indian fisherman, known to the settlers as "Little George." The next morning Mr. Grice conveyed me in the *Heron* as far as the outer islands of the sound, where the Indian was already fishing for bait. A thick fog settled down and continued at intervals all day. I dropped quickly into the canoe and the launch returned to Tofino. The canoe was a large one dug out of a cedar log, light enough for a strong man to manage with a single paddle at the stern or a pair of oars near the bow, and buoyant enough to sail 30 miles out to sea in order to spear fur-seal in the spring. We went close to the lighthouse rocks, where the siren was booming, riding easily in the midst of the white foam washing back from the breakers, and caught a fish which he called "quikima," a "rock salmon" (*Sebastodes* sp.), with a hook baited with a small tassel of cord and white spindle-shaped stick in front of the hook. Using pieces of the fish for bait we tried for halibut at several positions up to the 3-mile limit without success there being too much fog to get correct bearings. The following day (July 12) opened with fog, which cleared away later. The Indian came for me shortly after 5 a.m., since, according to his notion, halibut chiefly feed in the morning. We fished with four hooks baited in the Indian fashion, in about 25 fathoms, 3 miles off the lighthouse island, catching one halibut and one dogfish (*Squalus suckleyi*). The halibut was an immature male of small size, 28¾ inches in total length, weighing 9¼ pounds, age estimated at 7 years, the stomach full of crabs.

Through the kind mediation of Mr. Grice, I now made arrangements with Little George and another Indian named Peter to take me by canoe to Ucluelet, fishing on

the way and reaching Ucluelet in time to spend a couple of nights there and to return by the mail launch *Tofino* to Port Alberni. On July 14, Little George took his net down the inlet to catch viviparous perches (Embiotocidæ) for bait, as it was too foggy to look for octopus. He gave me to understand that these perches are nearly as attractive as octopus for halibut. Large octopus or devilfish are worth two dollars apiece, or 25 cents for each arm. If salted they can be kept for as much as six months; and a single baiting may account for a dozen halibut, this being their favourite, as well as their toughest natural food. Next to octopus the best bait for native halibut hooks is salmon. In the afternoon they came for me in a fine new sailing canoe, bringing a long line with seventy hooks. We took provisions on board and left Clayoquot at 4 p.m., arriving at an Indian reservation on Long Beach, distant 9 miles, about 8 p.m.

After landing at Long Beach they cut the fish into shacks, discarding heads and offal, and baited the hooks ready for the morning, littering the ground with the young. There were two species, a smaller and a larger. I examined a specimen of each: the one contained eight young, the other twenty-two, all ready for birth. We spent the night in the Indian house, and the men went off at 4 a.m. to try for halibut. I was expecting that they would go out to a halibut bank well known to them, called T'ach-ken, which lies 4 miles to the southwest from the northern point of Long Beach bay, but they returned at 6.35 a.m., reporting too much wind outside, and bringing two dogfish and two skates (*Raja binoculata*). The continual strong head wind obliged us to abandon the exploration of T'ach-ken, and we left Long Beach at 10.30 a.m. At noon we made a set in 20 fathoms at a position 1 mile from the Indian house. After fifty minutes the line was hauled in and the bait was found to be untouched. They said the water was too dirty; moreover the southwest wind was increasing and the sea was getting heavy and very choppy. It was a fair wind for Ucluelet, and open water all the way; the men were masters of their craft, and we reached Ucluelet without mishap at five o'clock.

At the entrance to the Ucluelet arm of Barkley sound, there was a floating scow which served as a fish-market, where halibut was received in order to be transported to the Uchucklesit cold storage on the Alberni canal. There is a brisk fishery conducted by owners of small gasolene launches and Indian canoes. I went alongside a fishing launch which had just come in with a load of halibut on July 16 and purchased the largest one there. The total length was 44 inches; weight, 36 pounds; the scales with nine narrow zones indicating an age of 10 years; stomach containing crab remains. The ovaries presented a congested and spent appearance, but after preservation they were found to be in a state of regeneration, with multitudes of growing eggs. Probably spawning had taken place in the winter or early spring. As usual, the anterior half of the body was infested with ectoparasitic flukes; these are commonly found on the white side of the body, but in this case they occurred on both sides. They belong to the same species as those infesting the skin of the Atlantic halibut, viz., *Epibdella hippoglossi*. The halibut banks in this district lie 8 to 12 miles outside the Ucluelet arm. On this occasion it was perfectly clear weather in the harbour, but foggy outside. I was informed (and I know it is true for July) that fogs prevail in July and August, gales in December and January, the two last being critical months in the life-history of the halibut. Thus the investigation in these waters is beset with all kinds of difficulties. Close to the floating scow mentioned above, stands the life-boat station on a point of land, and adjoining this there is a wooded islet with a ruined house on it which, if repaired, would answer well as a temporary biological station.

On July 23 I called on Dr. Charles Francis Newcombe at Victoria who showed me the utmost kindness, and put such of his vast stores of learning as I was able to assimilate at my disposal. In his company I inspected the collection of Indian halibut hooks and floats at the Provincial Museum. Mr. Ashdown Green, a veteran surveyor and pioneer of British Columbia, told us that he had seen ornamental or ceremonial

halibut hooks made of abalone shell (*Haliotis*) in earlier days. The common hooks were made of bone, and later of iron. The former existence of ceremonial hooks and halibut crests is a fact of historical interest in connection with the Pacific halibut fishery.

On my return to Departure bay I wrote to Inspector J. T. Williams of the Dominion Fishery Service at Prince Rupert, to whom I had been recommended by Chief Inspector Cunningham, to request his good offices in securing permission for me to accompany one of the steamers belonging to the Canadian Cold Storage Company to the gulf of Alaska. This was arranged without difficulty, thanks to the willing courtesy of Messrs. Johnson and Nicholl, manager and controller respectively of the company's plant at Seal Cove, Prince Rupert. It was desirable to put off the trip until a late moment in order that the examination of the halibut grounds might be made to cover as long a period as was possible during the season. Accordingly I set out once more for Prince Rupert on August 6, and booked a passage by the ss. Prince George from Vancouver. This was the day of the declaration of war, one effect of which was that the sailing of the vessel was cancelled, so that I had to transfer to the *Princess Alice,* which duly sailed north on August 8, reaching Prince Rupert two days later. It was the first dry day after forty days of almost continuous rain. In the afternoon I walked over to Seal Cove, after having conferred with Inspector Williams, and met the above-named gentlemen who informed me that the steamer *G. E. Foster,* which I was to join, had not yet been sighted. Eventually she came in about 6 p.m. on August 12. I had to sign on board as "cook's assistant," and the voyage commenced shortly before 1 a.m. on August 15.

After calling at Ketchikan, we continued north along the inside passage through Tongass narrows into Clarence strait which separates Prince of Wales island from the mainland. At 6.50 a.m. on August 16 we rounded cape Ommaney at the southern extremity of Baranof island, on which Sitka stands, and set a straight course across the gulf of Alaska to the south end of Kodiak island, distant 650 miles. During most of the voyage across the gulf and back the ship was accompanied by a large brown bird called a "goony," behaving something after the style of a tropical "booby." Sometimes several of them alighted on the surface close to the ship. Numerous other birds were seen far out of sight of land, shearwaters, puffins, and petrels, but the soundings gave no bottom until the evening of August 19, when land was sighted and the captain anchored at 10 p.m. in 54 fathoms on a bottom of greenish sand and gravel, about 20 miles southeast of the Trinity islands to the southward of Kodiak island. The Trinity islands ground is a continuation, south and west, of the great Albatross bank, which flanks the southeast side of Kodiak island, and juts out to the northeast into the Portlock bank. All this forms part of the submerged Alaskan plateau or continental shelf, the edge of which is approximately marked by the 100-fathom line of soundings which is sometimes 50 miles from the nearest land. At certain spots on the plateau there is a great deal of mud, and it is notorious that the halibut taken at such places are soft and gray and of inferior quality; these are called low-grade halibut, and are often rejected. The cause and nature of the change in the consistency of the flesh have not been investigated.

The fishing on the first day did not come up to expectations, the amount taken being estimated at 5,000 pounds. At least as great a quantity of true grey cod was thrown away. The halibut taken on the Albatross and Portlock banks belonged to the same class and quality of fish as those from Hecate strait, presenting the same range in size, the same colour and consistency, and the same degree of immaturity. A large one, measuring 46 inches in total length, weighed 45½ pounds; the ovaries weighed 2 pounds, and the eggs, as in all other cases examined, were fast in their follicles.

For the rest of the trip the weather was almost continually unfavourable for fishing, with strong southeast wind, heavy sea, and fog. The hooks brought up from time to time Actinians and Ascidians with the stones to which they were attached,

as well as hydroids and fan-corals. On one occasion the captain picked up from the deck of the ship what he took to be a stone and was about to throw it overboard when his hand was nipped by a claw. The apparent stone was a stone crab (*Rhinolithodes wosnessenskii*), taken on the halibut line from a depth of 50 fathoms on the Albatross bank abreast of Trinity islands. A sample of hydroids from the same grounds collected on August 20 included fifteen species identified by Dr. C. McLean Fraser, of which seven were recorded for the first time from Alaskan waters, and one had not been described before. The common fan-coral of these waters has a delicate pink colour in life, bleaching quickly to white; the branches have a beaded or moniliform structure, owing to the polyps being arranged in whorls. Prof. S. J. Hickson, to whom a specimen was submitted, states that it is a primnoid fan-coral, probably belonging to the genus *Caligorgia*. All these indications have their value in defining the nature of the ground and in showing how much remains to be ascertained concerning the organisms which inhabit the bottom frequented by halibut in the North Pacific.

At the northern end of the Portlock bank there is a narrow depression or gut where the depth descends below 100 fathoms. At midnight on August 22 we dropped anchor in 140 fathoms in the Portlock gut, and on the following day we set out the gear in 110 fathoms shoaling to 95 fathoms. A great school of Finback whales was spouting and curvetting in the offing. The bottom here consists of sand and fine mud, numerous small starfishes (*Ctenodiscus crispatus*) having their stomachs gorged with the mud. Basket stars, heart urchins, and apodous holothurians were also abundant, the last being especially characteristic of this position. They are probably the species *Chirodota discolor* Eschscholtz, with twelve peltato-digitate tentacles, about nine digits on each tentacle; and very numerous calcareous supporting rods in the tentacles; but I did not find any wheel-shaped calcareous bodies in the skin [compare H. L. Clark: The Apodous Holothurians. Smithsonian Contributions to Knowledge, vol. xxxv, Washington, 1907, p. 26 and p. 120]. They are fragile, soft, worm-like creatures, brownish and pinkish, very prone to self-mutilation or autotomy. The halibut taken here often had one or two large leeches on the white side; these showed nineteen transverse brown bands on the dorsal side, feebly indicated below, the bands are darker parts of a pigmented network, and are generally interrupted at the sides, which are colourless. One halibut contained an entire codfish in its stomach, and yet took the herring bait.

There was no fishing on August the 24th as the tide was too strong, with a heavy sea. A buoy and keg were put out to test the tide, and within an hour the keg had been drawn under water. On August 25 a set was made in 95 fathoms at a spot about 40 miles south of cape Cleare, which is 180 miles east of cape St. Elias. The tide proved to be setting strong from NW. to SE., and the gear was laid across the tide, which carried it over the edge of the continental shelf into 150 fathoms. A great many black cod were caught, one grey cod, several red cod, and a large halibut with total length of 55½ inches, weighing 85 pounds; the ovaries weighed 3½ pounds; numerous nematode worms were encysted at the surface of the liver and intestine and in the ovarian capsule.

August 26 was the stormiest day of the voyage. We were now heading for Cross sound, and making very slow progress against wind and sea, the gla s falling steadily all the time. About 7 a.m. on August 28, land loomed ahead enveloped in mist, which shrouded the mountains and obscured all marks. At noon we entered Cross sound, and our worst troubles were over. We anchored that night at Tenakee inlet off Chatham strait, in 70 fathoms, and rode through another very heavy squall. On August 29, whilst abreast of cape Decision we passed a large blue shark with its dorsal fin above the water after the manner of a Finback whale; and on the following day, after being stopped by the patrol cruiser H.M.C.S. *Rainbow*, reached Prince Rupert. I immediately transferred to the *Princess Royal*, which had already cast off her moorings, and in due time arrived at Nanaimo.

PART III.

Conclusion.—Halibut is classified for the market according to size: chicken halibut, ranging from 20 to 29 inches in total length from the end of the snout to the middle of the edge of the tail-fin; medium halibut, 30 to 39 inches; large halibut, from 40 inches upwards. They never approach maturity as "chickens." Accepting the principle of the scale-markings as a basis for estimating the age, it is a singular and useful fact, which follows from Professor McMurrich's observations and from my own measurements, that at least up to the twelfth or thirteenth year the age of the halibut is, with sufficient approximation, equal numerically to one-tenth of the total length measured in centimetres. Thus a fish of 28 inches (= 70 centimetres) is 7 years old; another of 44 inches (= 110 centimetres) is in its eleventh year. The proportions vary (perhaps by sex) and change as the fish grows. This may be illustrated by comparing the maximum expanse of the powerful tail-fin, measured across from tip to tip, with the width of the body measured on the white side between the bases of the median fins (see table below). It may be of interest to remark that the great horizontal expanse of the tail-fin, considered in conjunction with the exceptional swimming powers possessed by the halibut, is paralleled by the horizontal tail-flukes of the Cetacea and by the flattened tail of the beaver.

TABLE of Correlated Measurements.

No.	Length.	Width.	Expanse of tail fin.	Weight.	Sex.
	inches.	inches.	inches.	lb.	
1	$21\frac{5}{8}$	$6\frac{1}{2}$	$6\frac{5}{8}$	$3\frac{1}{2}$	Probably female.
2	$28\frac{1}{4}$	$9\frac{1}{2}$	$7\frac{3}{4}$	$9\frac{1}{4}$	Male.
3	33	10	$10\frac{1}{8}$	.....	Probably female.
4	44	14	12	36	Female.
5	$48\frac{1}{4}$	$15\frac{1}{2}$	$12\frac{7}{8}$	.....	Probably female.

The halibut is a hardy fish, coming to the surface without showing any reaction to the change of pressure, and continuing to live for some time on deck after being roughly shaken off the hook. Once I saw one disengage itself from the hook as it reached the surface and return rapidly towards the bottom. It would therefore not be difficult to select undamaged individuals and keep them alive in the well of a ship for experimental purposes. The provision of a suitable well such as for many years the Grimsby halibut boats in England have had, should form part of the equipment of any vessel which may be detailed for the scientific branch of the fishery service in the future. It would be a great advantage to observe halibut under experimental conditions for a lengthened period so as to be able to test its viability, rate of growth, and discharge of spawn.

According to Dr. T. W. Wemyss Fulton (on the Rate of Growth of Fishes, 24th Ann. Rep. Scottish Fishery Board, part iii, pp. 179-274, Glasgow, 1906) the approximate size of the female halibut at maturity is 48 inches, that of the male 30 inches. As explained above, a length of 48 inches indicates an age of about twelve years. Professor McMurrich came to the conclusion that the spawning period begins in the eighth year and lasts without any decided interruption throughout the succeeding four or five years. Fulton says that among flatfishes it is a common rule that the male comes to maturity a year earlier than the female; thus the male plaice matures at 4 years old, the female at 5. The female turbot attains maturity at the size of 17 to 18 inches, and at the age of 7 years. The turbot and plaice attain the same approxi-

mate maximum size, namely, 32 inches; the turbot (over 20 pounds) is more heavily built than the plaice (up to 10 pounds. The halibut attains the length of 84 inches. The interpretation of spawning marks on the scales is a very intricate problem and, as McMurrich justly odserves, the course of events as deduced from the scale-markings must be regarded rather in the light of a tentative suggestion. It is, however, quite possible that the Atlantic and Pacific halibut may mature at different ages. According to J. T. Cunningham, there is a difference of about 4 inches between the sizes of plaice at maturity in the English channel and in the North sea; moreover all individuals do not become mature at the same size in a given locality.

The halibut industry of the Pacific coast presents the usual complications attendant upon deep-sea fisheries elsewhere. The distribution of the halibut does not conform to international boundaries, but is continuous from the gulf of Alaska to cape Flattery. There is no evidence at present that the halibut performs extensive north-and-south migrations, though there are abundant indications that it ascends in schools, and also as individuals, into comparatively shallow water (about 15 fathoms) near the shoreline, which is generally steep-to on the west coast, and descends into deep water (about 150 fathoms) near or over the edge of the continental shelf. As mentioned in part I, there are reasons for presuming in a general way that the halibut approaches the shore in pursuit of its food, and descends to the depths for the purpose of spawning. Not only do the known habits of the halibut point in this direction, but the inference receives some support from the analogy of the spawning migrations of the plaice off the coast of Great Britain. It has been established by the recovery of marked fishes at the Plymouth laboratory " that a large proportion of the plaice to be found in Start bay make a periodical migration to the offshore grounds on the approach of winter. Dr. Kyle observed that the majority of the plaice recovered offshore from January to April in this experiment were either spawning or spent. After this spawning migration has taken place the smaller fishes tend to return again to the bays. The largest fishes may either return to the bays, or may pass to the south and west of Start point." [Walter Garstang: Report on Trawling and other Investigations carried out in the Bays on the South East Coast of Devon during 1901 and 1902. Jour. Mar. Biol. Ass. U.K. (n.s.) VI. December, 1903, Plymouth.]

It is obvious that the investigation of the natural history of the halibut in its relation to the maintenance of the stock at its full strength cannot be confined within territorial limits, and it is almost equally clear that if any restrictive measures were to be proposed, they would have to be based upon international agreement. The stock of the halibut is the object of persistent attack, to the exclusion of other fishes captured incidentally, whose food value to the human race is not inferior, in order to supply the demands of an artificial market. Under these conditions we have to consider whether the stock of halibut will continue to stand the strain that is imposed upon it. Practical fishermen are sometimes apt to be pessimistic in this regard, although the aggregate catches do not yet show any sign of diminution. Up to a certain point the thinning out of the banks by the capture of surplus fishes must be beneficial to the numbers and quality of those that remain. But this optimum standard of fishing intensity is vague and cannot be defined otherwise than arbitrarily. Recommendations to curtail the fishery are easily made but they would be entirely ineffective unless there happened to be a clear case for the immediate enforcement of rigid restrictions. The fact is that there is no such pressing call for drastic action, and therefore this aspect of the question need not be discussed here. What we are asked to do is to devise measures for the expansion, not for the limitation of the industry.

In order to throw some light upon the periodical movements of halibut, in the absence of marking experiments or supplementary to such experiments if they could be carried out, there is need for the accumulation of numerous properly authenticated

records of catches with memoranda of date, locality, and depth. Records sufficiently accurate are in fact kept in the ship's log book, at least in some cases, and it should be possible to arrange with some of the great companies for the tabulation of these data so as to make them available for future reference. Statistics of the aggregate catches are easily obtained, but no detailed list of fishing stations accompanies them. Perhaps the organization of a system of marine fishery statistics, including list of stations, depths, methods of fishing, kinds of fish caught, dates, and observations on the weather and currents, would be the first step towards a reasonable grasp of the state of the fishery from year to year. The difficulty here would be to ensure accurate statements of depth and locality because the owners of vessels operating in neutral waters would not feel disposed to give exact and gratuitous information merely to encourage the others. Moreover, the fixing of positions by the charts as they stand could, in many cases, only be a rough approximation. Nevertheless the alleged depletion of once productive banks requires some such scrutiny as that here suggested before it can be explained.

The artificial propagation of halibut in spawning ponds is a colossal experiment which might be tried in order to give an earnest of the endeavour on the part of the scientific departments to do something of direct economic value for the fishery. It is certain that nothing can be accomplished in this way without considerable expenditure, and nobody could guarantee positive and successful results. The cultivation of the plaice is a straightforward procedure offering no insuperable difficulties. It is only necessary to collect mature fish of both sexes and keep them in captivity under usual precautions of water-circulation, temperature, and food-supply, until spawning occurs. The turbot offered greater difficulties which have been overcome in the experimental stage. In February, 1907, Dr. R. Anthony, Assistant Director of the Marine Laboratory in St. Vaast-la-Hougue, procured ten adult turbots which he placed in three large hatching basins, the largest having a capacity of 300 cubic metres. At the end of a few weeks the captive turbot began to take food. They were fed once a week with large pieces of plaice at the rate of half a fish the size of the hand to each turbot, a designedly moderate allowance. To keep the basins free from putrefying food-substances, they put in, as scavengers, a conger eel and a dogfish long since accustomed to captivity. The turbots began to spawn in July. The brood stock should be captured six months before breeding. If taken only a few weeks before spawning time they would be likely to exhibit the phenomenon of ovular retention to which they would succumb. Five consecutive spawnings were observed on July 18, 21, 28, 29, and August 3. There were thousands of eggs in each lot, all normal and fertilized. Only limited numbers were gathered by plankton nets and transferred to the incubating apparatus, an essential feature of which is continual agitation of the water by a suitable mechanism to keep the eggs free from sediment and thus to prevent asphyxiation. Hatching occurred in six to eight days after spawning, and artificial feeding by carefully sifted plankton administered daily was commenced two to three days after hatching. The yolk sac disappeared fourteen to fifteen days after hatching, and the critical stage was passed about the eighteenth to twentieth day. [R. Anthony: La pisciculture du turbot au lab. mar. du Muséum (Saint-Vaast-la-Hougue) Bull. Mus. Paris t. XIII, pp. 557-559, 1908. Translated and presented before the Fourth International Fishery Congress held at Washington, U.S.A. September 22nd to 26th, 1908: Bull. Bur. Fish. XXVIII. Doc. No. 686, Washington 1910.]

Pending the inauguration of this great experiment, efforts need not be relaxed to continue the work already begun. To do this effectively a vessel, properly equipped for special service, should be chartered or commissioned to undertake explorations, not merely to locate fresh halibut grounds on the west coast, but to record observations on the state of maturity of halibut throughout the year, especially during late autumn, winter, and early spring, and to make determined efforts to discover the pelagic eggs by means of the deep sea tow-net. It is difficult to see what more or what else can be done to promote the interests of the fishery, except the compilation of statistical tables.

In the report by Dr. B. W. Evermann on the Alaska Fisheries and Fur Industries in 1913 (Bureau of Fisheries, Doc. No. 797, Washington, 1914) it is pointed out that "the commercial value of the halibut fishery of the Pacific now greatly exceeds that of the Atlantic, and in Alaska, as in British Columbia, it is second in importance only to the salmon fishery." Dr. Evermann adds the following statement: "It is believed to be a safe estimate that for every halibut caught at least one other fish of more or less value as food is taken from the hooks. With those rare exceptions when black cod are retained, all these fish are thrown back into the sea, either dead or soon to perish. Except in so far as they may become food for other species, they may be regarded as a total economic loss. The most abundant are the red rockfishes and the black cod, with the former ["red cod"] predominating in number when all grounds are considered. True cod are found in largest numbers where the depletion of halibut is most pronounced; and deep-sea soles, flounders, and skates are most numerous on a muddy bottom. It is certain that the total quantity of these fishes at present wasted is enormous in the aggregate; in weight it is probably at least one-half that of the halibut itself. That such a situation should not long be allowed to continue is obvious."

The state of things depicted in the above quotation has been referred to incidentally in the pages of this report. The remedy, if one can be found, would seem to lie in the direct encouragement of the companies by Government to take measures to divert the hitherto rejected food-fishes into more profitable channels.

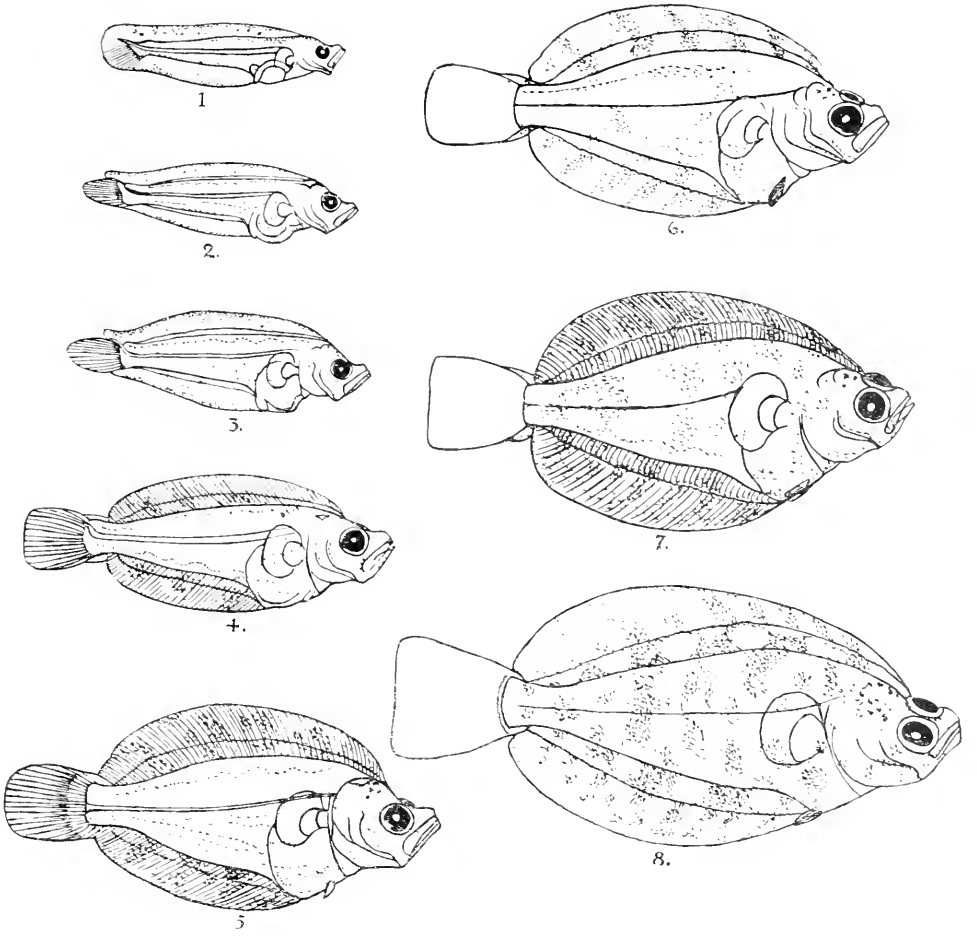

Fig. 1.—Hippoglossus hippoglossus, about $\frac{1}{2}$-inch long (May 22).
Fig. 2.— " " $\frac{5}{8}$-inch long (June 20).
Fig. 3.— " " $\frac{3}{4}$-inch long (June 20).
Fig. 4.— " " about $\frac{3}{4}$-inch long (June 19).
Fig. 5.— " " just under 1-inch long (June 13).
Fig. 6.— " " $1\frac{1}{2}$-inch long (June 20).
Fig. 7.— " " $1\frac{1}{2}$-inch long (June 19).
Fig. 8.— " " $1\frac{1}{8}$-inch long (July 9).

The above drawings are after Dr. Johs. Schmidt, Copenhagen (Meddel. f. Kommiss. for Havundersog. Fiskerei, Bd 1, 1904), and the specimens were obtained in 1904 off the west Iceland coast.

II.

NOTES ON THE EGG AND LARVAL STAGES OF THE HALIBUT.

By Professor Edward E. Prince, LL.D., D.Sc., F.R.S.C., etc.,

Dominion Commissioner of Fisheries, and International Commissioner (under the Fishery Treaty, 1908).

(With one plate.)

It is a well-known fact that the eggs of most of the important marine food-fishes, with such exceptions as the herring and the smelt, produce small buoyant eggs which float in the open sea, usually in the surface waters. They are so small that they escape notice, though in certain areas at the proper season of the year the sea within a fathom or two of the surface abounds with these floating eggs. As a rule, each egg floats single and separate, though occasionally, as in the angler or goose fish (*Lophius*) the eggs may be immersed in a long band or a mass of clear jelly-like substance and such egg bands are readily discernible in the open sea. In size, these floating eggs range from one-thirtieth to one-seventieth of an inch in diameter, and such vast numbers of them occur in the upper waters that a fine-meshed tow-net, of silk or cheesecloth, will secure great quantities; but, owing to their small size and colourless translucency, they may escape the notice of an ordinary observer. It is estimated that the eggs of over 250 species of marine fishes (*Teleosteans*) have been described, out of probably 80,000 to 90,000 species of fishes inhabiting the seas of the world.

RIPE HALIBUT EGGS DESCRIBED.

So far as is known, the largest of all these eggs is that of the halibut, yet it has more rarely been seen than those of any other species described by fish-embryologists. Ripe unfertilized eggs of the halibut have been obtaind five or six times during the last twenty-five years by marine biologists, the first being discovered by the leading European authority, Prof. W. Carmichael McIntosh, of St. Andrews, Scotland, who, in April, 1892, secured some ova from a ripe female halibut caught about 150 miles ENE. from Peterhead, Aberdeenshire. The eggs varied in diameter from one-sixth to one-eighth of an inch (3·07–3·81 mm.), or more than three times the size of the eggs of cod, haddock, or flounders. At the end of the same month Mr. Holt, who had been Professor McIntosh's assistant at St. Andrews, secured some halibut eggs at Grimsby, but though they were ripe and translucent they sank to the bottom when placed in a vessel of sea-water. Dr. H. C. Williamson later obtained ripe halibut eggs, and he noted the presence of a membrane-like covering, enveloping the yolk, quite separate from the external capsule of the vitelline membrane. In all cases the eggs were described as spherical, translucent, and clear, exhibiting no shining oily gloubles or other floating bodies in the ball of the yolk fluid. The outside capsule, as Professor McIntosh stated, was found to be extremely thin and marked with delicate "cross-hatching" or short intersecting lines. Indeed they easily collapse, when placed on a glass slip, after removal from water, being compressed by capillary attraction, and usually bursting. Most of these pelagic eggs, though so minute, transparent, and delicate, have some resistance, and can be gently rolled between the finger and thumb when, as Dr. Francis Ward said of plaice eggs, "they feel hard and shot-like," but the eggs of the halibut are unusually frail and collapsible.

ANNUAL SPAWNING PERIOD.

The spawning period of the halibut in the North sea appears to extend over many months. Dr. Williamson obtained some fully ripe eggs at the end of January, the parent fish having been taken about 145 miles out ENE. of Aberdeen, Scotland, the depth of water being 65 fathoms. Others have been noticed in March on the west coast of Scotland. Again, in the month of May, Dr. Williamson secured a quantity of ripe eggs from Viking bank, between Shetland and Norway, while Professor McIntosh studied ripe ova of halibut in April and May. The spawning period seems to range from January to August in different areas, for Dr. Brown Goode speaks of July, August, and even September as the spawning months on the Atlantic coast of North America; but Dr. J. B. Gilpin, a very diligent early observer, stated that it was in June he observed spawn running from ripe halibut of the Nova Scotia coast.[1] On the Pacific coast it would appear that the eggs are ripe in winter or early spring, as Professor Willey has pointed out in his paper, and the British Columbia Fisheries Commission, 1905-07, in their report, based on the evidence of British Columbia fishermen and others, recommended a close season from December 1 to March 31 each year, as appropriate. "A close season of four months in each year .....will rapidly restore the threatened halibut supply, and, enforced in the limits named, it will include all the 'banks' or spawning resorts in Hecate strait, etc., on to which the halibut move from the open ocean outside."

WHY FERTILIZED HALIBUT OVA NOT OBTAINED.

While the characteristics of the ripe unfertilized halibut egg have been fully described, and its recognition rendered an easy matter by the naturalist, no one has yet seen the fertilized or developing egg in the open sea, or has succeeded in obtaining ripe male and female halibut and artificially fertilizing and incubating the ova. In the pioneer investigations into the life-history of marine food-fishes, in which I was privileged to take a considerable part twenty-five years ago, two methods were adopted for the discovery and diagnosis of fish eggs and young. Eggs naturally spawned and fertilized were obtained by fine-meshed tow-nets floated near the surface of the sea, and these were studied and detailed drawings made, and the species determined by a comparative method, or the specialist obtained living fishes of both sexes from the fishing grounds, extruded the ripe eggs and fertilized them by the usual methods of fish-culturists, and hatched out the young fry in the tanks of a marine laboratory. In this way a body of knowledge was accumulated by the early investigators which has been invaluable for succeeding workers. In the case of the halibut the floating eggs have not yet been secured by tow-nettings, and Professor Willey, in the preceding paper, has ventured the suggestion that the eggs float at some depth, not near the surface, as do the eggs of the Argentine (*Argentina silus* Asc.) of the North Atlantic, which are of large size, 3 mm. to 3·5 mm. in diameter, and occurring in oceanic strata far from the surface, according to Dr. Schmidt. The fact that the eggs of the halibut must be very abundant in northern Atlantic and Pacific waters and yet none have been obtained in a developing condition in the sea, strongly supports Professor Willey's important suggestion.

DIAGNOSTIC FEATURES OF TWO SPECIES OF HALIBUT.

The earliest larval stages of the halibut are not yet known, and cannot be accurately made known until fertilized eggs are studied and the young fish hatched out and reared, as has been done in the case of such a great variety of marine food-fishes. At various times, small larval fishes have been captured in the sea, which were pronounced as most probably young halibut. In most of these cases later research has

[1] Food Fishes of Nova Scotia, Art. II, p. 23, Trans. N.S. Inst. of Sci., 1868. A. United States expert recently stated that an Oregon halibut on September 1, 1914, contained large loose eggs and more nearly approaching ripeness than any female specimen obtained previously, hence the spawning period could not be far off.

proved the diagnosis incorrect. Thus, Dr. H. M. Kyle, an able original worker in this field of research, described two larval flat fishes, 12 and 14 mm. in length, respectively, secured in August in the Moray Firth, Scotland, and regarded as probably larval halibut, though it was also thought that they might prove to be young pole-dab (P. cynoglossus). The description and published drawings (Plate iii, Journ. Mar. Biol. Assoc., Plymouth, vol. vi, No. 4, December, 1903) attracted the attention of specialists and resulted in favour of the latter determination, and Dr. Kyle, in a final foot-note (*ibid.*, p. 621), said: "At first I was disposed to regard them definitely as young halibuts, but from a drawing sent to him, Mr. E. W. L. Holt is inclined to regard them as pole-dab." Similarly, the staff of the United States biological steamer *Albatross,* regarded four specimens of flat fish as halibut which had been captured 60 or 70 miles off the New Jersey coast (39:45 N. lat., 73:49 W. long.) about the end of May, 1887, at the surface of the sea; but they were clearly not halibut, from certain diagnostic features which they presented. Thus they showed coloured transverse bands, and the dorsal fin possessed about 80 rays, though the fish were only 17 mm. long (seven-tenths inch), whereas the halibut does not exhibit a transverse arrangement of pigment spots until it is much larger, 27 mm., or over an inch long, and rarely fewer than 100 fin rays in the dorsal fin. The two species of halibut now recognized, viz., *Hippoglossus hippoglossus* Linn. (or *H. vulgaris* Flemming) has 90 to 103 rays in the dorsal fin, and *Platysomatichthys hippoglossoides* Walb., has 96 to 108 rays in the same fin. Conjointly with other features, if any specimen has 100 rays or more it is unquestionably a halibut. But the number of joints or vertebrae in the backbone is even more distinctive, for *H. hippoglossus* has usually fifty, and *P. hippoglossoides* has sixty-two vertebral elements, and the anal fin, it may be added, has seventy-one to eighty-three rays in the former and sixty-seven to seventy-nine in the latter species. The well-known specimen of supposed halibut procured by Dr. C. G. S. Peterson, of the Danish Zoological Station, in the waters of Christiansund is now known, like that of Dr. Kyle, to be almost certainly a specimen of the witch or pole dab. It was 32 mm. (1¼ inch) in length and had 104 rays in the dorsal fin, eighty-eight in the anal, and twenty-two in the caudal, and the gill cover exhibited a row of spines. This last feature is one which demonstrates the specimen not to be a halibut. Dr. Peterson's larger specimen obtained in Greenland in 1893 in May and measuring 51 mm. (over 2 inches) in length has seventy rays in the anal fin, but the halibut has more rays—not less indeed than seventy-three rays in *P. hippoglossoides*[1], and eighty-two to eighty-three in *H. hippoglossus.*

YOUNG LARVAL HALIBUT DESCRIBED.

It is due to the accomplished Dr. Jos. Schmidt, the Danish biologist, that the youngest stage of the halibut obtained up to the present has been determined. The specimen was 13·5 mm. long, over half an inch (or ·531 in.) and it had still the worm-like form and symmetrical upright position of the early larva (Pl. I. fig. 1). All the flat fishes (Heterosomata) undergo a transformation before they lie permanently on one side with both eyes on the same surface. "Flat-fish larvæ," as Dr. Ward says, "begin by swimming near the surface in an upright position like the larvæ of other fishes. Next, they flatten from side to side, and gradually approach the bottom, to end up by lying on their right or left sides as the case may be. . . . Plaice, soles, bounders, dabs, lemon soles, and halibut, after they have flattened, all lie on their left side, while turbot and brill lie on their right side." One eye moves to the other side as the transformation proceeds, so that both eyes are found on one side of the fish in the permanent flattened condition. Thus the halibut, when it hatches out of the egg,

[1] Dr. Gilpin, of Halifax, gave the number as seventy-four or seventy-five rays (loc. cit., p. 21) for Nova Scotia specimens.

has an eye upon each side of the head like the cod, haddock, herring, and all "round" fishes, and until it is 18 or 20 mm. (seven-tenths to eight-tenths inch) long shows little indication of the tendency to the flattened form so characteristic of the later stages.

The description which is here given refers mainly to the common species in the Atlantic and North Pacific ocean, viz., *Hippoglossus hippoglossus* but the differences between the two species in their young larval stages are not apparently very marked.

The larval halibut, about half an inch long, is a long slender little fish, with a snout slightly upturned and obtuse or flattened in front, quite unlike the flounder, sole, and other pleuronectids. In most of these flat-fishes the snout is rounded and curves downward, often with a sharp-hooked tip as in the sole (*Solea vulgaris*); but the snout of the larval halibut is flattened in front, slightly upturned and "pig-like." There is a marked depression between the eyes and the abrupt tip of the snout. The minute spots of black pigment present in the youngest stage known, viz., 13·5 mm. (·53 inch), are arranged in four indefinite rows along the caudal trunk behind the anus, also a series along the dorsal line and along the ventral margin at the base of the larval fin from the pectoral region posteriorly. On the larval fin membranes themselves scattered dots occur near the margin of the dorsal and ventral median fins. The dots cease as these fins merge in the terminal tail fin. The upper and lower jaws are very straight not curved as in some species and instead of bending downward, they turn upward at an angle of about 60 degrees and the mandibular articulation projects prominently in a characteristic manner. The eyes are large, silvery, and pigmented in all stages known, and the pectoral fins are well-developed. When about one-fifth longer (Pl. I. fig 2), very minute scattered spots of a reddish colour appear between the myotomes or serial muscle masses of the body and give a faint reddish tinge to the little fish when viewed by the naked eye. The large silvery eyes acquire a bright blue tint and show very prominently. The next stage 22 to 23 mm. (·83 inch) long is marked by the appearance of three groups of black spots or dark bands on the dorsal and ventral fins which are now supported by fin-rays, these rays being short and rudimentary in the previous stage. The spots on the body assume the form of very distinct wavy lines and the left eye begins to migrate from its position and is just visible as a slight projection in the depression on the head (or rather forehead). The fish has now a very characteristic halibut outline.

When a length of an inch is reached (24½ mm.) Pl. I. fig. 5, the groups of spots in transverse bands on the dorsal and anal median fins are more complex. Between the four main stripes, three smaller bands appear, so that at least seven stripes or bands can be counted upon each fin-expansion. This stage (Pl. I. fig. 6) is reached before the end of May, according to Dr. Schmidt, who obtained specimens on May 25 in water of 116 metres (60 fathoms).

Nearly a month later a size of about 30 mm. (1⅛ inch) is reached, and the left eye projects to the extent of about half of its mass above the contour of the forehead, and the coloured bands (the broad and the narrower secondary bands) are a still more marked feature on the dorsal and anal fins, while the spots on the side of the body form four fairly distinct transverse bands (Pl. I. fig. 7). On reaching a length of 34 mm. (Pl. I. fig. 8) the fish still swims in the upright position, but the right side is darker, more pigment being developed than on the left side of the fish. The patches of colour lose somewhat the transverse arrangement and mingle irregularly, producing a marbled pattern, which is very characteristic of the young halibut for a considerable subsequent period. It is noteworthy that two rounded patches appear near the base of the tail. Up to this stage the tail was transparent and clear and free from any pigmentation. Dr. Schmidt obtained this stage on July 7 in a depth of 44 metres (24 fathoms). The next stage recorded is that of Dr. Peterson, who secured an alleged halibut 51 mm. (2 inches) in length about the end of May in water 500 fathoms in depth. He noted that it has seventy rays in the anal fin, but the rays in the dorsal fin are not recorded. When a length of 120 mm.

(about 5 inches) has been attained, the features of the full-grown halibut seem to be assumed, and the subsequent changes are those pertaining to size and sexual development. Professor Verrill got a small halibut of this size in a dredge when investigating the Strait of Canso waters many years ago, and this is the smallest specimen obtained on North American shores.

OLDER EXAMPLES OF SMALL HALIBUT.

Halibut about 10 inches long (20 cm.) are common in shallow waters around Iceland, and Professor McIntosh has recorded Scottish specimens 12 inches long in shallow areas such as St. Andrews bay.

It is apparent from the little evidence available that halibut, after passing through their larval and post-larval metamorphoses in deep water, frequent inshore shallows during part of their adolescence, when the dull olive colour of the dark right side of the fish is marbled with the meandering dark bands which characterize it at so early a period as the 1⅛-inch stage. Comparing the common species with *H. hippoglossoides* specialists have found that in the two youngest known stages no pigment whatever appears, and in the larger stages (51 mm.) the colour spots on the body are sparse as contrasted with the other species at the same size. No doubt much pigment may have been lost, and in the youngest specimens removed completely through the action of the preservative fluid in which such specimens are placed for purposes of scientific study.

Immature halibut do not appear to frequent any special depths, and Dr. Gilpin long ago pointed out that specimens the size of the outspread hand are got in Nova Scotia weirs and traps, close inshore, and occur also in plenty on the "banks" in the open sea.

Dr. Wemyss Fulton obtained a halibut 7⅞ inches long in Aberdeen bay on November 1 some years ago, the depth being 8 to 18 fathoms, and one off Dunbeath (Caithness) 11¾ inches, while a specimen 14 inches long (weight, 15½ ounces) was secured in Dornoch Firth in December.[1] His opinion is that in July, August, and September these small halibut move off into deep water, and in October he records specimens from 17½ to 30 inches long in 65 fathoms depth, though Captain Collins, the well-known United States authority, records halibut of three pounds weight in October, 1886, on Jeffrey's ledge, off the New England coast. The migrations of these immature and of the large mature fish afford a complex and interesting problem for future investigation.

[1] 21st Ann. Rep., Scott. Fish Bd., 1902, p. 53.

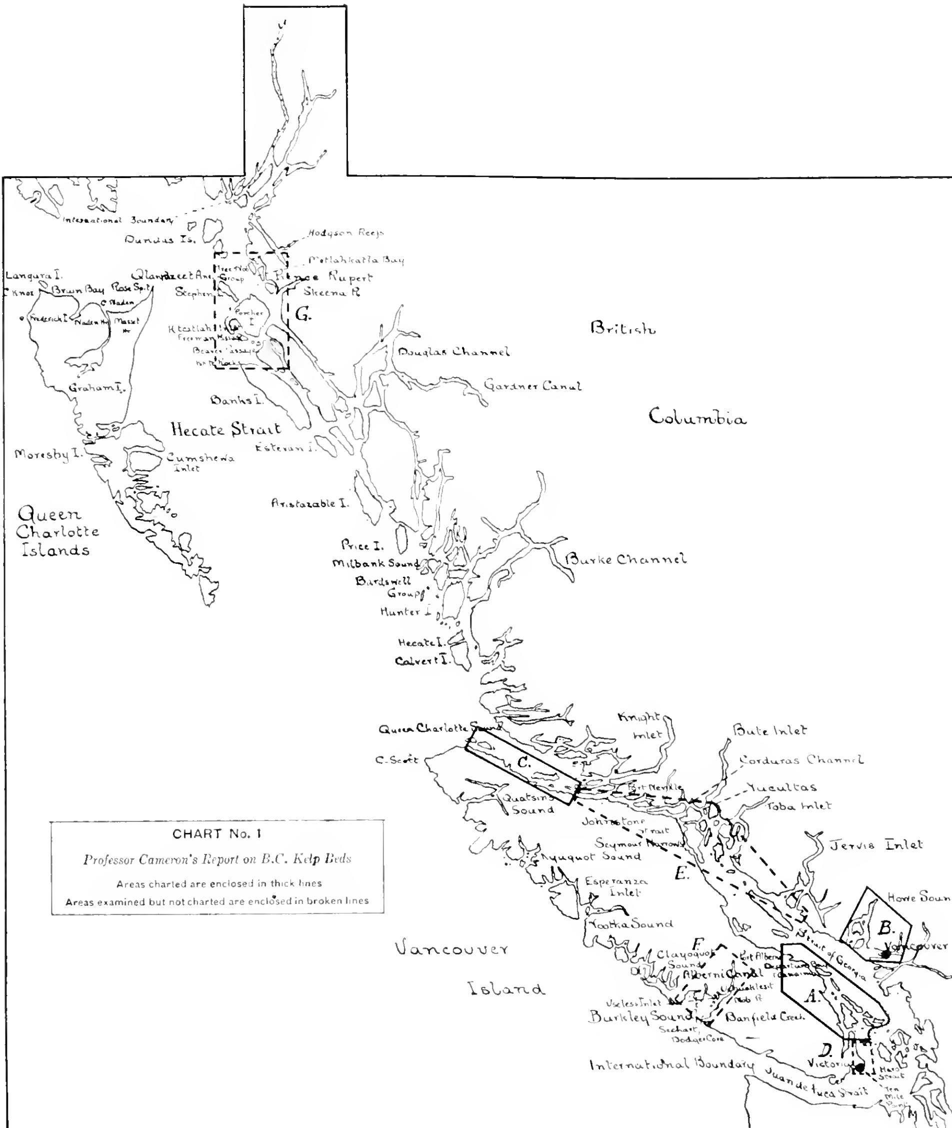
CHART No. 1
Professor Cameron's Report on B.C. Kelp Beds
Areas charted are enclosed in thick lines
Areas examined but not charted are enclosed in broken lines
British
Columbia
Queen Charlotte Islands
Vancouver Island
Hecate Strait
International Boundary
Dundas Is.
Hodgson Reefs
Metlahkatla Bay
Prince Rupert
Skeena R.
Langara I.
Graham I.
Moresby I.
Cumshewa Inlet
Banks I.
Estevan I.
Douglas Channel
Gardner Canal
Aristazable I.
Price I.
Milbank Sound
Hunter I.
Hecate I.
Calvert I.
Burke Channel
Queen Charlotte Sound
C. Scott
Quatsino Sound
Knight Inlet
Bute Inlet
Cordurus Channel
Yucultas
Toba Inlet
Johnstone Strait
Seymour Narrows
Jervis Inlet
Howe Sound
Vancouver
Strait of Georgia
Kyuquot Sound
Esperanza Inlet
Nootka Sound
Clayoquot Sound
Alberni Canal
Burkley Sound
Banfield Creek
Victoria
Juan de Fuca Strait
A.
B.
C.
D.
E.
F.
G.

III.

THE COMMERCIAL VALUE OF THE KELP-BEDS OF THE CANADIAN PACIFIC COAST.—A PRELIMINARY REPORT AND SURVEY OF THE BEDS.

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(With Three Charts.)

Kelps and other seaweeds have been extensively used for a long period as fertilizers. In the British Isles, Norway, and the coast of Brittany, and along the Atlantic coast of Canada and the New England coast they are collected, when washed ashore during storms, and spread as manures without further treatment.[1] The Pacific kelps are also used to a slight extent in the Western States in the same way.

Iodine was for a long time prepared commercially in considerably quantity in Scotland from various species of seaweed. Its preparation as a by-product in the nitre industry has caused the original industry to languish; little iodine is now prepared from seaweed.

The principal fertilizing constituents of seaweeds are potassium chloride and phosphates. Direct application to the soil involves the loss of iodine, one of the most valuable constituents.

The control of the world's supply of potassium has within recent years been held by the Stassfurt Potash Syndicate, which completely controls the German mines, and which has dictated both the annual supply, and the price to be paid for it. This price has not diminished, there being a steadily increasing demand.

The outbreak of the present war has emphasized this dependence on Germany for potash supplies. The source is at present cut off. Other sources must be sought for. The market quotation for raw potassium chloride held steadily at $39.07 for many months previous to August 1914, when the year began. There is no quotation for September.

In addition to its use as a fertilizer, potash is required for many other purposes. A recent quotation from *Science*[2] dealing with the effect of the war, reads: "Potash salts are employed in many industries other than the fertilizer industry. A large amount is used in glass and soap making and in the manufacture of a number of chemical products. These include potassium hydrate, or caustic potash, and the carbonate and bicarbonate of potash, used principally in glass and soap making; the potash alums; cyanide, including potassium cyanide, potassium ferrocyanide, and potassium ferricyanide; various potash bleaching chemicals, dyestuffs, explosives containing potassium nitrate, and a long list of general chemicals. The imports of potash salts, listed as such in the reports of the Bureau of Foreign and Domestic Commerce, include the carbonate, cyanide, chloride, nitrate, and sulphate, caustic potash, and other potash compounds."

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[1] An account of the present utilization of kelp in the United Kingdom is given in the United States Consular and Trade Report, Tuesday, June 9, 1914, pp. 1402-5 (Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington).

[2] *Science*, August 28, 1914, vol. 40, p. 310.

The far-reaching effect of a stoppage of all potassium imports may be exemplified by the fact that to work low-grade gold ores requires a large supply of potassium cyanide.

The *Science* article reads further: "The importation of the above salts in round numbers during the last three years has averaged 635,000,000 pounds in quantity and $11,000,000 in value. The figures . . do not include the imports of kainite and manure salts, which are used as fertilizers. The quantity of this class of material imported during the last three years has averaged about 700,000 tons valued at $4,300,000 annually. Thus it is apparent that the annual importations of potash salts exceed $15,000,000." These figures, of course, apply to the United States.

While the amount of potassium fertilizers at present imported into Canada is small, those of the potassium salts are of the same order per head of population as those for the United States, and show a steady marked annual increase. The figures following are calculated from the Report of the Department of Trade and Commerce (Ottawa) for the fiscal year ending March 31, 1913, Part I.

The imports include crude potassium hydrogen tartrate (cream of tartar), cyanide of potassium (and sodium), bicarbonate, bichromate, chlorate, chloride, sulphate, nitrate, ferrocyanide, and hydrate of potash. The total imports of these salts for the fiscal years 1912 and 1913 are, respectively, 5,585 and 7,440 tons; the respective values for the years 1909-13 are: $496,704, $515,501, $610,455, $703,711, $848,759. In addition potash salts for fertilizers were imported to the respective values of $7,993, $7,284, $5,921, $6,995, $252. It may be further noted that the corresponding figures for crude iodine imports are $25,751, $24,241, $15,081, $16,866, $23,712, the average yearly import being $21,138. The average total import of these commodities is therefore $661,847, but it is to be noted that the largest of the above items shows such a steady marked increase that the figure for the year just completed (which is not yet available) is probably about $1,000,000.

It is evident that it is highly important to ascertain whether there are any sources of potash salts in Canadian territory, whether these are sufficient to supply our own necessities, and whether any surplus can be profitably marketed.

The United States, having realized their dependence on outside sources for potassium salts, have been studying the problem for some years. The results of their initial inquiry were published in 1912 (F. K. Cameron and others, "Fertilizer Resources of the United States," Senate Document 190, 62nd Congress, 2nd Session, 1912). Since that time they have carried out much more extensive investigations, and Congress voted, during the past summer, $7,000 for the publication of the complete results. Their investigators have found that while certain mineral sources were available, and could be probably worked and supplied profitably over a limited area, by far the most extensive sources of potash were the large beds of different kelps growing along their Pacific coasts. Accordingly, these have been completely charted.

Last year I drew the attention of the Biological Board of Canada to some aspects of this problem, and this year was asked by them to carry out a preliminary investigation of the kelp beds of the Canadian Pacific coast. The results of this investigation follow.

NATURE OF THE AVAILABLE KELPS.

Most of the larger sea plants belong to the family *Laminariaceæ* of the *Phæophyceæ* or brown seaweeds. The distribution of *Laminariaceæ*, which include all the so-called kelps, along the shores of the strait of Georgia (which separates the British Columbia mainland from Vancouver island) is exemplified by those species observed in the neighbourhood of Nanaimo, B.C. Here are found: *Laminaria saccharina, Laminaria bullata, Costaria turneri, Agarum fimbriatum, Alaria tennifolia, Nereocystis lütkeana* [along with two rock-weeds, belonging to another family, *Fucus evanescens*, and *Fucus furcatus* (*inflatus*)]. I have seen also, cast up on a storm-swept bay on

the north side of Hope island, off the north coast of Vancouver island, *Nereocystis lütkeana, Macrocystis pyrifera, Alaria* (a second species), *Egregia menziesii, Cymathœre triplicata,* and *Hedophyllum.*

Of all these, only *Nereocystis lütkeana* and *Macrocystis pyrifera* are of economic importance. The other *Laminaria* are not present in large beds. The *Fucaceæ,* while abundant, could only be collected by hand, and conditions of labour along the Pacific coast therefore negative any idea of their utilization. Furthermore, their potash content is much smaller than that of the two kelps. These, from their nature, can be harvested by mechanical means, and hence at a much smaller cost.

Nereocystis lütkeana, commonly called bull-kelp, or simply kelp, consists of a long stalk or stipe, much branched below into the "holdfast" attaching it to a small rock or rock-crevice several fathoms below the sea-surface, and distended above into a hollow bladder, the "*pneumatocyst*," containing air. To this are attached numerous long fronds which are kept near the surface of the water by means of this float. *Nereocystis* is found growing at depths varying from 1 or 2 to 10 or more fathoms. Most of the *Nereocystis* that I have examined has been growing at depths of from 4 to 6 fathoms (24 to 36 feet). The length of the plant varies considerably. The longest plant that I measured was 63 feet in length. This was obtained near Haro strait, just north of the Puget Sound region. In the latter, Rigg states that he found no specimens over 70 feet in length[1], although elsewhere much greater lengths have been recorded. Much larger plants are also met with in British Columbia waters. Mr. A. Lucas, fishery overseer at Alert bay, informs me that he has obtained a plant on Nawhitti bar, off the North coast of Vancouver island, measuring 111 feet in length.

Nereocystis lütkeana is found more or less extensively throughout British Columbian waters.

Macrocystis pyrifera is, according to Setchell, known as "long bladder kelp."[2] I have found in use the more descriptive terms "sea-ivy" and "flag-weed." The plant consists of a holdfast of many whorls, from which extend upward usually numerous stipes, each of which carries at regular intervals large ivy-leaf-shaped fronds, joined to the stipe through a buoying bladder. The length of the plant is variable. Off the Californian coast plants 150 feet in length have been met with. Rigg states that 50 feet is the common length in the Puget Sound region. I have found plants 40 to 50 feet in length in Barkley sound (west coast of Vancouver island) and 30 feet or less off the north coast of Vancouver island and off Banks island. A diminution of mean temperature may determine this diminution of length.

Macrocystis pyrifera has been reported off Victoria and Port Renfrew. I have found it in Barkley sound, along the north coast of Vancouver island, off Banks island, and in Qlawdzeet anchorage, Stephen island, so that it is evident that it is present along the whole coast of British Columbia. This was to be expected, since, while common farther south, it is also not uncommonly met with in Alaskan waters. It is not present in the inner coastal waters of British Columbia, from Ten-mile point, near Victoria, to Port McNeill. Its absence in these waters must be attributed to their lessened salinity.

CONDITIONS AFFECTING THE GROWTH OF "NEREOCYSTIS" AND OF "MACROCYSTIS."

The factors determining the growth of *Nereocystis lütkeana* and *Macrocystis pyrifera* are the same:—

(1) A suitable rocky surface of attachment.
(2) A marked movement of the water containing the plant.
(3) A suitable salinity.
(4) Not too high a temperature.

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[1] "Fertilizer Resources of the United States." Senate Document 190, 1912, p. 180.
[2] *Ibid.,* p. 159.

(1) The most suitable surface of attachment for kelp consists of a stony or rocky bottom at a depth of from 3 to 6 or 8 fathoms (in Canadian waters). Most of the large plants of kelp that I have seen were growing in from 4 to 6 fathoms of water (low-tide measurement). Apparently the nature of the rock has something to do with the result, presumably through the surface it possesses. Sandstone and limestone rock-bottoms are usually devoid of kelp. Conglomerate and granite are favourable. Kelp need never be looked for along sandy or shingly shores, nor where there is a mud bottom.

(2) Kelps flourish most luxuriantly where there is a maximum tidal current of from 3 to 5 knots an hour. Beds are found where there is much slighter water movement, but, generally speaking, the less the movement of the water, the less luxuriant is the kelp growth. I have observed no growth of kelp where the "tide-rip" reaches a maximum of 6 or more knots an hour. Apparently *Macrocystis* grows preferably in somewhat stronger currents than *Nereocystis* (see the remarks on the kelp growth in Barkley sound and off Banks island below).

Salinity is one of the chief determining factors of the growth of kelp. It does not grow in brackish water (see the results for Howe Sound, etc.). *Nereocystis* can apparently attain a moderate size in water of less than two-thirds ocean salinity (mean density 1·019) and where the salinity occasionally sinks temporarily to much lower values (density 1·013, for example), but both length and weight increase distinctly with increased salinity, as will be shown below. *Macrocystis* does not grow at all until a higher salinity is reached. While *Macrocystis* has been observed in Barkley sound, with density of the containing water as low as 1·0185, too few readings were taken to determine the average value with accuracy (1·0195 for three readings). The average of readings off the north coast of Vancouver island, where *Macrocystis* is common, was 1·022, and the lowest figure observed 1·021.

(4) The effect of temperature is less certainly demonstrable. According to Setchell,[1] temperature is one of the chief factors affecting the distributing of different species, but there seem to be no available data bearing on the effect of temperature on the growth of particular species. In sheltered bays in the strait of Georgia, where local bodies of water attain a moderately high temperature (60° to 65° F.) for a month or more at the height of summer, disintegration of *Nereocystis* appears to commence sooner than usual.

LIFE-HISTORY OF "NEREOCYSTIS" AND "MACROCYSTIS."

Nereocystis is a yearly plant, growing rapidly in spring, reaching maturity in July or later, and then decaying at a greater or less rate. Many plants are torn away from their anchorages, and the beds considerably depleted in this way with the onset of winter storms. Others probably decay till the pneumatocysts burst, and the plants then sink. The beds are thickest from July to September or October. Many are probably visible throughout the year, the young plants attaining some size before the older plants have completely disappeared.

The plants are propagated asexually by spores. The exact time at which the spores are set free is a matter of importance, since it must be taken into consideration in fixing the best time to cut the beds. According to Rigg,[2] kelp plants can be cut after July 15 without interfering with spore-discharge and so with next year's crop. This conclusion is based on observations in the Puget Sound region. As far as I could judge, in more northern waters the plants reach full size at a slightly later date, and it might be desirable to defer cutting until a somewhat later period. More information is required on this point.

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[1] Setchell, *ibid.*, pp. 135-137.
[2] Rigg, *ibid.*, p. 186.

Macrocystis has a life longer than a year, and exact data as to its rate of growth and rate of regeneration (for the plant is said to regenerate when cut) are at present not available. Spore discharge takes place from sori situated on fronds low down on the plant towards the base, so that the greater portion of the plant can be removed without interfering with reproduction.[3]

During 1913, observations were made by the American Bureau of Soils at La Jolla and Point Fermin, California, and at Friday Harbour, Washington, on the life-history of *Nereocystis* and *Macrocystis,* with especial reference to cutting and harvesting.[4] The results will presumably appear in the report in process of publication already referred to.

THE ECONOMIC VALUE OF THE PACIFIC KELP BEDS OF CANADA.

This investigation has been directed with two aims. An estimate—very approximate, of course—was sought of the total amount of kelp available for commercial purposes, and a further estimate of what part of this could be harvested at a probable profit.

The kelp beds do not attain full size before the middle of July at earliest. Investigations were commenced, however, at the beginning of the month, and carried on until the end of August. Since, in that limited time, only a relatively small portion of the coast line could be examined accurately, typical portions were mapped out, so that from these the average yield per mile of coast line might be calculated with at least an approximation to accuracy. The portions examined will be seen on reference to Chart I. The following districts have been charted as accurately as time would permit:—

A. The district comprising the southeast coast of Vancouver island, from Northwest bay to the north of Saanich peninsula, and the islands to the east of this from the Ballenas group to the international boundary.

This district can be regarded as typical for waters of moderate salinity, abounding in reefs. It comprises 500 miles of coast-line.

B. The district included in Howe sound and Burrard inlet. These are typical of the large inlets comprising some thousands of miles of coast-line, and occurring at regular intervals along the mainland.

This district can be regarded as typical for brackish waters. The part mapped includes about 200 miles of coast-line.

C. The district along the north coast of Vancouver island from Hope island to Baronet passage.

This district is typical for waters of fairly high salinity; it comprises 240 miles of coast-line.

The following districts were examined:—

D. The coast-line of Vancouver island and the islands adjacent, south of district *A,* to Victoria.

E. The channels between Vancouver island and the mainland, from Texada island northward to Johnston strait.

F. Barkley sound and the Alberni canal (selected as typical of the inlets on the west coast of Vancouver island).

G. The district from the north of Banks island to Prince Rupert and Hodgson reefs.

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[3] Setchell, *ibid.,* 9. 139.

[4] Phalen, "Potash Salts for 1913," p. 93 (Publications of the U. S. Geol. Survey).

An attempt was made to examine the beds along the shores of the Queen Charlotte islands. I succeeded in reaching Rose Spit in the D.G.S. *Malaspina,* in a southeaster, but after remaining there for thirty hours without abatement of the weather, the steamer had to proceed south to Esquimalt on the outbreak of the war.

The observations were carried out in the various steamers and gasolene launches of the Fishery Service, and my thanks are due to Chief Inspector Cunningham, Inspectors Taylor and Williams, and the officers in charge of the boats of that service, and to Capt. Holmes Newcomb of the *Malaspina* for rendering me every assistance in their power in order to carry out this work successfully.

The launch at the Biological Station was also used for local work, and I have to thank Dr. Maclean Fraser, the curator at the station, for continued assistance and valued advice. He also surveyed for me the district from Nanoose bay to the Ballenas islands, included in *A*.

In carrying out such work as the above it may be noted that indications given in the Admiralty charts of the presence of kelp are as a rule accurate, kelp seldom being found in quantity except where marked on the charts. The charts give no clue, however, to the extent of the beds

The results of the examination will now be summarized, district by district.

Method of Examination.—Only a rough approximation has been attempted; this is undoubtedly a conservative one. Beds were considered as thin, or thick. Thin beds were estimated to contain an average of one plant per square yard. Thick beds were estimated to contain three or more plants per square yard (often the beds were decidedly thicker than this). The widths of the beds were estimated roughly and noted.

In addition, fringes close inshore were noted, and were considered about 5 yards wide, and thin or thick as before. Such fringes total to only a small percentage of the whole amount.

Several typical plants of typical beds were weighed to give the average weight per square yard. The parts weighed included the fronds, pneumatocyst, and 8 or 10 feet of the stipe, this being the probable amount removed by any mechanical system of cutting.[1] The calculations have been based on the weights and thickness of *Nereocystis* plants only. It is more difficult to estimate the thickness of beds of *Macrocystis.* The weights obtainable in any given area are probably of the same order for the two species. In any case the great majority of the kelp beds in British Columbia waters consist of *Nereocystis.*

Knowing the extent of the beds, the number of plants per square yard, and the average weight of each plant, the weight of the kelp in any area can then be at once calculated.

District A.—The actual survey of the district was made between the dates July 6 and 10, inclusive, a preliminary examination having been made in the previous week. The results of the survey are shown in Chart II.[2] Plants were weighed each day with the following results:—

[1] Various measurements indicate that the remainder of the stipe and the holdfast weigh from 50 to 70 per cent of the weight of pneumatocyst plus 8 or 10 feet of stipe.

[2] Map II is taken from Admiralty Chart No. 579, to which it should be referred.

Place obtained.	Total length.	Average length.	Weight of fronds.	Weight of pneumatocyst and part of stipe.	Total available weight.	Average weight.
	feet.	feet.	lb.	lb.	lb.	lb.
1. Shoal Harbour (inshore in shallow water).	44		0·5	1·5	2	
	39		4·5	1·5	6	
	35		4·5	2	6·5	
	29	37	3	1·5	4·5	5
2. Channel between Comet and Gooch islands.	63·5		15·5	4·5	20	
	51·5	57·5	23	6	29	24·5
3. South end of Prevost island.....	45		11	3·5	14·5	
	42		6·5	1·5	8	
	41·5		9·5	3	12·5	
	41·5	42·5	9·5	2	11·5	11·5
4. Belle Chain.....	57·5		8·5	2·5	11	
	43		5·0	2·5	7·5	
	38	46	9·5	2	11·5	10
5. On Gabriola reefs.....	29·5		6	1	7	
	28·5	29	7·5	2	9·5	8

Allowing equal value for each average, these figures give an approximate average of 12 pounds per plant (portions available for removal).

Using this figure, from the data furnished in map II, I estimate that 122,760 tons of kelp could be obtained from this district, giving an average of 245 tons per mile of coast line.

Throughout this and succeeding surveys, measurements of the density of the sea-water holding these beds were made at frequent intervals. These and other data are publish conjointly with Dr. Maclean Fraser on later pages, and have led to the conclusion that in the northern part of this district there is a noticeably smaller mean salinity value than in the southern (due to influx of fresh water from the inlets of the mainland and the Fraser river), the density figures being, respectively, 1·019 and 1·021.[1] Corresponding to this, the southern portion (Haro Strait region, connected to the open ocean through the strait of Juan de Fuca—see Chart I) has a much greater growth of kelp, as shown in the following figures. These are calculated on the assumption that the weight throughout is 12 pounds per plant. The table just given shows, however, that a higher value was obtained for plants farther south, so that the differences shown below are probably actually greater.

(1) District south of Saltspring island (coast-line 60 miles), 34,140 tons of kelp, being 570 tons per mile.

(2) District north of this limit (coast-line 440 miles), 88,620 tons of kelp, being 200 tons per mile.

The remaining conditions (kind of sea-bottom, tidal currents, temperature) were not markedly different. Chart II clearly shows the increased growth in the southern area.

All the kelp seen in district A was *Nereocystis lütkeana*.

District B.—In Howe sound there is no kelp. In Burrard inlet there is a single patch of *Nereocystis* an acre or less in extent in Vancouver harbour; this is negli-

[1] The extremes probably show greater differences, though too few readings were taken in the southern portion to lay great weight on them. Those observed were: Northern portion, 1.011 to 1.022; southern portion, 1.020 to 1.022.

gible. (The observations were made on August 19.) The absence of kelp in Howe sound is traceable to several causes, each probably in itself sufficient. The shore is sheer, a depth of 60 fathoms or more being reached a few feet out. The rocks are of carboniferous limestone, affording no hold for kelp, even were there any ridges at a suitable depth below the surface. The whole of the water of the sound is brackish, a large amount of fresh water being contributed by the Squamish river, flowing into the head of the sound. Density measurements taken within 3 miles of the head of the sound showed fresh water. Measurements 23 miles farther out (just outside the sound itself, in the strait of Georgia) showed a density of only 1·008. It may be pointed out here that since kelp grows near the surface, and since the greater part of the plant remains within 2 or 3 feet of the surface, it must be particularly subject to the influence of the surface water, so that measurements of the density of this give a clue to the salinity of the sea-water actually affecting the plants.

The conditions in Burrard inlet are somewhat similar to those in Howe sound, but the amount of fresh water flowing into the inlet is less, and the mean density value of the surface water higher. The combined coast-line of Howe sound and Burrard inlet is about 200 miles. The situation of this district can be seen by reference to Charts I and II. Off the extensive sand flats at the mouth of the Fraser river (see Chart II) no kelp is to be expected. I have not examined these flats myself, but have been informed by numerous persons that no kelp exists along this strip of coast.

Howe sound is typical of most of the large inlets farther north, both as regards the brackishness of the water, and the sheerness of the shores. I am informed that no kelp exists in any of them, except perhaps along the islands at their mouths. District B can, therefore, be taken as representative of a very considerable amount of coast-line.

District C.—The district north of Vancouver island is much richer in kelp than District A. The part surveyed is shown in Chart III, and the work was carried out on July 23 and 26, inclusive. An attempt was made to see the kelp on Nawhitti bar, to the west of the portion charted. There are vast beds here for more than 10 miles, indeed most of the way to cape Scott, and the kelp grows to a much greater size than on the less exposed portion actually seen. The weather conditions were unfavourable, and I was unable to see this region. In order to chart this mass of kelp properly it may be necessary to stay a week or longer in Bull harbour, Hope island, and seize a favourable combination of calm weather and slack low water. It should be noted that in order to survey many of the beds properly it is necessary to see them under these conditions; this materially hinders rapid work. Rough water hides the kelp considerably and prevents an accurate estimate of its extent. The kelp grows most luxuriantly in a "tide-rip," and this when in action drags it under, and may almost completely submerge large beds.

In order to estimate the weight of kelp available in this district sample plants were taken from a very large patch north of Haddington island with the following results:—

Total length.	Average length.	Weight of fronds.	Weight of Pneumatocyst and part of stipe.	Total available weight.	Average weight.
feet.	feet.	lb.	lb.	lb.	lb.
61		18·5	6	24·5	
56·5		16	5·5	21·5	
53		8	4	12	
51·5		13·5	4·5	18	
46	54	21	5	26	20

I think that this average of 20 pounds can be accepted as applicable to the whole of the kelp seen since while some of the shore kelp was undoubtedly much lighter in weight the bulk was in beds similar to that at which these measurements were made, and vast beds in the neighbourhood, such as those at Nawhitti bar, must average much higher. (The plant 111 feet long measured by Mr. Lucas had a weight of the order 100 pounds.)

Two hundred and forty miles of coast line was examined. The weight of the kelp available calculated on the above estimate from the additional data shown in chart III [1] was 224,640 tons, an average of 936 tons per mile of coast line. This, it is to be observed, is much higher than that for district A, corresponding to a higher mean density of the sea-water (average value observed, 1·0225; extremes, 1·021, 1·0265).

The bulk of the kelp seen was *Nereocystis lütkeana*. Near Port McNeill, with increased salinity due to nearness to the open waters of Queen Charlotte sound, occasional small patches of *Macrocystis* occur among the *Nereocystis* beds. They become commoner farther west, and between Suquash and Hardy bay there are extensive beds of *Macrocystis*. The beds are so thick that the weight per unit area is almost certainly comparable with that for *Nereocystis*, so that the error due to a calculation on the basis of *Nereocystis* only cannot be a large one.

Before proceeding to apply the data given above to the general problems the results of the rougher examinations of the other districts will be dealt with; as no charts were made for these, some actual figures and data are included for reference for future workers.

District D (*South of District A, to Victoria*).—This was examined on July 4. Off the islands east and south of Sidney island are probably fairly large beds of kelp which would repay charting. There are a few small patches near Zero rock and Johnstone reef. The coast near Ten-mile point is surrounded by fringes of kelp, while there are numerous small beds outside Oak bay and Foul bay. The whole could be charted in two or three days, and the average is probably of the same order as that for the southern section of District A.

I saw only *Nereocystis* in this region.

District E (*Channels between the northeast of Vancouver Island and the Mainland*).—This was examined between July 18 and 21, inclusive. The route covered was from Pender harbour through Calm channel and the Caldero channels to Forward harbour, thence to Port Neville, and south through Johnstone strait and the western passage to Quathiaska cove. The greater part of this territory consists of fairly narrow channels, with very strong tidal currents. There is very little kelp throughout. There are occasional small patches and fringes, but the difficulty of collection would be great (since much of the navigation is dangerous for small boats) and the amount obtainable would not repay collection. Port Neville, opening off Johnstone strait, is almost choked up with kelp, though when I saw it at half-tide most of this bed was submerged, and invisible. The district northward from this point would repay careful examination.

Such kelp as exists in this district is invariably *Nereocystis*. The observed densities ranged from 1·014 to 1·021; in the mean, 1·019.

District F (*Barkley Sound and the Alberni Canal*).—Examined August 25 to 27. This district was selected as typical of the west coast inlets of Vancouver island. The Alberni canal is 25 miles long, very deep (up to and over 100 fathoms in many places), large quantities of fresh water flow into it, and it is quite devoid of kelp. It resembles Howe sound in general character. It opens out to Barkley sound, which is roughly

[1] Chart III should be referred to Admiralty Charts Nos. 581 and 582.

about 25 miles square, and contains numerous small islands. The shores of these are sheer for the most part, and a suitable rocky bottom for kelp growth is rare. The south side of the sound was more especially examined. There is a patch of *Macrocystis* some acres in extent inside Banfield creek, and a fringe of *Nereocystis* outside. There is a similar distribution at Dodger cove, while the neck of Useless inlet is almost filled with *Macrocystis*, and farther out are a few plants of *Nereocystis*. As far as I could judge this distribution was determined by water-movements, the *Macrocystis* growing where the tidal current was stronger. There is little other kelp worth mentioning on the south side of the sound, and no kelp in the neighbourhood of Sechart. Most of the inlets contribute fresh water and contain no kelp. The salinity of the whole sound is distinctly below ocean values, though high enough for the growth of *Macrocystis* (average density 1·0195 where *Macrocystis* was found growing). The kelp in the sound would not repay collection. I am told that there is a similar distribution in Clayoquot sound, farther north, and that in Nootka sound, still farther north, the amounts are larger. I do not think that the west coast of Vancouver island need be examined further at present.

District G (From the north of Banks Island to Prince Rupert and Hodgson's Reefs).—This district was only seen in small part, on dates between July 28 and August 6. Throughout this period the weather conditions were unfavourable.

White Rocks, Banks Island.—The coast line here was examined for some miles. It consists of a vast network of narrow passages between small islands and Banks island itself. These passages are all fairly well filled with kelp. In the inside passages, where the tidal currents are stronger, *Macrocystis* predominates. Outside, where there is more wave motion but less current, *Nereocystis* is present in thick fringes 25 to 50 yards wide. I was informed that there is a similar thick distribution of kelp along the west coast of Banks island and the islands to the south of it (Estevan, Aristazable, etc.). The amounts of kelp present per mile of coast-line are at least of the order found for district C, and probably higher. *Macrocystis* plants run about 30 feet in length. *Nereocystis* plants are of medium size, about 10 to 15 pounds weight.

Kitkatlah Inlet.—There are thick fringes of kelp everywhere.

Freeman Passage, Porcher Island.—On the south side of the passage there is a bed of *Nereocystis* about 2 miles by half a mile in extent. On the north side there is a smaller bed.

Spire Reef, near Prince Rupert.—There is a bed of *Nereocystis* here several acres in extent.

Metlakatla Bay.—There are two beds here, one 1 by $\frac{3}{4}$ mile, the other $\frac{3}{4}$ by $\frac{1}{4}$ mile, both consisting of medium-sized *Nereocystis* plants.

Tugwell Islands.—Thick fringes of *Nereocystis* are present, and a large bed off the northeast point.

Hodgson Reefs.—There is here a bed about a mile square, of medium-sized plants.

All the above beds are thick.

Lucy Island.—Several small patches of *Nereocystis* are present.

Qlawdzeet Anchorage, Stephen Island.—Thick fringes of kelp, about 50 yards wide, surround the whole shoreline. Both *Nereocystis* and *Macrocystis* are present.

Tree-nob Group.—The islands, as far as seen, were all surrounded by wide fringes of *Nereocystis*. The plants were not very heavy. I was informed that there was a similar thick distribution north to the Dundas islands.

District H (the Queen Charlotte Islands).—As previously mentioned, an attempt to examine the kelp beds off these islands was prevented by the outbreak of the war.

For the undermentioned data I am indebted to Capt. Holmes Newcomb, of the D.G.S. *Malaspina.*

Cape Naden to Bruin bay, wide fringe.

Langara island, east and south sides, thick fringe.

Frederick island to cape Knox, west coast of Graham island, a bed 15 miles long, with an average width of 1¼ mile.

Masset and Naden harbours, fringe.

Outside Masset harbour, eastwards, bed 1½ by 1 mile, small plants.

Cumshewa inlet, east coast of Graham island, a bed 7 by 2 miles on the south side of the inlet; a second 5 by ½ mile on the north side (McCoy's cove to Clew); both thick.

Farther south the greater part of the rocky coast is fringed thickly with kelp, especially in the inside channels; e.g., Burnaby channel is solidly filled by a bed 3 by ¼ miles in extent.

Estimating on the above figures alone, and assuming thick beds of *Nereocystis* with an average weight of 15 pounds per plant, the available kelp from the Queen Charlotte islands would amount to more than a million tons. An accurate survey of these beds is therefore very desirable. The waters are treacherous, and such a survey would require the assistance of a man thoroughly familiar with the coast.

TOTAL AVAILABLE KELP AND ITS VALUE.

From the data given above it is possible to get some idea of the total value of the Pacific Coast kelp beds, but at present the calculations must be based partly on analyses made of samples obtained farther south in the Puget Sound region. I have obtained samples for analysis at various points along the British Columbia coast; these have been forwarded to Dr. Shutt at Ottawa. His results, when available, can be used to correct the following figures. I do not anticipate that much variation of composition will be found.

I have determined the water-content of *Nereocystis* at Departure bay, with the following results:—

Part of plant taken.	Percentage water content.	Dry residue.
	per cent.	per cent.
Fronds	91·91	8·09
Pneumatocyst	93·94	6·06
Stipe	87·29	12·71
Holdfast	87·17	12·83

Since an examination of the figures for plant-weight reveals a weight-ratio of frond to pneumatocyst and stipe (available portion) of between 3 and 4 to 1, if the figure 8 per cent be taken for the dry weight it will certainly give a conservative estimate.

Turrentine's figures for the potassium chloride and iodine contents of *Nereocystis* obtained in Puget sound are on the average 30·9 per cent potassium chloride and 0·14 per cent iodine.[1] My own figures for iodine in *Nereocystis* from Departure bay average 0·12 per cent iodine.[2] These are all expressed for the dried plant. In the following calculations I have assumed 30 per cent potassium chloride and 0·12 per cent iodine. (Since *Macrocystis* contains similar amounts of potassium chloride

[1] "Fertilizer Resources of the United States", Senate Document 190, 1912, p. 220.
[2] Cameron, *J. Biol. Chem.*, vol. 18, p. 350, 1914.

and iodine, no marked error will be made by calculating throughout for *Nereocystis* plants.) The potassium chloride values are calculated on the American quotations for the crude salt before the outbreak of the war ($39.07 per ton on an 80 per cent basis; hence reckoned as $50 per ton potassium chloride). Since there is no duty on this salt into Canada, these figures can be applied here. The iodine values are calculated from the values quoted for Canadian imports in 1913 ($1.73 per pound, equalling $3,875 per ton).

	District A 500 miles.	District B 200 miles.	District C 240 miles.
	tons.		tons.
Total kelp available	122,760		224,640
Dry weight	9,820		17,970
Weight of potassium chloride contained	2,946		5,391
Weight of iodine contained	11·78		21·56
	$		$
Value of potassium chloride contained	147,300		269,550
Value of iodine contained	45,647		83,545
Total value	192,947		353,095

Since these three districts may be held to represent fairly accurately and equally the distribution of kelp over the whole coast, an average of the results can be applied to the whole coast line, which is commonly estimated as 25,000 miles.[3]

	District A.	District B.	District C.	Mean.
	tons.	tons.	tons.	tons.
Average weight of potassium chloride per mile	5·9		22·5	9·4
Average weight of iodine per mile	0·024		0·09	0·038

Hence, total annual yield of potassium chloride is equal to 235,000 tons worth (valued at $50 per ton), $11,750,000.

Total annual yield of iodine is equal to 950 tons worth (valued at $3,875 per ton), $3,680,000.

The total calculated value is, therefore, over fifteen million dollars annually. It must be remembered that at present and during the present war the price of potassium chloride will remain much higher than that quoted, but that under normal conditions the marketing of large quantities of potassium salts (or of iodine) would probably result in a considerable lowering of price by the controllers of the present supplies.

It is perhaps doubtful whether under normal conditions the kelp in districts *A* and *D* could be harvested at a profit. The territory extending from the north coast of Vancouver island to the Dundas islands, including the islands in Queen Charlotte sound and the other islands Aristazable, Estevan, Banks, Porcher, Stephen, the Tree Nob group, etc., has much more extensive beds, and as far as I can judge the figures obtained for district *C* are applicable to the estimated coast-line comprised in this territory, but much of it has not yet been charted. From the available charts it would appear to be at least 2,000 miles in length, while 3,000 miles is not improbably a more correct figure. Using the smaller figure, with the data from district *C* (22·48 tons of potassium chloride and 0·09 ton of iodine per mile), the total available yield should be 44,960 tons potassium chloride and 180 tons iodine, worth, respectively, $2,250,000 and $700,000, a total of $2,950,000 for the annual harvest.

[3] See for example C. McLean Fraser, *Trans. B. C. Acad. of Science*, vol. 1, p. 49.

It would seem almost certain that the kelp in this district could be obtained and harvested at a profit. It would at present more than supply Canada's needs for potassium salts and iodine.

The annual value of the beds off the Queen Charlotte islands is also more than a million dollars at pre-war rates. The difficulties of harvesting will be greater.

RECOMMENDATIONS.

I submit the following recommendations:—

(1) The charting of the kelp beds from the north of Vancouver island to the Dundas islands should be completed. This can be carried out properly only between July and September of any year, when the kelp is thickest and the weather conditions are most favourable. The waters are dangerous for navigation in many parts of this territory. A seaworthy steamer carrying a small power launch, and the services of an efficient navigator with some knowledge of these waters are essential. The work would occupy at least two seasons. Much of the coast has not been charted, and it would be necessary to prepare a rough chart, which could be done in the two months previous to the actual kelp survey.

(2) The kelp beds of the Queen Charlotte islands should be surveyed. This must be carried out at the same period of the year. The difficulties of navigation are greater, from the dangerous nature of the waters.

(3) Further information should be obtained concerning the best period for cutting the kelp. It must not be cut too early or the discharge of the spores may be affected and next year's crop lessened. It will be necessary to make careful observations of definite areas over a series of years to find out whether the time of cutting affects the succeeding growth harmfully. If cutting is delayed too long, the fronds will have commenced to decay, and the total yield may be considerably diminished. This will not matter initially, when only part of the kelp beds is being utilized, and especially for works conducted on an experimental basis, so that until definite information is available, permission to cut kelp should probably be granted only between August and December, inclusive.

(4) There is not enough kelp to allow private companies to utilize the same beds. The areas will require division, and for effective working a particular area will have to be allocated to a single corporation. Policing will be essential, to prevent too early cutting. Perhaps this could be undertaken by the fishery officials.

(5) It has been stated by various investigators that the removal of kelp may interfere with the food supply of certain fishes, and may increase the dangers of navigation by removing natural breakwaters; further, that the presence of kelp in waters not well charted is of considerable assistance in the navigation of boats of light draught. The latter points may be important, and further consideration of them is required. Any difficulties can probably be overcome by more accurate charting of the coasts and increased buoying of the reefs.

(6) It will be necessary to secure information as to the best methods of harvesting the kelp, and obtaining from it the potassium chloride and iodine. American experiences are available,[1] and the conditions of labour and transport in British Columbia are probably not markedly different.

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[1] The technology of the seaweed industry is summarized in the Congress Report, No. 190, already frequently referred to, on pages 232 to 262. Some idea of the kind of manufacturing plant required and the cost of operation may be gathered from the following quotations:—

(*a*) W. C. Phalen, "Potash Salts, Summary for 1913," from "Mineral Resources of the United States, Calendar Year 1913—Part II", Washington, 1914: (pp. 94-6):—

"Commercial Utilization of Kelp.—Since interest has been aroused in kelp as a source of potash salts, several companies have been formed having in view its commercial exploitation, either in the dried form as a fertilizer or for the potash salts and the other valuable ingredients, such as iodine, which it contains. The names of eleven companies formed ostensibly to engage in the kelp industry have been brought to the attention of the survey during the last year. In

(7) No company or individual should be given permanent or unrestricted rights to remove and utilize kelp in British Columbia waters until the information outlined has been obtained.

(8) The desirability of establishing a Dominion experimental plant in the northern or central part of the British Columbia coast to carry out further experiments as to the best method of obtaining the commercial products should be considered.

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geographical distribution, these companies are located in the vicinity of Puget sound with headquarters chiefly at Seattle, and on the southern California coast near Long Beach, Los Angeles, and San Diego. Two of these companies were mentioned in this report for 1912.

"The American Potash Co., with offices at Los Angeles, Cal., plans to utilize the kelp in the vicinity of Long Beach. This company was formed by the merging of two other companies, one of which was the Coronado Chemical Company, of San Diego and Cardiff. It is stated that work will begin early in 1914 on the manufacture of potash and other by-products from kelp at a plant to be built at Long Beach. The plant is to be erected on the unit system, and construction work on it began early in 1913. The work of manufacturing potash will begin on the completion of the new buildings that are expected to be finished about April 1, 1914.

"The Pacific Products Co., of San Pedro, Cal., with a capital of $100,000, is reported to have a factory site on the California coast opposite the kelp grove outside of Point Fermin.

"The Pacific Products Co., of Seattle, Wash., capitalized at $125,000, will build a factory for the manufacture of fertilizer materials and by-products from fish and kelp at Port Townsend, Wash. Several beds of kelp have been optioned at the head of Puget sound, where a large quantity of seaweed will be harvested each year and transferred to the factory at Port Townsend. This company will also make a business of obtaining dogfish, and of utilizing the offal from the fish canneries in the vicinity. The first unit of the plant for converting kelp and dogfish into fertilizer material was reported completed in July 1913.

"The Pacific Kelp Mulch Co., is located at Terminal island, 1 mile east of East San Pedro, on the San Pedro, Los Angeles and Salt Lake railroad. The company has been gathering kelp from the ocean during the last two years and disposing of it to the farmers and fruit growers as a fertilizer. The company has developed a machine which harvests the kelp rapidly and on a large scale. The kelp is cut from 4 to 6 feet under water, and care is taken not to disturb the roots of the growing plants. It is loaded on a barge and brought to the boat landing of the plant. Here it is pitch-forked from the barge on a belt conveyor which conveys it to the cutter, being subjected during the passage to a steaming process which is practically instantaneous and which, it is asserted, removes all the adhering common salt (NaCl) but none of the potash salts. The cutter chops it into pieces 6 to 8 inches long—that is, of a length to be conveniently handled with a manure fork or to be harrowed under the soil after being spread. From the cutter the kelp falls into wagons or to the floor. It is then carted to the railroad and dumped into freight cars and shipped to the centres of consumption. This company has the distinction of being the first to harvest and market kelp on a commercial scale.

"The material is said to have many advantages as a fertilizer, and these are explained in a small pamphlet which has been issued by the company.

"The other companies whose names have come to the Survey as proposing to engage in the production of kelp on a commercial scale are the following: Ocean Products Co., Seattle, Wash., North Pacific Kelp Potash Co., Seattle, Wash., Pacific Coast Potash Co., Seattle, Wash., Puget Sound Kelp Potash Co., Seattle, Wash., Aquatic Products Co., Seattle, Wash., Kelp Products Co., San Francisco, Cal., Mexican Kelp Fertilizer Co., Los Angeles, Cal.

"The Survey has no first-hand knowledge of the activities of these companies".

(*b*) Note in *Pacific Fisherman*, May, 1914, p. 36:—

"American Potash, Inc., of Long Beach, Cal., which takes the kelp as it grows along the rock near Point Fermin and converts it into a fine grade of potash, together with many other by-products, is constantly enlarging its plant, and, it is said, has withdrawn its stock from the market. The plant was shut down for a short time during the latter part of April for the purpose of installing a new drier, which consists of an immense endless belt of wovenwire which runs over a hot blast, and also gets a large amount of heat from steam pipes located over the top. The dried kelp is burned and then reduced to its merchantable forms through a process of precipitation."

(*c*) Note in the Seattle *Post-Intelligencer*, August 23, 1914:—

"Congress will be asked by the Department of Agriculture to appropriate for the immediate construction of an experimental plant on Puget sound to demonstrate the commercial possibilities in manufacturing potash from kelp.

"The Bureau of Soils which has just concluded an exhaustive study of the kelp beds of the Pacific from Mexico to Alaska, in a report now being printed, strongly urges the development of the industry, and asserts that the product could be turned out in commercial quantities in from four to six months."

It should be noted, finally, that in this report I have not considered the possible preparation of phosphates or other substances from kelp. Some of these are indicated in the Congress Report, 1912, p. 249, etc.

SUMMARY.

The kelp beds of the British Columbia waters can supply far more potash and iodine than the amounts used at present in Canada. Large quantities could probably be marketed at a profit at pre-war rates. Should the present war be of long duration, all Canadian requirements can be met from this source. In any event, the industry, carried on on a moderate scale, would almost certainly be lucrative.

Definite evidence is adduced that the growth of kelp is largely dependent on the salinity of the containing water. *Macrocystis pyrifera* requires a more saline habitat than *Nereocystis lütkeana*. Both species grow more luxuriantly the more saline the containing water.

CHARTS ILLUSTRATIVE OF THE REPORT.

Chart I. A general outline of the British Columbia coast, showing areas charted (thick lines) and areas examined but not charted (dotted lines).

Chart II.—Detailed map of kelp area A, from the international line, Juan de Fuca straits, to Ballenas island, near Nanoose bay.

Chart III.—Detailed map of kelp area C, in Queen Charlotte sound.

(This report received for publication October, 1914.)—E. E. P.

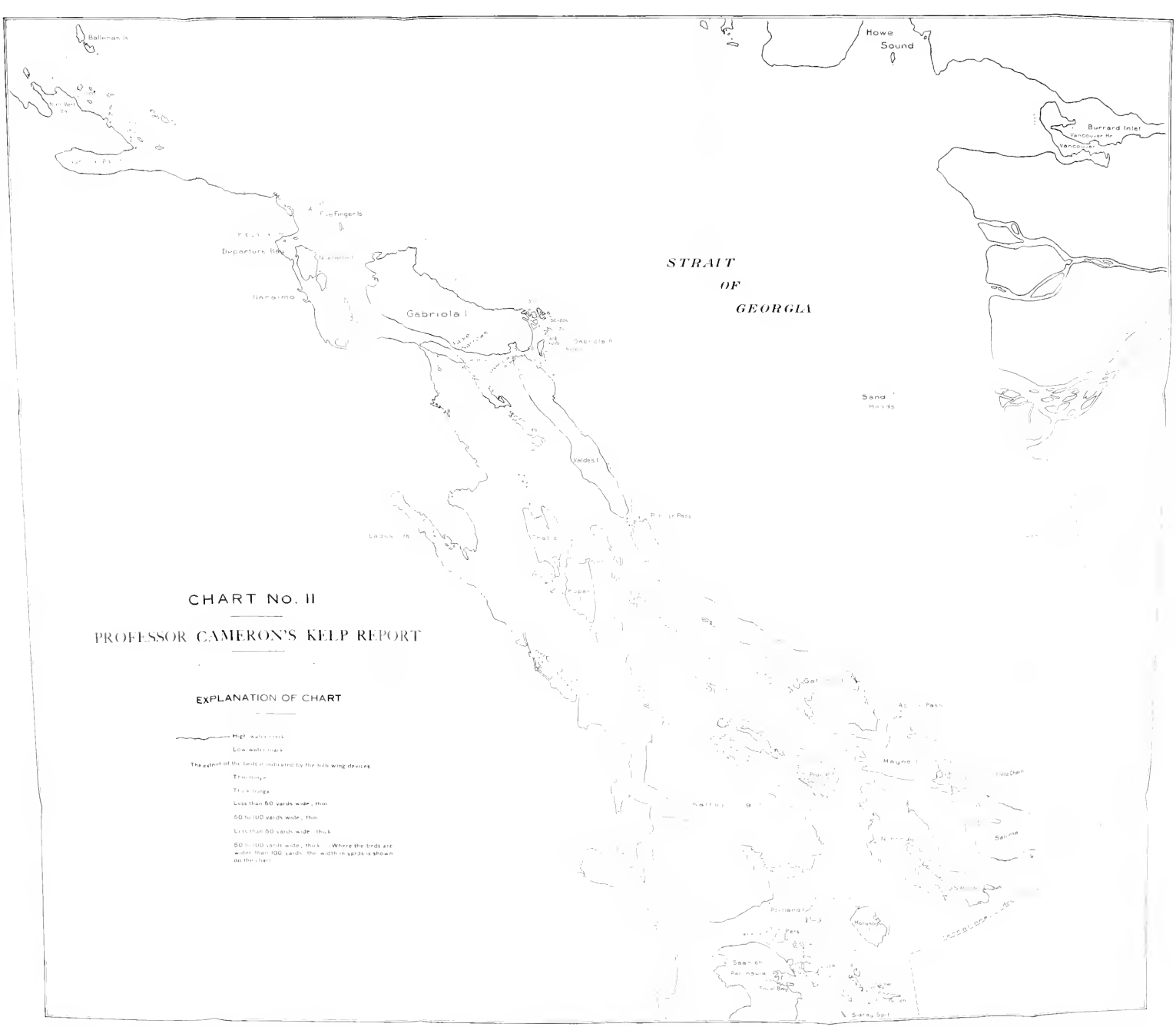


CHART No. II

PROFESSOR CAMERON'S KELP REPORT

EXPLANATION OF CHART

High water mark

Low water mark

The extent of the beds is indicated by thin tufts wing devices

Thin fringe

Thick fringe

Less than 50 yards wide, thin

50 to 100 yards wide, thin

Less than 50 yards wide, thick

50 to 100 yards wide, thick (Where the beds are wider than 100 yards, the width in yards is shown on the chart)

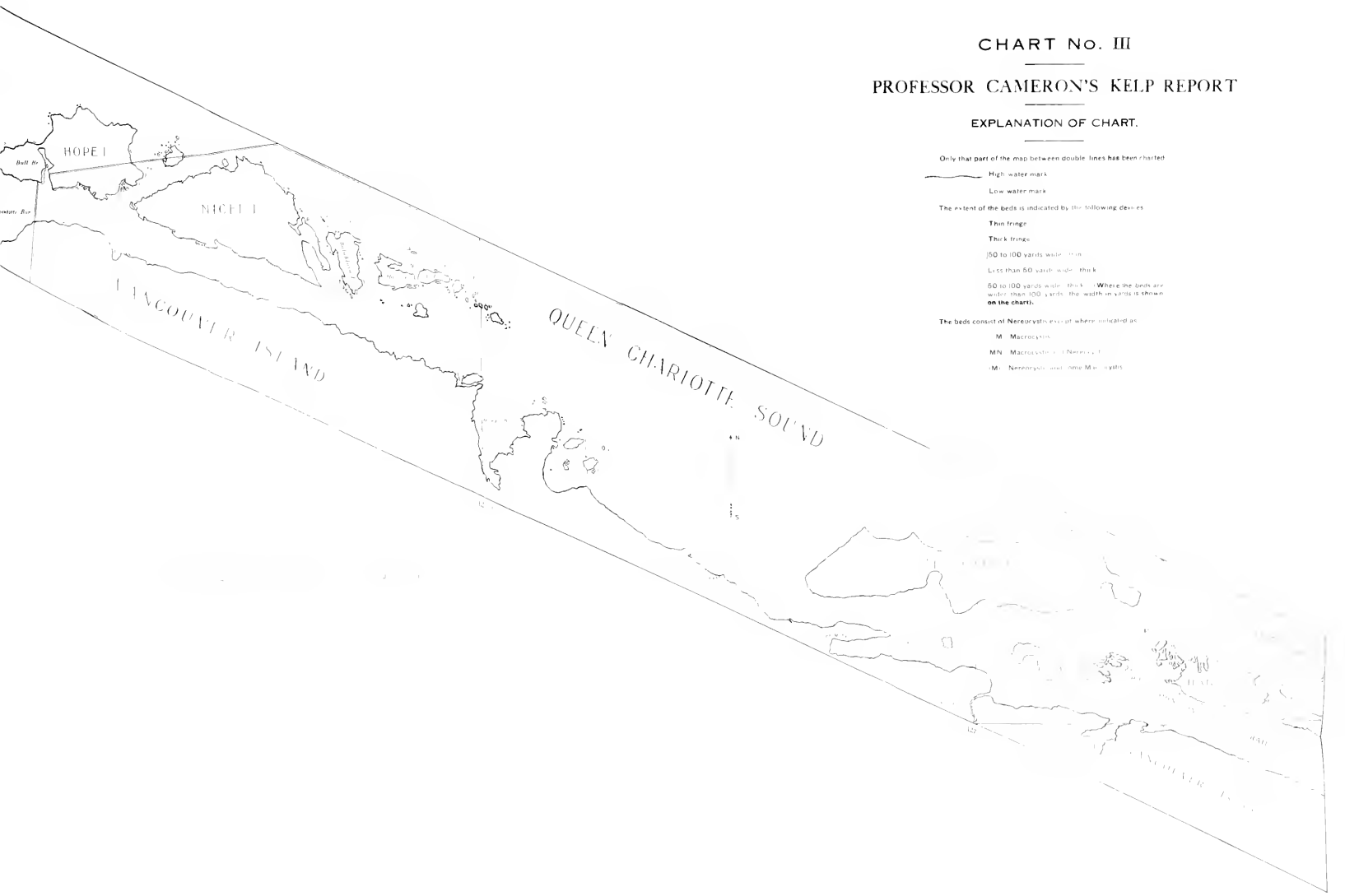


CHART No. III

PROFESSOR CAMERON'S KELP REPORT

EXPLANATION OF CHART.

Only that part of the map between double lines has been charted

High water mark

Low water mark

The extent of the beds is indicated by the following devices

Thin fringe

Thick fringe

50 to 100 yards wide thin

Less than 50 yards wide thick

50 to 100 yards wide thick (Where the beds are wider than 100 yards the width in yards is shown on the chart).

The beds consist of Nereocystis except where indicated as

M Macrocystis

MN Macrocystis and Nereocystis

Mc Nereocystis and some Macrocystis

Long Beach Pond at high tide. Viewed from a hill at the northeast end.

IV.

LOBSTER SANCTUARIES AND HATCHING PONDS: AN INVESTIGATION OF THE LONG BEACH LOBSTER POND, DIGBY COUNTY, NOVA SCOTIA, IN 1914.

By Professor A. P. Knight, M.A., M.D., F.R.S.C., etc.,

Professor of Animal Biology, Queen's University, Kingston.

(With six plates).

ACKNOWLEDGMENTS.

Acknowledgment is due to the Department of Naval Service, Fisheries Branch, for placing all the berried lobsters in the pond at the disposal of the scientific staff. Without these it would have been impossible to carry on the investigation.

Acknowledgment is due also to Professor Prince, the chairman of the board, for furnishing important references to the literature of the subject. In fact, it was he and Professor Macallum, the secretary of the board, who suggested the investigation.

SCIENTIFIC STAFF AT THE POND.

A. P. Knight, M.A., M.D., Professor of Physiology, Queen's University.
H. G. Perry, M.A., Professor of Biology, Acadia University.
W. E. Sullivan, Ph.D., Professor of Anatomy, University of Milwaukee.
A. B. Dawson, Acadia University.
W. Arnold Mersereau, University of New Brunswick.

RESULTS OF THE INVESTIGATION.

The following summary of the results of the investigation and of the conclusions reached will indicate the lines of the research.

In considering whether a rearing plant should be permanently located at Long Beach, certain very obvious disadvantages must be squarely faced:—

(1) The place is not easily accessible, consequently transportation and freight charges are excessive.

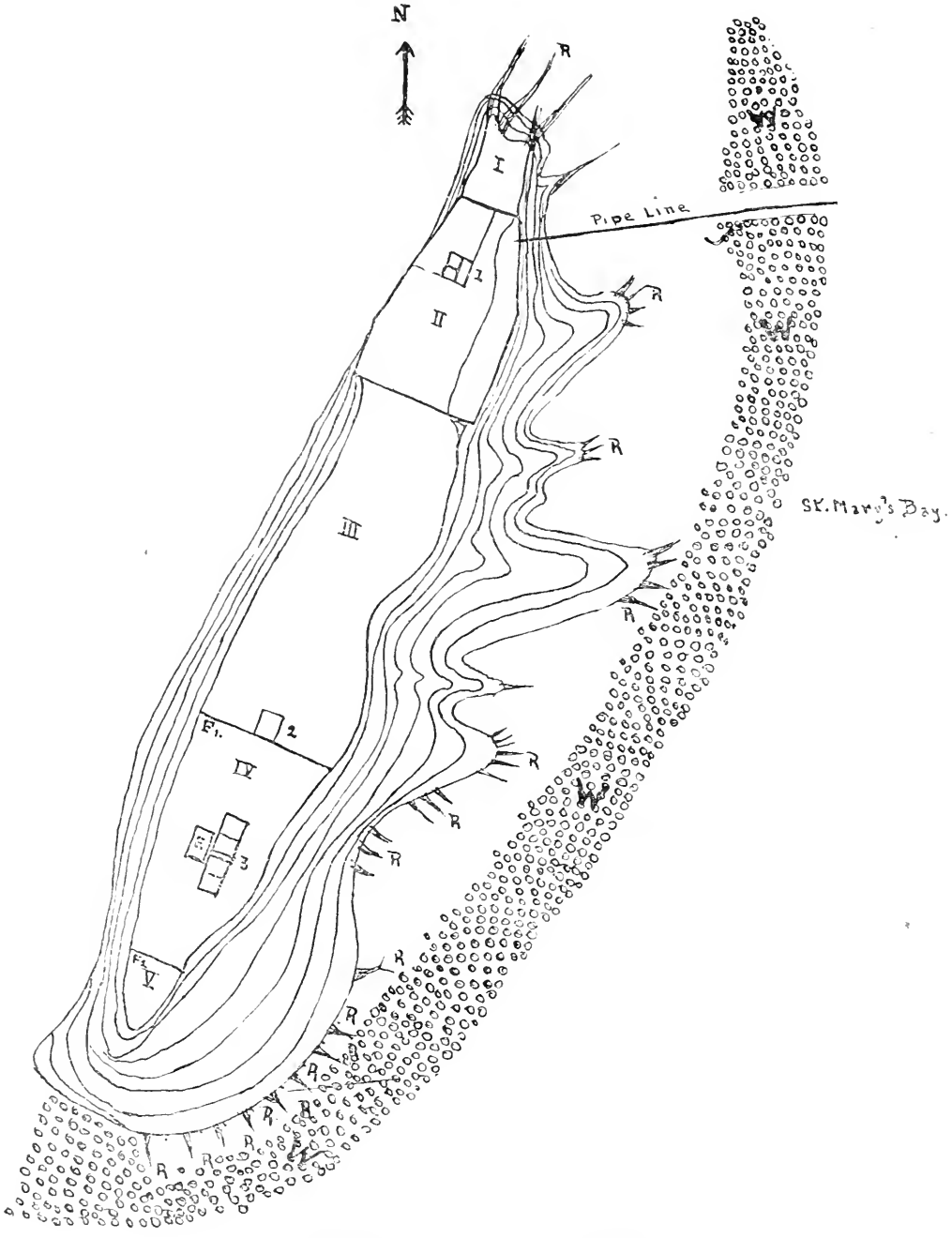
(2) The water is too cold and, therefore, delays the development and moulting of the larvæ.

(3) There is not nearly depth enough of water even under the present number of hatching boxes, there being only 18 to 20 inches under our four boxes at low tide, whereas there should be at least 6 feet. If the full complement of boxes (24) are to be installed, an area of 400 feet by 60 feet by 10 feet depth would have to be provided.

(4) Too great a growth of moulds, diatoms, and Cyanophyceæ, causing pollution of the water and sickness and death among the larvæ.

(5) Too much cloudy and foggy weather, thus depriving first stage larvæ of the sunshine into which they naturally swim whenever they can.

As against these disadvantages may be placed two very important advantages, namely, placidity of surface and suitable salinity. The surface of the pond is protected from high winds throughout its length by a hill on the west side and the high sea wall on the east. According to Mr. Martin, who investigated the subject last season, the salinity nearly equals that of the bay of Fundy. The amount of fresh



GENERAL PLAN OF THE PONDS.

W, W, W, W. Stone or sea-wall separating the pond from St. Marys bay on the east.

R, R, R, R, etc. Points inside of the sea-wall, at which rivulets enter and leave the pond during the rise and fall of the tide. The numerous wavy lines are intended to represent different levels of the water between high and low tide.

I, II, III, IV, V, indicate the five sub-divisions of the pond from the north to the south end.

Sub-division II, the cement pound, is an elongated six-sided enclosure, further subdivided into three smaller compartments, each 20 feet by 20 feet, as at 1, and one large compartment, 85 feet by 85 feet.

The wooden enclosure, marked 2, in sub-division III, is a temporary structure, 20 feet by 20 feet, and accommodated about 200 berried lobsters in 1913, when the cement pound was being built.

The hatching and rearing plant, 3, is located in sub-division IV, between fence F1 and F2. The letter E represents the position of the engine house. The four squares east of the engine house represent the location of the four hatching and rearing boxes. (Drawn by A. B. Klugh, M.A.)

water entering from the hillside is insignificant, and in my judgment would in no way endanger the life or undermine the vitality of any adult lobsters confined in the pond.

Notwithstanding the great disadvantages, it is only fair that the plant should be operated another season before a final judgment can be rendered as to the suitability of the pond for rearing young lobsters to the fourth or fifth stage. The disadvantages, however, overbalance the advantages so much that in my opinion the board would not be justified in asking the Government to expend any money upon the cement pond, excepting a small sum sufficient to provide the adult lobsters with shelters from the excessive light and heat of the sun, and perhaps a further small sum in reducing the leakage.

(6) While Long Beach pond is not likely to prove suitable as a reserve in which lobster larvæ can be raised to the lobsterling stage, it may nevertheless become even more valuable to the lobster industry: (1) as a sanctuary for berried females during the open season, and (2) as a mating ground for male and female commercial lobsters after the open season has ended.

LOCATION.

Long Beach pond is an elongated area of about 5 acres of sea-water at low tide and 7 acres at high tide. It is situated 4 miles from the southwest end of Digby Neck, Digby county, Nova Scotia.

The sea-wall which separates the pond from St. Mary's bay on the east is nearly 2,500 feet long, and varies in width from 20 to 50 feet on top. It consists of boulders of all sizes up to about 100 pounds intermixed throughout with sand and gravel. As a consequence, sea-water enters and leaves the pond along nearly the whole length of the sea-wall, but especially at points marked R.R.R., etc., on the general plan.

TIDES.

The tide rises and falls in the pond between 5 and 6 feet at the lower or southwest end, less, of course, at the upper or northeast end, and is later than the rise and fall in St. Mary's bay by about two hours. This delay in rise and fall is due to the obstruction which the sea-wall offers to the ingress and egress of the sea-water.

For convenience of description the pond may be considered as consisting of the five subdivisions, marked on the general plan as I, II, III, IV, and V.

Division I is the shallowest part of the pond, consisting of a small pool of no importance at the northeast end.

Division II is in some respects the most important portion of the pond. It is known as the cement pound, being inclosed on all sides by cement walls. It was constructed by the Department of Marine and Fisheries for the purpose of impounding berried lobsters, or holding them during the open season, the intention being to liberate them again at the beginning of the close season so that they might hatch their eggs naturally in the sea.

Division III, like Division II is very shallow at low tide, varying in depth from an inch or two to 8 or 10 inches in most places, but much of it is a mud-flat covered with sea-moss (Chætomorpha).

Division IV, between the wooden fences (E. 1 and F. 2), is the deepest of the pond. Here, over an area of about 25 feet by 50 feet, the water is about 5½ feet deep at low tide.

Division V is the part at which there enters and leaves probably two-thirds of all the water which composes the tidal volume into and out of the pond.

Long Beach pond is not directly accessible by railroad, boat, or stage. As a consequence, the cost of freighting construction material and all kinds of supplies to the place is greatly in excess of what it would be, if a more accessible location had been

chosen. For example, it cost nearly $5 per 1,000 feet b.m. to bring lumber from Weymouth, 7 miles away, and lay it down on the beach where construction was going on. Then, too, the cost of labour is high. Labourers ask $2 a day, handymen $2.25, carpenters $3 and $3.50 a day, a master carpenter $4. The rate for an ox-team and man ranges from $4 a day to $3. These wages may not be too high; but, at any rate, they exceed the rates which prevail around Little River.

THE PONDS AND SANCTUARY.

The acquisition of Long Beach pond, Nova Scotia, and Gabarus pond, Cape Breton, by the Government as sanctuaries for buried lobsters should need no defence. In fact "the reservation of natural inshore lagoons, harbours and coves" as breeding grounds for lobsters was recommended by the Lobster Commission of 1898 (see page 33 of their report).

It is not necessary that the sanctuaries should all be like the two mentioned above. On the contrary, they should be of different sizes, depending upon the varying needs of different localities. Some of them might well be very small harbours, having narrow entrances, and sheltered from high winds. Such entrances could be closed with a latticed fence or gate so as to admit tidal water freely, and at the same time retain lobsters. Others might be small wooden inclosures placed in coves or other sheltered places along the coast. Small sanctuaries might be quite as useful as large ones, and would not cost one tithe of the money.

To realize how useful a small wooden sanctuary may be, one has only to learn that the wooden pounds (within Long Beach pond) which accommodated 196 berried lobsters in 1913, during the time that the cement pound was being built, was a structure only 20 feet by 20 feet. "Too small," you exclaim. Of course it was: but it was sufficient to retain the lobsters until the open season ended when they were returned to the sea to hatch their eggs in the natural way.

This wooden enclosure could not have cost more than $150; it might just as well have been located in any other sheltered place than in Long Beach pond, and it accommodated nearly 200 berried lobsters throughout the open season of 1913 and through part of the season of 1914.

It must not be understood that this report advocates the establishment of tidal enclosures without any regard to cost. On the contrary, it recommends that a number of small wooden enclosures, costing not more than $200 or $300 each, be established as an experiment along the maritime coast at points convenient to large lobster factories, and it bases this recommendation upon the work accomplished at Long Beach pond in 1913 and 1914.

In making this recommendation it must be distinctly understood that the berried lobsters are not to be retained in the pound while hatching their eggs. They should be returned to the open sea as soon as the eggs show the first signs of hatching out. Our observations at Long Beach are decidedly opposed to the idea that the lobster larvæ could ever grow into adults or even "tinkers" within the confines of the pond. There were too many enemies present in the pond to permit of the growth of even a single larva into an adult lobster.

Furthermore, this recommendation is based upon the supposition that berried lobsters collected by the patrol boats shall be properly cared for during transportation. They should be towed to the sanctuaries in specially constructed tanks, or they should be packed in moist sea-weed and kept cool with ice throughout the journey.

Then again on reaching the sanctuaries the mother lobsters should get all the food they will eat—and good food, not gurry. Of course every one knows that the average fisherman feeds his impounded lobsters (if he feeds them at all) upon the decaying heads, backbone, ribs, fins, and viscera of fish which he is cutting up for

bait; and he will tell you with supreme confidence that lobsters are fond of the disgusting mess. To be sure, starving lobsters will eat bones, just as starving men have been known to eat their boots; but to assert that putrefying gurry is all the food that berried lobsters require is to assert what cannot possibly be true.

Another necessity in conserving the health and strength of the animals is shade. In their natural haunts they shrink from the light, hide under rocks or in weeds, and burrow in the mud. Why cannot these natural habits of the animal be recognized in any sanctuary that may be provided for them? Shelters in the shape of boxes made of cement or wood should be provided on all areas in which they are confined. If the space is small a dark canvass "fly" such as is stretched over a tent in hot weather would meet the habit of the animal to some extent at least. Surely if it is worth while to impound lobsters at all for breeding purposes, it is worth while to see that animals are well cared for both during transportation and confinement. The attitude of the intelligent stock-breeder towards his breeding animals is the attitude which should be inculcated upon fishermen in regard to berried lobsters.

Lastly, before a decision is reached as to the location of any inclosure, the pond, cove, or harbour in which it is proposed to locate it, should be subjected to a biological examination. Its fauna and flora should be determined for the purpose of discovering possible enemies of both adults and larvæ. Its bottom, its depth of water at high and at low tide, its available food supply for lobsters, its landing facilities, its accessibility for securing supplies—all of these things must be carefully considered if success is to follow the inauguration of any government scheme of tidal enclosures.

DECREASE OF LOBSTERS.

Failing adequate means of protection, it looks to-day as if the future plenitude of the lobster were doubtful. The catch in proportion to the men and gear employed in it has been steadily falling off in recent years. The canneries have been accepting thousands of "tinkers" or half-grown lobsters, and as long as the canners will buy, the fishermen will continue to catch and sell these immature animals, thus cutting off the supply of full-grown lobsters at its very source. It is, of course, illegal to sell or buy female lobsters with eggs on them; but it is an easy matter for the fishermen to scrape off the eggs. In proportion, therefore, as "tinker" lobsters are destroyed and eggs are removed from the mother animals, in just that proportion will the supply of lobsters be cut off in the future.

As against this wastage of lobster life the close season counts for something and so do the hatcheries, though there is some doubt about this. As a means of replenishing our depleted lobster waters, the hatcheries have been long known to be unsatisfactory. Moreover, the expense of running them is great. The mother lobster can hatch out a higher percentage of eggs than any artificial hatchery can, and she can in addition, distribute the young in the sea more widely, more uniformly, and more safely than any employee of a hatchery.

Why not, therefore, give the mother lobsters a little chance? Let the Government extend the lobster pond system, and establish a number of sanctuaries; let the fishermen be paid the same price for "berried" lobsters delivered at the sanctuaries as for male adults delivered at the canneries; let these mother lobsters remain in the ponds or sanctuaries during the open season and, when the close season begins, let them be returned to the sea to hatch out their eggs in their natural way, and it may fairly be claimed that the Government is at least taking one more efficient step towards the protection of the lobster industry.

THE CEMENT POUND.

A 5 acre sanctuary—the area at Long Beach—is, however, a pretty large area over which to allow lobsters to roam if they are to be fed regularly, kept under proper observation, and if it is desired to recapture and transport them to some other area

at a later date in the summer. Supervision and caretaking over a large area must be limited in some way, or the expense of running the pond would be very great. Consequently the department came to the conclusion that the northeast part of the pond should be inclosed by cement walls, making what may be called a cement pound within the natural pond. [See subdivision II of the general plan of the pond.]

To ensure that animals confined in it should have an adequate supply of fresh sea-water, the pound was connected with St. Mary's bay by an earthenware pipe 20 inches in diameter. When the tide outside rose higher than the bottom of the pound, a valve opened automatically, and it was expected that a large volume of sea-water would be retained in the pound. The scheme looked feasible, but the cement pound as it existed in the summer of 1914 was quite useless, because it would not retain water as planned.[1]

OTHER USES FOR THE POUND.

Three other uses have been suggested for the cement pound besides that of affording protection for berried lobsters. One of these was that the Biological Board should use it for the purpose of rearing lobster larvæ to the lobstering stage, that is, to the stage at which young lobsters cease to live at the surface of the water and descend to the bottom.

In accordance with this suggestion the writer spent three days at the pond about the middle of May, and reported to the board that while no use could be made of the cement pound for the purpose suggested, on account of the insufficiency of the water, even at high tide, he thought a small experimental rearing plant of the Wickford type could be located at the opposite or southwest end.

Even there the writer was in doubt as to whether there was a sufficient depth of water at low tide. He found the depth to be not more than 5½ feet. The rearing boxes which it was proposed to use would be 4 feet deep and would be immersed about 3½ feet in the water so that there would be less than 2 feet below the boxes, where 6 feet at least would be regarded as a minimum. Thus, before the experiment was undertaken at all, the insufficiency of the depth of water and area of water in the pond was pointed out. Moreover, this limited area of 25 feet by 75 feet would admit of the installation of only four hatching boxes, whereas the full complement of boxes in the Wickford system contemplates as many as twenty-four boxes. In order, therefore, to have an area of sufficiently deep water anywhere in the pond, to justify the installation of a complete rearing plant, it would be necessary to dredge an average of about 7 feet from the bottom of the pond over an area of approximately 400 feet by 60 feet. Either this, or a deep canal would have to be cut in the sea-wall, and enough water admitted from St. Marys bay to flood the pond 6 feet deep at low water. Which of the two plans would be the more economical is a question which only an expert hydraulic engineer could decide, but neither plan should be adopted until our present plant has been run for another season at least.

THE WICKFORD PLAN OF REARING YOUNG LOBSTERS.

The Wickford plan of rearing lobsters was the result of eight or ten years' of experimentation by Professor A. D. Mead and his assistants working under the auspices of the Rhode Island Fish Commission. Up to 1898 nearly all efforts to increase the lobster supply artificially were limited to hatching lobster eggs in jars.

Now, lobster hatching must be clearly distinguished from lobster rearing. Just as the hatching of chickens is a different process from the rearing of chickens, so the hatching of lobsters is quite a different matter from the rearing of lobsters. The

[1] Since this report was written, the Deputy Minister of Naval Affairs informs me that the leakage of water from the pound has been stopped, and that the mud and slime on the bottom have been removed under the direction of a Government engineer.

former process has been carried on in our Dominion hatcheries since 1891. Hitherto our hatcheries have confined their efforts to scraping the eggs from the abdomen of the mother lobster, placing them in jars of well aerated sea water and, when the young have come out of their "shells," emptying them into the sea. Many millions of young lobsters have been hatched in this manner every year since 1891.

The rearing of lobster babies for three or four weeks before putting them into the sea is the main feature of the Wickford system. In this system the mother lobsters do the hatching just as naturally as they hatch the young in the sea. The only difference is that in the Wickford plant the mother or berried lobsters are placed in large hatching boxes 10 feet long by 10 feet wide and 4 feet deep, set down in the sea about 3½ feet. The water in these boxes is kept aerated by revolving paddles. The animals are shaded by canvas covers, and regularly fed. You may call these boxes the "nests" of the mother lobsters if you like. At any rate they serve the same purpose as nests do in the rearing of young birds.

Every evening, especially if the weather is fine and the eggs ready to hatch, the mother lobster may be seen moving to and fro those parts of her body to which the eggs are attached, and presently a considerable number of the young escape from their "shells" and swim about near the surface.

These young are removed from the hatching box to other boxes called rearing boxes of the same size but with different length of paddles revolving in them. The "babies" are dipped up with shallow dip-nets made of cheese cloth, and are usually counted with the aid of an automatic counter. As many as 25,000 may be put into a rearing box; but at Long Beach we never transferred more than 15,000, and generally only 5,000 to 8,000, as we were anxious to rear quality rather than numbers during our first season.

With the transfer of the young, or larvæ as they will often be called, to the rearing boxes, the real work of rearing young lobsters begins. Feeding the larvæ is perhaps the easiest part of all. At Wickford they are fed chiefly upon hens' eggs, scrambled and pulverized; but clams and fish finely shredded are equally good.

Three big difficulties confront the operator: (1) the aeration of the water in the rearing boxes; (2) the prevention of cannibalism among the larvæ; and (3) the spread of infectious disease.

The aeration of water in the boxes in which lobsters, young or old, are kept is just as necessary as fresh air is for human beings or for domesticated animals. In fact, the aeration of water for aquatic animals corresponds precisely to ventilation for terrestrial ones; for, just as fresh air must be admitted to our houses, and frowsy air allowed to escape, so the stale sea-water in the hatching and rearing boxes must be replaced by fresh sea water if the lobsters are not to be smothered for lack of oxygen. The mechanism by which aeration is brought about will be described later on.

As to cannibalism, it is generally recognized that the younger and weaker larvæ are subject to danger from the stronger and more active ones. The more the larvæ are crowded together, as they must necessarily be in rearing boxes, the greater the extent to which the habit is likely to grow. Lack of food must tend to promote such a habit, as one can readily understand. If, however, the larvæ are kept moving about rapidly in the water of the rearing boxes, they are to some extent kept separate from each other and thus the danger of cannibalism would be greatly reduced. Aëration of water and reduction in cannibalism would be both controlled, to a very considerable extent at least, by the rate at which the water circulates in the boxes.

Perhaps the greatest difficulty of all is the prevention of disease. Just as human beings are killed by infectious diseases like measles, scarlet fever, diphtheria, smallpox, and consumption, so our first batch of 40,000, as well as our second batch of 30,000, were nearly all attacked and killed by infectious diseases caused by very tiny plants. Three of these plants are known as diatoms, and the fourth as a fungus.

The young of nearly all animals are more liable to such diseases than the adults. In Canada about thirteen babies die during the first year out of every 100 that are born; but nevertheless about three babies out of every four grow into men or women. In the case of lobster babies, however, only one out of every 15,000 grows into an adult. The inexorable forces of nature in the shape of cold, famine, and disease kill off the young by millions.

Whence came the parasitic plants from the growth of which our larvæ died? The answer to this question lies at the very root of our failure to rear larvæ. Did they come from the pond water, or did they come from the mother lobsters? A physician when looking for the origin of a case of scarlet fever would first ask whether any other member of the family had previously suffered from the disease. If not, he would look for some point of contact between the patient and some outsider who had been previously ill with the disease. Similarly, the staff at Long Beach cast about for the possible source of infection. Very early in our first experiment the microscope revealed the principal diatom adhering to the limbs of the larvæ. Later on, its growth on the limbs became so thick and "fuzzy" that any one could recognize it with the naked eye, once it had been pointed out.

Where did it come from? Search (under the microscope) among scrapings taken from the legs and "feelers" of mother lobsters showed the presence of the four kinds of parasitic plants. Here, then, was one possible source of infection. In hatching out their eggs, the mother lobsters may have transferred the parasites to their young, just as a human mother may give an infectious disease to her child.

The other sources of infection were, of course, the sea or the pond water. In order to determine whether the parasitic plants come from the pond water, or from the sea, tow-netting was carried on: (*a*) in St. Marys bay, and (*b*) in one of the hatching boxes which had been raised, cleaned, and repainted. The examination of the material obtained in this way, as well as the descriptions of the structure of the diatoms and fungus, awaits the examination by experts to whom the material has been sent, and who will report upon it in the near future.

In one particular the parasitic plants which caused the death of the larvæ are quite unlike those which cause infectious diseases among human beings. The former rapidly increase in number when growing in the light, the latter are usually killed off by the light. To keep diatoms, therefore, and other parasitic plants off mother lobsters, they should be kept either in deep water into which comparatively little light can penetrate, or they should be provided with artificial shelters from the light. Sheltering from sunlight would not merely be conforming to the natural habit of the animal, but it would be a means of lessening the parasitic growths upon them, and therefore preventing the spread of growths to their young.

An observation made by Williamson would appear to explain how parasites might grow profusely on berried lobsters between the time they reached the pond and the time they hatched out their young in our hatching car:—

> "In each of the two large concrete tanks were placed two female lobsters. In one tank a board shelf afforded protection from the sun so that only the antennæ of the lobsters were exposed to its rays. In the other tank there was no protection from the sun whatever. In the first case, after the summer season was over the lobsters themselves were free from growths of all sorts, but the antennæ were covered. The bodies and appendages of the lobsters which were confined in the exposed tank were, however, quite hidden by the prolific growth of sea-weeds, laminaria, young mussels, etc."—(*Quoted from the Report R. I. Com., 20th Jan. Sess., 1906, foot-note to sec. xvi, 'Influence of Parasites.'*")

A clear distinction must be made between the effect of diatoms on larvæ and the effect of a fungus growth. The former act mechanically and by clogging the limbs

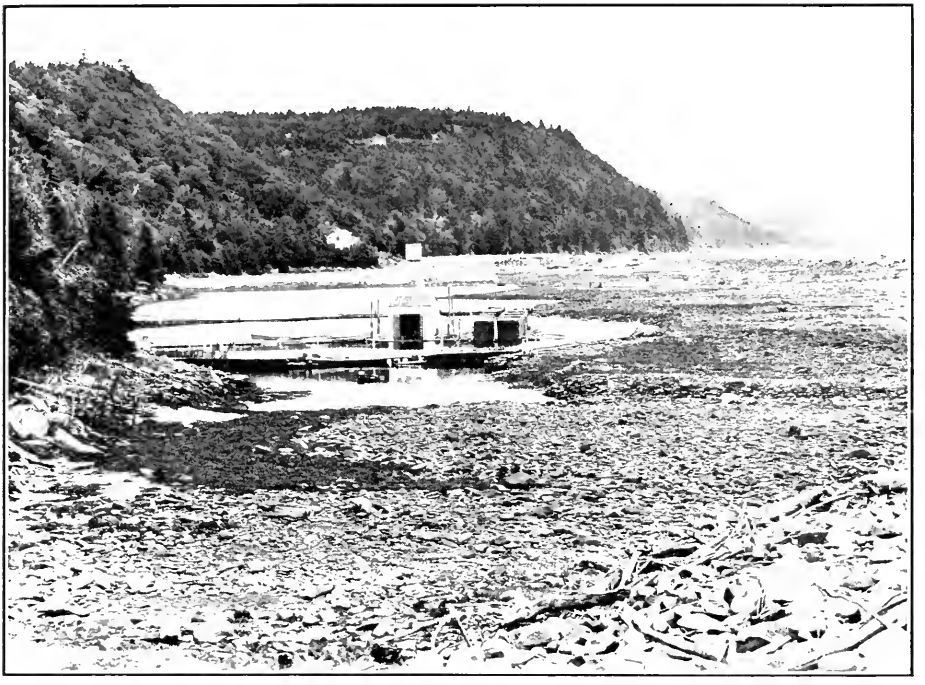


Fig. 1.—The pond as seen from the southwest at low water. Our hatching plant is in the foreground. A wooden fence, F2, is seen in the foreground, and one, F1, farther back. These two fences form the boundaries of sub-division IV. Sub-division V. is in the foreground.

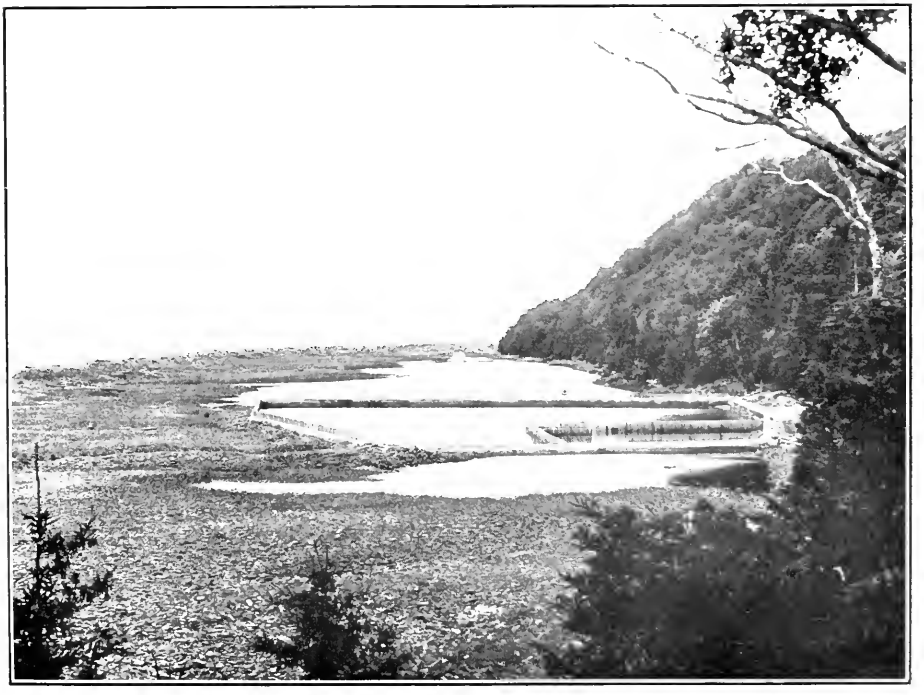


Fig. 2.—The pond at high water viewed from an upper window of the mess-house. The cement pound is seen in the foreground. Wooden partitions at the right hand subdivide the pound into three small compartments and one large one. The rearing plant may be seen at the farthest end of the pond.

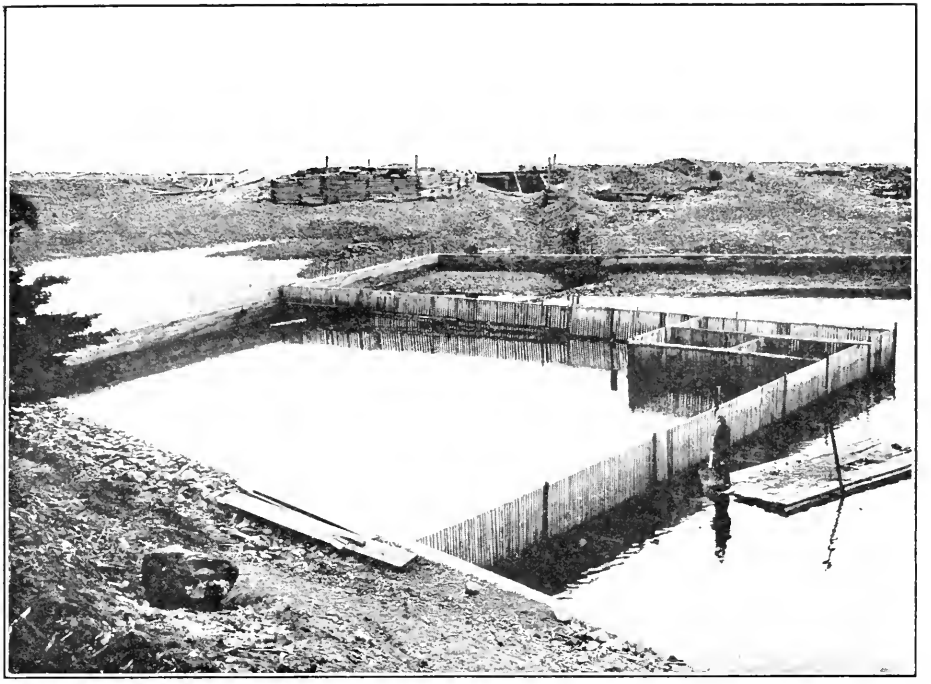


Fig. 1.—A mating pound with one large compartment and three smaller ones, all within the cement pound. The deepest water in the cement pound is immediately under the three small wooden compartments. This view was taken at about half tide, and shows the eastern side to be already bare of water. The man standing on the wall at the far side marks the position of the intake pipe.

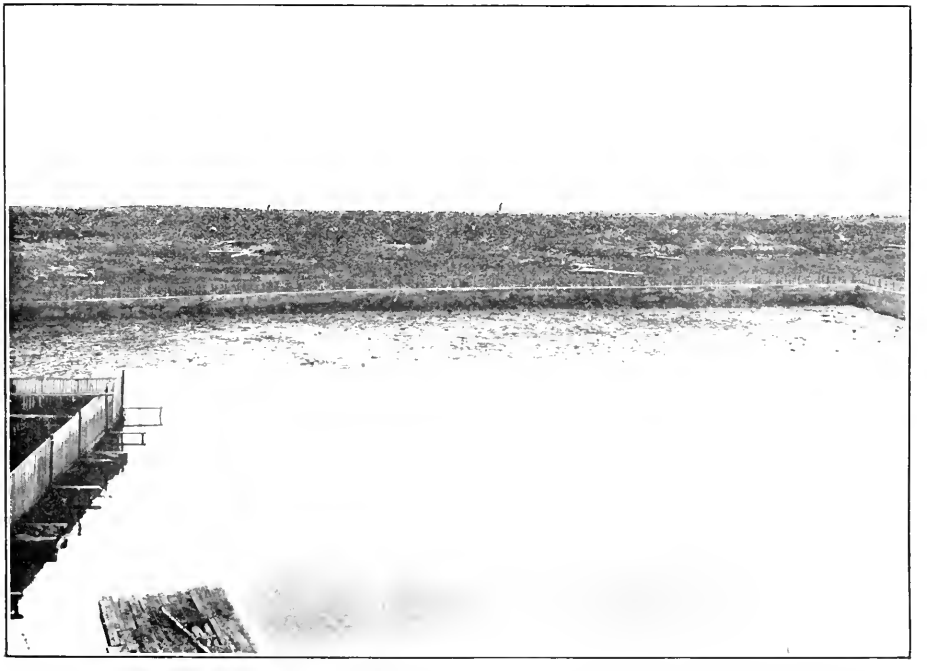


Fig. 2.—View of the eastern side of the cement pound taken near low tide. Nearly one-third of the bottom is bare of water. The rest is covered with water varying in depth from an inch to ten or fifteen inches. A small part of the wooden pound within the cement pound is shown at the left. The sea-wall is some distance beyond the cement wall, and St. Mary's bay in the background. The distant shore of the bay is faintly visible.

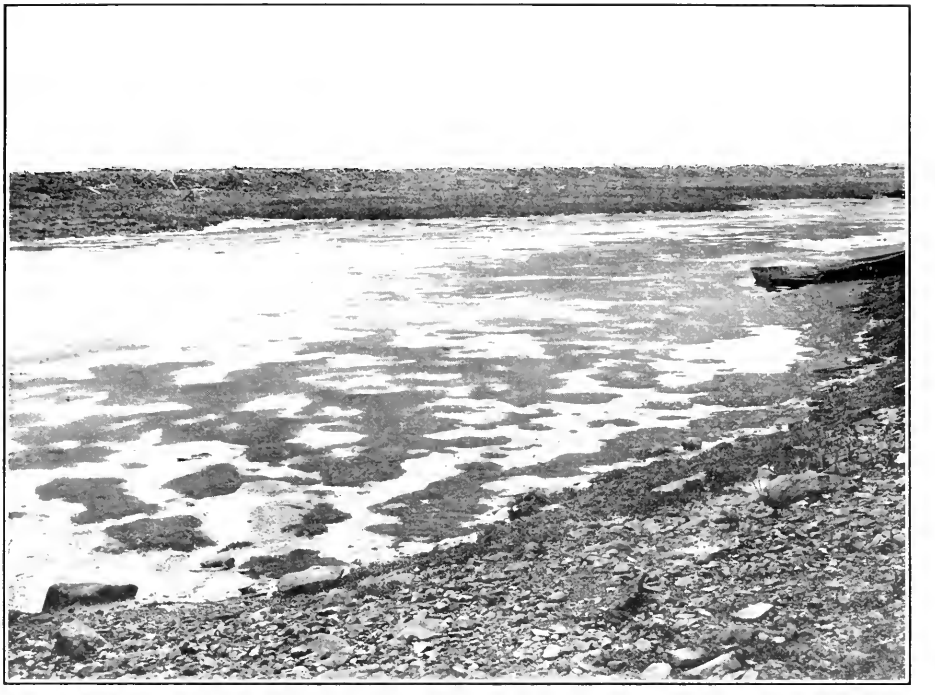


Fig. 1.– Sub-division of the pond marked III on the general plan, viewed at low tide. The dark patches are mud flats ; the light patches are shallow pools of water.

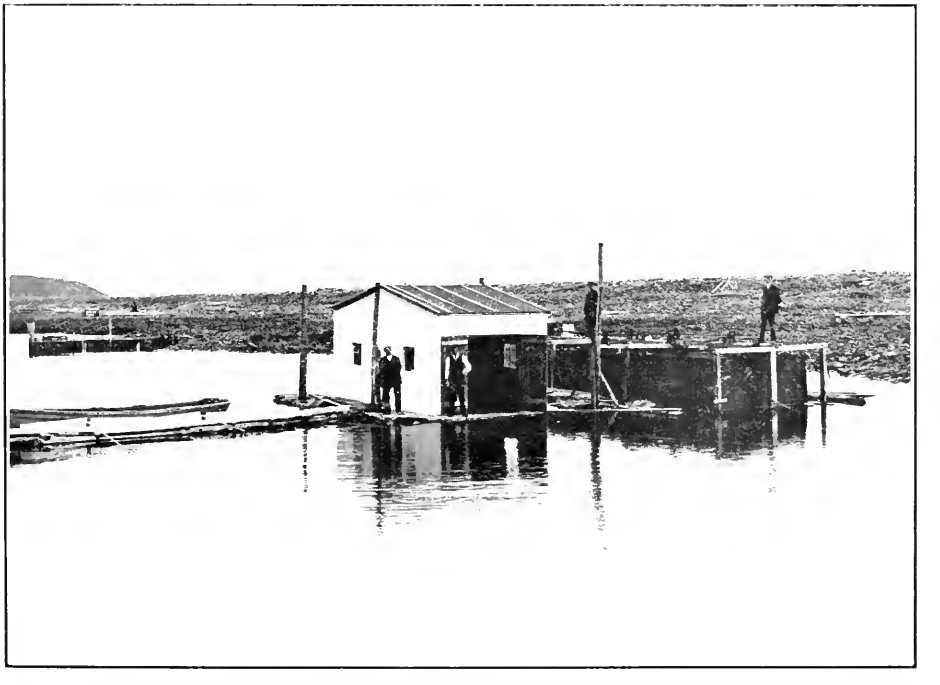


Fig. 2.—The plant viewed from the southwest side. A floating walk connects the engine house with the shore. The tall piles hold the rafts in place. The sea-wall is seen in the background.

"Berried" lobsters. Young females carry about 10,000 eggs on their abdominal appendages. The older and more mature ones may carry as many as 80,000.

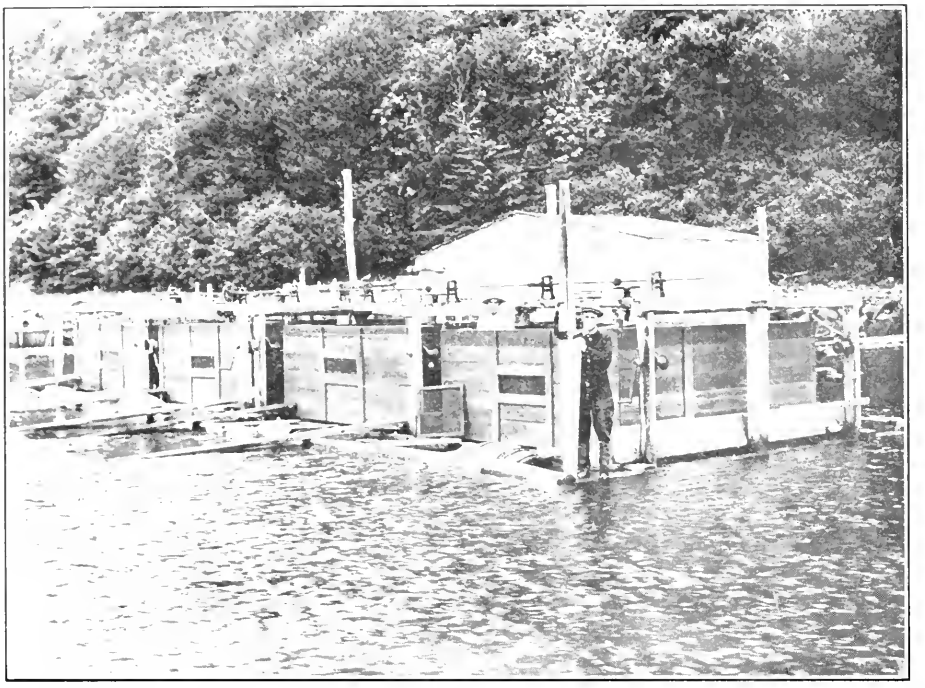


Fig. 1.—Rearing plant viewed from the east side. The four rearing or hatching boxes have been lifted out of the water. Side windows, 4 feet by 1 foot, are shown at the sides. Mr. Dawson is holding one of the paddles upright. The engine house is in the background.

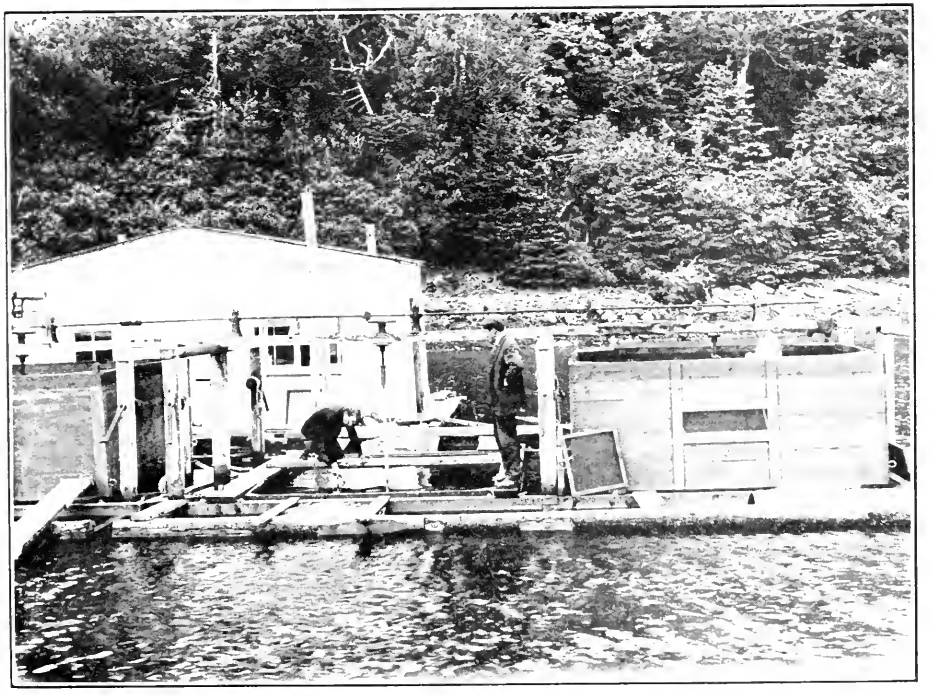


Fig. 2.—Rearing plant viewed from the east side. One of the rearing boxes is shown immersed in the water, and Mr. Dawson in the act of feeding the larvæ.

and mouth parts prevent the animals from feeding and moulting. The latter act quite differently. They are hair-like growths which penetrate the "skin" of the larvæ, and not merely prevent moulting, but suck out the juices from the bodies of the larvæ, and inevitably produce death.

WEATHER.

Another difficulty which we encountered was adverse weather conditions. At first sight it might appear strange that lobster larvæ should be subject to slight variations in weather conditions, but they are, even more so than human beings. Every one knows that when we are exposed to cold and damp and rainy weather we "catch cold," which is only another way of saying that when our vitality has been lowered by cold, disease germs enter the body all the more readily and make us sick. In a somewhat similar way, the foggy, cloudy, and cold summer at Long Beach pond last season delayed greatly the growth and moulting of the young, and gave plenty of time for disease germs to attack and kill them.

How do we know that warm water and sunlight are favourable to the growth of young lobsters, and that cold water and foggy weather are unfavourable? Very simply. We just examine the young lobsters under the microscope from day to day, and see how long it takes them to moult, that is, to change their "skin." When lobsters come out of their "shells" they are said to be in their first stage. They have no little legs or swimmerets on the under surface of their abdomen. When, however, they are properly fed, and when the water is warm and there is fair weather, they shed their skin or outside covering in from five to six days. They are then said to be in their second stage. In this stage they have short little swimmerets on the abdominal surface, and the presence of these is the chief mark by which we recognize that they are in the second stage. In three or four days more, if all conditions are favourable, the young moult again, that is, change their skin and pass into the third stage. Every time they change their skin they are said to moult and pass into another stage, and each stage is marked by some slight change in the size, shape, or colour of different parts of the beast's body.

Now, remembering what moulting means, let us return to the subject of the effect of warm and cold water upon the growth and development of lobster larvæ.

Professor Gorham has drawn up the following table showing the results of varying degrees of warm and cold sea-water upon the growth and development of lobster larvæ at different points along the Atlantic coast:—

Place.	Temperature.	Time taken from 1st to 3rd stage.
Orr's island, Maine	57°-63° F.	25 to 26 days.
Woods Hole, Mass.	63°-65° F.	22 to 25 days.
Wickford, R. I	65° F.	16 days.
" "	72° F.	9 days.
Annisquam, R. I.	76° F.	10 days.

Comparing these temperatures and results with ours at Long Beach we find that our temperatures ranged from 60°F. on July 17th the beginning of the hatching to 60°F., on August 22, the close of the plant. The highest temperature registered during the period was 65·2° F., July 30. Our average for the period during which the plant was in operation was 60·8° F., and we were unable to rear any lobsters to the fourth stage. The best we could accomplish was the second stage in ten days and the

third stage in six days longer. The reason we were unable to rear any to the fourth stage was that they became so greatly infected with parasites that they were unable to eat, and consequently died.

It will thus be seen that cold water retards the growth and development of larvæ, whereas warm weather promotes them. If, therefore, the policy of rearing lobsters is decided on as a permanent one for the Dominion, it will be essential that the plant be placed in the warmest sea-water along our Canadian coast.

LIGHT.

Light is another influence which profoundly affects the life of both larvæ and adult lobsters.

How quick and invariable the response to light is in the case of the young was frequently demonstrated to visitors. By transferring a number of larvæ to a basin containing sea-water and then placing the basin on a table so that direct sunlight might fall upon a small part of the water the newly hatched larvæ at once swam into the sunlight. This experiment was repeated again and again with the same results.

The conclusion to be drawn from it is clear enough. The newly hatched larvæ should be impounded in rearing boxes to which sunlight has free access. Cloudy or foggy weather in the earliest stage is unfavourable, and consequently in the selection of a locality in which to place a permanent rearing plant, careful consideration should be given to the amount of sunshine prevalent in the place.

But the young lobster does not seem to enjoy bright sunshine for any lengthened period. After it has moulted twice, and especially after it has moulted three times, the habit of basking in the sunshine changes to some extent to that of retiring from the light. In other words, it begins to take on the habit of the adult. As is well known, full-grown lobsters avoid the light. During the day they hide in burrows or under ledges of rock. In the evening they come out and roam about seeking food. Probably they move about all night, for those in sanctuaries are usually seen very early in the morning returning to their habitual haunts or shelters for the day.

It follows from the foregoing observations that as soon as larval lobsters reach the fourth or fifth stage, and adopt the habit of the adult of avoiding the light and hiding on the bottom in the mud or among the weeds, the rearing operation may cease. During the transition period between stage one, when they delight in sunshine, and stage four when they begin to avoid it, that is, during the third stage, the rearing boxes are shaded from the direct rays of the sun by a canvas covering stretched over the boxes.

It must not be imagined that cold water, cloudy weather, and microbes were the only enemies with which young lobsters had to contend in Long Beach. Eels, sticklebacks and various species of crustacea were present, the latter in vast numbers; *Mysis stenolepis* were also abundant; but above all *Idotea irrorata,* a species of isopod. All of these animals are enemies of lobster larvæ. As regards the last-named animal, an experiment which I suggested to A. R. Dawson shows that larvæ which were hatched in the pond would have but a poor chance to avoid being eaten. Mr. Dawson reports as follows:—

"On July 4, ten lobster larvæ, one day old, were placed in a basin of water, with one isopod. This was at 11 a.m. At 1 p.m. the isopod had killed eight larvæ. Only the cephalo-thorax was eaten. At one time the isopod held two lobster larvæ, one in the first and second pairs of the thoracic feet, the other in the third and fourth pairs. When the isopod had eaten the desired part of larva No. 1, it was released and allowed to float away, while larva No. 2, held in the third and fourth pairs of feet, was passed forward to be in a suitable position for being eaten.

"Almost invariably the isopods sank to the bottom of the basin as soon as they had taken their prey and rested on their backs while eating."

ANNUAL OR BIENNIAL HATCHING.

A second suggestion regarding the cement pound was that it might be used by the Biological Board for settling the question: "Do female lobsters extrude and hatch their eggs annually or bienially."

This question would appear to be already settled unless the habit of the Atlantic lobster differs entirely from those introduced into New Zealand. Professor Prince, who has always adhered to the view that lobsters spawn annually, sends me the report of the Marine Department of New Zealand for the year 1911-12. In this volume, Mr. F. Anderton, the Superintendent of the Marine Fish-hatchery at Portobello, N.Z., reports annual spawning by eleven out of fifteen lobsters in 1911, nineteen out of twenty-one in 1910, and twenty-three out of twenty-three in 1909.

If the lobsters now in Long Beach pond remain healthy during the next year, they will furnish some facts bearing upon this question.

FEEDING EXPERIMENTS.

A third suggestion that has been made regarding the cement pound is that it be used for feeding experiments. This is a proposal which every scientific worker will heartily endorse; but it is work that would be by no means easy. The pound as it stands at present cannot be used for such a purpose, because the bottom is covered with animal and vegetable matter and would thus supply some food for the lobsters. Unless, therefore, the bottom were cemented, it would be impossible to decide how much nourishment the lobsters derived from the bottom of the pound and how much from the special food supplied to them by the experimenter.

In the next place, the experimenter would need to be in a position to control all other conditions of feeding—frequency, quality, and quantity of food. Moreover, the amount and kind of excretion would have to be approximately determined; also, how much of the food is expended in the form of motion and how much in the form of heat.

When the Government, therefore, is prepared to cement the floor of the pound, which would be the very smallest part of the cost of such experiments; build compartments and shelters for the lobsters; guarantee that there shall be abundance of water throughout the year, with no danger of the animals being frozen to death in winter nor sickened by excessive heat in summer; lastly, when the Government is willing to provide salary to secure the services of a trained and experienced physiologist and provide him with a comfortable house at Long Beach throughout the year, then and not till then will it be possible to use the cement pound for experiments in the feeding and growth of lobsters. As the "balanced ration" for cattle was not discovered by an untrained farmer, so the balanced ration for lobsters will not be discovered by an untrained fisherman, who throws "gurry" at his beasts and calls the act scientific feeding.

MATING GROUNDS.

The cement pound, though of no use as a location for a rearing plant of the Wickford type, may nevertheless be utilized, I believe, for another purpose altogether. If a sufficient depth of water can be retained in it from one high tide until the next, if shelters are provided for the animals, and if they are properly cared for and regularly fed, the pond may be used as a mating ground for commercial lobsters.

That there is need for a restricted ground for mating purposes appears to be clear from the following facts: Only 10 or 12 per cent of the female lobsters caught along the Massachusetts coast are berried (see Rhode Island Fish Commission report for 1906). In St. Marys bay and the Bay of Fundy the percentage is much less. Why should not almost all the females carry eggs if their natural habit is to spawn every

year? The explanation appears to be this; the mating of male and female is largely a matter of accident. It is said that the male does not seek out the females, but "tries" every lobster he meets, male and female alike. If a female does not chance to meet a male, her eggs are not fertilized, and can produce no larvæ. The fewer lobsters, therefore, and the wider the area over which they are distributed the less the chances are for mating, and the fewer the number of berried lobsters.

As showing how restricted grounds may promote mating, and therefore, increase the number of berried females, the following facts appear to be significant: After the close season began in June (1914), the department arranged to send sixty-two commercial lobsters, forty-seven unberried females, and fifteen males to the cement pound. These were dipped up and examined about once a week. Before our plant closed (August 22) no fewer than nineteen out of the forty-seven females had extruded eggs. By the end of September nine more had extruded eggs. Not counting seven of the females which were young and under 9½ inches in length, the number extruding eggs (twenty-eight) would amount to 70 per cent of the forty females, a most extraordinarily high percentage.

How else can we explain this high percentage excepting on the hypothesis that the restricted area within which they were confined promoted mating? Whether the eggs have been fertilized or not can only be determined by examining them from time to time and watching for the development of the embryo—an easy task for any well-trained biologist.

In connection with this subject it is worth while to refer to the catch of 3,000 lobsters made in 1913 by Mr. Joseph W. Tidd, of Whale Cove, Digby county, Nova Scotia. Mr. Tidd used 175 traps. The traps were set along the bay of Fundy, about a mile northeast of Petite passage, and a quarter of a mile from shore. While the number of males and females were about equal, only three of the latter bore eggs. Why were there not about 700 berried females in place of three, if female lobsters extrude eggs biennially? Why were there not about 1,500 berried females if they extrude their eggs annually? On either supposition there must be a very high percentage of sterile females, or else, after extruding eggs in any season, they lose their eggs in some way which we do not as yet understand, but simply guess at.

To me the simplest explanation is that the facilities for mating are lacking. There is and has been much over-fishing in the bay, and the animals are scarcer and farther apart than they used to be. Moreover, lobsters are known to be eminently local in their habits, and do not wander far from their natural burrows or shelters. Perhaps their movements are restricted by the strong tidal currents which prevail in the bay. These are possible reasons why there is relatively little mating and therefore few berried females. Assuming that this is the true explanation, one can readily see the tremendous advantage of mating grounds. For after all is said and done, there are only three important ways in which we can increase our lobster supply: (1) by increasing the numbers of females which carry eggs; (2) by rearing the larvæ to the fourth or fifth stage, and there is some doubt as to whether this can be done economically; and (3) by limiting the catch of the larger and more mature males and females. If some temporary tidal enclosures are constructed here and there along the coast, as suggested elsewhere in this report, they could be used as mating enclosures for commercial lobsters as soon as the open season has ended and the berried females have been liberated in the sea.

CONSTRUCTION OF THE PLANT.

The carpenter work was ready for the shafting and gearing on June 23, but the machinery was unfortunately delayed in transportation for over a fortnight at St. John, and did not arrive until July 10. The rearing plant was started on its regular work on July 17, and ran exactly one month, when our supply of hatching lobsters

gave out. If our machinery had not been delayed in transit, we should probably have been able to complete three hatchings; but it is not likely that the results would have differed much if at all from those recorded in the preceding pages.

THE MECHANISM OF THE REARING PLANT.

The mechanism of our plant is very simple. It consists of three skeleton rafts which are buoyed up by empty molasses puncheons. One of the rafts carries the engine house, the other two carry two rearing boxes each.

The foundation structure of the two rafts which carry the four rearing boxes is easily understood. If looked at from above, it would present the following appearance:

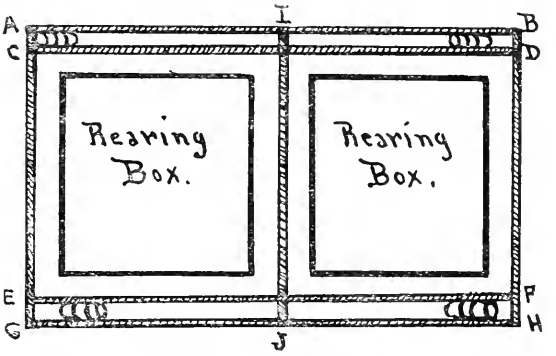


Fig. 2.—Foundation of a Raft.
(Drawn by A. B. Klugh, M.A.)

AB, CD, EF, GH, are parallel pieces of spruce timber 6 inches by 6 inches, A, G, I J, and B H are cross-timbers of the same size. They are all firmly bolted together and make up the floating part of the raft. At the four corners are fastened four large molasses puncheons.

The third raft differed from the other two only in the fact that it supported the engine house and, on account of the extra weight which it had to carry—engine, shafting, tools, etc., it was buoyed up by eight puncheons in place of four.

REARING BOXES.

Inside of the two largest areas of the skeleton rafts are placed two hatching or rearing boxes. These measure 10 feet by 10 feet by 4 feet, and are made of planed matched spruce boards $\frac{7}{8}$-inch thick, and carefully put together so as to prevent the escape of the larvæ. There are no openings into the boxes exceeding $\frac{1}{16}$-inch. Each box has four windows in it; two in the bottom, 2 feet by 2 feet, and two in opposite sides 4 feet by 1 foot. These are screened with bronze or brass cloth of $\frac{1}{16}$-inch mesh.

Each box is lowered into the water about $3\frac{1}{2}$ feet and kept there while the apparatus is in operation. On each of the rafts which support the hatching boxes is an elevated framework of timber 4 feet by 6 feet and 5 feet high, built for the support of the machinery which is used in making the water circulate. This superstructure, with its accompanying shafting and gearing, can be understood by looking at Plate VII.

When the plant is in operation, the rearing boxes are held down in the water by two planks, one at each end of a box, and the paddles, which will be described presently, are kept revolving at the rate of between eight and nine times per minute. When not

in operation, as between finishing with one batch of larvæ and starting a second batch, the boxes are raised from the water, dried, and their inside given a fresh coating of copper paint in order to prevent the parasites that may have infected one batch from infecting the following one.

PADDLES.

The paddles are paired structures about 9 feet long. Ours were 8 inches broad at one end and tapered gradually to 4 inches at the other. They were attached to 1 inch gas piping by clips such as are commonly used by plumbers in fastening gas piping to walls. The action of the paddles is such as to draw fresh salt-water in through the windows on the bottom of the rearing box, give it a circular and upward movement in the box, and pass it out through the side windows. This purpose is accomplished by setting the front edge of each paddle slightly downward. In this way, not merely was the water made to circulate, but its velocity could be adjusted, a most important thing in the rearing of the fry, according to officials at Wickford. The velocities used at Long Beach, estimated by the length of time it took a light cork to float in the water around a circle of 15 feet circumference were 1 foot per second, down to 1 foot in $1\frac{3}{4}$ seconds. The writer was unable to see any differences between the effects of these two velocities on the larvæ, the dominant factors being the low temperature of the sea-water and the excessive development of plant parasites.

THE POWER.

Our motive power was a two-horse-power horizontal engine made by the Fairbanks Morse Company. Though it was required to move the paddles in only four boxes, the pond is so sheltered from winds in every direction that the engine could easily generate sufficient power to run the machinery of a full Wickford plant of twenty-four boxes. In fact, if it is found after next season that the pond is not suitable for a permanent rearing plant, the engine and gearing can be removed and the equipment tried elsewhere. After the first week, during which the batteries and the wiring gave us some trouble, the engine ran for nearly a month, day and night, with only a few short stoppages for cleaning and adjustment.

ROUTINE WORK.

As soon as a sufficient number of larvæ were placed in the four boxes, regular routine work was established. The first step, of course, was to secure a sufficient number of mother lobsters whose eggs were all hatching at the same time. Eight or ten of these were placed in one of the boxes, and at the end of two days a sufficient number of larvæ had hatched out to stock another box. Two of the staff were detailed to count out between 5,000 and 8,000 fry by means of a dip net. An automatic counter held in one hand and operated by the thumb enabled each man to count out the exact number of larvæ which it was desired to transfer to each box.

All the boxes having been stocked in this way, routine work consisted in arranging a division of the work among the staff. For most of the time there were only three of us, and consequently each man was on duty for eight hours out of the twenty-four. The longest watch was felt to be the one lasting from 11 p.m. until 7 a.m. the next morning. During each watch the engine had to be supplied with gasolene, with water for cooling the cylinder, and with plenty of oil for lubrication. In addition to these duties, each man during his watch had to scramble eggs or macerate liver or mackerel and feed the fry every two hours. The work was anything but a "summer outing," though some of the local people evidently thought so at first. Possibly, reader, you may think so, too. But if you had taken your turn at the work, night and day, Saturdays and Sundays, week in and week out, for a month; and if in addition you had attempted to carry on some systematic scientific research during the day, your little delusion about our experiments being a summer outing would soon have been dispelled.

V.

FIRST REPORT ON THE "BARREN OYSTER BOTTOMS" INVESTIGATION, RICHMOND BAY, P.E.I.

By A. D. Robertson, B.A., *University of Toronto.*

In this investigation, which began early in May and was carried on until the middle of September, 1914, the following points were considered:—

1. Nature of the bottom in the various parts of the area.
2. Extent of level portions and of banks and deep gullies.
3. Depths in the various parts of the area.
4. Presence of eel-grass and seaweeds.
5. Salinity.
6. Temperatures at top and bottom.
7. Plankton and floating oyster food.
8. Inflow and amount of fresh water; number of flowing streams.
9. Presence of oyster enemies, starfish, drill, whelk, etc.
10. Occurrence of small oysters as evidence of spatting.
11. Occurrence of dead oyster shells, as evidence of former production.
12. Freezing to bottom in winter.
13. Time of spawning.
14. Time and extent of spatting.
15. Former output of the bay.

NATURE OF THE BOTTOM IN THE VARIOUS PARTS OF THE AREA.

Dredgings and soundings were made in the various parts of the bay for the purpose of investigating the nature of the bottom, but owing to the lack of proper facilities for ascertaining the exact location of the individual soundings and dredgings, an accurate map of the nature of the bottom cannot yet be given. The account of the bottom given here is also quite general.

The bottom consists for the most part of the red sand, so characteristic of Prince Edward Island. Rocky areas, composed of red sandstone, extend out from several points of the islands and of the mainland. In the deeper places the sand is mixed with a higher percentage of humus forming, in certain locations, a very soft black mud into which a pole can be shoved for several feet. Shell beds (oysters and quahaug) are found scattered over the mud areas and on the edges of the sand areas, while oysters are plentiful on the rocky points.

In the Inner bay or March Water (that portion of the bay between the Curtain islands and the Shipyard river), the sandy area extends around the shore along the south of Grover (Ram) island, across to Princetown point and on to Malpeque wharf and the Shipyard river. Thence it follows the south shore to Beech point, where it turns northward along the Curtain islands. The width of this area is not at all uniform. An extension southward from Princetown point forms the Middle Ground shoals which are separated from the point by only a shallow channel. The sandy area also extends out somewhat farther from the points on either side of the mouth of the Shipyard river and is more extensive, too, near Beech point and along Curtain (Little Curtain) and Bunbury (Curtain) islands. Patches of rock occur east of the Curtain islands, to the northwest of the Middle Ground shoals, and to the northeast

of Beech point. The muddy area comes in from the outer bay between Grover and Bunbury islands, widens out in the Inner bay, where it is encroached upon by the Middle Ground shoals and finally narrows down towards the mouth of Shipyard river. Oyster beds are found in that portion of the area, around the Middle Ground shoals and in that which lies between these shoals and the Shipyard river. They are, however, not very numerous.

In the Big bay (that part of the bay south of the line joining Charles point (cape Malpeque) and the north end of Bunbury island, the sandy area sweeps south along the Curtain islands, over to Beech point and on past Oyster cove to the Indian river. Thence it continues along the south shore past the Barbara Weit and Plat rivers to Shemody creek, from which it extends along the west shore to Charles point. As in the Inner bay, this area is everywhere of considerable width, but is especially wide in some places. This is particularly the case off Bentinck (Fraser's) point where the Bentinck shoals stretch out far into the bay and are separated from the point by a quite shallow channel. Rocky areas are found, in this part of the bay, west of Bunbury and Curtain islands, south of Beech point, off Taylor's, Chichester (Mill's), and Webber's (Townsend's) points, and from Charles point well down towards Bentinck point. The deeper muddy portion enters between Charles point and Bunbury island and extends towards the Indian and Barbara Weit rivers, sending off a long spur to the mouth of the Shemody creek. Oyster beds are numerous, widely distributed and extensive in this part of the bay.

In the Outer bay (that part of the bay north of Charles point, Bunbury island and Grover island) a sandy area extends from Royalty point past Princetown point to Grover island, a very extensive area stretches out to the north and northwest from Bunbury island, a third reaches from Charles point to the mouth of the Grand river, while another wide area lies along the west shore from the Grand river past Bald, Red, and Gillies (Low) points into the narrows between Lennox island and the mainland. Further and very extensive sand areas lie south from Middle (Bird), George (Hog), and Bill Hook (Fish) islands. The areas last mentioned, interrupted by channels of moderate depth, are continued into the shoals known as the Horseshoe shoals. In this part of the bay the rocky stretches are larger than those previously mentioned in this report. Extensive rocky areas are given off from the north of Grover and Bunbury island and Charles point, and also south from George island. Less extensive areas lie out from Campbell's pond on the west shore, in an area halfway between Charles point and the mouth of the Grand river, and also out from Bald point between the Grand river and Gillies point. The deeper portion of the bay enters between Bill Hook island and Royalty point, runs south of the Horseshoe shoals and, after giving off the two branches already referred to as entering the Inner and Big bays, and also a third running to the Narrows and the mouths of the Bideford and Trout rivers, continues southwesterly to the Grand river. Oyster beds do not occur in the deep muddy portions of this part of the bay although they do occur on the sandy area running out from Bunbury island.

The sandy areas are covered with eel-grass out to depths of 8, 10 or 12 feet. The rocky areas usually have a covering of seaweed.

It should be understood that the transition from the sand areas to the mud areas is a gradual one.

EXTENT OF LEVEL PORTIONS AND OF BANKS AND DEEP GULLIES.

The whole bay is remarkably level, and as a rule there are few rapid changes in depth. The deep channels have been referred to in the paragraphs dealing with the nature of the bottom. The channel enters the bay between Bill Hook island and Royalty point, runs westward south of the Horseshoe shoals to a point north of Bunbury island. Here the four branches mentioned above radiate. One enters the inner bay between Grover and Bunbury islands and passing south of the Middle Ground shoals reaches the Shipyard river. Another extends west of Bunbury island south-

ward into the Big bay towards the Indian and Barbara Weit rivers, and sends off a branch to Shemody creek. A third branch goes to the Grand river and a fourth to the Narrows between Lennox island and the mainland. These channels are for the most part wide and have fairly level bottoms.

The sandy areas near shore are also very level, sloping out gradually to the deep channel and showing a somewhat more abrupt incline on the edges of the latter. The slopes are somewhat more abrupt than usual on the sides of the Bunbury sands and of the Middle Ground shoals facing the main channels. Abrupt slopes occur also among the Horseshoe shoals.

DEPTHS IN THE VARIOUS PARTS OF THE AREA.

This portion of the investigation has not been completed and the work done on it is withheld, for publication in a later report. Only a very general account is given here. The greatest depth at the entrance of the bay, between Bill Hook island and Royalty point is 53 feet. There are places in the channels among the Horseshoe shoals which are at least 27 feet deep, while parts of the shoals are covered by about 3 feet of water. The channel into the Inner bay has a depth, between Bunbury and Grover islands, of 24 feet, and south of the Middle Ground shoals of 17 feet, while over parts of the shoals the depth is not more than 2 feet. The channel leading into the Big bay has a depth northwest of the Bunbury sands of 42 feet, west of the northern end of Bunbury island of 35 feet, west of its southern end of 32 feet, towards the Indian and Barbara Weit rivers of 14 feet, and towards Shemody creek of 15 feet. The Bentinck shoals are covered in places by about 2 feet of water. The channel at the ferry Grand river is 30 feet deep, and that approaching the Narrows between Lennox island and the mainland is 24 feet in depth.

PRESENCE OF EEL-GRASS AND SEA-WEEDS.

Eel-grass (*Zostera marina* L.) is very abundant everywhere on the sandy areas in depths up to 10 or 12 feet. It borders the shore of the whole bay except where there are rocky areas, and it is also found on the Horseshoe, Bentinck, and Middle Ground shoals. In many other and deeper places, dredgings show that quantities of dead and decaying eel-grass are lodged on the bottom. In the late summer and, according to reports, to a greater extent in the autumn, the storms tear loose quantities of eel-grass which are swept together into great masses and rolled in upon the shore. This eel-grass is gathered up and used as a fertilizer, or to bank buildings against the cold. The oyster companies do good work in removing the grass from their plots, but too often set it adrift in other parts of the bay instead of taking it ashore. When only small areas are cleared the loose eel-grass rolls over the bottom into the hollows, formed in the process of clearing these areas, and lodges there. Because of this, some of the companies have to clear their areas after each big storm. Eel-grass is detrimental to good catches of spat. In no case was there a good set on any of the collectors set among eel-grass.

Seaweeds are found on the rocky areas. In many cases the rock is well covered, and here the seaweed must interfere with the set of spat. In some places kelp (*Laminaria saccharina* Lamx.) is found attached to the oysters, and must, at times, when from any cause they are not attached to the bottom, result in their being carried to unfavourable localities.

The Marine algæ collected during the summer were sent to A. B. Klugh, M.A., of Queen's University, Kingston, and he has very kindly identified them. The collection is not very extensive, specimens which were taken in the dredge, or in the plankton net, alone being represented.

The following account gives the date and place of collection as well as the species collected:—

July 20.—Curtain Island shoal: *Lyngbya aesturia* Lieb., *Nodularia harveyana*, Thuret.

July 24.—Low Point: *Chordaria flagelliformis* Ag., *Gelidium crinale* (?) Ag.

July 24.—East of Low point: *Chondrus crispus* Stack., *Gelidium crinale* (?) Ag.

July 24.—Outer bay, midway between Bunbury island and Gillies point: *Gelidium crinale* (?) Ag.

July 25.—Gillies point: *Ectocarpus confervoides* Le Jolies, *Castagnea virescens* Thuret.

July 25.—East of Gillies point: *Polysiphonia urceolata* Grev., *Cladophora laete-virens* Dillw., *Anabaena variabilis* Kuetz., *Nodularia harveyana* Thuret., *Lyngbya aestuaria* Lieb.

July 28.—Bentinck point: *Gelidium crinale* (?) Ag., *Gelidium corneum* L., *Ectocarpus littoralis* Lyng.

July 30.—Bunbury island: *Ectocarpus confervoides* Le Jolie.

August 8.—Bunbury island: *Chordaria flagelliformis* Ag., *Chorda filum* L., *Chondrus crispus* Stack., *Gigartina mammillosa* J. Ag., *Laminaria saccharina* Lamx., *Gelidium crinale* (?) Ag.

September 3.—Grand river, below the ferry: *Cladophora laete-virens* Dillw., *Ulothrix flacca* Thuret.

The following species were preserved in bottles, from which the labels were lost: *Scytosiphon lomentarius* Ag., *Chondrus crispus* Stack., *Gigartina mammillosa* J. Ag., *Laminaria saccharina* Lamx., *Monostroma fuscum blyttii* Collins, *Entomorpha intestinalis* Grev., *Enteromorpha compressa* Grev., *Porphyra umbilicalis* J. Ag., *Gelidium crinale* (?) Ag.

Twenty species in all are recorded. This number will no doubt be greatly increased by the collections to be made in 1915.

SALINITIES AND TEMPERATURES AT TOP AND BOTTOM.

Salinities and temperatures were taken in many places in the bay at various times throughout the summer. The following is the list of locations:—

1. Narrows, west of Indian Chapel.
2. Narrows, near Sharp's beds "Rock bed".
3. West of Grover island.
4. Mouth of Indian river.
5. Bell bed, Grand river.
6. Mouth of Macdonald creek, Grand river.
7. Below bridge, Grand river.
8. Second bed below ferry, Grand river.
9. First bed below ferry, Grand river.
10. Old dump, Inner bay.
11. Wharf, Bideford river.
12. Bed southeast of second barrel buoy, Inner bay.
13. Plot 128 east of Bunbury island.
14. Plot 123 east of Bunbury island.
15. Plot 133 east of Bunbury island.
16. Plot 127 east of Bunbury island.
17. Plot 142 east of Bunbury island.
18. Plot 124 east of Bunbury island.
19. Off Bald point, Outer bay.
20. Little Curtain Island bed, Big bay.
21. Mouth of Plat river.
22. Mouth of Shemody creek.
23. Middle of channel south of Shemody point.
24. Mouth of Indian river.
25. Near mouth of Indian river.
26. Mouth of Barbara Weit river.

SALINITIES AND TEMPERATURES AT TOP AND BOTTOM—*Continued.*

27. South of Taylor's point.
28. Off Taylor's point.
29. Off Wait's point near mouth of Barbara Weit river.
30. Mouth of Oyster cove.
31. Sharp's "Peter Creek" bed, Narrows.
32. Third bed below ferry Grand river.
33. Burke cove, Grand river.
34. West of Charles point.
35. Lot 11, Grand river.
36. Southeast of Red point, Outer bay.
37. Off Charles point.
38. South of Bunbury island.
39. South of Bunbury island.
40. Off the north point of Bunbury island.
41. Plot 194 near Middle island.
42. Plot 300 near Middle island.
43. Plot 298 near Middle island.
44. Plot 196 near Middle island.
45. Plot 246 near Midle island.
46. Plot 197 near Gillies point.
47. Plot 200 near Gillies point.
48. Plot 294 near Gillies point.
49. Plot 297 near Gillies point.
50. East of Gillies point.
51. Middle of Outer bay, Gillies point, and north of Bunbury island in line.
52. Inman's bed, Shemody creek.
53. East of Shemody point.
54. East of Bentinck point.
54a. East of Simpson's Point.
55. Plot 378, Big bay, near Bunbury island.
56. Plot 428, Big bay, near Bunbury island.
57. Plot 424, Big bay, near Bunbury island.
58. Plot 425, Big bay, near Bunbury island.
59. Channel between Grover and Bunbury islands.
60. Plot 375, Big bay, near Bunbury island.
61. Plot 268, Big bay, near Bunbury island.
62. Plot 332, Big bay, near Bunbury island.
63. Plot 266, Big bay, near Bunbury island.
64. Plot 430, Big bay, near Bunbury island.
65. Plot 372, Big bay, near Bunbury island.
66. Plot 267, Big bay, near Bunbury island.
67. Plot 467, Big bay, near Bunbury island.
68. Plot 370, Big bay, near Bunbury island.
69. Plot 283, Big bay, near Bunbury island.
70. Plot 284, Big bay, near Bunbury island.
71. Plot 340, Big bay, near Bunbury island.
72. Plot 434, Big bay, near Bunbury island.
73. Plot 315, Big bay, near Bunbury island.
74. Plot 387, Big bay, near Bunbury island.
75. Plot 436, Big bay, near Bunbury island.
76. Channel between Bill Hook island and Royalty point.
77. Wharf, Malpeque.
78. Shipyard river.
79. First barrel buoy, Inner bay .
80. South side of gap between Grover island and Princetown point.
81. South of Grover island.
82. Northeast of Grover island.
83. North side of gap between Grover island and Princetown point, west end.
84. North side of gap between Grover island and Princetown point, middle.
85. North side of gap between Grover island and Princetown point, east end.
86. South shore Big bay, midway between Princetown and Royalty points.
87. South shore Big bay, towards Royalty point.
88. Shoals near Bill Hook island, Big bay.
89. Middle of Horseshoe Shoals, Big bay.
90. West of south point of George island, Big bay.
91. Off southeastern point of Middle island.
92. Channel between Beech point and Curtain island.
93. South of Curtain island.
94. South of Bunbury island.
95. Little Curtain island bed, Big bay.
96. Little Curtain island bed, Big bay, edge of bed.
97. Mouth of Indian river, right bank point.
98. Chicester (Mill's) mouth of Indian river.
99. Mill's point, mouth of Barbara Weit river.

SALINITIES AND TEMPERATURES AT TOP AND BOTTOM—*Concluded.*

100. Waite's plot, mouth of Barbara Weit river.
101. Off mouth of Webber creek.
102. Off Webber point.
103. Mouth of Plat river.
104. Off Compton point.
105. Southwest of Shemody point.
106. Northeast of Shemody point.
107. North of Bentinck point.
108. Southeast of Charles point.
109. West of Bunbury island.
110. Gap between Bunbury and Curtain islands.
111. Midway between Charles point and south end of Bunbury island, Big bay.
112. Midway between Charles point and Black point, Outer bay.
113. End of Sixteen wharf, Grand river.
114. South shore Grand river, point below R. C. church .
115. North shore Grand river, opposite Southwest arm.
116. Bell's point, Grand river.
117. Black point, Grand river.
118. Off McIntire's pond, north shore near Grand river.
119. Off Red point, Outer bay.
120. Off point left shore mouth Brown's creek, Outer bay.
121. Point above wharf, Bideford river.
122. Lowest point, left shore above mouth, Trout river.
123. Sharp's point, Bideford river.
124. Sharp's bed (Rock bed), Narrows.

TABLE of Physical Properties.

Station.	Date.	Time.	Tide.	Depth.	Temperature top.	Temperature bottom.	Specific Gravity top.	Specific Gravity bottom.	Chlorine.	Total Solids.
									p.c.	p.c.
1	June 9..	11.00	Going out.....	21	.....	.....	.....	.....	1·509	2·721
2	" 9..	12.00	" ...	5	.....	.... ..	.....	.....	1·587	2·861
3	" 9..	3.00	Coming in.....	8	.....	.....	.....	.....	1·6325	2·9435
4	" 11..	2.00	Low.....	12·5	56·5	55	.....	.....	1·627	2·934
5	" 12..	11.00	Going out.....	3	56	56	.....	.....	.....	.....
6	" 12..	3.00	Low.....	7	58	57	.....	.....	.....	.....
7	" 15..	12.00	High	8	60	58·5	.....	....	1·436	2·589
8	" 15..	2.00	Going out.....	17	56·5	52·5	.....	.....	1·641	2·959
9	" 15 .	3.00	" ...	.....	58·5	23.5	.....	.....	.....	.....
10	" 15..	6.00	Low.....	12	58·5	55	.....	.....	.....	.....
11	" 19..	2.00	Coming in. ...	10	.....	.....	.....	... .	1·454	2·621
10	" 20..	2.00	"	7	62	60	.....	.....	1·569	2·829
12	" 22..	3.00	"	10	61	58·5	.. ..	.....	1·579	2·847
13	" 23..	12.00	Low.....	17	63·5	55	.....	... .	.....	.....
14	" 23..	10.00	"	16	66	55·5	.....	.....	....	.....
15	" 23..	3.00	Coming in.....	30	63	23·5	.....	.....	.....	.....
16	" 25..	11.00	Going out....	7	63	58	.....	.....	.....	.....
17	" 25..	3.00	Coming in	22	61	57	.....	.....	1·694	3·152
18	" 26..	2.00	Low.....	4·5	63·5	.....	.....	.....	1·655	2·984
19	" 27..	11.30	Going out.....	10	58	57	.....	.....	..... .	.....
12	" 29..	11.00	" .. .	8	60·5	.....	.....	.....	... ...	.....
5	July 2..	3.00	"	2·75	65	62·75	.....	.....	.....	.....
20	" 3..	2.30	High.	20	63	.. ..	.....	... .	*1·627* 1·619	*2·934* 2·919
21	" 4..	10.00	Low.....	8	63	.....	.....	.....	.....	.....
22	" 4..	3.00	Coming in.....	5	67	.....	.....	.. ..	1·588	2·864
23	" 7..	12.00	Low...	8	67	65	1·0226	.....	. .....	.....
24	" 9..	10.00	Going out.....	5	69	.....	.....	.....	.....	.....
25	" 9..	12.40	Low.....	3·75	70	.....	1·0216	1·0216	1·581	2·851
26	" 10..	2.30	Coming in.....	3·5	77	.....	1·0222	1 0222	1·627	2·934
27	" 10..	4·00	"	4·5	76	.....	1·0209	.....	. ....	.....
28	" 11..	9.00	High	6	68	.. .	.....	... ...	... ...	.....
29	" 11..	10.00	Going out.....	5·5	67	66	1·0221	1·0223	.....	.....
30	" 11..	12.00	"	8	68	67	1·0222	1·0220	.....	.....
31	" 13..	12.30	"	5	69·5	69	1·0228	1·0222	1·606	2 8965
5	" 14 .	10.00	High	4	69	68	1·0229	1·0226	.....	.....
9	" 14..	12.00	Going out.....	.....	69	.....	.....	.....	.....	.....
8	" 14..	1.00	"	....	69	.....	.....	.....	.....	.....
32	" 14..	2.00	"	.....	70	67·5	1 0230	1·0230	.....	.....
33	" 14..	3.30	"	17	70	.....	.....	.....	.....	.....
34	" 15.	10.00	Coming in.....	5	62	.....	.....	.....	.....	.....
35	" 15..	1.00	Going out.....	15	67·5	64	1·0231	1·0224	1·672	3·015
19	" 15..	2.00	"	13	67	.....	.....	.. ..	... ...	.....
36	" 16..	10·45	Coming in.....	9	67	....	.....	.....	.....	.....
37	" 17..	11.00	"	7	71	70	1·0224	1·0224	*1·657* 1·631	*2·988* 2·941
38	" 17.	1.40	High.....	27	68	.....	.....	.....	.....	.....
39	" 17..	2.00	"	4	69	.....	1·0223	1·0223	1·653	2·981
12	" 20..	11.30	Low.....	17·5	75·5	.....	1·0216	1·0216	1·590	2·869
40	" 21..	9.00	Going out.....	5	70	65	1·0232	1·0221	1·634	2·947
41	" 24..	3.30	Coming in.....	17·5	67	.... ..	.....	.....	.... ..	... ..
42	" 24..	3.40	"	8·75	68	.....	... ...	.....	.... ..	.....
43	" 24..	3.50	"	22	67·5	.....	.....	.....	.....	.....
44	" 24..	4.00	"	4	69·5	.....	.....	.....	.....	.....
45	" 24.	4.10	"	22	67	.....	.....	.....	.....	.....
46	" 25 .	10.00	Going out.....	7	67·5	.....	.....	.....	.....	.....
47	" 25..	10.30	"	24	66·5	... .	.....	.....	.....	.....
48	" 25..	11.00	"	26	68	... .	.....	.....	.....	.....
49	" 25..	11.30	"	22·5	67·5	.....	.. ..	.....	.....	.....
50	" 25..	3.20	Coming in.....	24	68·5	65	1·0223	1·0226	*1·621* 1·631	*2·922* 2·941
51	" 25..	4 00	"	30	68·5	66·5	1·0225	1·0224	*1·679* 1·638	*3·023* 2·9535

TABLE of Physical Properties—*Continued.*

Station.	Date.	Time.	Tide.	Depth.	Temperature top.	Temperature bottom.	Specific Gravity top.	Specific Gravity bottom.	Chlorine.	Total Solids.
									p. c.	p. c.
52	July 27..	12·00	Going out.....	5	68·5	68	.....	.....	1 5675	2·826
53	" 27..	1·10	"	8	69	.....	.....	.....	.....	.....
54	" 27..	1·53	"	12	68	.....	.....	.....	.....	.....
55	" 28..	10.00	High.....	5·5	68	.....	.....	.....	.....	.....
56	" 30..	1.00	"	36	66	.....	.....	.....	.....	.....
57	" 30..	1.15	Going out.....	14	66	.....	.....	.....	.....	.....
58	" 30..	1·45	"	13	66	.....	.....	.....	.....	.....
59	" 30..	2·15	"	16	66	.....	.....	.....	.....	.....
60	Aug. 1..	12 00	Coming in.....	27	.....	.....	1.0214	1·0214	*1·616* 1 614	*2·913* 2·909
61	" 4..	9·30	Going out.....	21	.....	.....	1·0224	1·0223	*1·641* 1 626	*2·958* 2·931
62	" 4..	11.30	Low.....	36	66	.....	.....	.....	.....	.....
63	" 4..	12·05	"	19	65·5	.....	.....	.....	.....	.....
64	" 4..	1.35	Coming in.. ..	33	66	.....	.....	.....	.....	.....
65	" 4..	2·45	"	8	67	.....	.....	.....	.....	.....
66	" 4..	3 15	"	15	66·5	.....	.....	.....	.....	.....
67	" 4..	3·55	"	30	66	.....	.....	.....	.....	.....
68	" 5 .	12·30	Low.....	12·5	66	.....	.....	.....	.....	.....
69	" 5..	12·50	"	13	66	.....	.....	.....	.....	.....
70	" 5	1·10	Coming in.....	19·5	66·75	.....	.....	.....	.....	.....
71	" 5..	1·15	"	30	66	.....	.....	.....	.....	.....
72	" 5..	3·45	"	44	67	.....	.....	.....	.....	.....
73	" 6..	2·00	"	17	67	.....	.....	.....	.....	.....
74	" 6..	3·00	"	33	67	.....	.....	.....	.....	.....
75	" 6 .	3·20	"	18·5	67	.....	.....	.....	.....	.....
76	" 7..	3.00	"	27	66·5	.....	.....	.....	.....	.....
77	" 14..	2·00	Going out.....	50	.....	.....	1·0224	1·0224	1·631	2·941
78	" 25..	7·00	Coming in.....	4	56	56	.....	.....	.....	.....
79	Sept. 1..	8.00	Going out.....	4	62·25	61·75	1·0216	.....	.....	.....
80	" 1..	8·30	"	2	63	63·25	1·0189	.....	.....	.....
							1·0218	1 0219	*1·600* 1·609	*2·885* 2·9065
81	" 1..	9.00	"	2·75	65	65	1·0221	.....	1·6.05	2·976
82	" 1..	9.30	"	14	63·75	63·5	.....	.....	.....	.....
60	" 1..	10.45	Low..	30	64	63 5	1·0223	1 0222	.....	.....
83	" 1..	11.20	Coming in.....	2 5	66	65·5	1.0223	1·0222	.....	.....
84	" 1..	11.50	"	1	67	67	1·0224	.....	.....	.....
85	" 1..	12 20	"	2	65	65	1·0220	.....	.....	.....
86	" 1..	12 50	"	2	69	.....	1·0225	.....	.....	.....
87	" 1..	1.30	"	2	69	.....	1·0220	.....	.....	.....
88	" 1..	2·00	Coming in	3·3	67	67	1·0220	.....	.....	.....
77	" 2..	2·15	" ...	3·6	66	65	1·0220	.....	.....	.....
		2·40	"	54	63	62·5	1·0222	1·0218	*1·617* 1·610	*2·916* 2·903
89	" 2..	3·15	"	5	65	63·5	1·0221	.....	.....	.....
90	" 2..	3·40	" ...	27	65	63·5	1·0221	1·0215	*1·619* 1·623	*2·919* 2·925
91	" 2.	4·35	High	4	66	65·5	1·0220	.....	.....	.....
92	" 2..	4·55	"	3	69	68·5	1·0225	.....	.....	.....
90	" 2..	8·15	Going out.....	12·5	64·5	64·5	1·0221	1·0221	.....	.....
12	" 2..	8·35	"	18·5	65	64·25	1·0219	1·0220	.....	.....
93	" 2..	8·55	"	2·75	66	66	1·0223	.....	1·607	2 8965
94	" 2.	9 10	"	3·3	65	65	1·0224	.....	.....	.....
95	" 2..	9 30	"	3·25	65	65	1·0224	.....	*1·616*	*2·913*
96	" 2..	10 00	"	20·00	65	65	1·0221	1·0221	*1·616* 1·616	*2·913* 2 913
97	" 2..	10·15	"	8	65	65	1·0222	1·0221	.....	.....
36	" 2..	11·00	Low..... ...	8	66	66·5	1·0210	1·0217	.....	.....
98	" 2.	11·30	"	2	68	68	1·0184	.....	1·309	2·361
99	" 2..	11·50	"	3·25	66·5	66·5	1·0217	.....	.....	.....
100	" 2.	12·30	Coming in.....	3	66	66	1·0211	.....	.....	.....
101	" 2..	12·45	"	2·5	66 5	66·5	1·0217	.....	.....	.....
102	" 2..	1·00	" ..	4	68	66	1·0221	.....	.....	.....

TABLE of Physical Properties—*Concluded.*

Station.	Date.	Time.	Tide.	Depth.	Temperature top.	Temperature bottom.	Specific Gravity top.	Specific Gravity bottom.	Chlorine.	Total Solids.
									p. c.	p. c.
103..	Sept. 2..	1·22	"	3	66·75	66·75	1·0217	.....	.....	.....
104..	" 2..	1·45	"	2	66	66	1·0210	.....	.....	.....
105..	" 2..	2·00	"	3	68	66·75	1·0212	.....	.....	.....
22..	" 2..	2·30	"	2	68	67·75	1·0210	.....	.....	.....
106..	" 2..	2·45	"	4	68	67	1·0220	.....	.....	.....
54..	" 2..	3·00	"	3·5	66·25	66·25	1·0220	.....	.....	.....
107..	" 2..	3·25	"	4	65·25	65·25	1·0221	.....	.....	.....
55..	" 2..	3·40	"	2·5	67·5	67·5	1·0224	.....	.....	.....
108..	" 2..	4·05	"	4	68	66	1·0220	.....	.....	.....
109..	" 2..	4·10	"	4·25	66	66	1·0222	.....	.....	.....
37..	" 2..	4·30	"	4	68	67·5	1·0222	.....	.....	.....
110..	" 2..	4·50	"	4	69	69	1·0228	.....	.....	.....
111..	" 3..	8·20	Going out	2·5	65·5	65·5	1·0220	.....	.....	.....
112..	" 3.	8·50	"	28	64·5	64	1·0222	1·0222	.....	.....
37..	" 3..	9·05	"	5	66	65·5	1·0224	1·0223	.....	.....
113..	" 3..	9·25	"	5	64·5	64	1·0222	.....	.....	.....
114..	" 3..	9·40	"	30	65·25	65	1·0222	1·02..0	*1·576* 1·5615	*2·841* 2·870
5..	" 3..	10·00	"	12	65·75	67	1·0216	.....	.....	.....
115..	" 3.	10·35	"	4	66	65·75	1·0219	.....	.....	.....
116..	" 3.	10·45	"	3·3	66	66	1·0212	.....	1·524	2·747
6..	" 3..	11·05	"	4·25	66·5	65·75	1·0212	.....	.....	.....
117..	" 3.	11·30	Low	3	66	66	1·0218	.....	.....	.....
118..	" 3	12·30	"	3·3	67	66	1·0220	.....	.....	.....
119..	" 3..	12·55	"	3·5	67·5	66·5	1·0228	.....	.....	.....
19..	" 3..	1·20	Coming in. ...	2·6	67·75	66·5	1·0221	.....	.....	.....
120..	" 3..	1·45	"	2	67	67	1·0223	.....	.....	.....
121..	" 3..	2·20	"	3·3	68·5	68·25	1·0220	.....	.....	.....
50..	" 3..	2·44	"	4·25	66·5	65	1·0220	.....	.....	.....
122..	" 3..	3·35	"	4·5	71	68·5	1·0221	.....	.....	.....
123	" 3	4·00	"	3	68	67·5	1·0210	.....	.....	.....
124..	" 3..	4·15	"	3·3	67	66·75	1·0214	.....	.....	.....
125..	" 3..	4·45	"	2·5	70	70	1·0220	.....	.....	.....
31	" 3.	4·50	"	3	66	66	1·0216	.....	.....	.....
126..	" 3..	5·05	"	3·6	58	68	1·0219	.....	.....	.....

The table shows the salinities of samples of water taken in various parts of the bay, from the surface and also from the bottom. No samples were taken from intermediate depths. The figures show that the densities are well suited to the life and growth of oysters.

During the early part of the summer, samples were obtained from the bottom by means of a narrow-necked bottle wrapped with a sufficient quantity of sheet lead to cause it to sink readily. The bottle was lowered by means of a trawl-line which was securely fastened to both cork and neck of the bottle in such a manner that a short loop of line was left between them. The cork was tightly inserted and the bottle lowered by means of the cork to the desired depth and the cork released by sharply jerking the trawl-line. The bottle now filled was raised to the surface. On July 1 the brass bottle devised by Dr. H. F. Moore was obtained through the Bureau of Fisheries, Washington, U.S.A., and was used after that date.

The specific gravities were taken by means of delicate hydrometers graduated from 1·0000 to 1·0100, from 1·0100 to 1·0200 and from 1·0200 to 1·0300. The readings obtained were reduced to specific gravities at 60°F.

Samples of water from various localities were sent to Professor A. B. Macallum's laboratory at the University of Toronto, Dr. Roger Manning very kindly determined

the percentage of chlorine and the amount of total solids in these. His results are given in the last two columns of the table. In certain cases two sets of results are given. Those in italics are from the bottom.

The temperatures at top and bottom were taken with a Negretti and Zambra reversing thermometer. A few of these temperatures are shown in the table. The temperatures rose until about the first of July. The highest temperature recorded, 77°F., was taken on the 10th of July. A temperature of 60° F. was not recorded until June 20; after July 1, no temperatures of less than 60° F., except on one occasion, that of August 25. Early in the season there were often great differences between the surface and bottom temperatures. These differences became much smaller towards the end of the summer. A difference of 9·5°F. is recorded for a depth of 30 feet on June 23. On some occasions the bottom temperature was higher than that at the surface, e.g. at station 5 on September 3: top, 65°75; bottom, 67°. Owing to the low temperature of early summer the oysters did not spawn until after the first of August. Spatting began about three weeks later, and thus the season was short for the growth of the young oysters. The lateness of spawning must considerably increase the danger of the fry being destroyed by sudden falls in the temperature. The fry of the Malpeque oyster, however, must be quite resistent to such falls of temperature, since spatting occurred even after the sudden drop to 54°F. on the night of August 24.

PLANKTON OYSTER FOOD.

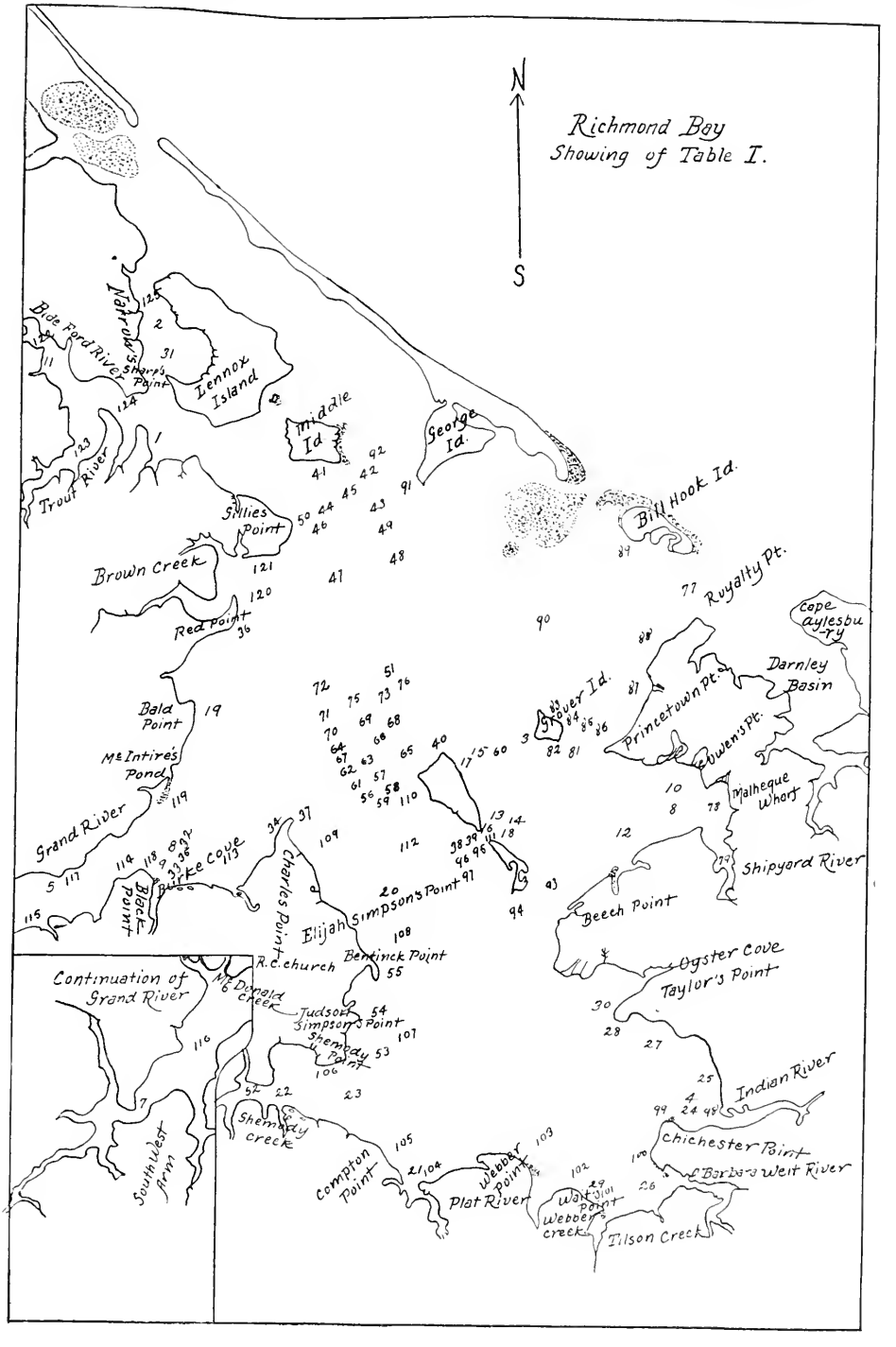
The diatomaceous oyster food collected in various parts of the bay throughout the summer is being worked over by Dr. A. H. MacKay, Superintendent of Education, Halifax, a well-known authority, and his results will be included in a future report.

INFLOW AND AMOUNT OF FRESH WATER.

Arrangements were being made to estimate the inflow of fresh water when it was decided that the desired result was more directly attained by taking the salinities. Fresh water affects the oyster by altering the salinity of the water in which the oyster lives. There are a great number of small streams flowing into Richmond bay. Owing to the fact that the woods are largely cleared away, the water rushes down quickly in the spring, and the volume of many of these streams is greatly augmented at this season while it is inconsiderable during the summer months. Unfortunately, records are not yet available of the densities of the water in the various parts of the bay while these spring floods are on.

PRESENCE OF OYSTER ENEMIES.

Starfish (*Asterias vulgaris* Verrill.) are abundant now in Richmond bay. A few years ago they were a curiosity. They constitute one of the worst enemies of the oyster in this bay. They are found in all parts of it, but are particularly abundant on the oyster grounds around the Curtain islands and in the Big bay. The government oyster steamer, the *Ostrea,* under Captain Kemp, the Dominion oyster expert, did good work during the summer, cleaning out starfish on the beds to the west of Curtain island and in the Big bay. He was assisted during the month of June by government patrol boats *D* and *E*. Some of the oyster companies also did service in this line. Both government and oyster companies should pursue this line of work much more vigorously, and the good results attained should be conserved and not lost as they were to a great extent last summer. The starfish fished from the beds are removed from the bay of course, but in the case of the work done by the *Ostrea* there was an indirect but none the less important result which was not conserved. The bed effectively cleared of starfish was swept by the starfish-mops and left white and clean and in good condition to secure a set of spat, had it not been torn to pieces by oyster-planters dredging for shell. This shell might have been secured from other beds not cleaned in this way.


Richmond Bay
Showing of Table I.
N
S
Bide Ford River
Sharp's Point
Lennox Island
Middle Id.
George Id.
Bill Hook Id.
Trout River
Willies Point
Brown Creek
Red Point
Bald Point
McIntire's Pond
Grand River
Burke Cove
Black Point
Charles Point
Elijah Simpson's Point
Bentinck Point
R.C. church
Continuation of Grand River
McDonald Creek
Judson Simpson's Point
Shemogy Point
Shemogy creek
Southwest Arm
Compton Point
Webber Point
Plat River
Webber creek
Wallace Point
Tilson Creek
Royalty Pt.
Cape Aylesbury
Darnley Basin
Princetown Pt.
Owen's Pt.
Malheque Whorf
Shipyard River
Beech Point
Oyster Cove
Taylor's Point
Indian River
Chichester Point
Barlow's Welt River

Large starfish were obtained in the dredge from the beds in the deep water and great numbers of young starfish were found in certain parts of the eel-grass-covered sand areas. Many of the fishermen are not yet convinced of the fact that a starfish torn in two and thrown back into the water grows into two starfish.

A boring sponge (*Cliona celata* Grant), for the identification of which the writer is indebted to Lawrence M. Lambe, F.G.S., occurs on some of the beds, more particularly in the mud areas. Fortunately one finds only a small percentage of shells attacked. This sponge, however, does considerable damage to the oysters which it attacks. Although it may not kill the oyster it weakens it by forcing it to expend its energy in repairing the shell, which is almost honeycombed by the sponge. The weakened shell leaves the oyster a much easier prey to its other enemies.

The drill (*Urosalpinx cinera* Say) is not known to occur in Richmond bay, although there is a small borer (*Tritia trivittata* Adams) which does penetrate the soft shells of *Pandora trilineata* Say, and which may possibly do damage to small oysters. It is very abundant in some parts of the bay.

The slipper limpet (*Crepidula fornicata* Lamarck) is very abundant and must come into competition with the oyster for points of attachment and for food. *Crepidula plana* Say, also occurs.

Eel-grass (*Zostera marina* L.) renders areas unfit for planting oysters until it is cleared off, smothers oysters when it is dead by lodging on them, and interferes with the setting of oyster spat, as will be pointed out in the account of the experiments on spatting. Certain seaweeds also grow on the rocks and interfere with the setting of spat here.

Ice, it is stated, destroys many young oysters on such points as those to the north of Grover and Bunbury islands. Many of these would doubtless be saved were these points leased. If leased to fishermen they could carry on operations here without the outlay of much capital. Clean cultch could be distributed over these points in retainers such as those used in our spat-collecting experiments, and these could be lifted and sold to the oyster companies before the ice formed in the autumn.

No doubt some oysters are destroyed by sifting sand, but it does not yet appear that the loss from this source is very great.

Sudden falls of temperatures such as that on the night of August 24 no doubt destroy great numbers of the oyster fry. That even such great drops as this do not destroy all is shown by the fact that spat set in several places after that date.

The most destructive enemy the oyster has, however, is man. Oyster poaching goes on widely, but were the oyster poacher and the man who buys from him severely dealt with, and efficient protective legislation effectively and impartially enforced, there would be a great advance in the oyster industry in Richmond bay.

OCCURRENCE OF SMALL OYSTERS AS EVIDENCE OF SPATTING.

The small number of young oysters shows either that spatting has not been good in recent years or that there has been a high death-rate among the small oysters. There is almost always, however, a good or at least a fair "set" in a few places such as the north point of Grover island, on the Curtain Island shoals, and in the narrows between Curtain island and the mainland. There is also generally a fair set in the Grand river and often near the mouths of the Indian and Barbara Weit rivers at the south end of the Big bay. There was a very light set in 1913. A few 1-year-old oysters occur at Grover island, in the narrows, and near the mouth of the Barbara Weit river. Two-year-old oysters were more abundant and more widely distributed. Small oysters up to 3 or 4 years old were found in the narrows, on the rocky shoals near George island, the rocky points north of Grover and Bunbury islands, the Grand river and at various points in the Big bay. Spatting does take place, and there is no doubt in the writer's mind that it would take place more abundantly if precautions were

taken to secure the protection of the old beds and to provide suitable cultch for spatting. A few years ago, when the channel to Malpeque wharf was dredged, the material removed, among which was a quantity of old shell, was dumped on what is now known as the "old dump." This shell, partially cleaned in the process, served as cultch for a set of spat and the "old dump" is to-day, as far as an overfished bed can be, a good bed.

OCCURRENCE OF DEAD OYSTER SHELLS AS EVIDENCE OF FORMER PRODUCTION.

There are extensive and deep old shell beds all over the Big bay and in many places in the Inner and Outer bays as well. These beds consist in the main of old oyster and quahaug shells, with a smaller proportion of live oysters and quahaugs. These beds occur not only in the main portions of the bay but in the rivers as well. Beds are found in the Grand, Bideford, Trout, Barbara Weit, and Indian rivers, and also in Shemody creek.

An attempt was made to obtain measurements of the thickness of some of these old beds. This can be satisfactorily done only by boring, and boring can best be done through the ice in winter. A rough estimate of the thickness was made by poling across the beds and through the mud at the sides. The sounding over the summit, which usually lies near one edge, was subtracted from that through the mud at the side and the difference taken as the depth of the bed. This estimate is admittedly only an approximation, but it is believed to give a fair idea of the depth. The following are the estimates for some of the beds:—

1. September 2.—Little Curtain Island bed—
   Off the north side—
   Top, 7·5 feet; bottom, 24 feet; thickness, 16·5 feet.
   Off the south side—
   Top, 8 feet; bottom, 22 + 6 = 28 feet; thickness, 20 feet.
2. September 3.—Bell bed, Grand river—
   Top, 6 feet; bottom, 10 + 7 = 17 feet; thickness, 11 feet.
3. September 3.—Bed above the ferry, Grand river—
   Top, 12 feet; bottom, 12 + 6 = 18 feet; thickness, 6 feet.
4. September 12.—Bed northwest of Bunbury island—
   Top, 10¼ feet; bottom, 19½ + 5¾ = 25¼ feet; thickness, 15 feet.
5. September 12.—Little Curtain Island bed—
   Off north side—
   Top, 7·5 feet; bottom, 21·5 + 3·5 = 25 feet; thickness, 17·5 feet.
   Off south side—
   Top, 7·5 feet; bottom, 26 + 5·5 = 31·5 feet; thickness, 24 feet.
6. September 12.—Little Curtain Island bed, west end—
   Top, 7·25 feet; bottom, 21·5 + 6 = 27·5 feet; thickness, 20·25 feet.
7. September 12.—Bed middle of Big bay, west of Curtain island—
   Top, 10 feet; bottom, 22·5 + 7·5 = 30 feet; thickness, 20 feet.
8. Chinick bed—
   Top, 16 feet; bottom, 21·5 + 7·5 = 29 feet; thickness, 13 feet.

The differences between the measurements of the depth of the Little Curtain Island bed are to be explained by the fact that the bed is a large one, and the measurements were not made in the same places on the two dates.

The mud-diggers take shell from considerable depths. The writer was informed that the face of the cut, which is all shell-bearing, is sometimes 24 feet in height. These points all indicate the oyster has existed in Richmond bay for a very great number of years. Throughout this period the conditions must have been favourable for oyster life. The presence of so much shell in the water insures a supply of lime for shell development in the live oysters.

FREEZING TO BOTTOM IN WINTER.

Young oysters are said to have a high death-rate on the north point of Grover island. This would appear to be due more to crushing by the ice than to freezing, since many oysters survive in the depressions, in the small crevices, and on the sides of stones. No evidence was obtained that oysters were killed on the beds by freezing. It was commonly stated that the ice was thin over the beds and that the thinness was a source of danger to travellers on the winter roads across the bay unless these roads avoided the beds. Some attributed it to the "natural heat" of the oyster beds. Others more properly to the currents which are naturally stronger over the shallow beds.

TIME OF SPAWNING.

Spawning was late this year. Oysters began to shed their spawn and oyster fry to appear in the water about the first of August. Fry was still found in the bay on the 29th of August, but none after that date. The oysters in the warmer water spawned somewhat later than those in the cooler water, there being a difference of about two or three days in the date of spawning at the south end of the Big bay and that in the Inner bay, and the deep-water oysters retained their spawn about a week after those in the shallower beds and in the rivers had shed all theirs. The bulk of the spawning took place during the first three weeks of August.

TIME AND EXTENT OF SPATTING.

Spat-collectors were made by placing shell in cylindrical containers made of wire netting. These, which were from 2 to 4 feet in height, were placed at various points around the bay. They were kept upright by being firmly wired to stakes. They were numbered, and at the end of the season were removed to deeper water to permit of further observations during subsequent seasons. The attempt to secure spat by the use of glass strips, placed with each collector, proved unsuccessful.

The following account shows in respect to each collector: the date set out, the location, some account of the environmental factors, the date taken up, the set of spat, and some account of the condition of the shell at the time of lifting.

1. August 19.—Bideford river, end of the first point above the wharf; near but not in eel-grass; oyster beds farther up the river; September 14, set heavy; heavily slimed over.

2. August 19.—Trout river, lowest point on the left bank; in 3·5 feet, near but not in eel-grass; oyster beds close at hand; September 14, set heavy; heavily slimed over.

3. August 19.—Bideford river, left bank, Sharp's point; in 3·5 feet on edge of eel-grass; near oyster bed; September 14; set heavy; heavily slimed over.

4. August 19.—Narrows between Lennox island and the mainland, Sharp's bed "Rock bed"; in 2·5 feet, no eel-grass on oyster bed; September 14; set heavy; heavily slimed.

5. August 19.—Narrows between Lennox island and the mainland, Sharp's bed (Peter Creek bed); in 2·5 feet, no eel-grass on oyster bed; September 14; set heavy; heavily slimed.

6. August 19.—Lennox island, first point northwest of the wharf; in 4 feet, among eel-grass, not close to oyster beds; September 14, no set, moderately slimed. (This collector fell over shortly after being set out and was left lying).

7. August 19.—Gillies point; in 2·5 feet, among eel-grass, not close to oyster bed; September 14; set light; slightly slimed.

8. August 20.—Middle island, southwest point; in 3 feet, among eel-grass, not close to oyster beds; September 14; no set; slightly slimed.

9. August 20.—Middle island, southeast point; in 3 feet, among eel-grass, near scattered oysters; September 14, set light; slightly slimed.

10. August 20.—George island, west of south point; in 4 feet, among eel-grass, near scattered oysters; September 14, no set; slightly slimed.

11. August 20.—George island, west of shoal running out from south point, about half-way out on shoal; in 3 feet, among eel-grass, near rock oysters; collector lost.

12. August 20.—George island, end of the shoal running out from south point; in 4 feet, among eel-grass, near rock oysters; collector lost.

13. August 20.—Bill Hook island, end of shoals to the southwest; in 7 feet, among eel-grass, not near oysters; September 14, no set; slightly slimed.

14. August 20.—Bill Hook island, shoals near lighthouse; in 7 feet, among eel-grass, not near oysters; September 14, no set; slightly slimed.

15. August 21.—Shipyard river, left bank, point above Crafer's; in 2 feet, on edge of eel-grass, just above oyster bed; September 16, set fair; slightly slimed.

16. August 21.—Shipyard river, right bank, Crafer's point; in 2 feet, on edge of eel-grass, just below oyster bed; September 16; set fair; slightly slimed.

17. August 21.—Shipyard river, channel above wharf; in 2·5 feet, no eel-grass, on oyster bed; September 16, set fair; slightly slimed.

18. August 21.—Shipyard river, left bank, Ramsey's point; in 3 feet, among eel-grass, not far from oyster beds; September 16; set fair; slightly slimed.

19. August 21.—Shipyard river, Owen's point end of point; in 2·5 feet, among eel-grass, not far from oysters; September 15, set fair; slightly slimed.

20. August 21.—Shipyard river, Owen's point, west of point; in 2·5 feet, on edge of eel-grass, not far from oysters; September 15, set fair; slightly slimed.

21. August 21.—Inner bay, Ellison's point; in 2·5 feet, on edge of eel-grass, not far from oysters; September 15, set fair; slightly slimed.

22. August 21.—Shoals between Princetown point and Grover island, middle of south side; in 2·5 feet among eel-grass, not far from oysters; September 15, set fair; slightly slimed.

23. August 21.—Grover island, middle of the northeast side; in 2·5 feet; among eel-grass, not far from oysters; September 14, set fair; slightly slimed.

24. August 21.—Grover island, off northeast point; in 2·5 feet, among eel-grass, not far from oysters; September 14, set fair; slightly slimed.

25. August 21.—Shoals between Princetown point and Grover island, middle of north side; in 2·5 feet, among eel-grass, not far from oysters; September 14, set fair; slightly slimed.

26. August 21.—Outer bay, shore between Princetown and Royalty points, Montgomery's point; in 2·5 feet, among eel-grass, not far from oysters; collector lost.

27. August 21.—Outer bay, shore between Princetown and Royalty points, point first west of Royalty; in 2·5 feet, on edge of eel-grass, not far from oysters; September 14; set fair; slightly slimed.

28. August 21.—Outer bay, north of Princetown point; in 2·5 feet, among eel-grass, not far from oysters; September 14, set light; slightly slimed.

29. August 21.—Grover island, north point; in 2 feet, on rocks, among very short seaweed, among rock oysters; September 15, set heavy, heavily slimed.

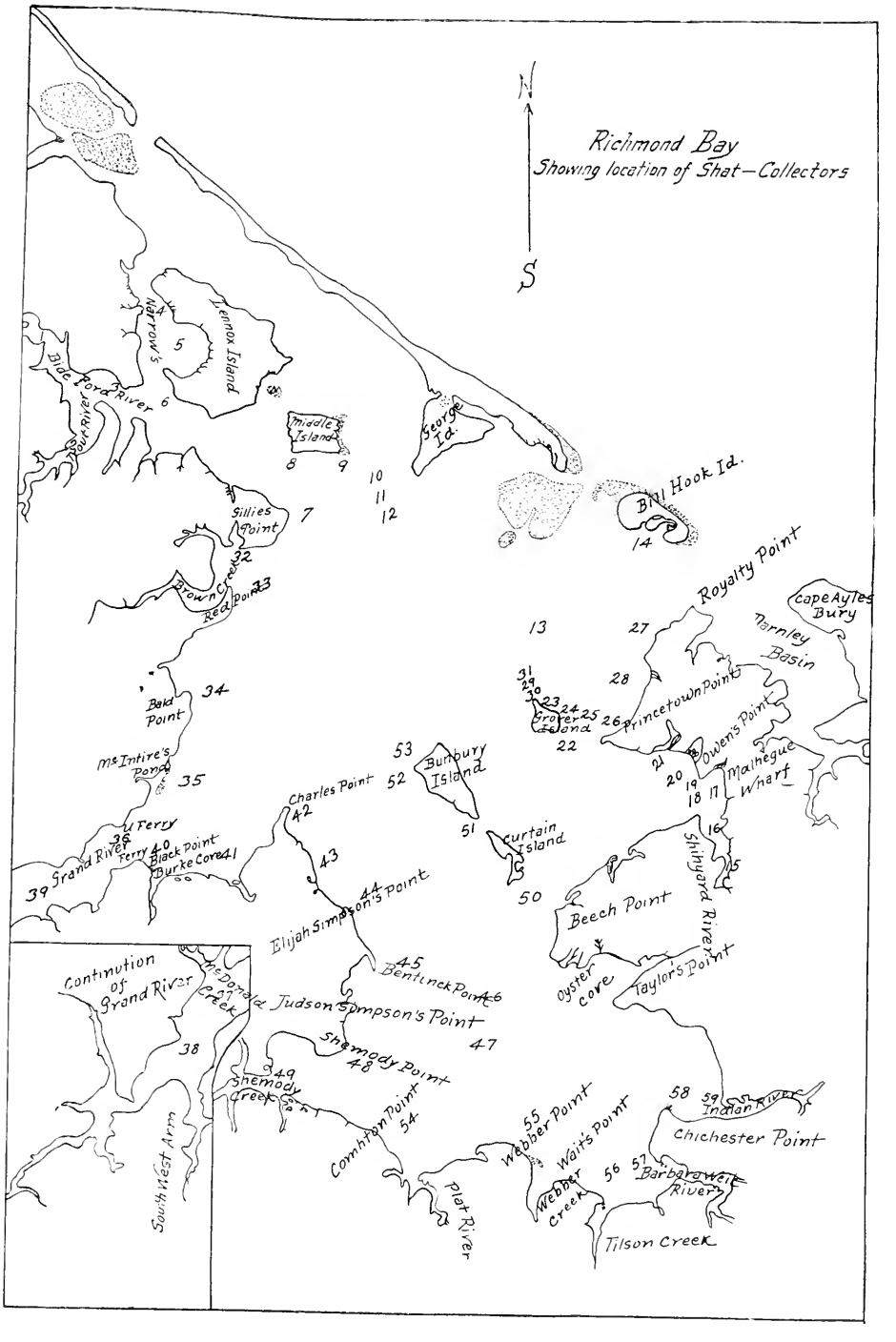
30. August 21.—Grover island, north point; in 1·5 feet, on rocks among short seaweed, among rock oysters; September 15, set heavy; heavily slimed.

31. August 21.—Grover island, north point; in 2·5 feet, on rocks among short seaweed, among rock oysters; September 15, set heavy; heavily slimed.

32. August 24.—Point west of Gillies point, mouth of Brown creek; in 2 feet, on edge of eel-grass, not near oysters; September 16; set light; slightly slimed.

33. August 24.—Red point; in 3·5 feet, among eel-grass, not near oysters; collector lost.

34. August 24.—Bald point, in 2·5 feet, among eel-grass, not far from oysters; September 16; set light; slightly slimed.


Richmond Bay
Showing location of Shat-Collectors
N
S
Lemon Island
Middle Island
George Id.
Bird Hook Id.
Sillies Point
Brown Creek
Red Point
Bold Point
Ms Intire's Pond
Ferry
Grand River
Black Point
Burke Cove
Charles Point
Burbury Island
Curtain Island
Princetown Point
Royalty Point
Cape Ayles
Bury
Barnley Basin
Powen's Point
Malhegue Wharf
Shipyard River
Beech Point
Oyster Cove
Taylor's Point
Elijah Simpson's Point
Bentinck Point
Judson's
Simpson's Point
Shemody Point
Shemody Creek
Continuation of Grand River
McDonald Creek
South West Arm
Comhton Point
Webber Point
Wait's Point
Webber Creek
Plat River
Barbara Weil River
Indian River
Chichester Point
Tilson Creek

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35. August 24.—Near McIntyre's pond; in 3·5 feet, among eel-grass, not near oysters; September 16; set light; slightly slimed.

36. August 24.—Grand river, Bell's point; in 3 feet, no eel-grass, close to oyster bed; September 16; set light; heavily slimed.

37. August 24.—Grand river, mouth of Macdonald creek; in 4 feet, on rocky bottom near eel-grass, not far from oyster beds; September 16; set heavy; moderately slimed.

38. August 24.—Grand river, point opposite Southwest arm; in 3·5 feet, among eel-grass, near oysters; September 16; set fair; moderately slimed.

39. August 24.—Grand river, point right shore above ferry; in 4 feet, among eel-grass, near oysters; September 16; set light; slightly slimed.

40. August 24.—Grand river, Black point; in 3·5 feet, among eel-grass, not far from oysters; collector lost.

41. August 24.—Half-way between Black and Charles points; in 5 feet, among eel-grass, not near oysters; September 16; no set; slightly slimed.

42. August 24.—Charles point; in 4 feet, no eel-grass, near oysters; September 15; set light; slightly slimed.

43. August 24.—South of Charles point, half-way to Simpson's point; in 4·5 feet, among eel-grass, not far from oysters; September 15; set light; slightly slimed.

44. August 24.—Between Charles and Bentinck points, Simpson's point; in 4 feet among eel-grass; not far from oysters; September 15; set light; slightly slimed.

45. August 27.—Bentinck point; in 2·5 feet, among eel-grass, not far from oysters; September 15; set light; slightly slimed.

46. August 27.—Bentinck shoal, north side; in 4 feet, among eel-grass not far from oysters; September 15; set light; slightly slimed.

47. August 27.—Bentinck shoal, south side; in 3·5 feet, among eel-grass, not far from oysters; September 15; set light; slightly slimed.

48. August 27.—Shemody point; in 4 feet, among eel-grass, not far from oysters; September 15; set light; slightly slimed.

49. August 27.—Shemody creek; in 2 feet, among eel-grass, near oysters; September 15; set light; slightly slimed.

50. August 27.—Curtain Island shoals, west side between Beech point and Curtain island; in 3·5 feet, in clear patch among eel-grass, near oysters; September 15; set heavy; slightly slimed.

51. August 27.—Curtain island shoals, west side, between Curtain and Bunbury islands; in 3·5 feet, among eel-grass, near oysters; September 15; set light; slightly slimed.

52. August 27.—Curtain Island shoals, west side of Bunbury; in 4 feet, among eel-grass, near oysters; September 15; set light; slightly slimed.

53. August 27.—Curtain Island shoals, northwest of Bunbury; in 5 feet, among eel-grass, not far from oysters; September 15; set light; slightly slimed.

54. August 28.—Plat river, Compton's point; in 2·5 feet among eel-grass, not far from oysters; September 15; set light; slightly slimed.

55. August 28.—Webber point; in 3 feet, among eel-grass, not far from oysters; September 15; set light; slightly slimed.

56. August 28.—Barbara Weit river, near Wait's point; in 2·5 feet, among eel-grass, not far from oysters; September 15; no set; slightly slimed.

57. August 28.—Barbara Weit river, west of Mill's point; in 3 feet, among eel-grass, near oysters; September 15; set light; slightly slimed.

58. August 28.—Indian river, east of Chichester point; in 3·5 feet, on edge of eel-grass, near oysters; September 15; set light; slightly slimed.

59. August 28.—Indian river, point at mouth right bank; in 2 feet, among eel-grass, near oysters; September 15; set light; slightly slimed.

60. August 28.—Grover island, north point; in 2 feet, on rocks, among short seaweed, among rock oysters; September 15; set light; moderately slimed.

61. August 28.—Grover island, north point; in 2 feet, on rocks, among short seaweed, among rock oysters; September 15; set light; moderately slimed.

Collectors 1 to 60 were filled with shell picked from oyster-mud, while collector 61 was filled with fresh oyster-shell. Collectors 60 and 61 were placed together in order to test the relative efficiency of fresh and old shell. No difference was observable but, owing to the fact that fresh shell was not obtained before August 28th these collectors were too late in being placed out to make the test a conclusive one.

The tests show that spat sets in practically all parts of the bay, wherever there is suitable cultch material. The set was in general light, although in a few places it was good. The result would, without doubt, have been very much better had it been possible to set out the collectors earlier. The set was best in locations where the water was shallow, easily warmed, and where the bottom, free from eel-grass, was swept by currents from oyster beds not too far distant. The whole investigation leaves the impression that of late years the set of spat has suffered a great decrease. Set of spat is a thing essential to oyster production in Richmond bay, and it would seem advisable to institute a strictly close season until spatting has again reached normal proportions. The attempt to restock the bay by means of American oysters would probably meet with very indifferent success. Even were it demonstrated that they would flourish and grow, there remains the much more doubtful question as to whether they would reproduce themselves or not. Besides, Malpeque oysters have a name which it is good policy to retain. There would, moreover, be the serious danger of introducing the devasting drill along with the oysters.

FORMER OUTPUT OF THE BAY.

The following statement of the number of barrels of oysters shipped from Prince Edward Island through the Charlottetown Steam Navigation Company will give some idea of the relative proportions of the oyster trade from Richmond bay through a series of years subsequent to 1889. The writer is indebted to the kindness of the company for it. Other companies have handled oysters, but information could not be obtained concerning the amounts. All the oysters handled by the Charlottetown Steam Navigation Company were not Richmond Bay oysters, but the bulk of them were. The statement will give a very fair idea of the relative trade from year to year in respect to the oysters from this bay.

	Barrels.		Barrels.
1889	23,538	1902	17,271
1890	20,033	1903	14,916
1891	20,825	1904	12,280
1892	23,654	1905	12,406
1893	20,328	1906	12,283
1894	15,565	1907	7,456
1895	15,265	1908	7,472
1896	15,157	1909	9,190
1897	12,661	1910	7,196
1898	16,550	1911	7,589
1899	15,161	1912	6,908
1900	15,683	1913	12,982
1901	18,238		

The sudden rise in the number of barrels shipped in the year 1913 is eloquent in support of the contention that there should be a strictly enforced close season. It was ten years since there had been so heavy a shipment of oysters. The figures show that the oyster trade was of considerable importance twenty-five years ago and that it has dwindled in that period until it was in 1912 less than one-third of its extent at the beginning of the period. The need of protection is very apparent.

CONCLUSIONS.

1. The character of the bottom is favourable to the development of oysters. There is a considerable amount of mud bottom, but there are also extensive tracts of good hard clean bottom on which it should be possible to develop good oyster areas.

2. Eel-grass is abundant throughout the shallow areas, and will demand the expenditure of labour and money in order that it may be kept in check.

3. The salinity of the water, although somewhat high, is still favourable to the production of oysters and, judging by the oysters seen during the summer, of very fine quality.

4. The temperatures are somewhat low until rather late in the summer. In this way the spatting is delayed and the season of growth during the same season shortened. The low temperature probably does decrease the rate of growth of and the number of oysters in Richmond bay, but it would appear that it improves their quality.

5. Although the identification of the diatoms, kindly undertaken by Dr. A. H. MacKay, is not yet completed, it may be here stated that there is an abundant supply of oyster food in the waters of this bay.

6. The enemies of the oyster are not yet a serious menace in Richmond bay if proper measures are taken to keep them in check. The most serious depredations are those made by man and the starfish.

7. Spatting falls short of the requirements for successful oyster growing, but this condition of affairs may be remedied.

8. Oysters have existed in Richmond bay for a very great number of years, and have been much more plentiful in former years than they are at present. This would appear to be due to overfishing.

The oyster beds of Richmond bay are in bad shape, but their condition may be remedied. There is no evidence on which one can make the statement that natural conditions bar the development of oyster production. Eel-grass and starfish present difficulties which may be successfully contended with. No good evidence was obtained that the physical conditions are more unfavourable than they have been in the past. The chief danger to oyster production is disregard for and slack enforcement of the law. The hope for the regeneration of the oyster industry as a great national asset lies in a strict and impartial enforcement of protective regulations.

RECOMMENDATIONS.

The writer would favour the following steps as most desirable:—

1. That measures be taken to more rigidly enforce the oyster laws.

2. That a close season of at least three years be established, during which no one be permitted to take oysters from the public beds, and during which the sale of oysters taken from any bed, public or private, in the bay be prohibited.

3. That the ground between the 4-foot line and the shore be leasable to the fishermen for spatting grounds.

VI.

A SUPPOSED DISEASE OF QUAHAUGS FROM NEW BRUNSWICK.

By Philip Cox, Ph. D., *University of New Brunswick.*

The Quahaugs, supposed to suffer from some affection or disease, were from Buctouche, N.B., and were studied chiefly at the Biological Station, St. Andrews, in 1914. Buctouche, Kent county, is situated on the estuary of the Buctouche river, there about 200 feet wide, with an average depth of 20 feet at low water. The population is about 600. The town is not incorporated, but has a board of health which does not allow waste nor objectionable matter to be dumped into the stream nor on the ice in winter. There is no sewerage system, and only two or three private drains enter the river, hence no pollution of the water seems possible in a stream of its volume with a rise and fall of tide of from 2½ to 4 feet.

Above the town there are extensive marshes, overgrown with weeds and grass, and laid bare generally at low water, and hence much decaying organic matter is swept seaward, rendering the stream quite turbid. The temperature of the flow is apt to run high, for the water, spread out for hours over the marshy flats, has had time to become warmed, especially during midsummer when from 68° to 70° F. cannot be unusual; indeed, when tested at 3 p.m. on July 24, it stood at 70°. Owing to the quantity of fresh water entering the estuary from the upper river and its branches, the salinity is apt to be low, especially at low water and during the spring and early summer when the fresh water is at its maximum.

MANNER OF STORING.

The hard-shell clams or quahaugs are confined in floating trays 18 feet by 14 feet by 18 inches, made of boards from 4 inches to 6 inches wide with ½-inch spaces, and moored end to end along the shore in several tiers or ranges. This close arrangement, and the very narrow slots, often overgrown and clogged with algæ, are not favourable to a rapid change of water; indeed the force of the tide either way as a factor aiding the change can be barely perceptible beyond the second tray tidewards, and although a slow interchange is always going on, it must be entirely inadequate to the vital needs of such an immense number of shell-fish crowded together in the manner described. An unobstructed flow of water is still more required to offset the injurious effects of the low salinity and high temperature to which they are exposed, often for several months before shipment. This prolonged period of confinement under abnormal conditions must sap the vitality of the animal and render it less resistant to the still more unnatural and trying conditions of transportation and marketing, particularly if the quahaugs were taken from the beds in May before they had recruited after a long winter of inactivity.

The trays are usually filled to the depth of from 6 inches to 15 inches, but when arrivals from the fishing grounds are large, and space limited, they are filled to their utmost capacity and readjusted as soon as extra space is available. Three or four days after, they are turned, if the trays are up to their full capacity, with forks of 8 or 9 tines with chisel points, and broken or dead ones are thrown out; but no close examination is made; whatever happens to be seen is rejected, and, as a matter of fact, dead clams and broken shells were more or less in evidence. It was noticed, moreover, that the middle trays—those farthest removed from the effects of the tide either way—contained the most dead quahaugs, which fact may be regarded as a result, at least

partially, of the very poor water circulation. How often they are turned depends on circumstances; but, as a considerable growth of algæ and much sediment was seen in some of the trays which had not been recently disturbed, probably once a week would be the maximum. The trays are said to be scrubbed and dried at intervals, and one was seen undergoing the process. It was pointed out that the fork with its chisel-pointed tines, used in turning the clams, may do more or less damage to the mantle, protruding siphons, or edges of the valves, but a close inspection of the material sent to the station for study does not bear out this view, though chipped valves were found in a few cases.

MATERIAL AND ITS SOURCES.

The clams thus stored are of one species, *Venus mercenaria* L., the short-necked or round clam, or quahaug. It occurs on the gulf shores of New Brunswick and Prince Edward Island, chiefly on mixed sand and clay bottoms and at the level of 1 to 5 fathoms below low tide, but its distribution is local, not general, determined by bottom conditions and influences not understood. Though common on some parts of the New England coast south of cape Cod, it does not seem to occur in the Bay of Fundy nor on the Atlantic coast of Nova Scotia, excluded therefrom doubtless by the colder Arctic waters.

The fishery begins in May, extends to the end of June, and reopens in September, the two intervening months, it is believed, covering the period of spawning; but much remains yet to be learned, not only as regards the length of the reproductive season, but of those occult influences which determine the peculiar distribution of the bivalve. All its known beds are for many months covered, more or less, with ice, the temperature falls, and the clam buries itself in the muds, ceases to feed, and necessarily falls off in condition. Just when it emerges from this dormant state and begins to feed is not definitely known, but is supposed to be about the first of May; yet much must depend on weather conditions and the time the ice disappears, for some springs, like that of 1914, are colder and later than usual. Those clams raked in May, then, are likely to be inferior in quality, to be lacking in the vigour and the vitality of later catches, especially those of October, and are not likely to stand storage and shipping conditions as well. The transfer from cold sea-water of average salinity to the warmer river estuary, fresher at that time than at any other time of the year, perhaps, must tax the animal's powers of resistance to a dangerous degree. It would seem that the early May catch is the largest of the season, for the more remunerative salmon and lobster fisheries are then scarcely under way, and many fishermen are free to rake the clam beds for a time. These large May receipts are stored and kept under the conditions described for some weeks, in some cases two months; and it is somewhat suggestive that most of the shipments to Chicago and New York going bad were either all May fish or were made up in part of that catch. It might be fruitful of good results to this fishery if this were made the subject of a special inquiry. It must be borne in mind, too, that preparation for reproduction and the process itself tax the vigour and vitality of the animal; and development of the generative organs and their elements to a healthy, ripe stage, may depend on recuperation after the trying season of dormancy. Before this is possible, however, the clams are raked, confined, and the natural food supply cut off; an arrest of growth and functional activity ensue, which may seriously affect the health of the clam.

The stock shipped from Buctouche is obtained from beds in the vicinity; from Cocagne, 12 or 15 miles distant; and from Percival and Gulf bays, Prince Edward Island. It is conveyed to the storage grounds in small vessels, the clams being in bags, piled up in the holds or on deck, and from two to four days are required for the passage from the farthest points.

MANNER OF SHIPPING AND EXTENT OF INDUSTRY.

Formerly the clams were shipped in ordinary grain and feed bags, but, a considerable loss resulting, it was thought well to use a more open sack permitting of freer circulation, and the coarse open "coffee" bag of about 1½ bushels' capacity is now in vogue. The quahaugs are sorted and classified as large and small, the soundness is, in one establishment, decided by rapping them together, a manner of testing regarded as injurious by the other, which claims that they are killed by even a slight blow. The action does seem a rather violent one, and it is still a matter of doubt if the jar to a creature of such delicate internal structure and loose arrangement of organs and parts does not produce strains and even ruptures more or less fatal, though the firm objecting to it had also consignments to New York and Chicago go bad. The experiments performed at the station and referred to below are certainly not conclusive on the point.

The sacks of clams are placed in tiers, one on top of the other, the box-car is iced at either end, and re-iced whenever necessary during transit, but no provision is made for the ventilation of the sealed car. The temperature at which it is kept could not be ascertained, nor whether it was uniform; but it is fair to assume that clams taken from water at a temperature of from 68° to 70° F., stored for a week or more in one at from 45° to 50° F., or perhaps less, and then exposed to a temperature of 80° or upwards at their point of destination, must suffer from such extremes; and, if shipped in a weak and physically reduced condition, many may be expected to die. It will be seen that the experiments made at the station are decisive on this point.

The want of ventilation referred to and the pressure at which half or more of the clams are subjected, keeping the valves firmly shut and rendering oxygen utilization nigh impossible, were thought to be important factors; but, in the light of the tests described below, the latter does not seem to be of any importance, at least within the time limits of the experiments, but the former, a condition that should not be ignored.

Two firms, R. O'Leary and Irving & Son, send annually from Buctouche to the American market, chiefly to Chicago and New York, between 600 and 700 tons, or about two carloads per week, from early in May till the middle of November.

Though there is always a loss, it never assumed the alarming proportions it did this summer, as the following record of shipments to Chicago made by Mr. O'Leary show:—

Date of Shipment.	Quantity.	Date of Arrival.	Loss.	Per cent Loss.	Per cent Total Loss.	Max. Temp. Chicago 24 hours, before and after date of arrival.
June 10th..	65,000 large....	June 16.....	14,600 large..	22½	35	70° F.
	33,000 small		19,800 small ..	60		
" 16th...	63,000 large. .	" 23.....	22,500 large...	36	29	91° F.
	26,000 small		3,450 small ..	13		
July 1st....	65,000 large.....	July 7.....	8,500 large...	13	10	84° F.
	20,000 small		.....			
" 8th....	65,600 large.....	" 13.....	14,000 large...	21½	17½	93° F.
	15,000 small		....			

The loss in subsequent shipments was unimportant.

It is seen: (*a*) that the large clams generally suffered the more; (*b*) that the small ones were practically immune after June 16, but the large clams continued to die for a month longer; (*c*) that other factors than exposure to high temperature at the point of destination were at work, since the cargo arriving June 16 lost more at a temperature of 70° F., with a mean of 59° for the 15th, 16th, and 17th, than that of July 13 at a temperature of 93° F., with a mean of 80° F. for the 12th, 13th, and 14th, though the death-rate of the large was about the same in both.

The consignees reported the stock diseased, and eventually refused to accept any further consignments, though later on shipping was resumed. The merchants were alarmed, as it meant a big loss and the probable ruin of a growing industry of considerable economic importance, and requested the biological board to investigate the matter. Directed by Professor A. B. Macallum, Toronto University, secretary-treasurer of the board, I went to Buctouche, inspected storage and other conditions, and brought away samples of water and lots of clams from several trays for study at the Marine Biological Station at St. Andrews, which were later supplemented by a special lot from one of the firms. They were all transferred to wooden tanks of sea-water, away from direct light, and jets were kept constantly running to renew and aerate it.

It must be noted that the salinity of this water is greater than that of the mooring grounds at Buctouche, where at low tide the specific gravity was only 1·0178 and at high tide 1·0202, but at the station it registers 1·02425, which was maintained fairly constant throughout, for the reservoirs supplying the tanks are always refilled at high tide. No ill-effects, however, were perceptible during the three or four weeks the bulk of the stock were thus under observation, which implies that the quahaug possesses a considerable power of resistance to osmotic pressure.

EXAMINATION AND TESTS.

An extended microscopic examination of the fluids and organs of many was made, but no trace of disease, due to pathological causes, could be found; a finding accentuated by the fact of only one death occurring among the several hundreds kept in the trays. It died the day after its arrival at the station.

It was conjectured, however, that the series of rather sudden changes of temperature from the storage trays at 70° F. to a sealed box-car at 45° or 50° for a week* or more followed by 80° or 90° F. at the point of destination, might cause a high death-rate of clams kept long in confinement and raked while they were in a reduced condition. To test this, a set of eight were put in the station ice-house for three days in a temperature ranging from 45° to 48°, and were then exposed to the open air at a mean of 60°, the maximum (one instance) being 72°. At the end of three days all were dead but one, which on dissection showed very feeble signs of life.

Another lot of ten was taken directly from the trays and exposed for fourteen days in the open air. They were all alive at the end of that time, and were returned to the trays where they still live, August 25.

These experiments seem to confirm the suspicion that sudden alterations of temperature are fatal. It will be seen, too, that in some respects the test was not so severe as the actual shipping. The ice-house is well ventilated; the duration of exposure therein was three days, not seven; and the average and maximum temperature of the weather was less than in Chicago when the last three shipments arrived. The contrast, however, is great—the first lot all died, the second, exposed longer, survived the test. The maintenance of a uniform average temperature during transit and marketing seems all-important.

A lot of ten were 'rapped" and exposed for six or seven days, and two died after being returned to the water. Of the eight mentioned above, which were subjected to a low temperature in the ice-house, four had been previously "rapped." While the data, then, are too meagre and uncertain to warrant any general conclusion as to the effects of this means of testing the soundness of clams, some considerations seem to point to it being injurious, and hence it should, if possible, be eliminated.

A general falling-off in weight resulted from all exposures. A lot of ten, wiped carefully, were weighed, and at the end of six days, reweighed. The loss ranged from 8 per cent to 20 per cent, or an average of 12 per cent, and the larger ones invariably showed the greater reduction, the two heaviest, of 220 and 246 grammes, respectively, losing 18 per cent. As no solid matter was excreted, the loss is clearly

* After this had been written I was informed by the shipper that the temperature of the iced car, ten hours after sealing, was 40°F.

due to evaporation of the contained water or that of the organic fluids, for several check experiments demonstrated that the shell remains constant as long as the contained moisture lasts. It is reasonable to assume that under such conditions, excretion of deleterious gas and secretion of oxygen must decline, and the functional activities of all parts and organs be lowered. The large quahaugs were much less resistant than the small ones, for 90 per cent at least of all dying in the course of the experiments were of that class.

Just here it may be asked: Does not a considerable percentage of old clams normally die every season in consequence of expended energy involved in reproduction, a number, the greater as the environment becomes the less natural? Very little is known of this and many other phases of its life-history, and until fuller and more definite knowledge is available, economic problems, like that under discussion, cannot be satisfactorily solved.

When loaded in box-cars, half or more are under a pressure too great to permit the valves to reopen; for, though they are shut and kept closed by contraction of the adductor muscles, they are reopened automatically by the elasticity of a small hinge, too weak, however, to overcome the increased resistance. Hence it was surmised that oxygen utilization would be greatly reduced, fatal results follow, and in the premises the mortality seemed partially accounted for; but in the light of the following experiments it cannot be regarded otherwise than at best a contributory cause, effective only, if at all, in a high temperature and under faulty ventilation.

August 3, thirteen clams were put under pressure in the laboratory, some in clamps, the rest under heavy weights. At the same time a large one was put into an 1800-c.c. jar of sea-water which had been boiled for half an hour to expel the oxygen. The jar was completely filled, so as to exclude all air, and sealed. It was noticed that the siphons were kept protruding as long as it was confined in the jar. The temperature of the room rose above 70° on two occasions, the maximum being 72°, the minimum 58°, the mean for the seven days being 62½°, 61°, 61°, 65½°, 62°, 66° 66°, or an average mean of 63°. No night temperatures were taken, but they were probably all below 60°. The conditions were certainly very favourable for testing the quahaug's powers of endurance under a fairly uniform temperature, and pointing to a means of minimizing the losses met with in the trade.

August 10 all were released and placed in trays, where they continued to live until removed at the end of the season.

The tests exemplify the clam's great resistance to the lack of oxygen. Philip H. Mitchell (*vide* Bull. U. S. Bureau of Fisheries, vol. xxxii, 1912) demonstrated by carefully performed experiments that forcibly closed quahaugs did not appreciably use any oxygen, but voluntarily closed ones did. His experiments, however, were conducted in a water medium, and while the valves may be closely enough set to prevent entrance of that oxygen-bearing element, it may be somewhat different in an air medium. Indeed the ridged character of the margins of the valves would seem to make it probable. One of his most important findings, however, is that oxygen utilization increases with the temperature, and that the smaller clams show a relatively greater consumption of oxygen than the larger.

To prove whether ventilation was or was not a valuable factor in provisions for marketing clams, the following experiments were made:—

(1) A tight box holding thirty-two was closed August 12 and kept in that condition till August 19 under the varying temperature of the room, which ranged between 58° and 70°. Before being opened, a thermometer thrust through a hole, just bored for the purpose, registered 2° lower than the room. Three clams were dead and five more died during the next two days in the tray to which they had been transferred, making a total loss of 25 per cent.

(2) Another lot of eleven was put into a glass jar, the top being covered with perforated cardboard, and the vessel was set in a tray in 2 inches of water with a jet

playing on it. The object was to maintain as uniform a temperature as possible. Seventeen days after, all were alive. Records of shippers and experiments performed at the station prove conclusively that large clams are less resistant than small ones. Lot No. 1 was half and half, but lot No. 2 was all large. The contrast between these two tests may be better seen in tabular form as follows:—

Lot	No. of Clams.	No. of days out of water.	Temperature.	No. lost.	Per cent lost.
1	32	7	variable	8	25
2	11	17	uniform about 62° F.		

That ventilation and uniform temperature are essential is here strongly emphasized.

Those dying in the course of these studies were microscopically examined, but no cause of death could be discovered. The bodies were wasted, parts shrunken, and the whole general appearance that of an animal dying from enervation due to a lack of nourishment. Generally speaking, no ripe generative elements were found, they had either been shed, or failed to develop into large, sound ova or sperm. In some instances, however, ripe ova and sperm did occur in small quantities, sometimes in the reproductive organs, oftener in the branchial chambers, where the ova were breaking down or disintegrating in the midst of swarms of bacteria and some protozoa.

It is the general belief that the valves of a clam spring apart at death, the adductor muscles relaxing, but such does not seem to be the case, for an immediate examination found decomposition already under way, accompanied with an offensive odour. In the case of such a low organism it does not seem possible to define death as a separate act, for the various parts and organs do not cease their functions simultaneously, and the muscular tissue of the adductors, the strongest in the body, may be the last to do so. In this connection it may be noted that the consignees at Chicago maintained the clams were dead on arrival, though the valves were unopened, but when opened in the usual way, they were unfit for use.

It is difficult to account for the decomposition of the ova. Though the clam possesses great resistance to a lack of oxygen, ova, especially when fertilized, demand a medium rich in that element, and renewed constantly. Lacking these conditions, the ovum generally dies and begins to decay, and where, as in the clam, it is in close contact with the most delicate and exposed part of the vascular system, certain toxic effects, fatal to the animal, may result. To this cause may be attributed, in part at least, the high death-rate of shipment in July, probably the maximum spawning period. The small clams were then nearly immune, and it is significant that ripe reproductive products were found in only one small individual at the station. Had this class already spawned, or not reached the necessary age and development? This question could not be answered at the station, nor could any definite information on the point be obtained from the scientific literature available. Its determination would be of some economic value to the trade, and conservation of the fishery.

In closing the brief report of this investigation, the following recommendations might seem warranted by the facts disclosed, and some at least could be tried at little extra cost over present methods. The trade should seek, as far as possible, to minimize the general loss, maintain the reputation of its goods on the market, and at the same time prevent the recurrence of such enormous losses as those met in 1914.

RECOMMENDATIONS.

1. That the floating trays be moored in water of greater salinity and lower temperature than that referred to above.

2. That more favourable methods of promoting circulation and change of water in the trays be adopted. These would seem to be:—

(*a*) Wider and more numerous slots.

(*b*) Shallower trays, or present ones filled to about half their capacity.

(*c*) Mooring in a more open arrangement, so as to utilize the full benefit of the tide.

3. That stock be shipped in the order of its arrival.

4. That cars be ventilated and kept at a fairly uniform temperature, about 62° F.

5. And that crowding and pressure be avoided as far as possible.

POINTS AWAITING INVESTIGATION.

In the course of the investigation, some biological questions and considerations were suggested which might, in the interests of the fishery and science, be fully examined and settled. These may be summarized in part:—

(1) At what age and size is the quahaug sexually mature, and do large and small individuals spawn at the same time?

(2) What proportion of the clams of the various sizes die normally every year, and does death generally follow the spawning season?

(3) What is the general effect of the retention of ova in the case of clams kept for some time in the open air?

(4) Comparison at intervals of quahaug raked early in May with those on the native beds to determine the growth of the reproductive organs of the former, and the general effect of storage.

VII.

INVESTIGATION OF A DISEASE OF THE HERRING (*CLUPEA HARENGUS*) IN THE GULF OF ST, LAWRENCE, 1914.

By Professor Philip Cox, Ph.D., etc.,

Professor of Natural History, University of New Brunswick, Fredericton, N.B.

(With Two Plates.)

About June 15, a large run of small herring, from 6 to 8 inches long, appeared in the shore waters of the straits and at certain points of the Chaleurs bay. The schools were especially large from Bathurst to Shediac—a littoral of nearly 200 miles—and remained till about the 10th of July. The fish died in great numbers, were washed ashore on the beaches or sand reefs, skirting the coast, or in quiet coves littered the bottom. From various points along the coast reports reached the department, and specimens were sent to the Commissioner of Fisheries, Professor Prince, Ottawa, but he was absent in New Zealand, and the specimens were stored.

The previous year had witnessed a similar phenomenon, but the diseased fish appeared earlier, about June 1, and before the annual run of spawning spring herring had left the coast. The latter became involved in the epidemic, and many died; but, as the season advanced, the large fish became fewer and fewer until only small ones were in evidence.

Fishermen recalled the fact, too, that sixteen years before a similar run of diseased fish had visited the coast, and as schools of young herring are very unusual in those waters, it was suggested that the epidemic may be the determining cause of the movement.

About the 20th of July, 1914, Prof. A. B. Macallum, University of Toronto, and secretary-treasurer of the Marine Biological Board of Canada, requested the writer to examine and report on the matter. Unfortunately the schools had disappeared; but an examination of the coast in the neighbourhood of Richibucto yielded two specimens and a fragment of a third—material altogether too scanty, it was thought, for solving the cause of the epidemic, as the death of these individuals might not be due to the general disease at all. A prompt report of the character of the sickness and general conditions, gathered from fishermen, was made to the Fisheries Department, and there the matter rested, until a careful examination of the two specimens was made at the Marine Biological Station, St. Andrews, the result of which is briefly set forth in this paper.

Here it may be remarked that these specimens (see fig. 1) seem to belong to the sea variety and not the coast variety of herring, for the body is rounder, the dorsal insertion more anterior, and the head not so deep as in the latter; but one of these characters is undoubtedly accentuated by the poor condition due to a wasting disease. If this be so, it would seem as if the epidemic were oceanic and not littoral in its origin, and, as before suggested, the shoreward movement may be a result of the general infection.

The ocean variety visits the Northumberland straits in midsummer and seems to spawn in July, for on the occasion of my visit they were being taken some miles off, in a gravid state, with ripe ova.

NATURE OF THE DISEASE.

Fishermen were agreed as regards the symptoms and general appearance of the dead and dying fish. Many saw sores, abrasions, and discoloured spots, especially on the caudal third of the body. A fisherman who owns a salmon stand on North Beach, Richibucto harbour, "dipped" a quantity and sent them to his family, but numbers were found unfit for the table. The disease was most evident in the flesh of the caudal peduncle.

The schools were described as crowding into very shallow water, and their movements were feeble, irregular, and similar to what might be expected of exhausted and dying fish.

CONDITIONS.

The spring had been late. Cold weather had continued far into June and even the average July weather was cooler than usual. The spring run of coast herring was the poorest for years—the fishery a failure at many points along the coast. Predaceous fishes were no more numerous than in other years, though cod were found closer inshore than usual, and generally refused bait, but were caught freely in salmon nets, an unusual occurrence. In July, jelly-fish were exceedingly abundant, surpassing anything known for years, but it does not seem they were much in evidence during the herring epidemic. The lobster catch, above the average up to the time the herring appeared, suddenly fell off, and even the ubiquitous, greedy crab failed to enter the traps. Food was probably in abundance, the herring dying in the off shore waters as well. No schools of squid were seen.

MATERIAL.

As already remarked, I was able to secure two dead fish only and the caudal part of a third; which, on examination, proved exceeding interesting; and, taken in connection with some of the facts referred to above, leaves little room for doubt that they were victims of the general infection. The specimens were 17·5 and 18 c.m., respectively, in length, and the tail fragment probably belonged to one of the same size and age. One had a sore on the side of the caudal peduncle near that fin, which communicated with a canal-like cavity, extending forward under the lateral line nearly the whole length, but here and there broken into two parallel cavities. No opening occurred on the opposite side, nor was there any on the second fish; but a series of dark patches were seen on all, and dissection revealed the open passages everywhere under the lateral line. The fragment had an opening and a cavity extending forward. The three fish had died of a disease similar to that affecting the fish referred to by the salmon fishermen.

The location and appearance of these cavities are shown in figs. 3 and 4. Comparing them with 5, they are seen to occupy the region of the "red meat" or the highly vascular and nerve tissue beneath the lateral line, which is especially rich in lymph and blood. The walls of these cavities and the adjacent muscular and vascular tissue were largely a mass of minute microscopic organisms of extraordinary protean forms (see figs. 6 to 18, inclusive) and members of that group of parasitic protozoa known as the *Myxosporidia*. They are credited with being the cause of widespread epidemics among fish and other animals. They infest the tissues of the body of their hosts, multiply rapidly and in many cases become lethal, death being due apparently to the gradual exhaustion of the system and certain toxic effects. The parasite was not by any means confined to the tissues mentioned, but occurred in the liver, the kidneys, intestinal tract, and abundantly in the blood found coagulated in the sinuses and auricle.

The method of infection is not fully known, but is believed to be by the mouth and intestinal tract. The minute spores may be swallowed directly by the fish, taken

in with food particles, or parasitic on the bodies of animalculæ on which the herring feeds. The life-history is very complicated, and the cycle of changes and apparent metamorphoses it undergoes surprising, as a glance at the figures appended to this paper will show. For the unravelling of these processes and determining the species, living material is essential, and even then it is one of the most difficult studies a micro-biologist can undertake.

It seems to be a Neosporidium, a member of a group of Myxosporidia which are propagated by means of spores. The spores are provided with a dense ectosarc which serves as a protective cell-wall, and are technically known as "sporons" The envelope is digested in the stomach or enteric canal and the parasite liberated in the form of an amoebula, which, partly owing to its minuteness and partly to the power of altering its shape to suit conditions, penetrates the epithelial lining, enters the blood-currents, and is carried to the special tissues to be infected. This amoebuloid form has been designated by Stempell a "planont," from the wandering habit; and the one under discussion seems to be intercellular, that is, occurs very generally lodged among the fibres of tissues, especially of the muscular and vascular tissues, which may become wholly disintegrated or destroyed by enormous swarms of the parasite. Constantly bathed in lymph, the Neosporidium ingests its food by absorption alone, so that the pseudopods seem to aid the parasite in insinuating itself among the fibres and increasing the extent of absorbing surface. Under these favourable conditions it multiplies in a surprising manner.

Though the life-history of the parasite could not be satisfactorily made out, the absolute character of some phases could; and reading in between them the scanty knowledge of the group available, certain relations of these phases were rendered probable. For instance figs. 11, 12, 13, and 14 plainly suggest a succession, eleven being theoretically the initial stage of the series. It is clearly a plasmodium or multinucleate cell, to be presently resolved into a large number of uninucleate cells, known as "meronts" and represented by fig. 13, rounded off in fig. 14. The multi-nucleate cell is generally believed to arise from the sporont, and some evidence to that effect was obtained during the study of the material, but the structure of the sporont made the initial steps of the development hard to follow. For instance: instead of the chromatin being more or less aggregated into a nucleus and a near nuclear investment, it was largely distributed through the whole cytoplasm in the form of granular chromatids and obscured more or less with melanin, so that the nucleus, even when stained, could be seldom seen, and hence the first stages of nuclear division were not clearly made out. Indeed some authors doubt that the sporont possesses a nucleus at all. It was only when the division of the nucleus, if it has one, had advanced somewhat, or the wandering chromatids had been attracted to certain points (multinuclear centres) that the phase became evident. Again, it could not be determined whether the multi-nucleate cell arose asexually or was the result of a previous conjugation of gamete sporonts. It undoubtedly represents one method of rapid multiplication.

Few instances of binary fission were met with, one of which is represented in fig. 19, but many of the protean forms suggest budding, a condition rendered quite probable on account of the nuclear elements being scattered throughout the whole cytoplasm. Indeed many of the pseudopodial enlargements were seen to be rounded distally and the chromatids more or less aggregated after the manner of an ill-defined nucleus, the whole suggesting new cell-formation by gemmation.

While all stages were to be found in any affected tissue, the meronts were most abundant in that least affected: the sporonts or resistant spores, where disintegration was most advanced; and the planont stage largely characterized the blood, liver, intestines and kidneys, though in the latter confined to the blood vessels.

Contamination is effected by the sporont, or at least such is the general belief, but the precise manner of transmission is in doubt. Granted some means of con-

veying them from infected hosts to the water, the rapid contamination of fish, schooling densely like the herring, must follow, but such means do not seem to be directly provided in all cases. For instance, one of the specimens had an opening on one side of the caudal peduncle, the other had none. In the former case suppuration doubtless carried out swarms of sporonts to enter other hosts and spread the infection, but many hosts seem to die in the progress of the disease before openings appear and sloughing is possible. It does not seem that many are voided through the natural openings, for their numbers in the intestinal tract, ovaries and spermaries are insignificant when compared with the masses to be found elsewhere. It may be surmised that the parasite has other hosts, and among them small organisms on which the herring prey. It is only necessary to add that once the protozoan has entered a host its wonderful power of rapid multiplication, absorption of the vital fluids and general clogging and disordering of the vascular system, especially of the blood vessels, must soon produce results highly lethal.

Since the above was written, I received two lots of herring from Dr. Macallum: lot No. 1, collected at Metis, P.Q., and lot No. 2, taken by Captain Wakeham at some other point, the exact locality unknown to the writer. These fish were reported diseased and dying. Indeed it seems as if a general epidemic was abroad among the herring of the coast waters of Canada and Newfoundland during the spring, summer and autumn of 1914. The first report came from Newfoundland, as the following clipped from the St. John *Globe*, which was copied from the Eastport *Sentinel*, will show:—

"Enormous quantities of dead herring are being found in the waters surrounding Newfoundland, and fishermen are worried. Many look upon it as a plague, and as the beginning of the end of the herring fishery, which, should it occur, means dire poverty and distress in its very worst shape to thousands of people there."

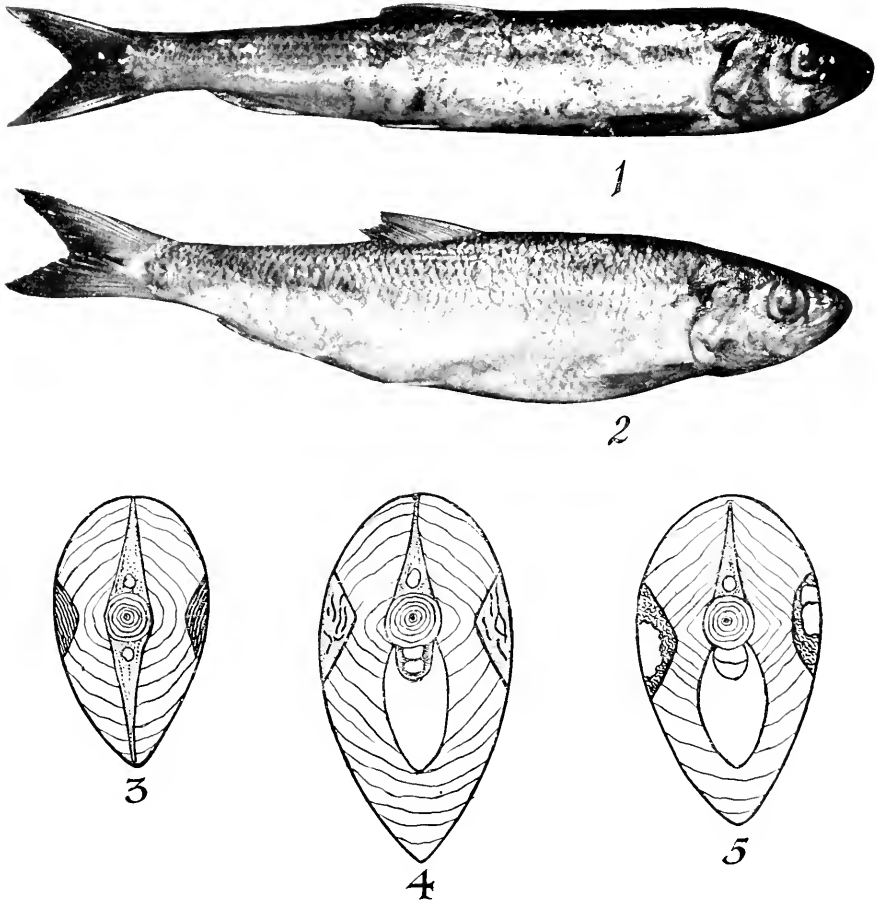
This was in April, and about the middle of June it appeared among the schools along the New Brunswick shore. Later it seems to have become pretty general at other places in the gulf. It is just possible that all these fish belonged to one great migrating body.

Lot No. 1 was made up of small fish from 6 to 8 inches in length and apparently of the sea variety, being in all respects similar to the New Brunswick specimens. The cause of death was the same in all cases. The parasite was especially abundant in the coagulated blood of the heart and sinuses, the lateral line tissue was badly affected or entirely destroyed, and sores were seen on the caudal peduncle, close to the fin.

Lot No. 2 was composed of larger and better conditioned fish, averaging from 11 to 12 inches in length. A few showed abrasions of the skin, apparently due to chafing against stones when dead, but the tissue here seldom contained any parasite, except in the case of a very badly affected fish. Some had small sores in the axils of the pectoral fins which seemed to open into diseased pockets where the contiguous tissues literally swarmed with parasites, generally in the sporont stage. The extra flow of blood to these parts may account for the colonies. A few axillary sores, however, seemed due to some external parasite, probably a crustacean, for the protozoan did not occur in the neighbouring tissue. In one, a well-conditioned and preserved specimen, no parasites were found, and the cause of death was probably due to an accident.

No Neosporidia were found in the brain, and the larger and least contaminated fish showed an immense number of plasmodia or multinucleate cells, see figs. 11-14, which seem to be characteristic of the initial, as the sporonts are of the final stages of the disease.

Herring Disease. Philip Cox.



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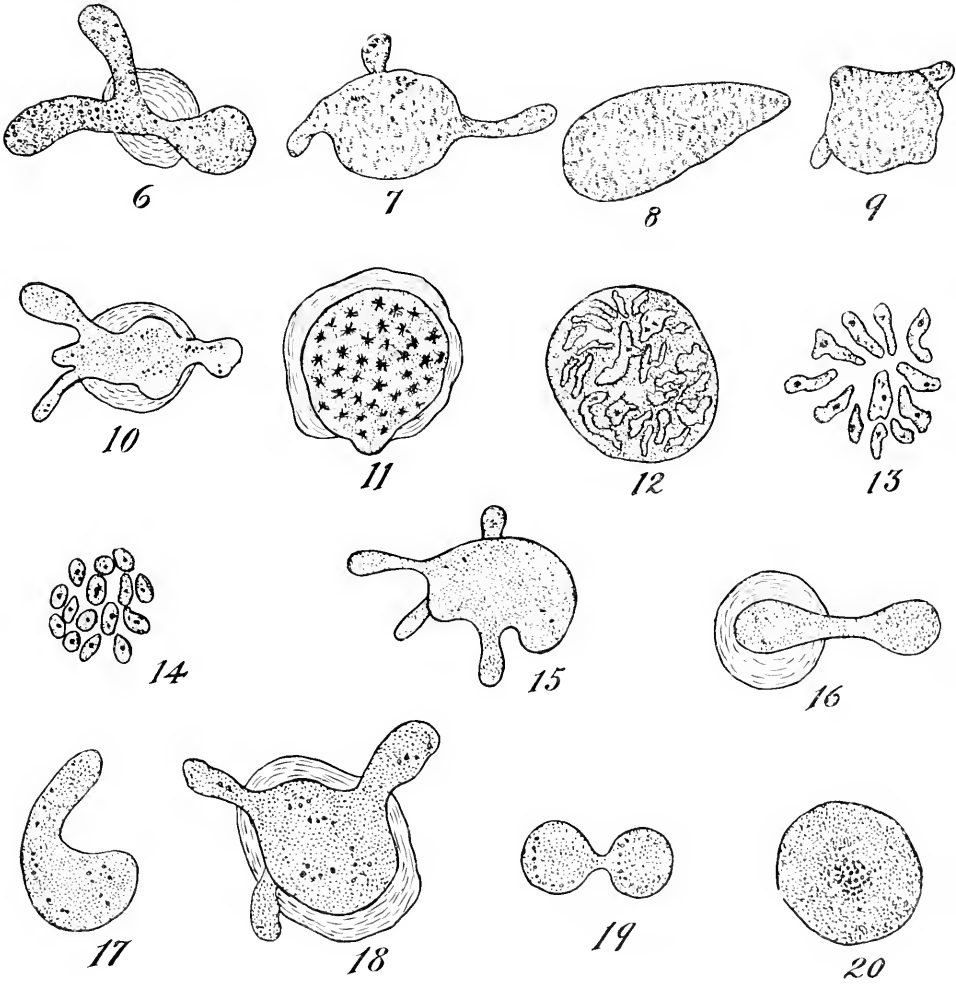
Herring Disease. Philip Cox.



EXPLANATION OF PLATES.

PLATE VIII.

Fig. 1. Diseased Richibucto Herring.
2. Coast Herring, Passamaquoddy Bay.
3. Cross-section. Lateral line tissue shaded.
4. Cross-section. Dark lines in lateral region marked early stage of disease.
5. Showing excavation of lateral line tissue.
6–10. Protean forms of planonts. The "shell" is represented in 6 and 10.

PLATE IX.

Figs. 11–14. Plasmodia or multinucleate cells.
15–18. Further planont forms.
19. Apparent cell division.
20. Sporont.
All magnified from 600 to 1,400 times.

VIII.

THE LIFE-HISTORY OF THE HAKE (*UROPHYCIS CHUSS* GILL) AS DETERMINED FROM ITS SCALES.

BY E. HORNE CRAIGIE, *University of Toronto.*

(With Seven Figures.)

The object of this investigation was to determine the rate of growth of the hake by an examination of the scales and comparison of the data thus obtained with the length-frequency curve.

In all, 780 hake were examined, representing several different catches, as follows:

No. 1. North Channel, June 15, 1914.

Nos. 2–50. North Channel, July 7, 1914, in the afternoon.

Nos. 53–100. Wilson's Beach, July 16, 1914.

Nos. 101–228. Wilson's Beach, July 22, 1914.

Nos. 229–352. Wilson's Beach, July 30, 1914.

Nos. 353–780. Wilson's Beach, July 31, 1914.

In the case of Nos. 1 to 52, inclusive, the length was recorded and scales were taken. Nos. 53 to 227 were also weighed, and their sex, the weight of the gonads, and the weight of the livers were recorded. In the remaining cases only the length and sex were recorded, in order to get data for a length-frequency curve.

The measurements of the first hundred fish were made with a folding rule, while the remainder were measured by placing them upon a board marked off into centimetres. In every case the measurement was made from the tip of the snout to the posterior end of the vertebral column.

The scales were taken from the side of the fish either a little above the lateral line or just below the dorsal fin. A considerable number were prepared by soaking in water, cleaning thoroughly with a small brush, and mounting dry in microscope slides. It was found, however, that they kept perfectly in paper, and could be examined quite readily, as when in permanent mounts, if simply wet, and placed upon a clean slide, the surplus water then being removed with a piece of clean filter paper, and this method was used in most of the work.

Curves were drawn with the lengths of the fish as abscissæ and the frequency as ordinates. One such length-frequency curve was drawn for Nos. 53–352 (fig. 1), which will be seen to show a typical "hat curve" for each sex, that for the males being particularly smooth and showing a predominance of fish 43 cm. long. The curve for the females, on the other hand, shows a marked predominance of individuals between 47 cm. and 50 cm. in length, the greatest number being 50 cm. One curve drawn for both sexes shows two humps corresponding to those on the curves for separate sexes, showing that there is not even sufficient overlapping of the sizes of the two sexes to smooth out the curve.

Graphs drawn for Nos. 353–780 (fig. 2) show even more strikingly regular "hat curves," and also show the same difference between the predominating size of the two sexes. From these graphs it appears, in the first place, that the fish of a given sex associate almost entirely with individuals of their own age, as there is only one marked hump in each curve. In the second place, it is evident that either the males of the age represented are smaller than the females of the same age, or else the

females associate with males which are younger than themselves. An examination of the lines of growth upon the scales indicates that the former is the correct explanation of the facts, the individuals of the two sexes being the same age.

The morphology of the scales of the hake differs entirely from that of the scales of the cod, haddock, etc., and bears some resemblance to that of the salmon scales There is no succession of spiral, cyclic, and crescentic rings. The nucleus in the centre of the scale is occasionally a short spiral, and in a few cases is a complete ring, but usually it is a ring with a little break at the anterior end. Such rings, in the form of a somewhat irregular ellipse continue, more or less uniformly spaced, until the end of the ellipse reaches the end of the scale, leaving a perfectly clear strip extending along the long axis of the scale from the centre to the anterior end. The

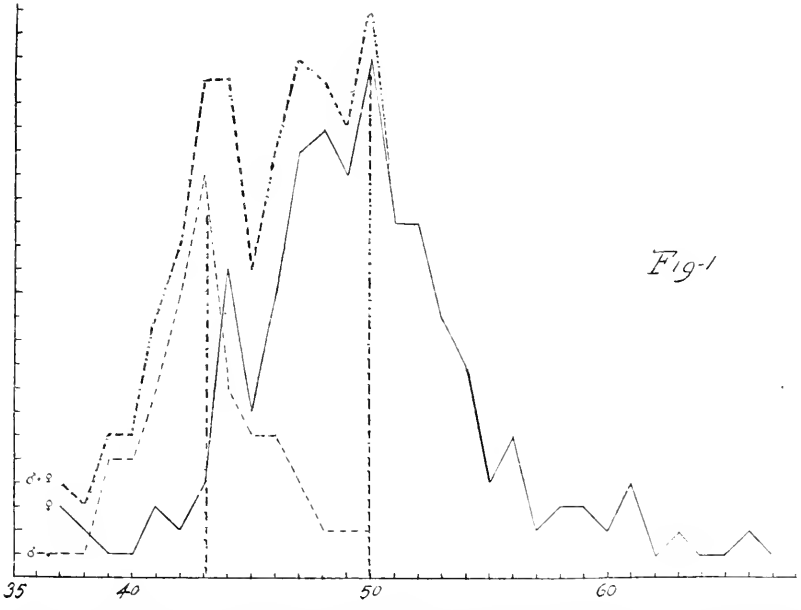


Fig. 1.—Length-frequency curves for specimens of hake Nos. 53-352. The clear line represents all the females, the interrupted line all the males, the dotted line represents the two sexes taken together. Dotted vertical lines represent means.

rings then continue to the edge of the scale as curved lines along each side. In some cases these lines, or rings, extend right to the extreme edge of the scale at each end, but most scales have a narrow clear area along the posterior edge.

The lines of growth, instead of being formed by a change in the nature of the rings, are merely shady lines produced by a little irregularity in each ring along the side of the scale and a roughened area across the posterior end. Where these lines reach the clear area on the long axis they are marked by the ring nearer the centre stopping abruptly at the clear space, while the next ring turns and runs along the edge of this space for some distance towards the outside of the scale. It is this change in the rings at the clear space which is considered to suggest the condition in the salmon, where the rings alter in such a way as to form caps. These lines of growth are sometimes very indistinct but are usually quite evident, though a little indefinite. In several scales the distance of the innermost line from the centre would seem to indicate that the first line is missing.

That these lines represent a periodicity in growth there is no doubt, but whether or not they are annual there is at present no means of determining, though this is

probably the case. In the tabulated data the number of these lines of growth has been recorded under the heading "Age." In three cases "(inter)" has been inserted after the number to indicate that one ring has been "interpolated," it being considered that the first ring appearing probably represents the second recurring period in the age of the fish.

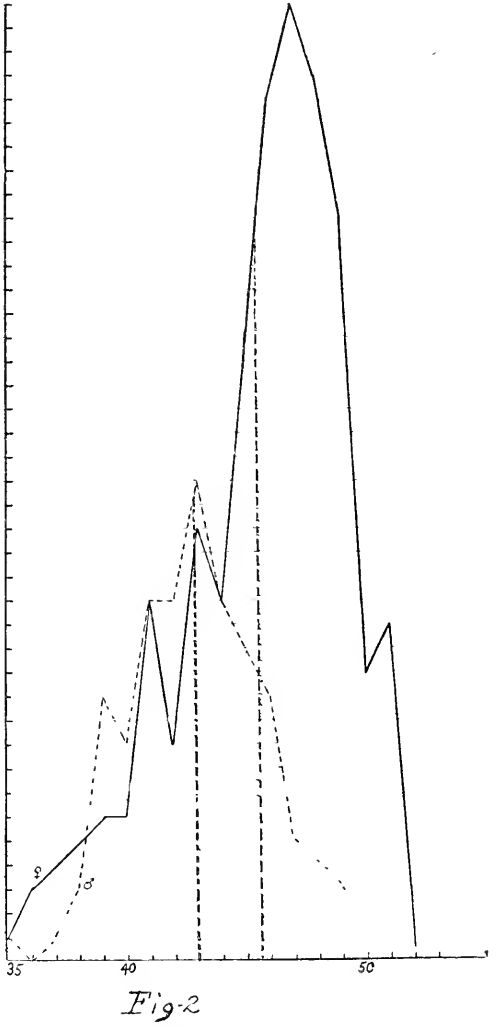


Fig. 2.—Length-frequency curves for specimens of hake Nos. 353–780. The clear line represents all the females, the interrupted line all the males. Dotted vertica lines represent means.

Almost all the fish examined appeared to be 3 years old (if it be assumed that the lines of growth are annual), one of the lines appearing in almost every case very near to the edge of the scale. An attempt was made to draw length-frequency curves for the two sexes at different ages, but there were not enough either two-year-old or four-year-old individuals to form curves at all. This is greatly to be regretted, as it

would have been a valuable check upon the curves for different ages as determined by assuming the growth of the scales to be proportional to that of the fish, which are described below. The curves for the three-year-old fish (fig. 3) naturally showed little difference from the length-frequency curves for all of the sex, the same humps appearing distinctly in each case.

Whether the growth of the scale is proportional to that of the fish could not be definitely determined owing to the impossibility of comparison of curves obtained upon this assumption with ordinary length-frequency curves for different ages. The assumption was made, however, and certain deductions were drawn as to the rate of growth.

A scale was placed under a low power of the microscope, and by means of a camera lucida a line was drawn, representing the long axis of the scale from the centre to the anterior extremity, and the positions of the lines of growth were marked upon this line (fig. 4). Another line, representing the short axis from the centre to one side was similarly drawn and marked off, the two lines being so placed that they formed a

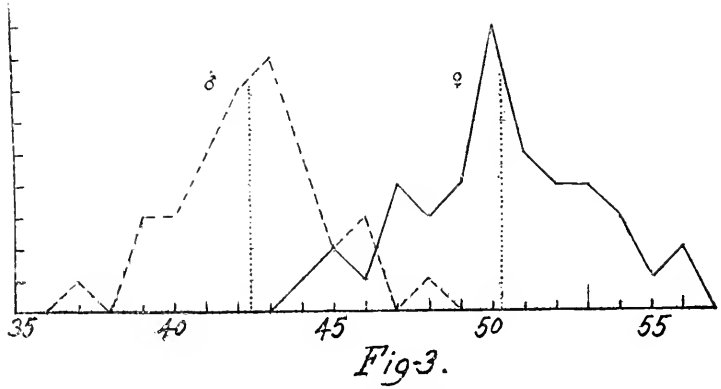


Fig. 3.—Length-frequency curves for 38 male and 42 female hake all three years old. Curve for females a continuous line, curve for males interrupted line. The positions of the means are indicated by dotted lines.

wide angle, the ends representing the outer ends of the axes coinciding. Between these lines there was then drawn from the angular point a third line representing the length of the fish, the scale being 2 mm. to 1 cm. Straight lines were now drawn from the ends of the two lines representing the axes to the end of the third line, and lines were drawn parallel to these from the positions of the lines of growth to meet the line representing the fish. In this way the length of the fish at the end of each year of its life was determined graphically. Unfortunately it was found that the two axes gave different results, and there was no fixed relationship between them. For this reason the construction was always made for both axes, as described, and the average of the two results was taken. In several cases the construction was made for more than one scale of the same fish. The results obtained in this way differed just as irregularly as did those given by two axes of the same scale, and again the average was taken.

Fifty females and forty-five males (all the males of which scales had been taken, except a few in which the number of lines of growth was doubtful) were examined in this way, and length-frequency curves were drawn for the different ages of each sex (Figs 5 and 6) from the lengths calculated as above, upon the assumption that the growth of the scales is proportional to that of the fish. Two of the lengths calculated for males at the end of the first year, one at the end of the second year, and two at

the end of the third year came so far outside the range of the curve that they were excluded entirely, as were also one first-year length and two third-year lengths of females, for the same reason. The curves obtained for the males were considerably smoother than those for the females, but fairly satisfactory results for the first three years were obtained for both sexes. The graph obtained thus for males at the end of

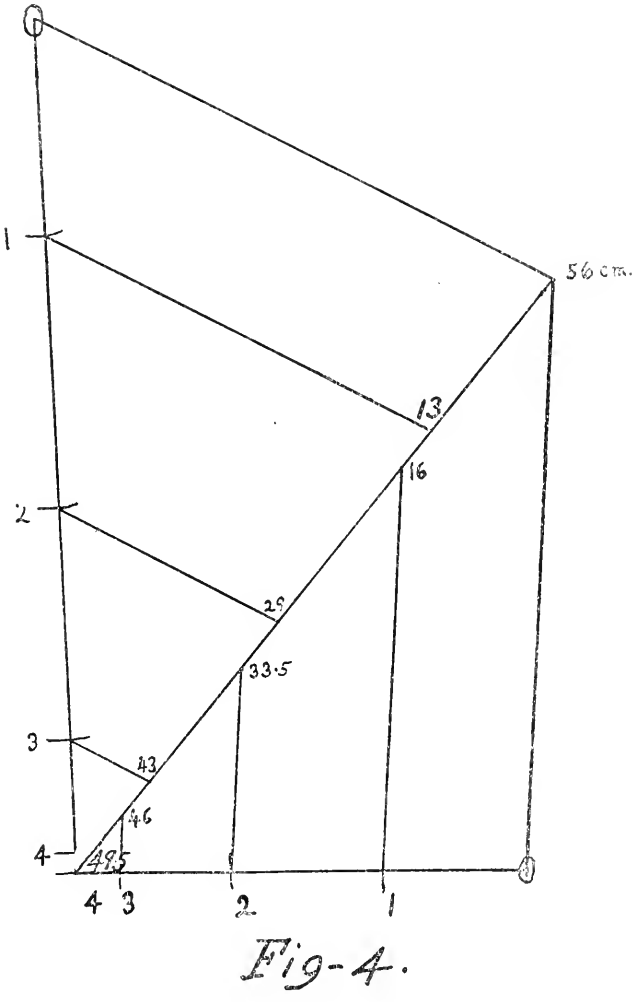


Fig. 4.—Scale diagram for female hake No. 83.

their third year closely resembles that for three-year-old males, the hump being for a little smaller size, as the three-year-old individuals had already grown somewhat in the early part of their fourth year. The same remark applies to the graph for the females. The mean for each age and sex was calculated, and is indicated in the figures (figs. 5 and 6). If these be compared with fig. 3 it will be observed that the mean of the male curve is about 1·5 cm. larger and that of the female curve about 3 cm. larger in the latter, owing to the growth in the part of the fourth year which had elapsed before capture.

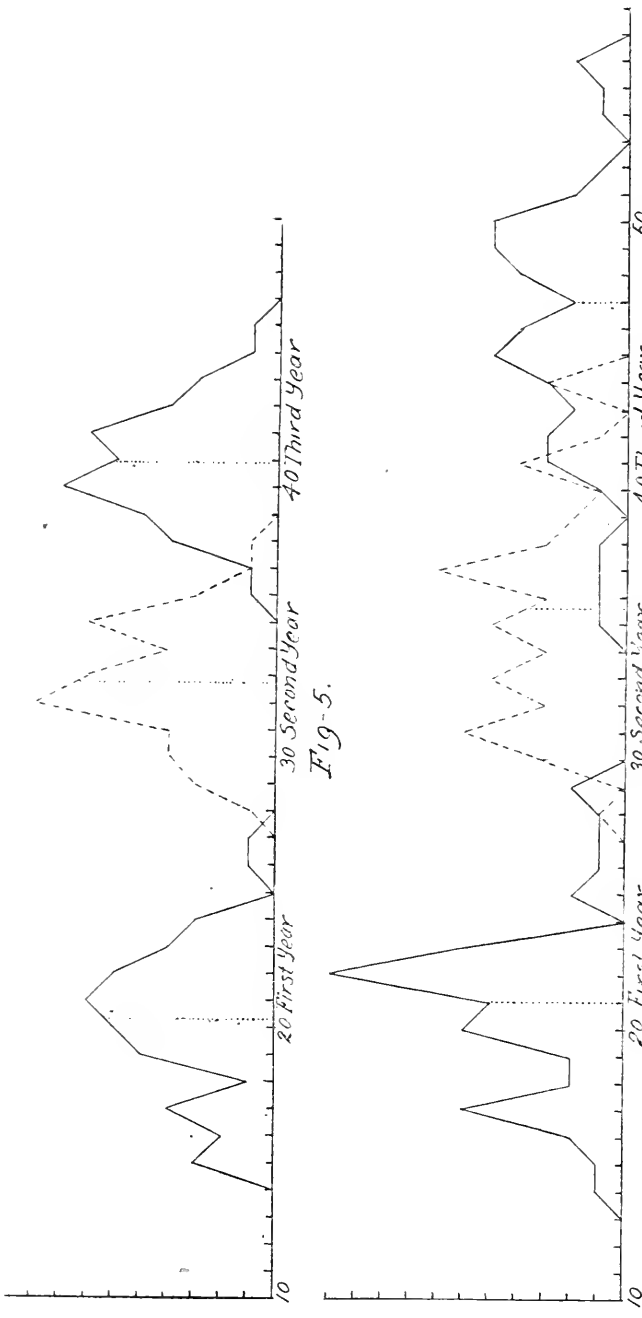


Fig. 5.—Length-frequency curves for 45 male lake based on lengths determined from scale diagrams. The position of the mean is indicated by a dotted line.

Fig. 6.—Length-frequency curves for 50 female lake based on lengths determined from scale diagrams. The position of the mean is indicated by a dotted line.

Taking the means of the curves based upon the scale diagrams as ordinates and the corresponding number of years as abscissae, a rate of growth-curve was now constructed for each sex (fig. 7). These curves show that the rate of growth is fairly uniform during the first three years, but is greatest in the first year, as would be expected, and decreases in each of the two succeeding years. They also show that the difference between the rates of growth of the two sexes increases in each succeeding year. It appears besides that the species is a rapidly growing one, while the uniformity of the curve indicates that it does not spawn before the fourth year, the spawning period always being marked by a decrease in the rate of growth.

The mean weights were calculated for the thirty-eight males and for the forty-three females in their fourth year, of which the length-frequency curves are illustrated in fig 3. The mean weight of the males was found to be 957 grams, while that

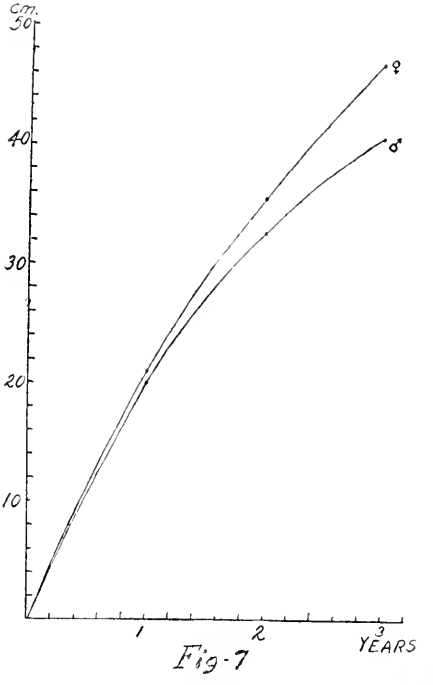


Fig. 7.—Rate of growth curves for male and female hake constructed upon the basis of the curves in Figs. 5 and 6.

of the females was 1,440 grams, showing that the females exceed the males in weight as well as in length. The ratio of the mean weight of the males to that of the females is ·642. If the cubes of the mean lengths, as marked in fig. 3, be calculated it is found that their ratio is ·604. Thus the excess in weight of the females over the males is a little less than one would expect from their excess in length, indicating that the males are generally slightly thicker than are the females in proportion to their length. This conclusion with regard to the shape of the males may not be justified, however, as the ovary, etc., are lighter than muscle, so that the female may exceed the male in bulk more than she does in weight.

As a sample of the data obtained, the records for fifty fish are tabulated at the end of this paper. The dates and locality will be found upon the first page of this paper.

In addition to the data already referred to, evidence was obtained to show that either the females are much more numerous than the males or the individuals of one sex associate in separate shoals. Among the forty-eight fish examined on July 16 (Nos. 53 to 100) there were only two males; among the one hundred and twenty-eight examined on July 22 there were forty-six males; among the one hundred and twenty-four examined on July 30 there were thirty-five males; among the four hundred and twenty-eight examined on July 31 there were one hundred and thirty-one males. From these figures it would appear that the second explanation suggested, namely, that the females are much more numerous than the males, is the probable one.

SUMMARY.

Thus in the investigation of the life-history of the hake, 780 individuals were examined. From the data obtained, length-frequency curves were drawn which showed that the average length of the females examined was greater than that of the males. An examination of the scales indicated that these males and females were the same age. Thus it appeared that the shoals are composed almost entirely of fish of one age and that the females are longer than the males of the same age. It is unfortunate that practically all the fish examined were in their fourth year. These fish were representative of all those caught in the St. Andrews district during the season, the size of all the hake brought in being remarkably uniform. Length-frequency curves for the individuals of either sex in their fourth year were drawn, and these were compared with length-frequency curves for the sexes at the end of each year of their growth, constructed from the lengths calculated from scale diagrams, upon the assumption that the growth of the scales is proportional to that of the fish. In preparation for the determination of age, and the construction of scale diagrams, the morphology of the scales was carefully examined. It should be mentioned that the vertebrae of a considerable number of individuals were cleaned and examined as a basis of age determination, to be a check upon the scales. It was found, however, that the rings of growth were too indefinite to be of much service, and this method was soon abandoned.

Finally, from the means of the length-frequency curves based upon the scale diagrams, rate of growth curves for the two sexes were constructed. These showed in the first place, that the rate of growth was fairly uniform during the first three years, indicating that spawning does not take place before the fourth year; in the second place, that the rate of growth decreases in each succeeding year for the first three years; in the third place, that the excess in rate of growth of the females over the males increases in each succeeding year during the same period.

In concluding this report I wish to express my appreciation of the direction and assistance of Dr. J. W. Mavor in the accumulation and working up of the data, and also of the assistance afforded in the former part of the work by all the members of the staff at the St. Andrews Biological Station in 1914.

IX.

INVESTIGATION OF THE HADDOCK FISHERY, WITH SPECIAL REFERENCE TO THE GROWTH AND MATURITY OF THE HADDOCK (*MELANOGRAMMUS ÆGLEFINUS*).

By Dorothy Duff, M.A., *McGill University, Montreal.*

The objects of this investigation at the Marine Biological Station, St Andrews, N.B., were as follows:—

(1) To test the method of determining the age of the haddock by the study of the periodic rings of growth on the scale, and to calculate the rate of growth of this fish from the rate of growth of its scales, as has been done for the herring and cod in the North sea.

(2) To determine, by measuring representative numbers, the size most abundant in the catches. This to enable us to form some idea of the haddock population and the general condition of the haddock fishery in this region of the North Atlantic.

(3) To calculate the yearly increase in weight and to find the relation of the weight to the length.

(4) To determine whether there was any marked difference in size and weight between fish of the same age but of different sex.

(5) To find the age of maturity for the haddock, that is the age at which they first spawn.

(6) To gather data leading to the determination of the season of the year when the spawning occurs, and the duration of the spawning period.

(A) MATERIALS OBTAINED AND EXAMINED.

We have examined 460 haddock. These were taken at random from twelve different catches, caught on baited trawls during the months of June, July, and part of August, 1914. They are numbered as follows:—

(1) Numbers 1 to 10—
Caught in St. Mary's bay, Nova Scotia.
Examined—The Fish Market, St. Andrews.
Date—June 10, 1914.

(2) Numbers 11 to 46—
Caught—St. Mary's bay, Nova Scotia.
Examined—The Fish Market, St. Andrews.
Date—June 11, 1914.

(3) Numbers 48 to 57—
Caught—North channel, between Grand Manan and the Wolves.
Examined—Wilson's beach, Campobello island.
Date—June 15, 1914.

(4) Numbers 58 to 65—
Caught—Off North head, Grand Manan island.
Examined—North Head harbour, Grand Manan.
Date—June 22, 1914.

(5) Numbers 66 to 98—
Caught—Letite Passage.
Examined—The Fish Market, St. Andrews.
Date—June 24, 1914.

(6) Numbers 99 to 128—
Caught—North channel.
Examined—The Fish Market, St. Andrews.
Date—June 25, 1914.

(7) Numbers 129 to 131—
Caught—Mouth of the St. Croix river.
Examined—Biological Station.
Date—July 2, 1914.

(8) Numbers 132 to 138—
Caught—North Channel.
Examined—The Fish Market, St. Andrews.
Date—July 7, 1914.

(9) Numbers 139 to 144—
Caught—Mouth of the St. Croix river.
Examined—Biological Station.
Date—July 8, 1914.

(10) Numbers 145 to 166—
Caught—Off the Wolves.
Examined—Wilson's Beach, Campobello island.
Date—July 16, 1914.

(11) Numbers 167 to 174—
Caught—Mouth of the St. Croix river.
Examined—Biological Station.
Date—July 30, 1914.

(12) Numbers 175 to 461 (representing all the fish of one catch)—
Caught—North channel.
Examined—The Fish Market, St. Andrews.
Date—August 4, 1914.

(B) MODE OF MEASUREMENT.

For measuring the length of the specimens of fish studied a "measuring board" was used. This consisted of a board marked with parallel grooves one centimetre apart and having at one end a short upright piece. The fish to be measured were placed with the end of the snout against the upright and the length to the end of the caudal vertebræ (easily ascertained by feeling) measured to a half centimetre. Every length was recorded as the nearest greater centimetre or half centimetre.

The length-frequency curves made from these measurements are shown in Fig. 1. Curve B represents all the fish of the first eleven catches. This first curve clearly resolves itself into six humps, which probably represent six-year classes of haddock. In the curve A, which represents one catch of three hundred fish (294 to be exact), these classes are somewhat obscured by the abundance of one class between 45 and 50 centimetres long. However, at least five distinct prominences can be seen in the curve. A study of these length-frequency curves shows that the lengths may be assigned to the following year-classes:—

Class.	Length in Centimetres.	Average length of class.
1	33-40	36·5
2	40–45	42·5
3	45-50	47·5
4	50 58	54
5	58-64	61
6	64-70	67·5

Curve C indicates these classes as shown in curve B.

An insufficient number of fish have been examined to enable any conclusions to be made with regard to the relative abundance of the different year classes in Passamaquoddy bay.

(c) STUDY OF SCALES TO DETERMINE AGE OF HADDOCK.

Scales were obtained from the fish of the first eleven catches examined. Those of seventy-four have been carefully studied. The scales were taken from the shoulder, above the lateral line just behind the head. They were washed in water, brushed with a small stiff paint brush to remove the mucus and epidermis, and mounted dry between two slides.

The morphology of the gadoid scale has been carefully worked out by Dr. Damas in connection with the North sea investigations. He examined the scales of the cod which very closely resemble those of the haddock. The haddock scale is ovoid and when magnified appears to be made up of numerous concentric rings. The distance of these rings from one another varies in a definite periodic manner. The first rings about the nucleus are relatively wide apart, outside these the rings come close together forming a so-called "winter ring," outside of which they are suddenly farther apart again. By studying cod scales at different seasons of the year Dr. Damas concluded that the region where the rings were well separated represented rapid growth under the favourable conditions of summer, and the narrow compressed rings were formed during the winter months. Each band of summer and winter growth together represent one year of the fish's life and the age of the fish can therefore be estimated by counting the number of winter rings on its scales. Fig. 2 shows the margins of successive winter rings on a scale of a four-year-old fish.

In a length frequency curve for the separate ages drawn after determining the age of each fish from a study of its scales, an obvious fact to be plainly deduced from this curve is that we have not sufficient data from which to draw satisfactory conclusions as to the most abundant size for any one age. It appears that the year classes overlap one another to a considerable extent, and that the overlapping becomes greater after the fourth year. This shows that growth is slower and more irregular after the fourth year, which is probably the age at which the haddock mature.

We can deduce the following year classes:—

Year.	Lengths in Centimetres.	Average Length of Age.
2	34-41	37·5
3	39-47	43
4	41-51	46
5	51-58	54·5
6	47-66	56·5
7	50-68	59
8	56-66	61

Comparing the averages of these classes with the averages deduced from the first length frequency curve (Fig. 3B) we find a striking correspondence in the first four classes.

Class.	Age.	Average from 1st length frequency curve.	Average from curve of separate ages.
1	2	36·5	37·5
2	3	42·5	43
3	4	47·5	46
4	5	54	54·5
5	6	61	56·5
6	7	67·5	59
7	8		61

Assuming that the scales grow as the fish itself grows, we naturally conclude that the growth of the scale bears a definite proportional relation to the growth of the body. We can thus calculate the amount of the fish's growth each year by measuring the distances between successive winter rings on the scale. The following simple method was used to estimate the rate of growth of the fish from the scales. Two scales from each fish were taken and the margins of the winter rings of each drawn with the camera lucida. The centres of scales were placed to coincide in the figure and their long axes to lie approximately at right angles. A line of a length proportional to that length of the fish from which the scales were taken was ruled between the axes of the scales, and its end joined by straight lines to the ends of these. Parallel to these last lines others were drawn from the points where the winter rings cut the axes of the scales to the median line, thus dividing it into lengths directly proportional to the lengths of the fish at the end of every winter of its life.

When we compare a length frequency curve for each age using the lengths calculated from the scales by the above method with that for the actual length of fish of known age, we find the range of size is much greater in it, where we are dealing with greater numbers of measurements, but the average lengths agree fairly closely.

Year.	Lengths In Centimetres.		Average Length.	
	From Measured Fish.	From Scale Calculations.	From Measured Fish.	From Scale Calculations.
1	.....	8-20	.....	13
2	34-41	15-33	37·5	25
3	39-47	24-45	43	36
4	41-51	32-58	46	45
5	51-58	38-62	54·5	52
6	47-66	43-63	56·5	54
7	50-68	48-67	59	57
8	56-66	56-66	61	60

It was intended to determine the length, age and sex of a number of haddock to find what, if any, difference of size there was between the male and female fish. The few results seem to show that the difference of sex is not accompanied by a marked difference in length. The following table shows the average size for each year as calculated from the scales of twenty-two fish:—

Year.	Average Length.		Average Length of 74 Fish of both Sexes.
	Male.	Female.	
1	13·5	12·5	13
2	27·5	23·5	25
3	39	34·5	36
4	43·5	43·5	45
5	47·5	49·5	52
6	50·5	52·5	54
7	54·5	54	57
8	59	56	60

The rate of growth curve shown in Fig. 1 is made from the average yearly lengths as determined from the scales of seventy-four haddock. This curve shows a

rapid and practically constant increase in size up to the fourth year. The growth after the fourth winter is slower than in the previous years, and after the fifth winter the yearly increment is very slight. Here we have evidence that the haddock mature in the fourth or fifth year of their life, as growth is probably arrested when the fish begin to spawn.

(D) ASCERTAINED WEIGHTS OF FISH, AND OF CERTAIN ORGANS.

The fish were weighed "round," that is before splitting and cleaning. The balance used weighed accurately to five grammes. The weights showed considerable variation, fish of the same length sometimes differing in weight by more than a hundred grammes.

The livers were weighed without the gall-bladder, immediately after removal from the fish. The percentage of liver-weight to body-weight varied from ·68 per cent to 4·30 per cent; the average percentage for twenty-two fish was 2·25 per cent. We might note that of the two extremes the fish with the smallest percentage of liver was 6 years old and measured 62 cm.; while that with the largest liver was 7 years old and 65 cm. long.

The gonads were weighed as soon as removed and graphs drawn showing the average weights of the gonads for each age. The ovary is proportionately much heavier than the testis except in the four-year-old fish, where average weights of the gonads are equal. The variation in the per cent weight of the ovaries is very slight, there being a difference of only three-quarters of 1 per cent between the largest and the smallest ovary.

(E) SIZE OF EGGS IN THE DEVELOPING OVARIES.

Eggs were taken from the ovaries (at a point beside the junction of the two organs). They were measured with an eyepiece micrometer. The average size of the largest eggs in the ovary was recorded. In general the eggs were ·20 mm. in diameter. In the case of a small 3-year-old fish, the largest eggs were only ·15 mm. in diameter. One 4-year old, and some 6- and 7-year-old fish showed eggs ·25 mm. in diameter. The size of the eggs bears no apparent relation to the size of the ovaries. A very small ovary may contain larger eggs than a larger ovary. From this we see that the size of the egg is probably the best criterion of the state of development of the ovary.

TABLE showing lengths of fish at different ages as calculated from the distance apart of the winter rings.

No.	Sex.	1 year.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	Length of fish when caught.
		cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
1		14	21	36	44·5	51				53
2		13	23	32·5	40	49	54			56·5
3		10·5	23·5	35	41					41
4		16	23	40						43
5		13·5	26·5	34·5	41	49	55	61		61
6		17·5	29	40	45	51				51
7		13	25	34	40·5	48·5	53			52·5
8		9·5	26	40·5						42·5
9		19·5	32·5	39						39
10		20	33	40·5						40.5
11		12	20·5	31·5	41	49·5	54	58		58
12		9	17	27	34·5	44·5	52			55
13		11·5	22	39·5	51	58	62			62
14		10·5	18	29·5	37	43·5	48	52·5	58	60
15		14	28	39	50	54·5	58			62
16		10·5	24·5	33	38	46·5	54·5	60·5	63·5	66
17		17	30	35	41	47	53	51		61
18		15·5	25·5	40·5	50·5	57·5	62·5			66
19		11·5	19·5	29·5	31·5	43	51·5	57·5		60
20		13·5	28·5	39·5	50·5	55				55
21		16	24·5	33	39·5	46	49	51·5		53
22		13	19	27	36·5	45	50·5			51
23		11	20·5	35·5	44					47
24		17·5	31·5	43						46
25		14	27	39	47					49
26		13·5	25	33·5	44·5	52·5	58·5	62		65
27		15·5	27	36	46	56·5	63	67		67
28		13·5	25·5	34·5	46	55	58·5			60
29		12·5	28	42						44
30		12	26·5	36·5	44	51	56	60		62
31		10·5	21	30·5	43	49	54			54
32		9·5	19	27·5	35	46	52			52
33		15	26·5	40	48	54	59·5			62
34		11·5	20 5	29·5	37	42·5	47			47
35		11	26 5	32	47	52·5	57			57
36		12	27	34·5	42·5	28·5	54			54
37		9·5	27	42	47	49·5	54	59	62	62
38		10·5	22	33	41	46·5	52·5			55
39		12·5	26	44	57·5					63
40		13	25	40	49	56	63			63
41		12	25	38	46·5	53·5				56
42		11	27	37	45·5	50·5	56·5	62·5	66	69
43		14	32·5							34
44		13	26·5	39·5	49·5	55				58
45		14	25	36·5						39
46		17	31·5	44						47
52		11·5	22	30	43	54·5	62	66		66
53		11	24·5	38	48	53·5	58			58
54		14	23	32	40	46	51	57		57
55		11	23	31	38	44·5	50·5	53		53
56		13	19	29	35·5	40·5	45 5	52	58	58
57		9	22·5	36	41	46·5	52	57	62	62
145	♂	14	26	34	39·5	45	50 5	55		59
146	♀	14·5	25	40	49·5	54				56
147	♀	11·5	24	33 5	41·5	48	52·5			54
148	♀	10·5	19·5	25·5	37	40	50			52
149	♀	14·5	30	45						47
150	♂	13	28·5	41	47·5					51
151	♂	11	22·5	36	40	46	51	56	59	62
152	♀	9·5	23	37	46	51	54·5			57
153	♀	13	25·5	30·5	37	42·5	47·5	52		53
154	♀	9·5	7·5	24	37	48	53			53
155	♂	15·5	26·5	37	47·5	53				54

TABLE showing lengths of fish at different ages as calculated from the distance apart of the winter rings—*Concluded.*

No.	Sex.	1 year.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	Length of fish when caught.
		cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
156	♀	10	16	26·5	33	37·5	43	47·5	.....	50
157	♀	11	25·5	39	51	57·5	62	.....	.....	62
158	♂	15	30	40	43	46 5	50	53	.....	55
159	♀	17·5	30	41	51	55	60	65	.....	65
160	♀	13	27·5	38	47	53	.....	.....	.....	53
161	♀	10	17·5	27 5	34	41	49	52	56	56
162	♀	8	15	27	40	50	54	.....	.....	54
163	♀	16·5	28	44	55·5	62	.....	.....	.....	62
164	♀	17	31	40	47	.....	.....	.....	.....	47
165	♀	11	20	32	.....	.....	.....	.....	.....	39
166	♂	15	31	45	.....	.....	.....	.....	.....	45

Fig. 1

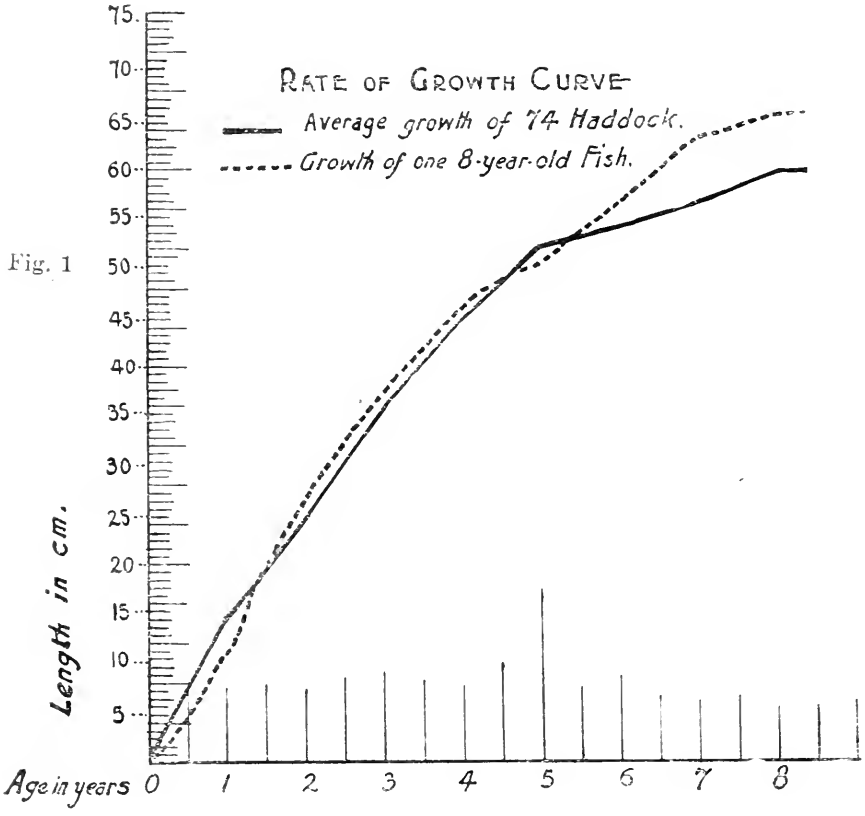


Fig. 2.

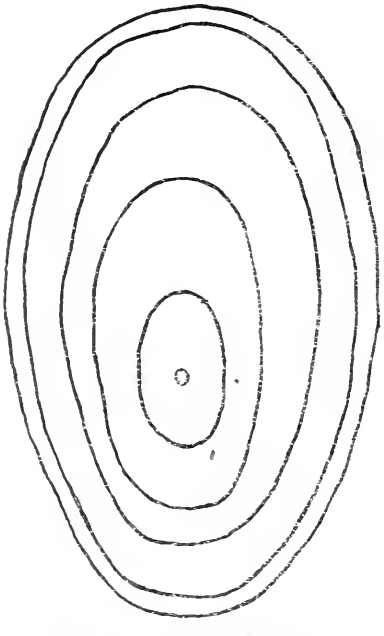
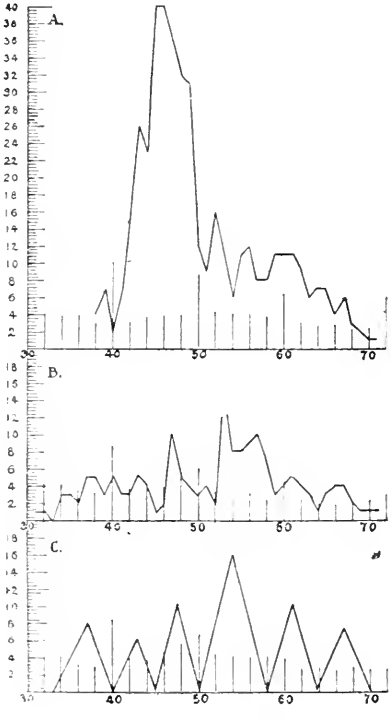


Fig. 3



X

REPORT ON THE LIFE HISTORY OF THE COD AS DETERMINED FROM THE SCALES AND OTHER DATA.

By R. P. Wodehouse, B.A., *University of Toronto.*

This investigation was carried out in the summer of 1914 at the Marine Biology Station, St. Andrews, from the beginning of June till the beginning of September, the object being to test the method of determining the age of a cod (*Gadus callarias*) from its scales, to determine the rate of growth of the cod in these regions (Passamaquoddy bay), and the comparative frequencies of the different "year-classes" and of the different "length-classes." Knowing these facts and the relation between the weights and lengths, it is possible to decide at what age it is most profitable to kill the fish. Recent experiments and the experience of fishermen, in injudicious exploitation of their stock, show that though the sea seems limitless, the stock of fish is by no means inexhaustible. The tagging experiments of Hjort and others show that the annual catch represents a very considerable proportion of the whole stock. In most of these experiments rarely less than 20 per cent of the tags were recovered, and usually considerably more, and it is reasonable to suppose that the number of tags recovered bears about the same relation to the number of fish tagged as the total number caught does to total stock in the sea.

Before proceeding to the results obtained, it will be necessary to explain the method of investigation. The greater number of measurements were taken at Gardiner and Doon's fish market, St. Andrews. The firm were cordial and kindly in allowing us to go there and examine their fish whenever they had the kinds we wanted, and were always ready in proffering information as to the locality and method of making the catches. Two members of the staff of the Station co-worked, one to take the notes and the other to make the measurements and take the scales. The cod were selected as nearly at random as possible, laid on a board and measured with a centrimetre rule, and the length called out to the man keeping notes.

The method of measuring was found to be slow and awkward, so a measuring board was devised on which the fish could be laid and the measurement read off at once. The fish were always measured from the tip of the snout to the end of the vertebral column, reading to the nearest centimetre. It was while on this measuring board that the scales were removed, these (with few exceptions) being taken from the shoulder (usually the right) above the lateral line, forward of the first dorsal fin. The slime and loose scales were carefully removed from the part of the body from which the scales were to be taken, then a few scales (about 50 to 100) were removed with a clean scalpel and placed on a small piece of paper on which the number and length of the fish were marked by the note-keeper. The papers were then folded once and put in the back of the note-book until we returned to the laboratory, when they were allowed to dry until needed for mounting.

In the laboratory the scales so obtained were removed from the papers on which they were collected and soaked in water. There is always a great deal of slime, dirt, and pigmented epidermis, that must be removed. The method found quickest and most satisfactory by the author was as follows: After the scales had soaked for from one to three days in fresh water, the water was poured off and replaced with a weak solution of KOH (about 1:4) in water. The scales must be very carefully watched

in this solution, for if left too long they fall to pieces and sometimes even completely dissolve. The time varies greatly with the saturation of the solution and the condition of the scales, depending largely on the amount of previous soaking in water. They were next washed in three changes of water, which should remove all the slime and dirt as well as the KOH. They are next transferred to 95 per cent alcohol, in which they need only remain a few minutes, when they may be mounted on slides. If the scales are of a fair size, it is best, at this stage, to look at them with a binocular microscope and pick out the best, for always a proportion of them are injured and are not good for age-determination. The alcohol next is drained off and they are placed on microscopic slides, ten to twenty from each fish. But if the scales are small, as is often the case, and there are a great many to be studied, it is most convenient to float them on the slide and drain off the alcohol. Before the scales become dry enough to curl up, another slide, lightly smeared with glue at the ends should be placed over them and firmly held there until the glue sets. We found that four spring clothes-pins, clipped on to the two ends, served this purpose admirably. When the glue is set, which usually takes several days in the New Brunswick climate, the scales are ready for microscopic study.

The following is a list of the fish, which (excepting where otherwise stated) were all taken on baited trawls, showing where and when caught:—

North Channel, June 12.

Number.	Length.	Age.	Number.	Length.	Age.
	Cms.	Years.		Cms.	Years.
1	79	4	18	53	3
2	122	6	19	61	3
3	41	3	20	43	
4	123	9	21	64	3
5	98	6	22	60	3
6	78	4	23	55	3
7	54	3	24	52	3
8	48	3	25	68	4
9	41	3	26	41	3
10	60	3	27	50	3
11	46	3	28	55	3
12	60	3	29	47	3
13	37	3	30	55	3
14	29	2	31	42	3
15	35	3	32	39	3
16	51	3	33	56	3
17	50	3			

North Channel, June 15.

Number.	Length.	Age.	Number.	Length.	Age.
	Cms.	Years.		Cms.	Years.
34	44	3	37	76	4
35	59	3	38	54	3
36	61	4			

Bulk Head, June 22.

Number.	Length	Age.	Number.	Length.	Age.
	Cms.	Years.		Cms.	Years.
39	59	3	45	72	4
40	66	4	46	47	3
41	86	5	47	60	3
42	71	4	48	75	5
43	59	3	49	57	3
44	74	4			

Campobello Island, June 23.

Number.	Length.	Age.
	Cms.	Years.
850	35	2

Letite, June 24.

Number.	Length.	Age.	Number	Length.	Age.
	Cms.	Years.		Cms.	Years.
51	47	3	69	43	3
52	44	3	70	45	3
53	49	3	71	33	2
54	36	2	72	36	2
55	42	3	73	103	7
56	37	2	74	83	4
57	34	2	75	43	3
58	41	3	76	58	3
59	36	2	77	57	3
60	36	3	78	65	4
61	44	2	79	50	3
62	37	2	80	41	3
63	34	2	81	43	8
64	38	2	82	39	3
65	40	3	83		
66	35	2	84	44	3
67	34	2	85	43	3
68	33	2			

North Channel, June 24.

Number.	Length.	Age.	Number.	Length.	Age.
	Cms.	Years.		Cms.	Years.
86	60	3	100	53	3
87	52	3	101	53	3
88	63	3	102	43	3
89	49	3	103	87	4
90	66		104		3
91	64	3	105	105	6
92	52	2	106	83	4
93	53	3	107	78	4
94	45	3	108	45	3
95	48	3	109	62	3
96	95	7	110	85	4
97	93	5	111	56	3
98	68	3	112	53	3
99	100				

Mouth of St. Croix River, July 2.

Number.	Length.	Weight.	Age.	Number.	Length.	Weight.	Age.
	Cms.	Grs.	Years.		Cms.	Grs.	Years.
113	38	830	5	116	36	670	2
114	40	850	2	117	37	580	2
115	50	1,840	3	118	33	....	2

Number.	Length.	Age.	Number.	Length.	Age.
	Years.	Cms.		Cms.	Years.
119	33	2	129	111	8
120	31	2	130	65	4
121	17	1	131	57	3
122	33	2	132	94	6
123	34	2	133	68	3
124	33	2	134	56	3
125	29	2	135	70	5
126	33	2	136	44	4
127	103	6	137	57	4
128	132	15	138	92	5

The Reef, July 7.

Number.	Length	Age.	Number.	Length.	Age.
139	35	2	140	37	2

Wilson's Beach, July 16.

Number.	Sex.	Length.	Weight.	Weight Liver.	Weight Gonad.	Age.
		Cms.	Grs,			Years.
141	♂	67	4,200	165	3·17	3
142	♀	53	2,160	55	5·82	3
143	♀	63	2,500	25	12·09	3
144	♂	55	2,160	25	4·76	3
145	♂	50	1,700	25	0·99	4
146	♀	51	1,930	25	5·74	2
147	♀	51	1,700	20	5·03	3
148	♀	44	1,040	15	1·31	2
149	♂	40	750	15	1·37	2
150	♂	47	1,130	30	1·98	2
151	♂	45	1,050	20	1·07	3
152	♀	118	24,110	530	270·00	5
153	♂	38	730	15	1·02	2
154	♂	51	1,820	25	1·32	2
155	♂	47	1,700	25	1·13	2

Bocabec River, taken by means of a seine July 3 (alcoholic specimens).

Number.	Length.	Weight.	Age.	Number.	Length.	Weight.	Age.
	Cms.	Grs.	Years.		Cms.	Grs.	Years.
156	4·25	0·65	$\frac{1}{2}$	159	3·55	0·32	$\frac{1}{2}$
157	4·10	0·62	$\frac{1}{2}$	160	3·70	0·39	$\frac{1}{2}$
158	3·00	0·225	$\frac{1}{2}$				

Wilson's Beach, July 30.

Number.	Length.	Weight.	Sex.	Age.	Number.	Length.	Weight.	Sex.	Age.
	Cms.	Grs.				Cms.	Grs.		Years.
161	48	1,580	.....	3	171	34	.....	♂	2
162	48	1,440	.....	3	172	36	.....	♂	1
163	48	1,360	.....	3	173	36	.....	♀	2
164	33	.....	♀	2	174	34	.....	♀	2
165	36	.....	♀	2	175	30	.....	♂	2
166	37	.....	♂	1	176	33	.....	♀	2
167	35	.....	♂	1	177	33	.....	♂	2
168	33	.....	♂	2	178	36	.....	♂	2
169	34	.....	♀	2					
170	34	.....	♂	2					

Measurements only of Fish caught inside of the Wolves, August 7.

Number.	Length.	Number.	Length.	Number.	Length.	Number.	Length.
	Cms.		Cms.		Cms.		Cms.
179	59	212	44	245	51	278	49
180	46	213	52	246	48	279	53
181	43	214	67	247	45	280	46
182	46	215	46	248	48	281	47
183	48	216	46	249	50	282	45
184	54	217	71	250	47	283	47
185	66	218	45	251	49	284	55
186	53	219	49	252	46	285	47
187	61	220	52	253	47	286	47
188	46	221	49	254	44	287	61
189	52	222	63	255	49	288	48
190	51	223	46	256	49	289	49
191	56	224	51	257	47	290	62
192	55	225	48	258	46	291	45
193	46	226	56	259	46	292	65
194	64	227	53	260	49	293	45
195	48	228	60	261	50	294	44
196	49	229	44	262	52	295	48
197	44	230	63	263	62	296	49
198	47	231	59	264	54	297	51
199	46	232	51	265	49	298	55
200	67	233	52	266	59	299	50
201	47	234	47	267	59	300	56
202	46	235	46	268	61	301	50
203	51	236	50	269	56	302	50
204	75	237	51	270	48	303	53
205	51	238	64	271	55	304	46
206	64	239	56	272	53	305	56
207	59	240	50	273	44	306	55
208	50	241	49	274	56·5	307	55
209	93	242	47	275	54·5	308	47
210	55	243	49	276	51	309	51
211	48	244	47	277	55	310	52

Fish Market, St. Andrews, August 8.

Number.	Length.	Age.	Number.	Length.	Age.
	Cms.	Years.		Cms.	Years.
311	61		342	56	3
312	54		343	60	3
313	59		344	49	3
314	56		345	75	4
315	69		346	54	3
316	53		347	51	3
317	48		348	70	4
318	49		349	48	3
319	63		350	62	4
320	54		351	58	3
321	53		352	51	3
322	61	2	353	49	3
323	46	3	354	50	3
324	61	4	355	56	
325	62	3	356	49	4
326	53	2	357	45	3
327	55	2	358	52	
328	64	2	359	52	
329	57	2	360	48	
330	55	3	361	46	
331	59	3	362	59	
332	46		363	51	
333	52	2	364	55	
334	67	3	365	82	
335	58	3	366	50	
336	108	5	367	52	
337	91	4	368	54	
338	59	4	369	48	
339	54	3	370	49	
340	55	3	371	49	
341	46	3	372	49	

Brandy Cove, August 12.

Number	Length.	Age.	Number.	Length.	Age.
	Cms.	Years.		Cms.	Years.
373	8·0	$\frac{1}{2}$	377	6·2	$\frac{1}{2}$
374	7·8	$\frac{1}{2}$	378	8·6	$\frac{1}{2}$
375	6·2	$\frac{1}{2}$	379	8·5	$\frac{1}{2}$
376	8·0	$\frac{1}{2}$	380	7·6	$\frac{1}{2}$

To bring out the significance of the results contained in these tables, length-frequency curves were plotted. At first all the fish were plotted on one large graph as they were measured, but as the season advanced and new fish were added to the graph, it was found that the curve lost what little form it originally had. This was doubtless due to the increase in length of the fish as the season advanced, throwing them out of their classes. Hence this method was abandoned and only measurements from catches, comparatively close together in time, were plotted on a single graph. This curve was interesting in that the two catches were taken at practically the same time, and the bulk of the fish fall within comparatively narrow limits in regard to length; two shorter and several much longer fish were omitted from the graph. This curve seemed to show that the details in the contour of the curve are meaningless, for the high places in one fill up the low places in the other, so that the sum does not resemble the curve for either of the catches in detail. It appeared also that most of the fish fall within the three-year class (the average length of fish

in the summer of their fourth year, i.e., three-year class, being determined from the other curves to be mentioned later. All the fish except those in the last humps (66 to 71) may be safely taken as 3-year-olds. Another curve was plotted for all the fish caught between June 11 and 24. This showed only a slight indication of division into year-classes. Most of the remaining fish (those caught in July and August) were plotted in another graph. The interesting things about this curve were the way the little fish (which were afterwards found to be less than one year old) fell into two groups representing two different catches taken about five weeks apart. The averages of these two humps indicate a growth of 3·6 centimetres in that time. The one year class is represented by only one fish and the two and three year classes can easily be distinguished.

Since the value of the next part of this paper depends so much upon the age determination of the fish, it will be necessary to explain how the scale is an indicator of the age of the fish. The youngest scale ever observed by me consisted of a single central plate, quite homogeneous, with a single ring of smaller plates around the margin. It was taken from a fish which measured 3·00 cm. The next smallest is from a fish 4·10 cm., and it clearly shows the central plate with three rings of smaller plates around it. From this it seems reasonable to suppose that when the fish starts out in life its scales consist of single plates, and as it grows it adds rings of smaller plates around the central nucleus of each scale. Since the number of scales on the fish does not generally increase throughout life, the linear growth of the scales may be expected to be proportional to the linear growth of the fish. It is found that when the rate of growth of the fish is greater, i.e., in the summer, the plates laid down are slightly larger than those laid down when the rate of growth is less. A glance at any old scale reveals a more or less regular alternation in the open and close bands, in the first three years at least, signifying a regular periodicity in the growth of the fish. It has been demonstrated beyond doubt by other investigators that this periodic retardation and acceleration in the growth of the fish is brought about by the alternation of winter and summer, the close band representing a winter's growth and the open a summer's. Another factor which retards the growth of the fish and consequently leaves a mark on the scale is the spawning period. In some kinds of fish, according to other investigators, the spawning rings can be clearly distinguished on the scales, but in the cod my experience has been that they only lead to confusion between winter and summer rings, making it almost impossible to tell with any degree of certainty the age of the older fish that have spawned many times. Doubtless there are other things which affect the growth of a fish besides the seasons and spawning periods and consequently the markings on the scales; for example, scarcity of food, or temporary incapacity of the fish to obtain food. Indeed I have seen some cod scales in which it was practically impossible to notice any distinction between summer and winter rings, and others in which there appeared to be more winter rings than would be expected from the size of the fish.

In spite of this drawback in the method, the ages of nearly all the fish from which scales were taken were determined and are appended in the tables above. In order to appreciate the significance of the age in relation to the length, the fish were plotted again in their different year classes. This showed that the majority of fish caught for commercial purposes are between two and four years old, and that the greater number of them fall into the three-year class.

In taking measurements for cod very few opportunities are offered for determining the sex. Those that were taken are shown in the tables and use made of them in constructing the rate of growth curves.

To further test the assumption that the rate of growth of the scale was proportional to the rate of growth of the fish, the following construction was made: A scale was drawn with the camera lucida. From the centre of the scale, *A*, a line was drawn to the periphery, *B*, usually in the direction of the long axis of the scale. Another

line, AC, was drawn from the centre of the scale making an acute angle with the first, and of a length which would represent the length (on some convenient scale, usually 1:10) of the fish from which the scale was taken. A line was then drawn connecting B and C and a series of lines were drawn parallel to BC from the points of intersection of the line AB with the rings on the scale. The growth of the fish which would correspond to any of the winter rings would then be read off on the line AC. According to this, the fish, which it is demonstrated was 17 cm. long at the end of the first year, 35 at the end of the second, 53 at the end of the third, 68 at the end of the fourth, and 80 at the end of the fifth, while it was 86 cm. long when caught.

The ages of all the fish whose scales were taken were calculated in this way and set down in table I. In every case two scales were used and unless the determinations from the two agreed, or nearly so, as in the figure, other pairs were taken until two were found that did agree. When all these were averaged up, it was found that the average sizes for a codfish were:—

First year, length, 14·5 cm.
Second year, length, 35·9 cm.
Third year, length, 49·8 cm.
Fourth year, length, 64·9 cm.
Fifth year, length, 82·0 cm.
Sixth year, length, 90·5 cm.
Seventh year, length, 99·3 cm.
Eight year, length, 115·0 cm.

Of the older ones we had too few samples to yield strictly correct results.

The length frequencies of the age classes calculated from the scales of all the fish in which these could be done satisfactorily were also plotted. The older ones and a good many of the younger ones were omitted owing to the difficulty of applying this method to any but the very clearest scales. For the sake of comparison another curve was made in exactly the same way including only Nos. 1 to 112, i.e., only fish caught between June 11 and 24. Since the curves, calculated on the assumption that the growth of the scale of the fish is proportional to the growth of the fish, tell the same story as the curves based on actual measurement of fish, the growth of the scale must be proportional to that of the fish.

The most casual study of the tables and graphs prepared showed that the rates of growth for the individual fishes vary widely, so that scarcely any two fish have the same life history in this respect. Nevertheless it is possible to obtain an average rate of growth for the given locality. This was done, using the averages obtained from the calculated lengths. Separate curves for males and females were plotted, and though not much importance must be attached to them, they seemed to show that the females grow faster than the males during the first two years, and then suddenly their rate of growth falls off so that the curves cross between second and third years. If the relative proportion of males to females varied in the different year-classes, it is quite possible this might account for the irregular features in the graphs studied.

TABLE I.—Lengths of measured cod in the different years of their lives as calculated from the positions of the winter rings by the method described in the text.

No.	Length 1st yr.	Length 2nd yr.	Length 3rd yr.	Length 4th yr.	Length 5th yr.	Length 6th yr.	Length 7th yr.	Length 8th yr.	Length 9th yr.
1	20	40	60	79					
2	18	40	65	96	110	122			
3	11	29	41						
4	18	34	40	71	86	100	112	122	133
5	22	48	65	80	90	98			
6									
7	17	35	51	54					
8	16	32	45	48					
9	11	28	39	41					
10	20	45	58	60					
11	16	30	43	46					
12	15	(?)	(?)	60					
13	20	36	37						
14									
15	15	(?)	35						
16	19	33	47	51					
17	14	33	47	50					
18	20	35	47	53					
19									
20									
21									
22	18	42	56	60					
23	13	38	52	55					
24	14	33	46	52					
25									
26									
27	17	36	47	50					
28	16	35	50	55					
29	18	33	44	47					
30									
31	16	33	40	42					
32									
33	15	47	54	56					
34	13	30	42	44					
35									
36									
37									
38	16	36	52	54					
39	15	41	56	59					
40	15	37	54	63	66				
41	17	35	53	68	80	86			
42									
43	17	40	57	59					
44	17	44	59	71	74				
45	14	39	55	69	72				
46	13	36	45	47					
47	19	45	54	60					
48									
49	10	35	45	55	57				
50	15	32	45						
51	11	26	45	47					
52	10	22	40	44					
53	17	37	45	49					
54	20	33	36						
55	11	27	38	42					
56	19	35	37						
57	6	32	54						
58	18	34	36						
59									
60	8	23	32	36					
61	18	41	44						
62	16	30	37						
63	10	34	39						
64	16	35	38						
65	9	25	37	40					

TABLE I.—Lengths of measured cod in the different years of lives, etc.—*Continued.*

No.	Length 1st yr.	Length 2nd yr.	Length 3rd yr.	Length 4th yr.	Length 5th yr.	Length 6th yr.	Length 7th yr.	Length 8th yr.	Length 9th yr.
66	13	33	35						
67	14	31	34						
68	9	30	33						
69	9	28	40	43					
70	7	32	43	45					
71	8	31	33						
72									
73	16	28	47	63	77	88	103		
74	25	51	66	76	83				
75	6	23	41	43					
76	10	36	54	58					
77									
78									
79	14	34	47	50					
80	8	24	38	41					
81	11	26	41	43					
82	8	23	37	39					
83									
84	7	23	42	44					
85	9	24	39	43					
86									
87									
88	15	39	60	63					
89									
90									
91	22	44	52						
92	26	47	52	64					
93	20	41	51	53					
94	12	30	41	45					
95	9	25	42	48					
96	17	34	45	61	71	81	91	95	
97	15	37	53	76	90	93			
98	23	49	62	68					
99									
100	14	36	47	53					
101	19	37	49	53					
102	9	31	41	43					
103	20	44	69	83	87				
104	30	70	95	100	(?)				
105									
106	26	52	72	81	83				
107	24	44	60	74	78				
108	15	30	42	45					
109	10	31	58	62					
110	20	43	68	81	85				
111	18	37	51	56					
112	14	37	49	53					
113									
114	17	38	40						
115	16	03	47	50					
116	13	33	36						
117	15	32	34						
118									
119									
120	9	28	31						
121	11	17							
122	13	27	33						
123	11	31	34						
124	18	31	33						
125	13	26	29						
126									
127	23	46	57	76	87	98	103		
128	12	32	44	56	71	85	95	108	111
129									
130	18	39	39	53	62	65			
131	24	46	57						
132	15		53	66	82	91	94		

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TABLE I.—Lengths of measured cod in the different years of lives, etc.—*Concluded.*

No.	Length 1st yr.	Length 2nd yr.	Length 3rd yr.	Length 4th yr.	Length 5th yr.	Length 6th yr.	Length 7th yr.	Length 8th yr.	Length 9th yr.
133	22	41	65	68					
134	15	32	47	56					
135	13	29	43	58	66	70			
136	6	22	30	40	44				
137	14	31	43	53	57				
138	28	50	62	78	87	92			
139	15	32	35						
140	16	34	37						
141	20	42	60	67					
142	17	37	49	53					
143	15	39	58	63					
144	20	37	53	55					
145	14	27	41	48	50				
146	16	45	51						
147	15	38	47	51					
148	17	40	44						
149	17	35	40						
150	11	33	47						
151	10	28	42	45					
152									
153	16	36	38						
330	18	37	49	55					
331									
332									
333	20	45	52						
334	10	46	61	67					
335	14	30	54	64					
336									
337	20	54	71	86	91				
338	13	33	45	55	59				
339	12	32	49	59					
340	21	39	53	55					
341	13	34	45	49					
342	20	41	53	56					
343	17	40	56	60					
344	10	26	43	49					
345	17	42	56	64	70	75			
346	13	35	50	54					
347	13	30	46	51					
348	22	45	61	67	70				
349	9	22	43	48					
350	16	40	49	56	62				
351	22	38	49	58					
352	15	31	48	51					
353	16	44	49						
354									
355									
356									
357	14	30	42	45					
358									
359									
Average	14·5	35·9	49·8	64·9	82	90·5	99·3	115	

XI.

ARE MIGRATING EELS DETERRED BY A RANGE OF LIGHTS—REPORT ON EXPERIMENTAL TESTS.

By Prof. Philip Cox, Ph. D., etc., *University of New Brunswick.*

Some one had ventured the opinion, on what grounds I know not, that such a device is effectual, and I was requested to test it by a series of experiments at the Biological Station, St. Andrews, in the summer of 1913. As the common eel, *Anguilla chrysopa*, is known to be a persistent and voracious spawn-eater, its exclusion by any means from the spawning grounds of lake and river food-fishes would be of vast importance to those fisheries, and give a stimulus to the restocking of new or depleted waters.

No fact is better known to the small boy who builds his fire at the water's edge after night, than that eels are attracted by the light; but will they come fully into and pass through it?

Two series of experiments were conducted: the first, in one of the tanks in the laboratory; the second on a larger scale and under more normal conditions in the outlook of Bocabec lake, 12 miles from the station.

Experiment I, July 27.—In a tray, 7 feet by 3 feet and 3 inches deep, were placed five eels which had been taken from a fresh-water lake, and gradually passed through water of increasing degrees of salinity until the average was reached. Water was admitted through a tap, provided with a jet attachment, and the stream struck the surface at a very acute angle, keeping the tray well oxygenated. Across the tank, and resting on the sides 2½ feet from the upper end, was a broad board on which an acetylene lamp stood, screened behind so that the lower part was dark, the other brightly lighted, and the line of demarcation between the two sharp and well defined. It was remarkable how soon the fish seemed to accommodate themselves to the increasingly salt medium, which at first made them apparently very uncomfortable but at the end of two or three hours failed to have any apparent disturbing effect at all. One fish, a very large one, had been in the tray two days before the experiment began; the rest were placed there in the afternoon of the evening when the first trial was made.

July 27.

Experiment I.

At 9 p.m. the fish were screened to the lower end of the tray, the laboratory darkened and the lamp lighted.

9.26. An eel moved into the light, swam to the end of the illuminated space, turned and disappeared in darkness. This was the large one which had been imprisoned two days.

9.30. Another moved half-way into the light and rested there.

9.36. It swam out into the lighted area, turned, stopped for a minute or two, and disappeared.

10.50. One has pushed its nose to the illuminated line.

10.52. It dropped back into darkness.

11.30. Another, the large one, has drawn up close to the lighted line

11.45. Another has moved up to the same place.

12.00. The former has moved into the lighted space. raises its muzzle above the surface, and then swims back into darkness.
12.18. The same fish returns into the light, raises its nose above the water, and remains motionless.
12.23. It returns to the shadow.
12.35. A small individual has passed into the light.
12.38. It returns to darkness.
12.45. Another has gone into the light.
12.48. It returns to the shadow.

July 28.

Experiment II.

10.10 p.m. Lamp lighted and room darkened.
10.15. Big eel has gone into the light.
10.55. Returns to darkness when a more intense light was made.
11.00. The same fish has moved into the light.
11.15. Has returned to darkness.
11.25. The same one has returned, but only head in the light.
11.36. It passes fully into the light.
11.50. Returns into the shadow.
12.05. Extinguished light.
12.10. Turned on the light suddenly. One was in upper part of tray, and the others that had remained most of the evening in the lower part had moved far up.

Several evenings were devoted to the observation of these fish, but their actions and movements were quite similar to those recorded above, except that the longer they were kept in confinement, the less they seemed to avoid the light.

It was thought that more satisfactory results could be obtained by conducting the experiments under more natural conditions, and for this purpose the outlet of lake Bocabec was chosen. It was admirably suited for the purpose, flowing through a level little valley, had a smooth clay and sandy bottom, water from 5 to 7 inches deep, with a gentle current, and banks regular, grassy, and slightly undermined, here and there affording a cool retreat for the eels during the day.

Two wire screens about 10 rods apart were stretched over the stream, there about 12 feet wide, and sunk some inches into the bottom and banks to prevent the eels from escaping by borrowing.

Two large bullseye lanterns were arranged, one on each side at the level of the water directly opposite and facing each other. The arrangement made rendered it impossible for a fish to pass without being seen by the observer.

Seven large eels were got from a fisherman who had caught them in a herring weir that day, and were placed in the pond just before noon hour, August 15. They showed the effects of a sudden change from salt to fresh water in a more marked manner than the first lot did on being transferred from a fresh to a brackish medium. Restlessness, rapid breathing, gasping, swimming from one end of the enclosure to the other, seeking to surmount the barrier, wheeling and moving rapidly to the other end, opening the mouth widely and swelling the gill region to a marked degree; all these symptoms continued with gradually lessening intensity until about 6 p.m., when most of them were quieter and breathed more moderately and regularly. During that afternoon and next day, they showed no tendency to huddle or seek concealment, but lay out in the open stream, one here and one there, but on the third day they were active in seeking hiding places and huddled. It would seem as if the open free life is the natural one to these large fish, but it is probably otherwise with smaller ones, though young ones from 5 to 7 cm. in length will swarm up an inlet from the sea all day under direct sunlight.

Late in the evening when it begins to grow dark, they become very active, issuing from their retreats, and heading up stream, one by one.

All the eels were driven below the line of the lamps, and the latter lighted at 8.45.

Experiment III.

9.45. One ran past, but manifesting uneasiness returned to darkness a minute or two later. I should have observed that the lights were only about 6 feet below the upper screen, hence the intervening space was fairly well lighted up, but planks across just below, made a marked line of division between the two.
10.00 Another runs past, but returns almost immediately.
10.20. Another passes the light but goes back into the shadow at once.
10.30. Another acts in a similar manner.
11.10. One passes; three or four lying just below the line of light, but they soon drew back.
11.30. Another ran by.
11.40. Another ran by.
11.50. Another ran by.

All of these soon returned to darkness. During the rest of the vigil an hour or more, the fish as a whole lay in darkness, and, though restless and active, avoided the light.

In a general way they repeated the movements of those observed in the trays—approached the light cautiously, lay motionless for some time just below the lighted line, then passed into and through the lighted area. It was not until the third night that any rested more than a few minutes in the light.

Though the fish were about the same size and could not be distinguished one from another, the above record would seem to point to the majority or all of them having passed the range of lamps during the night. They were fish fresh from the sea, and their behaviour may be taken as representative of the species under similar conditions, and hence had there been no screen above the lamps they would have all passed and entered the lake. Still it must be noted that these fish had been impounded eight or nine hours before the lamps were lighted, and their experience in the meantime, as well as the painful effects of changed osmotic pressure, may have, on the first night at least, modified their otherwise natural actions. Still their movements the next two nights were very similar; for a failure to secure fresh lots of fish, so late in the summer, obliged the experimenter to use the same fish all the time.

They always evinced a desire to run upstream at nightfall, but after eleven o'clock very few attempted it, contenting themselves with remaining in the darkened area, where they were often heard splashing and moving rapidly about, sometimes trying to surmount the screen, at others twisting and turning violently in the middle of the stream. With the exception of a few fry of the minnow, *Coueslas plumbus* Ag., in the upper or lighted part of the inclosure, there was no food visible except a few weeds here and there.

Before closing the vigil one night, I looked over the lower part to see where the fish were, when one was seen to scud away from the light of my lantern, which suggested the trial of a *moving* light. Next night one was suspended over the middle of the stream, midway between the bullseyes and a little above, and kept swinging crosswise the stream by means of a cord. For two or three hours none ventured to pass, and hope ran high that the problem had been solved. They came up to the line of light beforementioned, and pushing the head just beyond, lay motionless for a half hour or so, as if watching the moving object, then they withdrew, only to repeat the action some minutes later. About midnight, however, one after another gradually drew into the lighted area, until all I had impounded were lying side by side, only a few inches apart. One after the other, curving the anterior half of the body upwards

and resting the other half on the bottom, thrust the head out of the water far enough to expose the muzzle and eyes, and there they remained ogre-like, to an extraordinary degree, and motionless, as if watching intently the moving light. In a few minutes they began to sink back slowly and almost imperceptibly, and withdrew into darkness. Next night, this sigular behaviour was not observed except in one case. The eels paused at the line of light, but after a half hour or so, began to shoot rapidly past and remained in the upper part of the lighted area the rest of the night. Less and less fear of the swinging lamp was manifested night after night, until they seemed to pay little or no attention to it.

It has been remarked that when first put in, the fish showed no schooling tendency, indeed seemed to manifest distrust of one another; but as time passed, they became more social, and would often be seen during the day lying side by side under the overhanging bank. When disturbed they scudded into the stream, stirred up a cloud of mud at one point, when it settled only the head of the eel could be discerned. It was at length seen that the fish buried itself tail first. All the time the water was gradually falling and its temperature rising, and at length the eels ceased to lie by day under the bank, but their heads were to be seen here and there, though barely visible in the mud. Trial was made, and its temperature was found to be several degrees cooler than that of the water—a good reason for the fish burying themselves in it.

It will be seen that these two experiments were conducted under some objectionable conditions:—

(1) The fish were penned, not free.

(2) They had been taken from salt water and put into fresh water or vice versa, without in one case passing through slowly changing degrees of salinity.

(3) The season for migration to fresh water had long passed.

Waiving the modifying influences of these conditions and summing up the results of the tests we see evidence that—

(1) The fish were certainly afraid of the light at night. They would pause on the line of illumination; move slowly until about half the body was exposed, and then hurry past. As a rule, they soon returned to darkness, though after three or four nights experience they would linger a long time in the light.

(2) The longer they were in the pen, the less fear they showed.

(3) The moving light was at first fairly effective, but after a night or two they paid little attention to it.

(4) That they failed to appear except at rare intervals in the illuminated end of the pen after the third night was probably due to a growing consciousness of their being impounded.

All things considered it seems very unlikely that their ascent could be arrested by such means.

XII.

POSSIBLE LOBSTER PLANTING AREAS ON THE EAST COAST OF VANCOUVER ISLAND, B.C.

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(With Map.)

1. Review of Attempts to Plant Lobsters in Pacific Waters.

The idea of successfully transplanting lobsters from the Atlantic coast to the Pacific has been to the fore many times since the first shipment was attempted by the United States Fish Commission in 1873, or since the first successful transportation and planting in the following year. The fisheries of British Columbia did not come into much prominence until later, but when they did, the idea found lodgment among Canadians also, and a first attempt to transplant these crustaceans was made in the summer of 1896. According to the Fisheries Report of that year (pp. 289-291), 600 live lobsters left Halifax on July 2, about 50 per cent of which perished en route. The distribution is reported as follows: "At New Westminster we transferred the whole shipment to the tug provided. We steamed over 100 miles from five o'clock in the morning till nine at night, but could not find the water sufficiently salty anywhere, the whole straits of Georgia being highly coloured with floating sediment from the Fraser river. We put 196 live lobsters, including two very large ones weighing over 10 pounds each, and many females with eggs, on inshore grounds adjacent to Nanaimo lighthouse in charge of Mr. Brown. We put seventy-two near the shore, surrounded by a net. The rest we put overboard in deeper water en route to Nanaimo, hoping that the water would be more salty near the bottom."

In 1905 a second shipment was brought out, starting from Halifax June 8 (cf. Fisheries Report, p. 285). This consisted of twelve crates containing 590, and eleven barrels or patent carriers containing 435, a total of 1,025, the majority of which arrived safely at Vancouver. Those in the boxes were deposited "in a bay just above the Second Narrows on the south side of Burrard inlet, about 5 miles above Vancouver, the bottom consisting of rocks and kelp." Of the remainder, "one barrel and three berried lobsters were planted in Secret cove, Sechelt peninsula, one barrel and three berried lobstrs in Long bay, southeast corner of Gambier island, one barrel and three berried lobsters in Snug cove, east of Bowen island, three barrels and fifteen berried lobsters in False narrows, four barrels and the remainder of the berried lobsters in Nanoose bay."

The third shipment was made in 1908 (cf. Fisheries Report, p. 271). This consisted of fifteen crates containing 1,620 lobsters, of which "some 1,100 were ultimately placed in the large crates in Sooke harbour and kept there for some weeks, which proved beyond a doubt that this crustacean would live and thrive in Pacific waters. The distribution was subsequently made in various waters."

In the following year, I believe, a number of eggs were hatched out at the Biological station under the supervision of the late Mr. G. W. Taylor and Dr. A. G. Huntsman. The young lobsters were liberated in Departure bay.

2. Apparent Non-success of Lobster Shipments.

Although the United States Fisheries Department has been planting lobsters in the Pacific for over forty years, and the Canadian Department for nearly twenty years, I believe I am correct in saying that there is no record to show whether or not any of these lobsters have survived to spawn and produce another generation. Scores of the reports have been correct, but one is much inclined to doubt it after following up so many of the reports only to find that the so-called lobsters were not lobsters at all. In nine cases out of ten these prove to be sand shrimps, either of the species *Callianassa californensis,* or of the species *Eupogebia pugettensis.* Why is it not possible to find out for certain if the lobsters are present in these waters?

3. Reproduction of Lobster.

According to Herrick[1] the female lobster is 6 or 7 years old when it first spawns. In British Columbia waters there have been about 2,400 lobsters planted. Of these, about 300 were planted in 1895. At most, even if those were old enough to spawn at the time they were planted, there could not be more than three generations since. We have no means of judging as to how many would survive from each batch of eggs, but they would do very well if the number were increased 100 per cent in each generation. In that case there might be 1,200 from the first lot by this time. In 1905 about 1,000 were planted. There would be but time for one generation of lobsters from these, hence on the same basis of calculation there might be 2,000 of these. From those planted in 1908, about 1,100, there might be as many more well grown or perhaps old enough to spawn, making 2,200 in all. Of course, the mature lobsters would keep on spawning, every two years according to Herrick, but even taking that into consideration, the above estimate would probably be high, and this would not make more than 5,000 in all. The distance from Secret cove, Sechelt peninsula, to Sooke harbour, north and south, is approximately 120 miles; the distance from the Second narrows, Burrard inlet, to Nanoose bay, east and west, is about 50 miles. The area between these points would therefore be at least 4,000 or 5,000 square miles. Consequently, if the lobsters have done well, there may be one to each square mile on an average, provided none have moved outside of that area.

4. Migratory Powers of Lobster.

It is true that ordinarily the lobster is sedentary in its habits, and we might expect to find them somewhat massed around the points at which they were planted, but even that would not make them very plentiful in any one locality. On the other hand, from tagging experiments carried out at Wickford[2] we have record of some rather rapid migration. One covered 12 miles in eleven days, another 10 miles in less than eight days, and several others made records almost as good. Since that is the case, if those planted were not in localities to suit their taste, they might have moved off a few miles to find better ones. In this case they might be massed in some locality not so very far away. What chance is there to find such a locality, or if they are scattered what chances are there for any great number to be near the original location? Efforts have been made time and again to locate them by means of lobster pots, but in vain. There is little chance of getting them in such a way except by accident. They should appear in shallow water occasionally, but even if they did, many of the islands are uninhabited or but sparsely inhabited, hence they might be

[1] Herrick, F. H., Natural History of the American Lobster. Bull U. S. Bureau of Fisheries, vol. XXIX, 1911.

[2] Natural History of the American Lobster, p. 180.

plentiful without being seen. But even if they were seen and possibly if they were recognized, not one in a thousand of those likely to see them would ever report. The chances are all against getting definite information in the matter.

5. Favourable Reports of Results.

The only evidence that appears to be available, as far as the experiments in this province go, is favourable. Of those planted in 1905 in the small bay at Mudge island at the entrance to False narrows, we have direct evidence that they seemed to thrive for a time. They were prevented from escaping by means of a net drawn across the entrance of the bay. The net rotted and was taken away by a storm in a couple of months, but during this time the lobsters seemed to thrive although they had but little room for exercise, especially at low-tide. There was no sign of any dead lobsters and nothing to indicate that they were not in the best of health. Again in 1908 when the shipment was taken to Sooke and the lobsters put in crates, the report already quoted says that they lived for some weeks before they were distributed. But that is not all. Inspector E. G. Taylor has informed me that when the crates themselves were taken away to be broken up, some time later, there was an occasional lobster still present, apparently hale and hearty. In both these cases if the lobsters got along so well for the first few weeks, that there was no evidence of mortality, it would seem that they should get along all right at any time. To this conclusion one objection might be raised. While the lobsters were in the net or in the crates, they were protected from any species that might cause their destruction. When the protection was removed and the lobsters were exposed in the open waters such enemies might appear. As an offset to this it might be remarked that the mature lobster is fairly well able to look after himself, and since other crustaceans, by no means so well provided with weapons of defence, thrive in these waters, there cannot be many enemies that the lobster would need to fear.

6. Bottom, Food and other Conditions.

Comparisons have been made of conditions in the Pacific and in the Atlantic as to the possibilities of or the suitability for lobster rearing. Rathbun[1] has gone into the matter rather fully, but, he has made the comparison chiefly in reference to the San Francisco region, it may be worth while to make a similar comparison with the Vancouver Island region.

In the first place, as to natural resorts, there is no lack of such rocky, gravelly and sandy bottoms, with ample provision of kelp and other large algæ. The area for such at suitable depths in this vicinity will be considered later.

As to food material, Prince[2], in speaking of the American lobster, says: "Lobsters may be almost said to be omnivorous. They are certainly not particular in their diet, and greedily devour fish alive, dead, or even putrid, seaweed, eelgrass (*Zostera*), shrimps, starfish, indeed anything in the nature of edible material." Herrick[3] mentions fish, crustaceans, chiefly isopods and decapods, molluscs, including clams, large and small univalves, echinoderms, including starfish and sea-urchins, hydroids and algæ. British Columbia waters could certainly supply a greatly varied menu along those lines. There are bottom fish of so many species that it is quite probable many of them have not even been examined. There are plenty of dead fish, particularly at certain times of the year, e.g., when the dog salmon start up the streams to spawn. As to Crustaceans, Taylor's list[1] will give some idea of the variety of the decapods.

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[1] Rathbun, R., Transplanting of Lobsters to the Pacific Coast, Bull. U.S. Fish Commission, vol. VIII for 1888, pp. 453-472.

[2] Prince, E. E., Report of the Canadian Lobster Commission, 1899, p. 9.

[3] History of the American Lobster, pp. 185-187.

Isopods are not so numerous in species but are by no means lacking in number of individuals. As to molluscs, Taylor's papers[2] will indicate very well the number of species and Thompson's[3] papers indicate the extent of the beds of some of the edible forms. If echinoderms serve as toothsome morsels, the lobster may feast at will along this coast. Starfish are so numerous as to be almost a plague; two species of sea-urchins are present in abundance, and, if it will only tackle the holothurians, *Stichopus californicus* should supply him with trepang for many days in the year. The abundance of hydroids in indicated by some of my own papers, particularly the most recent.[4] In many places the sea-bottom is carpeted with them, while around the rocks, piles, etc., at and below low-tide they appear in great quantities. If the lobster enjoys a meal of these as the crab evidently does, it may have them for dessert as often as it wishes. Eel-grass, fucus and kelp are everywhere abundant if it chooses to turn vegetarian. As far as food material is concerned, therefore, there need be no lack.

7. Temperature Conditions in British Columbia Waters.

Another condition on which considerable stress has been laid is the temperature of the water. Although that is the case, there has really been very little ground on which to base a comparison. Rathbun (cf. p. 454) makes the statement: "The continuous temperature observations in the possession of the Fish Commission relate mainly to the surface waters, but in the shallow areas where they were taken there is generally not much difference in this respect between the surface and the bottom." That may be true at the points referred to and yet in the temperature charts for the vicinity of Woods Hole,[5] a difference of 4 degrees or even more is shown in some instances in the very shallow water of Buzzards bay. At present we have not very many readings at various depths for this district but the few we have indicate that it is not safe to make such a statement. As an instance, at a point in Departure bay, which is nowhere much more than 25 fathoms deep, the following readings were taken on July 15, 1914:—

Surface	63·1° F.
1 fathom	61·0° F.
2 "	60·4° F.
3 "	59·5° F.
4 "	57·9° F.
5 "	56·3° F.
10 "	53·8° F.
20 "	51·4° F.
25 "	50·7° F.

A more sudden change was shown on October 14, 1914, when the following readings were obtained:—

Surface	52·9° F.
1 fathom	49·73° F.
2 "	49·46° F.
3 "	49·19° F.
4 "	49·01° F.
5 "	48·83° F.
10 "	48·65° F.
20 "	48·49° F.

[1] Taylor, G. W., B.C. Decaod Crustaceans, Contributions to Canadian Biology, 1906-1910, pp. 187-214.

[2] Taylor, G. W., Preliminary Catalogue of the Marine Mollusca of the Pacific Coast of Canada. Trans. Royal Soc. of Canada, Sec. iv, 1895, pp. 17-100.

Notes on the Marine Mollusca of the Pacific Coast of Canada, Trans. Royal Soc., Sec. iv, 1899, pp. 233-250.

[3] Thompson, W. F., Report of the Commissioner of Fisheries for B.C., 1912, pp. I 7–I 56; 1913, pp. R 103–R 130.

[4] Hydroids of Vancouver Island Region. Trans. of the Royal Society of Canada, Sec. iv, 1914, pp. 99-216.

[5] Sumner, Osburn and Cole, A Biological Survey of the Waters of Woods Hole and Vicinity. Bull. U. S. Bureau of Fisheries, vol. XXXI, 1913, pp. 429-432.

and this at a time when the temperature at the surface was not high. The range here would easily fall within the extremes 32° to 76° as given for the Atlantic waters, for unless for a fathom or two at the surface or on long sloping beaches, it would seem from the little data that we have that the temperature is not likely to go below 45° or above 65° at any depth in the strait of Georgia and the straits and channels among the islands. Moreover, in cases where it is stated that the lobsters live in localities where there may be somewhat extreme surface temperatures, it is commonly stated as well that the lobster migrates to the deeper water to escape the cold of the shallow water. This is only a surmise, however, and not necessarily a correct one, as the migration is just as liable to be due to the necessity of going to deeper water for requisite food material which at this time of year might be scarce in shallow water areas. It has been proved time and again that the lobster seems to be in no way harmed by being kept at a low temperature during transportation, hence if the low temperature alone came into play the winter migration might not be necessary. At any rate there seems to be little doubt but that the lobster can adapt itself to considerable variation in temperature provided it is not too high, and a danger from high temperature is not likely to be a factor in the waters of the strait of Georgia.

I have found that there is very little difference in temperature in water at 100 fathoms or even at 50 fathoms in July and October, hence there is not likely to be very great difference during the rest of the year. I have no data as to the temperature at these depths in the Atlantic, but would be surprised to find that it differed much from the temperature at the same depth here. It would seem, therefore, although we may not have such extremes of surface temperature as in the Atlantic where the lobsters are now at home, yet at the depths that the lobsters are likely to be located at any particular time of the year there is not likely to be very much difference, not enough to be of any serious obstacle to their welfare.

8. Conditions of Density and Salinity of Water.

Another feature to which scarcely any attention has been paid by those who have written about the lobster, viz., density or salinity, would appear to me to be much more important than the temperature and yet from this lack of attention it is impossible to give any satisfactory comparison. Herrick in his large work of over 250 pages does not consider the question at all. Prince says: "Lobsters avoid localities where fresh-water streams run in unmingled with salt water," but that does not help out a great deal. Rathbun does not think it worth mentioning in his comparison. Reports on destiny in two localities on the Atlantic coast where lobsters are found may give some idea of what density is required. In the paper already mentioned on the biological survey of Woods hole (cf. pp. 433-436) four density charts are given for Buzzards bay and Vineyard sound. The water is all so shallow in the area surveyed that it is scarcely comparable to the waters of the east coast of Vancouver island, and yet as lobsters live and thrive in these waters, the degree of salinity must be favourable. The water at the bottom has practically the same density as that at the surface in nearly all cases, with but few instances where the density is lower than 1·0230 or higher than 1·0240, very uniform throughout the year. In a paper on "The Temperatures and Densities of Passamaquoddy bay and its Environs"[1] the density measurements were all made during the summer months and most of them were at the surface or not more than 5 fathoms from the surface. These readings fall fairly well between the same limits as do those at Woods hole, although there is noticeable variation due to the excessive change of the tide. If it is necessary to have a salinity represented by such density right to the surface of the water then it is useless to attempt to grow lobsters along the east coast of Vancouver island, because it would be a difficult matter to find a spot between Haro strait and Queen Charlotte sound

[1] Copeland, G. G. Contributions to Canadian Biology, 1906-1910, pp. 281-294.

at least, where the density is not noticeably lower than this, through a great portion of the year if not through the whole of it. Readings as given in a preliminary paper on density and temperature by Prof A. T. Cameron and myself, which follows this paper, show that during the summer months, when these readings were made, the average surface density within this area falls between 1·0180 and 1·0190. Practically the same thing is true of such large inlets as Barkley sound, into which pour large streams of fresh water. This would indicate that the salinity in the strait of Georgia at the surface is only about 80 per cent that of the salinity at Woods hole or Passamaquoddy bay. On the other hand if it will answer the purpose to have such a density at 10 fathoms or even at 5, and there seems no reason why it should not, as apparently the lobsters are at that depth or more for the greater part of the time, the question is quite a different one, as over a great portion of the area mentioned such a density, in all probability, exists throughout the year. This might account for the fact that the planted lobsters, if any of them do exist, are not seen in shallow water.

9. Enemies of the Lobster.

As to the enemies of the lobster, there are numerous predaceous fish that would enjoy the taste of young lobster, but whether they are more or less abundant, more or less predaceous, than these on the Atlantic coast, it is impossible to know. The chances of the young lobster growing to the adult stage seems as much beset with difficulties in the one case as in the other. A reference to enemies of the full-grown lobster has already been made.

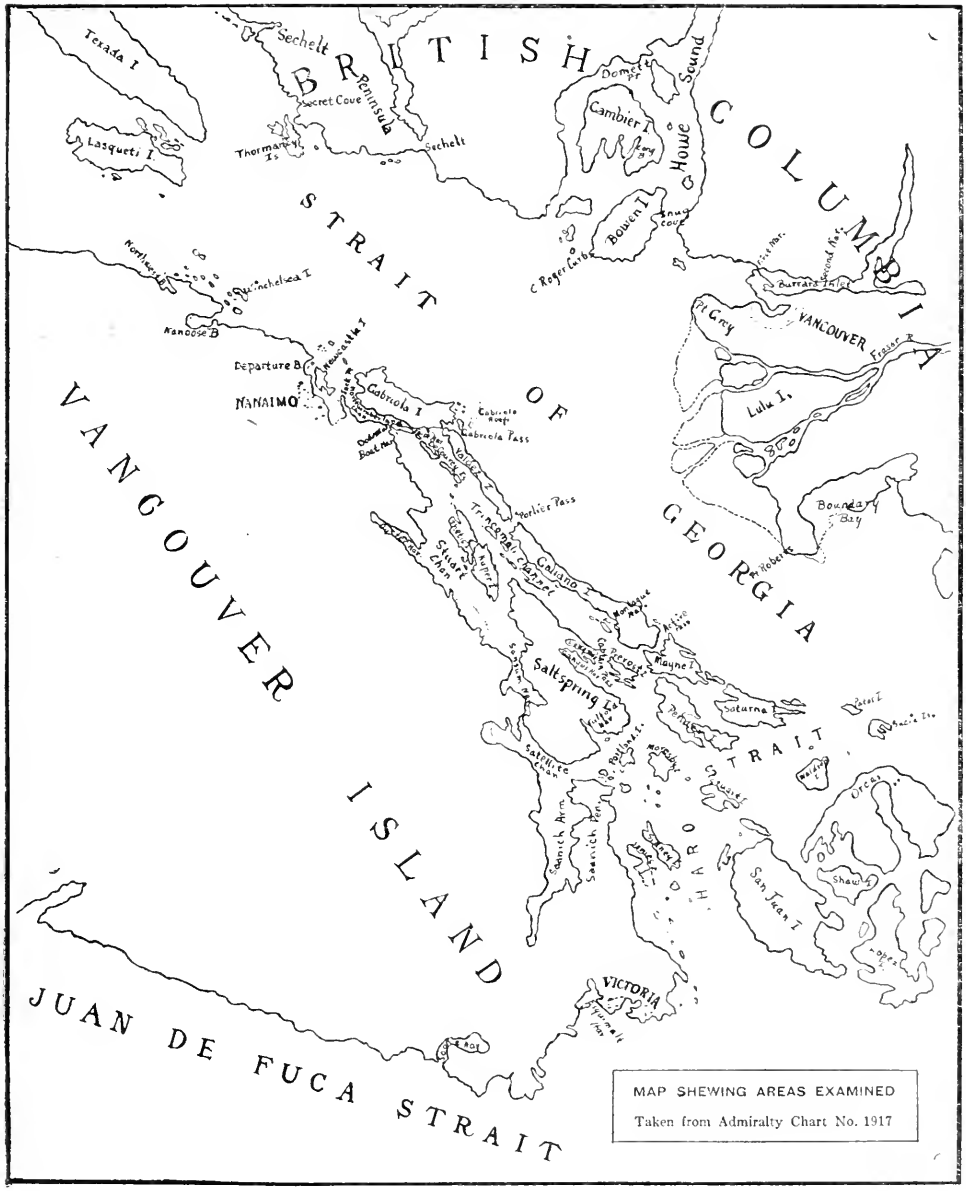
Would the introduction of lobsters on a large scale upset the marine equilibrium so as injure the prospects of any other fishing industry? It scarcely seems possible. The only crustaceans of economic importance found in the district are crabs and shrimps and these are so little fished that they can hardly be said to be of importance at the present time. The marketable crab, *Cancer magister,* prefers to live in shallow water which may be so much lacking in salinity as to be brackish, on a sandy or muddy bottom such as is found at or near the mouth of a river or stream, where there is little or no fucus or kelp, hence his haunts are not likely to be disturbed by the lobster. The shrimps that have hitherto been used for market go more to the other extreme and stay out in the deeper water. These are not much more likely to be disturbed.

10. Areas Examined Described in Detail.

An examination has been made of a considerable area between Vancouver island and the mainland in order to know if the general conditions seem suitable for lobster habitat. This area includes the strait of Georgia and contiguous waters from Texada and Lasqueti islands to the north to Victoria or near it to the south.

The mainland coast in this area, as a whole, does not offer very favourable conditions. Around Thormanby islands, in Buccaneer bay, through Welcome pass and even eastward along the shore behind Trail islands to Sechelt, there is a rather narrow strip that might be available. The logging camps in the neighbourhood seem to have made some change in the nature of the bottom as dredgings made in this vicinity in water of 15 to 30 fathoms brought up more bark than anything else. The area is small and detached from any other area. Secret cove, in Sechelt peninsula, where some of the lobsters were planted in 1905, is at the northern extremity of this area. Eastward from Sechelt to Howe sound the coast is too precipitous and this is true of Howe sound itself. Some lobsters were planted southwest of Gambier island and east of Bowen island but in both these places, although close in shore there is shallow water, it drops off very near by to 100 fathoms or more. Moreover, the sound apparently gets more than the ordinary supply of fresh water if one is to judge from

Lobster Planting, B. C. McLean Fraser.



readings taken at the surface on August 19, 1914, by Mr. Cameron. At the head of the sound at the mouth of the Squamish river the water was so fresh as to be not even brackish. A little farther out the density was 1·00035. Near Domett point it was 1·004 and even off cape Roger Curtis at the southwest corner of Bowen island it was but 1·006, while at the same time in the open strait and in Departure bay it was 1·018 or more. Burrard inlet supplies a large comparatively shallow area, the length from point Atkinson to Port Moody being about 20 miles but the width is nowhere very great except outside Stanley park or the First narrows. Much of the Fraser river water passes in through the narrows at flood-tide, while at the same time Seymour, Capilano, and other smaller streams add to the supply of fresh water but even then the density is far from being as low as it is in Howe sound. A great trouble would probably arise from the refuse poured into it from Vancouver and other places along the shore. From point Grey southward the shore is in no way suitable as it is all an immense sandbank with the water made brackish by the Fraser river.

The shores of Texada island are precipitous. To the north of Lasqueti island, from Tucker bay to the eastern end of Bull passage, there is a small detached area with some small rocky bays and with plenty of kelp and fucus, that would make a suitable ground for a small number of lobsters. There is no place where there would be a better interchange of water or a better chance of being free from the intermingling of fresh water but here again it is but a short distance into very deep water.

On the Vancouver Island coast the shore to the northwest of Northwest bay is a sandy or gravelly beach extending out into deep water but to the southeast of this bay there is a continuous stretch of good coast reaching to Victoria. The distance from Northwest bay to Victoria is approximately 90 miles, the greatest width of the area with less than 100 fathoms of water is about 25 miles with the average width about half that. The total area must be about 1,000 square miles. Probably half the area is taken up with islands, hence the water area would be about 500 square miles. Over at least one-half of the area the water is less than 30 fathoms deep, and over three-fourths of the remainder the water is not over 50 fathoms.

From Northwest bay to Nanoose bay, 8 miles, conditions seem very satisfactory. The strip here is from 1½ to 2½ miles wide and is dotted with small islands and reefs fringed with kelp. Strong currents pass through the channels to keep a large supply of food material on the move. The bottom is generally rocky, but there are some sandy spots with a good variety of molluscs. The entrance to Nanoose bay (the bay extends in about 4 miles with an average width of about a mile) is rocky and supplied with kelp to the north and the centre but the south shore slopes gradually up to form a sandy beach. Inside the entrance rocks, much of the bottom is covered with mud brought down by the streams that flow into the head of the bay and in general is not very suitable for lobster habitat. From Nanoose bay to Hammond bay there is but a narrow strip of shallow water, nowhere more than a mile wide, with no islands or reefs and very little irregularity in the shoreline. It is well supplied with kelp and other algæ but is much exposed to all storms.

From Neck point at the western side of Hammond bay to Horswell rock at the entrance to Departure bay, a distance of 2 miles, there is a triangular area with the apex at Five Finger island, about 1½ miles from shore, in which conditions are much similar to those in the area west of Nanoose bay, that portion about West rocks and Five Fingers island being especially suitable. It is well out in the open strait, with plenty of current, rocky bottom, kelp and an abundant supply of food material. The plankton taken around these islands is very rich in crustacea. In Departure bay itself the conditions are fair. The northern side of the bay is rocky with clam beds at intervals along the shore; the deeper part of the bay and the south side has rather too muddy a bottom and this is true through the channel separating Newcastle and Protection islands from Vancouver island, forming Nanaimo harbour at the

south end. The water from the Nanaimo river passes through this channel to some extent so that the region is not so suitable as the shallow water strip to the east of the islands which extends well outward towards the middle of the channel. The crude oil that gets into the water as well as the refuse from the Canadian Explosives Works, and the gasolene and oil from the numerous power boats cannot be good for these or other marine forms.

Only a narrow strip connects the Newcastle and Protection area, along the Vancouver island side of Northumberland channel, with Dodds narrows and False narrows where entrance is obtained to the large area of shallow water farther south. Between this strip and Gabriola island there is a wide channel of deeper water ,which is the northern part is 100 fathoms deep in places but farther south seldom more than 60 or 70. Along the Gabriola bluff this deep water comes in close to shore, but to the north of this and on to the north end of the island there are several small bays, with points ending in reefs running out between. This is true at the north end of the island as well, particularly so from the northwest where the shallow water runs out past Snake island, a distance of over a mile and a half, and the northeast, where it runs out past Entrance island, about the same distance.

Beginning with the north end of Gabriola island and extending in a southeasterly direction, past Valdez, Galiano, Mayne, and Saturna islands, there is a very regular coast, with scarcely any small islands except at the entrance of the passes and scarcely a small bay or inlet of any kind. The 30-fathom line is seldom more than half a mile from shore, but the 100-fathom line is from 2 to 3 miles out. With the exception of the portions near the passes, therefore, this coast is not well suited for growing and fishing for lobsters. The passes are shallow and hence are connected with the inside areas, but they may as well be considered here.

At the eastern entrance to Gabriola pass, Breakwater island with the numerous small islands of the Flattop group and the portions of the shores of Gabriola and Valdez islands adjacent, include numerous little bays and channels, points and reefs, and to help matters Gabriola reef extending north and south for a distance of about 2½ miles outside of these islands, shelters an area that is nowhere more than 30 fathoms. Similar conditions exist through the pass itself. On both sides there are numerous small bays separated by rocky points which extend far into the passage as reefs. At Porlier pass (Cowichan gap) the islands on the strait side are represented by reefs only. The characteristics of the pass itself are similar to those of Gabriola pass, with the adjacent shores of Valdez and Galiano islands even more ragged than those of Valdez and Gabriola at Gabriola pass. Active pass agrees very well with Porlier pass in the nature of the eastern entrance, but the shores are more regular than either of the others and the channel is deeper. The eastern entrances of all these passes are rather strongly affected by the Fraser river current especially when this river is in flood. Between Mayne and Saturna islands there can scarcely be said to be a regular passage as the islands and reefs so block up the intervening space, from the Belle Chain of reefs half a mile off shore, almost all the way through to the southwest sides of the islands. There are so many tide-rips and overfalls in this area that, however suitable a place it might be for lobsters it might not be very suitable for fishing. This is somewhat true as well in the neighbourhood of Tumbo island, north of the eastern extremity of Saturna island, although since there are not so many reefs it is not such a dangerous coast. Rounding Saturna island, Haro strait, running at first south of west and then south to the south end of Vancouver island, provides a distinct obstacle to lobster communication with the San Juan islands, as everywhere in mid-channel it is 100 fathoms deep or very little short of it.

South and west of this chain of islands, lying between them and the coast of Vancouver island and extending from Dodds narrows and False narrows all the way to Victoria is a large area, very little of which is apparently unsuitable for lobster

habitat. There is very little water with a depth of over 30 or 35 fathoms, the only part of any size to be excepted being Stuart channel from the south end of Thetis island, Sansum narrows and the northern portion of Satellite channel or, generally speaking, the channel between Saltspring island and Vancouver island. Even in this channel there is seldom 100 fathoms or very near it. In this area the effect of the mixture of fresh water from the Fraser river is much less marked than it is outside of this chain of islands. Judging from plankton observations, low-tide collections and bottom dredgings, there is an abundant supply of food material throughout the area.

Certain inshore locations offer snug retreats and convenient abiding-places such as the lobster has a fancy for. Around the DeCourcy islands there are many such locations. Near Mudge island, with Dodds narrows on one side and False narrows on the other, these are more especially marked. It was in a small bay on the False narrows side of Mudge island that the lobsters thrived for a couple of months in 1905. The adjacent shores of Vancouver island on one side and Gabriola island on the other are of much the same nature. From Pylades island, the last large island of the DeCourcy group, or the smaller Tree island, it is a short distance by way of the Danger reefs to the reefs to the north of Thetis island, and from this along the west side of Trincomali channel, taking in the shores of Reid, Hall, Norway, Wallace, and Secretary islands, Governor rock and Atkins reef, it is good all the way to the entrance of Captain passage. On the other side of the channel the outline of Valdez and Galiano islands is very regular and but little indented until Montague harbour is reached. The Vancouver island coast is much more indented and irregular as far as Oyster harbour, as is the north shore of the harbour, but the south side and from this along the coast southward as far as Crofton, the water along the shore is shallow and the shore itself is sandy or muddy with but few rocks along the whole distance. The west coast of Thetis and Kuper islands is quite regular also, with the exception of a small portion around Telegraph harbour, where there are a number of small islands and reefs. The west coast of Saltspring island and the adjacent coast of Vancouver island are quite regular but there are some very suitable small bays. The rapid progression into deep water in almost every case spoils the desirability of the location.

In the neighbourhood of Captain passage, the conditions are very favourable. In fact the whole coast of Prevost island is very suitable, with its numerous rocky and sandy bays passing inland in a southeasterly and northwesterly direction. On the opposite side of Captain passage the strip between Ganges harbour and Trincomali channel offers similar conditions. Long harbour runs inland for 2½ miles as a narrow inlet. From Ganges harbour southward the shore of Saltspring island is regular with no large indentations and few small ones. This is largely true of the south end of the island as well, with the exception of the entrance to Fulford harbour, where there are numerous small rocky indentations. The whole area between Mayne and Saturna islands on the one side and Pender island on the other is shallow, much of it less than 15 fathoms. The shores are not so very ragged but there are several small bays that would serve for lurking places. The south and west shores of Pender island are quite regular and rather abrupt.

To the east of the north end of Saanish peninsula is a triangular area, approximately 4 miles each way, that offers very favourable conditions. Moresby island forms the eastern apex, with Portland and Piers to the north and the southern point running down to Sidney and James islands. The surface water in this area has a greater density than that at any other part of the region under consideration; it has the largest beds of kelp and, in all probability, all the other conditions that go with these. It cannot be said that the area is limited thus to the south as in reality a continuation of it, a strip from 2 to 4 miles wide extends along the Vancouver island

coast to Victoria. In this strip the large islands are almost absent but there is a fair share of rocks and reefs.

11. Two Methods Suggested in Future Planting Schemes.

To all appearances there are these areas and probably other areas equally as good at other points along the British Columbia coast, which provide all the conditions necessary for the welfare of this crustacean that has become so valuable on account of its increasing scarcity in the last few years. Nothing but experiment with the animal itself can tell us any further whether it will thrive or not and it has been already demonstrated that experiment without continued observation and control counts for little more than no experiment. It could easily be possible to go on putting in a small shipment of lobsters every few years, for this and several succeeding generations, without being any wiser as to whether any survived or not. It certainly would be preferable if another experiment is undertaken to put it on such a basis, no matter what time it takes to do it, that the question should be definitely decided one way or the other. To do this two methods suggest themselves. One of these is to place a large number of lobsters in an area that seems suitable and at the same time is fairly well cut off by land or deep water from adjacent areas. In this way the lobsters would have a chance to move about under conditions as natural as possible and if the numbers were large enough the movements of the plantation as a whole could be followed. I cannot see where anything is to be gained by putting a few here and there over a wide area where it is entirely impossible to make any observations as to how they live or where they go.

The other method would be to place a number, not necessarily so large, in a small bay where the conditions seem satisfactory and impound them there by making the enclosure complete as far as the lobsters are concerned, but not so complete as to hinder a constant interchange of the water supply. This was done in some of the previous experiments, but a net, satisfactory as it may be at the moment, must soon rot and become useless when left constantly in the salt water. A permanent barrier is necessary, either in the form of a weir, of a wooden barrier built after the style of the side of a lobster car, or of a stone or cement wall, with grated openings for the free passage of water. In any case it should be strong enough to stand any storms that might reach it, and sufficiently permanent to last at least a couple of years. This would permit of a more extensive series of observations than the other, but there are certain objections to it. The conditions are to some extent artificial, as enemies, if there are any, would be kept outside of the enclosure, and the food material, to some extent at least, would also. It might be necessary on that account to give an additional food supply. Furthermore, such an enclosed area would of necessity be rather shallow, and if it is necessary for the lobster to get into deep water for a portion of the year, its well-being might suffer if it were kept in the shallow water throughout the year. If, on the Atlantic coast, this movement into deep water is merely to get away from the cold water near shore, that point would not need to be considered seriously, since as has been previously stated, the water would be at a suitable temperature during the winter months as well as during the summer.

12. Expert Supervision Essential.

No matter which method is used, it seems to me that it is absolutely essential to have a suitable man to look after them continuously for two years at least, in order to know if those brought out as seed lobsters would spawn again in British Columbia waters (that is, if Herrick is correct in his contention that lobsters spawn but once in two years). It would be much better to carry this on for six, seven or eight years to find out if the lobsters hatched out in these waters would develop into mature lobsters and propagate.

13. Desirable Condition for Experiment Specified.

If an open area should be decided upon, the following locations seem to be the most suitable: The area between Northwest bay and the entrance to Nanoose bay; around Five Finger island and West rocks; around Mudge island, on either the Dodds narrows or the False narrows side; around Secretary and Wallace islands; around Prevost island and the area east of the north end of Saanich peninsula. To this might be added the area around Breakwater and the Flattop islands, were it not that this location is liable to be much affected by the water of the Fraser river. All these locations are mentioned in the general description.

If the enclosure method is to be used, deciding on a suitable location is a difficult matter. So many of the small bays among the islands are used for anchorage or wharfage and consequently could not well be closed up. To give just one example, there is a fine small bay in the Winchelsea islands, but this is practically the only protected anchorage for small boats between Nanoose and Northwest bays, and since much fishing is done off these islands (locally known as the Grey rocks) it would be a great hardship to the fishermen if that were closed up.

To be suitable for the purpose, the bay must be large enough to allow for the wandering of a large number of lobsters, narrow enough at the entrance so that it can be readily blocked, sufficiently protected that it may not suffer too much from storms, deep enough so that at low-tide there is an abundance of water, varied enough in shoreline to provide rocky clefts and fissures in which the lobster may lurk, and sandy beds where it may dig for shellfish but not muddy enough to spoil it all, well provided with kelp, fucus and other algæ, near enough to strong currents to allow for the bringing in of food material, for the lobsters themselves and for the forms on which they feed, and as free as possible from contamination from fresh water. At the same time it would be well to have it near a suitable location for a permanent habitat so that if the experiment should prove successful it would not be necessary to transport them when it was desirable to liberate them. To get a location with all these conditions is rather a large order. Practically all the shores of all the islands in the district under consideration have been examined, with the results that very few cases were found with any approach to fulfilling them all. There are very many small bays like that in which some of them were impounded in False narrows, that would do very well for a location for a limited period if there were not too many lobsters, but they would not be satisfactory if it was desired to impound a large number for a long period, as it would allow for so little chance for the individuals to move around on account of the overcrowding, more especially at low tide.

14. Six Areas Described as Preferable for Experiment

The location which to me seems the most suitable for this purpose is an inlet. Glenthorne creek, extending into Prevost island from the west. The inlet itself is about a mile long, nowhere more than 250 yards wide, and in some places very much less than that. Its north shore is a narrow neck of land separating it from a similar inlet, Annette creek. Its south shore is not continuous but is made up of two larger islands, several smaller islands or reefs and a point of Prevost island, Glenthorne point. From the extremity of this point to the head of the inlet is about a quarter of a mile, and this portion could readily be inclosed by placing a barrier across from this point to the north side, which here is not more than 100 yards away at low-tide. The portion thus shut in would have a rocky shore line throughout the greater portion at high-tide and throughout about half of it at low-tide, the other part being heavy sand or sandy mud. About one-half of the area has 1½ to 2 fathoms of water at low-tide and but a small portion of the beach goes dry. Through Captain passage, at the entrance of the inlet, a strong current flows a great part of the time and some

of this current comes through the inlet and in and out among the gaps between the islands and reefs, so that a constant interchange of water would be assured. There is practically no drainage area from which fresh water could come, as Ellen bay coming in from the southeast and Annette creek, just north of Glenthorne creek, very nearly cut the island in two, leaving but a very narrow strip between them and the southwest shore of the island. On account of these two inlets being thus situated, no inconvenience is ever liable to arise through the shutting up of the end of Glenthorne creek.

Annette creek is somewhat similarly placed but does not seem nearly so suitable as Glenthorne creek. It reaches in farther as the points on each side reach out farther, but as both shores are complete if a portion of it was closed off the tide current would not be running past the barrier, and hence all the interchange there would be could only be of the nature of a back wash. This probably accounts for the fact that it is much more muddy than Glenthorne creek. The depth of the two is much the same but Annette creek has more shallow water around the shore and in consequence a greater portion would go dry at very low tide.

Just across Captain passage from the mouth of these two inlets, Long harbour extends in a similar way for a distance of 2½ miles into Saltspring island. About half a mile from the entrance some small islands and reefs run parallel to the northeast shore, about 100 yards from it at both ends but more than that at the centre, where there is a small indentation in the shore occupied by a sandy beach. There is a greater variation in depth here, and if it could be blocked at each end in such a way that the tide would pass right through, it might be a suitable location. It would not be so large as the head of Glenthorne creek but in other respects the conditions are somewhat similar.

At the southeastern extremity of DeCourcy island a peninsula extends northward in such a way as to leave a bay between it and the main portion of the island. The entrance to this bay is somewhat cut off by a couple of small islands, and at low-tide a ridge extends and very nearly connects these with the extremity of the peninsula. The area thus inclosed is 500 or 600 yards long and nearly half that width at the widest part but narrowing very much towards the head. The water over the greater portion is 1½ to 2 fathoms deep at low-tide. All of the shore with the exception of the extreme head, where there is a beach, is rocky, the rocks being rough and broken on the one side but smoother and sloping more gradually on the other. A good tide current flows in and out over the reef and between the islands. It is fairly well protected from storms and could readily be inclosed by a barrier across the entrance. No fresh water runs into it and it is not used as an anchorage.

Just south of Boat harbour on the main coast of Vancouver island is a peninsula somewhat similar to that on DeCourcy island. It is not so large but a series of reefs extend from its extremity, protecting the bay almost as well as if the point did project. The opening here is to the southwest instead of to the north. The bay is almost as long but much narrower. Several other bays somewhat similar to this occur between Boat harbour and Oyster harbour, but fresh water runs into the majority of them, and the ranchers use them for anchorage.

A little over a mile from Jack point, not far from Nanaimo, and just before Duke point is reached, there is the entrance to a lagoon over three-quarters of a mile long and from 150 to 200 yards wide, which may be entered readily by small boats at high-tide but is inaccessible at low-tide. The entrance is somewhat narrow and the rocks across the entrance serve as a barrier up to about half tide, with the exception of two narrow passages. This barrier retains the water as the tide goes out so that the water in the lagoon may be at a much higher level than that outside. Even if the water lowers to the levels of the rocks at the entrance only a small portion of the whole area becomes dry. The greater part of it is from ½ to 2 fathoms at the lowest tide. The southern end of it has a bottom of sandy mud, with bunches of eel-

grass, and dries for a short distance out, but near the entrance it is rocky and somewhat deeper with plenty of algæ present. Such animals as sea-urchins, which are usually found in the strong current or where there is a good interchange of water, are here in plenty. Plankton taken at half-tide on August 14 showed an abundance of copepods, cladocera, nauplii, larval ascidians, mollusc eggs, and smaller numbers of several other groups. This lagoon is separated from the Nanaimo river by but a constricted neck of land, through which a narrow passage is cut for row-boats. To see if the Nanaimo river would have any material effect on the water of the lagoon, some samples were taken on October 19, when the river was high from heavy rains. These were taken just at the end of ebb-tide, so that the water from the strait would have the least effect in backing up the water of the river. In Northumberland channel, outside of the lagoon, the surface density was 1·0216, in the lagoon it was 1·0207, while on the Nanaimo river side of the neck of land at the entrance to the boat passage the density was only 1·0014. As the passage is narrow and out of the line of the Nanaimo river current, it would seem that little fresh water passes through.

None of these locations are entirely ideal, but they seem to be the best available. Some of the locations in the area east of Saanich peninsula seem as good as these, but without exception all of them are occupied, at least in the summer when the campers get out along the shore to take advantage of all the suitable protected spots.

15. Summary.

Three attempts to introduce lobsters into British Columbia waters have been made by the Canadian Department of Fisheries, and numerous similar attempts have been made in the Pacific waters farther south by the United States Bureau of Fisheries. It is not known if any of these attempts have been successful, since there has been no system of control or continued observation in connection with the experiments. Further attempts of a similar nature are not liable to give any better results. It would seem to be worth while to know definitely if transplanted lobsters will thrive as the price of lobsters has very materially increased in recent years on account of the decrease of the supply. On the east coast of Vancouver island, and in all probability in many other places, there is a large area that apparently is very suitable for lobster habitat.

If another attempt at transplanting is made, such control of the experiment should be exercised as to decide definitely, one way or the other, as to its success. Two ways to make it possible are suggested. The one is to transplant a large number of lobsters into a large, although somewhat isolated area, where they would have conditions as nearly natural as possible, and hence in no way inclosed. The other is to transplant a smaller number into some inlet, with a barrier across the entrance of sufficient strength to last for years, and yet provided with means of constant interchange with the water out in the open. In either case, the lobsters should be under daily observation for at least two years, to see if seed lobsters would spawn again, or better still for six or eight years to see if young lobsters hatched in the first year would mature and propagate.

XIII.

VARIATIONS IN DENSITY AND TEMPERATURE IN THE COASTAL WATERS OF BRITISH COLUMBIA—PRELIMINARY NOTES.

By C. McLean Fraser, M.A., Ph.D., and A. T. Cameron, M.A., B.Sc.

(With Two Charts and a Map.)

It is well known that two of the chief factors determining the distribution of marine fauna and flora are the salinity and the temperature of the containing water. The series of observations embraced in this paper have been carried out in order to obtain an idea as to the extent to which these factors participate in British Columbia waters, and to see therefore whether a subsequent more exact series of measurements is desirable.

We are not acquainted with any extended series of observations of density and temperature of these waters previously published; while scattered data almost certainly exist bearing on the problem, we have had no opportunity of consulting them. Any previous observations by other observers have not, therefore, been taken into consideration.

Continuous observations have been made at the Biological Station, Departure bay, for a period of four months. Examination of the Pacific coast kelp beds by one of us afforded an opportunity of similar measurements at points over a large part of the British Columbia coast. These, taken together, give data for the variation at a single point (the Biological Station) and for a large number of scattered points. Since the results indicate a considerable variation at the one point, a similar undetermined variation probably exists for many, if not all of the other points, at which only one or very few readings could be made. Only certain general conclusions can therefore be drawn from the second series of readings.

The readings taken at the Biological Station are given in Appendix A, and figured in fig. 1. Those dealing with density will be considered first. They indicate variations in density between the limits 1·013 and 1·022, with a mean value 1·0185. The curve is marked by repeated sudden fluctuations in the sense of a fall with subsequent slower rise. These fluctuations indicate sudden influxes of fresh water. The possibility of tide-effects was tested in the earlier readings by taking numerous readings at high and low tide. The corresponding points lie on the curve and show no marked tidal influence.

The position of the Biological Station is shown in the accompanying coast map. Possible sources of fresh water are: (1) local, small streams flowing into the bay, and the Nanaimo river flowing into adjacent waters 4 miles south (the amount from these sources is practically negligible at the height of summer); (2) large bodies of fresh water poured into the strait of Georgia, by the Fraser river, and through Howe sound and inlets farther to the north. The nearest of these more distant sources is the Fraser river, 30 miles directly across the strait of Georgia. Since the amount of water from this source far exceeds that from those in the near vicinity, this alone need be considered under the second head. We are convinced that the fresh water of the Fraser river, and not that from more local sources, is the cause of the fluctuations here chronicled, on the following grounds:—

(1) The readings throughout Departure bay on June 29 were practically constant. On June 30 a lower reading was obtained outside than that obtained inside

the bay. Hence the local streams flowing directly into the bay could not have caused the largest lowering of density observed during the whole summer.

(2) On July 10 a much lower reading was obtained outside Gabriola pass, in the open strait, than that obtained inside. The tide was then flowing east through the pass. This change could therefore only be produced from some source on the opposite side of the strait, i.e., the Fraser river.

(3) The greatest fluctuation was observed about the end of June, when the water was highest in the Fraser river. Preceding fluctuations were smaller, succeeding fluctuations gradually diminished, corresponding to the gradually diminishing volume of water poured out by the Fraser river.

Fresh water, being less dense, tends to remain at the surface in calm weather, and we consider that the variations in density which we have observed at the Station are caused by large bodies of relatively fresh water travelling directly across the strait from the Fraser river (this does not necessarily mean a noticeably rapid movement). Actual observations off the Sand Heads lightship in calm weather show that with flood tide the Fraser river water is taken in a strong current to the northward, but when the ebb starts it is carried more towards Gabriola pass, Cowichan gap and southward, hence under favourable conditions it is readily conceivable that occasionally bodies of surface water may reach Departure bay comparatively unchanged. With high winds and heavy seas the mixture of fresh water with the deeper salt water naturally takes place more readily and rapidly, while strong currents travelling north or south in the strait would also prevent the fresher water from reaching Departure bay. Since even during the summer months one or more of these disturbing factors is usually in evidence the readings are as a whole nearer the maximum observed than the minimum.

Our conclusions with regard to Departure bay are strengthened by the short series of readings made in Howe sound and in Vancouver harbour (August 19). The former were attributable to the fresh water poured into Howe sound by the Squamish river, since had the Fraser river been responsible similar small figures should have been obtained for Vancouver harbour. With these results may be compared those for Alberni canal and Barkley sound, which are quite similar and similarly explained, since large bodies of fresh water flow into the canal at the head, at Uchucklesit, and elsewhere, and, while higher values were obtained for the middle of the sound, they were still lower than those for normal ocean salinity.

These results indicate that from every large inlet along the coast a similar result may be expected.

Readings taken later than those here recorded show that with the autumn rains and the consequent large increase in flow of the local streams, the effect of these on the surface water becomes strongly predominant. To quote a single instance:

A narrow neck of land terminating in Jack point, separates the flat at the mouth of the Nanaimo river from Northumberland channel. A row-boat passage is cut through this neck about a mile from the point. On the east side, this passage opens into what is called a lagoon although a large portion of it never dries, and this lagoon is directly connected even at low-tide with Northumberland channel by two passages, one of which is quite near the east entrance of the boat passage. On October 19, after heavy rains, a current from the Nanaimo river passed out into the strait in such a way that there was a distinct margin visible, running northeasterly from Jack point, separating it from the surface waters of Northumberland channel. A sample taken just within the current and about a quarter of a mile from Jack point gave a density reading of 1·0129, while a sample taken but a few yards away, outside of the margin of the current, had a density of 1·0216, and on the other hand a sample taken off MacKay point, Newcastle island, about 2½ miles away but in line with the current, had a density of 1·0164. The water in the lagoon

showed a density of 1·0207, almost as high as that in Northumberland channel (1·0216), but the water on the Nanaimo river side of the boat passage was only 1·0014. The temperature was not materially different in the different cases. It was just about low slack water at the time the readings were taken and there was about a foot of water in the boat passage.

It will require much investigation to find out at all definitely the relative value of the influence exerted by the local streams and of the Fraser river in various localities at different times of the year. While we are of the opinion that during the summer months the larger portion of the variation in surface density is due to the Fraser river water, even in Departure bay, we have not sufficient data at present to offer any opinion concerning conditions during the remainder of the year.

From the figures in Appendix B it would appear that the coastal waters between Vancouver island and the mainland can be divided roughly into three large areas: (i) north of Seymour narrows and the Yucultas; (ii) between these and the chain of islands extending southeast from Gabriola island and forming the southern limit to the strait of Georgia; (iii) southwest and south of this boundary. It will be seen from the map that the second section is a relatively closed area. Of these areas (i) and (iii) have an average density distinctly higher than (ii). In the first area the value increases as the open waters of Queen Charlotte sound are approached. In the third area a similar result is noticeable as Haro strait and the strait of Juan de Fuca are neared. The figures indicate an average for (i) and (iii) of the order 1·021 to 1·022, and for (ii), 1·018 to 1·019. The difference is due to the addition of fresh water at different points already referred to.

The variations of temperature readings can be attributed to: (i) the influence of fresh water (Howe sound); (ii) influence of ocean waters (cf. the lowering of temperature on nearing Queen Charlotte sound, Haro strait, Barkley sound, etc.); (iii) special effects produced in shallow waters (indicated by readings at the station, and true for all similar bays) attributable to the influence of air temperatures and shown by the comparison of air and water temperatures on the curves in fig. 1. In the series of readings taken in Departure bay and shown in fig. 1 generally a rise in density is accompanied by a fall in temperature, indicating very frequently, admixture of surface water with water from a lower depth.

These readings both of density and temperature refer only to surface water. The type of variation with depth is shown in fig. 2. It was possible to take but one set of readings of this nature during the time the other readings tabulated were taken, all of the others being taken later. These readings, quoted in Appendix C, give a chance for comparison of water from the deeper part of the strait with that from the shallower bays and channels. They show plainly that the main portion of the variation in both density and temperature occurs in the five fathoms nearest the surface. Below this there is a very slight gradual increase with the depth until 50 fathoms, after which there appears to be little or no variation down to 100 fathoms, the greatest depth at which samples were taken. Below 50 fathoms there seems to be little difference in either density or temperature in different localities in readings taken at or near the same time. The set of readings taken in Departure bay on October 14, after heavy rains had swelled the local streams, that taken in the open strait, east of Breakwater island, on October 26, and that taken at Sand heads on October 2, show the sudden change from water of low density at the surface to water of greater density 5 fathoms down.

For any one set of readings the curve is not quite regular, due to cross currents, irregularity of bottom, etc., but it is quite possible, if a number of sets could be taken during a period of settled weather, that the average would give a fairly regular curve. Even the curve made from the average of those here recorded gives one which is quite satisfactory. A very much extended series of readings is required for any definite statements in the matter.

The following figures show that for these waters, at any rate, values of density and salinity content can be regarded as parallel. The salinity has been assumed to be proportional to the halide content, and this, estimated as chloride by Mohr's method (with silver nitrate, using chromate as indicator). The samples of water were taken from Departure bay and points within 10 miles of it. In the fifth column, P represents the percentage of sodium chloride, and E the percentage excess of the density observed over that of water.

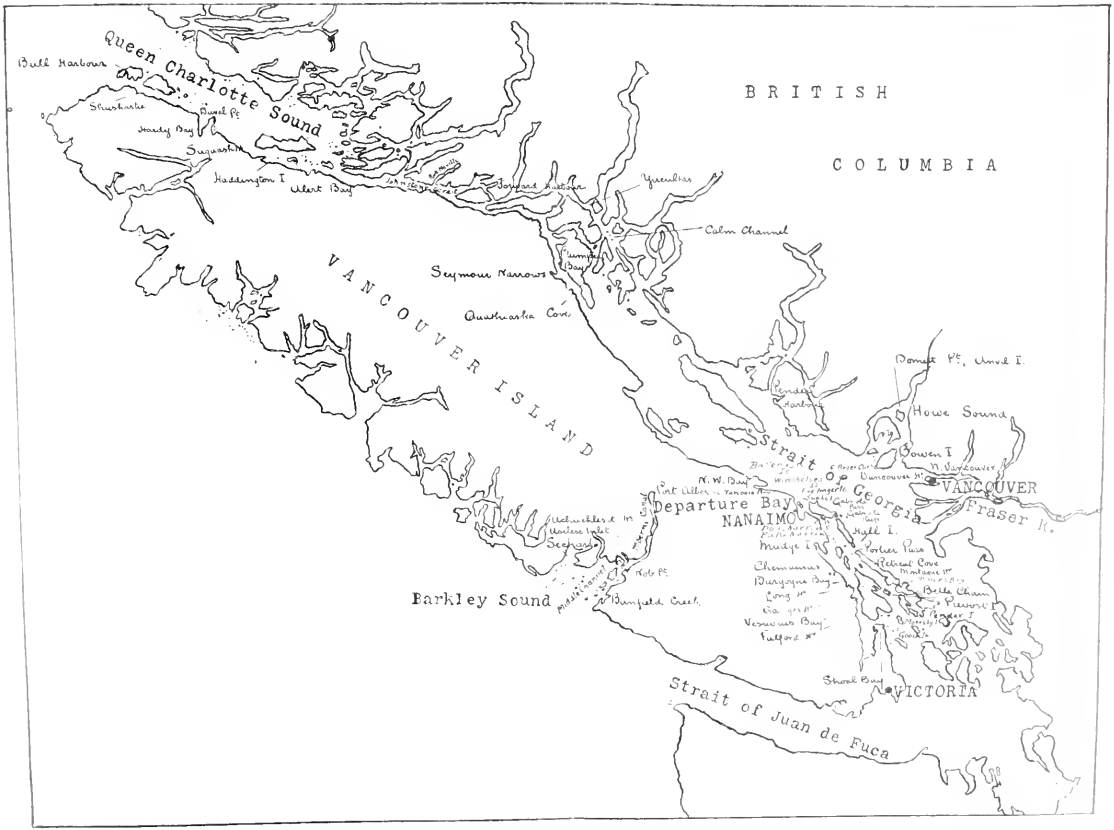
Sample No.	Date.	Density.	Sodium Chloride Content.	P. / E.	Point where taken.
1	12 May 1914.....	1·0211	2·584	122	Mudge Island.
2	8 June 1914	1·0209	2·680	128	False Narrows.
3	6 " 1914.....	1·0202	2·460	122	Nanoose Bay.
4	1 " 1914.....	1·0178	2·050	115	Departure Bay.
5	12 " 1914.....	1·0163	1·994	122	"
6	29 " 1914.....	1·0135	1·652	122	"

So far we have been able to work out accurately only one example of the relationship between salinity and distribution, namely, in connection with the Pacific coast kelps. The results, which will be published fully elsewhere, show definitely that for the species *Nereocystis lütkeana* (*bull-kelp*), other factors being constant, with increased salinity is concomitant increased growth, both as to weight and length of individual plants and size of beds, while a second species, *Macrocystis pyrifera* (sea vine) will not grow in such a low mean salinity as is found in area (ii) above defined, i.e., where the salinity falls below a mean value of 1·019 to 1·020, but is always found in waters where the salinity reaches a slightly higher mean value (density 1·021 to 1·022). The surface values of density are fully applicable here, since these kelps grow chiefly at depths of from 4 to 6 fathoms in British Columbia coast waters, while the greater part of each plant remains near the surface continually; hence their conditions of growth are primarily subject to changes in the surface waters.

According to Thompson (British Columbia Fisheries Report, 1914, p. R. 126-R. 130), the abalone, *Haliotis gigantea*, has a similar range to that which we have found to exist for *Macrocystis*. This also is found within the same limits of depth, and probably illustrates a case from the animal kingdom in which the distribution is conditioned by salinity.

We consider that the results so far obtained indicate that further, exact observations should be made over a longer period with a view to determining: (i) to what depth the sudden fluctuations observed in Departure bay and its neighbourhood extend; and (ii) the relative effect of such sudden fluctuations on marine plant and animal life compared with those more regular changes to be observed in the estuary of such a river as the St. Croix (cf. Copeland, Contributions to Canadian Biology, 1906-1910, p. 281).

Such an inquiry would probably be of special importance in relation to proposals to transfer species with sedentary habits such as the lobster and the oyster to a new habitat, and we hope that provision will be made to carry out such observations with a view to solving these and similar questions.



Map of Vancouver Island district, showing the location of all the points referred to in Appendix B with the exception of a few lying along the more northern part of the coast. The relative position of the Fraser River, Departure Bay and other points of the vicinity can be seen at a glance.

Appendix A.

Readings of Density and Temperature of the Sea-water, and Maximum and Minimum Air Temperatures at the Biological Station, Departure Bay, May to September, 1914.

The sea-water temperatures have been corrected by calibrating the instrument of measurement against standard thermometer (standardized at Kew); the densities were measured by a hydrometer subsequently standardized by calibration in sodium chloride solutions, whose densities were determined with a pyknometer. All the densities have been corrected to 15° C. (and comparison with water at 15° C.). The air temperatures have not been corrected. They were taken by instruments supplied by the Meteorological Office. The results are shown as curves in fig. 1. The water temperatures do not show maximal and minimal readings, so that the comparison with the air readings is not absolute. Initially the water measurements were carried out at times approximating to high and low water as soon as it became evident that tides did not produce an effect, this was discontinued and the readings were made between 8 and 9 a.m. The times given do not of course refer to the air temperatures.

Date.	Time.	Water.		Air Temperature.		Remarks.
		Temperature.	Density.	Maximum.	Minimum.	
1914		° C.		° F.	° F.	
May 12 ...	8 p. m.	13·9	1·0219	73·2	45·2	High water.
" 13....	2 "	15·5	1·0210	66·7	53·0	Low water.
" 20...	4 "	15·0	1·0216	84·1	46·0	High water.
June 1....	10 a. m.	15·5	1·0178	80·2	55·3	"
"	5 p. m.	14 6	1·0178	.....	.....	Low water.
" 2....	12 m.	15·9	1·0176	66·5	47·7	High water.
"	5 p. m.	16·1	1·0178	.....	.....	Low water.
" 3....	2 "	15·7	1-0185	58·8	46·2	High water.
"	7 "	15·2	1·0186	.....	.....	Low water.
" 4....	3 "	15·1	1·0184	64·2	40·2	High water.
"	9 "	14·5	1.0190	.....	.....	Low water.
" 5....	.....	.....	.....	63·4	42·6	
" 6....	2 "	14·2	1·0211	68·2	42·0	
" 7....	11 a. m.	14·1	1·0203	56·0	48·4	Low water.
"	6 p. m.	13·9	1·0201	.....	.....	High water.
" 8....	7 "	14·5	1·0201	60·4	48·0	
" 9....	12 m.	13·7	1·0210	61·0	49·0	
" 10....	1 p. m.	14·1	1·0209	69·0	44·0	
" 11...	1 "	16·0	1·0210	75·0	46·0	
" 12....	2 "	16·3	1·0163	76·0	49·0	
" 13....	8 a. m.	15·6	1·0160	70·0	54·0	
" 14....	9 "	14·5	1·0199	80·2	47·8	
" 15....	11 "	17·9	1·0169	85·2	54·7	High water.
"	7 p. m.	19·5	1·0168	.....	.....	Low water.
" 16....	1 "	18·5	1·0162	76·3	54·3	
" 17....	2 "	18·8	1·0168	75·2	51·0	
" 18....	9 a. m.	17·1	1·0182	72·2	54·6	Low water.
"	4 p. m.	18·0	1·0168	.....	.....	High water.
" 19....	9 a.m.	16·6	1·0177	69·2	50·6	Low water.
" 19....	6 p.m.	18·7	1·0178	.....	.....	High water.
" 20....	10 a.m.	16·6	1·0182	64·0	46·3	
" 21....	10 "	15·9	1·0186	59·0	45·7	
" 22....	9 "	15·9	1·0207	63·3	25·2	Low water.
" 22....	7 p.m.	16·2	1·0210	.....	.....	High water.
" 23....	12 m.	16 6	1·0206	68·8	43 5	
" 24....	12 m.	15·6	1·0199	59·0	48·8	

APPENDIX A.—*Continued.*

Readings of Density and Temperature of the Sea-water, and Maximum and Minimum Air Temperatures at the Biological Station, Departure Bay, May to September, 1914—Continued.

Date.	Time.	Water.		Air Temperature.		Remarks.
		Temperature.	Density.	Maximum.	Minimum.	
1914		°C.		°F.	°F.	
June 25	1 p.m.	17·4	1·0168	68·6	49·8	Low water.
" 25	8 "	17·1	1·0173	.....	.....	High water.
" 25	8 "	15·9	1·0202	69·2	50·7	
" 27	1 "	17·5	1·0201	69·6	51·4	
" 28	1 "	17·5	1·0194	77·2	47·4	
" 29	8 a.m.	17·9	1·0131	83·5	54·5	High water.
" 29	8 p.m.	19·6	1·0135	.....	.....	Low water.
" 29	9 "	18·8	1·0131	.....	.....	High water
" 30	10 a.m.	18·4	1·0131	85·7	57·0	"
July 1	1 p.m.	19·3	1·0134	.....	.....	Low water.
" 1	5 "	19·7	1·0138	82·2	58·4	High water.
" 2	8 a.m.	18·4	1·0138	.....	.....	Low water.
" 3	.....	.....	1·0149	85·0	60·8	
" 4	.....	.....	.....	79·2	59·6	
" 5	7 p.m.	19·5	.....	72·2	54·7	
" 6	10 a.m.	18·4	1·0171	69·2	55·0	
" 7	.....	.....	1·0182	76·8	47·8	
" 8	.....	.....	.....	77·2	49·4	
" 9	.....	.....	.....	70·6	54·4	
" 10	8 p.m.	19·7	.....	78·0	54·6	
" 11	6 "	20·9	1·0179	77·1	55·7	
" 12	3 "	20·5	1·0152	83·7	61·3	
" 13	5 "	21·1	1·0151	81·3	61·3	
" 14	5 "	19·6	1·0155	74·2	56·7	
" 15	9 a.m.	15·9	1·0159	66·2	57·6	
" 16	10 "	17·8	1·0202	76·8	56·4	
" 17	9 "	19·2	1·0181	83·0	55·5	
" 18	9 "	19·3	1·0173	86·2	61·8	
" 19	8 "	19·4	1·0174	80·2	60·4	
" 20	9 "	18·6	1·0189	71·4	51·4	
" 21	9 "	17·8	1·0191	62·2	49·4	
" 22	1 p.m.	19·4	1·0193	76·0	50·0	
" 23	6 a.m.	17·3	1·0198	76·1	54·8	
" 24	9 "	21·0	1·0210	67·8	51·5	
" 25	9 "	17·5	1·0208	68·5	54·7	
" 26	8 "	15·4	1·0204	65·6	53·6	
" 27	8 "	15·8	1·0211	72·0	45·5	
" 28	8 "	16·2	1·0193	76·1	49·3	
" 29	8 "	16·8	1·0183	77·2	49·3	
" 30	8 "	17·1	1·0179	79·9	63·8	
" 31	8 "	17·4	1·0178	78·2	63·6	
Aug. 1	8 "	17·2	1·0184	79·9	50·5	
" 2	8 "	17·1	1·0191	83·3	55·9	
" 3	8 "	17·2	1·0192	77·0	53·4	
" 4	8 "	17·4	1·0198	77·0	52·5	
" 5	8 "	17·2	1·0176	80·0	49·8	
" 6	6 "	17·3	1·0205	68·2	53·0	
" 7	9 "	16·2	1·0213	63·2	52·0	
" 8	9 "	16·1	1·0203	71·5	53·2	
" 9	9 "	17·5	1·0174	77·3	47·5	
" 10	8 "	17·4	1·0170	81·2	47·4	
" 11	8 "	17·3	1·0174	82·0	58·4	
" 12	8 "	17·8	1·0181	83·5	56·7	
" 13	8 "	17·9	1·0184	85·5	56·0	
" 14	8 "	17·8	1·0186	79·2	60·2	
" 15	.....	.....	.....	71·5	56·8	
" 16	9 a.m.	18·9	1·0190	64·4	54·2	
" 17	8 "	17·3	1·0196	68·5	50·0	

APPENDIX A.—*Concluded.*

Readings of Density and Temperature of the Sea-water, and Maximum and Minimum Air Temperatures at the Biological Station, Departure Bay, May to September, 1914.—Concluded.

Date.	Time.	Water.		Air Temperature.		Remarks.
		Temperature.	Density.	Maximum.	Minimum.	
1914		°C.		°F.	°F.	
Aug. 18...	6 p.m.	18·0	1·0187	80·3	43 0	
" 19....	....	.....	....	84·2	52·4	
" 20....	8 a.m.	17·8	1·0176	76·2	56·0	
" 21 ...	8 "	17·7	1·0182	67·4	53·2	
" 22....	9 "	16·0	1·0209	74·2	51·0	
" 23....	9 "	16·7	1·0195	79 6	54·8	
" 24...	8 "	17·0	1·0189	79·6	57·3	
" 25....	7 "	17·8	1·0182	77·0	57·6	
" 26....	7 "	17·4	1·0189	75·2	54·2	
" 27....	7 p.m.	18·2	1·0194	72·8	50·6	
" 28....	9 a.m.	17·2	1·0197	70·6	53·4	
" 29....	8 "	16·4	1·0200	70·2	49·7	
" 30....	9 "	16·0	1·0202	70·2	53·0	
" 31....	6 "	15·8	1·0195	73·2	53·5	
Sept. 1....	8 "	15·8	1·0180	73·0	48·5	
" 2....	9 "	16·4	1·0190	64·2	49·4	
" 3....	8 "	16·6	1·0186	57·8	52·8	
" 4...	8 "	16·0	1·0197	67·2	51·0	
" 5....	8 "	15·9	1·0201	66·0	45·3	
" 6....	8 "	15·7	1·0201	62·0	46·2	
" 7....	8 "	15·0	1 0201	58·8	51·5	
" 8....	9 "	16·3	1·0210	55·5	47·8	
" 9....	8 "	13·2	1·0213	58·5	46·7	
" 10....	8 "	13·6	1·0213	62·0	51·5	

The density readings in the above table show a mean value of 1·0185, and extreme values of 1·0131 and 1·0219.

Fig. 1 shows the corresponding curves. Where more than one reading of sea-water temperature was taken in any one day, the morning reading was taken for the curve.

Appendix B.

Readings of Density and Temperature of the Sea-water at Various Points in British Columbia Coast Waters.

The temperature readings were corrected as already described. Most of the density measurements were made with an ordinary urinometer, which was calibrated against the other instruments in use. It did not allow such accurate readings.

Place of Reading.	Date.	Time.	Water Temperature	Water Density.	Remarks.
			° C.		
Prince Rupert	July 27..	2 p.m...	13·4	1·013	
"	Aug. 7..	8 a.m...	11·9	1·015	
Rose Spit, Graham Island	July 29..	11 "	11·8	1·022	S.E. gale increasing.
" "	" 30..	7 p.m...	11 8	1·022	" "
" "	" 30..	9 a.m...	10·2	1·0235	" "
Tree Nob Islands	" 28..	1 p.m...	11·8	1·0235	
Egan Harbour, Beaver Pass	Aug. 5..	7 p.m...	11·0	1·0195	Much surface water from heavy rains.
White Rocks, Banks Island	" 6..	11 a.m...	11·8	1·021	(East side Hecate St.)
Bull Harbour, Hope Island	July 23 .	7 p.m...	12·0	1·021	Flood tide. Small streams flow into harbour.
" "	" 24..	7 a.m...	11·5	1·022	" "
" "	.....	5 p.m...	11·0	1·022	" "
Shushartie	.....	7 "	10·0	1·023	Streams flow in.
Strait, 2 miles west of Duval Pt.	.....	9 "	10·0	1·0255	
Hardy Bay	July 23 .	1 "	14·3	1·0215	" "
"	" 25..	7 a.m...	12·6	1·022	
Suquash	" 23..	9 "	11·5	1·021	Ebb tide.
One mile north of Haddington I.	" 25..	12 m....	10·4	1·0215	
Alert Bay	" 21..	7 p m...	10·5	1·0215	
"	" 22..	5 "	10·6	1·023	Flood tide.
"	" 25..	6 "	10·0	1 023	"
"	" 26..	6 a.m...	9·6	1·0215	Ebb tide.
Between Plumper and Pearse Island	" 25..	5 p.m...	10·5	1·0265	
Johnstone str. off Port Neville.	" 20..	9 a.m...	10·6	1·021	
Forward Harbour	" 18..	6 p m...	13·1	1·020	
"	" 19..	8 a.m...	13 0	1·020	
"	.....	6 p.m...	11·1	1·021	N.W. wind all day.
"	July 20..	7 a.m...	11·9	1·021	
Plumper Bay, north of Seymour Narrows	" 20..	2 p.m...	11·2	1·0195	Ebb tide.
Quathiaski Cove, S. of Seymour Narrows	" 20..	5 "	11·0	1·0195	"
Middle of Calm Channel	" 18..	1 "	15·7	1·0145	Flood tide.
Pender Harbour	" 17..	7 "	20·4	1·0195	
Howe Sound, 2½ miles from head	Aug. 19..	12.25p.m.	12·7	0·998	Flood tide. 100 yds. inside last tide mark.
Howe Sound, 2½ miles from head	.....	12.35 "	14.6	1·0035	100 yds. outside last tide mark.
Howe Sound, 11 miles from head	Aug. 19..	1.20p.m.	15·6	1·004	(East of Donett Pt.)
Howe Sound, 26 miles from head	.....	3.30p.m.	15·6	1·006	(Off C. Roger Curtis).
North Vancouver, Burrard Inlet	July 23..	8 p.m...	14·0	1·0186	H.W. slack.
" "	" 24..	7 a.m...	14·6	1·0155	"
" "	" 25..	6 a.m...	14·9	1·0148	"
Vancouver Harbour	Aug. 19..	5 p.m...	14·7	1·015	High tide.
Ballenas Island	July 29..	12 m....	17·1	1·0188	
Northwest Bay	June 6..	1 p.m...	17·1	1·0200	
Winchelsea Island	July 29..	10 a.m...	17·9	1·0178	
Nanoose Bay	June 6..	11 a.m...	14·2	1·0202	
"	July 31..	1 p.m...	17·4	1·0179	
Five Finger Island	June 23..	11 a.m...	17·6	1·0208	
" "	Aug. 14..	9 "	17·6	1·0194	
Snake Island	June 4..	8 p.m...	13·9	1·0207	

APPENDIX B.—*Concluded.*

Readings of Density and Temperature of the Sea-water at Various Points in British Columbia Coast Waters—Concluded.

Place of Reading.	Date	Time.	Water. Temperature	Water Density.	Remarks.
			° C.		
Departure Bay, north side	" 29..	8.30a.m.	17·9	1·0131	
" Brandon Island	.....	9.00 "	.....	1·0138	
" East side	.....	9.45 "	18·8	1·0135	
" Further east	.....	10.20 "	.....	1·0135	
" Centre	.....	9 55 "	.....	1·0138	
" North side	.....	11.30 "	.....	1·0133	
" North side	June 30..	10.30 "	18 4	1·0131	
" Northeast corner	.....	11.00 "	.....	1·0135	
" Outside Bay, to Northeast	.....	10.50 "	.....	1·0130	
False Narrows	June 8..	12 m....	11·0	1·0204	Flood tide.
Dodds Narrows, north side	" 26.	2 p.m...	14·4	1·0211	"
" South side	May 12..	11 a.m...	11·7	1·0211	"
Inside Gabriola Pass	July 10..	1 p.m..	16·5	1·0185	Tide flowing East.
Outside "	.....	2 "	19·6	1·011	" "
Southwest of Cowichan Gap	June 26..	2 "	13·9	1·0207	" "
Hall Island	Aug. 17..	2 "	16·1	1·0165	
Retreat Cove, Galiano Is	July 9..	9 "	15·6	1·0195	
" "	" 10..	8 a m...	14·5	1·0205	
Montague Har., "	" 9..	6 p m...	15·4	1·0185	
Miner's Bay, Mayne Is	" 8..	6 "	11·7	1·022	
" "	" 9..	8 a.m...	12·0	1 0195	
Belle Chain, north of Saturna Island	" 8..	2 p.m...	14·2	1·020	
Head of Long Harbour, Saltspring Island	Aug. 18..	12 m....	16·0	1·0185	
Ganges Harbour, Saltspring Is.	July 9..	2 p.m...	16·4	1·0195	
Fulford Harbour, "	" 7..	8 "	13·4	1·0225	
" "	Aug. 17..	9 "	15·5	1·0195	
" "	" 18..	7 a.m...	15·4	1·0175	
Chemainus Bay	" 27..	11 "	19·2	1·0201	
Vesuvius Bay, Saltspring Is.	" 26..	1 p.m...	19·0	1·0201	
Burgoyne Bay, "	" 26..	7 "	17·8	1·0211	
" "	" 27..	7 a.m...	16·8	1·0211	
South of Prevost Island	July 9..	4 p.m...	.....	1·0215	
South Pender Wharf	" 7 .	7 "	13·8	1·022	
"	" 8..	8 a.m...	.....	1·0215	
South of Morseby Island	" 7..	4 p.m...	.....	1·0215	
Between Comet and Gooch Is.	" 7..	12 m....	.....	1·0225	
Shoal Bay	" 7..	10 a.m...	15·5	1 020	Inshore.
Port Alberni	Aug. 25..	1 p.m...	19·7	1·0035	
Off Nob Pt., outside Alberni Canal	" 25..	5 "	15·6	1·0175	
Outside Uchucklesit Harbour in Canal	" 27..	8 a.m...	.....	1·0165	
Inside Uchucklesit Harbour	" 26..	7 p.m...	17 1	1·0165	
Head of Useless Inlet	" 26..	6 "	17·1	1·0175	
Neck " "	" 26.	6 "	17·1	1·0285	
Sechart	" 26..	2 "	16·3	1·022	
Middle of Middle Channel, Barkley Sd	" 26..	12 m....	14·3	1·022	
Banfield Creek	" 25..	7 p.m...	16·0	1·0195	
"	" 26..	9 a.m...	14·9	1·0205	

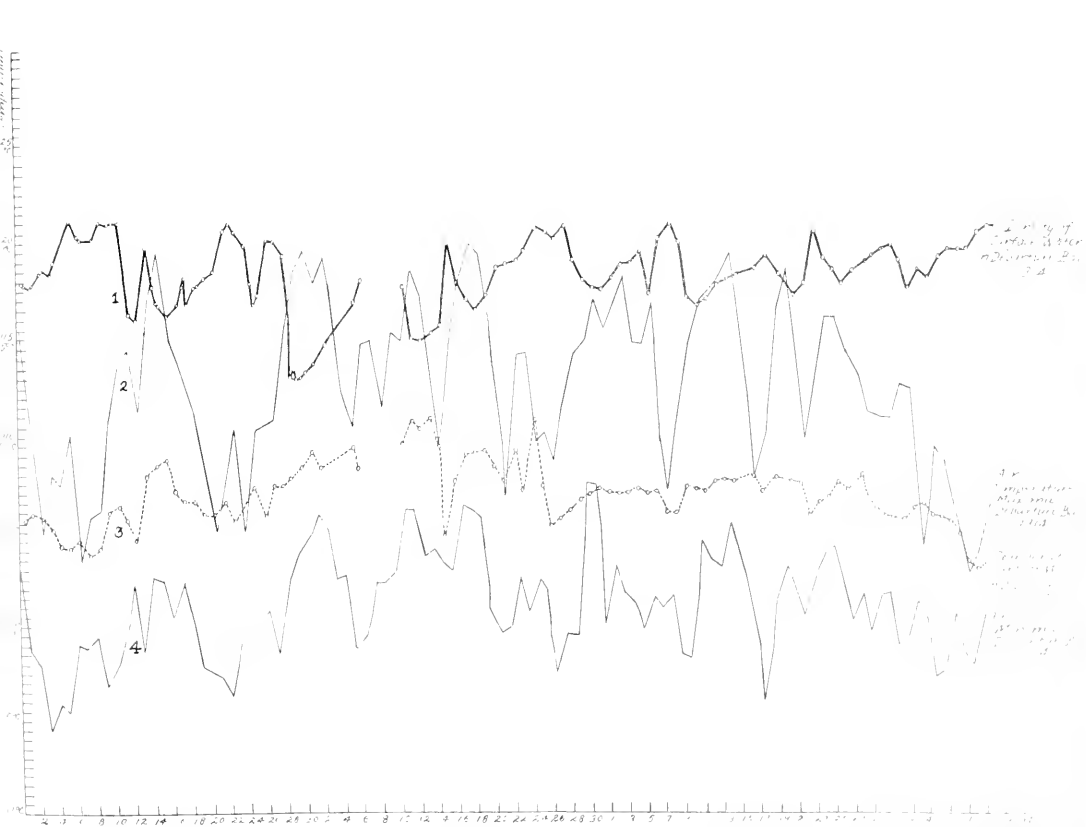
Appendix C.

Readings of Density and Temperature of the Sea-water at Various Depths.

Place of Reading.	Date.	Time.	Depth.	Temperature.	Density.
			Fath.	° C.	
1. Centre of Departure Bay in 25 fathoms of water.	July 15....	3 to 4 p.m . ..	0	17·3	
			1	16·1	
			2	15·8	
			3	15·3	
			4	14·4	
			5	13·5	
			10	12·1	
			15	11·3	
			20	10·8	
			25	10·4	
2. East of Five Finger I. in 120 fathoms of water.	Sept. 9...	3 to 5 p.m	0	13·1	1·0218
			5	10·69	1·0228
			10	10·50	1·0228
			20	9·96	1·0228
			50	8·84	1·0230
			100	8·71	1·0238
3. 200 yards West of Sand Heads Lightship in 30 fathoms.	" 28....	1·30 to 3 p.m....	0	12·70	1·0102
			5	10·96	1·0220
			10	10·32	1·0223
			20	9·70	1·0223
4. 2½ miles East of south end of Breakwater I. in 80 fathoms.	Oct. 2....	11·30 to 12·30...	0	.....	1·0229
			5	.... . .	1·0235
			10	.....	1·0239
			20	.....	1·0251
			50	....	1·0251
5. 1½ miles northeast of Porlier Pass in 90 fathoms.	" 2....	2 to 3 p.m	0	... .	1·0226
			5	....	1·0235
			10	... .	1·0239
			20	.....	1·0245
			50	....	1·0245
6. Centre of Departure Bay in 25 fathoms..	" 14....	9·30 to 11·00....	0	11·6	1·0116
			1	9·85	
			2	9·70	
			3	9·55	
			4	9·45	
			5	9·35	1·0220
			10	9·25	1·0220
			20	9·16	1·0226
7. East of Five Finger I. in 120 fathoms...	" 21....	9·30 to 11 00....	0	10·72	1·0225
			5	9·96	1·0227
			10	9·67	1·0242
			20	9·40	1·0247
			50	9·05	1·0247
			100	9·05	1·0247
8. 3 miles east of south end of Breakwater I. in 120 fathoms.	" 26....	11·45 to 1·00....	0	11·39	1·0151
			5	10·29	1·0217
			10	10·15	1·0223
			20	9·72	1·0239
			50	9·14	1·0249
			100	9·14	1·0251
9. Pylades Channel, ½ mile south of west entrance to Gabriola Pass in 30 fathoms.	" 26....	2·30 to 3·00.....	0	11·00	1·0205
			5	10·11	1·0217
			10	10·00	1·0235
			20	9·72	1·0241

The temperature readings were made, in the first and part of the sixth set, with a Negretti and Zambra deep-sea thermometer, standardized against the other thermometers used, and in the remaining series, with a Richter deep-sea thermometer, standardized at the Physikalische Technische Reichanstalt, Charlottenburg. The samples of water were obtained in a Pettersen-Nansen deep-sea water bottle. As the density readings were taken at room temperature, the correction for 15° C. has been applied in each case.

Some curves to illustrate are shown in fig. 2.


1
2
3
4
June
July

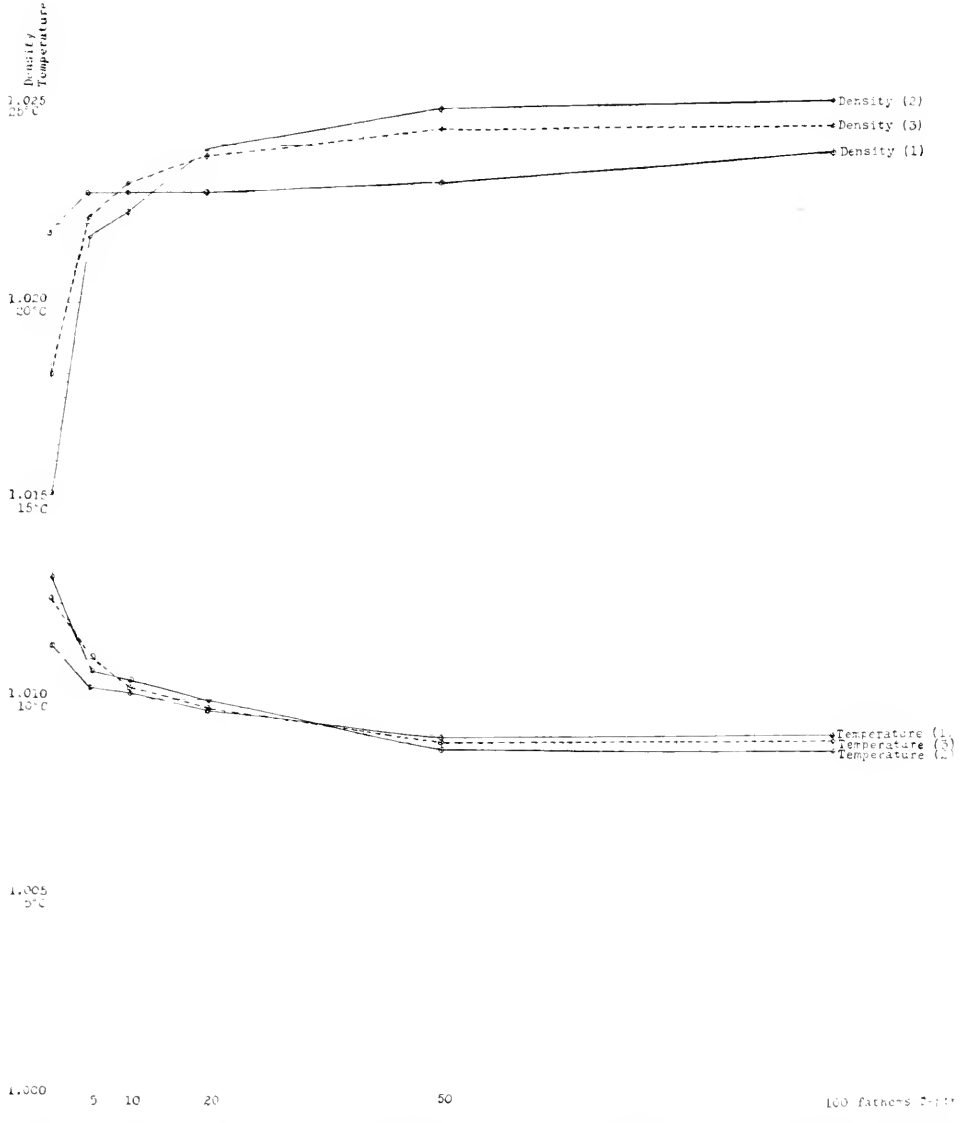


Fig. 2.—Three density curves and three temperature curves, the upper set being the density curves. No 1 density curve is for the readings obtained near Five Finger Islands on Sept. 9, as an example of a set where the surface water is of high density and hence little difference between the surface water and water at depth. No. 2 is that for the readings taken in the open Strait, east of Breakwater I., on Oct. 26, as an example of an instance when the surface water was of low density and hence differed materially with that at depth. No. 3 is made from the averages for the various depths of all the readings recorded in Appendix C. The temperature curves 1, 2 and 3 correspond to the density readings similarly numbered.

XIV.

AN INVESTIGATION OF THE BAYS OF THE SOUTHERN COAST OF NEW BRUNSWICK WITH A VIEW TO THEIR USE FOR OYSTER CULTURE.

By J. W. Mavor, E. Horne Craigie, and J. D. Detweiler.

(With a Map showing Stations of Observation.)

1. Introduction.

The observations recorded in the present paper were made for the purpose of ascertaining what bays could be found on the southern coast of New Brunswick which supplied the conditions required for oyster culture. The investigation must be regarded as of a preliminary nature. Nearly all the observations were made between August 13 and 17 during two cruises with the motor-boat *Prince* of the Biological Station at St. Andrews. All the bays between the St. Croix river and St. John were visited, observations made on the temperature, salinity, and plankton, and the contents of dredgings determined. The stations at which this was done are listed below and their position marked accurately on the accompanying map. It was originally intended to include the Upper St. Croix river, Pegano cove, Oak bay, and Warwig creek in the list of stations, but lack of time prevented this. In 1910, Mr. G. G. Copeland[1] made hydrographic observations in these bays. His stations have been placed on the map and his data are given in our table of hydrographic observations. Mr. G. G. Copeland also made in the same year observations near our stations in Passamaquoddy bay. These observations also are given in tabular form. His temperatures, which were given in degrees Fahrenheit, have been reduced to the Centrigrade scale. In some cases records are given of dredgings made at the stations in previous years.

For the direction of the investigation and the methods used, Dr. J. W. Mavor is responsible, for the hydrographic observations, Mr. E. Horne Craigie, and for the dredging, Mr. J. D. Detweiler.

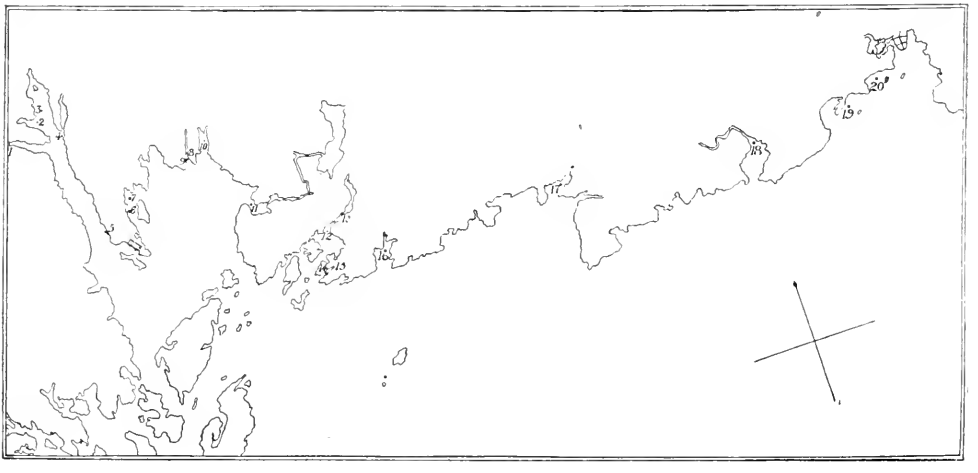
A LIST OF THE STATIONS REFERRED TO IN THIS PAPER.

Station 1. St. Croix river. Mr. Copeland's station 3.
" 2. Pagan's cove. Mr. Copeland's station 5B.
" 3. Oak bay. Mr. Copeland's station 5A.
" 4. Mouth of Warwig creek. Mr. Copeland's station 5D.
" 5. Brandy cove, equally distant from sides and end.
" 6. Chamcook harbour, between the bars, off an old weir, the highest hill west of Chamcook hill being between the two buildings of the Canadian Sardine Company's factory.
" 7. Chamcook harbour, on a line between the factory and the opposite point, the lighthouse being in the centre of the height on the outer point.

[1] G. G. Copeland. The Temperatures and Densities and Allied subjects of Passamaquoddy Bay and its environs. Their Bearing on the Oyster Industry. Contributions to Canadian Biology being studies from the Marine Biological Stations of Canada, 1906-10, Ottawa, 1912, pp. 281-294.

Section 8. Bocabec river.
" 9. Bocabec river, farther out.
" 10. Digdeguash bay.
" 11. Magaguadavic river, near the mouth.
" 12. L'Etang harbour, off Indian point.
" 13. L'Etang harbour, off Trainor's landing.
" 14. Black's harbour, off Connors' factory.
" 15. Black's harbour, head of bay, equidistant from end and sides.
" 16. Beaver harbour.
" 17. Lepreau, off point with Square House.
" 18. Head of Musquash bay.
" 19. Bay inside Mahogany island.
" 20. Bay W.S.W. of Shag rocks (near St. John).

Oyster Culture, Southern New Brunswick. Mavor, Craigie and Detweiler.



2. Hydrographic Observations.

For taking the water samples a Pettersson-Nansen water bottle was used. This consists of an insulated metal cylinder, open at both ends, which slides vertically on two parallel brass rods. At the lower end of the brass rods a cap is fastened, which, when the cylinder is lowered, closes its lower end. The upper end of the cylinder is closed by a similar cap, which slides on the brass rods above. The apparatus is so constructed that it can be lowered down with the cylinder open and, when it arrives at the depth desired, can be closed by sending a weight down the sounding wire.

The temperatures were taken with a deep-sea reversing thermometer. In most cases the Richter reversing thermometer attached to the water bottle was used. (Laboratoire Hydrographique Kobenhavn, Preisliste, 1914, No. 75, Thermometer No. 164). In the other cases a reversing thermometer by Negretti and Zambra, No. 170664, was used. In both of these thermometers the mercury column is narrow at a point just above the reservoir. By reversing the instrument at any required depth the mercury column is broken at the narrow part. The scale is marked on the glass so that the temperature at the time of reversing can be read off from the length of the broken off part of the mercury column. In the Richter thermometer an accessory thermometer was included in the same case in order that a correction for the expan-

sion of the mercury column due to the higher temperature of the air in which the reading was taken could be made. The Richter thermometer was reversed by the same messenger which reversed the water bottle. The Negretti and Zambra thermometer was used on a separate sounding line in a Maghmani case, which is reversed by a propeller which turned only when the thermometer was being raised.

The Richter thermometer had been tested by leaving it in the standard temperatures for fifteen minutes. It was found that readings made after the thermometer had remained four minutes at a given depth differed from those obtained after fifteen minutes by less than one-tenth of a degree. It was also found that the correction for the expansion of the mercury column for the temperatures measured was about twenty-five thousandths of a degree. In the work, the thermometer was left at the required depth for four minutes and the correction neglected. Tests with the Negretti & Zambra thermometer showed it to reach the temperature of the surrounding water after three minutes. In the above observations it was left at the depth recorded for three minutes.

The densities were determined with the hydrometer at room temperature and then corrected to read at 60° F. or 15·56° C. by Buchanan's[1] diagram.

Station.	Date.	Tide.	Depth.	Air Temp.	Bottom Temp.	Bottom Density.	Nature of Bottom.
				°C.	°C.		
[1].....	July 14 1910..	⅔ ebb...	3 Fath.	30·1	13·2	1·0085	
	" 20 " ..	Flood	4 "	21·1	13·0	1·021	
2.....	" 6 " ..	½ ebb....	4 "	20·6	9·9	1·023	
	" 13 " ..	⅙ flood..	2 "	17·2	12·7	1·0213	
	Aug. 10 " ..	½ flood...	3 "	16·1	10·7	1·022	
	" 26 " ..	⅔ ebb....	3 "	21·7	12·8	1·0236	
	" 31 " ..	⅚ flood...	4 "	18·3	13·2	1·0231	
3	July 6 " ..	⅓ ebb....	4 "	17·1	9·7	1·023	
	" 13 " ..	⅙ flood...	2 "	17·2	11·8	1·0212	
	Aug. 10 " ..	½ flood...	3 "	16·1	9·4	1·023	
4.....	July 5 " ..	⅔ " ...	5 "	15·6	9·7	1·0225	
	" 6 " ..	⅓ ebb....	5 "	18·7	10·5	....	
	" 14 " ..	Ebb.....	5 "	26·7	10·8	1·023	
	" 19 " ..	⅔ ebb....	5 "	27·5	10·7	1·022	
5	Aug. 21 1914..	⅓ "	5 "	17·3	11·1	1·02455	
6.....	" 13 " ..	Ebb.....	5 "	.....	12·6	1·02418	Mud.
7.....	" 13 " ..	"	6 "	.....	12·4	1·02426	"
8.....	July 3 " ..	.....	1·5 "	.....	10·7	1·02354	
9.....	Aug. 13 " ..	⅓ ebb....	7 "	.....	10·8	1·02445	Sand
10.....	" 13 " ..	⅙ " .. .	4 "	.....	11·0	1·02465	Mud.
11.....	" 13 " ..	Flood	11·5 "	.....	10·4	1·0249[8]	
12.....	" 17 " ..	⅙ ebb....	3·6 "	20·0	13·1	1·02454	Mud and hard bottom.
13.....	" 17 " ..	⅙ "	3 "	21·1	15·5	1 02414	Mud and shells
14.....	" 14 " ..	⅚ flood...	4·5 "	.....	10·9	1·02459	Mud.
15.....	" 14 " ..	½ ebb....	1·5 "	.....	13·2	1·02452	"
16.....	" 17 " ..	Ebb	4 5 "	17·5	11·2	1·02443	Gravelly mud.
17.....	" 17 " ..	½ ebb....	3 "	16·7	12·2	1·02440	Mud.
18	" 17 " ..	⅓ "	2·5 "	16·5	12·3	1·02411	"
19.....	" 17 " ..	Flood	5 "	14·8	11·4	1·02412	"
20.....	" 17 " ..	Flood ...	5 "	14·4	11·3	1·02415	"

[1] The data given under stations 1 to 4 are quoted from Mr. G. G. Copeland's tables. The readings on the Fahrenheit scale have been converted into the Centigrade scale.

It has not been found possible accurately to locate Mr. Copeland's stations, but where his observations have been taken very near some of the new stations, his tem-

[1] J. Y. Buchanan. "Report on the Specific Gravity of Samples of Ocean water, observed on board H. M. S. *Challenger* during the years 1873-76." Report of the Scientific Results of the exploring voyage of the *Challenger*, Physics and Chemistry, Vol. 1, 1884, Diagram 1.

peratures have been converted to the Centigrade scale, and are here given for comparison:—

Copeland's station.	Near station.	Date.	Tide.	Depth.	Temp.	Density.
					°C.	
26	9	July 26 1910...	⅓ flood...	1 Fath.	11·2	1·022
		Aug. 28 " ...	⅓ ebb....	2 "	15·6	1·0241
28	10	July 26 " ...	½ flood...	2 "	11·7	1·023
		Aug. 3 " ...	⅓ ebb....	3 "	11·2	1·0225
33	11	" 3 " ...	Flood.....	10 "	10·7	1·0
		" 28 " ...	½ ebb....	8 "	11·9	1·0245

3. Dredgings.

Dredgings were made at the following stations and the mollusca obtained determined. In some cases records of dredgings made previously without regard to this report are included:—

Station 5—

Date, July 6, 1913. Depth, 3 fathoms. Bottom, sawdust.
Dredgings—*Thracia myopsis* Beck, 1.
Leda tenuisulcata Stimpson, 1.
Tritia trivittata Adams, 1.
Cytherea conversea Verril, 2.

Station 6—

Date, July 11, 1913. Depth, 8 feet. Bottom, sand.
Dredgings—*Yoldia limatula* Say, several.

Station 10—

Date, August 16, 1913. Depth, 5 feet. Bottom, mud.
Dredgings—*Yoldia limitula* Say, 1.
Cardium pinnulatum Conrad, 1.
Chiton albus Montagu, 2.
Yoldia sapotilla Gould, several.
Bela sp., 1.

Station 12—

Date, August 16, 1914. Depth, $3\frac{2}{3}$ fathoms. Bottom, mud and stones.
Dredgings—*Polynices heros* Say (small), 8.
Polynices trisereata Say, 1.
Siphonorbis pygmeus Gould, 4.
Venericardium borealis Conrad, 17.
Aporrhais occidentalis Sowerby (dead), 1.
Cylichnia alba Brown, 2.
Thyasira gouldii Phillippi, 3.
Bella pleurotomasia Adams, 1.

Station 13—

Date, August 17, 1914. Depth, 3 fathoms. Bottom, mud and shells.
Dredgings—*Modiola modiolus* Lamark, 1.
Pecten magellanicus Gmelin (dead), 1.
Tritonofusus stimpsoni Morch, 1.
Saxicava rugosa Gould, a few.
Cardium pinnulatum Conrad, 2.
Doris sp., 4.
Chiton albus Montagu, 1.

Station 16—

Date, August 17, 1914. Depth, 4½ fathoms. Bottom, gravelly mud.

Dredgings—*Astarte undata* Gould, 1.
Tritia trivittala Adams, 1.
Venericardium borealis Conrad, 1.
Polynices heros Say, 4.
Polynices trisereata Say, 6.
Cardium pinnulatum Conrad, 2.
Cylichnia alba Brown, 6,
Utriculus.
Margarita, 3.
Leda tenuisulcata Stimpson, 1.
Cyclus (Cyprina) islandica Lamark, 1.

Station 17—

Date, August 17, 1914. Depth, 3 fathoms. Bottom, mud.

Dredgings—*Polynices heros* Say, 1.
Astarte sp. (small), 1.
Yoldia sapotilla Gould, 3.
Leda tenuisulcata Stimpson, 2.
Polynices triseriata Say, 9.
Cyclus (Cyprina) islandica Lamark, 1.
Lyonsia hyalina Conrad, 2.

XV.

HYDROGRAPHIC INVESTIGATIONS IN THE ST. CROIX RIVER AND PASSAMAQUODDY BAY IN 1914.

By E. Horne Craigie, *University of Toronto.*

(With One Chart and Twenty-three Figures.)

During the month of August, 1914, the writer, under the direction of Dr. J. W. Mavor, and with his constant and active assistance, undertook to make a series of hydrographic observations in Passamaquoddy bay and the St. Croix river. The object of this work was to obtain as much information as possible not only about the actual temperatures and densities of the water, but also about the nature of the currents of warm and cold water, how these are affected by the tides, etc. Such observations, besides being of importance and interest in themselves, are valuable on account of their bearing upon the haunts and habits of fish frequenting the waters studied, or passing through these waters in their migrations.

It is to be regretted that, owing to lack of apparatus, the work could not be started earlier in the season, and that, on account of the other work being carried on at the same time, more data could not be obtained. It is also regrettable that no current-meter of any kind was to be had, as some observations with such an instrument would undoubtedly throw much light upon the subject by indicating the direction and strength, as well as the fluctuations of the currents at various points.

For taking the temperature observations, reversing thermometers were used. These have already been described in the report on the hydrographic work in connection with the "Investigation of the Bays of the Southern Coast of New Brunswick with a View to Their Use for Oyster Culture." The Pettersson-Nansen water-bottle, with which the water samples were obtained at points of considerable depth, is described in the same report. At points near the surface and at the shallower stations, the water samples were taken by means of a small water-bottle manufactured by Negretti and Zambra, London. This consists of a brass cylinder holding a little less than a pint, into the top and bottom of which fit two caps connected by a rod. The top of the rod is held by a hook above the cylinder, the bottle thus being kept open, and in this condition it is lowered to the depth where a sample is to be taken. A messenger is then sent down the line and releases the hook, whereupon the caps are pulled into place by two springs inside the cylinder, thus closing the bottle firmly. In order to be sure that the sample represented the water at the point where the bottle was closed, the bottle was jerked up and down a little and allowed to remain a few moments before the messenger was sent down.

The Richter thermometer,[1] which was attached to the Pettersson-Nansen water-bottle, was always allowed to remain down five minutes, while the Negretti-Zambra thermometer[2] was usually left for three minutes, these times having been found to allow the thermometers to give accurate readings. It was found that the correction for the expansion of the mercury column at the temperatures measured averaged about twenty-five thousandths of a degree, which was neglected in recording the temperatures.

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[1] Laboratoire Hydrographique, Kobenhavn, Preisliste, 1914, No. 75, Thermometer No. 164.
[2] Maghnani pattern frame, Negretti and Zambra thermometer No. 170,664.

The density of the water samples was determined by means of a delicate hydrometer at room temperature, and corrected to read at 15·56° C. by Buchanan's diagram,[3] as in the case of the densities recorded in the report referred to above. The nature of the bottom at each station was determined by means of soap in the bottom of the sounding-lead. The data obtained are tabulated at the end of the report.

The stations were selected so as to give four vertical sections, two of the lower St. Croix river, one of Passamaquoddy bay from Tongue Shoal light to Pendleton island, and one of the Western channel, the last section being the deepest studied in this investigation. The numbers and locations of the stations are as follows:—

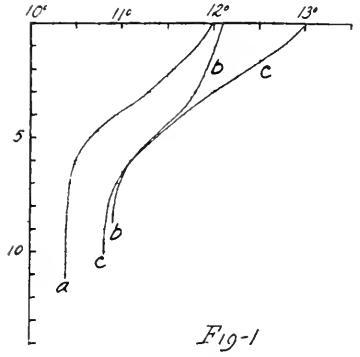
Station 1. On a straight line across the St. Croix river at the Biological Station, such that the flagstaff on the end of the pier is in line with the centre of the window in the water tower, 0·3 mile from the Biological Station.
" 2. On the same line 0·5 mile from the Biological Station.
" 3. On the same line, 0·7 mile from the Biological Station.
" 4. On the same line 1·1 mile from the Biological Station.
" 5. On a straight line across the mouth of the St. Croix river at St. Andrews, such that the two beacons at the north end of the harbour are in line. In the centre of the steamer channel beside the inner beacon.
" 6. On the same straight line, at the buoy just outside the outer beacon.
" 7. On the same straight line, 1·7 mile from the St. Andrews shore.
" 8. On the same straight line, 2·1 miles from the St. Andrews shore.
" 9. On the same straight line, 2·4 miles from the St. Andrews shore.
" 10. On the same straight line, 2·7 miles from the St. Andrews shore.
" 11. On a straight line drawn from Tongue Shoal light to Deer island, such that Tongue Shoal light always appears in the centre of Chamcook hill. At the buoy off Tongue Shoal light.
" 12. On the same straight line, 0·8 mile from Tongue Shoal light.
" 13. On the same straight line, 1·3 mile from Tongue Shoal light.
" 14. On the same straight line, 1·8 mile from Tongue Shoal light.
" 15. On the same straight line, 2·4 miles from Tongue Shoal light.
" 16. On the same straight line, 2·8 miles from Tongue Shoal light.
" 17. On a straight line drawn across the Western passage from the first island south of Frost ledge to the highest part of Clam Cove head, 0·15 mile from small island.
" 18. On the same straight line, 0·3 mile from small island.
" 19. On the same straight line, 0·6 mile from small island.

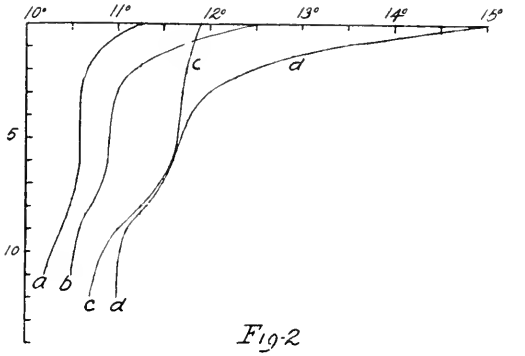
The distances recorded in the above table are in geographical miles. The points were determined by landmarks upon the shore and were afterwards located on the chart. The exact position of these stations is shown upon the accompanying map, upon which the beacons and the Tongue Shoal light, which were used in determining the sections, are also indicated. The 10-fathom line has been inserted to show the shape of the deeper part of the basin, with a tongue extending out from St. Andrews. The part of the 10-fathom line extending along the shore of Deer island from the Western passage to Letite passage was not marked on any of the charts examined and has been filled in as accurately as possible from the soundings recorded on the chart. It is possible that a very narrow channel over 10 fathoms deep runs right through Letite passage, which appears at the extreme right of the map. The compass marked on the map shows the direction of the magnetic needle.

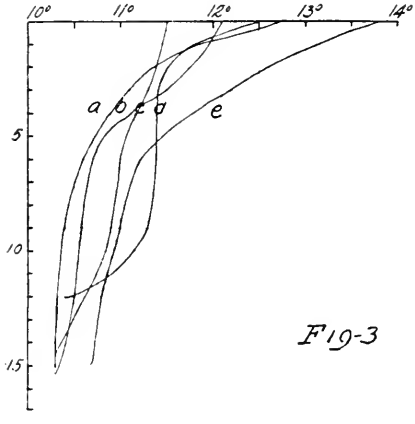
[3] J. Y. Buchanan—"Report on the Specific Gravity of Samples of Ocean Water, observed on board H. M. S. Challenger during the years 1873-76." Report of the Scientific Results of the Exploring Voyage of the *Challenger*, Physics and Chemistry, Vol. 1, 1884, Diagram 1

From the data recorded a temperature curve for each set of observations at each station was drawn, and from the graphs thus obtained, isothermal sections were constructed. The isotherms in every case were taken to represent the lowest limit of the temperature marked upon them.

The graphs show that at different stages of the ebb-tide, there is not much change in the shape of the curve, but in the case of the section of the St. Croix river at the







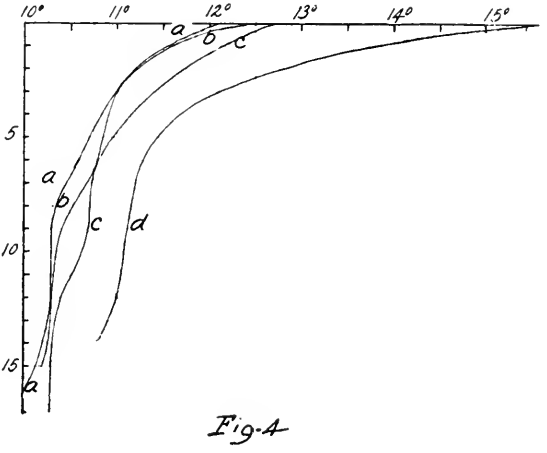


Fig. 1.—Temperature curves at Station 1: (a) Aug. 7, $\frac{1}{4}$ ebb; Aug. 6, $\frac{1}{2}$ flood; (c) Aug. 19, $\frac{1}{6}$ ebb.
Fig. 2.—Temperature curves at Station 2: (a) Aug. 7, $\frac{1}{4}$ ebb; (b) Aug. 4, ebb; (c) Aug. 6, $\frac{1}{2}$ flood; Aug. 19, $\frac{2}{3}$ ebb.
Fig. 3.—Temperature curves at Station 3: (a) Aug. 5, $\frac{2}{3}$ ebb; (b) Aug. 7, $\frac{1}{2}$ ebb; (c) Aug. 6, $\frac{2}{3}$ flood; (d) Aug. 4, ebb; (e) Aug. 19, $\frac{1}{6}$ ebb.
Fig. 4.—Temperature curves at Station 4: (a) Aug. 6, $\frac{2}{3}$ flood; (b) Aug. 5, $\frac{2}{3}$ ebb; (c) Aug. 8, $\frac{1}{2}$ ebb; (d) Aug. 19, $\frac{1}{6}$ flood.

Biological Station (figs. 1-4), the whole curve moves to the right, i.e., the temperature rises at all depths. The graphs also show that the whole of the water increases in temperature as the summer advances. It will be noted that the temperature falls most rapidly near the surface, as a rule, and in many cases least rapidly about mid-water. The graphs at several stations, however, show that this condition is reversed, the most rapid decrease in temperature occurring in mid-water. This is particularly noticeable at stations 1, 10, 12, 16, 17 and 18 (figs. 1, 12, 19, 22, 14 and 15), while some of the other curves suggest it. It is a noteworthy fact that this character

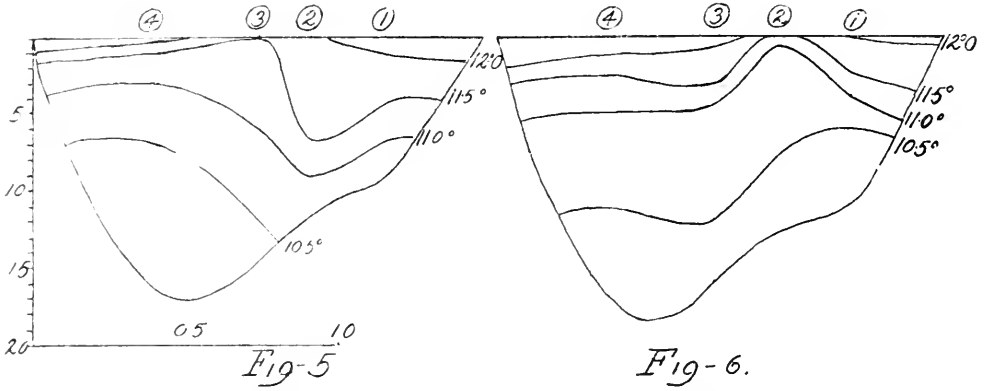


Fig. 5.—Profile section of the St. Croix River at the Biological Station. Aug. 6. Tide rising ($\frac{1}{2}$ to $\frac{3}{4}$ flood).
Fig. 6.—Profile section of the St. Croix River at the Biological Station, Aug. 7. Tide falling ($\frac{1}{4}$ to $\frac{1}{2}$ ebb).

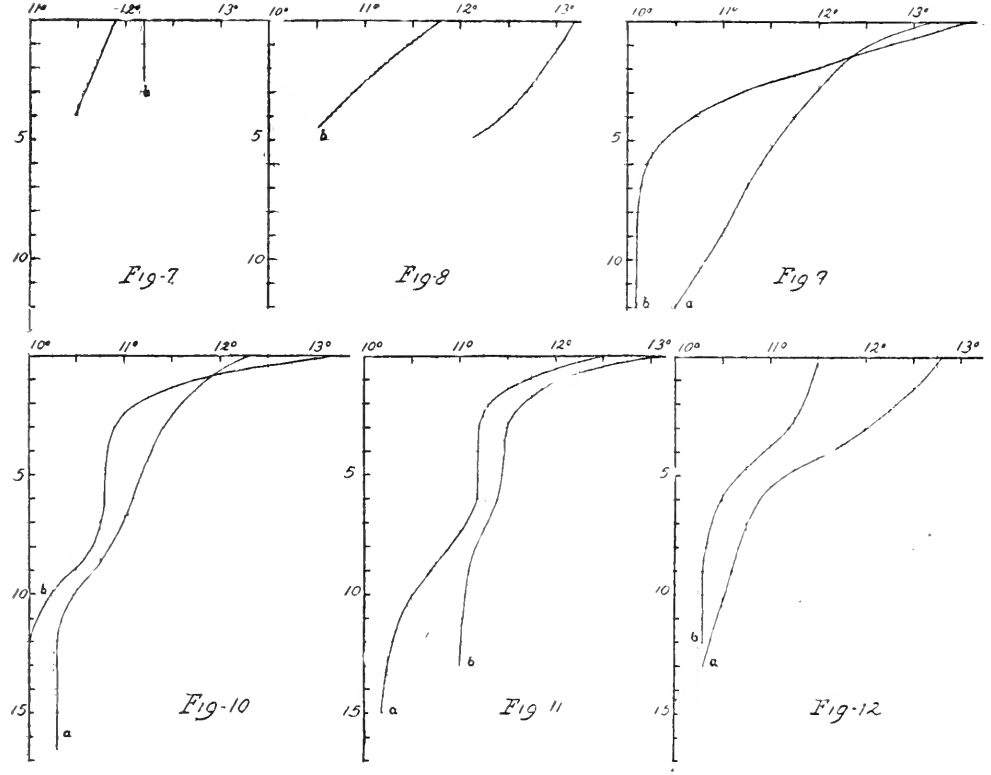


Fig. 7.—Temperature curves at Station 5 : (a) Aug. 10, flood ; (b) Aug. 6, $\frac{2}{3}$ ebb.
Fig. 8.—Temperature curves at Station 6 : (a) Aug. 10, flood ; (b) Aug. 6, $\frac{1}{3}$ flood.
Fig. 9.—Temperature curves at Station 7 : (a) Aug. 10, flood ; (b) Aug. 6, flood.
Fig. 10.—Temperature curves at Station 8 : (a) Aug. 10, $\frac{1}{6}$ ebb ; (b) Aug. 6, flood.
Fig. 11.—Temperature curves at Station 9 : (a) Aug. 10, $\frac{1}{3}$ ebb ; (b) Aug. 6, ebb.
Fig. 12.—Temperature curves at Station 10 : (a) Aug. 10. $\frac{1}{3}$ ebb ; (b) Aug. 7, $\frac{2}{3}$ ebb.

varies with the state of the tide, and with more data it would doubtless throw some light upon the tidal currents. It also appears that the temperature at the bottom at station 3 did not change with the tide, but rose as the season advanced.

The two isothermal sections of the St. Croix river at the Biological Station (figs. 5 and 6), taken at nearly opposite states of the tide upon succeeding days, show a most interesting change in the arrangement of the layers of water. It will be seen that with a rising tide (fig. 5), the warmer water is massed near the Canadian shore —the right hand side of the figure—while with a falling tide (fig. 6), the colder water is heaped up at almost exactly the same place, while the warmer water is spread out towards the United States bank.

The section of the river at St. Andrews (fig. 13) shows the same general arrangement of the water, showing that it extends down to that point. It also confirms the evidence of a tidal change, as it will be noted that the cold water is about the centre of the river, while the section represents observations taken between flood tide and one-third ebb—just the time when the other two diagrams would lead us to expect

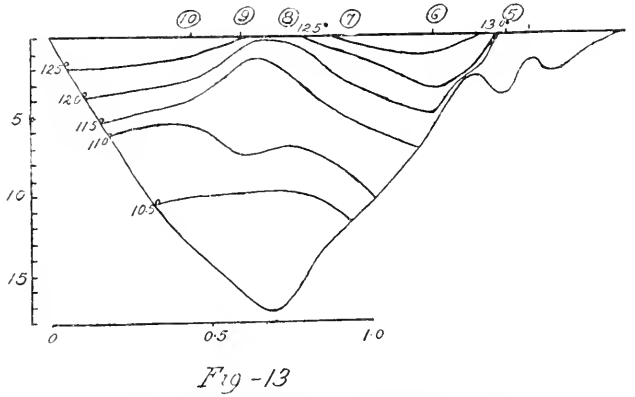


Fig 13.—Profile section of the St. Croix River at St. Andrews, Aug. 10. Tide beginning to fall (flood to $\frac{1}{3}$ ebb).

the current of cold water to be crossing from the United States to the Canadian bank. This is a most interesting set of facts, which demands further investigation, as our present knowledge of the conditions in the St. Croix river and Passamaquoddy bay suggests no explanation. Apparently the great tidal currents in the bay swing round the current coming down the river, but just what these currents are and how they act we do not at present know.

It is also noteworthy that the warmest water does not pass through the channel between Navy island and the Canadian shore, the water there being comparatively cold, and the surface there being colder than at any other part of the section. Thus it would appear that while the surface and the bottom water both pass outside Navy island, some of the water from middle depths rises and runs through that channel. It may be that the rising tide has completely filled the narrow channel there with cold water from outside and forces the warmer water in the river to keep to the outer passage, where it flows over the cold water which advances to meet it.

The section at the Western passage (fig. 17) shows isotherms which, though more uniform than those in the St. Croix river sections, indicate the same general arrangement as that shown with a falling tide. In this section the tide is just beginning to rise, and the isotherms, as we would expect, appear to be flattening out and probably rising on the United States side, the left-hand side of the figure. The fact that

all the temperatures in this section are higher than those in the previous sections is to be accounted for by the fact that the observations were taken a fortnight later in the season. The fact that there is no cold water even at the bottom of this deep

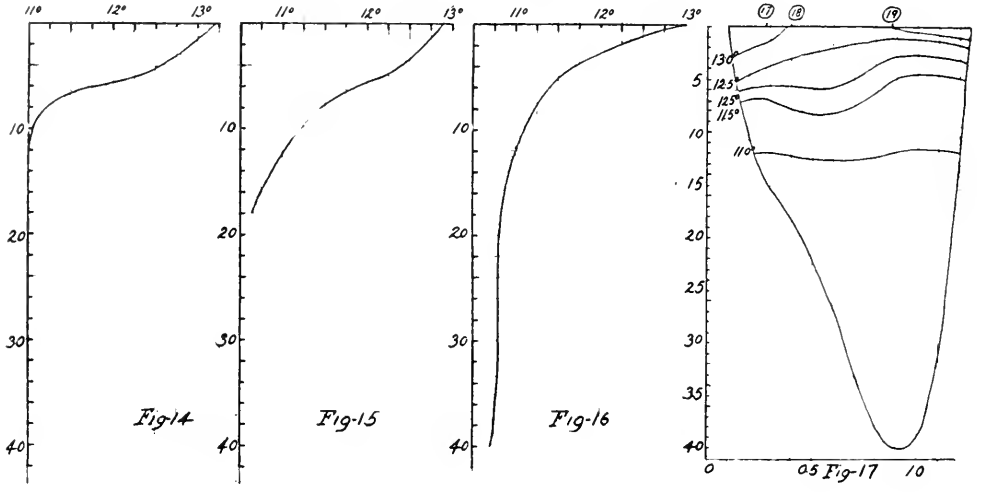


Fig. 14.—Temperature curve at Station 17. Tide ebb.
Fig. 15.—Temperature curve at Station 18. Tide $\frac{1}{3}$ flood.
Fig. 16.—Temperature curve at Station 19. Tide $\frac{1}{3}$ flood.
Fig. 17.—Profile section of the Western Passage, Aug. 20. Tide beginning to rise (ebb to $\frac{1}{3}$ flood).

channel seems to indicate that it is entirely filled by water from the river and bay, which is in constant motion right to the bottom.

Turning now to the section of Passamaquoddy bay (fig. 23), we find the above conclusions with regard to the course of the warm water in the river confirmed. As

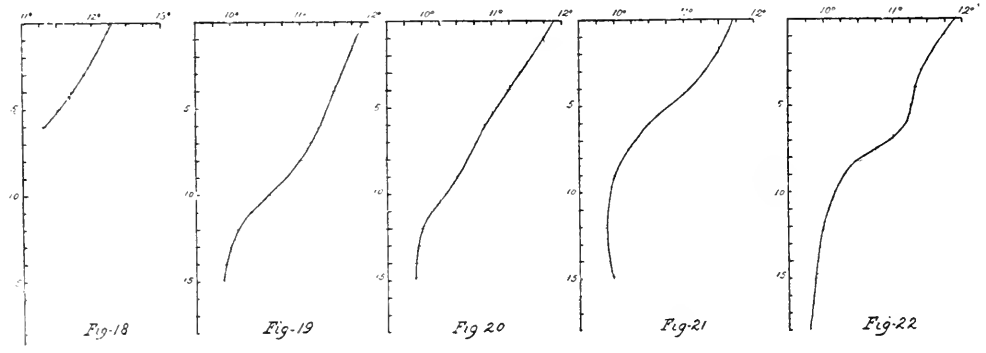


Fig. 18.—Temperature curve at Station 11. Aug. 5, $\frac{2}{3}$ flood.
Fig. 19.—Temperature curve at Station 12. Aug. 5, $\frac{2}{3}$ flood.
Fig. 20.—Temperature curve at Station 13. Aug. 5, $\frac{1}{4}$ flood.
Fig. 21.—Temperature curve at Station 14. Aug 5, flood,
Fig. 22.—Temperature curve at Station 16. Aug. 5, $\frac{1}{3}$ ebb.

in previous cases, the water in the centre is colder than near the sides, but it will be noticed that the warmest water appears at the mouth of the St. Croix river, i.e., at the extreme left of the diagram, while colder water than is found in any of the other sections, and much colder than appears in the Western passage, occurs in the deep

part near the right of the diagram, i.e., near Letite passage. Thus we may conclude that, while the warm water passes out through the Western passage, cold water from outside enters through Letite passage. This cold water does not appear in the section, but may be seen from the tables.

It is claimed by the fishermen that a current runs northeast along the north shore of Deer island from the Western passage. This probably meets the cold water entering at Letite passage and the two currents mingle and run out into the bay. A

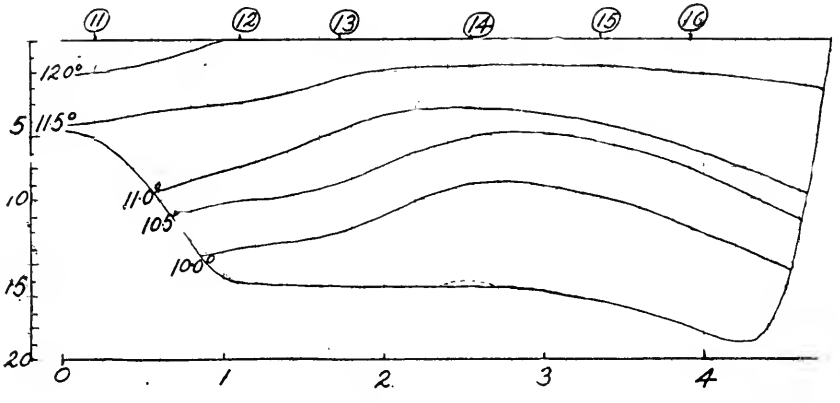


Fig 23

Fig. 23.—Profile section of Passamaquoddy Bay from Tongue Shoal Light to Deer Island beside Pendleton Island. Aug. 5. Tide $\frac{2}{3}$ flood to $\frac{1}{3}$ ebb.

little water at a slightly higher temperature appearing at the bottom at station 14 is probably due either to this current coming up from the Western passage, or to a small current running out from the mouth of the river. This water of higher temperature is indicated by a dotted line.

It is very unfortunate that sufficient data with regard to the densities to confirm these conclusions were not obtained, and that direct observations upon the currents could not be made, but it is felt that the work gives a foundation upon which further and more definite investigations may be based, either to confirm and extend the conclusions reached, or to demonstrate their error and provide the correct explanation of the conditions.

DATA of Sections of St. Croix River

Station.	Bottom.	Date.	Time.	Depth.	Tide.	Air Temp.
						°C.
1	Sand.	Aug. 6	9 A.M.	9 F.	1/5 flood.	
		" 7	2 P.M.	11 "	1/4 ebb.	
		" 19	11.15 A.M.	10 "	1/6 ebb.	22·6
2	Sand.	" 4	4.55 P.M.	11 "	Ebb.	
		" 6	9.15 A.M.	12.5 "	1/2 flood.	
		" 7	2 P.M.	12.5 "	1/4 ebb.	
		" 19	1.15 P.M.	12 "	2/3 ebb.	27·3
3	Rock	" 4	5.42 P.M.	12.5 "	Ebb.	
		" 5	3.40 P.M.	15.7 "	2/3 ebb.	
		" 6	9.50 A.M.	14.5 "	2/3 flood.	
		" 7	3 P.M.	15.5 "	1/2 ebb.	
		" 19	2.45 P.M.	15 "	5/6 ebb.	26·5
4	Sand.	" 5	3 P.M.	15.5 "	2/3 ebb.	
		" 6	10.25 A.M.	16 "	2/3 flood.	
		" 7	3.35 P.M.	17 "	1/2 ebb.	
		" 19	5.15 P.M.	14 "	1/6 flood.	23·5
5		" 6	4.20 P.M.	2.5 "	2/3 ebb.	
		" 10	2.30 P.M.	4 "	Flood.	21·4
6	Sand.	" 6	11.10 A.M.	4.5 "	5/6 flood.	
		" 10	3 P.M.	5.5 "	Flood.	16·4
7	Mud.	" 6	11.25 A.M.	11.5 "	Flood.	
		" 10	3.25 P.M.	12 "	Flood.	17·1
8	Fine sand.	" 6	11.55 A.M.	17 "	Flood.	
		" 10	3.55 P.M.	16.5 "	1/6 ebb.	18·0
9		" 6	4.45 P.M.	13 "	Ebb.	
		" 10	4.35 P.M.	15 "	1/3 ebb.	18·0
10	Mud.	" 7		12 "	2/3 ebb.	
		" 10		13 "	1/3 ebb.	19·0
11	Rock	" 5	9.20 A.M.	6 "	2/3 flood.	
12	Mud	" 5	9.50 A.M.	15 "	2/3 flood.	
13	Mud	" 5	10.25 A.M.	15 "	5/6 flood.	
14	Mud	" 5	11.10 A.M.	15 "	Flood.	
16	Rock	5 5	12·10 P.M.	18 "	1/6 ebb.	
17		" 20	5 P.M.	14.5 "	Ebb.	21·4
18		" 20	6 P.M.	18 "	1/6 flood.	18.5
19		" 20	7 P.M.	41.5 "	1/3 flood.	16·5

and Passamaquoddy Bay.

1 Fath.	3 Fath.	6 Fath.	9 Fath.	12 Fath.	15 Fath.	18 Fath.
°C.	°C.	°C.	°C.	°C.	°C.	°C.
12·1	11·8	11·1	10·9	....	.....	
12·0	11·3	10·5	10·4	10·4	.....	
13·0	12·0	11·1	10·8	.....	.....	
12·5	11·0	10·9	10·6	10·5	....	
11·9	11·7	11·6	11·0	10·7	.....	
11·3	11·6	10·6	10·4	10·2	.....	
15·0	12·0	11·6	11·1	11·0	.....	
12·5	11·4	11·4	11·3	10·4	.....	
12·7	11·1	10·6	10·4	.....	10·3	
11·5	11·3	11·0	10·9	10·6	10·3	
12 1	11·5	10·7	10·6	10·5	10·3	
13·8	12·2	11·2	11·0	10·8	10·7	
12·5	11·0	10·8	10·4	10·3	10·2	
12·1	11·0	10·6	10·3	10·3	10·0	
12·7	11·4	10·8	10·7	10·4	10·3	10·3
15·6	12·1	11·3	11·0	11·0	10·8	
12·2	12·2	.....	....	....	.....	
11·9	11·5	....	....	.....	.....	
11·8	10·9	10·5	....	.....	.....	
13·2	12·7	11·8	.....	.. . .	.....	
13·6	11·2	10·2	10·1	10·1	.....	
13·2	12·2	11·4	11·0	10·5	.....	
13·3	10·9	10·8	10·5	10·0	10·0	10·0
12·3	11·4	11·1	10·7	10·3	10·3	
13·1	11·5	11·4	11·1	11·0	.....	
12·5	11·2	11·2	10·7	10·3	10·2	
11·5	11·2	10·5	10·3	10·3	.....	
12·8	12·0	10·9	10·6	10·3	.....	
1·23	11·9	11·3	.....	. .....	.....	
11·9	11·6	11·3	10·8	10·1	9·9	
11·9	11·4	10·9	10·5	10·0	9·9	
11·7	11 3	10·5	10·0	9·9	10·0	
11·9	11·4	11·2	10·3	10·0	9·9	9·8
13·2	12·8	11·8	11·1	11·0	.....	

Surf.	5 Fath.	10 Fath.	15 Fath.	20 Fath.	30 Fath.	40 Fath.
°C.	°C.	°C.	°C.	°C.	°C.	°C.
12·9	12·2	11·2	10·8	10·9	.....	
13·0	11·5	11·1	11·0	10·8	10·8	10.7

DENSITIES.

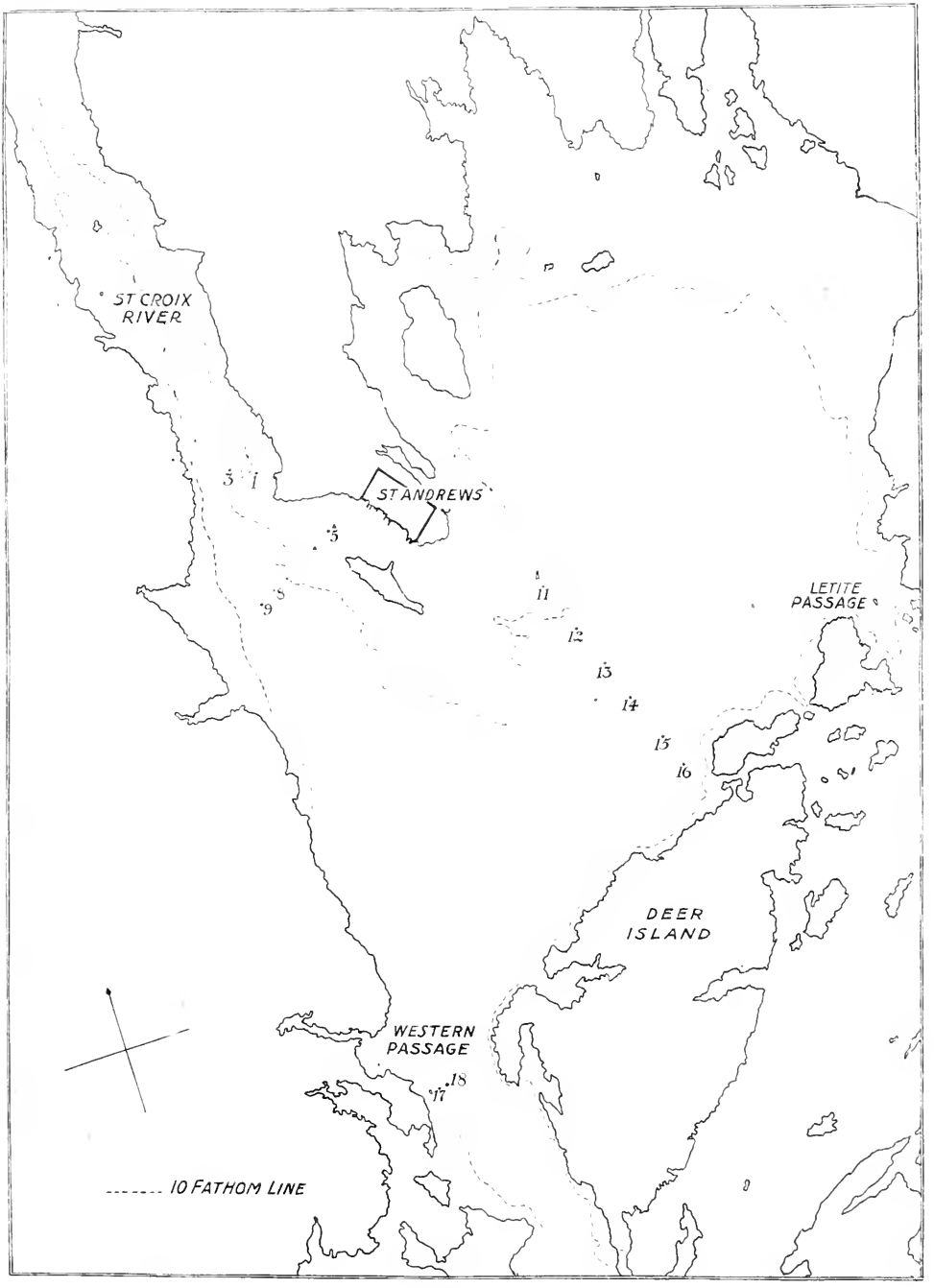
Station.	Date.	Time.	Depth.	Tide.	Surf.	3 F.	6 F.	9 F.	12 F.	15 F.	—
1	Aug. 19	11.15 A.M.	10 F.	⅓ ebb.	1·02391	1·02420	1·02431	1·02440	.....	.....	
2	" 19	1.15 P.M.	14 "	⅔ ebb.	1·02180	1·02393	1·02440	1·02449	1·02450	2·02451	
3	" 19	2.45 P.M.	15 "	⅔ ebb.	1·02211	1·02338	1·02429	1·02440	1·02444	.....	
4	" 19	5.15 P.M.	14 "	⅙ flood.	1·02342	1·02420	1·02429	1·02457	.....	.. ....	
17	" 20	5 P.M.	14.5 "	Ebb.	1·02444	1·02450	1·02471	1·02464	1·02471	.....	
					Surf.	5 F.	10 F.	15 F.	20 F.	30 F.	40 F.
18	Aug. 20	6 P.M.	18 F.	⅓ flood.	1·02438	1·02482	1·02483	1·02495	1·02483	.....	
19	" 20	7 P.M.	41.5 F.	⅔ flood.	1·02444	1·02468	1·02485	1·02476	1·02476	1·02479	1·02478

For purposes of comparison, the data recorded by Copeland in 1910 for four stations near stations established this summer are here appended, although it has not been found possible to locate his stations exactly.

Copeland's Station.	Near Station.	Date.	Tide.	Surface.	5 F.	10 F.	15 F.	30 F.
				°	°	°	°	°
9	3	July 7, 1910	Ebb.	9·9	9·1	6·17	.....	
				1·0234	1·0235	1 0234	.....	
... .	.....	" 8, 1910	Flood.	10·7	9·1	9·0	8·7	
				1·0227	1·0235	1·0235	.....	
.....	.....	" 7, 1910	⅙ ebb.	10·1	9·1	9·0	.....	
				1·0234	1·0235	1·6234	.. ..	
43	13	" 15, 1910	Ebb.	12·3	9·3	8·9	8·8	
				1·0235	1·0235	1·0235	.....	
.....	....	" 31, 1910	Flood.	15·0	10·7	15·4	9·7	
				1·023	1·022	1·0235	.....	
41	16	" 30, 1910	Ebb.	10·4	10·8		....	
				1·0235			.....	
17	17-18	Aug.21, 1910	⅔ flood.	13·1	11·0		.....	11·1
				1·022	1·0237		1·0241	

SESSIONAL PAPER No. 38a

Hydrography St. Croix R., etc. E. Horne Craigie.



XVI.

A HYDROGRAPHIC SECTION OF THE BAY OF FUNDY IN 1914.

By E. Horne Craigie, *University of Toronto.*

(With 1 Chart and 5 Figures.)

In addition to the hydrographic investigations in the St. Croix river and Passamaquoddy bay, which have been described in a separate report, it was felt that much might be gained from a similar investigation of the Bay of Fundy itself. Under the existing conditions very much of such work could not readily be carried on, and lack of time necessarily made the observations very limited, but during the last week of August a cruise was made across to St. Mary's bay, Nova Scotia, on which it was found possible to make sufficient observations to form one complete section across the bay. To add to the value of the work, one of the members of the staff took plankton samples at each station. A few observations of the surface temperature were also made between the stations. These are recorded in the table of data obtained, but were not sufficient for any deduction to be made from them.

The apparatus used in this work was exactly the same as that which has already been described in the report on the work in the St. Croix river and Passamaquoddy bay, as were all the methods employed. The weight used for sounding was twenty-two pounds. On account of the depth of the water, observations were made only at 10-fathom intervals instead of at 3-fathom intervals as was done in the previous investigation, except at the two deeper stations in the Western passage.

Temperature curves for each station and an isothermal section of the bay have been constructed. For convenience of comparison the section has been drawn upon the same scale as the accompanying map, upon which the stations are shown.

The stations were established upon a straight line drawn from East Quoddy head, Campobello island, to Boars head, Petit passage, Long island, Nova Scotia, and were located as follows:—

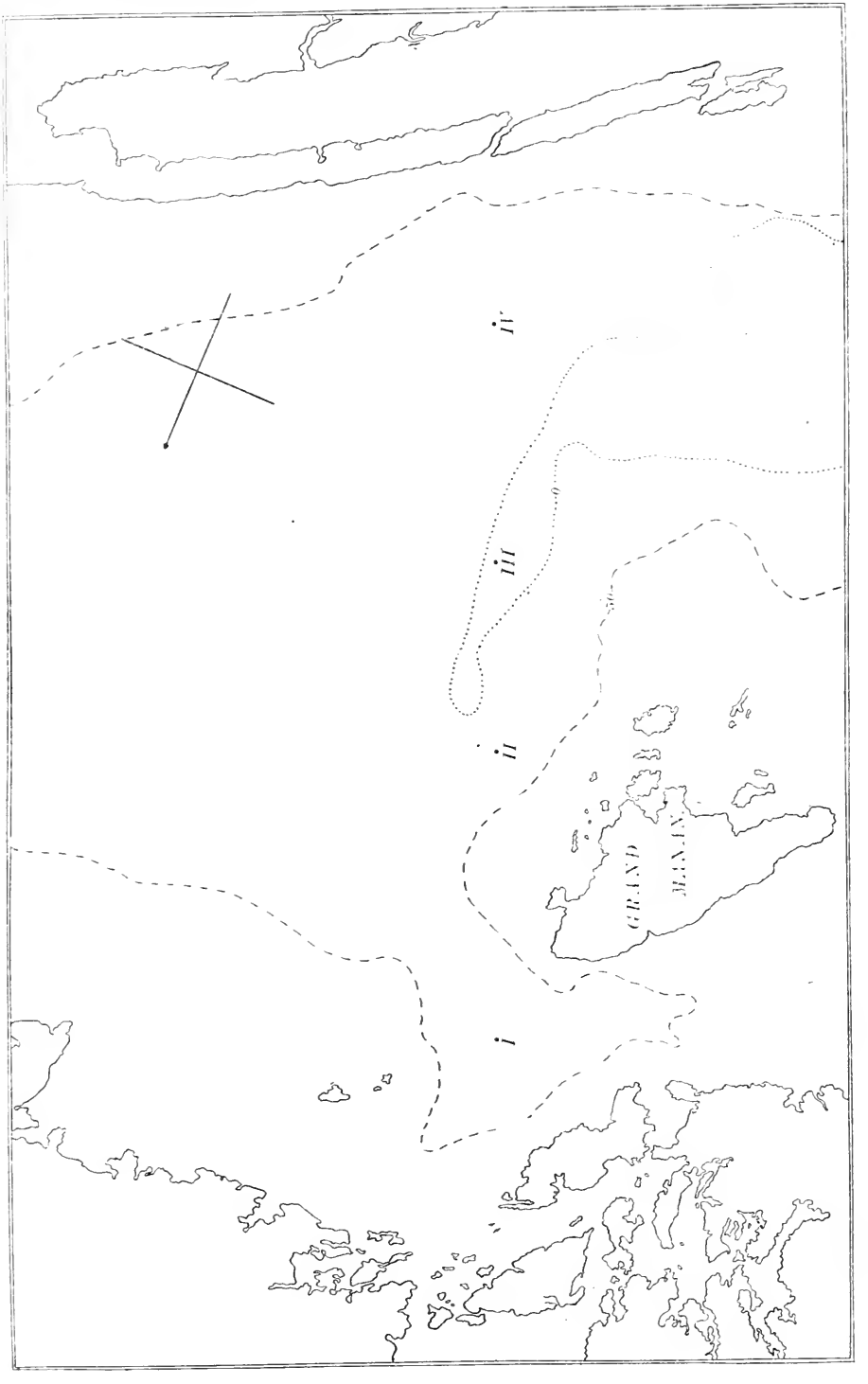
Section	I	— 7	miles	from	East Quoddy head.
"	II	—19	"	"	" "
"	III	—27	"	"	" "
"	IV	—37	"	"	" "
"	III-a	—30¾	"	"	" "
"	III-b	—33¼	"	"	" "
"	IV-a	—40	"	"	" "

The distances are geographical miles. The points were found by the use of a log.

The 50 fathom and 100 fathom lines have been inserted upon the map, which thus gives an idea of the conformation of this part of the bay and shows how the stations were established so as to obtain as complete a section as possible, showing conditions in the various parts. Station 1 is in the Grand Manan channel, which will be noticed to rise to less than 50 fathoms a little further out, while station III has been placed so as to show the conditions in the deepest part, where the depth is over 100 fathoms.

The temperature curves (see figure) are interesting in that they show a marked resemblance between stations II, III, and IV, while station I in the Grand Manan channel is distinctly different. Considerable areas of the same, or nearly the same,

Bay of Fundy Hydrography. E. Horne Craigie.



temperature occur at stations III and IV. These are even more marked in the section than in the graphs. The occurrence of such areas about the mouth of the bay of Fundy has been recorded by Bigelow,* who attributes them to the vertical mixing of the water by the strong tidal currents. A stream of water of slightly higher temperature than that around it indicated by a dotted line, appears near the bottom at station II. As the difference is small, the corrections have been made and the second decimal is given for the temperatures at this point. The actual limits of this area, as indicated by the line, are, of course, arbitrary and may be quite wrong, being founded upon the reading obtained at a single point only. It seems, however, that the position indicated is a probable one. It will be noticed that the coldest water is not in the deepest part of the channel, but on the slope coming down from Grand Manan. There is no marked difference between temperatures upon the two sides of the bay, the water towards the Nova Scotia shore (the right of the diagram) being slightly warmer on the whole.

The densities were determined by bringing the samples to a temperature of 15·56° C. in a water bath and then reading the density from the hydrometer. The results, however, are so irregular that nothing can be deduced from them. As I am not satisfied as to the reliability of our apparatus, I simply give the figures obtained for what they are worth. In each case the density is recorded under the temperature at the same point.

In conclusion, I wish to thank Dr. Mavor for the constant direction and assistance which he has given me in all the work recorded in these reports.

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* "Oceanographic Cruises of the United States Fisheries Schooner Grampus, 1912-1913," by Henry B. Bigelow, in "Science," N.S., Vol. XXXVIII, No. 982, pages 599-601, October 24, 1913.

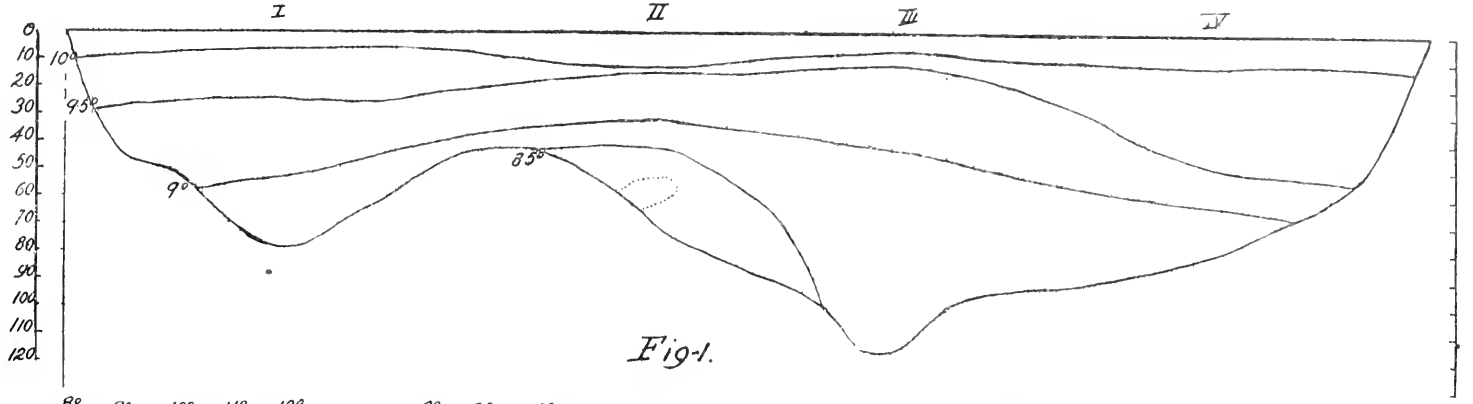

Fig-1.

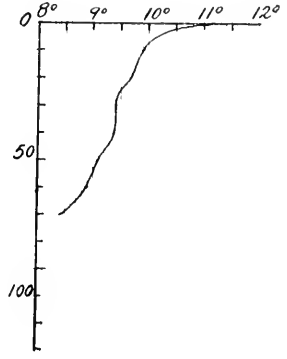

Fig-2.

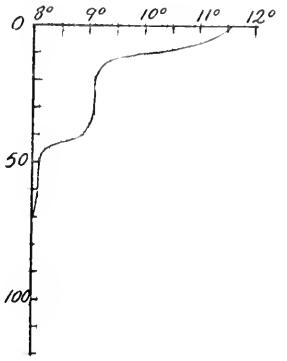

Fig-3.

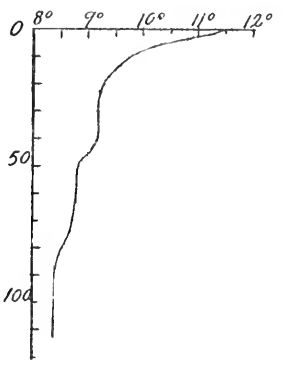

Fig-4

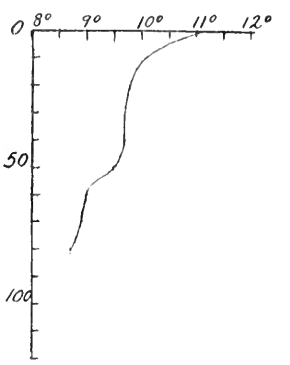

Fig-5

Fig. 1. Profile section of the Bay of Fundy from East Quoddy Head to Petit Passage. Fig. 2.—Temperature curve at Station I. Fig. 3.—Temperature curve at Station II. Fig. 4.—Temperature curve at Station III. Fig. 5.—Temperature curve at Station IV.

DATA of Section of Bay of Fundy.

Station.	I.	II.	II.	III.	III.	IV.	IV.	IIIa.	IIIb.	IVa.
Date.	August 27.	August 27.	August 29.	August 27.	August 29.	August 29.	August 27.	August 29.	August 27.	August 29.
Time.	11.20 am. 12.20 p.m.	2.05. 2.55 p.m.	12.40 p.m.	3.55 5.15 p.m.	11.35 a.m.	9.30 a.m. 10.20 a.m.	7.05 p.m.	11.15 a.m.	6.30 p.m.	9.05 a.m.
Bottom	sand	mud	.....	mud	.....	sand & hard				
Depth	79 F.	71 F.	.....	113 F.	.....	81 F.				
Tide	$\frac{1}{3}$ flood	$\frac{3}{3}$ flood	$\frac{1}{3}$ ebb	flood	ebb	$\frac{3}{3}$ ebb	$\frac{1}{3}$ ebb	$\frac{2}{3}$ ebb	$\frac{1}{3}$ ebb	$\frac{1}{3}$ ebb
Wind	S.	S.W.	N.E.	S.W.	N.E.	N.E.	S.W.	N.E.	S.W.	N.E.
Air temperature	15·0°	13·5°	11·8°	15·2°	14·2°	13·2°	.....	14·8°	.....	14·6°
Surface temperature	11·2°	11·5°	14·2°	11·5°	12·1°	11·2°	11·3°	11·1°	11·1°	11·6°
density	1·02322	1·02393	.....	.....	.....	1·02440				
10 F. temperature	9·9°	10·2°	.....	9·8°	.....	10·1°				
density	1·02382	1·02403	.....	1·02425	.....	1·02437				
20 F. temperature	9·7°	9·1°	.....	9·3°	.....	9·9°				
density	1·02397	1·02419	.....	1·02429	.....	1·02449				
30 F. temperature	9·4°	9·1°	.....	9·2°	.....	9·7°				
density	1·02401	1·02422	.....	1·02429	.....	1·02455				
40 F. temperature	8·4°	8·9°	.....	9·2°	.....	9·7°				
density	1·02419	1·02438	.....	1·02429	.....	1·02474				
50 F. temperature	9·1°	8·1°	.....	8·8°	.....	9·5°				
density	1·02434	1·02468	.....	1·02452	.....	1·02469				
60 F. temperature	8·9°	8·18°	.....	8·8°	.....	9·0°				
density	1·02423	1·02461	.....	1·02483	.....	1·02462				
70 F. temperature	.....	8·05°	.....	.....	.....	8·9°				
density	.....	1·02480	.....	.....	.....	1·02493				
75 F. temperature	8·4°	.....	.....	8·7°	.....	.....				
density	1·02420	.....	.....	1·02471	.....	.....				
80 F. temperature	.....	.....	.....	.....	.....	8·7°				
density	.....	.....	.....	.....	.....	1·02477				
90 F. temperature	.....	.....	.....	8·4°	.....					
density	.....	.....	.....	1·02478						
100 F. temperature	.....	.....	.....	8·4°						
density	.....	.....	.....	1·02481						
112 F. temperature	.....	.....	.....	8·4°						
density	.....	.....	.....	1·02481						

XVII.

THE WATER AND IODINE CONTENTS OF SOME PACIFIC COAST KELPS.

By A. T. Cameron, M.A., B.Sc.

Assistant Professor of Physiology and Physiological Chemistry, University of Manitoba.

In a previous communication[1] I have dealt with the iodine content of a large number of marine species, both animal and vegetable, obtained near the Biological Station at Departure Bay, B.C., during the summer of 1914, while carrying out other work at the Station, I collected a considerable amount of kelp material, and this, with some rock-weed, has been subsequently analyzed in the Physiological Chemical Laboratory of the University of Manitoba. The results of these analyses follow. In all cases the material was allowed to drain for an hour before weighing. For the earlier weighings (May) an exact balance was not available, as is shown by the figures. The somewhat sticky surface of most of the Laminariaceæ prevents adherence of much seawater, so that error from this source is very slight. The material was either at once heated to constant weight at 100° C., or preserved in absolute alcohol and subsequently so heated. Kendall's[2] method of iodine analysis was used. The material was obtained in Departure Bay, unless otherwise stated. Similar samples of those specimens marked with an asterisk were sent to Dr. F. T. Shutt for analysis of other constituents.

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[1] Cameron, *Contributions to Canadian Biology*, Fasciculus I, 1911-1914, pp. 51-68, (Ottawa), 1915.

[2] Kendall, *Journ. Biol. Chem.*, XIX, p. 251, 1914.

Species.	Date obtained.	Weight fresh.	Weight dry.	Per cent Water.	Amount taken for Iodine Analysis.	Iodine found.	Per cent Iodine.	Remarks.
		gram.	gram.		gram.	gram.		
Laminaria bullata	June 6, 1914	3.525	0.474	86.55	0.432	0.001164	0.274	Samples of several young plants.*
	" 6, 1914	7.368	1.208	83.60	0.500	0.000863	0.173	Samples of several old plants.*
					0.500	0.000886	0.177	
							Mean 0.075	
Laminaria saccharina	" 6, 1914	3.350	0.419	87.49	0.405	0.000834	0.206	Samples of several young plants.*
	" 6, 1914	7.263	1.732	76.15	0.500	0.000394	0.079	Samples of several old plants.*
					0.500	0.000383	0.077	
							Mean 0.078	
Costaria turneri	" 6, 1914	7.613	0.933	87.75	0.500	0.000143	0.029	Samples of several plants.
Nereocystis lutkeana	May 26, 1911	1.25	0.08	94				Frond
		0.65	0.01	94				Float — One plant 0.7 feet long.
		0.60	0.06	90				Stipe
	" 26, 1914	4.14	0.28	93.2	0.260	0.000708	0.272	Frond
		0.80	0.11	86.3	0.0266	0.000053	0.20	Float — One plant 1.3 feet long.
		0.69	0.07	90	0.0518	0.000158	0.305	Stipe
	" 26, 1914	4.95	0.32	93.6	0.296	0.000737	0.249	Frond
		1.35	0.08	94	0.0453	0.000083	0.19	Float — One plant 1.5 feet long.
		0.73	0.07	90	0.0723	0.000190	0.263	Stipe
	" 26, 1911	12.20	0.82	93.3	0.494	0.001272	0.257	Frond
		3.09	0.17	94.5	0.132	0.000133	0.086	Float — One plant 2.0 feet long.
		1.61	0.16	90	0.132	0.000406	0.305	Stipe
	" 26, 1914	23.7	1.71	92.7	0.494	0.001353	0.274	Frond
		2.50	0.14	94.4	0.113	0.000126	0.111	Float — One plant 2.1 feet long.
		1.65	0.14	91.5	0.128	0.000269	0.210	Stipe
	" 26, 1914	29.4	2.58	91.2	0.500	0.000870	0.174	Frond
		8.15	0.48	94.1	0.452	0.000725	0.145	Float — One plant 3 feet long.
		2.90	0.40	86.2	0.388	0.001045	0.269	Stipe
	" 26, 1914	46.1	2.45	92.5	0.500	0.001082	0.216	Frond (sample)
		16.2	1.06	93.5	0.500	0.001311	0.262	Float (whole) — One plant 6 feet long.
		13.5	1.65	87.8	0.500	0.001376	0.275	Stipe (whole)
	" 27, 1914				0.500	0.001441	0.288	Frond
					0.500	0.000979	0.196	Float — Samples of one plant 11 feet long.
					0.500	0.001257	0.251	Stipe
					0.500	0.000567	0.113	Frond — Samples of one plant 12 feet long.
					0.500	0.000292	0.058	Float

	June 10, 1914...	7.196	0.581	91.93	0.500	0.001252	0.250	Frond	Samples of several full-grown plants.*
		7.355	0.447	93.92	0.425	0.000554	0.130	Float	
		6.536	0.826	87.36	0.500	0.000666	0.133	Stipe	
					0.281	0.000374	0.133		
							Mean 0.133%		
		4.894	0.627	87.19	0.500	0.000734	0.147	Holdfast	
	July 8, 1914..	.....	.....	.....	0.500	0.000489	0.098	Frond	Samples of several full-grown plants from Belle Chain, 50 miles, S.E. of Departure Bay*
					0.500	0.000972	0.194	Float	
								Stipe	
	" 25, 1914...	.....	.....	.....	0.500	0.000391	0.078	Frond	Samples (preserved in formol) from off Haddington Id. off the N. Coast of Vancouver Id. From several plants.*
					0.462	0.000375	0.081		
							Mean 0.079%		
					0.500	0.000831	0.167	Float	
					0.217	0.000362	0.167		
							Mean 0.167%		
					0.500	0.000328	0.066	Stipe	
					0.533	0.000317	0.065		
							Mean 0.065%		
Macrocystis pyrifera	" 23, 1914...	...	..	.....	0.506	0.001053	0.210	Frond	Samples of several plants obtained of Suquash, N. Coast of Vancouver Id.*
					0.500	0.000954	0.191		
							Mean 0.200%		
					0.500	0.000818	0.164	Float	
					0.500	0.000873	0.175		
					0.500	0.000827	0.165	Stipe	
							Mean 0.170%		
					0.500	0.001170	0.234	Holdfast	
Alaria tenuifolia.....	June 6, 1914..	...	.....	.....	0.500	0.000137	0.027	A single plant	
Fucus furcatus (? inflatus).....	" 10, 1914...	8.118	2.540	68.71	0.500	0.000214	0.043	Samples of several plants.*	
					0.500	0.000211	0.042		
							Mean 6.042%		
	Aug. 20, 1914...	.....	...	.....	0.500	0.000086	0.017	All samples of several plants obtained at the same spot at different heights above low tide mark.	
	" 20, 1914..	.....	..	.....	0.500	0.000077	0.015		
	" 20, 1914...	.....	.....	.....	0.500	0.000126	0.025		
					0.500	0.000152	0.030		
							Mean 0.027%		
	" 20, 1914...				0.500	0.000056	0.011		
Fucus evanescens	June 10, 1914..	8.070	1.628	79.83	0.500	0.000144	0.029	Samples of several plants.*	
					0.500	0.000141	0.028		
							Mean 0.028%		
	Aug. 20, 1914...	.....	.....	.....	0.500	0.000078	0.016	All are samples of several plants obtained at the same spot at different heights above low tide mark *	
					0.500	0.000096	0.019		
					0.500	0.000071	0.014		
					0.500	0.000090	0.018		
					0.500	0.000073	0.014		
							Mean 0.016%		
					0.500	0.000057	0.011		

Using the figures given in the previous report, the following data are available for variations of iodine content with age in the same species growing under the same conditions.

Species.	Obtained August, 1913.	Obtained June, 1914.	Obtained August, 1914.
Laminaria bullata	0·060	0·270 (young plants) 0·175 (old plants)	
Laminaria saccharina	0·156 (small plant) 0·176 (medium sized)	0·206 (young plants) 0·078 (old plants)	
Fucus furcatus	0·015 (average)	0·042	0·017 (average)
Fucus evanescens	0·016 (average)	0·028	0·015 (average)

These figures show the effect of age and a distinct effect of period of year (this has already been pointed out by Scurti for *Sargassum* and *Cystoseira*). The data for *Nereocystis* confirm these variations. A determination of ash was carried out with one set of samples of *Nereocystis;* the results are only approximate since some inorganic salt was vaporized before the carbon was completely ignited.

Where obtained.	Date.	Length of plant.	Per cent Water.			Per cent Iodine.			Per cent Ash.		
			Frond	Float.	Stipe.	Frond	Float.	Stipe	Frond	Float.	Stipe.
	1914.	Feet.									
Departure Bay	May 26	0·7	94	94	90						
	" 26	1·3	93·2	86·3	90	0·272	0·20	0·305			
	" 26	1·5	93·6	94	90	0·249	0·19	0·263			
	" 26	2·0	93·3	94·5	90	0·257	0·086	0·305			
	" 26	2·1	92·7	94·4	91·5	0·274	0·111	0·210			
	" 26	3	91·2	94·1	86·2	0·174	0·145	0·269			
	" 26	6	92·5	93·5	87·8	0·216	0·262	0·275			
	" 27	11				0·288	0·196	0·251	44·5	49·9	29·1
	" 27	12				0·113	0·058				
	June 6	Full grown	91·9	93·9	87·4	0·250	0·130	0·133			
	Aug. 13	Small.				0·184	0·120	0·147			
	" 13	Full grown				0·171	0·090	0·161			
	" 13	"	89·2	94·4	92·2						
Protection Is	" 13	Small				0·064	0·217	0·085			
	" 13	Full grown				0·130	0·108	0·046			
Breakwater Is	" 13	Small.				0·160	0·011				
Belle Chain	July 7	Full grown				0·698	0·194				
Haddington Is	July 25	"				0·079	0·167	0·065			

The specimens obtained near Haddington island were preserved in formol, and I have shown elsewhere that in such cases iodine is lost in the subsequent evaporation to the extent of about 10 per cent.

Careful examination of the above figures shows, in spite of the marked individual variation which is their most striking characteristic, that the percentage of iodine is almost always less and the percentage of water greater in the float than in either the fronds or stipe. The ash determinations show a similar difference. The iodine content in *Nereocystis* appears, on the average, to diminish with growth, the highest values for frond and stripe being obtained for the smallest plants. The water content of frond and stipe shows dimunition with age (this is especially true for the

stipe), while that of the float is very constant. There is therefore an evident and marked difference between the composition of the float and that of the stipe; to microscopic examination they appear very similar in structure.

From the fact that young plants of *Nereocystis* usually contain more iodine than full grown ones, it follows that plants obtained during early summer, when the majority are not full grown, will give a greater average yield of iodine for the same weight, than plants obtained later in the year. (The total bulk of the plant increases rapidly, however, during the final stages of growth, so that with a lesser average content, full grown plants will yield a greater quantity of iodine. For harvesting for commercial purposes, also, *Nereocystis*, for various reasons set forth in an earlier report, should not be cut before July.)

Comparison of the figures given for full grown plants of *Nereocystis* with those given by other observers for the same species from other localities does not reveal any differences more marked than those in the last table above, and does not give any definite evidence that latitude is a factor in iodine content as has sometimes been suggested.

UNIVERSITY OF MANITOBA,
June 30, 1915.

INVESTIGATIONS

INTO THE

NATURAL HISTORY OF THE HERRING

IN THE

ATLANTIC WATERS OF CANADA

1914

PRELIMINARY REPORT No. 1.

BY

JOHAN HJORT.

DEPARTMENT OF THE NAVAL SERVICE

SUPPLEMENT

TO THE FIFTH ANNUAL REPORT OF THE DEPARTMENT OF THE NAVAL SERVICE FOR THE FISCAL YEAR ENDING MARCH 31, 1915.

OTTAWA

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1915

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INVESTIGATIONS INTO THE NATURAL HISTORY OF THE HERRING OF THE ATLANTIC WATERS OF CANADA, 1914.

PRELIMINARY REPORT No. 1.

BY

JOHAN HJORT.

When the Biological Board of Canada did me the great honour of asking me to visit Canada for the period of a few months to study the Atlantic herring fisheries, I accepted this invitation with the greatest pleasure, hoping that some useful scientific information might be obtained through a comparison of the herring fisheries of the two sides of the Atlantic, if studied by the methods employed during recent years in north European waters.[1] It was from the beginning understood that a few months' work could aim at nothing more than a preliminary orientation in some of the most fundamental problems. These most important problems seem to me to be the following:—

1. Do the herring that visit the Atlantic coast of Canada all belong to a single race or type, or is it possible to distinguish several races in these waters?

2. Does the rate of growth vary (according to the conditions of the waters along the coast)? Can types of different growth be distinguished and defined?

3. Is the renewal of the stock of herring of a constant character, or are there the same great fluctuations in the stock (in the number of individuals belonging to the different year-classes) as in European waters?

The first two problems or groups of problems are of course identical with the problems of the distribution or migrations of the herring. If the Atlantic stock of herring can be shown to belong to several different races, then of course the area of distribution and migration of each race or type may be defined by a study of samples of herring taken from different localities along the whole coast.

The third problem is of the greatest importance for any elucidation of the old riddle—the fluctuations in the yield of the fisheries—this being to a very great extent dependent on the fluctuations in the number of herring at the time living in the sea.

In order to be able to study these questions, I asked the Biological Board to assist me in getting collections, samples of the catches of the fishermen from different parts of the coast. I have further, for the same purpose, made a journey along that part of the Atlantic coast of North America where herring are caught, from Boston along the Atlantic Coast of Canada to Newfoundland, trying everywhere to get samples for an examination by the methods referred to above. Samples have been collected as follows:—

1. Spring Herring, 1914--

(*a*) Collections from the coasts (west, north, and east) of Newfoundland.

(*b*) Collections from the gulf of St. Lawrence (Magdalen islands, several places in the Northumberland strait, and the west coast of Cape Breton).

[1] See my paper: Fluctuations in the Great Fisheries of Northern Europe. Rapports et Procès-verbaux, Copenhagen, 1914.

2. Fall Herring 1914—

(*a*) West coast of Newfoundland.

(*b*) Atlantic coast of Nova Scotia.

(*c*) Bay of Fundy.

(*d*) Gloucester, Mass.

During my journey along the Atlantic coast I had many opportunities of conversations with business people and fishermen interested in the herring fisheries, and at some places I had the opportunity of seeing the fishing gear and how it was used. The fishermen use, almost without an exception, gill-nets with a certain fixed size of mesh (2½ to 2¾ inches). The nets are placed along the sea-bottom on the coast or in the bays or inlets along the shore. At no point is fishing carried on far out from the coast in deep water, or on the surface(by drift-nets or by purse-seines).

This particular method of fishing has, of course, great disadvantages for the study of the life-history of the herring. The big meshes of the fishermen's nets can procure samples of the large, mature herring only, and it is further quite uncertain whether the samples are in any way representative of even the mature shoals or not. It may be that the fishermen, through a long experience of fishing in these waters, have been able to adopt a size of mesh which takes practically all the sizes of mature herring visiting the coast, but only by means of experiments carried out with gear taking all the sizes probably occurring, can this question be satisfactorily answered. The study of the composition of the stock of herring with regard to age (year classes) will therefore be of a superficial character so long as systematic fishing experiments have not been made.

The methods adopted in the fishing industry at present are further inadequate, for a study of the life-history of the herring, for the reason that the fishing is carried on only along the coast. According to the experience of the fishermen the herring come into the bays or to the coast at a certain time of the year. In Newfoundland (the west coast) for example, in the spring and in the fall the herring appear. When I visited the bays of the west coast of Newfoundland at the beginning of November the fishermen had just begun to catch the herring in the southern bays, while they were still waiting for them in the northern bays (Bonne bay). In conversation with the fishermen I obtained the information that shoals of herring were often seen off the coasts of Nova Scotia, Cape Breton, and Newfoundland, at certain seasons of the year (e.g., in summer) when no herring struck into the shore. A satisfactory study of the life-history of the herring must therefore be based upon material collected by systematic fishing experiments, carried on along the coast and off the coast in the open sea, with such gear that all sizes of herring can be captured. From a perusal of my paper, mentioned above, especially page 59, fig. 34, it will be seen that investigations of the European herring in the North Sea have had to be carried out in this way. Only through an expedition, equipped with gear for the catching of all sizes of herring, and with a sea-going vessel available, will a satisfactory scientific study of the herring be possible.

From the experience which I have obtained during my recent tour, it seems to me quite evident that a thorough scientific investigation of the life-history of the herring must necessarily be of the greatest immediate practical importance. To prove this, I think it sufficient to draw attention to the following circumstances:—

(1) Only large mature herring are taken in the big mesh of the fishermen's nets, whereas in Norway hundreds of thousands of barrels of younger herring ("fat-herring") have been caught every year for centuries.

(2) No Canadian herring fishing is carried on off the coast in the open sea far from land. In the North Sea millions of barrels are caught far from land every year. The coast fishing is comparatively insignificant. In Norway all fishing was coast

fishing until some successful fishing experiments gave satisfactory evidence that herring could just as well be caught off the coast, and hundreds of thousands of barrels have in consequence been caught every year. These considerations are by no means new in the Canadian fisheries. For many years the Canadian Government made efforts to investigate the problem of catching herring in offshore waters, and by drift nets such as are used in European waters.

A steam drifter "No. 33" was bought and brought over from Scotland in the year 1904, and this steamer has, during the years 1904-7 carried out a great number of experiments under the experienced direction of Mr. J. J. Cowie. (See the annual reports of the Department of Marine and Fisheries for the years 1904-7, and a special report by Mr. Cowie published by the department as Bulletin No. 1.) The experiments were in the first years not very successful, but in the year 1907 most promising catches were made off Prince Edward Island, off the Magdalen islands, and off the Gaspé coast. In all these experiments, catches were made (up to sixty-eight and mainly between twenty and thirty barrels in a night) which may be considered satisfactory, especially if the fact be considered that drift-net fishing everywhere must depend on the detailed and local experience which is necessary for making good hauls, and will require fishing operations for some seasons. Further, one boat working alone has greater difficulties in finding the schools of herring than a fleet of boats, and last but not least, fishing experiments, always shifting ground in order to extend the knowledge of a large geographical area, can never be expected to obtain such considerable catches as boats which stay on the field where fishing has proved to give satisfactory results. Mr. Cowie's experiments would thus, in any case, give ample grounds for the expectation that material, for the study of the natural history of the herring, could be got by means of a scheme of drift-net experiments. Indeed, there seemed to me to be so much hope of obtaining practical results of value to the fisheries, through the understanding of the natural history of the herring, that I ventured to propose to the Biological Board of Canada that the study of the Canadian herring should be taken up by a well-planned expedition. Such an expediiton would investigate the sea off Nova Scotia and in the gulf of St. Lawrence during the period extending from May to September.

My proposal was favourably regarded and accepted by the Biological Board, and later by the Department of Naval Service, which granted the means and assistance necessary for the work. A detailed plan for the work was drawn up by the Dominion Commissioner of Fisheries, Prof. E. E. Prince, and myself, as follows:—

1. That the steam drifter "No. 33" be fitted out with drift-nets for the catch of herring and fish in the gulf of St. Lawrence and off the Atlantic coast of Nova Scotia during the suggested time—May to September.

2. That hydrographical and biological investigations be carried out through the assistance of fishery cruisers.

The steam drifter "No. 33" to be fitted out with her gear, etc., in Halifax during the first part of May, and then proceed directly to the gulf of St. Lawrence, in order to carry on herring fishing operations off the coasts of Gaspé, New Brunswick, Prince Edward Island, the Magdalen Islands, and the west shore of Cape Breton. When the season advances the vessel should follow the schools of herrings out to sea, mainly on the bank between the Gaspé coast and Cape Breton, especially with the object of getting samples of the different schools of herrings there. In the late summer she will further have to make test catches of herrings of the west coast of Newfoundland and the east coast of Cape Breton and Nova Scotia.

The hydrographical and biological investigations will mainly aim at the collection of the following material:—

Hydrography.—The distribution of the different water layers (currents) in the gulf and the outside areas, by collection of water samples for determination of salinities (titrations).

Biology.—(*a*) The distribution of the eggs and larvæ of the most important food-fishes, mainly cod, haddock, pollock, mackerel, and herrings. This material will make it possible to outline the areas where these fish spawn, and may thus be caught during their spawning time.

(*b*) The distribution of the most important animals, which serve as food for these fishes, especially the Schizopoda. These investigations may be especially important after the spawning time is over, and the fishes (herrings), are feeding on or outside the spawning banks.

For the combined studies of all material, it seemed important to arrange three series of cruises:—

1. The first, in May, when herring and other fish are spawning, and when the winter conditions still may be found in the sea.

2. The second, in June, when the larvæ of these fish are to be found in the water. As the eggs of herrings are laid on the bottom, they cannot be fished by tow-nets. But in June, when the larvæ escape from the eggs the time will be especially valuable for the location of the spawning grounds of the herring (by means of catching the young larvæ). It will then be possible to determine the first influence of the summer season in the sea.

3. The third series of cruises, at the end of July or in August, when the distribution of young fish (herring, cod., etc.) can be studied, and when the summer conditions of the sea are fully advanced in the different water-layers.

It seems important that each of these series of cruises should follow approximately the same course, as this will facilitate comparison between successive periods, during the season. It is further important to arrange the courses so that the most important banks (spawning grounds) and layers of water can be included, and come under observation. The ideal arrangement of the cruises would seem to be:—

1. A line of stations from Escumenac point (New Brunswick) over the great bank of the gulf of St. Lawrence to the bank east of Anticosti.

2. A line from there across the northern channel to Matashwan bank.

3. From the Matashwan bank to the Bay of Islands (Newfoundland).

4. From St. George's bay (Newfoundland) across the great channel between Newfoundland and Cape Breton, passing cape St. Lawrence and continuing to Pictou island.

5. From Country Harbour, Nova Scotia, over Sable Island bank to the continental slope.

6. From there over the Banquereau, the bank St. Pierre towards Miquelon and St. Pierre islands.

7. From these islands over the Green bank to the Great bank.

8. From Great bank to the southeastern corner of Newfoundland.

Along each of these lines, stations should be determined with a distance of about 20 miles between each station. The average time for the work on a station may approximately be established at from one to one and a half hours. An investigation along these lines would give three cross-sections of the outflowing waters of the St. Lawrence, and of the Atlantic water flowing into the gulf, and provide full opportunities for definitely determining the old questions of the connection between the polar water (coming southwards along the coast of Newfoundland) and the Atlantic and the gulf of St. Lawrence water.

The investigation would further give important information regarding the spawning areas of the most important fishes, inside and outside the gulf of St. Lawrence, and determine hydrographical and biological conditions in this great fishing area. This contemplated plan will, in any case, in its main lines be the basis for

work during the coming summer. It is still uncertain if circumstances will allow it to be carried out to its full extent. Some parts, as for instance certain of the proposed lines for hydrographical and biological work, may have to be omitted should the necessary assistance of ships required not be available, but the expedition will, as far as circumstances allow, aim at the full undertaking of all the work proposed, and preparations for the equipment of the ships (gear, instruments) are now in progress.

Before the commencement of the expedition, it seems advisable to give a short review of the results already obtained by the study of the material collected during the year 1914. It is evident that these results can only be regarded as preliminary. The material to be collected during the coming season will, it is hoped, give a much wider basis for the discussion of the problems, the solution of which is now to be attempted, and a final statement will therefore have to wait till further material has been secured and the whole question considered in its entirety. But in the meantime it may be of value also for those who are taking part in the expedition to become acquainted in a preliminary way with the results of the material which has been studied already. The material now before me may throw some light on the following problems concerning the natural history of the herring:—

1. The racial characters of Canadian herring.
2. The age and growth of herring.
3. The fluctuations in the year-classes of herring.

I will in the following pages treat each of these problems separately.

1. RACIAL CHARACTERS.

The fishermen have in course of time made the observation that the herring are not everywhere of the same sort; that different sizes and qualities appear at different times, and in different parts of the sea. This led many to conclude that there are in the North Sea, for example, a great number of different local races of herring, each with a very restricted area of movement, and that the peculiar seasonal occurrence is only due to the fact that the fish, during the period of development of the genital organs, congregate in denser schools, rendering fishery operations profitable. Between the two extreme opinions, that of a great migration, and that of a number of local races, various other theories have arisen, and there exists a considerable series of works dealing with the different hypotheses. Scientific writers on the subject have, also, ever since the time of Linnaeus, distinguished between different races or varieties of herring. There has, however, as Lilljeborg observes, always been a difficulty in classifying them according to definite and constant characteristics. In the earlier literature on the subject, we find several attempts at establishing a sharper distinction between the races by means of measurements and figures. Thus Nilsson attempted to calculate different physical dimensions, in proportion to the total length, for several races of herring, and to compare these proportions as between different races. He calculates in the case of the ocean herring (*forma oceanica*) that the longitudinal diameter of the eye amounts to from one twenty-second to one-twentieth of the total length (to base of tail fin) whereas the corresponding figures for the coast herring (Skjærgaardssild; *forma taenensis*) are only from one-seventeenth to one-sixteenth.

This method of distinguishing between different races by measurement of the dimensions of the body has, as is generally known, played an especially important part in the study of the races of mankind (anthropometry)) and the attempts which have been made to find some arithmetical expression of such minor racial peculiarities as lie at, or beyond, the limit of immediate visual perception, or are subject to so great a degree of variation that extensive observations are necessary in order to discover the average and the distinguishing characteristic for each separate race.

It is to Heincke that credit is due for first applying to the study of the herring all those principles and methods which have gradually been discovered and found of value for the study of mankind

The term "race" (family or tribe) is taken by Heincke to mean a number of individuals living together under the same external conditions, together propagating their kind, and standing therefore in more or less close relation to each other. The idea of a race is based upon that of an ideal type. All the separate individuals diverge from this type, both as regards each single quality and also, in each case to the combination of all the qualities appertaining to the type. The very idea of a type presupposes a certain degree of variation in the individuals and in their features, the type being the average or mean of all the different individual varying features.

Heincke's method is therefore to examine the individuals with regard to all, or a large number of qualities, and to find an arithmetical expression for a combination of these. In this way, the individuals of one and the same race will naturally group themselves about the same type (the mean of the race), and individuals of different races be separated, owing to the grouping of their qualities about different means. (Metode der kombinirten Merkmale.)

Working on this basis, Heincke has examined the variation of a great number of features in thousands of herring from different localities. Of the features in question some are constant, i.e. independent of the age and growth of the fish; to these belong the number of vertebræ, of keel scales, and of fin rays. By far the greater number of features which Heincke has examined have, however, been found to vary with age and growth. As Heincke himself points out, only a part of the investigations made can therefore be regarded as sufficiently exact and adequate. On the basis of all his investigations, Heincke has drawn up a system, the features of which we may notice as follows, taking especially into consideration the characters, which Heincke himself regards as the constant ones, i.e., number of vertebræ and number of keel scales:—

1. Northern ocean herring; spawn near the coasts in winter or spring, but move during summer in the open sea.

(*a*) Iceland herring of large size, mostly over 300 mm., when at maturity, number of vertebræ large, averaging over 5.7; number of keeled scales behind ventral fin (k_2) small, averaging under 14; tail tolerably long, head short and broad.

(*b*) Spring herring of Norway, large in size, at maturity over 300 mm., number of vertebræ very large, averaging over 57·5, single examples up to 60; number of tail vertebræ large, average 14·5 and more; average number of keeled scales under 14·5.

2. Coast herring; these are always winter spawning; they live in the immediate neighbourhood of the coast, spawning in brackish or estuary waters, differing greatly in different waters.

3. Ocean herring of the North Sea banks; inhabiting the open waters, from the coasts of England and Scotland across the whole North Sea. In summer and autumn they move to seek spawning grounds on the sandy and stony banks, which rise from the depths of the sea, and some distance from land. These have all a medium number of vertebræ (56·5 to 55·5); a large number of keel scales behind the ventral fins (15 to 14), these scales being highly developed. They have a broad skull. The southern bank herring have an extraordinary number of keel scales, 15 on an average to 17 and 20 in individual cases.

4. Autumn or sea-herring of the Baltic; size 250 mm., but towards Ruegen and Gotland bank growing less to 220 and 210 mm. Number of vertebræ small, 56·0 on an average, number of vertebræ to first hæmal arch 25·0 and more; number of keeled scales moderate 14·0 to 14·5.

5. Spring herring of the Baltic. Size less than 200 mm., number of vertebræ 55·5 to 55 on an average; keeled scales behind ventral fins, also small in number, the highest, 14·0 going down to 13·5 or less, number of first vertebræ with hæmal arch in contrast to small number of vertebræ very high, on average 25·0.

6. Herrings of English Channel. Size medium, probably on an average not over 250 mm., number of vertebræ small, 56; number of keeled scales behind ventrals very large, 15 and more.

7. Herrings of the White Sea. A very distinct race, size moderate; number of vertebræ very small, only 53·6 on average and descending even to 52; very small number of keeled scales, 12·5 behind ventral fins.

To this system there seems to be some general law for the development of the different types. Thus as the salinity of the Baltic diminishes from west to east, the constitutional size of the "ripe" herring becomes smaller, as does the number of certebræ, and the breadth of the skull, the body becomes shorter; the lengths of head and tail become greater, and so does the difference in position between the dorsal and anal fins.

Again, those herring which grow in very warm, shallow and brackish water, as those of Schley and Zuider Zee, have an extremely small number of vertebræ to the post-hæmal arch. And again, the herring with the most considerable constitutional size, and likewise the largest number of vertebræ, live on the coasts of the northern portions of the North sea, and of Norway and Iceland.

Many investigations of more recent years have confirmed Heincke's investigations, i.e., the Norwegian investigations carried out by Dr. Hjalmar Broch. Of special interest are the following features in his description of a peculiar type of herring from the inlocked Beitstadfjord, a part of the Trondhjemsfjord. This type resembles the Norwegian coast herring, but has a smaller number of vertebræ (56·48 on an average); the number of the first vertebræ, with hæmal arch, is 25·09; the keel scales (behind the ventrals) 13·58, while these numbers for the coast herring are 57, 60, 25·05, and 14·07.

The investigations of herrings from the Atlantic coast of Canada are yet of a quite preliminary nature, but they already show, nevertheless, some features of great interest. I found it necessary to confine the work to some of the many characters which Heincke has studied, and I selected the following, which also are regarded by Heincke himself as the most important ones:—

Number of fin rays in the dorsal fin.
Number of fin rays in the anal fin.
Number of keel scales behind the ventrals.
Total number of vertebræ.
Number of first vertebræ with hæmal arch.

For the study of these characters, a series of samples (each consisting of from fifty to seventy-five individuals) were selected from the following localities:—

West coast of Newfoundland .
Magdalen islands, Northumberland straits, Gulf of St. Lawrence.
West Ardoise (Cape Breton, Atlantic coast).
Lockeport (Nova Scotia, Atlantic coast).
Bay of Fundy.
Gloucester, Massachusetts.

The investigations were made with the kind assistance of Dr. A. G. Huntsman and Mr. Horne Craigie of the University of Toronto. Table No. 1 contains the figures embracing the averages of the characters mentioned above for these samples, and the table gives in addition some details concerning the average length, percentage of the sexes, stages of development of sexual organs in individuals, etc.

TABLE No. 1.—Samples, investigated regarding race-characters.

—	West Coast, N.F.	Magdalen Islands.	Northumberland Straits.	West Ardoise, N.S.	Lockeport, N.S.	Bay of Fundy.	Gloucester, Mass.
When caught	Fall 1914	May 1914	21 May 1914.	10 August 1914.	Fall 1914	Fall 1914	Fall 1914
Number of ind	75	55	52	55	50	54	50
Average lenghts	30·5	30·2	29·42	29·48	28 24	18·8	17 2
Per cent of ♂	41·3	45·5	39·1	68·6	50	?	?
Per cent of ♂	58·7	54·5	60·9	31·4	50	?	?
Average stage of sex. org	3-4	·5	5	4-5	5-6	1	1
Average of fat	†	0	0	1	0		
Fall (F.) or Spring (S) Spawners	S	S.	S.	F.	F.	F. (?)	F.
Average number Dorsal rays	20	18·3	18·27	18·58	20·28	18·7	19·9
Average number Anal rays	17·9	16·6	16·7	17·33	18·46	17 6	18·1
Average number Keel Scales	12·6	12·54	12·5	12·85	12·88	14·08	13·4
Number of first vertebra with closed normal arch	25·	25·3	25·2	25·5	25·2	25·	24·8
Total number of vertebrae	56·83	56·52	56·27	56·63	56·54	56·46	56·68

The herrings from the west coast of Newfoundland are spring spawners. The sample collected in the fall, 1914, had therefore sexual organs in development (stages 3 to 4, and medium development of fat). They were of large size, varying from 28 to 34, average 30·5. Number of dorsal fin rays varied from 18 to 22, average 20; anal fin rays from 16 to 20, average 18; keel scales from 11 to 14, average 12·6; total number of vertebræ from 55 to 59, average 56·83; first vertebræ with hæmal arch, average number, 25.

The sample from Magdalen islands, caught in May, 1914, consisted of spawning individuals from 27 to 32 cm. in length, average 30·2. Number of dorsal rays from 17 to 20, average 18·3; anal rays 15 to 18, average 16·6; keel scales 11 to 14, average 12·54; vertebræ 55 to 58, average 56·52; number of first hæmal vertebræ, 25·3.

The Northumberland Strait herring, caught in May, were also spawning; length from 27 to 33, average 29·42. Number of dorsal rays from 16 to 20, average 18·27; anal rays 15 to 19, average 16·7; keel scales 11 to 15, average 12·5; vertebræ 55 to 58, average 56·27; first hæmal vertebræ, number 25·2.

The sample from West Ardoise (Atlantic coast of Cape Breton) consists of individuals from 26 to 35 centimetres in length, average 29·48. The sample was caught on the 10th of August, 1914, the genital organs were developing (stages 4 and 5), which shows that these would have spawned during the fall. Dorsal rays 17 to 20, average 18·53; anal rays 15 to 19, average 17·33; keel scales 12 to 14, average 12·85; total number of vertebræ 55·58, average 56·63; first hæmal vertebra, number 25·5.

The sample from Lockeport (Atlantic coast of Nova Scotia) contained individuals from 25 to 34 centimetres of length. The sample did apparently consist of a mixture of mature and immature individuals, the stages of the sexual organs being as follows:—

Stage 2 (immature): 4.

Stages 5 and 6 (spawning or near spawning): 23.

Stage 7 (spents): 13.

The sample was taken in the fall, 1914, showing that the herrings spawn in the fall. Dorsal rays 19 to 22, average 20·28; anal rays 17 to 21, average 18·46; keel scales 11 to 14, average 12·88; total number of vertebræ 55·57, average 56·54; first hæmal vertebra number 25·2.

Bay of Fundy.— A sample of young immature herrings from 16 to 22 centimetres of length with genital organs so small that no conclusion can be drawn as to their spawning time. Dorsal rays 18 to 20, average 18·7; anal rays 15 to 20, average 17·7; keel scales 13 to 16, average 14·1; total number of vertebræ 55·57, average 56·5; first hæmal vertebra number 31·7.

Gloucester, Massachusetts.—A sample of small herring (13 to 22 cm.) taken in December, 1914, with immature genital organs. Dorsal rays 18 to 21, average 19·9; anal rays 16 to 20, average 18·1; keel scales 12 to 17, average 13·4; total number of vertebræ 55·58, average 56·68; first hæmal vertebra number 24·8.

While the foregoing figures are worthy of very careful study, yet the difficulty cannot be ignored that the investigation was essentially of a preliminary character, and it is possible that the material obtained was not sufficient to decide with certainty its full representative character. The quantity may not be sufficiently large to be regarded as representative or typical of the schools of herring from which the samples were taken.

No opinion can of course be made from *a priori* considerations; experience and continued investigation are the only means of arriving at a final and reliable conclusion in this matter. It will be noticed that the samples examined have been limited to about fifty in each sample. The reason for this was that the varying factors in most cases show a comparatively very narrow amplitude of variation (four or five classes). The results obtained seem to demonstrate that the method adopted gives corresponding results, but I wish nevertheless here to emphasize: first, that the results will have to be regarded as tentative and preliminary; and, secondly, that they ought to be confirmed during the work of the expedition before us. For this purpose it is valuable to consider the figures more thoroughly and try to ascertain what further investigations would seem of greatest interest and importance.

The first result yielded by the figures given above, and by table 1, is this: that there is a marked difference between the spring-spawning types of the gulf of St. Lawrence, Northumberland strait, Magdalen islands, and the west coast of Newfoundland, and the herrings from the Atlantic open coast (Cape Breton and Nova Scotia). This is already well known from the experience of men engaged in the Atlantic fishing industry; spring spawners being caught everywhere in the gulf, fall spawners off the Atlantic coast. According to information, which I have obtained, through interviews with the fishermen, the limit dividing the spring spawners and the fall spawners has to be drawn in an easterly direction through a point along the coast of Cape Breton at its northern shore (at the entrance to the gulf of St. Lawrence). North of this line all herrings are said to be spring spawners. South of the line the oceanic types are all of them fall spawners, but besides these types there are known to exist local spring spawning coast herrings as, for example in the bay of Fundy and around the coasts of the southern part of Nova Scotia. This is confirmed by the early investigations of Gilpin,[1] who observes that he has seen spawning herrings both in May and in September and October. From the Digby basin (bay of Fundy) he observes: "The first herring that make their appearance in the basin come there the last of March and the first of April; about the first of May they begin to spawn, and by the 20th May they have mostly left the harbour. On the Atlantic coast of Nova Scotia he has observed a shore run, about 11 inches in length, appearing early in March, and spawning in September and October." This would correspond to the conditions in the North Sea where there are herrings, coast herrings spawning in the spring, and oceanic herrings spawning at the outer banks, (e.g. Dogger bank) in the fall, but my material gives no opportunity for a proper description of these interesting varieties, which should be subjected to more thorough examination. The average figures given in the table, page 10, show, on the whole, small differences only between the different samples. There are no very striking differences to be observed in the

[1] J. Bernard Gilpin, "On the common herring (*Clupea elongata*)." Proceedings and Transactions of the Nova Scotia Institute of Natural Science, vol. 1, 1863.

characters of the different schools, from which the samples were taken. This much may, in any case, be noted:—

1. There is a marked difference in the number of keel scales between the northern spring spawners and the southern fall spawners. The average for the first group being about 12·5, the number for the second group increasing to 13 to 14.

2. The total number of vertebræ is highest in the sample from the west coast of Newfoundland (56·83).

3. Amongst the three spring-spawning types the number of vertebræ of the dorsal and anal rays, and of the keel scales is higher in the sample from the west coast of Newfoundland than in the samples from the southern part of the gulf of St. Lawrence.

4. The number of dorsal and anal rays is higher in the individuals caught in the open sea than in those from the closed waters (the gulf and bay of Fundy).

If we compare these samples from the American Atlantic coast with the samples which have been studied in European waters, we note, first of all, the very low number of keel scales in the northern samples from the American side; while the oceanic herrings of Northern Europe have an average number of keel scales (behind the ventrals) 14, 14·5, and even 15, all the samples from the gulf of St. Lawrence show an average number below 13, and near 12·5. Such a low average has in European waters only been observed from the Baltic and the White Sea, that is from inclosed waters with a very low winter temperature and low salinities. It is in this connection interesting to note that the number of vertebræ, of fin rays and of keel scales decrease in the series: west coast Newfoundland, Magdalen islands, Northumberland strait, just as these corresponding figures decrease in Norwegian samples collected from the open coast to the head of long enclosed fjords (Beitstadfjord, see above).

The herrings from the west coast of Newfoundland, which in other respects, such as their rate of growth, very much resemble the herrings of the Norwegian coast, have no such high number of vertebræ (57 to 58) as the Norwegian herrings, but I must draw attention to the fact, that my material does not contain any samples from the eastern shores of Newfoundland and from Labrador. These should be obtained and studied before any final conclusions are drawn in this respect.

On the whole, if the material before us does not give any conclusive and final determination of the racial characters of the herring types off the Atlantic coasts of North America, it does at any rate indicate:firstly, a marked racial difference between northern and southern types; and secondly, a difference between the racial characters of American and European herrings.

AGE AND GROWTH.

During the international investigations of the fisheries of northern Europe, methods have been developed for the study of the age and growth of the most important food fishes. The old discovery, that the bones and scales of these fishes show rings which very closely correspond to the growth of the fishes during the different seasons, has again attracted the interest of a great number of scientists, who have been able to prove[1] that the rings very closely correspond to the growth of the fishes, not only so, but the number of rings corresponds to the number of seasons (summers and winters) during which the fish have lived, and so complete are these features that the size of the rings, or zones, gives exact information with regard to the question as to the rate the fish has grown in the different periods of growth.

The investigations of Mr. Einar Lea have shown that the herrings of the Norwegian west coast mainly grow during the months from April to September; at the

[1] For the literature on this subject I may refer the reader to my paper quoted above.

most rapid rate during the three months May to July, while, in the winter, practically no growth whatever is indicated (see fig. 1, which is copied from Mr. Lea). This

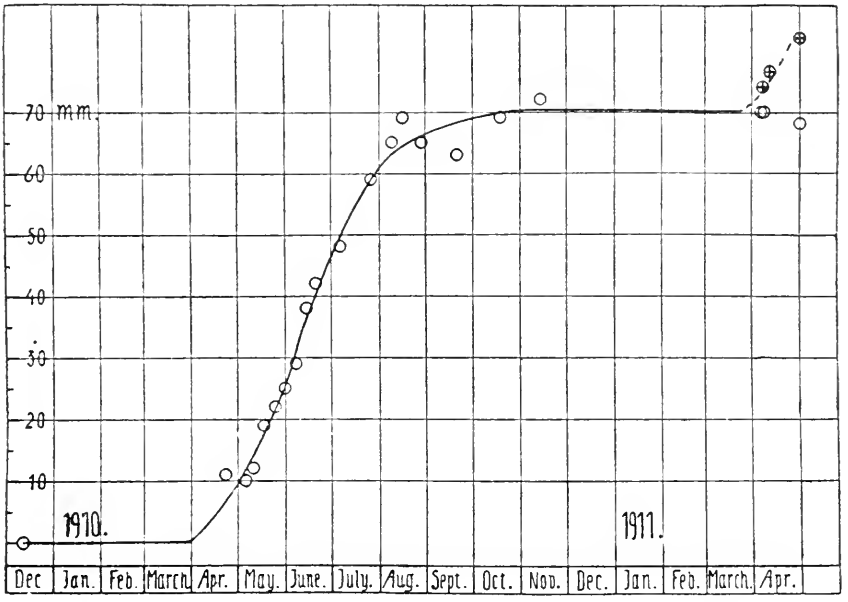

Fig. 1. Diagram illustrating the average increment of the herrings of the west coast of Norway in their 3rd growth period, between December, 1909, and March, 1911 (t_3). The broken curve denotes increment in the 4th period of the herrings (t_4). (LEA.)

shows the winters marked on the scales by sharp lines, while the growth of the summer appears as broad belts. If we now draw a picture of a scale, enlarged to such a degree as to make the distance between the centre of the so-called basal (horizontal on the figures) line to the edge of the scale equal to the length of the fish (see fig. 2) then

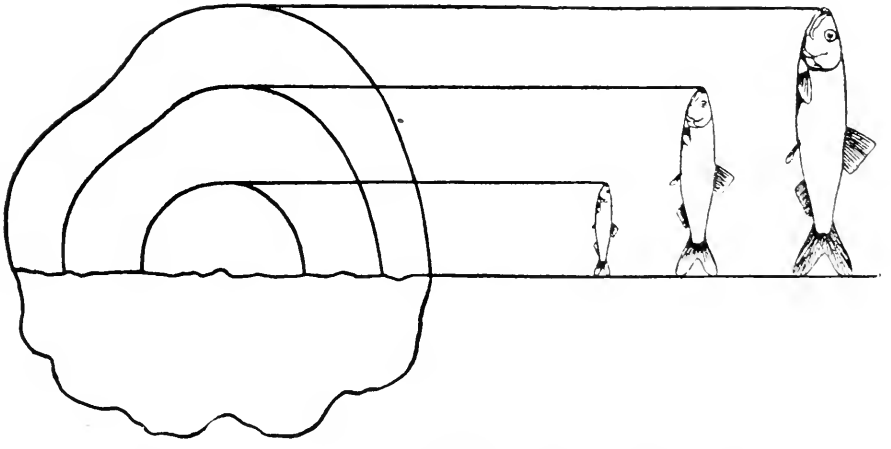

Fig. 2. Growth zones of herring scales compared with the size of fish.

the distances to the different winter rings will immediately show the size of the fish during each winter of its life.

In order to avoid the arduous work of drawing the scales thus enlarged, a labour-saving method is adopted as follows: With the aid of a prism, the microscopic picture is thrown on to a piece of paper on the table beside the microscope. On this picture a slip of paper is laid, upon which are marked off the different distances from the centre of the basal line to the annual rings (see fig. 3 $V_1 r_1$ and r_2). By means of

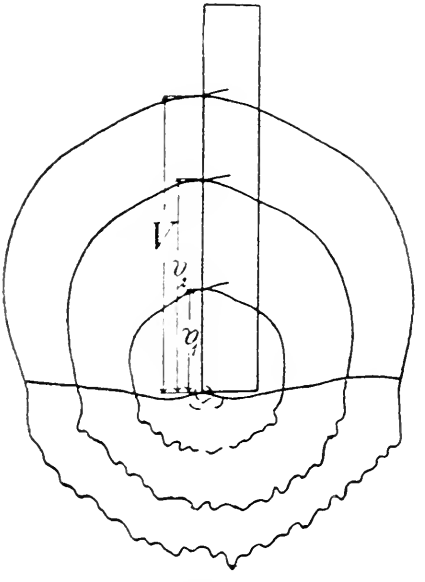

Fig. 3.

a special apparatus, it is then easy to calculate the length of the fish during the different winters.

During the international herring investigations, some thousands of fish from different waters have been measured according to these methods, and calculations made as to the size of the individuals, at the different periods of growth through which they have passed, thus furnishing a very large number of figures for calculation of the average growth of the herrings in different regions.

Some examples will show what can be attained by such investigations. Fig. 4

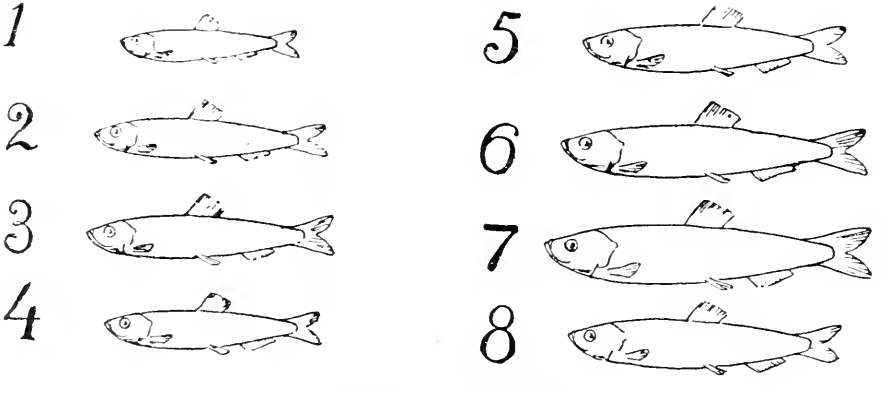

Fig. 4. Eight herring of equal (4 years) age from

1. White Sea.
2. Lysefjorden (West Norway).
3. Zuider Zee.
4. East Coast of Sweden.
5. Western part of North Sea.
6. Atlantic Ocean.
7. Iceland.
8. West Coast of Norway (Spring herring).

shows eight fish, all of equal age, viz. 4 years, but from different localities. All are drawn to the same scale and in the size representing the average for their respective localities. The drawings for this and the following figure are taken from two plates prepared by Lea for the Copenhagen Expedition, 1912.

The four races on the left (1 to 4) have their origin in closed waters, whereas the four on the right (5 to 8) were taken in the open sea (North Sea, Arctic ocean, Atlantic ocean). It will at once be seen that the herring from the closed waters are smaller than fish of the same age from the more open waters. Precisely the same impression is obtained on examination of the scales, as shown in fig. 5. These scales

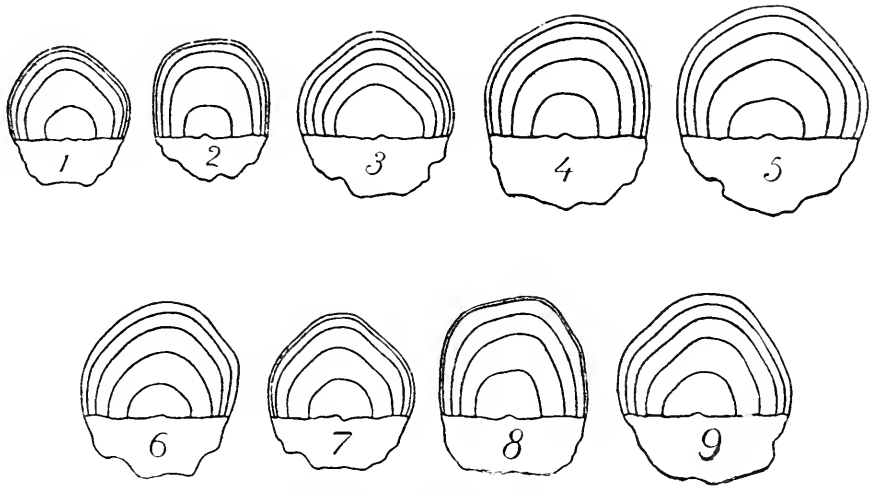

Fig. 5. Normal scales of 5 year old herring from

1. Lysefjorden. 2. Zuider Zee. 3. Kattegat.
4. Faeroes. 5. Iceland. 6. Norway (Spring herring).
7. Western part of North Sea. 8. Atlantic Ocean. 9. Shetlands.

illustrate the growth of 4-year old herring from the localities in question. The scales are drawn in proportion to the size of the fish, while the distances between the different winter rings show how they have grown from year to year. A glance at the figure will show that the study of the scales furnishes information not only as to the different waters, but also as to entirely different modes or rates of growth in the periods embraced. Some show meagre growth until the formation of the first winter ring (1 and 2), while others show more rapid growth (3). Some have grown well in their first years, but less favourably later (7 and 8) while others exhibit very satisfactory growth even in their fifth year (5, 6 and 9). The growth may thus exhibit variations so considerable that it is frequently possible, in the case of a loose scale, to determine to what fish it belongs, even though other sorts may have been taken in the same haul.,

The material which has been collected from the North American waters, and which I have mentioned above, is now being studied by a similar method, and I shall here confine myself mainly to the results obtained from the study of the three great groups or types, which we have distinguished above.

1. From the Atlantic coast of Nova Scotia, containing oceanic herrings spawning in the fall, characterized by their large size.
2. From the west coast of Newfoundland, containing spring spawners.
3. From the Magdalen islands in the gulf of St. Lawrence, also spring spawners.

Before we try to compare these three types it will be necessary to go into somewhat greater detail concerning the methods for studying the variation of growth in

the different individuals of a type; and for the calculation also of the mean or average growth of the type. If we have a very large mass of observations upon the age of herrings of different sizes, it may, in many cases, be possible to find the average length of the herrings of each age (for each year's age). This is done by calculating the average length of all the different groups of equal age, e.g. of all the 4-years, the 5-year-old herrings, and so on. This same material can also be used for the study of the variation in length of all the 4, 5, or 6-year-old herrings. But the investigations of later years, especially the investigations of the Norwegian zoologists, Einar Lea and Oscar Sund, have shown that this method is not so reliable as one might anticipate, because the schools of herrings often consist of individuals which are not representative of all the individuals of the year-class to which they belong. A school of herring may contain only the larger individuals of the 4-year-old herrings, and an average of the length of these individuals may not represent the average length of all the 4-year-old herrings of the type living in the sea. The gear used for catching the herrings may also have a selecting power. All the smaller 4-year-old herring may go through the meshes, and the 4-year old herrings remaining in the net may, therefore, be far from being representative of the whole year-class.

Experience of this kind has led to the development of another method for the study of the variation and for ascertaining the average growth of fishes. We now examine the individuals of our samples, which belong to one single year-class of old grown fish from the spawning schools, these being so old that we may suppose that all individuals of the year-class have joined the spawning school. For each of the individuals of the year-class in the sample the length at the conclusion of the different growth periods is calculated, and these figures are then used for the study of the variation and average lengths exhibited by the year-class at different ages.

We will now briefly consider some figures obtained by the application of either of these two methods. The following tables (2 to 5) give some examples of the study of a series of samples by the first method, that is by the comparison of the length which herrings of the different year-classes had reached when the sample was taken.

TABLE No. 2.—Immature herring; Halifax Harbour, Fall, 1914.

Cm.	Number of different year classes.			All year classes.
	3	4	5	
23	1			1
24	1			1
25	1	6		7
26		28		28
27		12		13
28		8	1	8
29				0
30			2	2
All sizes	3	54	3	60
% All sizes	5	90	5	

Table 2 gives the analysis of a small sample of immature herrings from Halifax harbour. The sample consisted of 3, 4, and 5-year-old herrings. It will readily be seen that only the 4-year-old may have been represented in any such number that they could give us a key to the variation and average growth of the year-class. The variation is within the limits 25 to 28 centimetres of length, the average being somewhat over 26 centimetres.

TABLE No. 3.—Atlantic Coast of Nova Scotia, Fall, 1914.

Cm.	Number of different years classes.								All Year-classes.
	5	6	F.	8	9	10	11	Over 11	
29	1								1
30	1	2							3
31	1	4	3						8
32		2	6	1	1	1		1	12
33			5	3	3		1		12
34	1		8	7	10	5	2		33
35				4	25	10	2	3	44
36					2	5	8		15
37					1	2	3		6
38						1			1
All sizes.	4	8	22	15	42	24	16	4	135
p. c. of all sizes.	3	6	16·3	11·1	31·1	17·9	11·9	30	

Of the 3-year old only some few, apparently large individuals, were taken. The few 5-year-old belonged very likely to the smaller individuals of that year-class. Table 3 gives a smaller analysis of a sample consisting of 135 herrings from the coast of Nova Scotia. We find here some material of interest as far as the older year-classes are concerned, especially the 9, 10, and 11-year-old herring.

The 9-year-old vary between 32 and 37.
" 10 " " " 32 " 38.
" 11 " " " 33 " 37.

The younger year-classes are only represented by few individuals, and it seems uncertain if the individuals present have in any case been representative for the year class.

TABLE No. 4.—West Coast of Newfoundland, Spring, 1914.

Cm.	Number of Different year-classes.										All Year-classes.
	5	6	7	8	9	10	11	12	13	14	
27	1										1
28		1						1			2
29				1		2					3
30				1	3	7					11
31				2	9	18	5				34
32				5	13	13	7			1	39
33					3	7	5	2	1		18
34						3					3
35							1			1	2
All sizes.	1	1		9	28	50	18	3	1	2	113
p. c. all sizes.	0·9	0·9		8·0	24·8	44·2	15·8	2·7	0·9	1·8	

Table 4 gives the result of the study of some samples from Newfoundland. We meet here quite similar conditions; only the oldest year-classes seem to be represented by individuals of all sizes. Of the younger year-classes there are only a few individuals of all sizes. Of the younger year-classes there are only a few individuals which may belong to the larger part of their year-class. We find the 8-year old between 29 and 32, with an average of about 31 centimetres in length. The 9-year-old between 30 and 33, with an average between 31 and 32; the ten-year-old between 29 and 34; average a little over 31.

Table 5 contains an analysis of 151 herrings from the Magdalen islands. This sample shows some few younger (4 to 6-year-old) herrings. It seems very unlikely that the younger individuals are by any means representative of their respective year-classes. Better results are obtained by the second method described above, namely, by using the figures from the calculated lengths of the individuals in their different periods of growth. Tables 6 and 7 give the figures obtained by this method for the three different types of herring. Table 6 gives the limits of variation. The reader will here be able to see within which limits of size the herrings of different types have been found. Of great interest for our purpose is Table 7, where the figures are given for the average lengths in different ages and the average yearly increment of growth, as they have been found by the study of the three samples. In the table letters l_1, l_2, l_3, stands for the length of the herrings, when they were one, two or three years old (or rather when their first, second, or third winter ring was formed). The letters t_1, t_2, t_3, stand for the increment of growth, which the herrings have had during the respective years of their life.

TABLE No. 5.—Magdalen Islands, Spring, 1914.

Cm.	Number of Different Year Classes.									All Year Classes.
	4	5	6	7	8	9	10	11	Over 11	
25	1									1
26	1									2
27	5	1								6
28	4	1								5
29			4	4	4	1	1			14
30			4	6	9	7	7	10	1	44
31			1	6	6	6	9	15	4	47
32					4	3	3	13	4	27
33								2	2	4
34									1	1
No. all sizes	11	2	9	16	23	17	20	41	12	151
Per cent all sizes	7·3	1·3	6·0	10·6	15·2	11·3	13·3	27·2	7·7	

TABLE No. 6.

Age—Years.	Limits for variation in lengths (cm.) in different ages.		
	Nova Scotia.	Newfoundland.	Magdalen Islands.
1	8—14	4—11	8—11
2	16—22	10—21	15—20
3	21—27	16—25	21—24
4	24—31	19—28	24—27
5	27—33	22—30	25—28
6	27—34	25—33	27—29
7	30—34	25—33	28—30
8	31—35	27—34	28—30
9	32—36	29—35	29—31
10	32—36	31—35	29—32

TABLE No. 7.—Lengths (l) and Increments (t) of Herrings at Different Ages.

	L.			t			
	Nova Scotia. E	N. F. w. c. —	Magd. Isl. M		Nova Scotia. E	N. F. w. c. K	Magd. Isl. M
l_1	11.05	6.6	9 73	t_1	11.05	6.3	9.73
l_2	18.55	13.7	17.2	t_2	7.5	7.3	7.47
l_3	23 5	19.2	22.47	t_3	5.45	5 2	5.27
l_4	27.2	22.7	28 25	t_4	3.7	3.7	2.78
l_5	29.65	25.3	26.75	t_5	2.45	3.0	1.50
l_6	31.15	27.5	27.87	t_6	1.50	3.0	1.12
l_7	32.25	29.0	28.74	t_7	1.10	1.1	0.87
l_8	33.4	30.2	29.2	t_8	1.15	1.4	0.46
l_9	34.15	31.0	30 53	t_9	0.75	0.6	0.80
l_{10}	34.85	31.7	31.2	t_{10}	0.70	0.9	0.53

A study of the table will clearly show that there is a great difference in the growth of the three types. The Atlantic herring from the coast of Nova Scotia (sample E.)

has all through a much more rapid growth than the two other types. The 1-year-old herring is over 11 centimetres (5½ inches long); the 2-year, 18½ centimetres (7½ inches long). It reaches 23·5 centimetres (9½ inches) at 3 years, 27·2 (11 inches) at 4 years, about 12 inches at 5, and nearly 14 inches at 10 years of age.

The herrings from the west coast of Newfoundland are especially characterised by slow growth during the first years of their life. In the first five years the Newfoundland herring are smaller than herrings belonging to the two other types, but from the fifth year on, their growth is more rapid than the two other years. The older Newfoundland herrings are therefore larger than the herrings from the Magdalen Island, and they approach without quite reaching the size of the equally old herrings from the Nova Scotian Atlantic coast. It is very characteristic of the Newfoundland herrings that their growth is greater even until a late period in life than is the case with the two other types. The Magdalen Island herring grow comparatively well during the first three or four years, but from then on the rate of growth is very small.

The comparison between these types will perhaps be rendered still easier by the study of figure 6, where the average growth (lengths) of the three types is represented

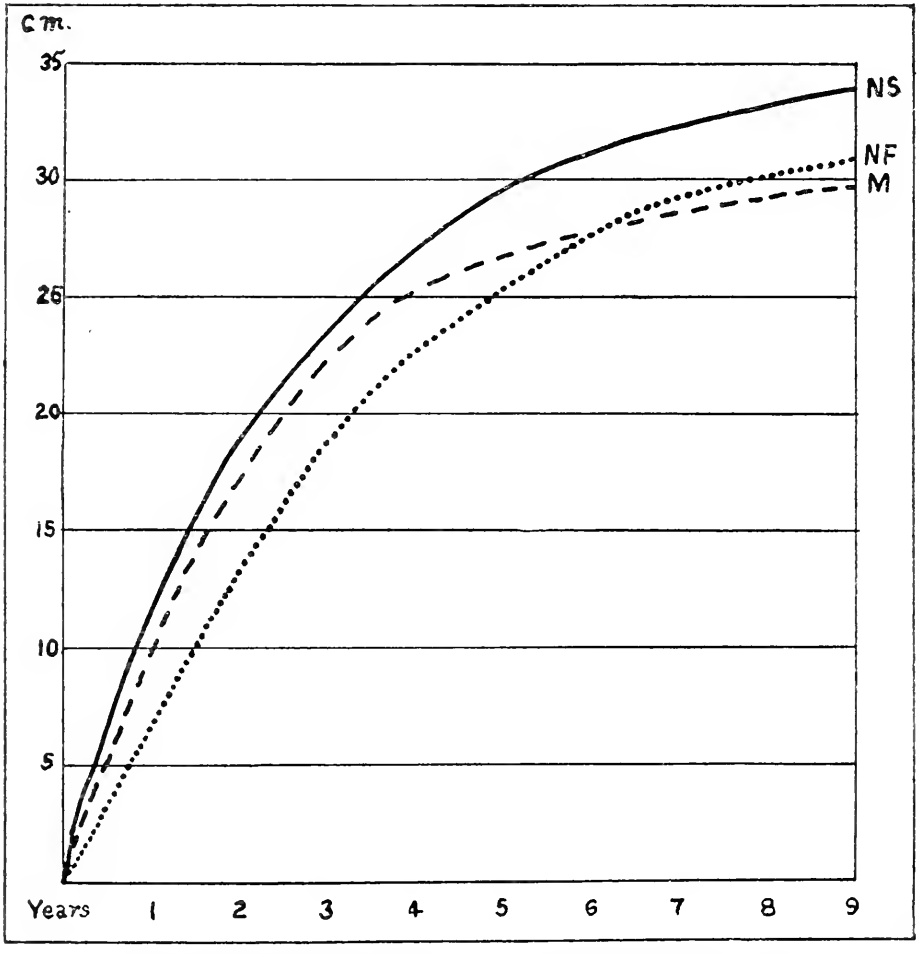

Fig. 6. Curves for the average lengths in different years of herrings from Atlantic Coast of Nova Scotia (N.S.) West Coast of Newfoundland (N.F.) and The Magdalen Islands (M.)

by three curves. The reader will observe that the curve for the Nova Scotia herring, through its whole length, lies above the two others, that the curve for the Magdalen Islands herrings first lies above and then crosses below the curve for the Newfoundland herring.

Similar results have been obtained by the study of herrings from the waters of northern Europe. Fig. 7 gives the typical growth of three European types, the one

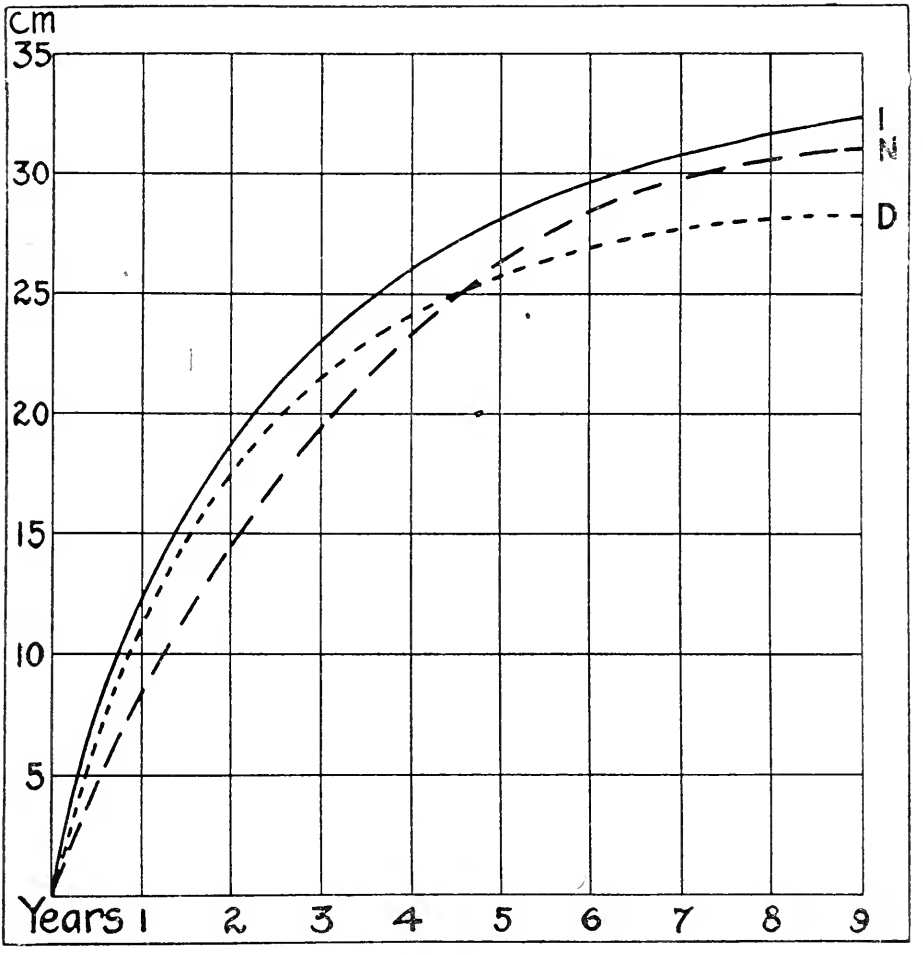

Fig. 7. Curves for the average lengths in different years of herrings from Atlantic Coast of Ireland (I.) West Coast of Norway (N.) and The Dogger Bank, Southern North Sea (D.)

from the west coast of Ireland, the second from Norway, and the third from southern North Sea, the Dogger bank. It will be observed that the growth of these three types differs in a manner quite corresponding to what we have described above for the three types from American waters. The growth of the herrings from the Atlantic open coast of Ireland is the greatest, the curve being always above the other two curves. The herrings from Norwegian waters show a slow growth in their first years of life, slower than the Dogger bank herrings, but the growth is very even up to the age of five or six years, it therefore surpasses the growth of the Dogger bank herring in later years, the two curves for these types cross each other, and the old Norwegian herring

approach but do not quite reach the size of the Atlantic herrings from Ireland of the same age. A comparison between the two figs. 6 and 7 should therefore indicate that there is a resemblance, with regard to growth, between the Atlantic herrings from Ireland and those from Nova Scotia; the west coast herrings from Norway and those from the west coast of Newfoundland; the North Sea Dogger Bank herrings and the herrings from Magdalen Island. It seems worth while to give this statement a more careful consideration. This may be facilitated by the inspection of the three figs. 8, 9, and 10. Fig. 8 gives two curves for the Atlantic herrings from Ireland and Nova

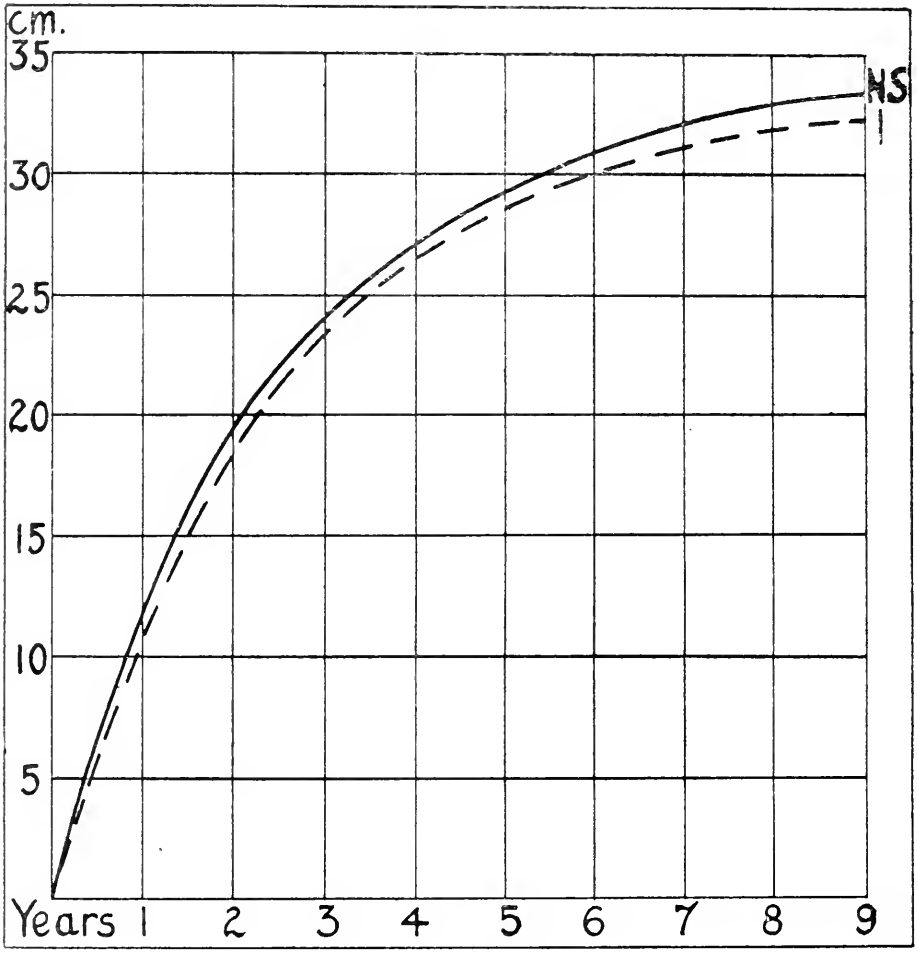

Fig. 8. Curves for the average lengths in different years of herrings from
West Coast of Ireland (I.) Atlantic Coast of Nova Scotia (N.S.)

Scotia. The curves run quite parallel, and the distance between them is everywhere very small. Fig. 9 compares the growth of herring from Newfoundland, (NF) and Norway (N). We find also here a very great correspondence. The Newfoundland herring grow somewhat slower, but the difference seems to be very small. Fig. 10 compares the herring from Magdalen Islands (M) with the Dogger bank herring (D). These two types have the same characteristic in common, that their growth in the first years is very rapid but afterwards very slow. The Dogger bank herring grow less than the Magdalen herring in later years of life.

These differences in the different types are so characteristic that the mere inspection of the scales in many cases will suffice to distinguish individuals belonging to one

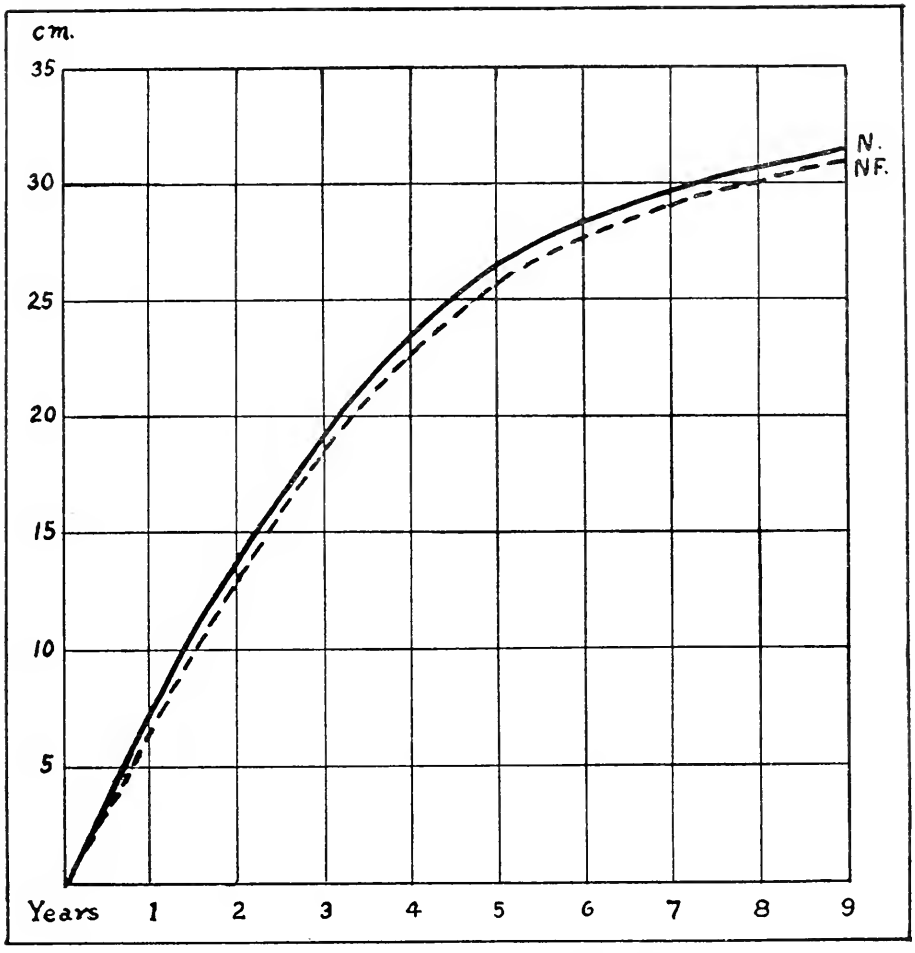

Fig. 9. Curves for the average lengths in different years of herrings from West Coast of Norway (N.) West Coast of Newfoundland (N.F.)

type from those of other types. To demonstrate this I have drawn the two series of normal scales of fig. 11. The series A, C, and E on the left side of the figure give the three types from the European side; the series to the right B, D, and F, from the American side. All these normal scales are drawn according to the rule, described above (text to fig. 5), that the vertical distances, from the centre of the basal line to the margin of the scales in all the drawings, correspond to the average length of the fish when nine years of age, while the growth zones represent the average growth of the types in the respective periods (years) of growth.

A comparison of these normal scales will clearly show a marked difference in rate of growth and in manner of growth between the different types of each series and, further, the great resemblance between the two series. Most marked is the difference between the Newfoundland herring and the Magdalen Island herring. This circumstance is very important as both these types of herring occur in the same sea (the gulf of St. Lawrence), though not in the same areas of that sea. In the sample of

the Magdalen Island herrings a few individuals were found showing a growth very similar to that of the Newfoundland herring, and the scales of these herring were so

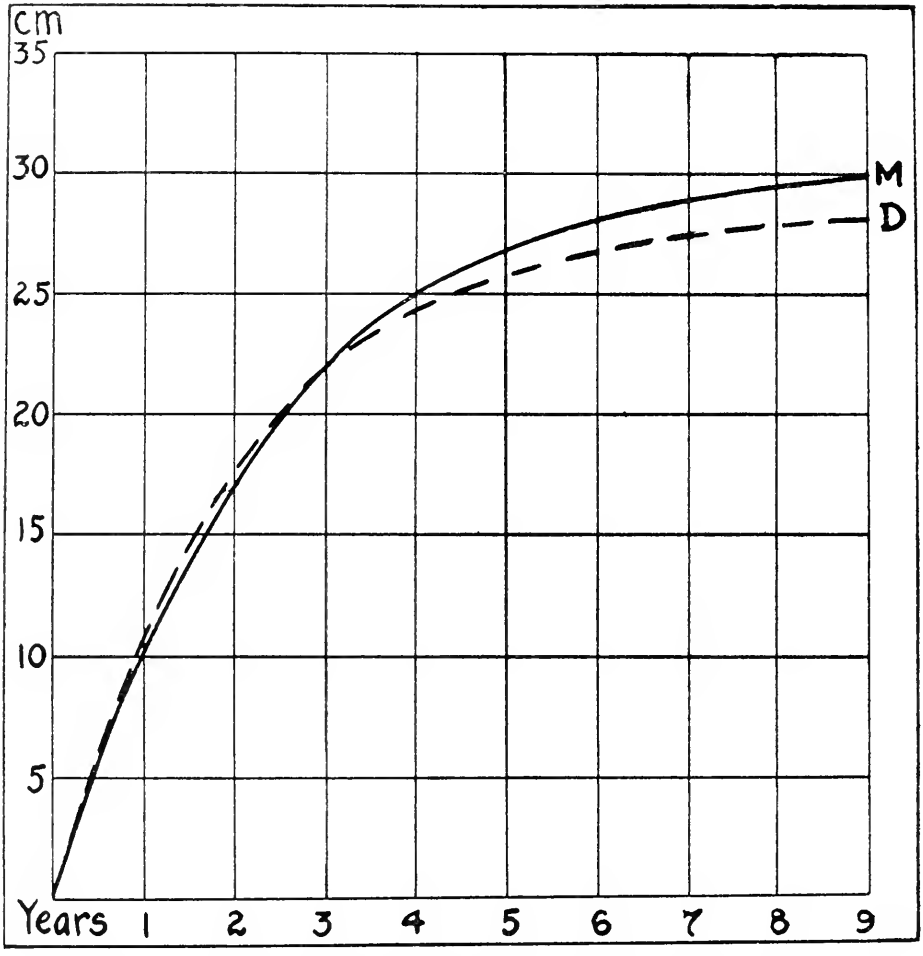

Fig. 10. Curves for the average lengths in different years of herrings from The Dogger Bank, Southern part of North Sea (D.) The Magdalen Islands (M.)

characteristic that they immediately revealed themselves clearly to the observer. In those areas of the sea where two or more very different types of herrings meet or intermingle to a greater or small degree, it may be possible, therefore, to ascertain the extent of the intermixing between the different schools, and the areas of distribution and migration of the different types. The gulf of St. Lawrence seems to provide the most excellent conditions for investigations of this kind.

The comparison between the different types of herring which I have tried to draw, raises the question "what conditions are the most important for developing this variation in the different types of herring?" To all biologists it will be clear that questions like these can only be solved by tests and experiments. Such experiments have never been made ,and they may not be expected in the near future. It will be necessary to overcome great technical difficulties, as the development of the animals not only through years, but through generations, will require to be followed. On the basis of our present knowledge we can only compare the conditions of the sea under which the different types live. The larger in amount our material is, and the greater

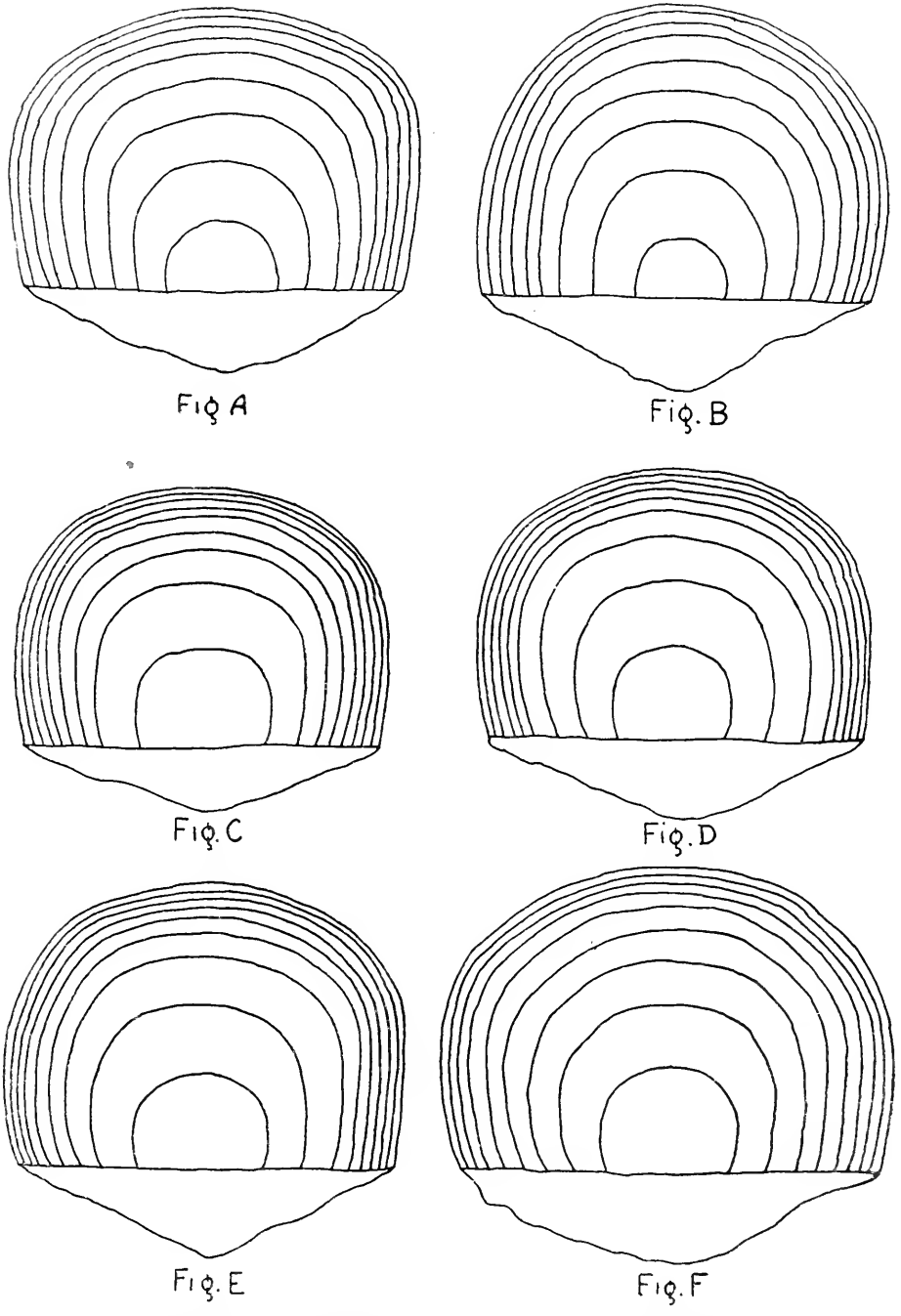

Fig. 11. Two series of normal scales of herrings. The left series from the waters of Northern Europe. The right series from North American waters.

A. Norwegian West Coast.
B. West Coast of Newfoundland.
C. Dogger Bank.
D. Magdalen Islands.
E. Atlantic Coast of Ireland.
F. Atlantic Coast of Nova Scotia.

the area of the sea is, which we have been able to investigate, the easier it will be for us to determine the conditions or environment under which a certain type everywhere occurs, but this method of geographical and biological comparison will nevertheless hardly ever reach the certainty of accurate scientific experiment.

It must in any case, be regarded as an important addition to our knowledge that the interesting series, or system of types, which have been determined by the investigations in Europe, now can be proved to have a close parallel both in regard to racial characters and with regard to rate of growth, on the American side of the Atlantic. This addition to our knowledge may therefore justify a few remarks regarding the conditions under which the different types live.

The Irish and the Nova Scotian herrings, distinguished by their excessive growth, their spawning in the fall, their high numbers of keel scales, both belong to the open Atlantic waters, these waters being marked by a high salinity and more limited changes in temperature during the different seasons.

The Norwegian and Newfoundland herrings also belong to the open sea, but the salt water is of less salinity and is mixed with cold fresh water from the land or from the Arctic sea. They live under a more marked boreal climate and amidst a typical boreal fauna. The difference between summer and winter is very marked in their surroundings, both with regard to temperature and biological conditions (food animals).

The herrings of the Magdalen islands live in the southern part of the gulf of St. Lawrence, where the fresh water from the St. Lawrence river lowers the salinity of the sea water, where the temperature in summer is high, in winter very low, where the water is shallow over the many banks of the gulf. The conditions, under which the Dogger Bank herring live, only to some extent correspond to these conditions in the southern part of the gulf of St. Lawrence. The southern North sea is shallow, its temperature is high in summer and low in winter, but never so low as in the gulf of St. Lawrence. The two areas must therefore in many respects be very different, to what extent it is difficult to ascertain at present, as little has been done to define the conditions in the gulf, conditions of the greatest interest from a biological point of view. This is one of the reasons for my proposal to combine the herring work of the coming summer with hydrographical and biological investigations of a wider character. When such investigations have been completed, it may be possible to establish a more satisfactory comparison between the herrings of the gulf and herrings from other parts of the ocean. In European waters there are several types of herrings all characterized by rapid growth in their first years, and by stagnant growth in the later part of their life. Such is the case in Skagerak, the Cattegat, the Baltic, the Zuider Zee, etc. It will be interesting to revive these questions when further investigations have been made.

It may in this connection be of interest to compare the growth of the so-called fresh-water herring (*Pomolobus pseudo-harengus*, Wilson), although this herring belongs to a quite different species. I have not been in the position to investigate a great number of individuals belonging to this species, but have, through the kindness of Dr. Huntsman, had the opportunity of examining a few specimens. The scale, fig. 12, is from a fish with seven rings inside the margin. The fish was caught in lake Ontario (at Port Credit) in the fall of 1913, nad was 24 centimetres long. Its lengths at different periods of growth were the following: l_1 8·5, l_2 16·3, l_3 18·7, l_4 20·2, l_5 21·6, l_6 22·8, l_7 23·7. It will be observed that this growth indicates a marked resemblance to the Magdalen Island and the Dogger Bank herring, viz., a rapid growth during the first years of life and a very slow or stagnant growth in later years.

3. THE FLUCTUATIONS IN THE YEAR-CLASSES.

During the international investigations of the fisheries of Northern Europe, discoveries have been made showing:—

1. That the stock of cod and herring includes a far greater number of year classes than previously had been supposed, and

2. That the relative numerical value of these year-classes exhibits great fluctuations from year to year.

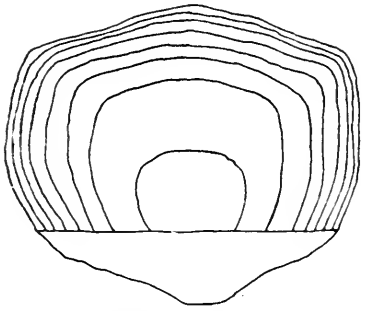

Fig. 12. A scale of a specimen of *Pomolobus pseudoharengus* (WILSON) taken off Port Credit, Lake Ontario, in the Fall 1913. The scale is drawn in the same magnification as the normal scales of fig. 11.

These discoveries resulted from the endeavour to subject the stock of these important fishes to a similar examination, and to such a survey as that universally adopted for the study of the human population (the vital statistics of a population). In a lecture delivered at the meeting of the International Council for the Study of the Sea, 1907, I endeavoured to formulate the programme for this work in the following words: "In all expositions of the science of vital statistics,[1] there are three prominent features which attract our chief consideration: (1) birth-rate; (2) age, distribution; (3) migration. It is customary to study these questions by the help of what are called representation statistics. A certain number of individuals are selected who are supposed to stand for the mass of the people, and attention is directed to them. We ascertain from this source their average length of life, their wanderings, their increase or decrease, and whether sickness, war, disaster, or emigration plays any appreciable part in reducing the population. It seems at first sight a bold suggestion to propose studying the fish supply on lines like these. A population can be counted, but who knows how many fishes are in the sea? And yet, it appears to me a project big with possibility, to regard the discoveries of fishery research from a standpoint similar to that which has been adopted in the science of vital statistics."

The methods and plan for investigating the stock of fishes along lines like these will best be understood by the consideration of examples of what has been accomplished already. Before I try to describe the first few investigations of the stock of herring from the Canadian waters, I will in spite of the risk of being obliged largely to repeat my previous publications, first give a short review of some of the results obtained through the study of the herring fisheries of Norway. I have previously described these fisheries in the following way: The herring fishery is carried on along the whole of the Norwegian coast, in the fjords, among the islands, and in the open sea off the shore. The fishermen use nets and seines, stake-nets which are anchored along the bottom or to floats, and drift-nets, which are fastened together in a chain, and drift with the boat or vessel at night. The seines cut off the shoals, either along the shore (shore-seines) or at some little distance from land (purse-seines). The nets used take only certain sizes of fish, according to the width of mesh, and nets with many different sizes of mesh are therefore employed, having regard to the kind of fish expected to be caught. The seines are of fine mesh, and can frequently take all herrings down to 7 or 8 cm. in length. It is very rarely, however, that all sizes of herring are found in one and the same haul. This is due to the fact that the different sizes of fish move in separate shoals, apart from one another. There are thus many

[1] See my paper quoted above.

different kinds of herring fishing carried on in the Norwegian waters, and many different "sorts" of herring are recognized, according to the size most common in the different shoals. These sorts have been known, both among the fishermen and in the trade, from time immemorial, and a great amount of care and study has been devoted to the question of dividing them according to some rational method of assortment.

The fishery statistics distinguish four principal groups: small herring, fat herring, large herring, and spring herring. It is also possible to distinguish, practically speaking, four different kinds of herring fishing, corresponding to these four classes, and differing, not only as regards the method of capture employed but also in point of place and time; these being carried on, for the most part, in different regions of the coastal waters, and at different periods of the year. In the year 1908, the catches of the different classes were as follows (given in hectolitres) see chart, fig. 13:—

—	Spring Herring.	Large Herring.	Fat Herring.	Small Herring.
West Coast	613,356	.....	605	47,880
Romsdal	11,500	101,320	4,990	18,151
Trondelagen	.....	9,628	73,852	39,320
Nordland	.....	800	408,654	77,100
Tromso-District	.....	9	127,500	48,100
Finmarken	.....	.....	.....	92,580
Whole country	624,856	111,757	615,601	323,131

Whole country total of all sorts 1,675,345 hl.

The small herring are taken, as will be seen from the above, all along the coast, but in increasing numbers farther to the north. The fat herring are taken, by far the greater part, within the range from Trondhjemsjord to the Tromso district, the large herrings of the coasts of the Romsdal and southern Trondhjem district, while by far the greater part of the spring herring are taken in the west coast waters.

The small herring do not exceed 19 centimetres in length; they vary from 8 to 19 cm. The ovary or milt is, at the utmost, only visible as a thin thread below the spine; in point of fatness they are far inferior to the fat herring. Age determinations have shown that they belong to the three, mostly to the two first year-classes. The fat herring vary as a rule from 19 to 26 centimetres (7½ to 10½ inches), the genital organs of the lesser fish are very small, incipient development being noticeable in the case of the larger. The adipose deposit, however, in the flesh and round the intestines ("ister,") is much more developed than in any other class of herring. Age determinations have shown that the fat herring consists of fish from 3 to 6 years old. The large herring are superior in size, running as a rule from 27 to 32 centimetres; their genital organs are, from the autumn, in advancing development towards maturity. In the course of this development the adipose deposit gradually decreases in quantity, and the fish finally pass, by imperceptible degrees, into the class of spring herring, which are the spawning fish. Among these latter, the ovaries are in January firm, in February and March slack, and in April entirely spent, the fish at this time being also thin and in poor condition. According to the age determinations the large and spring herrings consist of the oldest from 3- to 20-year-old fish (*vide* below).

Small herring and fat herring are thus immature fish, the large and spring herring being mature. The maturity has been shown to develop at a different age in different parts of the long coast. In the southern part at an age of 3 to 5, mostly 4 years, in the northern part of the coast at 5 or even 6 years of age. The spawning shoals off the southwestern coast contain, therefore, individuals from the third year on.

The scientific investigations of the stock of herrings off the coast of Norway has, after the work of many years, yielded the following general idea of the life history of the herring in these Norwegian waters.

All the herrings of the open coast belong to one and the same race or type. By far the greatest number of native individuals of this race aggregate during the fall off the coast of Romsdal (see chart fig. 13), where they are called "large" herring

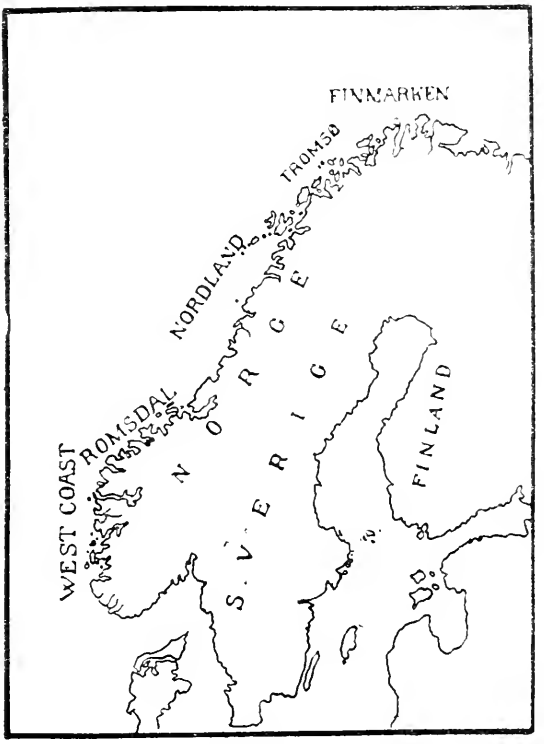

Fig. 13.

and caught by drift-nets in great quantities. The genital organs are then developing, and this developing condition or ripening continues during the winter months, when the spawning shoals aggregate at the west coast, where they are caught in gill-nets and seines as spring herring.

The young fry undergoing development in the ova laid on the sandy bottom of the inshore banks off the west coast escape soon from the eggs and are then carried northward along the coast by the current, which off the whole west coast has a marked northerly direction (the so-called Gulf Stream). They spread as if sown all along the extensive range of the coast, and everywhere these small fish undergo further development, without question, in northern waters. In the autumn when these small fry are 8 to 10 centimetres (below 4 inches), and two-thirds of a year old, they begin to make their appearance in the seines. Next year they reach a size of 12 to 15 centimetres (5 to 6 inches). These are the small herring which are caught along the whole coast (see table above).

In the third year they develop an abundance of fat, and remain in this state (mainly in the summer and fall) till the genital organs develop, which, as stated above, begins from the third, but mostly at the fourth or fifth year in the south, and mostly at the fifth and sixth year in the north.

The mature individuals then leave the fat herring shoals and begin to migrate southwards along the coast till they reach the large shoals of mature large herring, with which they intermingle.

Among these many different sizes of herring, from the young fry up to the mature and oldest fish, we find several groups, differing either in biological respects or in regard to habitat and manner of life. It is therefore impossible here (contrary to what may be the case in the study of the human population of a town or a country) to make at any one place or at any one time a selection from the individuals in the sea sufficiently representative to permit of immediate conditions as to the composition of the mass. In each catch made we find individuals, which may be representative with regard to size and age of the biological group (i.e., the mature herring) to which they belong, but not to the whole stock of herrings.

It is necessary, therefore, to take many samples from different shoals of fish at different places, endeavouring to combine observations resulting so as to form, as it were, a complete picture. Moreover, it is in some respects impossible to find any standard by which to judge of the respective quantitative values of the different groups, even though it may be possible to accurately determine the composition in point of size of each separate group. The investigations of the different (biological) groups of herring have, however, shown that repeated study from season to season can give a most valuable general idea of the variations and fluctuations in the preponderance of the different ages or year-classes within the different groups; e.g. within the fat herring and spring herring. The combined study of the statistics of the fisheries (the catches of the fishermen) and the fluctuation with regard to the year-classes, in the most important groups of herrings, have proved sufficient to demonstrate that the cause of fluctuations in the fisheries is to be found in the great fluctuations in the number of individuals occurring in the fish born or developed in the different years (fluctuations in the year-classes).

For a fuller proof of this statement, I may refer the reader to my publication mentioned above. Here I must confine myself to the most striking and important instance found in this direction, namely, to the fluctuation in the year-classes within the shoals of the Norwegian spring herring.

The spring herring of the Norwegian west coast have been studied in the years from 1907 to 1915. In each of these years samples have been collected from the seine catches of the fishermen, and the age of each herring in the sample has been determined by the methods described above. On the basis of this large amount of material, the percentage of the different year-classes represented in the samples has been calculated in order to get definite information as to the question: are different ages every year represented by the same numbers, or do fluctuations occur from year to year?

The results of all these age determinations for the years 1907-14 are given on fig. 15, where percentage curves are shown for each of the eight years. The curve for 1907 shows that there were in this year, no less than five fairly rich and fairly evenly represented year-classes (the 4 to 8-year-old fish). This even proportion is broken in 1908 by the appearance of a very great number of 4-year-old individuals (the summit of the curve) which, accordingly, were born in the year 1904, the 1904 year-class. In all the following years this year-class maintains a great preponderance over all the other year-classes. In 1909 the 5-year, in 1910 the 6-year, in 1911 the 7-year-old fish being by far the most numerous. It has been calculated that the Norwegian spring herrings in the years 1907-13 were caught to the number of 3,312,000,000 individuals, taken altogether, and that of this total no less than 1,776 millions belonged to the 1-year-class, the individuals born in the year 1904. The immense number of this year-class is further believed to have been the great cause of the rise in the Norwegian spring herring fisheries, which in the years 1908-13 (when the year-class in increasing numbers belonged to the spawning shoals) increased from 625,000 to no less than 1,500,000 hectolitres.

The extensive investigations of the Norwegian fisheries have further demonstrated that this same year-class of herrings played the greatest role also amongst the fat herring in the years (1907-10) when great numbers of the individuals of this year-class still were immature and belonged to the fat herring shoals.

Other investigations have shown that similar fluctuations in the different year-classes also take place in the stock of haddock and cod, and that the year 1904 had the same important influence regarding these species of fish. Immense numbers of young fish were produced which were of the greatest importance to the Norwegian fisheries, when they reached the age and size in which they are caught by the fishermen. The international investigations of the herring fisheries of the North Sea (the herring of the British coasts) have been summarized in the following words: "If we compare these results with the composition in point of age of the Norwegian race of herring, we find this similarity, that both races exhibit some remarkably rich year-classes, not, however, in both cases from the same year. There is probably also this point of difference, that the richness of these year-classes is more pronounced in the case of the Norwegian race than in that of the North Sea fish. The fluctuations in the herring fishery of the North Sea are therefore slighter than in those of the Norwegian waters."

From the point of view of the method of investigation, it must be regarded as a most striking and wonderful fact, that it is possible to collect a sample, say of some few hundred herrings, and then to find this sample really giving a representative picture of the composition, with regard to size and age, of the whole stock of incalculable millions of spawning herring in the sea. As I pointed out in my lecture in London, in 1907, before these investigations started, it seemed at first a bold suggestion to propose studying the fish supply along lines like these. A population can be counted; but who knows how many fish are in the sea? From the feeling of the magnitude and difficulty of the task, the scientists who took part in this work hesitated for many years before their definite belief in the representative character of the results grew so strong that they dared to regard the method and the results as sufficiently proved and fully established.

The essential question which had to be answered before this belief was strong enough to become a scientific conviction was, of course, this: "How large an amount of material was absolutely necessary to afford a representative picture?" We have during our work started from the point of view that no information could be obtained regarding this problem purely from theoretical or *a priori* considerations. No mathematician can calculate the number required for a representative sample of the Norwegian spring herring. This number depends above all on the question, how evenly mixed are the different sizes and ages in the stock of the spawning shoals, and the answer to this question can only be given through scientific tests and experience, that is, through the comparative study of a number of different samples. In my paper, often mentioned in the foregoing pages, I give the data for such a comparative study. Referring the reader to these facts, which since the paper was published, have been very much extended, I will here confine myself to one example, the result of the analyses of the samples of spring herring from the year 1914, as far as the 1904 year-class is concerned. In 1914 seven samples of spring herring were collected containing in all 1,933 herrings. The samples were collected from places along the west Norwegian coast, some places several hundred miles apart. Along all this distance the spring herring were spawning. The analysis gave the following result, as far as the 1904 year-class is concerned.

Number of individuals in the samples.	Percentage of year-class 1904.
175	52·6
305	58·4
44	59·1
565	62.3
354	60.7
289	50·2
201	61·2
Average.... 276	Average....57·8

In these seven samples the percentage of deviation from the average of 57·8 were as follows: 5·8, 0·6, 1·3, 4.5, 2·9, 7·6, 3·4. Similar results have also been obtained from other sources, (also from this year).[1]

It is difficult to explain this close correspondence in any other way than this: that the different year-classes of the spawning herring must be so evenly mixed that samples containing a few hundred (even forty-four) individuals will suffice in many cases to give approximate information of the percentage of each year-class represented in the stock. The data illustrated by fig. 14 will also give a convincing impression

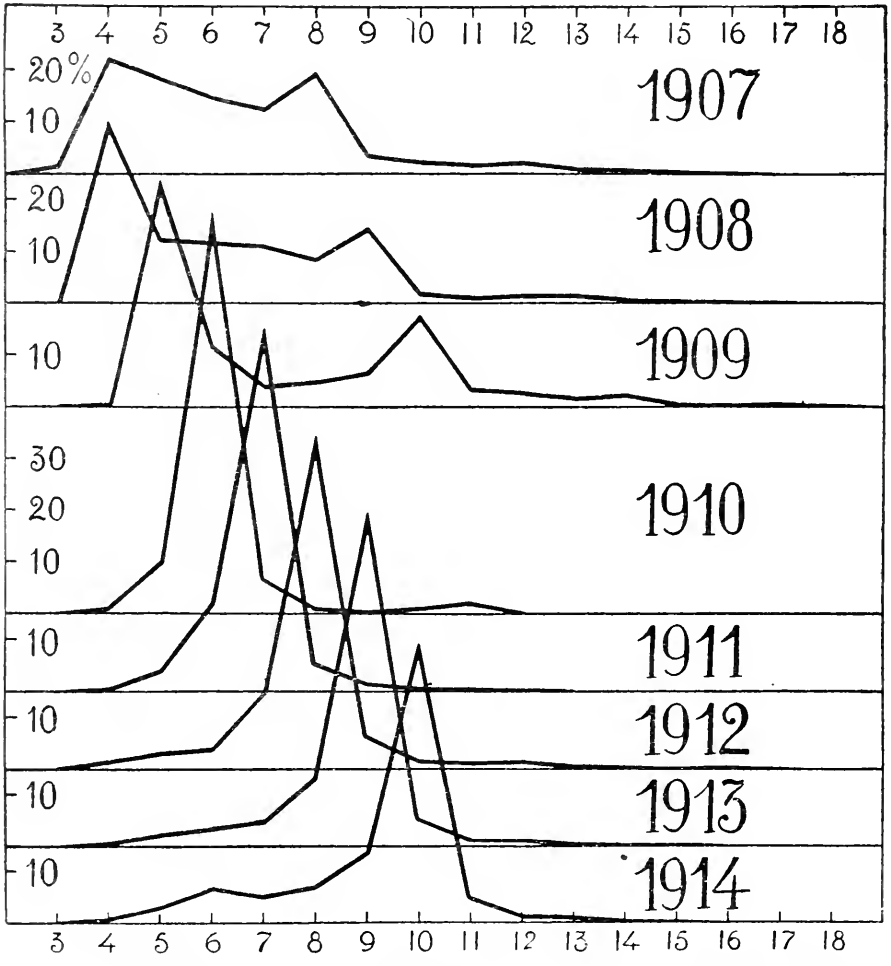

Fig. 14. Composition in point of age of Norwegian spring herring for the years 1907-1914; average of all samples examined in each year. For 1914 only samples from February included.

of the validity of the method. It seems impossible to explain the fact that the investigations through nine consecutive years have given the preponderance of one and the same year-class, if the method of investigation were unable to yield a representative picture of the composition of the stock.

The discussion of these results has been necessary for the following review of the preliminary investigation, which circumstances have allowed me to make regarding

[1] According to information sent me from Mr. Einar Lea.

the material collected from the Canadian waters. The material is naturally not so extensive as the material from Northern Europe, where investigations have been carried out for a series of years. The Canadian material is also, for other reasons, less reliable than the Norwegian material. For example, while most of the Norwegian material has been collected from catches made by seines (shore-seines and purse-seines), all sizes of herring present in the shoal being captured, the Canadian material is collected from catches made by gill-nets of large meshes ($1\frac{1}{2}$ to $1\frac{3}{4}$-inch meshes), which may let through a great many of the smaller individuals. It will therefore be necessary for the planned expedition both to collect more extensive material and to have collections made by means of specially arranged fishing experiments.

As an orientation of the problems before us it might, however, be advisable, with all possible reservation, to consider the data which have been obtained by the analysis of the material already before us.

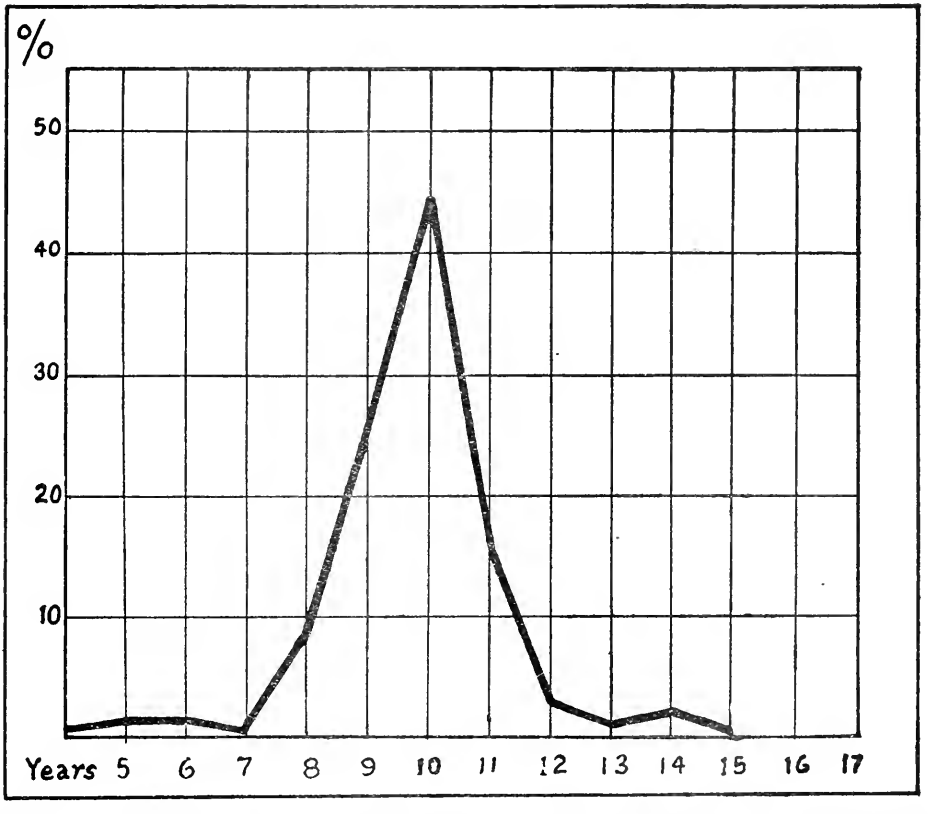

Fig. 15. Composition in point of age of spring herring from West Coast of Newfoundland (May, 1914.)

We will then, first of all, direct attention to the analysis of some samples from the west coast of Newfoundland. These herrings were, it will be remembered, in several respects, in the characteristics of their growth, very much like the Norwegian herrings. We should therefore also expect a similar composition with regard to age.

On the west coast of Newfoundland, herrings are caught in the spring, in the summer, and in the fall. The spring herrings are large, with mature roe and milt, and they are the spawning shoals and correspond to the Norwegian spring herring. The

herring spawning season seems everywhere in the gulf of St. Lawrence to be in May, that is about two months later in the year than on the Norwegian west coast. In the summer some fishing is going on in the bays. The catch consists, according to information obtained through conversation with fishermen, of smaller herring, which are used as bait only. The fall fishing is a very important one, large herring schools approaching the coast and entering the bays. This herring is large, with the sexual organs developing. They correspond thus entirely to the "large" herring, which are caught in Norway late in the fall.

TABLE No. 8.—Sample of Herring from Newfoundland (West Coast) about beginning of November, 1914.

Percentage of Different Ages in the Sample.

5	6	7	8	9	10	11	12	13	14
0·9	0·9	.....	8·0	24·8	44·2	15·8	2·7	0·9	1·8

TABLE No. 9.—Sample of Herring from Newfoundland (West Coast) about beginning of November, 1914.

Percentage of Different Ages in the Samples.

5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3·1	2·1	8·3	2·1	3·1	18·8	43·8	5·2	2·1	1·0	2·1	5·2	1·0	1·0	..	1·0

The two tables 8 and 9 give the results of the analysis of two samples of herring from the westcoast of Newfoundland, one sample (table 8) was taken in the spring, another (table 9) in the fall of the year 1914; in all, the ages of several hundred herrings have been determined from this part of the gulf. A comparison of samples will first of all reveal the important fact that very few of the younger year-classes have been caught. This is especially the case in the samples taken in the spring (table 8), where practically no herring under 8 years are found. In the fall a little admixture of 5, 6 and 7-year old fish was found in two of the three samples (table 9).

This fact may be explained in one of two ways: either the spawning shoals of the west coast of Newfoundland, in the year 1914, consisted only of the older year-classes represented in the samples, or the younger year-classes were present but not caught by the large meshes of the fishermen's gill-nets. Which of these two explanations may be the right one cannot be decided with any definite certainty. For my own part, I am mostly inclined to the belief that the younger year-classes in the year 1914 were not very plentiful. I base this belief, which I do not wish to be regarded as anything more than a suggestion, on the fact that some of the samples contain individuals of the younger year-classes, but in small numbers; further, on my inspection of the fishermen's nets, which varied very much with regard to size of the meshes; and, in addition, the fishermen's statement, that there were but few herrings of smaller size this year, 1914. In the discussion of this question, a great need is felt of investigations as to the age when the Newfoundland herring first

reach maturity. No definite information could be obtained as to this, and it must therefore be left to future investigations, when the necessary facts in this respect can be collected. From the experience obtained through the European investigations it must be assumed that the two types of herrings, which have so much resemblance as to their rate of growth, may also reach their maturity at about the same age. If this is so, it must further be supposed that the spawning schools off the Newfoundland coasts in some years, in any case, must consist of large numbers of smaller and younger (4-, 5-, and 6-year-old fish), which to a great extent must go through the fishermen's nets and thus escape from being caught. This point, which obviously has great theoretical and practical importance, should be kept in view in any further scientific researches, as well as in practical fishing experiments, such as will undoubtedly have to be made in future. It would be of great interest if such experiments could be made, during the coming spring.

We will now, with all the precaution and reservation immediately arising from the considerations just urged, again regard the two tables (8 and 9) and especially draw attention to the comparison of the figures of the percentage for the older year-classes, which are represented in the samples in great numbers.

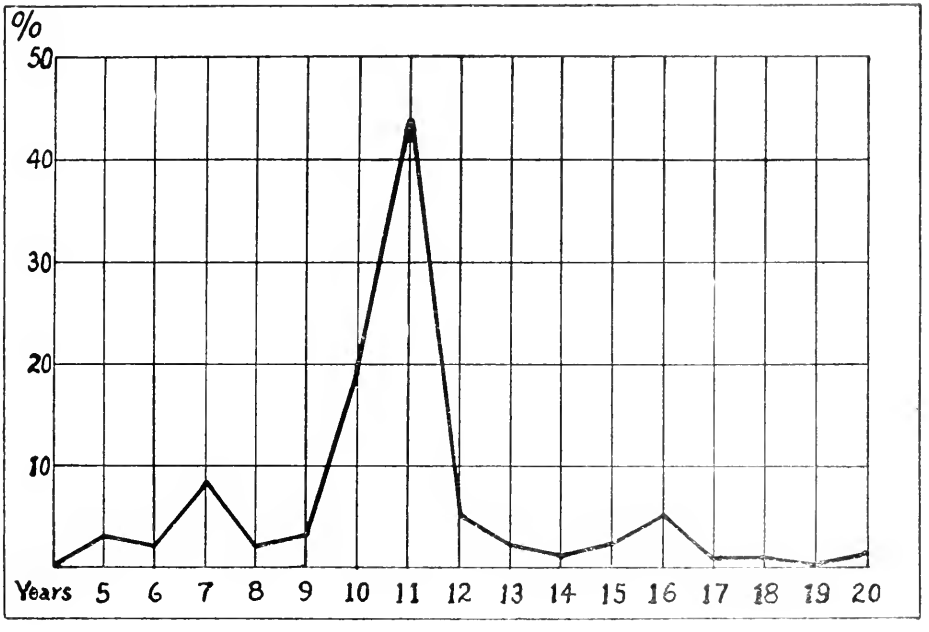

Fig. 16. Composition in point of age of fall herring from West Coast of Newfoundland (about beginning of November, 1914).

It may also be of interest to compare the two figures, 15 and 16, which are drawn on the basis of the figures contained in table 8 and 9. It will then be seen that the spring herring (table 9) for the greatest part consisted of three year-classes, the 9-, 10-, and 11-year old herring, amongst which the 10-year-old, born in the year 1904, predominated to such an extent that about half (44 per cent) of the total number of the individuals in the samples belonged to this single year-class. We have thus here again established the fact that great fluctuations occur in the number of the different year classes. Spawning schools of the Newfoundland herring resemble also in this respect the spawning schools of the Norwegian spring herring.

Still greater interest will be attached to this fact if we now compare the two tables 8 and 9. While in the table 8 the 9-, 10-, and 11-, and especially the 10-year-old herring were the dominant, we find in the samples of table 9 a preponderance of the 10-, and 11-year-old herrings, with a marked predominance amongst these year-classes of the 11-year-old herrings. The samples of the table 9 were collected in the fall (about beginning of November, 1914). The two series of herrings, that of table 8 and that of table 9 were both, it is true, caught in the same calendar year, 1914, but the series, nevertheless, belonged to two different periods of growth, to two different winter seasons. From the explanation of the methods of investigation here employed (see above, especially fig. 1), it will be remembered that the growth of the herrings exclusively takes place during summer, from April to September (inclusive). This holds good for the west coast of Norway, under the hydrographic conditions there prevalent. In the gulf of St. Lawrence the winter conditions last till late in May (a factor being the melting of the ice in the gulf), the spawning season of the fish is therefore some months later there than in the Norwegian waters, and the growth of the fish is limited to a somewhat different part of the year. In May the winter ring is still at the margin of the herring scales, and in November a new winter ring has been formed outside of the winter ring of the month of May. The individuals which in May had ten winter rings on their scales would therefore in the period from November, 1914, to May, 1915, have eleven rings marked on the scales. The two tables, 8 and 9, therefore reveal an instance of the same facts which were demonstrated for the Norwegian spring herrings (see fig. 14) that the predominance of the same year-class can be followed from one season to the other, as the same individuals again return to their own spawning areas. It is most striking that the richest year-class was that of 1904, the same year which produced such a rich stock of herrings in Norwegian waters. The far-reaching importance of this correspondence between the two stocks of herring on both sides of the Atlantic makes it still more necessary not to draw any definite conclusions from the comparatively small material which hitherto has been investigated. The reading of the Newfoundland scales is not easy. I have, therefore, felt the desire to compare my readings with those of Mr. Paul Bjerkan, and although we agree in our investigations of the samples mentioned here, I think it right to reserve any further discussion of the interesting problems which immediately arise from this study, till the whole material has been worked out. So much may in any case be said, that the samples have shown, that great fluctuations take place, and that future investigations must be carried on, if the understanding of the important biological and practical conditions of the herring fisheries of the American waters is ever to be obtained. The expedition of the coming season will, of course, have chiefly in view the continued observations upon these conditions. The Newfoundland herring forming my material are entirely confined to samples from the spring and fall schools, all of which are large mature fish. As far as I have been able to ascertain, no fishing takes place with the object in view of catching the younger, the "fat" herring. Only some few barrels of younger herring are caught in the bays for use as bait. Where then are the sizes of herrings which correspond to the Norwegian small and fat herring? Are they, as is the case along the Norwegian coast, mainly confined to some special areas of the coast or of the open waters in or outside the gulf? Do they anywhere occur in such quantities and under such circumstances that a new fishery could be developed? That the younger stages of herrings in any case must occur in larger quantities than the larger and older ones is quite clear. It may be that the younger year-classes are less numerous in a special year or shorter series of years (fig. 14), but during a longer period of years it is evident that older herring must be so much reduced in number, in comparison with the younger individuals, that the death-rate of the species will diminish their number. From our study of the growth of the Newfoundland herring it is evident that the 3, 4, 5 and 6-year-old herring, which to a larger or smaller degree may belong to the immature "fat" shoals, must possess the principal qualities of the Nor-

wegian fat herring which in Norway are caught in hundreds of thousands of barrels (cf. the table page 28). There seems to be a vast field for the most interesting scientific and practical investigations in the solution of these questions.

TABLE No. 10.—Samples of Herring from Gulf of St. Lawrence, May, 1914.

Sample.	Number of Individuals in Sample.	Percentage of Different Ages in the Samples.													
		4	5	6	7	8	9	10	11	12	13	14	15	16	17
Q_1.	43	9·3	16·3	4·7	30·2	2·3	7·0	7·0	23·3	.....	.....	.....	.....	.....	.....
M.....	151	7·3	1·3	6·0	10·6	15·2	11·3	13·3	27·2	4·6	0·7	1·3	0·7	.....	0·7

Q^1—Northumberland Strait.
M—Magdalen Islands.

Table 10 gives a summary of the percentage of the different ages in two samples from the southern part of the gulf of St. Lawrence, of which the one sample has already been treated in table 5. We find in this table many more year-classes represented than amongst the samples from Newfoundland, the younger, 4 and 5-year-old fish being more represented. There is, further, not such a strongly marked difference to be observed between the year classes. No single year-class has so much as half of the individuals of the whole sample. (See table 10.)

The 10-year-old herrings, which played such a great role in the Newfoundland material, are only very few amongst these herring from the southern part of the gulf. We find, on the other hand, a marked preponderance of the 11-year-old herrings amongst these gulf herring. There is then no correspondence with regard to the predominance of certain year-classes between the Newfoundland and the Magdalen Island herrings, just as there is no correspondence, in this respect, between the herrings of the Norwegian coast and the shoals around the British Islands. These different types live, each of them, under special conditions, not only as regards their growth but also as regards the renewal of their stock. The Magdalen Island herring have also this in common with the North Sea herring, that the fluctuations in the year-classes are smaller than in the Norwegian and the Newfoundland herring.

Between the two samples (table 10) there is an interesting difference. The Magdalen Island sample consists of older individuals than the sample from the inshore Northumberland strait. It will be necessary to investigate this more closely and to ascertain if this difference is due to the method of fishing or to some peculiarity in the life-history of these herring.

My material contains no sample of younger, immature herring, from the southern area of the gulf. It is, in this connection, of interest to note that Mr. J. J. Cowie, from the experience of his fishing experiments, has drawn attention to the occurrence of schools of younger herring in the gulf, which he compares with the Scotch "Matjes." From the investigations of the growth of these herring of the gulf it should be anticipated that the smaller and younger herring of this type must be very similar to the young North Sea herring, and the indications given by Mr. Cowie will be of the greatest interest for further investigations.

TABLE No. 11.—Samples of Herrings from Atlantic Coast of Nova Scotia, Fall, 1914.

Sample.	Number of Individuals in Sample.	Percentage of Different Ages in Sample.										
		3	4	5	6	7	8	9	10	11	12	13
A	60	5	90	5								
E	135			3	5·9	16·3	11·1	31·1	17·9	11·9	1·5	1·5

A. Young immature herrings from Halifax harbour.
E. Spawning Lockeport.

In table II, I give the result of two samples (already treated in tables 2 and 3). Sample "A" from Halifax harbour contained only young, immature herring; sample "E" mature herring from the Atlantic coast of Nova Scotia. I will here confine myself to simply setting forth figures of the table which have their chief interest through comparison that will be afforded by similar material to be collected during future investigations.

FORTY-EIGHTH ANNUAL REPORT

OF THE

FISHERIES BRANCH

DEPARTMENT OF THE NAVAL SERVICE

1914-15

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY J. DE L. TACHÉ, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1915

No. 39—1916]

To Field Marshal His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and of Strathearn, K.G., K.T., K.P., etc., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR ROYAL HIGHNESS:

I have the honour to submit herewith, for the information of Your Royal Highness and the legislature of Canada, the forty-eighth Annual Report of the Fisheries Branch of the Department of the Naval Service.

I have the honour to be,
Your Royal Highness's most obedient servant,

J. D. HAZEN,
Minister of the Naval Service.

DEPARTMENT OF THE NAVAL SERVICE,
OTTAWA, October, 1915.

ERRATA.

Page 1, New Brunswick, line 6: $1,539,629 should read $1,572,119.

Page 40, New Brunswick: Total value of catch in Green State should read $3,464,654 instead of $3,443,054.

Page 62, beginning with the second paragraph, the remainder of Inspector McLeod's report refers to his entire district (District No. 1, Nova Scotia).

Page 62, District No. 2, Nova Scotia, line 6: $1,939,299, should read $1,945,391.

Page 63, line 4: 10,892 cwts. should read 11,492 cwts.

ERRATA.

Page 331. Distribution from Long Beach Pond, 219,000,000 should read 219 egg bearing lobsters.

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DEPUTY MINISTER'S REPORT

To the Honourable
J. D. HAZEN,
Minister of the Naval Service.

SIR,—I have the honour to submit the forty-eighth annual report of the Fisheries Branch of the Department of the Naval Service, which is for the fiscal year ended March 31, 1915.

The following nineteen appendices are included:—

No. 1.—New Brunswick Fisheries.
" 2.—Prince Edward Island Fisheries.
" 3.—Nova Scotia Fisheries.
" 4.—Quebec Fisheries.
" 5.—Manitoba Fisheries.
" 6.—Saskatchewan and Alberta Fisheries.
" 7.—Yukon Fisheries.
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" 9.—Ontario Fisheries.
" 10.—Imports and Exports of Fish.
" 11.—Fish Breeding.
" 12.—Fishing Bounty.
" 13.—Fisheries Expenditure and Revenue.
" 14.—Canadian Fisheries Museum.
" 15.—United States Fishing Vessel Entries.
" 16.—Oyster Culture.
" 17.—The Fisheries Patrol Service.
" 18.—Report on the Biological Stations.
" 19.—The Outside Fisheries Staff.

Transportation of Fresh and Mildly Cured Fish.

The arrangements that obtained for assistance in this service in 1913-14 were continued in 1914-15, viz.:—

1. Payment of one-third of the express charges on less than carload lot shipments from Canadian Atlantic points to Quebec and Ontario, and from the Pacific Coast, as far east as Manitoba, inclusive.

2. An express refrigerator car one day each week from Mulgrave to Montreal, the earnings on this car being guaranteed up to those on 10,000 pounds on the trip west, plus the cost of icing the car.

3. A fast freight refrigerator service one day each week from Mulgrave and Halifax to Montreal, the earnings on the car being guaranteed up to two-thirds those of a minimum carload of 20,000 pounds, plus the cost of icing.

With the exception of No. 2, the above assistance has been effective since 1908. That it has proved of enormous benefit to the industry there is no room for doubt. At the time the Government undertook to do something to stimulate the industry, it was in a very languishing condition. Such Canadian centres as Montreal and Toronto were being largely supplied from United States ports, and the trade from the Maritime Provinces was so small that the railways did not find it feasible to place proper facilities at the disposal of the shippers.

All this has been changed, and fish is rapidly coming to be an important part of the food supply of the interior portions of the country.

It was the hope of the Department that when it was shown to the express companies that a large business could be done in the transportation of fresh and mildly cured fish, if proper facilities and cheap enough rates were made available, they would afford such, and the Government would thus be relieved of the necessity for paying any portion of the charges. Up to the moment, they have shown no disposition to reduce their rates; but even if they do not, experience is indicating that the time is approaching when the business will be large enough to enable it to be handled practically altogether in refrigerator cars hauled by fast freight. Shipments now going forward in such cars reach their destination in perfect condition, which is not always the case with consignments packed in ice in ordinary express cars. Already the shipments brought from Canso—via Mulgrave—and Halifax for the Friday markets in Montreal, Toronto, etc., have reached carload proportions, and are regularly forwarded in refrigerator cars by fast freight. Indeed, the only difficulty to having the daily shipments fowarded by fast freight is the late date at which the wholesale dealers are able to procure their orders. What seems to be needed then is the education by the wholesalers of the retailers to the desirability, in their own interests, of the latter placing their orders a few days in advance. By so doing they will not only be assured of receiving their fish in perfect condition, but at cheaper prices than if forwarded by the more expensive express method.

Last year the amount paid to the express companies was not as large as in the previous year. It does not appear that this was due to a lessening of the trade, but to a greater amount going forward in carload lots, on which the Department pays nothing, and to the more extensive use of freight.

The following statement will afford an understanding of the development of the less-than-carload lot express shipments. It shows the amounts paid by the Government as one-third of the charges under the arrangement explained by No. 1, above:

Year.	On shipments from east coast.	On shipments from west coast.
1909-10	$15,162 20	$13,541 76
1910-11	16,898 13	21,896 73
1911-12	19,620 62	35,315 10
1912-13	29,969 48	39,277 13
1913-14	37,818 85	44,114 47
1914-15	26,667 33	34,528 60

This statement indicates but a small part of the total business done. In addition to the less-than-carload lot shipments by express, several carloads of halibut and salmon per week are shipped from the Pacific coast to Winnipeg, Toronto and Montreal, while, as indicated above, large shipments in carload lots by fast freight are made weekly throughout the season from the Atlantic coast. Moreover, during the whole winter season the large quantities of frozen fish that are used are nearly all shipped by freight.

The express refrigerator car from Mulgrave was rather a disappointment. It was anticipated that it would have been availed of to a greater extent than during the initial season, but such did not prove to be the case. It was started on May 30, and was continued until January 16. It appears doubtful if it is proving of sufficient value to warrant the expense of continuing it another season. The shipments carried in it are shown in the following statement. For convenience those over the guarantee of 10,000 pounds are placed in one column, and those under it in another, but the total weight of the shipments are given in each case. It will be remembered that in addition to making up whatever may be involved in the guarantee, the Department also pays the usual one-third of the express charge, so as to enable delivery to be made at the same rate:—

Date.	Over Guarantee.	Under Guarantee.
1914.	Lbs.	Lbs.
May 30	18,125	
June 6	11,087	
" 13	14,734	
" 20		6,102
" 27		7,200
July 4		7,600
" 11		7,970
" 18		5,500
" 25		9,426
Aug. 1		4,050
" 8		5,610
" 15		6,462
" 22		7,950
" 29	11,810	
Sept. 5		2,760
" 12	19,285	
" 19	12,338	
" 26		8,265
Oct. 3		6,335
" 10		7,760
" 17	12,785	
" 24		7,675
" 31	10,630	
Nov. 7	13,330	
" 14	16,075	
" 21	14,500	
" 28	17,180	
Dec. 5	17,350	
" 12		8,105
" 19	16,190	
" 26		7,422
1915.		
Jan. 2		6,050
" 9	14,425	
" 16	11,701	

As would naturally follow, the expansion of the trade in fresh and mildly cured fish is satisfactorily reflecting itself on the fishing industry. For instance, motor boats were being used to a trifling extent only when this service was inaugurated, while this year the fishermen were using 9,302 of them.

Fisheries Exhibit at the Canadian National Exhibition at Toronto.

The fisheries exhibit at this exhibition, which was given last year for the first time, was repeated this year on a larger and better scale, and again proved to be one of the leading attractions at the Fair.

In addition to the twenty-ton refrigerator, with a glass front, in which to display all kinds of frozen fish, there was installed this year a large chilled show case, in which fresh fish were attractively displayed. The case is shaped somewhat like a roof, so that fish can be shown on both sides. The temperature in this case was maintained at about 35° Fahrenheit, so that no ice was needed about the fish. The object of this case was twofold, viz., to enable the fresh and mildly cured fish to be most attractively shown, and to indicate to retailers the ideal method of handling such fish.

In view of the great interest taken in the exhibit last year by the patrons of the Fair, it was considered that its effectiveness would be clinched if a Fisheries Restaurant were operated on the grounds, at which a first-class fish dinner could be obtained at a moderate price. Indeed arrangements were about completed for the operation of such a restaurant when the war broke out. As it was feared that the war might seriously interfere with the success of the exhibition as a whole, it was decided to cancel the arrangements for the restaurant. It is hoped, however, that next year it will be found feasible to have a restaurant operated, as there seems no room for doubt that it will do a great deal to enhance the value of the exhibit.

A gold medal was again awarded the exhibit this year, and the effect of the exhibit in showing to the people the desirability of freely using fish for food in their homes was undoubtedly far reaching.

The Department wishes to express its appreciation of the displays made by the Maritime Fish Corporation, Limited, of Montreal, and the F. T. James Fish Company, Limited, of Toronto, who again this year co-operated with it in making the exhibit, as well as of their general assistance and co-operation in making the whole exhibit the splendid success it was.

Daily Bait Reports.

For the purpose of assisting masters of fishing vessels to locate bait supplies during the cod fishing season, and thus avoid the great loss of time annually spent in searching for bait from harbour to harbour, the Department, in the course of the season, 1914, continued the system whereby definite information concerning supplies of bait along certain stretches of the Atlantic seaboard was collected by the local officer of the Department, and despatched, daily, by telegram, to certain important sea ports, and there posted up.

The number of ports selected as receiving stations had necessarily to be limited, but through the courtesy of the daily papers in Nova Scotia, in which the telegrams were published each day, the smaller fishing communities derived the benefit of direct advice as to available supplies of bait.

During the spring 155 telegrams were sent from the Magdalen islands, Souris, P.E.I., and Queensport, N.S., to Canso, Halifax, Lunenburg, and Riverport, N.S. During July and August 489 telegrams were sent from Little Bras d'Or, Petit de Grat, Lower L'Ardoise, Canso, Wine Harbour, Tangier, and Musquodoboit Harbour, N.S., to North Sydney, Canso, Halifax, Lunenburg, Riverport, and Shelburne, N.S.; also from Lockeport, N.S., to Canso, Halifax, Lunenburg, and Riverport, N.S.; from Shag Harbour, Middle West Pubnico and Digby, N.S., to Halifax, Lunenburg, Shelburne and Lockeport, N.S.

During September, October, November and December, 111 telegrams were sent from Campobello, N.B., covering information from the counties of Charlotte and St. John to Digby, Yarmouth, Pubnico, and Clark's Harbour, N.S.

The information contained in the telegrams proved a decided benefit as well to line fishermen who were in need of bait, as to net fishermen who had bait to sell.

Fish Inspection Act.

In view of the fact that the pickled fish industry of Canada, owing to the poor leaky packages of varying size which are commonly used and to the lack of a uniform system of grading the fish, together with careless unsystematic packing, has been in a languishing condition for a long time, there was passed in June, 1914, an Act to provide for the inspection and branding of pickled fish, such as mackerel, herring, alewives, and salmon. The object aimed at by the Act is to bring into use a strong well-made barrel of a fixed or standard size for marketing such fish in; also to raise the general standard of curing and grading the fish, so that the cured article may secure the confidence of dealers and consumers at home and abroad and be traded in with advantage to the producer and dealer alike.

The Act comes into force in May, 1915. It does not make inspection compulsory, however, but with a rigid enforcement of the regulations when application is made for inspection, it is expected that the Government brand will in a short time become such a guarantee of quality in the trade, that in due course merchants will refuse to buy goods that do not show the Government brand.

A staff of competent inspectors will be appointed to carry out the provisions of the Act. They will strictly examine all pickled fish presented to them for inspection, and, provided the barrel is of the standard size and make and the fish packed and graded in accordance with the Act and its regulations, will apply, with a hot iron to each barrel so conforming to the requirements, a brand showing the kind and grade of fish, the year of branding and the initials or number of the inspecting officer.

By means of public meetings and the distribution of printed instructions, the Department has made the meaning and intention of the Act clear to fishermen and packers. Notwithstanding this, however, it is not anticipated that during the first year's operation of the Act, at least, the calls for inspection will be very numerous, as many barrels of the old size remain to be used up, and further, as there may exist a natural feeling of uncertainty amongst fishermen as to whether branded fish will bring them more money. Some packers here and there will, however, have faith enough to make use of the brand from the beginning; and when the branded fish have been once placed upon the markets and have become known to the buyers, inspection and branding will no doubt rapidly become general along the coast.

Inspection of Fish Canneries.

In the course of the year under review the administration of that part of the Meat and Canned Foods Act which deals with the canning of fish, was taken over by this Department, from the Department of Agriculture. A systematic inspection of all lobster, salmon and other fish canneries, by the Department's Fishery Overseers on the Atlantic coast, and by three specially appointed Inspectors on the Pacific coast, was thereupon instituted, with a view to ensuring that the various kinds of fish and shell-fish be prepared for canning under proper sanitary conditions, and to prevent the canning of unsound fish.

The experience that the Department has thus gained, and the information secured through the reports of the Inspectors will be duly utilized in framing improved regulations for the continued supervision of this branch of the fishing industry.

Marine Biological Stations.

During the year a full staff of scientific workers, from the various Universities of the Dominion, carried on fishery and technical researches at the Atlantic Station, St. Andrews, N.B., and at the Pacific Station, Departure Bay, B.C. There were thirteen scientists at the former institution, the Curator in charge being Dr. James W. Mavor, while five members of the staff engaged in special investigations at the Vancouver island laboratory, Dr. McLean Fraser again performing the duties of curator. The life-histories, especially the rate of growth, of a number of important food-fishes, was followed up with success; the study of certain epidemic diseases, their nature and causes, in the case of the herring in New Brunswick, and the quahaug or hard shell clam, and the problem of oyster culture on Prince Edward island, and the extent and possible utilization of the British Columbia kelp beds, were amongst the lines of research pursued. Reports on these researches, and on the other work of the stations, have been completed, and two separate volumes of biological memoirs are ready for issue. A comprehensive study of the Atlantic herring resources of Canada is being arranged, the services of the famous Norwegian fishery expert, Dr. Johan Hjort, being available by the consent of the Government of Norway, and the Biological Board have arranged a detailed plan of work, from which important results may be anticipated.

A report by Professor Prince, Chairman of the Biological Board, on the work done at the various stations during the year, forms Appendix 18 to this Report.

GENERAL REVIEW.

Extent of Fisheries.

To say that Canada possesses the most extensive fisheries in the world is no exaggeration; moreover, it is safe to add that the waters in and around Canada contain the principal commercial food fishes in greater abundance than the waters of any other part of the world. The extraordinary fertility of what may be called our own waters is abundantly proved by the fact that, apart from salmon, all the lobsters, herring, mackerel and sardines, nearly all the haddock, and many of the cod, hake, and pollock landed in Canada are taken from within our territorial waters.

The coast line of the Atlantic provinces, from the Bay of Fundy to the Strait of Belle Isle, without taking into account the lesser bays and indentations, measures over 5,000 miles; and along this great stretch are to be found innumerable natural harbours and coves, in many of which valuable fish are taken in considerable quantities with little effort.

On the Pacific coast, the province of British Columbia, owing to its immense number of islands, bays and fiords, which form safe and accessible harbours, has a sea-washed shore of 7,000 miles.

Along this shore and within the limits of the territorial waters, there are fish and mammals in greater abundance, probably, than anywhere else in the whole world.

In addition to this immense salt-water fishing area, we have in our numerous lakes no less than 220,000 square miles of fresh water, abundantly stocked with many species of excellent food fishes. In this connection it may be pointed out that the area of the distinctly Canadian waters of what are known as the Great Lakes—Superior, Huron, Erie and Ontario—forms only one-fifth part of the total area of the larger fresh-water lakes of Canada.

The fisheries of the Atlantic coast may be divided into two distinct classes: the deep-sea and the inshore or coastal fisheries.

The deep-sea fishery is pursued in vessels of from 40 to 100 tons, carrying crews of from 12 to 20 men. The fishing grounds worked on are the several banks which lie from 20 to 90 miles off the Canadian coast. The style is that of "trawling" by hook and line. The bait used is chiefly herring, squid and capelin; and the fish taken are principally cod, haddock, hake, pollock and halibut.

The inshore or coastal fishery is carried on in small boats with crews of from two to three men; also in a class of small vessels with crews of from four to seven men. The means of capture employed by boat fishermen are gill-nets, hooks and lines, both hand-line and trawl; and from the shore are operated trap-nets, haul seines, and weirs. The commercial food fishes taken inshore are the cod, hake, haddock, pollock, halibut, herring, mackerel, alewife, shad, smelt, flounder and sardine. The most extensive lobster fishery known is carried on along the whole of the

eastern shore of Canada, whilst excellent oyster beds exist in many parts of the Gulf of St. Lawrence, notably on the north coast of Prince Edward island, and in the Northumberland strait.

The salmon fishery is, of course, the predominant one on the Pacific coast, but a very extensive halibut fishery is carried on in the northern waters of British Columbia in large, well-equipped steamers and vessels. The method of capture is by trawling, dories being used for setting and hauling the lines, as in the Atlantic deep-sea fishery. Herring are in very great abundance on the Pacific coast, and provide a plentiful supply of bait for the halibut fishery.

In the inland lake fisheries, the various means of capture in use are gill-nets, pound-nets, seines and hook-and-line to a great extent. The principal commercial fishes caught are whitefish, trout, pickerel, pike, sturgeon and fresh-water herring—the latter in the lakes of Ontario only.

Value of the Fisheries.

The total marketed value of all kinds of fish, fish products and marine animals taken by Canadian fishermen from the sea and inland lakes and rivers during the fiscal year ended March 31, 1915, amounted to $31,264,631, as against $33,207,748 for the preceding twelve months, a decrease of $1,943,117. This drop in value is due entirely to the fact that the preceding year was one in the cycle of four in which the run of salmon to the Fraser river is greatest. The year under review, therefore, was a lean year on the Fraser, which caused the value of salmon taken in that district to fall $2,863,280 below the value for the preceding fat year. But, while the Fraser river salmon value dropped greatly, the salmon value in the northern district of British Columbia, which includes Rivers inlet, Skeena river and Naas river, increased by $892,610.

There was a falling off of over $500,000 in the value of the Nova Scotia fisheries, caused partly by the lowered value of canned lobsters, brought about by the war conditions in the latter half of the 1914 season, and partly by a poor mackerel fishery, which, also owing to war conditions, did not yield the value that would in normal times be expected to follow a shortage in supply.

The considerable falling off in Nova Scotia was more than offset, however, by an increase of over $600,000 in the value of the New Brunswick fisheries. This very substantial increase in New Brunswick is largely due to an abundant sardine fishery in the Bay of Fundy district, together with the high price paid for these fish throughout the season.

The value of the fisheries of Ontario, Quebec, Manitoba, Alberta and the Yukon, as will be seen in a table which follows, have increased; while the value of the Prince Edward island and Saskatchewan fisheries have fallen off somewhat.

To the total value of the fisheries of Canada, the sea fisheries contributed $27,198,257, and the inland fisheries $4,066,374.

There were 1,892 vessels, tugs and carrying smacks, and 29,842 boats used in the prosecution of the fisheries during 1914-15. These were manned by 69,954 men.

In the various fish and smoke-houses, canneries and freezers on shore, 24,559 persons were employed cleaning and preparing the fish for market. Of the total number of those employed on sea and shore, 84,108 were connected with the sea fisheries, and 10,405 with the inland fisheries.

Gasoline boats have come to be such an enormous benefit to fishermen that the number used in the fisheries is increasing fast from year to year. In the year under review there were 9,302 in use, or 602 more than in the preceding year. In four years the number of gasoline boats has thus increased from 4,588 to 9,302.

The following table shows the value produced from the fisheries of each province in its respective order of rank, with the increase or decrease, as compared with the year 1913-14:—

Province.	Value Produced.	Increase.	Decrease.
	$	$	$
British Columbia	11,515,086		2,376,312
Nova Scotia	7,730,191		567,435
New Brunswick	4,940,083	631,376	
Ontario	2,755,291	80,606	
Quebec	1,924,430	74,003	
Prince Edward island	1,261,666		18,781
Manitoba	849,422	243,150	
Saskatchewan	132,017		16,585
Alberta	86,720	5,401	
Yukon	69,725	1,460	
Totals	31,264,631	1,035,996	2,979,113
Net Decrease			$1,943,117

The following table shows the quantity of the chief kinds landed in the whole of Canada during 1914-15, and during the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	1,409,828	1,551,411	1,253,997	1,136,732
*Lobsters	408,816	514,646	555,138	589,141
Cod	1,820,025	1,664,599	1,729,070	2,097,260
Haddock	566,002	405,633	503,822	530,221
Hake and Cusk	262,897	353,598	349,395	275,755
Pollock	159,788	150,094	143,324	250,881
Halibut	239,920	256,096	282,658	245,609
Herring	2,118,291	2,484,219	2,484,673	2,251,278
Mackerel	143,712	215,442	107,964	90,141
Sardines (Brl.)	298,885	141,384	281,548	404,383
Alewives	90,935	61,768	117,614	75,567
Smelts	93,771	88,728	102,360	81,748
Whitefish	159,894	137,887	140,404	131,515
Trout	67,890	73,164	73,664	80,638
Pickerel	97,555	61,603	64,839	79,610
Pike	97,724	64,925	62,492	80,328
Sturgeon	4,871	4,811	10,035	9,145
Oysters (Brl.)	26,545	29,828	23,377	31,746
Clams and Quahaugs "	87,972	121,335	105,303	103,347

* During 1914 the quantity of green lobsters allowed to a case of canned was 200 lb., instead of 250 lb. in the preceding years.

The following table shows the relative value of the chief commercial fishes returning $100,000 and upwards, in their order of rank, for the year under review, with the amount of increase or decrease, when compared with the values for the year 1913-14:—

Kind of Fish.	Value.	Increase.	Decrease.
	$	$	$
Salmon	8,560,386		2,273,327
Lobsters	4,339,929		370,133
Cod	3,886,134	499,025	
Herring	2,735,257		437,872
Halibut	1,793,283		243,117
Sardines	1,349,615	672,947	
Haddock	1,244,840	403,329	
Whitefish	975,685	45,723	
Smelts	837,682	27,290	
Mackerel	826,846		453,473
Pickerel	657,783	208,244	
Trout	623,504		59,115
Pike	469,919	97,051	
Hake and Cusk	313,921		177,058
Clams and Quahaugs	282,876		85,449
Pollock	214,195	26,472	
Oysters	177,979	4,226	
Tullibee	156,529	92,619	
Perch	115,220	42,235	
Alewives	106,906	21,461	

In the table which follows, the total results of the sea and inland fisheries are given separately. In the first two columns are shown the catch of all kinds of sea fish, and its value as realized at the vessel's or boat's side; while in the third and fourth columns are shown the various modes in which the catch was marketed, and the market value of each kind of fish. In the fifth and sixth columns are shown the quantity and value of all kinds of fresh-water fish caught and marketed. Such fish being practically all marketed by the fishermen in its fresh state, no distinction is made between the value of the catch as landed, and its marketed value. In the outer columns are shown the total marketed quantities of the various kinds of both sea and fresh-water fish and the market values of the same.

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products marketed in a fresh, dried, pickled, canned, etc., state, for the **Whole of Canada**, during the year 1914-15.

Kinds of Fish.	Sea Fisheries.				Inland Fisheries.		Both Fisheries.		Total Marketed. Value.
	Caught and Landed.		Marketed.		Caught and Marketed		Total Marketed.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Salmon ..... Cwt.	1,406,718	5,772,766	.....	.....	.....	.....	.....	.....	
" used fresh ..... "	.....	.....	248,101	1,922,315	3,110	36,070	251,211	1,958,385	
" canned ..... cases	.....	.....	1,134,973	5,675,518	.....	.....	1,134,973	5,675,518	
" salted (dry) ..... Cwt.	.....	.....	120,315	540,435	.....	.....	120,315	540,435	
" mild cured ..... "	.....	.....	26,372	289,020	.....	.....	26,372	289,020	
" smoked ..... "	.....	.....	7,952	83,528	.....	.....	7,952	83,528	
" pickled ..... "	.....	.....	900	13,500	.....	.....	900	13,500	
									8,560,386
Lobsters ..... "	408,816	2,990,410	.....	.....	.....	.....	.....	.....	
" canned ..... cases	.....	.....	160,903	3,048,993	.....	.....	160,903	3,048,993	
" shipped in shell ..... Cwt.	.....	.....	86,824	1,290,936	.....	.....	86,824	1,290,936	
									4,339,929
Cod ..... "	1,820,025	2,957,053	.....	.....	.....	.....	.....	.....	
" used fresh ..... "	.....	.....	134,362	568,457	.....	.....	134,362	568,457	
" green-salted ..... "	.....	.....	181,925	599,811	.....	.....	181,925	599,811	
" smoked ..... "	.....	.....	711	6,637	.....	.....	711	6,637	
" dried ..... "	.....	.....	439,440	2,710,165	.....	.....	439,440	2,710,165	
" smoked fillets ..... "	.....	.....	133	1,064	.....	.....	133	1,064	
									3,886,134
Haddock ..... "	566,002	907,645	.....	.....	.....	.....	.....	.....	
" used fresh ..... "	.....	.....	138,926	279,572	.....	.....	138,926	279,572	
" smoked ..... "	.....	.....	72,430	547,314	.....	.....	72,430	547,314	
" canned ..... Cases	.....	.....	.....	.....	.....	.....	.....	.....	
" dried ..... Cwt.	.....	.....	88,784	403,018	.....	.....	88,784	403,018	
" green-salted ..... "	.....	.....	7,468	14,936	.....	.....	7,468	14,936	
									1,244,840

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products marketed in a fresh, dried, pickled, canned, etc., state, for the **Whole of Canada**, during the year 1914-15—*Continued.*

Kinds of Fish.	Sea Fisheries.				Inland Fisheries.		Both Fisheries.		Total Marketed Value.
	Caught and Landed.		Marketed.		Caught and Marketed		Total Marketed.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Hake and Cusk ..... Cwt.	262,897	236,637							
" used fresh ..... "			8,965	9,350			8,965	9,350	
" dried ..... "			84,266	304,235			84,266	304,235	
" green-salted ..... "			168	336			168	336	
									313,921
Pollock ..... "	159,788	158,105							
" used fresh ..... "			20,274	26,430			20,274	26,430	
" dried ..... "			45,863	186,869			45,863	186,869	
" green-salted ..... "			448	896			448	896	
									214,195
Herring ..... "	2,025,984	1,622,554							
" used fresh ..... "			172,142	503,441	80,636	400,681	252,778	904,122	
" canned ..... Cases			3,350	16,750			3,350	16,750	
" smoked ..... Cwt.			86,555	304,272	1,202	12,020	87,757	316,292	
" dry salted ..... "			236,461	359,014			236,461	359,014	
" pickled ..... Brl.			126,098	524,288	3,089	30,890	129,187	555,178	
" used as bait ..... "			291,584	505,374			291,584	505,374	
" used as fertilizer ..... "			156,288	78,527			156,288	78,527	
									2,735,257
Mackerel ..... Cwt.	143,712	689,362							
" used fresh ..... "			70,815	550,748			70,815	550,748	
" salted ..... Brl.			24,277	276,098			24,277	276,098	
									826,846
Shad ..... Cwt.	4,452	30,213							
" used fresh ..... "			3,762	31,899	922	4,610	4,684	36,509	

" salted	Brl.			230	3,450	45	225	275	3,675		40,184
Alewives	Cwt.	86,561	79,528								
" used fresh	"			25,197	33,568	4,374	8,748	29,571	42,316		
" salted	Brl.			20,451	64,590			20,451	64,590		106,906
Sardines	Brl.	298,885	896,355								
" canned	Cases			103,000	515,000			103,000	515,000		
" sold fresh	Brl.			278,305	834,615			278,305	834,615		1,349,615
Halibut, used fresh	Cwt.	239,920	1,242,955	239,920	1,793,283			239,920			1,793,283
Flounders	"	7,353	11,186	7,353	28,220			7,353			28,220
Smelts	"	93,771	542,441	93,771	837,682			93,771			837,682
Mullets	"					9,158	9,158	9,158			9,158
Skate	"	768	1,672	768	6,129			768			6,129
Whiting	"	137	371	137	1,096			137			1,096
Trout	"	4,550	41,540	4,550	46,746	63,340	576,758	67,890			623,504
Soles	"	4,824	18,898	4,824	36,648			4,824			36,648
Albacore	"	4,741	17,174	4,741	13,971			4,741			18,971
Oulachans	"	13,642	68,116	13,642	71,036			13,642			71,036
Sturgeon	"	1,237	10,227	1,237	23,736	3,634	46,111	4,871			69,847
Bass	"	3,351	33,016	3,351	39,914	715	7,521	4,066			47,435
Eels	"	3,763	17,878	3,763	24,620	8,520	51,258	12,283			75,878
Tom cod	"	20,017	29,875	20,017	40,007			20,017			40,007
Swordfish	"	4,982	22,952	4,982	24,780			4,982			24,780
Whitefish	"					159,894	975,685	159,894			975,685
Pickerel	"					97,555	657,783	97,555			657,783
Perch	"	344	1,980	344	2,064	22,718	113,156	23,062			115,220
Pike	"					97,721	469,919	97,724			469,919
Tullibee	"					50,946	156,529	50,916			156,529
Maskinongé	"					105	1,411	105			1,411
Catfish	"					6,823	52,147	6,823			52,147
Octopus	"	98	453	98	980			98			980
Goldeyes	"					7,327	14,643	7,327			14,643
Carp	"					27,897	55,794	27,897			55,794
Mixed fish	"	14,023	26,739	14,023	40,147	116,105	375,738	130,128			415,885
Squid	Brl.	2,719	7,735	2,719	9,954			2,719			9,954
Oysters	"	26,545	135,738	26,545	177,979			26,545			177,979
Clams, Quahaugs and Scallops	"	87,972	149,816								
" used fresh	"			69,669	175,814			69,669	175,814		
" canned	Cases			18,303	107,062			18,303	107,062		282,876
Capelin (bait fish)	Brl.	27,063	6,813	27,063	6,813			27,063			6,813
Dulse, Crabs and Cockles, etc	Cwt.	11,448	34,357	8,608	59,273			8,608			59,273
Tongues and Sounds	"			1,045	7,565			1,045			7,565
Caviare	"			2	400	91	9,017	93			9,417
Sturgeon bladders	No.					837	502	837			502
Whales	"	659	237,800								
Hair Seals	"	6,345	4,807								
Hair Seal skins	"			6,345	6,557			6,345			6,557

RECAPITULATION—*Concluded.*

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products marketed in a fresh, dried, pickled, canned, etc., state, for the **Whole of Canada**, during the year 1914-15—*Concluded.*

Kinds of Fish.	Sea Fisheries.				Inland Fisheries.		Both Fisheries.		Total Marketed Value.
	Caught and Landed.		Marketed.		Caught and Marketed		Total Marketed.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Fur Seals..... No.	352	10,560							
Fur Seal skins..... "			352	10,560			352		10,560
Whale oil..... Gal.			926,900	283,154			926,900		283,154
Fish oil..... "			391,650	121,521			391,650		121,521
Fertilizer..... Ton.			2,966	54,611			2,966		54,611
Glue material..... "			31	310			31		310
Whalebone and Meal..... Cwt.			210	4,350			210		4,350
Glue..... Gal.			6,080	4,560			6,080		4,560
Hake Sounds, dried..... Cwt.			720	6,386			720		6,386
Fish skins..... Ton.			6	360			6		360
Totals.....		19,015,727		27,198,257		4,066,374			31,264,631

The Number of Persons Employed and Amount of Capital Invested.

In the year under review there were 94,513 persons engaged in the work of the fisheries. Of this number, 84,108 were engaged in the sea and 10,405 in the inland fisheries The total number is less than that for the preceding year by 4,156. Of the total, 9,400 were employed on vessels, tugs and smacks, 60,554 on boats, and 24,559 in canneries, freezers and fish houses, etc.

The amount of capital invested in the form of value of vessels, boats, fishing gear and fixtures on shore, fell from $27,464,033 in the preceding year, to $24,733,162 in the year now being reviewed.

The value of vessels, boats and gear, amounted to $14,038,574, and of canneries, fish houses and fixtures on shore, to $10,694,588.

Of the total for 1914-15, $22,331,072 represents the amount invested in the sea fisheries, and $2,402,090 that invested in the inland fisheries.

The following table shows the details of the number and value of vessels, boats and gear, etc., and the number of persons employed in the fisheries throughout the whole of Canada:—

RECAPITULATION

Of the Number of Fishermen, etc, and of the Number and Value of Fishing Vessels, Boats, Nets. Traps, etc., used in the Sea and Inland Fisheries in the Whole of Canada, for the Year 1914-15.

	Sea Fisheries.		Inland Fisheries.		Total, Both Fisheries.	
	Number.	Value.	Number.	Value.	Number.	Value.
		$		$		$
Steam fishing vessels	48	804,700	177	639,000	225	1,443,700
Sailing and gasoline vessels	1,236	2,717,425			1,236	2,717,425
Boats (sail and row)	25,105	1,068,912	4,737	180,109	29,842	1,249,021
" (gasoline)	8,740	2,520,234	562	188,657	9,302	2,708,891
Carrying smacks	431	229,535			431	229,535
Gill nets, seines, trap and smelt nets, etc.	147,824	2,345,970	53,467	966,975	201,291	3,312,945
Weirs	860	513,770	188	48,150	1,048	561,920
Trawls	19,485	194,796			19,485	194,796
Spears			190	308	190	308
Skates of gear	1,850	32,500			1,850	32,500
Hand lines	67,323	55,834	8,968	13,777	76,291	69,611
Eel traps			164	179	164	179
Crab traps	53	636			53	636
Lobster traps	1,596,538	1,517,107			1,596,538	1,517,107
" canneries	696	663,210			696	663,210
Salmon "	77	2,839,213			77	2,839,213
Clam "	21	29,250			21	29,250
Sardine "	6	357,000			6	357,000
Freezers and ice houses	845	2,440,011	633	210,300	1,478	2,650,311
Smoke and fish houses	7,740	1,338,405	187	36,655	7,927	1,375,060
Fishing piers and wharves	2,638	2,231,124	146	53,980	2,784	2,285,104
Whaling stations	5	360,000			5	360,000
Oil factories	1	40,000			1	40,000
Fishing huts and cottages, etc			55	64,000	55	64,000
Scows, pile drivers, etc	554	31,440			554	31,440
Totals		22,331,072		2,402,090		24,733,162

RECAPITULATION—*Continued.*

Of the Number of Fishermen, etc., and the Number and Value of Fishing Vessels, Boats, Nets, Traps, etc., used in the Sea and Inland Fisheries in the Whole of Canada, for the Year 1914-15.

—	Sea Fisheries.	Inland Fisheries.	Total, Both Fisheries
	Number.	Number.	Number.
Number of men employed on vessels	7,800	882	8,682
" " " boats	51,424	9,130	60,554
" " " carry smacks	718	.....	718
" persons employed in fish houses, freezers, canneries, etc.	24,166	393	24,559
Totals	84,108	10,405	94,513

REVIEW OF THE FISHERIES OF EACH PROVINCE.

NEW BRUNSWICK.

The total marketed value of the fisheries of this province for the year 1914-15 amounted to $4,940,083, and gives an increase of $631,376 over the total for the preceding year. This substantial increase is largely due to an abundant sardine fishery in the Bay of Fundy district, together with the high price paid for these fish.

The north shore of the province, however, also shows an increased value of over $155,000, due chiefly to increased activity in the mackerel fishery.

The amount of capital invested in vessels, boats, fishing gear and fixtures throughout the province, is placed at $3,765,020 for the year under review. This is an advance of $164,473 since the preceding year.

There were 1,412 men engaged in the work of the fisheries on vessels, 14,413 in boats, and 120 in carrying smacks; while 6,089 persons were employed in the various fish and smoke houses on shore, making a grand total of 22,034, as against 21,876 in the year preceding.

District No. 1.

The total marketed value of the fisheries of this district, which comprises the counties of Charlotte and St. John, amounted to $2,049,322, which gives an increase of $477,203 over the total for last year; further, this total is about 25 per cent greater than the average value of the yield for the previous eight years. This very large increase is almost entirely due to the sardine fishery. Fish were plentiful and prices high. Some of the weirs secured phenomenal catches and returned large sums of money to their owners.

The following table shows the quantities of the chief kinds landed during the year under review, and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Lobsters	9,337	11,751	12,410	8,539
Herring	92,726	197,297	189,200	190,660
Sardines (brl.)	298,585	141,384	280,282	403,103
Pollock	53,875	70,862	47,954	58,210
Hake	61,370	65,180	97,524	79,412
Salmon	3,724	3,998	3,295	3,353
Cod	23,300	18,832	25,253	18,160

The falling off in the lobster catch this year was due to very unfavourable weather, which made fishing impossible in the early part of the season. With improved weather during the remainder of the season the catch was about normal.

The amount of money invested in fishing material in this district increased from $1,923,874 last year to $2,065,896 this year.

There were 351 men engaged in vessels and carrying smacks, 2,203 men in boats and 939 persons in fish houses on shore; making a total of 3,493 persons employed, which is 274 less than the total for the preceding year.

District No. 2.

The total marketed value of the fisheries of this district, which comprises the counties of Albert, Westmorland, Kent, Northumberland, Gloucester and Restigouche, amounted to $2,849,820, which constitutes an increase of $155,180 over the total for the preceding year. The increase is derived largely from the mackerel fishery. Lobsters, cod, alewives, smelts and oysters also contribute more or less to the increase; while the value of herring fell off considerably, owing to a decreased catch caused by bad weather during the herring season.

The quantities of the chief kinds landed during the year under review, and the three preceding years, are shown in the following table:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	12,497	13,090	10,004	9,144
Lobsters	59,719	66,426	71,768	83,343
Cod	229,338	221,603	218,683	180,400
Herring	546,096	670,829	565,482	552,729
Mackerel	29,857	16,831	6,010	5,671
Smelts	65,105	60,059	79,854	64,179
Clams and quahaugs (brl.)	15,130	29,214	22,416	33,674

The falling off shown in the salmon catch was confined to Gloucester and Kent counties; Restigouche, Northumberland and Westmorland counties gave considerable increases, but not quite enough to offset the shortage in Gloucester and Kent.

The mackerel fishery in this district is growing in importance from year to year. Its value for the year under review is $117,822 greater than that for the year before.

The amount of capital invested in vessels, boats and fishing material, etc., belonging to this district, amounted to $1,589,925, which gives an increase of $22,465 when compared with the total investment in the previous year.

There were 1,140 men engaged in the fisheries on vessels, 10,992 in boats, 41 on carrying smacks, and 5,150 persons employed in fishing establishments on shore; making a grand total of 17,253 persons engaged in the work of the fisheries in the district, which is an increase of 313.

District No. 3 (Inland).

The total marketed value of the fisheries of this district, which includes the counties of Kings, Queens, Sunbury, York, Carleton, Victoria and Madawaska, amounted to $40,941, which is $1,007 less than the total for the preceding year. A greatly reduced catch of bass practically accounts for the difference in value between the two years.

The following table shows the catches of the chief kinds landed during the year under review, and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	835	897	578	520
Trout	651	728	574	579
Pickerel	480	528	897	658
Alewives	4,374	3,810	4,288	3,760
Shad	967	839	821	709

The amount of capital invested in fishing boats, gear and club houses in this district amounted to $109,199, which shows very little difference from that for the preceding year.

There were 119 more men employed in boats than during the year before.

In Appendix No. 1 there will be found fuller details of the fisheries of New Brunswick.

PRINCE EDWARD ISLAND.

The total marketed value of the fisheries of this province during the year that is being reviewed amounted to $1,261,666, which shows a decrease of $18,781 from the total for the preceding year.

The values of lobsters and smelts combined increased by over $200,000, but the values of cod, herring, mackerel, oysters and clams, taken together, fell off by $221,000, and wiped out the increase from lobsters and smelts.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Lobsters	88,341	92,898	136,992	118,090
Cod	29,542	59,022	49,876	49,653
Hake	22,500	25,191	38,751	16,600
Herring	55,032	85,295	83,391	79,178
Mackerel	9,215	11,496	5,448	5,005
Oysters	7,823	12,951	8,631	8,835
Smelts	19,326	9,777	10,545	5,688
Clams and quahaugs	2,748	18,966	4,985	8,083

Scarcity of bait and the prevalence of dogfish caused the falling off in the cod fishery.

The amount of capital invested in vessels, boats, gear and fixtures on shore, amounted to $1,030,464 in the year under review, which is greater than that for the preceding year by $81,797.

There were 83 men engaged in the work of the fisheries on vessels, 3,265 on boats, 12 in carrying smacks, and 2,472 persons employed in fish and smoke houses; making a grand total of 5,832, which, however, falls below the total for the year before by 432.

In Appendix No. 2 will be found fuller details of the fisheries of this province.

NOVA SCOTIA.

The total marketed value of fish and fish products of this province for the year 1914-15 amounted to $7,730,191. This is a decrease of $567,435 from the total for the preceding year. The values of cod, haddock and herring, taken together, advanced beyond those for the preceding season by $570,372, but this large increase was not sufficient to offset the big drop in the combined values of lobsters, hake and mackerel, which show a decrease of $1,075,393.

The value of lobsters was affected considerably by war conditions in the latter half of the 1914 season; while the mackerel fishery seems to have undergone one of those poor seasons which we have periodically, owing to the erratic movement of this fish along our shores.

The amount of capital invested in vessels, boats, gear and fixtures on shore in this province is placed at $7,568,821 for the year under review; this shows an advance of $458,611 since the preceding year.

There were 5,684 men engaged in the work of the fisheries in vessels and smacks, 16,922 in boats, and 6,758 persons employed in fish and smoke houses on shore; making a grand total of 29,364, which is 485 greater than that for the year before.

District No. 1.

The total marketed value for this district, which comprises the whole of the island of Cape Breton, amounted to $1,029,650, which shows an increase of $31,566 over the total for the preceding year The value of lobsters and mackerel together decreased by over $139,000, but the value of salmon, cod, haddock and halibut more than made up for the falling off in the lobster and mackerel values.

The quantities of the chief kinds landed during the year under review and the three preceding years were as follows:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	4,169	2,406	1,903	2,690
Lobsters	32,843	51,426	53,221	49,250
Cod	159,666	114,043	101,696	146,440
Haddock	94,510	64,949	70,220	95,708
Hake	5,224	7,338	6,541	6,384
Pollock	16,103	5,245	7,141	10,244
Herring	47,931	54,947	47,886	33,621
Mackerel	25,437	36,772	19,882	8,883

The decreased lobster catch is largely accounted for by the fact that drift ice remained on the coast a month later than usual, during which time fishermen were unable to set their traps.

The mackerel fishery was curtailed by storms in June which destroyed much netting.

The amount of capital invested in vessels, boats, gear and fixtures on shore in this district stands at $1,213,686 in the year that is being reviewed, which shows an advance of $141,588 since last year.

There were 501 men engaged in the work of the fisheries, in vessels, 4,638 in boats, 138 on carrying smacks, and 2,075 persons employed in fish and smoke houses on shore; the whole making a grand total of 7,352, which is an increase of 26 over that of the year before.

District No. 2.

The total marketed value of the fisheries of this district, which comprises the counties of Cumberland, Colchester, Pictou, Antigonish, Guysboro, Halifax and Hants, amounted to $1,945,391, which gives a decrease of $262,330 from the total for the preceding year. While the value of haddock and herring, taken together, shows an increase of over $96,000, the combined values of salmon, lobsters, cod, mackerel, halibut and swordfish, show a falling off of $359,710. The decreased value of mackerel alone accounts for about half of this shortage.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Lobsters	75,073	93,258	101,075	97,682
Mackerel	34,557	59,225	19,441	48,970
Cod	139,208	147,694	137,314	181,439
Halibut	13,199	21,962	15,692	17,794
Haddock	135,368	101,375	162,172	192,774
Herring	136,659	111,165	110,156	161,698

The amount of capital invested in vessels, boats, gear and fixtures on shore in this district stands at $1,964,629 for the year 1914-15, which sum is rather less than that shown in the preceding year.

There were 654 men engaged in the work of the fisheries in vessels, 4,785 in boats, 133 on carrying smacks, and 2,128 persons employed in fish and smoke houses on shore; making a grand total of 7,700, and an increase of 477 over the total for the preceding year.

District No. 3.

The total marketed value of the fisheries of this district, which comprises the counties of Lunenburg, Queens, Shelburne, Yarmouth, Digby, Annapolis and Kings, amounted to $4,755,060 for the year under review; this is a decrease of $336,761 from the total for the preceding year.

The combined values of haddock, cod and herring gave an increase of over $375,000, but the value of lobsters, hake and mackerel taken together more than offset that increase by a drop of over $700,000. The falling off in the value of lobsters is attributable chiefly to the fall in price of the canned article and to the fact that there was an unusual run of lobsters of a suitable size for exporting, which frequently caused the fresh lobster market to be glutted and the price to be lowered.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Lobsters	120,693	157,577	129,222	175,316
Cod	624,146	709,133	689,695	1,021,493
Haddock	314,233	221,062	239,880	217,876
Hake and Cusk	147,010	203,838	167,998	135,218
Herring	228,285	220,361	218,105	180,033
Mackerel	23,544	66,610	45,263	8,899

The catch of cod and hake by the Lunenburg banking fleet was much smaller than that in the preceding year. This is accounted for by scarcity of bait and ice conditions in the spring, which prevented the vessels from getting to the northern fishing grounds as early as usual. Hake were not found in such phenomenally large quantities by the fleet as in the preceding season.

The shore fisheries, excepting the mackerel fishery, were very successful, and, in a measure, made up for the falling off in the returns from the banking fleet.

The amount of capital invested in vessels, boats, gear and fixtures on shore in this district in the year now being reviewed, was $4,390,506, which makes an increase of $323,715 since the preceding year.

There were 4,147 men engaged in the work of the fisheries on vessels, 7,499 in boats, 111 on carrying smacks, and 2,555 persons employed in fish and smoke houses on shore; making a grand total of 14,312. This total is less than that for the preceding year by 18. There were fewer men on vessels, but more men on boats, largely owing to the increasing success of the gasoline boat in the prosecution of the shore fisheries.

In Appendix No. 3 will be found fuller details of the fisheries of Nova Scotia.

QUEBEC.

The total marketed value of the fisheries of this province for the year under review amounted to $1,924,434, which gives an increase of $74,093 over the total for the preceding year. The values of lobster, mackerel and smelts, taken together, show a decrease of $255,434. On the other hand, the value of cod alone more than offsets that shortage, with an increase of $334,647.

The total amount of capital invested in vessels, boats, gear and fixtures on shore in the province for the year 1914-15 amounted to $1,392,039; this falls short of the amount for the preceding year by $53,832.

There were 299 men engaged in the work of the fisheries in vessels, 8,896 in boats, 19 in carrying smacks, and 1,818 persons employed in the fish and smoke houses on shore; making a grand total of 11,012, and an increase of 39 over the total for the preceding year.

Gulf Division.—Sea Fisheries.

The total marketed value of the fisheries of this division, which comprises the counties of Bonaventure, Gaspe (including the Magdalen islands), Rimouski and Saguenay, amounted to $1,792,172, which is $55,591 greater than the total for the year before.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	11,310	12,676	8,946	8,278
Lobsters	22,810	41,310	50,450	56,927
Cod	567,664	365,052	478,573	474,610
Herrings	355,849	363,649	358,709	393,982
Mackerel	21,102	23,598	11,786	12,713
Smelts	1,245	12,146	4,019	3,540

During the year there were 85 whales landed, as against 87 in the preceding year.

Inland Fisheries.

The total value of what is called the inland fisheries amounted to $132,258, which sum is greater than that for the preceding year by $18,412.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Pickerel	1,289	1,229	1,423	1,175
Trout	356	967	1,240	1,000
Eels	4,871	2,496	3,167	4,428
Sturgeon	1,075	977	1,742	2,095
Pike	871	935	855	914
Perch	1,954	1,823	1,722	1,726

In Appendix No. 4 will be found fuller details of the fisheries of the province.

MANITOBA.

The total value of the fisheries of this province for the year 1914-15 amounted to $849,422; this is $243,150 greater than the total for 1913-14, and $49,273 greater than that for 1912-13. All kinds contributed to the increase, with the exception of trout, which gave $3,815 less than in the preceding year. The falling off in trout is accounted for by the fact that three of the northern lakes where trout are caught were closed to commercial fishing in 1914.

The following table shows the quantities of the chief kinds taken during the year under review, and the three preceding years:—

Kinds of Fish.	1914-15	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Whitefish	47,649	38,243	48,439	51,844
Pickerel	53,898	31,024	33,044	54,274
Pike	37,043	18,753	29,770	32,890
Tullibee	39,987	13,844	8,470	7,129

The amount of capital invested in the industry in this province in the year that is being reviewed was $3,818,283; this is an increase of $14,356 over the total in the year before.

There were 1,864 persons employed in the fisheries during the year, the number being 416 in excess of that for the preceding year.

In Appendix No. 5 will be found fuller details of the fisheries of this province.

SASKATCHEWAN.

The total value of the fisheries of this province for the year 1914-15 amounted to $132,017; this total is less than that for the preceding year by $16,585.

The values of trout and tullibee increased by $6,303, while the values of whitefish, pickerel and pike together decreased by $22,922. Notwithstanding the fact that the combined value of the three last named is less than that for last year, each shows an increase in quantity.

There being a poor demand for furs during 1914-15, many of the trappers turned to fishing for a livelihood, with the result that in many places the supply of fish at times greatly exceeded the demand, and caused the price to fall as low as one-half cent per pound. A number of fishermen thereupon ceased operations, and the price finally rose to five cents.

The following table shows the quantities of the chief kinds landed during the year and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Whitefish	35,443	30,993	23,120	30,856
Pike	10,913	7,936	5,197	5,975
Pickerel	1,951	1,710	2,193	2,656
Mixed Fish	7,752	4,984	2,915	3,195

The amount of capital invested in the industry in this province in 1914-15 was $14,307; this is an increase of $13,366 over that in the preceding year.

There were 813 men engaged, as against 645 in the year before.

In Appendix No. 6 will be found fuller details of the fisheries of this province.

ALBERTA.

The total value of the fisheries of this province amounted to $86,720 for 1914-15; this is an increase of $5,401 over the total for the preceding year, which year gave an increase of $29,703 over the total for the year 1912-13.

The value of trout and pickerel fell off by $7,252. On the other hand, the values of whitefish, pike, tullibee, and mixed fish increased by nearly $12,000.

The fisheries of Northern Alberta are rapidly becoming very important. With the extension of railway facilities to the more northern lakes, great supplies of the best varieties of fresh-water fish will soon be available for consumption.

The amount of capital invested in the industry in 1914-15 was $20,234, which makes an increase of $4,356 over the total in the preceding year.

There were 947 men engaged in the fisheries in Northern Alberta during the year under review, as against 456 during the preceding year.

In Appendix No. 6 fuller details of the fisheries of the province will be found.

YUKON TERRITORY.

The total value of the fisheries in the Yukon Territory in 1914-15 amounted to $69,728; this is less than the total in the preceding year by $1,460.

There is little difference between the quantities of the various kinds taken in the year under review and in the preceding year. It appears that the salmon yield of the Yukon river is undiminished, notwithstanding the fact that many fish wheels are in operation on the lower Yukon for the Alaskan side.

Lake La Barge, the first lake to be fished for whitefish in the Yukon district, still produces an abundance of these fish. The Klondyke river, however, shows a decreased production; this is attributed to the turbid condition of the water during the summer months, caused by the large dredges that operate on the river.

The amount of capital invested in boats and fishing gear in the year being reviewed was $11,915, against $11,798 in the year before.

There were 243 men engaged fishing in 1914-15, as against 236 in the preceding year.

In Appendix No. 7 will be found fuller details of the fisheries of this province.

BRITISH COLUMBIA.

The total marketed value of the fisheries of this province for the year 1914-15 amounted to $11,515,086; this is a drop of $2,376,312 from the total for the year 1913-14.

The value of salmon fell by $2,224,835, and would have fallen lower still but for an increase in the salmon value in the Northern or No. 2 district, amounting to $892,610. The greatly decreased value is due to the fact that the year under review was an off-year on the Fraser river. The preceding year happened to be the one in the four years' cycle in which the run to the Fraser is a big one.

Herring dropped in value by $78,932, the Vancouver island district being responsible for the bulk of this decrease. Halibut also dropped in value, by $172,574; but, while the value of halibut landed in the southern portion of the province fell, it increased in the northern portion by $57,300.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	1,369,740	1,509,354	1,221,057	1,103,666
Cod	47,161	29,220	28,580	25,065
Herring	563,406	649,062	729,567	545,442
Halibut	214,444	223,465	253,283	196,486

The number of whales caught and landed in the province was 573, as against 705 in the preceding year.

The amount of capital invested in vessels, boats, gear and fixtures on shore amounted to $8,829,740 in the year under review; this is a falling off of $3,659,373. The chief inspector for the province explains this by the fact that in previous years too high a valuation seems to have been placed on canneries, wharves and other fixtures.

There were 18,328 persons employed in connection with the fisheries during the year that is being reviewed. In the preceding year there were 20,707 thus employed. The decrease of 2,379 is in the number of those employed in canneries, etc., on shore, due to the much smaller pack on the Fraser river.

District No. 1.

The total marketed value of the fisheries in this district, which comprises the southern portion of the province mainland, amounted to $3,984,091 in 1914-15, as against $7,012,787 in the preceding year. This great drop in value is almost entirely due to the fact that the preceding year was the year in which the big quadrennial run of salmon to the Fraser river occurred.

The decrease in the salmon value alone was $2,863,280; herring and halibut values together also show a decrease of $200,855. The quantity of herring landed in the district was slightly greater than that landed during the preceding year, but those used fresh and smoked seem to have dropped in value.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	439,283	797,524	410,000	445,355
Herring	34,540	29,502	46,800	19,822
Halibut	78,565	93,677	211,274	158,541
Cod	13,772	12,690	14,750	14,165
Sturgeon	1,149	1,090	5,051	5,168
Smelts	1,757	1,835	1,864	2,530

The amount of capital invested in vessels, boats, gear and fixtures on shore stands at $2,747,934 in the year being reviewed, as against $6,130,484 in the preceding year. This large decrease is explained by the fact that valuations were too high in the preceding year.

There were 7,692 persons employed in the industry in 1914-15, as against 8,778 in the year before. The falling off is entirely in the number of persons employed in canneries, etc., due of course to the year being an off one in the salmon business.

District No. 2.

The total marketed value of the fisheries of this district, which comprises the northern part of the province, including Queen Charlotte island, amounted to $4,279,551 in the year under review, which gives an increase of $1,048,763 over the total in the preceding year.

Salmon contributed the bulk of this increase, its value being $892,610 greater than that in the preceding year. The value of cod increased by $48,495, of herring by $43,268, of halibut by $57,300, and of whale oil by $27,938.

The following table shows the quantities of the chief kinds landed in the year that is being reviewed, and in the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	564,929	414,380	589,647	491,989
Halibut	118,948	107,488	29,079	27,945
Cod	10,904	1,205	1,600	
Oulachans	12,700	13,950	13,800	15,000
Herring	68,060	62,240	166,787	26,410
Whales, (No.)	253	219	526	309

The amount of capital invested in vessels, boats, gear and fixtures on shore in this district stands at $4,331,421 in 1914-15, as against $4,475,079 in the preceding year.

There were 7,770 persons employed in connection with the fisheries in the year under review, as against 8,317 in the year before. The falling off is in the number of those employed on shore.

District No. 3.

The total marketed value of the fisheries of this district, which comprises Vancouver island and a portion of the mainland adjacent to the northern end of the island, amounted to $3,251,444. This is a decrease of $396,379 from the total of the preceding year.

The value of salmon fell by $254,155, and that of herring and halibut combined by $151,119. On the other hand, the value of cod increased by $26,630.

The following table shows the quantities of the chief kinds landed during the year under review and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Salmon	365,528	297,450	221,410	166,322
Cod	22,485	15,325	12,230	10,900
Herring	460,806	557,320	515,980	499,210
Halibut	16,931	22,300	12,930	10,000
Clams and quahaugs (brl.)	9,322	10,000	8,865	4,030

The amount of capital invested in vessels, boats, gear and fixtures on shore stands at $1,750,385 in the year that is being reviewed, while in the preceding year it stood at $1,884,050, or a decrease of $133,665.

There were 2,866 persons employed in the fisheries in 1914-15, as against 3,612 in the preceding year.

In Appendix No. 8 will be found fuller details of the fisheries of this province, also a report on the removal of the obstruction at Hell's Gate in the Fraser river, by Engineer J. McHugh.

ONTARIO.

The fisheries of this province are administered by the Provincial Government, and this Department is, therefore, indebted to the Provincial Deputy Minister of Game and Fisheries for the figures concerning the fisheries of the province contained in this report.

The total value of the fisheries for the year under review was $2,755,291, which sum is $80,606 greater than that for the year before.

The following table shows the quantities of the chief kinds landed during the year 1914-15 and the three preceding years:—

Kinds of Fish.	1914-15.	1913-14.	1912-13.	1911-12.
	Cwt.	Cwt.	Cwt.	Cwt.
Trout	57,609	62,204	63,707	65,120
Whitefish	57,964	52,263	58,897	44,540
Herring	91,474	130,718	170,677	131,020
Pickerel	39,173	26,564	26,656	20,225
Pike	44,258	345,47	24,732	20,985
Perch	19,536	12,427	13,931	9,572

The amount of capital invested in fishing boats, gear and fixtures on shore in the year under review amounted to $1,752,339; this is an increase of $245,758 oevr the total for the year before. During the year that is being reviewed there were 4,076 men engaged in the work of the fisheries throughout the province; this number is 565 greater than that for the year preceding.

In Appendix No. 9 will be found fuller details of the fisheries of the province.

Tables, recapitulating by provinces the quantity and value of fish marketed and the number and value of vessels, boats, etc., follow; also a table showing the annual value of fish produced by each province from 1870 to 1914-15, a table showing the number and value of vessels and boats, etc., used annually in the fisheries since 1880, and a table showing the number of persons annually employed in the industry since 1895.

RECAPITULATION.

By Provinces of the Quantities and Values of all Fish and Fish Products Marketed during the Year 1914-15.

Number.	Kinds of Fish.	Nova Scotia.		New Brunswick.		Prince Edward Island.		Quebec.		Ontario.		Number.
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
			$		$		$		$		$	
1	Salmon, used fresh ... cwt.	8,986	141,737	17,056	255,840	299	2,990	8,882	106,601			1
2	" canned ... cases.	40	320			56	672	47	376			2
3	" salted (dry) ... cwt.							1,885	13,195			3
4	" mild cured ... "											4
5	" smoked ... "	48	960									5
6	" pickled ... "											6
7	Lobsters, canned ... cases.	76,370	1,381,013	29,045	580,900	44,158	883,140	11,330	203,940			7
8	" shipped in shell ... cwt.	75,683	1,141,586	10,966	148,200	25	175	150	975			8
9	Cod, used fresh ... "	77,311	198,881	12,003	24,006	2,725	5,621	956	1,434			9
10	" green salted ... "	84,012	312,954	33,803	104,039	5,576	17,129	55,954	139,884			10
11	" smoked fillets ... "	133	1,064									11
12	" smoked ... "	500	4,000									12
13	" dried ... "	224,903	1,475,201	57,718	294,050	5,219	31,314	151,600	909,600			13
14	Haddock, used fresh ... "	131,209	260,662	7,208	17,990	314	628	195	292			14
15	" smoked ... "	68,964	529,984	3,466	17,330							15
16	" green, salted ... "	7,468	14,936									16
17	" canned ... cases.											17
18	" dried ... cwt.	86,384	394,685	1,476	4,637	103	412	821	3,284			18
19	Hake and Cusk, used fresh ... "	4,331	5,737	4,542	3,429	92	184					19
20	" green, salted ... "	168	336									20
21	" dried ... "	55,080	199,488	21,574	74,174	7,462	29,973	150	600			21
22	Pollock, used fresh ... "	12,034	18,140	8,240	8,290							22
23	" green, salted ... "	448	896									23
24	" dried ... "	50,619	133,515	15,244	53,354							24
25	Herring, used fresh ... "	42,937	61,621	22,006	42,341	10,141	10,164	1,260	1,986	79,803	3 99,015	25
26	" canned ... cases.			3,350	16,750							26
27	" smoked ... cwt.	20,894	78,618	57,676	162,624			675	1,350	1,202	12,020	27
28	" dry salted ... "											28
29	" pickled ... brl.	65,299	269,935	47,090	189,350	2,089	10,227	5,076	20,304	3,089	30,890	29
30	" used as bait ... "	65,604	138,604	58,786	96,740	19,307	38,614	132,617	198,926			30
31	" used as fertilizer ... "	700	350	118,783	59,774			36,805	18,403			31
32	Mackerel, used fresh ... cwt.	40,572	255,474	27,760	277,600	1,379	12,154	1,104	5,520			32
33	" salted ... brl.	14,296	168,809	699	8,388	2,616	32,241	6,666	66,660			33
34	Shad, used fresh ... cwt.	411	3,999	4,115	30,140							34
35	" salted ... brl.	5	75	270	3,600							35
36	Alewives, used fresh ... cwt.	12,352	20,003	17,189	22,253	30	60					36
37	" salted ... brl.	4,401	16,440	15,960	47,880	90	270					37

38	Sardines, canned	cases.			103,000	515,000							38
39	" sold fresh	brl.	300	600	278,005	834,015							39
40	Halibut, used fresh	cwt.	24,689	224,963	493	4,930			294	1,764			40
41	Flounders	"	2,225	10,586	2,826	5,517							41
42	Smelts	"	5,874	50,159	65,189	651,890	19,326	111,552	1,245	6,225			42
43	Mullets	cwt.											43
44	Skate	"											44
45	Whiting	"											45
46	Trout	"	923	11,298	2,658	26,585	131	1,310	635	7,264	57,669	539,850	46
47	Soles	"	484	2,136									47
48	Albacore	"	4,741	18,971									48
49	Oulachans	"											49
50	Sturgeon	"	28	456	168	1,280			1,075	6,916	2,451	38,115	50
51	Bass	"	149	1,490	3,266	39,064			615	6,773			51
52	Eels	"	1,827	8,930	1,704	13,110	284	2,849	4,993	30,148	3,475	20,850	52
53	Tom-cod	"	181	265	19,716	39,432	80	160	20	30			53
54	Swordfish	"	4,982	24,780									54
55	Whitefish	"			28	420			598	6,112	57,964	533,400	55
56	Pickerel	"			480	4,800			1,289	13,602	39,173	391,730	56
57	Perch	"			8	32			1,954	10,420	19,536	97,680	57
58	Pike	"							871	5,955	44,258	354,064	58
59	Tullibee	"									8,701	52,206	59
60	Maskinonge	"							88	986			60
61	Catfish	"							186	939	5,886	17,088	61
62	Octopus	"											62
63	Gold Eyes	"											63
64	Carp	"									27,897	55,794	64
65	Mixed Fish	"	3,424	3,600	831	831	175	175	11,411	42,781	34,647	173,235	65
66	Squid	brl.	2,154	8,969	355	670			210	315			66
67	Oysters	"	1,824	8,811	15,130	90,780	7,823	49,769					67
68	Clams, Quahaugs and Scallops												
69	used fresh	"	23,929	53,922	34,365	65,008	2,288	10,170	1,191	2,977			68
	" canned	case.	95	427	12,703	63,515	460	2,760					69
70	Capelin (bait fish)	brl.	63	63					27,000	6,750			70
71	Dulse, Crabs, Cockles, etc	cwt.	1,405	4,217	1,362	7,268							71
72	Tongues and Sounds	"	262	1,460	585	2,925	162	3,000	56	180			72
73	Caviare	"	2	400	2	165					89	8,852	73
74	Sturgeon Bladders	No.									837	502	74
75	Hair Seal Skins	"	801	804					3,494	5,241			75
76	Beluga Skins	"											76
77	Fur Seal Skins	"											77
78	Whale Oil	gal.	1,055	126	900	279			135,600	40,681			78
79	Fish Oil	"	156,863	51,185	75,160	22,593	14,040	3,962	104,338	31,300			79
80	Fertilizers	ton.	1,692	6,129					30	1,050			80
81	Glue Material	"	31	210									81
82	Whale Bone and Meal	cwt.							135	2,700			82
83	Glue	gal.	6,080	4,560									83
84	Hake Sounds, dried	cwt.	547	191	173	6,195							84
85	Fish Skins	ton.	6	360									85
	Totals			7,730,191		4,940,083		1,261,666		1,924,430		2,755,291	

RECAPITULATION—*Concluded.*

By Provinces of the Quantities and Values of all Fish and Fish Products Marketed during the year 1914-15—*Concluded.*

Number.	Kinds of Fish.	Manitoba.		Saskatchewan.		Alberta.		Yukon.		British Columbia.		Number.
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
			$		$		$		$		$	
1	Salmon, used fresh ..... cwt.							1,886	18,860	214,102	1,432,357	1
2	" canned. ..... cases.									1,134,830	5,674,150	2
3	" salted (dry) ..... cwt.									118,430	527,240	3
4	" mild cured ..... "									26,372	289,020	4
5	" smoked. ..... "									7,904	82,568	5
6	" pickled ..... "									900	13,500	6
7	Lobsters, canned ..... cases.											7
8	" shipped in shell ..... cwt.											8
9	Cod, used fresh. ..... "									41,367	338,515	9
10	" green, salted ..... "									2,580	25,805	10
11	" smoked fillets ..... "											11
12	" smoked ..... "											12
13	" dried ..... "									211	2,637	13
14	Haddock, used fresh ..... "											14
15	" smoked ..... "											15
16	" green, salted ..... "											16
17	" canned ..... cases.											17
18	" dried ..... cwt.											18
19	Hake and Cusk, used fresh ..... "											19
20	" green, salted ..... "											20
21	" dried ..... "											21
22	Pollock, used fresh ..... "											22
23	" green, salted ..... "											23
24	" dried ..... "											24
25	Herring, used fresh ..... "									96,631	388,995	25
26	" canned ..... cases.											26
27	" smoked ..... cwt.									7,310	61,680	27
28	" dry salted ..... "									236,461	359,014	28
29	" pickled ..... brl.									6,544	34,472	29
30	" used as bait. ..... "									15,270	32,490	30
31	" used as fertilizer ..... "											31
32	Mackerel, used fresh ..... cwt.											32
33	" salted ..... brl.											33
34	Shad, used fresh ..... cwt.										2,370	34
35	" salted ..... brl.									158		35
36	Alewives, used fresh. ..... cwt.											36
37	" salted. ..... brl.											37

38	Sardines, canned	cases.											38
39	" sold fresh	brl.											39
40	Halibut, used fresh	cwt.									214,444	1,561,626	40
41	Flounders	"									2,302	12,117	41
42	Smelts	"									2,137	17,856	42
43	Mullets	cwt.	9,158	9,158									43
44	Skate	"									768	6,129	44
45	Whiting	"									137	1,096	45
46	Trout	"	742	3,710	2,498	3,552	1,200	9,300	284	8,520	1,210	12,115	46
47	Soles	"									4,340	34,512	47
48	Albacore	"											48
49	Oulachans	"									13,642	71,036	49
50	Sturgeon	"									1,149	22,980	50
51	Bass	"	36	108									51
52	Eels	"											52
53	Tom-cod	"									20	120	53
54	Swordfish	"											54
55	Whitefish	"	47,649	273,818	35,443	87,155	17,370	53,730	842	21,050			55
56	Pickerel	"	53,898	240,085	1,951	5,606	759	1,860	5	100			56
57	Perch	"	1,091	4,719	9	45	120	260			344	2,064	57
58	Pike	"	37,043	78,530	10,913	18,697	4,637	12,623	2	50			58
59	Tullibee	"	39,987	97,443	1,501	5,381	757	1,499					59
60	Maskinonge	"							17	425			60
61	Catfish	"	751	4,129									61
62	Octopus	"									98	980	62
63	Gold Eyes	"	7,140	14,048			187	595					63
64	Carp	"											64
65	Mixed Fish	"	61,837	123,674	7,752	11,581	2,528	6,853	1,036	20,720	6,487	32,435	65
66	Squid	brl.											66
67	Oysters	"									1,768	28,619	67
68	Clams Quahaugs and Scallops												68
69	used fresh	"									7,896	43,737	
	" canned	case.									5,045	40,360	69
70	Capelin (bait fish)	brl.											70
71	Dulse, Crabs, Cockles, etc	cwt.									5,841	47,788	71
72	Tongues and Sounds	"											72
73	Caviare	"											73
74	Sturgeon Bladders	No.											74
75	Hair Seal Skins	"									2,050	512	75
76	Beluga Skins	"											76
77	Fur Seal Skins	"									352	10,560	77
78	Whale Oil	gal.									789,345	242,068	78
79	Fish Oil	"									41,249	12,481	79
80	Fertilizers	tons.									1,244	47,432	80
81	Glue Material	"											81
82	Whale Bone and Meal	cwt.									75	1,650	82
83	Glue	gal.											83
84	Hake Sounds, dried	cwt.											84
85	Fish Skins	tons.											85
	Totals			849,422		132,017		86,720		69,725		11,515,086	

RECAPITULATION.

By Provinces of the number and value of Fishing Implements, Vessels, Boats, etc., used in the Fishing Industry of Canada during the year 1914–15, and of the number of persons employed.

Provinces.	Persons employed.			Vessels, Tugs and Carrying Smacks.		Boats.			Value of gill-nets, seines, trap and smelt nets, etc.	Value of hand lines, weirs and trawls, etc.	Value of lobster plant.	Approximate value of salmon and other canneries, freezers, fish houses and fixtures.	Total value.
	No. in Vessels, etc.	No. in Boats.	No. in Canneries, Fish-houses, etc.	Number.	Value.	Gasoline.	Sail and Row.	Total Value.					
					$			$	$	$	$	$	$
Nova Scotia	5,684	16,922	6,758	854	1,938,620	4,035	9,258	1,267,246	647,440	224,560	1,018,749	2,472,206	7,568,821
New Brunswick	1,532	14,413	6,089	449	338,700	1,419	8,052	631,945	646,593	495,674	379,258	1,272,850	3,765,020
Prince Edward island	95	3,265	2,472	28	12,100	1,170	759	241,104	45,745	9,848	577,455	144,212	1,030,464
Quebec	318	8,876	1,818	76	96,000	266	4,984	326,491	277,181	84,072	204,855	403,440	1,392,039
Ontario	646	3,430	.....	133	509,250	407	1,639	256,739	800,956	3,739	.....	181,655	1,752,339
Manitoba	80	1,475	309	8	107,000	1	635	26,500	83,991	92	.....	100,700	318,283
Saskatchewan	.....	813	.....	.....	.....	30	442	14,377	27,195	1,980	.....	755	44,307
Alberta	.....	947	.....	.....	.....	13	245	6,016	10,655	288	.....	3,275	20,234
Yukon	.....	226	17	.....	.....	.....	120	3,185	3,344	161	.....	5,225	11,915
British Columbia	1,045	10,187	7,096	344	1,388,990	1,961	3,708	1,184,309	770,481	38,900	.....	5,447,060	8,829,740
Totals	9,400	60,554	24,559	1,892	4,390,660	9,302	29,842	3,957,912	3,313,581	859,314	2,180,317	10,031,378	.....
Grand total value	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24,733,162

COMPARATIVE TABLE showing the total Value of the Fisheries in the respective Provinces of Canada, from 1870 to 1914–15 inclusive, as compiled from the Annual Reports of the Department of Marine and Fisheries.

Year.	Nova Scotia.	New Brunswick.	Prince Edward Island.	Quebec.	Ontario.	British Columbia.	Manitoba, Saskatchewan, Alberta and Yukon.	Total for Canada.
1870	$ 4,019,425	$ 1,131,433	$ Inconnu.	$ 1,161,551	$ 264,982	$ Inconnu.	$ Inconnu.	$ 6,577,391
1871	5,101,030	1,185,033	"	1,093,612	193,524	"	"	7,573,199
1872	6,016,835	1,965,459	"	1,320,189	267,633	"	"	9,570,116
1873	6,577,085	2,285,662	207,595	1,391,564	293,091	"	"	10,754,997
1874	6,652,302	2,685,794	288,863	1,608,660	446,267	"	"	11,681,886
1875	5,573,851	2,427,654	298,927	1,596,759	453,194	"	"	10,350,385
1876	6,029,050	1,953,389	494,967	2,097,668	437,229	104,697	"	11,117,000
1877	5,527,858	2,133,237	763,036	2,560,147	438,223	583,433	"	12,005,934
1878	6,131,600	2,305,790	840,344	2,664,055	348,122	925,767	"	13,215,678
1879	5,752,937	2,554,722	1,402,301	2,820,395	367,133	631,766	"	13,529,254
1880	6,291,061	2,744,447	1,675,089	2,631,556	444,491	713,335	"	14,499,979
1881	6,214,782	2,930,904	1,955,290	2,751,962	509,903	1,454,321	"	15,817,162
1882	7,131,418	3,192,339	1,855,687	1,976,516	825,457	1,842,675	"	16,824,092
1883	7,689,374	3,185,674	1,272,468	2,138,997	1,027,033	1,644,646	"	16,958,192
1884	8,763,779	3,730,454	1,085,619	1,694,561	1,133,724	1,358,267	"	17,766,404
1885	8,283,922	4,005,431	1,293,430	1,719,460	1,342,692	1,078,038	"	17,722,973
1886	8,415,362	4,180,227	1,141,991	1,741,382	1,435,998	1,577,348	186,980	18,679,288
1887	8,379,782	3,559,507	1,037,426	1,773,567	1,531,850	1,974,887	129,084	18,386,103
1888	7,817,030	2,941,863	876,862	1,860,012	1,839,869	1,902,195	180,677	17,418,510
1889	6,246,722	3,067,039	886,430	1,876,194	1,963,123	3,348,067	167,679	17,655,256
1890	6,636,444	2,699,055	1,041,109	1,615,119	2,009,637	3,481,432	232,104	17,714,902
1891	7,011,300	3,571,050	1,238,733	2,008,678	1,806,389	3,008,755	332,969	18,977,878
1892	6,340,724	3,203,922	1,179,856	2,236,732	2,042,198	2,849,483	1,088,254	18,941,171
1893	6,407,279	3,746,121	1,133,368	2,218,905	1,694,930	4,443,963	1,042,093	20,686,661
1894	6,547,387	4,351,526	1,119,738	2,303,386	1,659,968	3,950,478	787,087	20,719,573
1895	6,213 131	4,403,158	976,836	1,867,920	1,584,473	4,401,354	752,466	20,199,338
1896	6,070,895	4,799,423	976,126	2,025,754	1,605,674	4,183,999	745,543	20,407,425
1897	8,090,346	3,934,135	954,949	1,737,011	1,289,822	6,138,865	638,416	22,783,546
1898	7,226,034	3,849,357	1,070,202	1,761,440	1,433,632	3,713,101	613,355	19,667,121
1899	7,347,604	4,119,891	1,043,645	1,953,134	1,590,447	5,214,074	622,911	21,891,706
1900	7,809,152	3,769,742	1,059,193	1,989,279	1,333,294	4,878,820	718,159	21,557,639
1901	7,989,548	4,193,264	1,050,623	2,174,459	1,428,078	7,942,771	958,410	25,737,153
1902	7,351,753	3,912,514	887,024	2,059,175	1,265,706	5,284,824	1,198,437	21,959,433
1903	7,841,602	4,186,800	1,099,510	2,211,792	1,535,144	4,748,365	1,478,665	23,101,878
1904	7,287,099	4,671,084	1,077,546	1,751,397	1,793,229	5,219,107	1,716,977	23,516,439

COMPARATIVE TABLE showing the total Value of the Fisheries in the respective Provinces of Canada, from 1870 to 1914–15 inclusive, as compiled from Annual Reports of the Department of Marine and Fisheries—*Concluded.*

Year.	Nova Scotia.	New Brunswick.	Prince Edward Island.	Quebec.	Ontario.	British Columbia.	Manitoba, Saskatchewan, Alberta and Yukon.	Total for Canada.
1905	$ 8,259,085	$ 4,847,090	$ 998,922	$ 2,003,716	$ 1,708,963	$ 9,850,216	$ 570	$ 29,479,562
1906	7,799,160	4,905,225	1,168,939	2,175,035	1,734,856	7,003,347	1,492,923	26,279,485
1907-08	7,632,330	5,300,564	1,492,695	2,047,390	1,935,025	6,122,923	968,422	25,499,349
1908-09	8,009,838	4,754,298	1,378,624	1,881,817	2,100,078	6,465,038	861,392	25,451,085
1909-10	8,081,111	4,676,315	1,197,556	1,808,436	2,177,813	10,314,755	1,373,181	29,629,169
1910-11	10,119,243	4,134,144	1,153,708	1,692,475	2,026,121	9,163,235	1,676,507	29,965,433
1911-12	9,367,550	4,886,157	1,196,396	1,868,136	2,205,436	13,677,125	1,467,072	34,667,872
1912-13	7,384,055	4,264,054	1,379,905	1,988,241	2,842,878	14,455,488	1,074,843	33,389,464
1913-14	8,297,626	4,308,707	1,280,447	1,850,427	2,674,685	13,891,398	904,458	33,207,748
1914-15	7,730,191	4,940,083	1,261,666	1,924,430	2,755,291	11,515,086	1,137,884	31,264,631

COMPARATIVE TABLE showing Number and Value of Vessels and Boats engaged in the Fisheries of Canada, together with the Value of Fishing Material used, since 1880.

Year.	Vessels.			Boats.		Value of Nets and Seines.	Value of other Fishing Material.	Total Capital Invested.
	Number	Tonnage.	Value.	Number	Value.			
			$		$	$	$	$
1880	1,181	45,323	1,814,688	25,266	716,352	985,978	419,564	3,936,582
1881	1,120	48,389	1,765,870	26,108	696,710	970,617	679,852	4,113,049
1882	1,140	42,845	1,749,717	26,747	833,137	1,351,193	823,938	4,757,985
1883	1,198	48,106	2,023,045	25,825	783,186	1,243,366	1,070,930	5,120,527
1884	1,182	42,747	1,866,711	24,287	741,727	1,191,579	1,224,646	5,014,663
1885	1,177	48,728	2,021,633	28,472	852,257	1,219,284	2,604,285	6,697,459
1886	1,133	44,605	1,890,411	28,187	850,545	1,263,152	2,720,187	6,814,295
1887	1,168	44,845	1,989,840	28,092	875,316	1,499,328	2,384,356	6,748,840
1888	1,137	33,247	2,017,558	27,384	859,953	1,594,992	2,390,502	6,863,005
1889	1,100	44,936	2,064,918	29,555	965,010	1,591,085	2,149,138	6,770,151
1890	1,069	43,084	2,152,790	29,803	924,346	1,695,358	2,600,147	7,372,641
1891	1,027	39,377	2,125,355	30,438	1,007,815	1,644,892	2,598,124	7,376,186
1892	988	37,205	2,112,875	30,513	1,041,972	1,475,043	3,017,945	7,647,835
1893	1,104	40,096	2,246,373	31,508	955,109	1,637,707	3,174,404	8,681,557
1894	1,178	41,768	2,409,029	34,102	1,009,189	1,921,352	4,099,546	9,439,116
1895	1,121	37,829	2,318,290	34,268	1,014,057	1,713,190	4,208,311	9,253,848
1896	1,217	42,447	2,041,130	35,398	1,110,920	2,146,934	4,527,267	9,826,251
1897	1,184	40,679	1,701,239	37,693	1,128,682	1,955,304	4,585,569	9,370,794
1898	1,154	38,011	1,707,180	38,675	1,136,943	2,075,928	4,940,046	9,860,097
1899	1,178	38,508	1,716,973	38,538	1,195,856	2,162,876	5,074,135	10,149,840
1900	1,212	41,307	1,940,329	38,930	1,248,171	2,405,860	5,395,765	10,990,125
1901	1,231	40,358	2,417,680	38,186	1,212,297	2,312,187	5,549,136	11,491,300
1902	1,296	49,888	2,620,661	41,667	1,199,598	2,103,621	5,382,079	11,305,959
1903	1,343	42,712	2,755,150	40,943	1,338,003	2,305,444	5,842,85	12,241,454
1904	1,316	43,025	2,592,527	41,938	1,376,165	2,189,666	6,198,584	12,356,942
1905	1,384	41,640	2,813,834	41,463	1,373,337	2,310,508	6,383,218	12,880,897
1906	1,439	40,827	2,841,875	39,634	1,462,374	2,426,341	7,824,975	14,555,565
1907-08	1,390	36,902	2,731,888	38,711	1,437,196	2,266,722	8,374,440	14,826,592
1908-09	1,441	40,818	3,571,871	39,965	1,696,856	2,283,127	7,957,500	15,508,275
1909-10	1,750	37,662	3,303,121	41,170	1,855,629	2,572,820	9,626,362	17,357,932
1910-11	1,680	38,454	3,028,625	38,977	2,483,996	2,786,548	10,720,701	19,019,870
1911-12	1,648	.....	3,502,928	36,761	2,695,650	2,453,191	12,281,135	20,932,904
1912-13	1,669	.....	4,674,923	34,501	3,072,115	4,154,880	12,489,541	24,388,459
1913-14	1,992	.....	4,445,259	37,686	3,834,178	3,423,110	15,761,486	27,464,033
1914-15	1,892	.....	4,390,660	39,144	3,957,912	3,313,581	13,071,009	24,733,162

COMPARATIVE TABLE showing the Number of Persons employed in the Fishing Industry since 1895.

Year.	Number of Persons in Canneries and Fish-houses.	Number of Men in Vessels.	Number of Men in Boats.	Total Number of Fishermen.	Total Number of Persons in Fishing Industry.
1895	13,030	9,804	61,530	71,334	84,364
1896	14,175	9,735	65,502	75,237	89,412
1897	15,165	8,879	70,080	78,959	94,124
1898	16,548	8,657	72,877	81,534	98,082
1899	18,708	8,970	70,893	79,893	98,601
1900	18,205	9,205	71,859	81,064	99,269
1901	15,315	9,148	69,142	78,290	93,605
1902	13,563	9,123	68,678	77,801	91,364
1903	14,018	9,304	69,830	79,134	93,152
1904	13,981	9,236	68,109	77,345	91,326
1905	14,037	9,366	73,505	82,871	96,908
1906	12,317	8,458	67,646	76,104	88,421
1907-08	11,442	8,089	63,165	71,254	82,696
1908-09	13,753	8,550	62,520	71,070	84,823
1909-10	21,694	7,931	60,732	68,663	90,357
1910-11	24,978	8,521	60,089	68,610	93,588
1911-12	25,206	9,056	56,870	65,926	91,132
1912-13	23,327	9,076	56,005	65,081	88,408
1913-14	26,893	10,525	61,251	71,776	98,669
1914-15	24,559	9,400	60,554	69,954	94,513

OTHER APPENDICES.

Exports and Imports of Fish.

Statements showing the quantities of the chief commercial fish and fish products imported into Canada for home consumption, and the quantities of the chief commercial fish and fish products, the produce of Canada, exported during the fiscal year, 1914-15, will be found in Appendix No. 10.

The quantities of the various kinds exported in any one year do not necessarily bear any relation to the quantities caught in that year, for the reason that the products may not be all exported during the year in which the fish are caught. The figures in this Appendix are taken from the report of the Customs Department and are reproduced, therefore, in a convenient form, for the purpose merely of showing to what countries the various products are sent.

Fish Breeding.

The total distribution of fry and fingerlings from 64 hatcheries that were in operation was 1,643,725,212, an increase of 415,748,623 over the total distribution in the preceding season. The increase was principally in whitefish and lobsters.

The collection of Pacific salmon eggs during the 1914 season was not so large as in the preceding year, owing to the fact that 1914 was an "off year" in the run of salmon to the Fraser river.

The administration of and the revenue from the fisheries of Ontario and the inland fisheries of Quebec were handed over to these provinces as a result of the decision of the Privy Council in the Fisheries Reference of 1898. Pending the settlement of outstanding questions affecting fisheries rights, the Federal Government continued the policy of propagating both sporting and commercial fish for stocking both the inland and coastal waters.

As it appeared unlikely that the fisheries in question would be again placed under Federal authority, and as the Provincial Governments derived all the revenue from these fisheries, an arrangement was entered into with the Ontario Government in 1912 whereby it undertook to attend to the stocking of waters resorted to by anglers, while this department would confine its efforts to the propagation of commercial fish in the waters fished by regular fishermen for their livelihood. A similar arrangement has been recently entered into with the province of Quebec, so that the four hatcheries hitherto operated by this department for stocking the inland waters of that province have been handed over to the care of the Department of Colonization, Mines and Fisheries of Quebec. This department's fish breeding operations in Quebec will, therefore, be confined in future to the propagation of Atlantic salmon and lobsters, for stocking the coastal waters.

In Appendix No. 11 will be found a detailed report on the work carried on in connection with the breeding of fish in the various establishments throughout the Dominion.

Fishing Bounty.

The fishermen of the Maritime Provinces received the sum of $159,584.14 as bounty on their respective catches of sea fish during the year 1914. The number of claims received during the year was 14,281, as against 13,412 in the preceding year. The number of claims paid was 14,216, as against 13,533 in the preceding year, which included 158 claims held over from 1912. The sum of $62,985.84 was paid to 955 vessels and their crews, which is an increase of 45 vessels when compared with the preceding year. To boats and boat fishermen was paid the sum of $96,598.30; the number of boats being 13,261, and of boat fishermen, 22,828, an increase of 638 boats and 1,271 men.

The amount of bounty expended in each province for 1914 was as follows:—

Nova Scotia	$94,990 54
New Brunswick	17,536 50
Prince Edward Island	10,339 65
Quebec	36,717 45

Since the inception of the system in 1882, the sum of $5,218,444.76 has been paid to fishermen and vessel and boat owners, with a view to encouraging them in the development of their industry.

The regulations governing the payment of the bounty, as well as the particulars respecting its distribution, form Appendix No. 12.

Fisheries Expenditure and Revenue.

A statement of the total expenditure and revenue in connection with the fisheries of Canada during the fiscal year ended March 31, 1915, forms Appendix No. 13 of this report.

The expenditure amounted to $1,305,776.51, divided amongst the various services as follows:—

Salaries and disbursements of Fishery Officers	$275,950 71
Fish Breeding	370,093 17
Miscellaneous expenditure	659,732 63

In addition to which the sum of $159,584.14 was distributed as fishing bounty.

The total revenue from fishing licenses, fines, etc., in the different provinces was $101,635.77, which includes the sum of $8,879 paid by United States fishing vessels for "Modus Vivendi" licenses.

Fisheries Museum.

The museum is situated at the corner of O'Connor and Queen streets, Ottawa. It is open to visitors on week days from 9.30 a.m. to 5.30 p.m., and on Sundays from 2 to 5 p.m. From the time of the re-opening of the Museum in March, 1914, till March, 1915, it was visited by 29,934 people.

Mounted specimens of many of the fishes of the British North American waters are on exhibition, and the number is being added to annually. Adjoining each specimen visitors will find a label which gives the geographical range of the fish together with a short note on its natural history. Since last year specimens of the following species have been added to the collection:—

Great blue shark, ouananiche, tunny, Dolly Varden trout, quill back, Columbia river sucker, sole and slippery sole. Additional specimens of the following species are also on exhibition since last year:—

Big skate of California, common sturgeon, Atlantic salmon and starry flounder.

There have also been added specimens of a sea lion, a fur seal, a hair seal and a walrus; also the skeleton of a fin-back whale.

In Appendix No. 14 will be found a detailed report on the Museum, by the Department's Naturalist.

United States Fishing Vessel Entries.

In Appendix No. 15 will be found lists of United States fishing vessels which made use of Canadian ports, and of United States fishing vessels to which "Modus Vivendi" licenses were issued during the year 1914-15.

On the Atlantic coast an aggregate of 1,495 entries were made by 219 vessels, against 1,349 entries by 219 vessels during the preceding year. "Modus Vivendi" licenses were issued to 70 United States vessels during the year, the revenue from which amounted to $8,879, there being a decrease of 24 in the number of vessels and of $2,849.50 in the amount of revenue received.

Oyster Culture.

Prior to 1911, little attention had been devoted to the artificial culture of oysters in Canada, owing to the uncertainty caused by the decision of the Imperial Privy Council in the Fisheries Reference of 1898, as to whether the right to grant licenses lay with the Federal or Provincial Government. Since 1911, however, a "Modus Vivendi" has been arranged by which the Provincial Governments concerned are empowered to grant and guarantee exclusive rights to those desiring to lease barren bottoms for artificial cultivation.

During 1912 the Government of Prince Edward island took active steps towards making a complete survey of the surrounding water bottom, with a view to laying out areas to be leased for private cultivation. In the season of 1913 a dozen companies, with capital ranging from twenty-five thousand to one hundred and fifty thousand dollars, had got to work preparing the leased bottom and stocking it. It is anticipated that the work of the private culturists will benefit the public beds as well as the private ones.

During the past season the survey work has been continued, and it is confidently expected that under private culture the oyster industry of the island will soon assume very much larger dimensions.

The oysters planted on the beds at Shemogue, N.B., last year have grown, and the bottom appears to be in a satisfactory condition.

In Richmond bay, P.E.I., starfish appear to have become extremely numerous and injurious in recent years to the oyster beds, and an effort was made in the course of the year under review to clear the beds of this pest. The department's expert, in the steamer *Ostrea,* assisted by two of the Fisheries patrol boats, scraped up on the public beds of Richmond bay 394 baskets (1,000 to a basket) of these starfish.

Quahaugs grow and are found in the waters of Buctouche harbour, N.B., but in the adjacent waters of Richibucto harbour none are to be found. One hundred bushels of quahaugs were, therefore, planted in the latter named harbour in the course of the season, with a view to ascertaining whether these shellfish would thrive therein.

As fishermen from time to time have reported that scallops were found on the hooks of their trawls off the shores of Prince Edward island, the *Ostrea,* with a view to determining whether any extensive beds of these shellfish existed there, dredged along the shores from Malpeque to Alberton, also off Tignish and along the west coast of the island. Off Alberton three dozen scallops were found, while off the west coast fifteen scallops were picked up. To do this work effectively, however, larger dredges and hoisting power than the *Ostrea* is equipped with are required.

In Appendix No. 16 will be found details of the work of the department's oyster expert on the steamer *Ostrea.*

Fisheries Patrol Service.

For the prevention of illegal fishing, and for the general enforcement of the fisheries regulations in the inland waters and for the prevention of illegal lobster and other fishing on the sea coast, the Fisheries Branch has under its control in the various provinces a number of motor launches and small steamers. Reports on the work of these craft during the year 1914-15 will be found in Appendix No. 17.

Outside Fisheries Staff.

The names of the various Inspectors of Fisheries and Fishery Overseers, with the districts over which they have jurisdiction, as well as a list of officers in charge of fish hatcheries and of officers in charge of Fisheries patrol boats, will be found in Appendix No. 19.

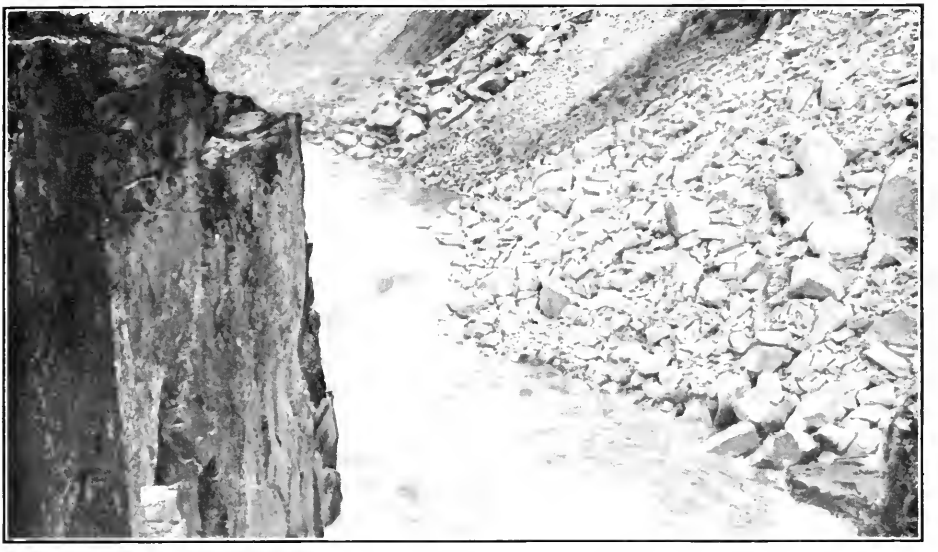
General.

The officers and clerks of the Fisheries Branch of the department performed their duties in a loyal and efficient manner in the course of the year, and I desire to express to you my high appreciation of their services.

I have the honour to be, sir,
Your obedient servant,

G. J. DESBARATS,
Deputy Minister of the Naval Service.

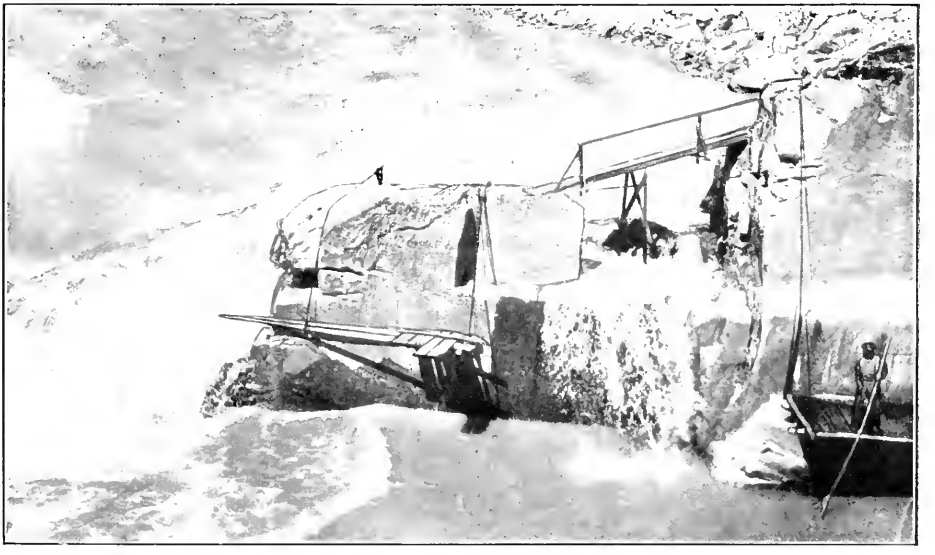
PHOTOGRAPHS.



Hell's Gate—After the Big Slide.

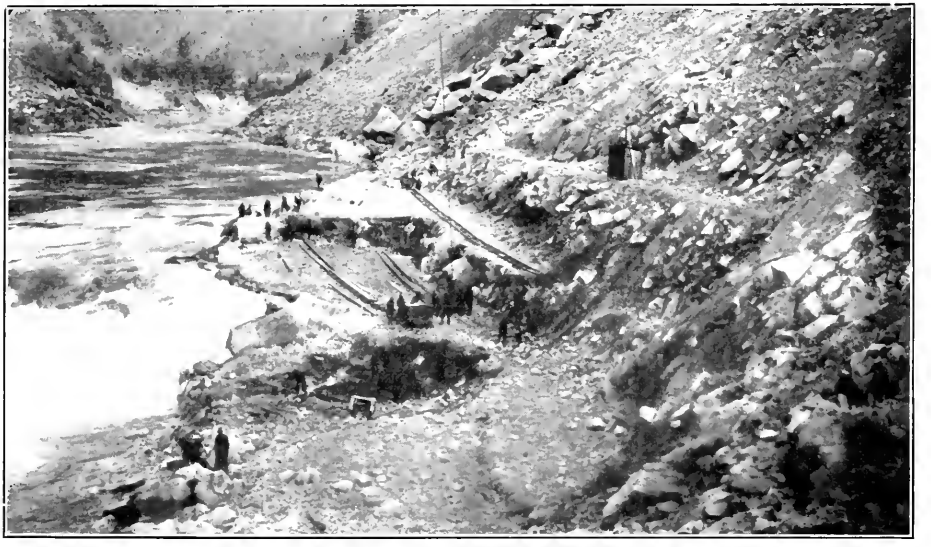
Showing the Fall at Hell's Gate caused by the slide.

Development of the Benches as the work of removing the obstructions proceeded.

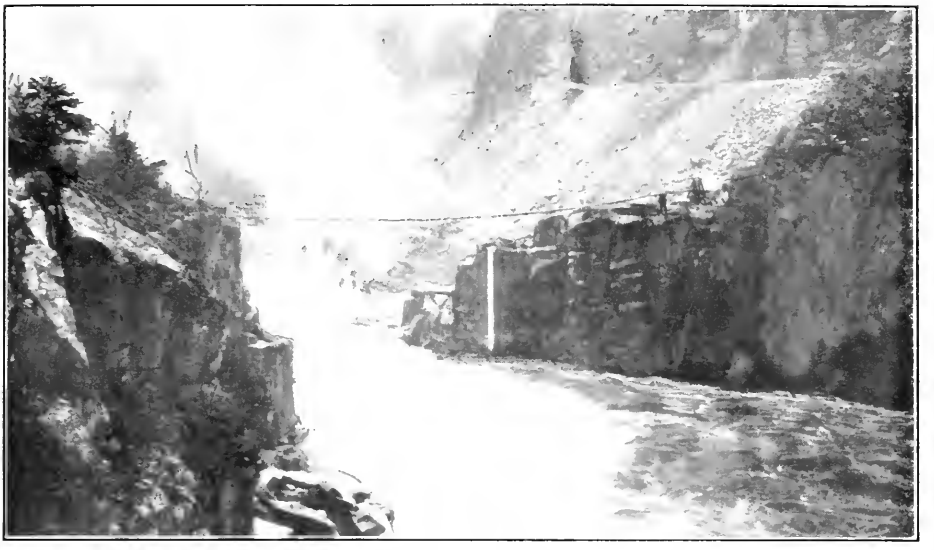


Dip-netting Salmon and transferring them to the eddy above.

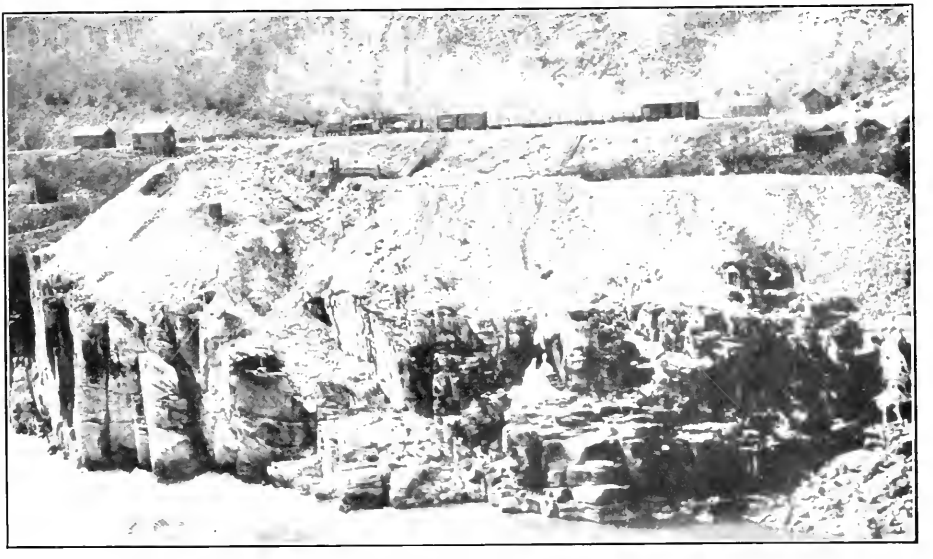
Temporary Fishway through which several thousand salmon passed up



Further development of the Benches.

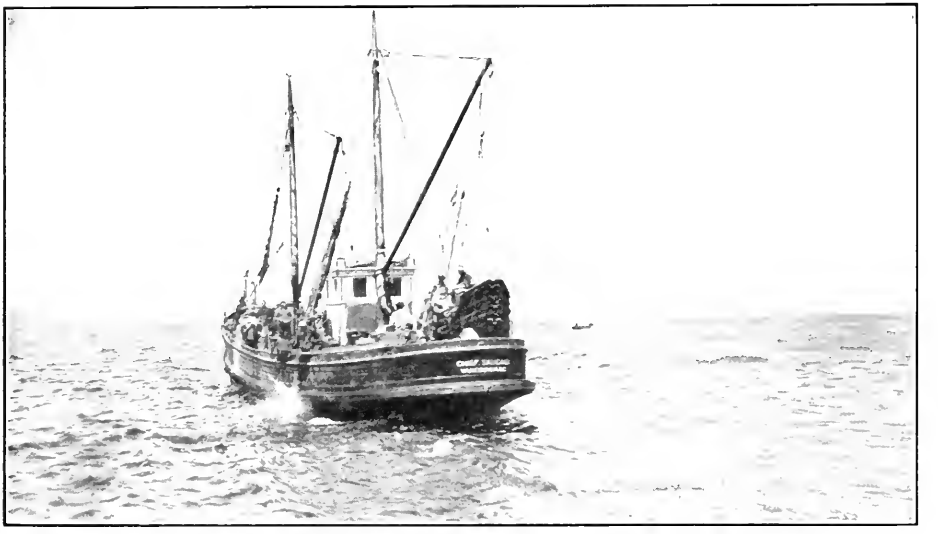


A discharge of 60% dynamite above the Falls.

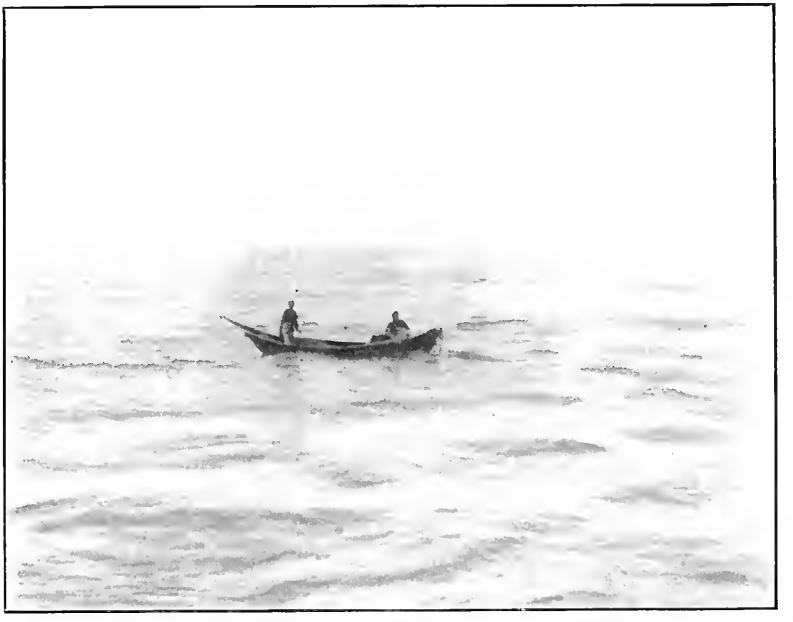


Excavated material on opposite bank —approximately 60,000 cubic yards.

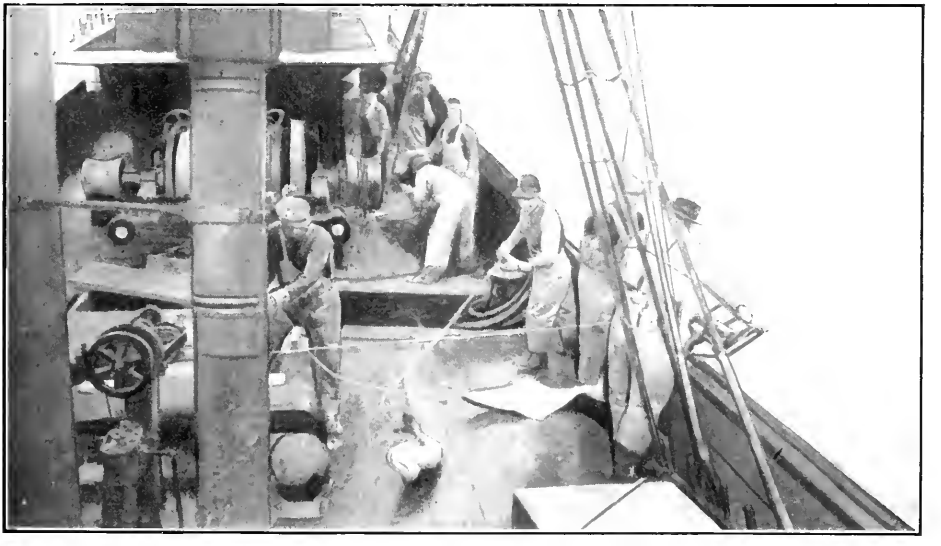
After completion of work—Note the eddy above the Gate in which the Salmon rest after going through the gate.



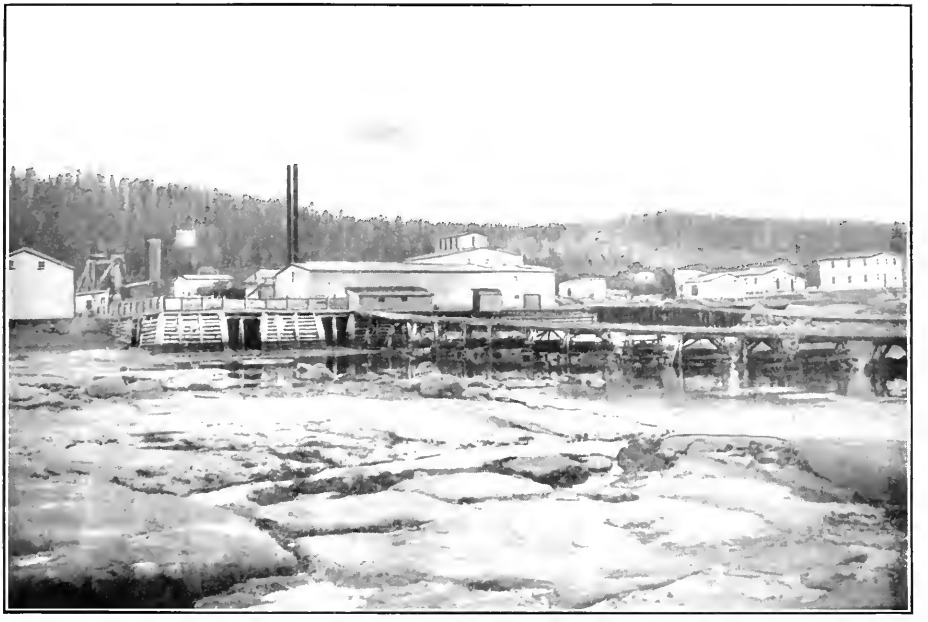
A British Columbia Halibuter proceeding on a fishing voyage.



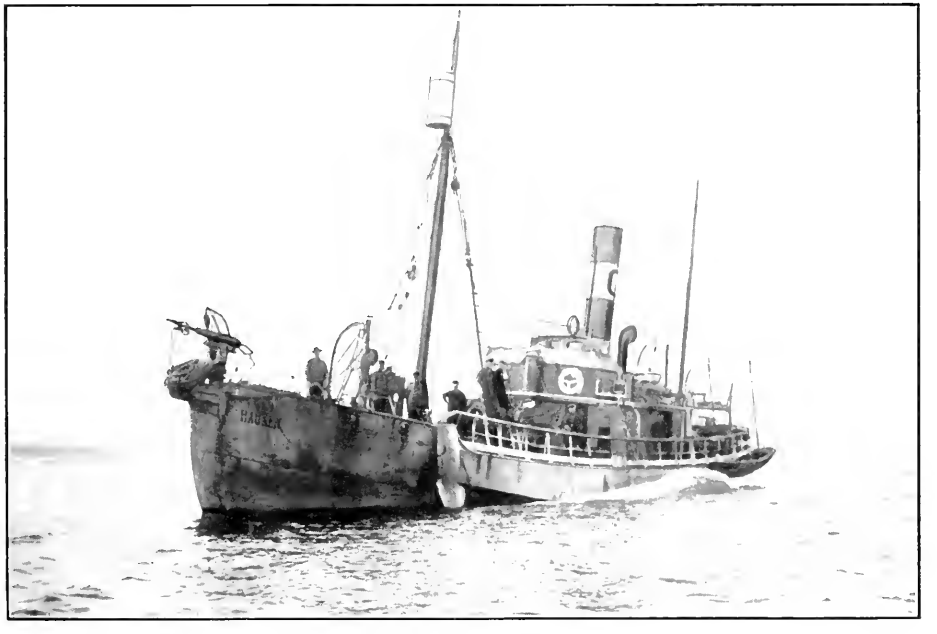
A Dory from a Halibut Steamer on the banks.



Hauling Halibut Trawls direct to the steamer's deck.



Whale Factory at Seven Islands, P. Q.



Whaling Steamer with a Whale in tow.

A Whale on the factory slip.

Fletching a Whale.

APPENDIX No. 1.

NEW BRUNSWICK.

District No. 1.—Comprising the counties of Charlotte and St. John. Inspector, John F. Calder, Campobello.

District No. 2.—Comprising the counties of Albert, Westmorland, Kent, Northumberland, Gloucester and Restigouche. Inspector, D. Morrison, Newcastle.

District No. 3.—Comprising the counties of Kings, Queens, Sunbury, York, Carleton, Victoria and Madawaska. Inspector, H. E. Harrison, Fredericton.

REPORT ON THE FISHERIES OF DISTRICT No. 1.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to present herewith my annual report on the fisheries of District No. 1, province of New Brunswick, together with the statistics of the different subdivisions.

It is a source of pleasure to be able to report a very large increase in the value of the catch for this year as compared with the previous one. The value of the yield for this year—1914-15—was $2,049,322, against $1,539,629 for the previous year. I may say that the average value of the yield for the eight years previous to this one is $1,506,710; therefore the earnings of the fishermen for this year were 25 per cent more than for an average year. As a matter of fact the records only show one year—1911-12—when the high mark of this year was beaten; the value of the yield for that year being about $54,000 greater than that of the present year. Unfortunately the large increase for this year was not general in character and does not apply to all branches—as a matter of fact it is almost altogether due to the abundantly prosperous year in the sardine fishery. Some of the weirs made phenomenal catches which were sold at high prices, and the owners reaped wonderful harvests.

SALMON.

The salmon catch for the past three seasons has been very good, 3,295 cwts. being taken in 1912, 3,998 cwts. for 1913, and 3,724 cwts. for this, while the catch for this year was not quite so good as last year, it is not due to a falling off in the run of salmon but rather on account of the very bad weather which occurred during the early portion of the season for this year, which seriously retarded the operations of the fishermen. During the year a fishway was placed in the dam owned by the Pjepscot Lumber Company at Salmon river, large quantities of salmon fry were taken from the Silver Falls hatchery and carefully placed in the rivers of St. John and Charlotte counties. Strict measures have been taken to have the reuglations regarding the pollution of streams carried into effect. And it is confidently expected that these combined efforts will have the effect of at least keeping the salmon fishery at its present high level.

LOBSTERS.

There is a large falling off in the lobster catch for this year as compared with 1913-14; the catch for that year was 11,751 cwts. against 9,337 cwts. this year. Weather conditions also played an important and unfavourable part in this branch during the early part of the fishing season. The open season begins on November 15. During the remainder of that month last year there were 3,436 cwts. taken against 1,899 cwts. for this November. This large falling off was due to a series of heavy storms, extending from the middle until the latter part of November, which made operations impossible. For the rest of the season the catch was about normal. I find general satisfaction with the present size limit for lobsters, 4¾-inch carapace; but in many cases, particularly at Grand Manan, I find a general complaint about the great length of the open season. Perhaps it would be well to carefully note the results from the coming season before taking action in the matter. If the catch does not show an improvement over the past year it would be well to consider the matter of taking two weeks off the last end of the open season. I believe the close season has been kept better than during any previous year, yet at the same time more or less illegal fishing was carried on. When it was possible the *Phalarope* made cruises over the district and destroyed a considerable number of traps. These cruises also had the effect of deterring would-be violators from putting out their traps. As stated in my other reports for recent years it is very difficult to prevent shipments of small lobsters into the Boston and New York markets, particularly from Grand Manan. However, I am in hopes that with the new patrol boat—*G*—which is to take the place of the *Sea Gull* the officers will be able to keep this illegal traffic to very small proportions.

HAKE, HADDOCK, COD AND POLLOCK.

The value of the catch of codfish for this year is $48,668 against $37,672 for last year. The increase in the value of the haddock for this year is about in the same proportion, with $36,036 for this year and $21,701 for last year. There was a considerable falling off in the values for both the hake and the pollock fisheries. The value of the hake catch dropped from $75,290 for last year to $69,548 for this year and that for pollock from $76,373 to $61,494.

SARDINES.

As already stated 1914 was a banner year for this fishery. All circumstances in connection with this branch were favourable—the failure of the catch on the Maine coast, the small pack made by the Maine canneries during the previous season and the fine run of the proper size fish for sardine purposes, all combined to make 1914 the most prosperous year in the history of the business. There were sold to the American canneries 278,005 brls., valued at $834,015, while the Canadian canneries packed 103,000 cases valued at $515,000—a total valuation of $1,349,015. In connection with this large increase in the yield and value of the sardine fishery we must not be unmindful of the facts that the number of weirs have increased very materially during the past few years, that the weirs are better adapted for retaining and catching fish and that the employment of a large fleet of gasoline carrying smacks have all been important factors in the increased production. A number of years ago, when sardines were carried in sail boats, weirs which were some distance from the canneries would sometimes contain large quantities for days without being able to obtain a market for them, while at the present by means of the telephone and motor smacks the owners are at all times in close touch with the buyers and generally speaking all fish are taken from the weirs as soon as they enter. Whether or not the fishery will continue in a healthy state under these new conditions the future alone will tell. For the present, however, the sardine industry is enjoying the acme of prosperity.

MATERIALS.

There is an increase in the value of the materials used in the fisheries as compared with last year of $142,022; the figures for last year being $1,923,874 and $2,065,896 for this year. More than one-half of this amount is made up of values for herring weirs, smoke houses, seines and sardine canneries. I desire to call your attention to the amounts invested in each of these branches, herring weirs valued at $470,700, smoke houses $273,835, seines $103,347, sardine canneries at $357,000.

FISHWAYS.

In addition to the fishway in the dam at Salmon river a new fishway has replaced the old one in the dam owned by the Mann Axe and Tool Company, Porters Mill Stream, St. Stephen, which I understand is proving to be efficient.

PROSECUTIONS.

There was an unusual large number of prosecutions during the year. The chief of which were for the use of explosives among pollock at White Head, Grand Manan and at Campobello and for torching herring at Didgeguash. Heavy fines were imposed on those who were found guilty of using dynamite for the purpose of killing fish. The violators from White Head paid their fines when imposed. The violation at Campobello was by a resident of Eastport, Maine, who in default of payment was lodged in the county jail. But after remaining there for a week his friends paid the amount of fine ($100) and costs, and he was released. Fines were imposed and collected for the violations at Didgeguash.

I am pleased to be able to again express my appreciations of the courteous treatment received from yourself and the other officials of the department during the past year.

I am, sir, your obedient servant,

J. F. CALDER.
Inspector of Fisheries.

REPORT ON THE FISHERIES OF DISTRICT No. 2.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to submit my second annual report on the fisheries of District No. 2, in the province of New Brunswick, for the fiscal year 1914-1915, together with a statistical statement of the quantities of fish taken, the fishing material used, and the number of persons engaged in the fisheries.

These returns show the value of fish taken to be $2,849,820 against $2,694,640 for the preceding year, an increase in value of $155,180.

The returns show an increase in the catch of cod, haddock, shad, mackerel, alewives, smelts, bass, and oysters, and a decrease in lobsters, salmon, herring, hake, eels, and clams.

SALMON.

There was a falling off in the catch of salmon in my whole district amounting in the aggregate to 593 cwt. This decrease is in the counties of Gloucester, and Kent; the former shows a decline of 570 cwt., and the latter 862 cwt., or a total in these two counties of 1,432 cwt., while Restigouche county shows an increase of 477 cwt., Northumberland 242 cwt., and Westmorland 103 cwt.

The catch in these three last-named counties was good, exceeding that of 1913-1914, which was considered an extra year, and shows that in these last-named counties this important fishery is more than holding its own, and is evident that the hatcheries, along with better protection in the spawning season, is keeping up the supply. The fall run on the Miramichi was equal if not larger than the previous year.

LOBSTERS.

Notwithstanding the shortening of the lobster canning season and the very unfavourable weather in the first part of the fishing season causing a great loss in traps and fishing gear, which could not be replaced, this fishing shows an increase of 4,459 cases, notwithstanding there was 1,336 cwt. less shipped in shell it still leaves a net increase of $72,500 in value of this important shell fish, which under the circumstances is a very substantial gain.

HERRING.

The catch of herring last year was a larger one. This year there is a decrease of 124,733 cwt. You will note by the return 8,623 brls. less were used as fertilizer, 15,306 brls. less for bait, and 22,469 brls. were pickled. About the same quantity was used fresh. The rough weather was largely accountable for the decrease in the catch.

MACKEREL.

This fishery is becoming very important, exceeding in value as compared with last year about $117,822. 1913-1914 returns show a catch of 16,831 cwt., while this year's returns show 29,857 cwt. landed, with a value amounting to $285,988 as against $168,166 for last year.

SMELTS.

I am pleased to report that notwithstanding the unfavourable weather conditions at the beginning of the season when fishermen were unable to get their nets placed for want of ice, the fishing shows an increase in the catch of over 5,000 cwt. and a net increase in value of over $50,000.

COD.

The catch of this fishery increased over 7,000 cwt. The storm in June interfered very much with the prosecution of this fishery; a number of boats were lost and I regret to say twelve fishermen lost their lives. Owing to the stormy weather in the first part of the season there was less fish dried than usual which accounts for the increase in the quantity of green-salted and explains the increase in the value being only $6,330.

OYSTERS.

There was an increase of 4,330 barrels of oysters with an increased value of $25,980.

CLAMS AND QUAHAUGS.

The quantity of clams and quahaugs taken was 19,714 barrels, valued at $70,342, as against 29,214 last year, valued at $103,042.

I am, sir, your obedient servant,

D. MORRISON,
Inspector of Fisheries.

SESSIONAL PAPER No. 39

REPORT ON THE FISHERIES OF DISTRICT No. 3. (INLAND).

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to submit my thirteenth annual report on the inland fisheries of New Brunswick for the fiscal year 1914-15, together with a statement of the quantities and value of fish taken and the materials used in the prosecution of the industry.

The following comparative statement shows a nearly equal value of fish taken and materials in use, compared with the year 1913-14:

Years.	Value of Fish.	Value of Material.
1913-14	$41,948	$45,213
1914-15	40,941	45,199

While there is a slight decrease in the total value of the year's catch, the unfortunate aspect of the matter is the greatly reduced catch of bass, amounting to practically the difference in value as between the two years.

It is difficult to account for the actions of these fish. At certain periods they appear in one of the tributaries of the St. John river, viz.: the Belle Isle waters, and about as quickly disappear again.

There is a less catch of nearly 150 per cent and I think it possible that the open season is too long, and for a small body of water it may be overfished.

There is also a small decrease in the quantity of salmon reported to have been taken in the past year. This applies particularly to the county of York and the Tobique river in Victoria county. The St. John river conditions are probably the ordinary; up and down experiences of fishermen not indicating even a reduced run of fish, in fact some fishermen and non-fishermen, who are about the water much, state that they appeared more plentiful than usual, judging by the fish playing in the water.

I believe conditions would be quite satisfactory were it not for the experience of the Tobique Salmon Club (fly fishermen), the members of which claim that they are not getting a fair deal, inasmuch as the early May and June runs of fish cannot get to the Tobique waters because of the netting in the St. John river. The superintendent of their club states that they need the early run of fish for good fly fishing, as the later runs do not rise well to the fly. As Mr. Allen is a fly fisherman with a long experience on the Tobique waters, no doubt his statement is correct, but when illegal fishing in the St. John is given as the cause for the early fish not getting to the Tobique waters, I am not as ready to acquiesce, because, while it is a fact that a considerable number of nets are set under licenses, illegal fishing, drifting for salmon and spearing, are not carried on to a very great extent in the early months because the water is too high for drifting and too oily for spearing. We have much more difficulty in preventing illegal fishing after the month of June.

I require younger and more efficient officers to patrol in Carleton county and, with some conditions which should not exist, changed, an improved condition would speedily come there.

It is important that a large number of early run spawn fish should reach the beds in the Tobique, not only that the members of the above-named club should have

good fishing, as they pay a large sum, said to be from ten to twelve thousand dollars per year, for the privilege, but that the spawn may be deposited there.

Trout fishing was not so good as in 1913, probably because of climatic conditions.

Thousands of people enjoy this sport in this district, and if it were possible to annually place trout fry in some of the many streams and lakes it would greatly improve conditions.

The catch of shad shows a gratifying increase in these waters, and I believe there is no doubt that the credit is due to the operation of the floating shad hatchery on the Kennebecasis and Washademoak waters the past three seasons. The residents of the whole St. John River district and beyond should be grateful for this.

Alewives show a considerably increased catch also, and there was a ready and profitable market for them.

Pickerel shows a falling off; eels about the same, and a little more than 50 per cent increase in the catch of sturgeon.

I am pleased to say that, after much delay, the St. George Pulp and Paper Company built an up-to-date fishway in their dam at the outlet of Magaguadavic lake last season. Salmon are unable to reach this water because of falls and dams below, but trout fishing may be benefited.

Several native and foreign sport fishermen have summer homes on the shores and on the islands of the two, Big and Little Magaguadavic lakes, the place being very accessible on the main line of the Canadian Pacific railway and a station at the lake-side.

I am to report also that the fishway at the dam at Plaster Rock on the Tobique river was rebuilt and modernized last autumn by the Fraser Lumber Company.

The department lost a faithful officer last winter through the death of Mr. A. C. Worden.

Not having fishery overseers in the counties of Kings and Carleton, the reports from the special guardians in those counties are revised and incorporated in the foregoing general report.

Overseer Holmes, Queens county, reports the fishing season, salmon, shad and alewives, later than usual opening up. All kinds of fish were quite plentiful, the catches running about as in the previous year. Salmon and shad taken in the St. John river and the Washademoak, alewives and pickerel mostly in the latter and in Grand lake and adjacent waters. Boats, gasoline and sail, and nets kept in good condition and the fishery regulations observed.

Overseer Babbitt, Sunbury county, reports all kinds of fish rather more plentiful than in 1913-14, and fishermen had a ready and remunerative market for all fish caught. Alewives, the most important fishery in his district, was of short duration, but the catch was very satisfactory, and profitable sales were made in St. John city.

The fishery regulations were enforced, not a difficult matter in Sunbury county.

Overseer McNally, a new officer for the St. John river, York county, reports a serious decrease in the catch of salmon. The fish appeared to be very plentiful, but as they come in schools or separate runs, and as most of his district is non-tidal water, the nets have to be raised or removed each alternate fortnight, and he thinks many large runs passed up in the closed weeks.

The first run was two weeks later than usual and large numbers moved up late in the season, one indication of this being in the great energy displayed by poachers with drift nets. Many of the poachers were brought to justice and several boats and nets were seized and confiscated.

The catch of shad showed a very gratifying increase over 1913, and trout were reported plentiful; the regulations being generally well observed. He recommends that special guardians be required to make affirmation to their weekly diary returns.

Overseer Niles, also a new officer, reporting for the southwest Miramichi river and the southern waters of York county, states that the impression is abroad in the Miramichi district that much illegal salmon fishing is carried on beyond his jurisdic-

tion, the run of fish being light, but possibly the low water prevented the fish freely ascending.

The season in the southern part of the county, which is the best watered and probably visited by more sport fishermen than any other section of New Brunswick, was an average one. Close seasons well observed and fishways in good condition. Some trouble on the Nashwaak and Magaguadavic waters with mill owners, but arrangements have been made to obviate this trouble in future.

Overseer Watson, Victoria county, reports an improvement in fisheries in his county. He states that salmon ascended the Salmon river, passing through all three fishways, and that this stream should have better protection, the two special guardians there last season being appointed too late to be of much benefit.

He asks, also, that a special guardian be stationed on the Aroostook river near the international boundary, as fish cannot pass beyond that point and United States fishermen come across and fish without a permit.

He reports the close seasons well observed, and salmon protected on the spawning beds and all mill men have agreed to prevent mill refuse going into the water.

Overseer Gagnon, Madawaska county, reports no unusual conditions in his district, although the catch of trout was not up to the average, probably on account of low water in the streams throughout a good portion of the season. He was not able to learn of the violation of the fishery regulations, apart from the actions of the mill men along the St. John river, and this trouble will be overcome shortly as the Fraser Lumber Company, owners of the large mills, are contemplating the conversion of their sawmills into a pulp mill and have agreed to, within a specified time, either bring this change about or provide means for preventing all refuse from their mills going into the water.

In conclusion I wish to say that conditions, regarding the mill refuse troubles, have greatly improved within the past year, and, with persistent attention, will continue to improve.

I am, sir, your obedient servant,

H. E. HARRISON,
Inspector of Fisheries.

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the Counties of **Charlotte** and **St. Johns**, Province of **New Brunswick**, during the year 1914-15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												Fishing Gear.						Number.
		Sailing and Gasoline Vessels.				Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.		Weirs.		Trawls.		
		20 to 40 tons, number.	10 to 20 tons, number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	
	County Charlotte.			$			$		$			$			$		$		$	
1	Lepreau to Red Head	2	3	10000	10	100	1500	33	8250	66				300	14520	54	43200			1
2	Red Head to L'Etang		8	4500	24	142	2910	73	18400	180	11	16500	27	289	7545	68	34000	73	2605	2
3	L'Etang to St. George		4	1400	10	239	6575	47	9110	209	1	1000	2	369	8232	56	48000	74	339	3
4	St. George to St. Stephen		9	67500		312	10970	40	15000	320				615	12552	115	125000	15	600	4
5	Grand Manan	1	52	38100	136	210	1200	197	72100	325				781	21015	74	137500	120	2400	5
6	Campobello	3	5	4500	59	140	2600	110	36000	285	3	2400	6	225	3680	23	9000	90	2000	6
7	West Isles		7	12000	14	240	3600	121	22000	220	19	9600	38	380	10330	80	40000	20	400	7
	Totals	6	88	138000	253	1383	32755	621	180860	1605	34	29500	73	2959	77874	470	436700	392	8344	
	St. John County.																			
1	St. John Harbour					185	6675	52	15600	225	2	1600	4	415	15000	24	16000			1
2	Lepreau to Chance Harbour	3	1	2400	17	22	440	27	6750	54	1	500	2	195	2500	5	3000	10	188	2
3	Chance Harbour to St. John		2	2100	2	120	2400	108	34350	275				1230	14950	30	15000	20	475	3
4	Mispec to Tynemouth Creek					12	120	10	1330	20										4
5	Tynemouth to Albert County		3	1550		17	230	11	1985	24				9	135					5
	Totals	3	6	6050	19	356	9565	208	60015	598	3	2100	6	1819	32585	59	34000	30	663	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the Counties of **Charlotte** and **St. John**, Province of **New Brunswick**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Fishing Gear.				Canneries.				Other Material.								Persons employed in Canneries, Freezers and Fish Houses.	Number.
		Hand lines.		Lobster traps.		Sardine Canneries.		Clam Canneries.		Freezers and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.		Pile Driver and Sein Reels.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Charlotte County.		$		$		$		$		$		$		$		$		
1	Lepreau to Red Head	....	...	2000	2000	....	....	3	12000	.....	.....	.....	.....	6	6000	12	1200	90	1
2	Red Head to L'Etang	84	42	2250	2270	3	75000	3	3000	5	2700	34	10620	25	19650	96	2275	257	2
3	L'Etang to St. George	212	166	808	808	...	....	....	....	....	....	32	1815	17	875	91	2565	4	3
4	St. George to St. Stephen	45	22	300	300	1	257000	1	3000	3	6000	2	2700	1	1000	108	9600	30	4
5	Grand Manan	980	980	17600	17600	....	....	....	.....	1	500	440	171000	106	65000	11	5550	395	5
6	Campobello	500	250	800	800	....	....	....	.....	...	.....	90	6000	47	3500	30	1000	22	6
7	West Isles	624	312	1700	1700	2	25000	1	2500	....	.....	60	9000	50	6000	193	7800	60	7
	Totals	2445	1712	25458	25458	6	357000	8	20500	9	9200	658	201135	252	102025	541	29990	858	
	St. John County.																		
1	St. John Harbour	....	.....	900	900	....	.. ..	....	....	9	94000	84	68000	57	90000	.....	...	50	1
2	Lepreau to Chance Harbour	....	..	900	900	....	.....	....	.....	...	....	3	500	5	600	.....	.....	15	2
3	Chance Harbour to St. John	....	...	2000	2000	....	.....	....	.....	3	2800	42	4200	15	2000	13	1450	16	3
4	Mispec to Tynemouth Creek	....	.....	950	950	...	.....	....	.....	.....	...	.	.....	.....	...	.....	.....	.....	4
5	Tynemouth to Albert County	10	10	1255	1255	....	.....	....	.....	.....	.....	.....	....	....	..	.....	....	.....	5
	Totals	10	10	6005	6005	....	....	..	..	12	96800	129	72700	77	92600	13	1450	81	

*Not operated.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the Counties of **Charlotte** and **St. John**, Province of **New Brunswick**, during the year 1914–15.

Number.	Fishing Districts.	Salmon, cwt.*	Salmon, value.	Lobsters, cwt.	Lobsters, value	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Sardines, brl.	Sardines, value.	Number.
	Charlotte County.		$		$		$		$		$		$		$		$	$	$		$	
1	Lepreau to Red Head			321	4815															56200	168600	1
2	Red Head to L'Etang			750	11250	1940	3880	7440	18600	34000	25500	2200	2200	11215	11215	10	50			20100	60300	2
3	L'Etang to St. George			205	3075	1535	3070	1630	4075	1600	1200	3050	3050	15	15					51500	154500	3
4	St. George to St. Stephen			32	480	150	300	2028	5070	1200	900	5	5	275	275					79480	238440	4
5	Grand Manan			5625	84375	11440	22880	620	1550	10500	7875	9620	9620	70860	70860					35450	106350	5
6	Campobello			411	6165	4970	9940	2880	7200	6400	4800	30000	30000	4000	4000					615	1845	6
7	West Isles			380	5700	2050	4100	150	375	2720	2040	9000	9000	5200	5200					30500	91500	7
	Totals			7724	115860	22085	44170	14748	36870	56420	42315	53875	53875	91565	91565	10	50			273845	821535	
	St. John County.																					
1	St. John Harbour	965	14475	360	5400									920	920	1340	6700	39300	39300	15000	45000	1
2	Lepreau to Chance Harbour	390	5850	191	2865	510	1020			4260	3195									4250	12750	2
3	Chance Harbour to St. John	2369	35535	400	6000	645	1290			690	518					380	1900	1625	1625	5450	16350	3
4	Mispec to Tynemouth Creek			322	4830	60	120							136	136					40	120	4
5	Tynemouth to Albert County			340	5100									105	105							5
	Totals	3724	55860	1613	24195	1215	2430			4950	3713			1161	1161	1720	8600	40925	40925	24740	74220	

*Qwt. =100 lb.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the Counties of **Charlotte** and **St. John**, Province of **New Brunswick**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts,	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Eels, cwt.	Eels, value.	Squid, brl.	Squid, value.	Scallops, brl.	Scallops, value.	Clams, brl.	Clams, value.	Dulse, cwt.	Dulse, value.	Cockles, cwt.	Cockles, value.	Whales, number.	Whales, value.	Number.
	Charlotte County.		$		$		$		$		$		$		$		$		$		$	
1	Lepreau to Red Head													8150	8150	60	90					1
2	Red Head to L'Etang	20	200	20	30	50	506							4800	4800					1	100	2
3	L'Etang to St. George			70	105	21	210			5	20	200	400	3140	3140							3
4	St. George to St. Stephen			180	270	13	130							3779	3779			362	1086			4
5	Grand Manan	170	1700											3400	3400	2820	4230					5
6	Campobello	78	780							100	400	2000	4000	70	70							6
7	West Isles											215	430	1600	1600							7
	Totals	268	2680	270	405	84	840			105	420	2415	4830	24939	24939	2880	5320	362	1086	1	100	
	St. John County.																					
1	St. John Harbour							60	480													1
2	Lepreau to Chance Harbour																					2
3	Chance Harbour to St. John																					3
4	Mispec to Tynemouth Creek																					4
5	Tynemouth to Albert County																					5
	Totals							60	480													

* Cwt. = 100 lb.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for Counties of **Charlotte** and **St John**, Province of **New Brunswick**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †quintal.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintal.	Hake and cusk, used fresh, cwt.	Hake and cusk, dried, quintal.	Pollock, used fresh, cwt.	Pollock, dried, quintal.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, bbl.	Herring, used as bait, bbl.	Herring, used as fertilizer, bbl.	Number.
	Charlotte County.																		
1	Lepreau to Red Head		321																1
2	Red Head to L'Etang		750	522		471	100	3466	122	190	11270		732	200	200		2028	766	2
3	L'Etang to St. George		205	1292		118	1650			1600		990	686	15					3
4	St. George to St. Stephen		32			50	2028				350		2		136				4
5	Grand Manan		5225	800	1605	2480	360		87		3500	1150	2824	400	19800	855	14445		5
6	Campobello		441	3470		500	2850				2134	3000	9000		2000				6
7	West Isles		380		1025		150			2722		3000	2000		1500	100	950		7
	Totals		7724	6084	2630	3622	7148	3466	209	4512	17254	8140	15244	615	23636	955	17123	766	
	Rate $		15	2	1	6.50	2.50	5.00	4	.75	3.50	1	3.50	1	4	5	2	1	
	Values $		115860	12168	10520	23543	17870	17330	836	3384	60389	8140	53354	615	94544	4775	34246	766	
	St. John County.																		
1	St. John Harbour	965	360											920					1
2	Lepreau to Chance Harbour	390	191	510							1420								2
3	Chance Harbour to St. John	2369	400	645							230								3
4	Mispec to Tynemouth Creek		322	5		18								136					4
5	Tynemouth to Albert County		340													35			5
	Totals	3724	1613	1160		18					1650			1056		35			
	Rates $	15	15	2		6.50					3.50			1		5			
	Values $	55860	24195	2320		117					5775			1056		175			

*Cwt. = 100 lb. †Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for Counties of **Charlotte** and **St. John**, Province of **New Brunswick**, during the year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Herring, canned, cases.	Shad, used fresh, cwt.	Shad, salted, brl.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Sardines, canned, cases.	Sardines, sold fresh or salted, brl.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Eels, used fresh, cwt.	Squid, used as bait, brl.	Scallops, used fresh, brl.	Clams and quahaugs, used fresh, brl.	Clams and quahaugs, canned, cases.	Dulse, dried, cwt.	Hake Sounds, dried, cwt.	Cockles, cwt.	Fish Oil, gal.	Whale Oil, gal.	Number.
	Charlotte County.																					
1	Lepreau to Red Head							56220							3850	6300	20					1
2	Red Head to L'Etang	3350	10				100500		20	20	50				4800			86		6720	900	2
3	L'Etang to St. George							51500		70	21		5	200	3140					350		3
4	St. George to St. Stephen							79480		180	13				976	2803			362			4
5	Grand Manan							35150	170						3400		940	50		8000		5
6	Campobello							615	78				100	2000	70			37		10000		6
7	West Isles						2500	30000						215	1600					6300		7
	Totals	3350	10				103000	253265	268	290	84		105	2415	17836	7103	960	173	362	31370	900	
	Rate $	5	5				5	3	10	1.50	10		4	2	1	5	6	35	4	30c.	31c.	
	Values $	16750	50				515000	759795	2680	405	840		420	48.30	17836	35515	5760	6055	1448	9411	279	
	St. John County.																					
1	St. John Harbour		890	150	10500	9600		15000				60										1
2	Lepreau to Chance Harbour							4250														2
3	Chance Harbour to St. John		380		1625			5450										4		150		3
4	Mispec to Tynemouth Creek							40														4
5	Tynemouth to Albert County																					5
	Totals $		1270	150	12125	9600		24740				60						4		150		
	Rate $		5	15	1	3		3				8						35		30c.		
	Values $		6350	2250	12125	28800		74220				480						140		45		

Total value, Charlotte county ..... $ 1,835,114
" St. John county 213,908

Grand total value $2,049,322

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc, State, for **District No. 1**, Province of **New Brunswick**, during the year 1914–15.

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Salmon	cwt.	3,724	55,860			
" used fresh	"			3,724		55,860
Lobsters	"	9,337	140,055			
" shipped in shell	"			9,337		140,055
Cod	"	23,300	46,600			
" used fresh	"			7,244	14,488	
" green-salted	"			2,630	10,520	
" dried	"			3,640	23,660	48,668
Haddock	"	14,748	36,870			
" used fresh	"			7,148	17,870	
" smoked (finnans)	"			3,466	17,330	
" dried	"			209	836	36,036
Hake	"	61,370	46,028			
" used fresh	"			4,512	3,384	
" dried	"			18,904	66,164	69,548
Pollock	"	53,875	53,875			
" used fresh	"			8,140	8,140	
" dried	"			15,244	53,354	61,494
Herring	"	92,726	92,726			
" used fresh	"			1,671	1,671	
" canned	cases			3,350	16,750	
" smoked	cwt.			23,656	94,544	
" pickled	brl.			990	4,950	
" used as bait	"			17,123	34,246	
" used as fertilizer	"			766	766	152,927
Shad	cwt.	1,730	8,650			
" used fresh	"			1,280	6,400	
" salted	brl.			150	2,250	8,650
Alewives	cwt.	40,925	40,925			
" used fresh	"			12,125	12,125	
" salted	brl.			9,600	28,800	40,925
Sardines	"	298,585	895,755			
" canned	cases			103,000	515,000	
" sold fresh or salted	brl.			278,005	834,015	1,349,015
Halibut, used fresh	cwt.	268	2,680	268		2,680
Flounders	"	270	405	270		405
Smelts	"	84	840	84		840
Eels	"	60	480	60		480
Squid	brl.	105	420	105		420
Scallops	"	2,415	4,830	2,415		4,830

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc, State, for **District No. 1**, Province of **New Brunswick**, during the year 1914-15.—*Concluded.*

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Clams	brl.	24,939	24,939			
" used fresh	"			17,836	17,836	
" canned	cases			7,103	35,515	53,351
Dulse, cockles, etc	cwt.	3,242	6,406	*1,322		7,268
Hake sounds	"			173		6,195
Whales	No.	1	100			
Fish oil	gal.			31,370		9,456
Whale oil	"			900		279
Totals			1,458,444			2,049,322

* The Dulse included is dried.

RECAPITULATION

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels Boats, Nets, etc., in **District No. 1**, Province of **New Brunswick**, for the year 1914–15.

	Number.	Value.
		$
Sailing and gasoline vessels	103	144,050
Boats (sail)	1,739	42,620
" (gasoline)	829	240,875
Carrying smacks	37	31,600
Gill nets, seines, trap and smelt nets, etc	4,778	110,459
Weirs	529	470,700
Trawls	422	9,007
Hand lines	2,455	1,722
Lobster traps	31,463	31,463
" canneries		
Sardine "	6	357,000
Clam "	8	20,500
Freezers and ice-houses	21	106,000
Smoke and fish-houses	787	273,835
Fishing piers and wharves	329	194,625
Pile drivers, etc	554	31,440
Totals		2,065,896

Number of men employed on vessels	272
" " boats	2,203
" " carrying smacks	79
" persons employed in fish-houses, freezers, canneries, etc	939
Totals	3,493

DISTRICT No. 2.

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in **District No. 2**, Province of **New Brunswick**, during the year 1914-15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.																Fishing Gear.						Number.
		Steam Vessels.				Sailing and Gasoline Vessels.				Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.		Weirs.		Trawls.		
		Number.	Tonnage.	Value.	Men.	(20 to 40 tons) No.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	
	Restigouche County.			$				$			$		$			$			$		$		$	
1	Above Dalhousie	..	..	..	..	....	1	800	5	46	950	3	4500	56	3	350	6	1140	15264	..	....	....	...	1
2	Below Dalhousie	..	..	....	..	..	1	500	3	230	6060	10	3000	350	1	500	2	2360	21000	....	..	....	.....	2
	Totals	....	....	...	..	...	2	1300	8	276	7010	13	7500	406	1	850	8	3500	36264	..	....	.....	.. ..	
	Gloucester County.																							
3	Beresford, etc	..	....	....	..	....	.....	.....	....	458	12700	4	1200	859	5	1600	10	4000	30000	..	..	10	50	3
4	Bathurst, New Bandon, etc	..	..	..	..	..	8	4000	31	322	7500	1	400	735	3	500	6	4150	26000	..	....	42	410	4
5	Caraquet, etc	..	..	..	..	11	141	75000	607	380	13000	4	3500	760	....	.....	...	3200	21000	....	....	166	1360	5
6	Shippigan and Miscou Islands	..	....	....	..	4	62	38809	290	402	22500	15	4600	838	....	.....	.....	2044	16800	....	....	140	1060	6
7	Tracadie, Inkerman, etc	..	..	....	..	....	32	19200	120	404	13380	11	6200	825	...	...	...	5805	48600	....	..	50	360	7
	Totals	..	..	...	..	15	243	137000	1051	1966	75080	35	15900	4017	8	2100	16	19199	142400	..	....	408	3180	
	Northumberland County.																							
8	Chatham, Negnac, etc	1	30	2500	3	....	3	1200	10	468	12000	6	3250	710	3	300	3	10308	100400	....	....	6	50	8
9	Bay du Vin, etc	..	..	....	..	....	3	2900	10	250	4900	14	6250	439	....	..	....	6500	99500	..	....	.....	....	9
10	Southwest and Northwest Miramichi Rivers	..	..	....	..	....	.....	.....	....	200	2900	2	1000	215	..	.....	.. ..	1850	13500	...	....	....	. ..	10
	Totals	1	30	2500	3	....	6	4100	20	918	19800	22	10500	1364	3	300	3	18658	213400	..	....	6	50	

	Kent County.																								
11	Richibucto, etc.					13	5600	35	242	15800	16	4800	446				3466	34720			12	286	11
12	Buctouche, etc.				2	5	5000	20	590	22000	12	6000	1100	1	500		3000	30000					12
13	Dundas								440	14000	8	3800	866			2	1544	10815					13
	Totals				2	18	10600	55	1272	51800	36	14600	2412	1	500	2	8004	75535			12	286	
	Westmorland County.																						
14	Shediac, etc					1	600	3	502	16000	67	20100	980	2	800	4	3810	24030			20	220	14
15	Botsford								250	5000	300	60000	1050	1	400	2	1900	17100					15
16	Sackville and Westmorland								240	7000	75	14250	600	2	2000	6	1300	8000	6	600			16
17	Dorchester								34	2400			65				160	1800	1	100			17
	Totals					1	600	3	1026	30400	442	94350	2695	5	3200	12	7170	51530	7	700	20	220	
18	*Albert County*								15	500	2	400	28				200	800	2	200			18

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in **District No. 2**, Province of **New Brunswick**, during the year 1914-15—*Con.*

Number.	Fishing Districts.	Fishing Gear.				Canneries.				Other Material.						Persons employed in Canneries, Freezers and Fish-Houses.	Number.
		Hand lines.		Lobster traps.		Lobster canneries.		Clam canneries.		Freezers and Ice-Houses.		Smoke and Fish-Houses.		Fishing Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Restigouche County.		$		$		$		$		$		$		$		
1	Above Dalhousie	60	30	....	....	....	....	....	....	3	16000	2	800	....	....	30	1
2	Below Dalhousie	40	20	3350	3350	2	1650	....	....	5	8500	4	2000	1	300	50	2
	Totals	100	50	3350	3350	2	1650	....	.	8	24500	6	2800	1	300	80	
	Gloucester County.																
3	Beresford, etc	250	150	3520	3520	4	1375	....	....	8	3000	24	1500	....	....	100	3
4	Bathurst, New Bandon, etc	425	400	10400	10400	9	6750	....	....	8	3400	8	1200	....	....	210	4
5	Caraquet, etc	2150	1800	4950	4950	7	3650	....	....	6	3600	31	8500	3	2500	450	5
6	Shippigan and Miscou Islands	2000	1200	36500	36500	43	32500	....	....	7	3500	27	8500	2	2000	782	6
7	Tracadie, Inkerman, etc	780	420	14700	14700	15	9100	2	3500	12	18000	52	5400	2	2000	450	7
	Totals	5605	3970	70070	70070	78	53375	2	3500	41	31500	142	25100	7	6500	1992	
	Northumberland County.																
8	Chatham, Negnac, etc	180	80	17900	17900	10	10800	....	....	32	18000	80	14000	....	....	340	8
9	Bay du Vin, etc	53	35	10000	10000	5	3500	....	....	8	4600	4	1000	....	....	247	9
10	Southwest and Northwest Miramichi Rivers	....	....	....	....	....	....	....	....	7	1800	28	750	....	....	42	10
	Totals	233	115	27900	27900	15	14300	....	....	47	24400	112	15750	....	....	629	

	Kent County.																			
11	Richibucto, etc	340	200	24800	24800	11	14900	1	500	20	18200	9	700	14	7200		292	11
12	Buctouche, etc	350	200	13000	13000	16	8150	1	500	8	7000	5	500	3	1500		325	12
13	Dundas, etc	300	150	9800	9800	8	4000	1	600	3	1000	.....	.....	.....	.....		169	13
	Totals	990	550	47600	47600	35	27050	3	1600	31	26200	14	1200	17	8700		786	
	Westmorland County.																	
14	Shediac, etc	90	40	26100	26100	18	12750	.....	.....	8	11000	12	8500	.....	.....		383	14
15	Botsford	100	40	47100	47100	19	16400	.....	.....	35	8000	55	4800	14	2800		950	15
16	Sackville and Westmorland	100	40	.....	.....	.....	.....	.....	.....	30	1800	100	10000	10	2000		300	16
17	Dorchester	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	300	2	500		30	17
	Totals	290	120	73200	73200	37	29150	.....	.....	73	20800	182	23600	26	5300		1663	
18	*Albert County*	.....	.....	150	150	.....	.....	.....	.....	.....	.....	2	120	.....	.....		.....	18

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in **District No. 2**, Province of **New Brunswick**, during the year 1914–15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Number.
	Restigouche County.		$		$		$		$		$		$	
1	Above Dalhousie	1050	15750			140	210							1
2	Below Dalhousie	2063	30945	830	4150	340	510			180	180			2
	Totals	3113	46695	830	4150	480	720			180	180			
	Gloucester County.													
3	Beresford, etc.	1184	17760	1005	5025	4520	6780							3
4	Bathurst, New Bandon, etc	870	13050	2392	11960	14200	21300							4
5	Caraquet, etc.			872	4360	112600	168900	2700	2700	3000	3000			5
6	Shippigan and Miscou Island			8510	42550	51220	76830	1100	1100	2500	2500			6
7	Tracadie, Inkerman, etc	326	4890	3492	17460	23510	35265							7
	Totals	2380	35700	16271	81355	206050	309075	3800	3800	5500	5500			
	Northumberland County													
8	Chatham, Neguac, etc.	1622	24330	3550	17750	1780	2670							8
9	Bay du Vin, etc.	3700	55500	4613	23065	1420	2130							9
10	Southwest and Northwest Miramichi River, etc	480	7200											10
	Totals	5802	87030	8163	40815	3200	4800							
	Kent County													
11	Richibucto	894	13410	9678	48390	1980	2970	60	60	2360	2360			11
12	Buctouche			3692	18460	390	585							12
13	Dundas, etc.			3159	15750	50	75							13
	Totals	894	13410	16520	82600	2420	3630	60	60	2360	2360			
	Westmorland County.													
14	Shediac	217	3255	6763	33815	11828	17742							14
15	Botsford			11082	55410	170	255							15
16	Sackville and Westmorland	15	225			40	60							16
17	Dorchester	46	690			150	225							17
	Totals	278	4170	17845	89225	12188	18282							
18	*Albert County.*	30	450	90	450	5060	7500					100	100	18
	Grand totals													

*Cwt. = 100 lbs

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in **District No. 2**, Province of **New Brunswick**, during the year 1914-15—*Continued.*

Number.	Fishing Districts.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Number.
	Restigouche County.		$		$		$		$		$		$	
1	Above Dalhousie											500	750	1
2	Below Dalhousie	5920	3552	7	49	15	120					150	225	2
	Totals	5920	3552	7	49	15	120					650	975	
	Gloucester County.													
3	Beresford, etc	34710	20626	410	2870							80	120	3
4	Bathurst & New Bandon, etc	14850	8710	65	455					65	520	40	60	4
5	Caraquet, etc	63500	38100	1080	7560					110	880	40	60	5
6	Shippigan & Miscou Island	39850	23910	3320	23240					40	320			6
7	Tracadie, Inkerman, etc	25300	15180	10875	76125	110	880	4680	2808	10	80			7
	Totals	178210	106526	15750	110250	110	880	4680	2808	225	1800	160	240	
	Northumberland County.													
8	Chatham, Neguac, etc	13780	8268	390	2730	320	2560	2330	1398			200	300	8
9	Bay du Vin, etc	8500	5100	2480	17360	80	640	4100	2460			120	180	9
10	Southwest and Northwest Miramichi River					790	6320	825	495					10
	Totals	22280	13368	2870	20090	1190	9520	7255	4353			320	480	
	Kent County.													
11	Richibucto, etc	24360	14616	9430	66010	148	1184	5400	3240			986	1479	11
12	Bactouche, etc	44450	26670	340	2380			625	375			140	210	12
13	Dundas, etc	48380	29028	45	315			425	255			30	45	13
	Totals	117190	70314	9815	68705	148	1184	6450	3870			1156	1734	
	Westmorland County.													
14	Shediac, etc	111900	67140	1210	8470	35	280	600	360			250	375	14
15	Botsford	73500	44100	195	1365			300	180					15
16	Sackville and Westmorland	37000	22200	10	70	110	880	500	300					16
17	Dorchester	75	45			480	3840							17
	Totals	222475	133485	1415	9905	625	5000	1400	840			250	375	
18	*Albert County.*	21	12			50	400					20	30	18
	Grand totals													

*Cwt = 100 lbs.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in **District No. 2**, Province of **New Brunswick**, during the year 1914-15—*Continued.*

Number.	Fishing Districts.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Sturgeon, cwt.	Sturgeon, value.	Bass, cwt.	Bass, value.	Eels, cwt.	Eels, value.	Tom-cod, cwt.	Tom-cod, value.	Number.
	Restigouche County.		$		$		$		$		$		$	
1	Above Dalhousie	2350	14100	40	320	..	..	20	200	50	300	40	60	1
2	Below Dalhousie	440	2640	160	1280	..	..	12	120	50	300	26	39	2
	Totals	2790	16740	200	1600	..	..	32	320	100	600	66	99	
	Gloucester County.													
3	Beresford, etc.	20	120	30	240	..	..	12	120	30	180	50	75	3
4	Bathurst, New Bandon, etc.	355	2130	54	432	..	..	25	250	40	240	4860	7290	4
5	Caraquet, etc.	1000	6000	20	160	..	..	25	250	40	240	200	300	5
6	Shippigan & Miscou Island	1650	9900	10	80	..	..	22	220	20	120	..	..	6
7	Inkerman, Tracadie, etc.	4660	27960	90	720	..	..	230	2300	450	2700	50	75	7
	Totals	7685	46110	204	1632	..	..	314	3140	580	3480	5160	7740	
	Northumberland County.													
8	Chatham, Neguac, etc.	20790	124740	60	480	..	..	73	730	110	660	13260	19890	8
9	Bay du Vin, etc.	14360	86160	40	320	..	..	170	1700	40	240	680	1020	9
10	Southwest and Northwest Miramichi River	80	480	1140	9120	..	..	285	2850	250	1500	..	..	10
	Totals	35230	211380	1240	9920	..	..	528	5280	400	2400	13940	20910	
	Kent County.													
11	Richibucto, etc.	6650	39900	28	224	..	..	2118	21180	40	240	80	120	11
12	Buctouche, etc.	4280	25680	50	400	..	..	50	500	125	750	40	60	12
13	Dundas, etc.	1260	7560	35	280	..	..	50	500	45	270	30	45	13
	Totals	12190	73140	113	904	..	..	2218	22180	210	1260	150	225	
	Westmorland County.													
14	Shediac, etc.	3160	18960	60	480	..	..	60	600	40	240	300	450	14
15	Botsford	3600	21600	40	320	..	..	20	200	25	150	..	..	15
16	Sackville and Westmorland	450	2700	20	160	..	..	20	200	25	150	10	15	16
17	Dorchester	..	..	30	240	60	300	..	..	40	240	50	75	17
	Totals	7210	43260	150	1200	60	300	100	1000	130	780	360	540	
18	*Albert County.*	..	..	100	800	..	..	10	100	50	300	40	60	18
	Grand totals	..	..	..	..	..	..	..	..	..	..	..	..	

* Cwt. = 100 lbs.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in **District No. 2**, Province of **New Brunswick**, during the year 1914–15—*Concluded.*

Number.	Fishing Districts.	Mixed fish, cwt.	Mixed fish, value.	Squid, brl.	Squid, value.	Oysters, brl.	Oysters, value.	Clams, brl.	Clams, value.	Quahaugs, brl.	Quahaugs, value.	Dulse, crabs, cockles, etc., cwt.	Dulse, crabs, cockles, etc., value.	Number.
	Restigouche County.		8		8		8		8		8		8	
1	Above Dalhousie	40	40	..	....	.....	....	15	30	.....	.....	...	.....	1
2	Below Dalhousie	100	100	.. .	..	....	... .	20	40	...	.....	....	.....	2
	Totals	140	140	....	....	. ...	.....	35	70	....	.. .	....	....	
	Gloucester County.													
3	Beresford, etc	....	....	....	....	.....	. . .	180	360	.....	.....	....	.....	3
4	Bathurst, New Bandon, etc	....	...	....	...	50	250	60	120	.....	.....	...	.....	4
5	Caraquet, etc	200	200	200	200	80	400	1320	2640	75	150	..	.....	5
6	Shippigan & Miscou Island	...	....	50	50	14	70	400	800	....	.....	....	.....	6
7	Tracadie, Inkerman, etc	...	.. .	....	...	.....	.....	5600	11200	.....	.....	....	.....	7
	Totals	200	200	250	250	144	720	7560	15120	75	150	....	.....	
	Northumberland County.													
8	Chatham, Neguac, etc.	....	....	....	....	690	3450	1903	3806	.. .	.....	....	.....	8
9	Bay du Vin, etc	....	...	....	....	3430	17150	.....	.....	.....	.....	....	.. ..	9
10	Southwest and Northwest Miramichi River	....	....	....	....	.....	.....	25	50	.....	.....	....	.....	10
	Totals	....	...	....	....	4120	20600	1928	3856	.....	.....	..	....	
	Kent County.													
11	Richibucto, etc	150	150	...	....	3450	17250	26	52	.. ....	.....	40	40	11
12	Buctouche, etc	....	....	....	....	1912	9560	.....	.....	3335	6670	...	.....	12
13	Dundas, etc	....	...	....	....	1214	6070	.....	.....	4650	9300	....	... .	13
	Totals	150	150	....	....	6576	32880	26	52	7985	15970	40	40	
	Westmorland County.													
14	Shediac, etc	30	30	....	....	4200	21000	100	200	1820	3640	....	.....	14
15	Botsford	....	....	....	....	90	450	30	60	55	110	.	.....	15
16	Sackville and Westmorland	....	....	...	....	.....	.....	30	60	.....	.....	....	.....	16
17	Dorchester	..	...	....	..	.....	.....	30	60	.....	....	....	.....	17
	Totals	30	30	....	...	4290	21450	190	380	1875	3750	....	.....	
18	*Albert County.*	....	....	...	....	.....	... .	40	80	.....	.....	....	.....	18
	Grand totals	....	....	....	....	.....	.....	.. ...	.. ..	.....	.....	...	.....	

* Cwts. = 100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No, 2**, Province of **New Brunswick**, during the year 1914-1915.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters shipped in shell. cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †quintals.	Had'dock, dried, quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Herring, used as fertilizer, brl.	Mackerel, used fresh, brl.	Mackerel, salted, brl.	Shad, used fresh, cwt.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Number.
	Restigouche County.																				
1	Above Dalhousie	1050	.....	.....	140	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
2	Below Dalhousie	2063	358	114	110	85	20	.....	30	50	280	.....	1070	400	815	7	.....	15	.....	.....	2
	Totals	3113	358	114	250	85	20	.....	30	50	280	.....	1070	400	815	7	.....	15	.....	.....	
	Rates ..... $	15	20	5	2	3	5	.....	1.50	3	2	.....	4	1.50	50c.	10	.....	10	.....	.....	
	Values ..... $	46695	7160	570	500	255	100	.....	45	150	560	.....	4280	600	407	70	.....	150	.....	.....	
	Gloucester County.																				
3	Beresford, etc	1184	292	421	822	705	763	.....	.....	.....	310	.....	3630	420	11335	410	.....	.....	.....	.....	3
4	Bathurst, New Bandon, etc	870	1171	50	660	3200	2380	.....	.....	.....	1350	.....	1820	1100	2920	65	.....	.....	.....	.....	4
5	Caraquet, etc	.....	400	72	200	5125	34050	900	.....	1000	500	.....	4500	2500	22250	930	50	.....	.....	.....	5
6	Shippegan and Miscou Island	.....	4230	50	200	9925	10390	367	.....	833	1020	.....	5380	5730	5610	3005	105	.....	.....	.....	6
7	Tracadie, Inkerman, etc	326	1726	40	140	3360	5550	.....	.....	.....	200	.....	3500	1790	5600	10005	290	110	120	1520	7
	Totals	2380	7819	633	2022	22315	53133	1267	.....	1833	3380	.....	18830	11450	47715	14415	445	110	120	1520	
	Rates	15	20	5	2	3	5	3	.....	3	2	.....	4	1.50	50c.	10	12	10	2	3	
	Values	35700	156380	3165	4044	66945	265665	3801	.....	5499	6760	.....	75320	17175	23857	144150	5340	1100	240	4560	

	Northumberland County.																							
8	Chatham, Negaac, etc.	1622	1750	50	125	330	332	...	.....	... .	750	40	1545	1838	2315	31	120	320	45	760	8
9	Baie du Vin, etc.	3700	2294	25	554	133	...	.....	.....	... .	100	.....	510	1475	1960	2480	.....	80	100	1333	9
10	Southwest and Northwest Miramichi Rivers.	480	.....	.....	.....	..	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	790	75	250	10
	Totals	5802	4044	75	679	763	332	.....	....	.....	850	40	2055	3313	4275	2510	120	1190	220	2343	
	Rates	15	20	5	2	3	5	...	.....	... ...	2	2	4	1.50	.50c.	10	12	10	2	3	
	Values	87030	80880	375	1358	2289	1660	.....	.....	.....	1700	80	8220	4969	2138	25100	1440	11900	440	7029	

*Cwt.=100 lbs. †Quintal=112 lbs.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No. 2**, Province of **New Brunswick**, during the year 1914-15.—*Continued.*

Number.	Fishing Districts.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Bass, used fresh, cwt.	Eels, used fresh, cwt.	Tom-cod, used fresh, cwt.	Mixed Fish, used fresh, cwt.	Squid, used as bait, cwt.	Oysters, used fresh, brl.	Clams and Quahangs used fresh, brl.	Clams and Quahangs, canned, cases.	Tongues and Sounds, pickled or dried, cwt.	Fish Oil, gal.	Total Value per Fishing District.	Number.
	Restigouche County.															$	
1	Above Dalhousie		500	2350	40	20	50	40	40			15					1
2	Below Dalhousie		100	440	160	12	50	26	100			20			50		2
	Totals		650	2790	200	32	100	66	140			35			50		
	Rates $		2	10	10	12	8	2	1			3			30c.		
	Values $		1300	27900	2000	384	800	132	140			105			15		
	Total value															94,318	
	Gloucester County.																
3	Beresford, etc		80	20	30	12	30	50				180					3
4	Bathurst, New Bandon, etc	65	40	355	54	25	40	4860			50	60		5	1000		4
5	Caraquet, etc	110	40	1000	20	25	40	200	200	200	80	1395		300	25000		5
6	Shippegan and Miscou Islands	40		1650	10	22	20			50	14	400		200	15000		6
7	Tracadie, Inkerman, etc	10		4660	90	230	450	50					5600	12	1200		7
	Totals	225	160	7685	204	314	580	5160	200	250	144	2035	5600	517	42200		
	Rates $	10	2	10	10	12	8	2	1	1	6	3	5	5	.30c.		
	Values $	2250	320	76850	2040	3768	4640	10320	200	250	864	6105	28000	2585	12660		
	Total value															970,553	

	Northumberland County.																	
8	Chatham, Negnac, etc.	.....	200	20740	60	73	110	13260	.....	.....	690	1903	.....	.....	60			8
9	Baie du Vin, etc.	.....	120	14360	40	170	10	680	.....	.....	3439	.....	.....	.....	.....			9
10	Southwest and Northwest Miramichi Rivers	.....	.....	80	1140	285	250	....	.....	.....	.....	25	.....	.....	.....			10
	Totals	.....	320	35230	1240	528	400	13940	.....	.....	4129	1928	.....	.....	60			
	Rates	$	2	10	10	12	8	2	.....	.....	6	3	.....	.....	30c.			
	Values	....	640	352300	12400	6336	3200	27880	...	.....	24720	5784	....	....	18			
	Total value	...	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		669,886	

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No, 2**, Province of **New Brunswick**, during the year 1914-1915—*Continued.*

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green salted, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Herring, used as fertilizer, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Shad, used fresh, cwt.	Shad, salted, brl.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Number.
	Kent County.																					
11	Richibucto, etc	894	4814	50	200	180	473	60	787	.....	9500	.....	2000	2500	1930	9430	...	148	...	100	1767	11
12	Buctouche, etc	...	1796	100	30	...	120	.....	.....	...	750	.....	5780	3000	10180	340	.....	.....	..	20	200	12
13	Dundas	.....	1550	50	50	...	...	.....	.....	.....	1600	.....	4825	3000	13152	45	.....	.....	.....	30	130	13
	Totals	894	8160	200	280	180	593	60	787	....	11850	...	12605	8500	25262	9815	.....	148	...	150	2097	
	Rates $	15	20	5	2	3	5	2	3	.....	2	.....	4	1.50	.50c.	10	....	10	...	2	3	
	Values $	13410	163200	1000	560	540	2965	120	2361	.....	23700	.....	50420	12750	12631	98150	.....	1480	....	300	6291	
	Westmorland County.																					
14	Shediac, etc	217	3223	317	168	5830	.....	.....	.....	...	2200	4000	8900	7000	30500	928	94	35	....	...	200	14
15	Botsford	.....	5441	200	170	.....	..	.....	...	...	700	16000	1300	10000	8450	75	40	...	.....	.....	100	15
16	Sackville and Westmorland	15	.....	.....	40	.....	...	.....	.....	...	1000	14000	1333	1000	1000	10	.....	110	..	200	100	16
17	Dorchester	46	.....	....	150	....	....	.....	.....	.....	75	...	.....	.....	...	.....	.....	255	75	....	....	17
	Totals	278	8664	517	528	5830	.....	...	.....	...	3975	34000	11533	18000	39950	1013	134	400	75	200	400	
	Rates $	15	20	5	2	3	....	.....	.....	.....	2	2	4	1.50	.50c.	10	12	10	15	2	3	
	Values $	4170	173280	2585	1056	17490	.....	....	...	.....	7950	68000	46132	27000	19975	10130	1608	4000	1125	400	1200	

	Albert County.																				
18	Albert County	30		90	1000	2000				100			7					50				18
	Rates $	15		5	2	3				1.50			4					10				
	Values $	450		450	2000	6000				150			28					500				

* Cwt = 100 lbs. † Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No. 2**, Province of **New Brunswick**, during the year 1914-1915—*Concluded.*

Number.	Fishing Districts.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Sturgeon, used fresh, cwt.	Bass, used fresh, cwt.	Eels, used fresh, cwt.	Tom-cod, used fresh, cwt.	Mixed Fish, used fresh, cwt.	Oysters, used fresh, bri.	Clams and Quahaugs, used fresh, bri.	Dulse, Crabs, Cockles and other shell fish, used fresh, cwt.	Tongues and Sounds, pickled or dried, cwt.	Fish Oil, gal	Total Value per Fishing District.	Number.
	Kent County.															$	
11	Richibucto, etc		986	6650	28		2118	40	80	150	3450	26	40	20	800		11
12	Buctouche, etc		140	4280	50		50	125	40		1912	3335					12
13	Dundas		30	1260	35		50	45	30		1214	4650					13
	Totals		1156	12190	113		2218	210	150	150	6576	8011	40	20	800		
	Rates $		2	10	10		12	8	2	1	6	3	1.50	5	.30c.		
	Values $		2312	121900	1130		26616	1680	306	150	39456	24033	60	100	240		
	Total values															607,855	
	Westmorland County.																
14	Shediac, etc		250	3160	60		60	40	300	30	4200	1920		48	680		14
15	Botsford			3600	40		20	25			90	85					15
16	Sackville and Westmorland			450	20		20	25	10			30					16
17	Dorchester				30	60		40	50			30					17
	Totals		250	7210	150	60	100	130	360	30	4290	2065		48	680		
	Rates $		2	10	10	5	12	8	2	1	6	3		5	.30c.		
	Values $		500	72100	1500	300	1200	1040	720	30	25740	6195		240	204		
	Total value															495,870	

	Albert County.															
18	Albert County	....	20	......	100	......	10	50	40	......	......	40	......	......	......		18
	Rates $	.....	2	.....	10	.....	12	8	2	......	.. .	3	.....	.....	.....		
	Values $	.....	40	.....	1000	.....	120	400	80	.....	.....	120	....	.....	...		
	Total value	...	......	.....	......	.. .	. .	......	....	. ....	......	......	....	.....	....	11,338	

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, etc., State, for **District No. 2, Province of New Brunswick,** during the year 1914-15.

Kinds of Fish.	Caught and Landed in a Green State.		Marketed.		Total Marketed Value.
	Quantity.	Value.	Quantity.	Value.	
		$		$	$
Salmon ..... cwts.	12,497	187,455	.....	.....	
" used fresh. .. .. "	.....	....	12,497	.. ....	
					187,455
Lobsters..... "	59,719	298,595	.....	. .. ...	
" canned..... cases	.....	.....	29,045	580,900	
" shipped in shell. ..... cwts.	.. ..	.....	1,629	8,145	
					589,045
Cod..... "	229,338	344,007	.....	.....	
" used fresh..... "	.....	.....	4,759	9,518	
" green-salted..... "	... .	.....	31,173	93,519	
" dried. ..... "	.....	... .. .	54,078	270,390	
					373,427
Haddock ..... "	3,860	3,860	.....	.....	
" used fresh..... "	....	.....	60	120	
" dried..... "	....	....	1,267	3,801	
					3,921
Hake. ..... "	8,040	8,040	.....	.....	
" used fresh..... "	....	.....	30	45	
" dried..... "	.....	.....	2,670	8,010	
					8,055
Pollock ..... "	100	100	.....	.. ..	
" used fresh..... "	....	....	100	.....	
					150
Herring..... "	546,096	327,257	....	.....	
" used fresh ..... "	.....	.... ..	20,335	40,670	
" smoked ..... "	.. ..	.....	34,040	68,080	
" pickled..... brls.	....	.....	46,100	184,400	
" used as bait.. "	.....	.....	41,663	62,494	
" used as fertilizer..... "	.....	.....	118,017	59,008	
					414,652
Mackerel ..... cwts.	29,857	208,999	.....	... ..	
" used fresh..... "	.....	.....	27,760	277,600	
" salted . ..... brls.	.....	....	699	8,388	
					285,988
Shad..... cwts.	2,138	17,104	... .	... ...	
" used fresh.... "	.....	... .	1,913	19,130	
" salted ..... brls.	....	.....	75	1,125	
					20,255
Alewives..... cwts.	19,785	11,871	.....	.....	
" used fresh ..... "	.....	.....	690	1,380	
" salted .... brls.	..... .	.....	6,360	19,080	
					20,460
Halibut, used fresh... .. .. cwts.	225	1,800	225	....	2,250
Flounders . ... "	2,556	3,834	2,556	.....	5,112
Smelts .... "	65,105	390,630	65,105	....	651,050
Trout .... "	2,007	16,056	2,007	.....	20,070
Sturgeon..... "	60	300	60	. .. ..	360
Bass .... "	3,202	32,020	3,202	.... ..	38,424
Eels..... "	1,470	8,820	1,470	.....	11,760
Tom-cod..... "	19,716	29,574	19,716	....	39,432
Mixed Fish .... "	520	520	520	.....	520
Squid ... . brls.	250	250	250	.....	250
Oysters..... "	15,130	75,650	15,130	.....	90,780
Clams and quahaugs ..... "	19,714	33,428	.....	.....	
" used fresh..... "	.. . .	....	14,114	42,342	
" canned ..... cases	.....	.....	5,600	28,000	70,342
Dulse, Cockles and other shell fish..... cwts.	40	40	40	.....	60
Tongues and Sounds ..... "	.....	.....	585	.....	2,925
Fish Oil..... gals.	... .	... ...	43,790	.....	13,137
Totals.....	....	2,006,210	....	.....	2,849,820

RECAPITULATION

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in **District No. 2, Province of New Brunswick**, for the year 1914-15.

	Number.	Value.
		$
Steam fishing vessels (tonnage 30)	1	2,500
Sailing and gasoline vessels	287	153,600
Boats (sail and row)	5,473	184,590
" (gasoline)	550	143,250
Carrying smacks	21	6,950
Gill nets, seines, trap and smelt nets, etc	56,731	519,929
Weirs	9	900
Trawls	446	3,736
Hand lines	7,218	4,805
Lobster traps	222,270	222,270
" canneries	167	125,525
Clam "	5	5,100
Freezers and ice-houses	200	127,400
Smoke and fish-houses	458	68,570
Fishing piers and wharves	51	20,800
		1,589,925

Number of men employed on vessels	1,140
" " boats	10,922
" " carrying smacks	41
" persons employed in fish-houses, freezers, canneries, etc.	5,150
Total	17,253

DISTRICT No. 3 (INLAND).

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material used in the Fishing Industry in the Counties of **Kings, Queens, Sunbury, York, Carleton, Victoria** and **Madawaska**, Province of **New Brunswick**, during the year 1914–15.

Numbers.	Fishing Districts.	Boats.					Gill-Nets.		Eel Traps.		Rods and Lines.		Freezers and Ice-Houses.		Smoke and Fish-houses.		Numbers.
		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
	County of Kings.		$		$			$		$		$		$		$	
1	St. John River District	40	800	3	600	65	92	1840	...	...	50	100	.....	.....	10	100	1
2	Kennebécasis River District	30	300	5	1000	30	125	1250	124	124	375	550	.....	.....	25	250	2
3	Belle Isle Bay District	28	420	2	500	65	75	900	30	30	75	150	....	....	....	....	3
	Totals	98	1520	10	2100	160	292	3990	154	154	500	800	.....	.....	35	350	
	County of Queens.																
4	North of St. John River	80	800	9	1350	130	350	2800	....	.....	100	250	.....	..	35	280	4
5	South of St. John River	80	960	3	1200	160	200	2000	5	10	50	125	10	100	20	200	5
	Totals	160	1760	12	2550	290	550	4800	5	10	150	375	10	100	55	480	
6	*County of Sunbury*, (in all)	32	480	3	750	48	590	4720	5	15	60	200	... ..	.....	15	250	6
	County of York.																
7	St. John River District	115	1150	.....	.....	115	115	1725	.....	.....	100	200	.....	.....	.....	.....	7
8	St. Croix, Magaguadavic and Oromocto waters	100	1500	15	5250	125	.....	.....	.....	.....	500	1000	19	1900	....	.....	8
9	South West Miramichi waters	25	250	.....	...	125	30	180	.....	.....	125	250	.....	.....	.....	....	9
	Totals	240	2900	15	5250	365	145	1905	.....	.....	725	1450	19	1900	.....	.....	
	County of Carleton.																
10	St. John River and West	60	480	.....	.....	60	60	720	.....	.....	100	200	.....	.....	.....	.....	10
11	East of St. John River	10	120	.....	.....	10	.....	.....	.....	.....	50	200	.....	.....	.....	.....	11
	Totals	70	600	.....	.....	70	60	720	.....	.. ..	150	400	.....	.....	.....	.....	

	County of Victoria.																						
12	St. John River District	10	100	....	....	15	7	70	.....	....	40	100	....	....	.....	12							
13	Tobique River and Lakes	30	600	.	....	30	.....	.....	.....	.....	75	700	5	500	.....	13							
	Totals	40	700	.....	.....	45	7	70	...	....	115	800	5	500	....								
	County of Madawaska.																						
14	Madawaska River and East	135	1300	....	.....	195	....	.....	.....	....	370	400	....	....	.....	14							
15	West of Madawaska River	65	700	.....	....	115	...	.....	.....	....	125	200	.....	.....	.....	15							
	Totals	200	2000	.....	...	310	.....	.....	.....	.....	495	600	....	....	.....								

RETURN showing the Quantities and Values of all Fish caught and marketed or consumed locally for the Counties of **Kings, Queens, Sunbury, York, Carleton, Victoria** and **Madawaska**, Province of **New Brunswick**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Trout, cwt.	Trout, value.	Whitefish, cwt.	Whitefish, value.	Bass, cwt.	Bass, value.	Pickerel, cwt.	Pickerel, value.	Sturgeon, cwt.	Sturgeon, value.	Eels, cwt.	Eels, value.	Perch, cwt.	Perch, value.	Alewives, cwt.	Alewives, value.	Shad, salted, cwt.	Shad, salted, value.	Shad, fresh, cwt.	Shad, fresh, value.	†Mixed fish, cwt.	†Mixed fish, value.	Caviare, cwt.	Caviare, value.	Number.
	County of Kings.		$		$		$		$		$		$		$		$		$		$		$		$		$	
1	St. John River District	300	4500	25	250	....	....	....	....	....	....	100	1000	....	....	....	....	32	64	....	....	50	250	20	20	1¼	125	
2	Kennebecasis River District	6	90	65	650	....	....	....	....	30	300	....	....	114	570	....	....	120	240	....	....	150	750	35	35	....	....	1
3	Belle Isle Bay District	9	135	10	100	....	....	46	460	6	60	..	....	20	100	....	....	65	130	....	....	20	100	12	12	....	....	2
	Totals	315	4725	100	1000	....	....	46	460	36	360	100	1000	134	670	..	....	217	434	....	....	220	1100	67	67	1¼	125	3
	County of Queens.																											
4	North of St. John River	20	300	7	70	....	..	5	50	100	1000	....	....	....	....	..	....	500	1000	..	....	230	1150	30	30	..	....	4
5	South of St. John River	11	165	8	85	....	....	....	....	150	1500	....	....	15	75	....	....	1300	2600	30	150	330	1650	32	32	....	....	5
	Totals	31	465	15	155	....	....	5	50	250	2500	....	....	15	75	....	....	1800	3600	30	150	560	2800	62	62	....	....	
6	*Sunbury County* (in all)	65	975	16	160	....	....	....	....	164	1640	8	80	10	50	..	....	2272	4544	15	75	8	40	55	55	4.0 1.0.0	40	6
	York County.																											
7	St. John River District	231	3465	120	1200	....	....	....	....	....	....	....	....	....	....	....	....	25	50	....	....	120	600	10	10	....	....	7
8	St. Croix, Magaguadavic and Oromocto Waters	50	750	100	1000	....	....	13	130	30	300	....	....	....	..	8	32	10	20	....	....	..	....	10	10	..	....	8
9	Southwest Miramichi Waters	40	600	50	500	....	....	....	....	....	....	....	....	....	....	....	....	40	80	....	....	....	....	2	2	....	....	9
	Totals	321	4815	270	2700	....	....	13	130	30	300	....	....	....	....	8	32	75	150	....	....	120	600	22	22	....	....	
	Carleton County.																											
10	St. John River and West	60	900	15	150	....	....	....	....	....	....	....	....	....	....	....	....	10	20	....	....	10	50	10	10	....	....	10
11	East of St. John River	5	75	20	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	5	5	....	....	11
	Totals	65	975	35	350	....	....	....	....	....	....	....	....	....	....	....	....	10	20	....	....	10	50	15	15	....	....	

	Victoria County.																													
12	St. John River District	5	75	25	250	....	....	....	....	....	....	....	....	15	75	....	....	....	....	..	....	4	20	10	10	....	....	12
13	Tobique River and Lakes	25	375	50	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10	10	....	....	13
	Totals	30	450	75	750	....	....	....	....	....	....	....	....	15	75	....	....	....	....	....	....	4	20	20	20	....	....	
	Madawaska County.																													
14	Madawaska River and East	8	120	90	900	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45	45	....	....	14
15	West of Madawaska River	....	....	50	500	28	420	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	25	25	....	....	15
	Totals	8	120	140	1400	28	420	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	70	70	....	....	

(Wt. – 100 lbs.

†"Mixed Fish" includes greyling, bull-heads and ouananiche.

RECAPITULATION.

Of the Yield and Value of the Fisheries in **District No. 3**, Province of **New Brunswick**, during the year 1914-15.

Kinds of Fish.		Quantity.	Value.
			$
Salmon	*Cwt.	835	12,525
Trout	"	651	6,515
Whitefish	"	28	420
Bass	"	64	640
Pickerel	"	480	4,800
Sturgeon	"	103	1,080
Eels	"	174	870
Perch	"	8	32
Alewives	"	4,374	8,748
Shad, salted	"	45	225
" fresh	"	922	4,610
Mixed fish	"	311	311
Caviare	"	$1\frac{65}{100}$	165
Total			40,941

Quantity consumed in Canada 7,153
" exported to U.S.A ..... $848\frac{55}{100}$

* Cwt. = 100 lbs.

RECAPITULATION.

Of the Number and Value of Vessels, Boats, Nets, Traps, etc., used in the Fisheries in **District No. 3**, Province of **New Brunswick**, during the year 1914-15.

——	Number.	Value.
		$
Steam vessels or tugs		
Boats (sail)	840	9,960
" (gasoline)	40	10,650
Gill-nets, seines and other nets	1,644	16,205
Eel traps	164	179
Rods and lines	2,195	4,625
Freezers and ice-houses	34	2,500
Smoke and fish-houses	105	1,080
Lodges built and used by native and foreign sport fishermen	55	64,000
		109,199

Number of men employed on boats 1,288

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the **whole** of **New Brunswick**, during the year 1914-15.

Kinds of Fish	Sea Fisheries.				Inland Fisheries.		Total both Fisheries.		Total Marketed Value.
	Caught and landed in a Green State.		Marketed.		Marketed.		Marketed.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Salmon.....cwts.	16221	243315							
" used fresh.. "			16221	243315	835	12,525	17056		255840
Lobster..... "	69056	438650							
" canned.....cases.			29045	580900			29045	580900	
" ship. in shell..cwt.			10966	148200			10966	148200	729100
Cod.....cwts.	252638	390607							
" used fresh.... "			12003	24006			12003	24006	
" green salted.. "			33803	104039			33803	104039	
" dried..... "			57718	294050			57718	294050	422095
Haddock..... "	18608	40730							
" used fresh.. "			7208	17990			7208	17990	
" smoked..... "			3466	17330			3466	17330	
" dried..... "			1476	4637			1476	4637	39957
Hake..... "	69410	54068							
" used fresh.. "			4542	3429			4542	3429	
" dried..... "			21574	74174			21574	74174	77603
Pollock..... "	53975	53975							
" used fresh.. "			8240	8290			8240	8290	
" dried..... "			15244	53354			15244	53354	61644
Herring ..... "	638822	419983							
" used fresh.. "			22006	42341			22006	42341	
" canned..... cases			3350	16750			3350	16750	
" smoked..... cwt.			57676	162624			57676	162624	
" pickled .... brls.			47090	189350			47090	189350	
" used as bait "			58786	96740			58786	96740	
" used as fertil. "			118783	59774			118783	59774	567579
Mackerel..... cwt.	29857	208999							
" used fresh . "			27760	277600			27760	277600	
" salted .....brls.			699	8388			699	8388	285988
Shad ..... cwt.	3868	25754							
" used fresh.... "			3193	25530	922	4,610	4115	30140	
" salted..... brls.			225	3375	45	225	270	3600	33740
Alewives..... cwt.	60710	52796							
" used fresh.. "			12815	13505	4374	8,748	17189	22253	
" salted..... brls.			15960	47880			15960	47880	70133
Sardines..... "	298585	895755							
" canned.....cases			103000	515000			103000	515000	
" sold fresh or salted ....brls.			278005	834015			278005	834015	1349015
Halibut..... cwt.	493	4480	493	4930			493		4930
Flounders. ..... "	2826	4239	2826	5517			2826		5517

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the **whole** of **New Brunswick**, during the year 1914-15—*Concluded.*

Kinds of Fish.	Sea Fisheries.				Inland Fisheries.		Total both Fisheries.		Total Marketed Value.
	Caught and landed in a Green State.		Marketed.		Marketed.		Marketed.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Smelts ..... cwts.	65189	391470	65189	651890	.....	.....	65189	.....	651890
Trout ..... "	2007	16056	2007	20070	651	6515	2658	.....	26585
Sturgeon ..... "	60	300	60	300	108	1080	168	.....	1380
Bass ..... "	3202	32020	3202	38424	64	640	3266	.....	39064
Eels ..... "	1530	9300	1530	12240	174	870	1704	.....	13110
Tom-cod ..... "	19716	29574	19716	39432	.....	.....	19716	.....	39432
Whitefish ..... "	.....	.....	.....	.....	28	420	28	.....	420
Pickerel ..... "	.....	.....	.....	.....	480	4800	480	.....	4800
Perch ..... "	.....	.....	.....	.....	8	32	8	.....	32
Mixed fish ..... "	520	520	520	520	311	311	831	.....	831
Squid ..... brls.	355	670	355	670	.....	.....	355	.....	670
Oysters ..... "	15130	75650	15130	90780	.....	.....	15130	.....	90780
Clams and scallops, " "	47068	69197	.....	.....	.....	.....	.....	.....	.....
used fresh ..... "	.....	.....	34365	65008	.....	.....	34365	65008	
Clams and scallops canned ..... cases	.....	.....	12703	63515	.....	.....	12703	63515	
									128523
Dulse, cockles, etc. cwts.	3282	6446	*1362	7268	.....	.....	1362	.....	7268
Tongues and sounds "	.....	.....	585	2925	.....	.....	585	.....	2925
Caviare ..... "	.....	.....	.....	.....	2	165	2	.....	165
Fish oil ..... gals.	.....	.....	75160	22593	.....	.....	75160	.....	22593
Whales ..... No.	1	100	.....	.....	.....	.....	.....	.....	.....
Whale oil ..... gals.	.....	.....	900	279	.....	.....	900	.....	279
Hake sounds ..... cwts.	.....	.....	173	6195	.....	.....	173	.....	6195
Totals	.....	3443054	.....	4899142	.....	40941	.....	.....	4940083

*The Dulse included is dried.

RECAPITULATION.

Of the number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in the **whole** province of **New Brunswick**, for the year 1914–15.

	Sea Fisheries.		Inland Fisheries.		Total, both Fisheries.	
	Number.	Value.	Number.	Value.	Number.	Value.
		$		$		$
Steam fishing vessels (tonnage 30)	1	2,500			1	2,500
Sailing and gasoline vessels	390	297,650			390	297,650
Boat, (sail and row)	7,212	227,210	840	9,960	8,052	237,170
" (gasoline)	1,379	384,125	40	10,650	1,419	394,775
Carrying smacks	58	38,550			58	38,550
Gill nets, seines, trap and smelt nets, etc.	61,509	630,388	1,644	16,205	63,153	646,593
Weirs	538	471,600			538	471,600
Trawls	868	12,743			868	12,743
Hand lines	9,673	6,527			9,673	6,527
Eel traps			164	179	164	179
Rods and lines			2,195	4,625	2,195	4,625
Lobster traps	253,733	253,733			253,733	253,733
" canneries	167	125,525			167	125,525
Sardine "	6	357,000			6	357,000
Clam "	13	25,600			13	25,600
Freezers and ice-houses	221	233,400	34	2,500	255	235,900
Smoke and fish-houses	1,245	342,405	105	1,080	1,350	343,485
Fishing piers and wharves	380	215,425			380	215,425
Pile drivers and scows	554	31,440			554	31,440
Lodges used by fishermen			55	64,000	55	64,000
Totals		3,655,821		109,199		3,765,020

	Sea Fisheries	Inland Fisheries.	Totals.
No. of men employed on vessels	1,412		1,412
" " boats	13,125	1,288	14,413
" " carrying smacks	120		120
No. of persons employed in fish-houses, etc	6,089		6,089
Totals	20,746	1,288	22,034

PRINCE EDWARD ISLAND.

APPENDIX No. 2.

REPORT ON THE FISHERIES OF THE PROVINCE.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to submit my Annual Report on the Fisheries of this province for the year 1914-1915, with statistics showing the value and quantity of fish taken.

The total value of the fisheries for the last fiscal year is $1,261,666, as against $1,280,447, for the preceding year, showing a small decrease of $18,781.

REPORT ON THE FISHERIES OF THE PROVINCE.

LOBSTERS.

The ice remained on the coast up to the 8th of May, and in some sections later, and prevented the fishermen from getting out their traps, lines, etc. The fish were large and well filled, prices good, and fishermen and packers made a good season, except a few who had fish on hand when war was declared.

COD.

I regret to report a decrease in this fish compared with last season, owing to the scarcity of bait, and great abundance of dog-fish.

HADDOCK.

Very few haddock are taken on this coast.

HAKE.

There was about an average catch, and good prices were obtained.

HERRING.

This fish is principally used for lobster bait. The catch being short, herring had to be imported to supply the fishermen.

MACKEREL.

I regret to report a shortage in this fish, as mackerel had been increasing for the past two or three seasons, and a further increase was expected last season.

SMELTS.

This fishery shows a large increase over last season, and fishermen made good wages.

ALEWIVES.

Prices were low, and not much effort was made to take them.

OYSTERS.

This fishery has decreased about 30 per cent, principally owing to the small oysters being taken out of the public beds to assist private enterprises, which caused a great deal of trouble in protecting the fishery.

TROUT AND EELS.

Were about as usual.

I am, sir, your obedient servant,

J. A. MATHESON,
Inspector of Fisheries.

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and in the County of **Kings**, Province of **Prince Edward**

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												Gill Nets, Seines, Trap and Smelt Nets, etc.	
		Sailing and Gasoline Vessels.				Boats.					Carrying Smacks.				
		(20 to 40 tons) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Kings County.			$			$		$			$			$
1	Souris and Red Point	4	1	3500	25	20	400	60	9000	170	..	..	..	200	3000
2	Bay Fortune	..	..	..	..	15	300	30	4500	70	..	..	..	50	500
3	Annandale	..	..	..	..	50	1000	40	6000	130	1	200	1	150	1200
4	Georgetown	..	..	..	..	50	1000	40	6000	130	2	500	2	260	2500
5	Murray Harbour North	..	..	..	..	75	1500	60	9000	170	..	..	..	340	3000
6	Murray Harbour South	3	2	2500	18	15	300	60	9000	115	1	200	1	270	2500
7	Morell and St. Peters	..	..	..	..	20	400	50	7500	130	..	..	..	330	3000
8	Naufrage	..	..	..	..	20	400	30	4500	80	..	..	..	125	1200
9	North Lake	..	..	..	..	25	500	30	4500	80	..	..	..	100	1000
10	East Lake	..	..	..	..	20	400	40	6000	90	..	..	..	110	1000
	Totals	7	3	6000	43	310	6200	440	66000	1165	4	900	4	1935	18900

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry **Island**, during the year 1914-15.

Fishing Gear.						Canneries.				Other Material.						Persons employed in Canneries, Freezers and Fish-Houses.	
Trawls.		Hand lines.		Lobster traps.		Lobster canneries.		Clam canneries.		Freezers and Ice-Houses.		Smoke and Fish-Houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		$		
160	1280	160	100	4100	4100	3	2000	....	.....	1	1000	5	250	1	500	120	1
25	200	50	50	5600	5600	2	3000	....	.....	....	....	4	100	1	50	40	2
20	160	130	130	18000	18000	3	7500	1	50	....	....	4	100	2	500	80	3
25	200	140	140	22000	22000	3	9000	1	50	...	....	8	400	1	500	130	4
20	160	130	130	21800	21800	5	6000	2	150	...	....	10	500	....	.....	100	5
220	1760	200	200	16500	16500	2	9000	1	50	....	...	14	700	1	500	90	6
120	960	180	180	29100	29100	9	13200	....	.....	....	....	14	700	1	200	170	7
20	160	75	75	10700	10700	7	6800	..	....	...	.	8	200	....	....	120	8
25	200	80	80	10700	10700	7	5400	....	....	....	....	12	400	....	.....	110	9
80	640	125	125	18300	18300	7	15000	....	....	....	....	14	600	....	.....	120	10
715	5720	1210	1210	156800	156800	48	76900	5	300	1	1000	93	3950	7	2250	1080	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and in the County of **Queens**, Province of **Prince Edward**

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.											
		Sailing and Gasoline Vessels.			Boats.					Carrying Smacks.		
		(10 to 20 tons.) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value	Men.
	Queens County.		$			$		$			$	
1	Tracadie				74	2664	88	13200	324			
2	New London	3	1500	13	10	500	45	11250	106			
3	Point Prim				15	750	52	9620	114			
4	Rustico	1	500	5	23	1725	70	17500	183	1	200	2
5	Wheatley River				16	400	6	1020	33			
6	Pownal				5	135	9	1800	23			
7	Charlottetown				15	600	11	2200	60			
8	Crapaud				6	240	14	2800	30			
9	Lot 65				30	900	60	12000	180			
10	Bays and Rivers				80	560	6	1500	24			
	Totals	4	2000	18	274	8474	361	72890	1077	1	200	2

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry **Island**, during the year 1914-15.

Fishing Gear.								Canneries.		Other Material.				Canneries.	
Gill Nets, Seines, Trap and Smelt Nets, etc.		Trawls.		Hand Lines.		Lobster Traps.		Lobster.		Smoke and Fish-Houses.		Fishing Piers and Wharves.		Persons Employed in Canneries, Freezers and Fish Houses.	
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$	$			$		$		$		$		
650	3900	12	240	85	51	20700	20700	5	12000	90	2600	9	9050	135	1
890	6675	11	220	150	90	8900	8900	7	4050	10	875	9	1000	70	2
72	360	10	200	70	42	18151	17770	24	8535	8	240	.....	.....	86	3
368	2302	25	500	220	132	15500	14000	4	8500	35	3500	2	1500	95	4
76	456	5	100	10	6	700	700	1	500	.....	.....	1	400	8	5
35	140	.....	.....	.....	.....	2000	2000	1	200	.....	.....	.....	.....	7	6
20	80	.....	.....	50	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
60	450	.....	.....	.....	.....	4800	3600	6	2450	6	300	.....	.....	36	8
53	371	.....	.....	.....	.....	14500	14500	5	5300	17	272	2	1000	69	9
40	160	.....	.....	.....	.....	.....	.....	.....	.....	20	200	.....	.....	.....	10
2264	14934	63	1260	585	346	85251	82170	53	41535	186	7987	23	12950	506	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels Industry in the County of **Prince**, Province of **Prince Edward**

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.														Gill Nets, Seines, Trap and Smelt Nets, etc.	
		Sailing and Gasoline Vessels.					Boats.					Carrying Smacks.					
		(40 tons and over.) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Prince County.			$			$		$			$			$
1	Tignish	...	...	...	...	10	1000	80	16000	230	2	500	4	100	700
2	Nail Pond	...	...	...	...	18	1440	8	1500	45	...	...	...	40	200
3	Skinner's Pond	...	...	...	...	52	4600	15	3000	70	...	...	...	80	320
4	Miminegash	...	1	400	4	20	1600	35	7000	97	1	250	2	70	280
5	Alberton	...	2	850	8	10	800	15	3000	45	...	...	...	100	800
6	Roxberry	...	1	400	4	4	320	4	1200	14	...	...	...	30	250
7	West Point	...	...	...	...	3	240	14	2800	32	...	...	...	30	300
8	Brae	...	...	...	...	6	480	5	1000	20	...	...	...	40	320
9	Narrows, Lot 11	...	...	...	...	5	400	21	4200	52	...	...	...	119	294
10	Ellerslie, Lot 12	...	...	...	...	2	160	1	200	3	...	...	...	55	330
11	Bideford	...	...	...	...	...	...	...	...	...	...	...	...	120	331
12	Wellington	...	...	...	...	...	...	...	...	...	...	...	...	120	600
13	Grand River	...	...	...	...	6	480	16	3200	27	...	...	...	140	700
14	Richmond Bay	...	...	...	...	14	1120	10	2000	48	...	...	...	80	400
15	Travellers' Rest	...	...	...	...	...	...	...	...	...	...	...	...	85	425
16	Malpeque	1	1	600	6	20	1600	17	3400	87	...	...	...	187	744
17	Fifteen Point	...	...	...	...	4	320	70	14000	147	...	...	...	85	1400
18	Summerside	...	...	...	...	...	...	5	1000	10	...	...	...	18	315
19	Carleton	...	...	...	...	...	...	15	3000	27	...	...	...	85	1250
20	Tryon	...	...	...	...	...	...	32	6400	62	...	...	...	122	790
21	Enmore	...	...	...	...	1	80	3	600	7	...	...	...	140	662
22	Indian River	...	...	...	...	...	...	...	...	...	...	...	...	90	450
	Totals	1	5	2250	22	175	14040	369	73500	1023	3	750	6	1936	11861

and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing **Island**, during the year 1914-1915.

Fishing Gear.								Other Material.						Persons employed in Canneries, Freezers and Fish-Houses.
Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.		
Number.	Value	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
	$		$		$		$		$		$		$	
.....	... .	50	25	30000	30000	8	14400	1	500	9	2600	1	40000	225
10	80	10	5	6000	6000	3	6500	.....	...	3	600	... .	.....	60
50	500	20	10	13000	13000	4	4000	1	400	4	800	.....	...	90
20	200	60	30	1200	1200	9	7200	1	400	7	1400	1	20000	72
40	400	40	20	6300	6300	11	3650	.....	....	8	1600	1	20000	60
2	20	12	6	4600	4600	3	2000	.....	.....	2	400	.....	.	30
....	.....	8	4	6000	6000	11	4500	.....	.....	7	1000	1	15000	30
.....	.....	.....	...	2500	2500	4	3000	.....	..	4	1100	1	6000	20
.....	.....	10	5	6250	5950	6	5000	.....	.....	.....	....	.....	.....	34
.....	.....	15	7	400	400	1	300	.....	.....	.....	.....	.....	.....	3
. ...	.....	. ...	... .	.....	.....	....	.....	.....	...	.....	.....	... .	.....	
.....	.....	...	...	.....	.....	....	.....	.....	...	.....	.....	.....		
.....	.....	. .	.	3300	3300	1	1000	.....	.....	8	175	.....	.....	14
.....	.....	.....	.....	12000	11000	3	3000	.....	.....	.....	.....	..	... .	47
....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	
.....	... .	....	.....	11500	11500	3	4000	.....	... .	4	200	1	1600	40
.....	.....	....	.....	24000	24000	10	11150	.....	.....	.....	. ..	.....	.....	91
.....	.. .	.....	.....	1500	1500	1	450	.. ..	..	.....	.....	.....	.....	10
.....	.... .	.....	.....	4450	4450	3	1800	.....	.....	.....	.....	.....	.....	17
.....	.....	.....	.....	12400	12400	6	2400	.....	.	.....	.....	....	.....	36
.....	.....	.....	.....	1300	1300	1	300	.....	....	.....	.....	2	2000	7
... ..	.....	. .	.....	.....	.....	....	....	.....	.....	... ..	.....	.....	.....	
122	1200	225	112	146700	145400	88	74650	3	1300	56	9875	8	104600	886

THE

RETURN showing the Quantities and Values of all Fish caught and landed in during the

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Herring, cwt.
	Kings County.		$		$		$		$		$	
1	Souris and Red Point			1143	6858	1880	2820	250	250	10210	7657	4500
2	Bay Fortune	68	680	1450	8700	300	450	15	15	250	187	800
3	Annandale			3239	19434	215	322	10	10	150	112	800
4	Georgetown			3537	21422	270	405	15	15	120	90	2000
5	Murray Harbour, North			4254	25524	250	375	10	10	80	60	1600
6	Murray Harbour, South			3158	18948	1000	1500	150	150	6800	5100	3000
7	Morell and St. Peters	280	2800	8357	50142	1910	2865	120	120	120	90	1200
8	Naufrage			3355	20130	250	375	15	15	60	45	800
9	North Lake			3749	22494	470	705	20	20	70	52	525
10	East Lake			4958	29748	403	604	20	20	118	88	800
	Totals	348	3480	37200	223400	6948	10421	625	625	17978	13481	16025

*Cwt.=100 lbs.

CATCH.

Green State, in the County of **Kings**, Province of **Prince Edward Island**, year 1914-15.

Herring, value.	Mackerel, cwt.	Mackerel, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Eels, cwt.	Eels, value.	Tom-cod, cwt.	Tom-cod, value.	Mixed fish, cwt.	Mixed fish, value	Clams, brl.	Clams, value.	Quahaugs, brl.	Quahaugs, value.	Number.
$		$		$		$		$		$		$		$		$	
2250	2500	10000	115	575	5	40	10	50	10	10	25	12	300	600	...	....	1
400	60	240	180	900	10	80	5	25	.....	.....	10	5	40	80	...	....	2
400	70	280	20	100	5	40	5	25	.....	.....	10	5	50	100	....	....	3
1000	35	140	20	100	10	80	40	200	.....	.....	10	5	150	300	....	....	4
800	20	80	70	350	10	80	40	200	.....	.....	15	7	500	1000	60	150	5
1500	20	80	140	700	15	120	25	125	10	10	25	12	120	240	....	....	6
600	1200	4800	320	1600	5	40	30	150	.....	.....	60	30	40	80	....	....	7
400	180	720	30	150	12	96	.....	.....	....	.....	20	10	....	....	....	....	8
262	840	3360	46	230	12	96	5	25	.....	.....	....	..	....	....	....	....	9
400	866	3464	.....	.....	10	80	10	50	. .	.....	....	....	....	....	....	....	10
8012	5791	23164	941	4705	94	752	170	850	20	20	175	86	1200	2400	60	150	

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Kings** Province of **Prince Edward Island**, during the year 1914–15.

Number.	Fishing Districts.	Salmon, used fresh and salted, *cwt.	Salmon, canned, cases.	Lobsters, canned, cases.	Cod, used fresh, cwt.	Cod, shipped green salted, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock, dried, quintals.	Hake and Cusk, dried, quintals.	Herring, used fresh, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, used fresh, brl.	Number.
	Kings County.														
1	Souris and Red Point			571	120	20	573	99	50	3403	2500	100	850	325	1
2	Bay Fortune	68		725	10	10	90	15		83	200	30	255	15	2
3	Annandale			1619	10	10	62	10		50	300	25	212	22	3
4	Georgetown			1768	20	10	77	15		40	1500	40	190	8	4
5	Murray Harbour, North			2127	10	10	73	10		26	1200	20	170	5	5
6	Murray Harbour, South			1579	50	10	310	50	33	2267	2000	150	275	5	6
7	Morell and St. Peters	231	56	4179	80	30	590	60	20	40	900	30	105	377	7
8	Naufrage			1678	10	10	73	15		20	600	10	85	20	8
9	North Lake			1875	16	10	147	20		23	320	20	72	18	9
10	East Lake			2479	22	15	117	20		39	550	16	101	23	10
	Totals	299	56	18660	342	135	2112	314	103	5991	10070	441	2315	818	
	Rates $	10	12	20	2.50	4	6	2	4	4	1	5	2	8	
	Values $	2990	672	372000	855	540	12672	628	412	23964	10070	2205	4630	6544	

†Cwt. = 100 lb. * Quintal = 112 lb

THE CATCH MARKETED.

RETURN showing he Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Kings**, Province of **Prince Edward Island**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Mackerel, salted, brl.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Eels, used fresh, cwt.	Tom-cod, used fresh, cwt.	Mixed fish, used fresh, cwt.	Clams and Quahaugs, used fresh, brl.	Clams and Quahaugs, canned, cases.	Tongues and Sounds, pickled or dried.	Hake Sounds, dried, cwt.	Fish oil, gal.	Number.
	Kings County.												
1	Souris and Red Point	725	115	5	10	10	25	300	.....	5	60	2400	1
2	Bay Fortune	15	180	10	5	.....	10	40	.....	.....	.....	50	2
3	Annandale	16	20	5	5	.....	10	50	.....	.....	.....	50	3
4	Georgetown	9	20	10	40	.....	10	100	50	.....	.....	40	4
5	Murray Harbour, North	10	70	10	40	.....	15	210	350	.....	.....	20	5
6	Murray Harbour, South	5	140	15	25	10	25	60	60	5	40	2000	6
7	Morell and St. Peters	274	320	5	30	.....	60	40	.....	5	.....	440	7
8	Naufrage	53	30	12	.....	.....	20	.....	.....	.....	.....	.....	8
9	North Lake	274	46	12	5	.....	.....	.....	.....	.....	.....	.....	9
10	East Lake	281	.....	10	10	.....	.....	.....	.....	.....	.....	.....	10
	Totals	1662	941	94	170	20	175	800	460	15	100	5000	
	Rates $	12	7	10	10	2	1	4	6	4	20	25c.	
	Values $	19944	6587	940	1700	40	175	3200	2760	60	2000	1250	

Total value $476,838

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in the County of **Queens**, Province of **Prince Edward Island**, during the year 1914-15.

Number.	Fishing Districts.	Lobsters, cwts.*	Lobsters, value.	Cod, cwts.	Cod, value.	Hake and Cusk, cwts.	Hake and Cusk, value.	Herring, cwts.	Herring, value.	Mackerel, cwts.	Mackerel, value.	Alewives, cwts.	Alewives, value.	Number.
	Queens County.		$		$		$		$		$		$	
1	Tracadie	5373	32238	1351	7184	100	150	677	677	350	2450	150	150	1
2	New London	3016	18096	2472	4078	109	163	471	471	514	3598			2
3	Point Prim	2788	16728	189	311	372	558	96	96					3
4	Rustico	1874	29244	8253	13617	200	300	869	869	525	3675			4
5	Wheatley River	174	1044	4320	2178	71	106	111	111	21	147			5
6	Pownal	405	2430					6	6					6
7	Charlottetown													7
8	Crapaud	801	4806					301	301					8
9	Lot 65	2544	15264					160	160					9
10	Bays and Rivers											120	120	10
	Totals	19975	119850	16588	27368	852	1277	2691	2691	1410	9870	270	270	

*Cwts.=100 lbs.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in the County of **Queens**, Province of **Prince Edward Island**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Smelts, cwts.*	Smelts, value.	Trout, cwts.	Trout, value.	Eels, cwts.	Eels, value.	Oysters, brls.	Oysters, value.	Clams, brls.	Clams, value.	Quahaugs, brls.	Quahaugs, value.	Number.
	Queens County.		$		$		$		$		$		$	
1	Tracadie	2690	13450	7	70	88	572	1376	6880	.....	.....	13	26	1
2	New London	590	2950	6	60	26	169	6	30	.....	.....	.....	.....	2
3	Point Prim	371	1855	24	240	.....	.....	556	2780	.....	.....	.....	.....	3
4	Rustico	390	1950	.....	.....	.....	.....	.....	.....	280	560	.....	.....	4
5	Wheatley River	73	365	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
6	Pownal	9	45	.....	.....	.....	.....	14	70	.....	.....	.....	.....	6
7	Charlottetown	268	1340	.....	.....	.....	.....	60	300	.....	.....	.....	.....	7
8	Crapaud	164	820	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
9	Lot 65	490	2450	.....	.....	.....	.....	484	2420	.....	.....	20	40	9
10	Bays and Rivers	300	1500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
	Totals	5345	26725	37	370	114	741	2496	12480	280	560	33	66	

*Cwts.=100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Queens**, Province of **Prince Edward Island**, during the year 1914–15.

Number.	Fishing Districts.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green salted, cwt.	Cod, dried, [quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Herring, used fresh, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Alewives, salted, brl.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Eels, used fresh, cwt.	Oysters, used fresh, brl.	Clams and Quahaugs, used fresh, brl.	Fish oil, gal.	Number.
	Queens County.																				
1	Tracadie	2686		530	1447	310		33	7	10	320	182	56	50	2690	7	88	1376	13	530	1
2	New London	1508		113	920	173		36	5	40	173	100	138		590	6	26	6		800	2
3	Point Prim	1394		96		31	92	93	5	11	29				371	24		556		150	3
4	Rustico	2437		1198	2568	639		66	12	39	370	258	89		390				280	5000	4
5	Wheatley River	87		150	240	230		23	5	9	39	21			73					250	5
6	Pownal	190	25						6						9			14			6
7	Charlottetown														268			60			7
8	Crapaud	400							3		149				164						8
9	Lot 65	1272							3		78			40	490			484	20		9
10	Bays and Rivers														300						10
	Totals	9974	25	2087	5175	1383	92	251	46	109	1158	561	283	99	5345	37	114	2496	313	6730	
	Rates ... $	20	7	2	3	6	2	4.50	1.50	3	2	10	15	3	5	10	10	5	3.50	30c	
	Values ... $	199480	175	4174	15525	8298	184	1129	69	327	2316	5610	4245	270	26725	370	1140	12480	1095	2019	
	Total value ...	... $285,631																			

† Quintal = 112 lbs.

THE CATCH.

RETURN showing the Quantities and Value of all Fish caught and landed in a Green State, in the County of **Prince**, Province of **Prince Edward Island**, during the year 1914-1915.

Number.	Fishing Districts.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Alewives, cwt.	Alewives, value.	Smelts, cwt.	Smelts, value.	Tom-cod, cwt.	Tom-cod, value.	Oysters, brl.	Oysters, value.	Quahangs, brl.	Quahangs, value.	Number.
	Prince County.		$		$		$		$		$		$		$		$		$		$	
1	Tignish	6528	32640	520	780	560	420	4980	2490	150	600			565	2825							8
2	Nail Pond	1452	7260	891	1336	580	435	1260	630	60	240											9
3	Skinner's Pond	1700	8500	924	1386	860	645	1740	870	300	1200											10
4	Miminigash	1460	7300	866	1299	770	578	1500	750	600	2400			2670	13350							11
5	Alberton	1130	5650	842	1263	718	538	1275	637	390	1560			4070	20350							12
6	Roxberry	1116	5580	310	465	182	136	900	450					3360	16800			491	2455			13
7	West Point	880	4400					690	345													14
8	Brae	680	3400					550	275					365	1825							15
9	Narrows, Lot 11	1930	11580	450	900			2250	1125					60	300			200	1000	125	313	16
10	Ellerslie, Lot 12	58	348	400	800			600	300					175	875			970	4850			17
11	Bideford							600	300									971	4855	250	1000	18
12	Wellington			50	100			300	150			30	60	65	325	60	60	1050	5250			19
13	Grand River	400	2400	75	150			600	300					40	200							20
14	Richmond Bay	1928	11568											40	200			610	3050			21
15	Traveller's Rest							900	450					150	750			300	1500			22
16	Malpeque	2224	13344	678	1356			6255	3127	514	2056			325	1625			200	1000	300	1200	23
17	Fifteen Point	5402	32412					6396	3198					100	500							24
18	Summerside	324	1944					450	225					400	2000							25
19	Carleton	1176	7056					1050	525					500	2500							26
20	Tryon	2586	15516					2700	1350					90	450							27
21	Elmore	192	1152					1245	622					125	625			385	1925	500	2000	28
22	Indian River							75	37					40	200			150	750			29
	Totals	31166	172050	6006	9835	3670	2752	36316	18156	2014	8056	30	60	13040	65200	60	60	5327	26635	1175	4513	

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Prince**, Province of **Prince Edward Island**, during the year 1914-15.

Number.	Fishing Districts.	Lobsters, canned, cases	Cod, used fresh, *cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †quintal.	Hake and Cusk, dried, quintal.	Herring, used fresh, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, salted, brl.	Alewives, used fresh, cwt.	Smelts, used fresh, cwt.	Tom-cod, used fresh, cwt.	Oysters, used fresh, brl.	Clams and Quahaugs, used fresh, brl.	Hake Sounds, pickled or dried, cwt.	Fish Oil, gals.	Number.
	Prince County.																	
1	Tignish	3264			173	186		235	2137	50		565				87	600	1
2	Nail Pond	726			297	193		270	225	20							200	2
3	Skinners Pond	850			308	286		315	397	100						11	500	3
4	Miminigash	730			288	256		280	330	200		2670				10	480	4
5	Alberton	565			280	239		234	286	130		4070				9	500	5
6	Roxberry	558			103	60		40	390			3260		491		2	30	6
7	West Point	440						104	189									7
8	Brae	340						26	236			365						8
9	Narrows, Lot 11	965	100	100	50			5	1117			60		200	125			9
10	Ellerslie, Lot 12	29	50	100	50				306			175		970				10
11	Bideford								300					971	250			11
12	Wellington		8	6	10				150		30	65	60	1050				12
13	Grand River	200	10	10	15				300			40						13
14	Richmond Bay	964										40		610				14
15	Travellers Rest								450			150		300				15
16	Malpeque	1112	128	50	150		25	15	3093	171		325		200	300			16
17	Fifteen Point	2701						10	3183			100						17
18	Summerside	162							225			400						18
19	Carleton	588							525			500						19
20	Tryon	1293						5	1342			90						20
21	Enmore	96							622			125		385	500			21
22	Indian River								37			40		150				22
	Totals	15583	296	266	1724	1220	25	1539	15834	671	30	13040	60	5327	1175	47	2310	
	Rates $	20	2	4	6	4	1	5	2	12	2	6	2	7	5	20	30c.	
	Values $	311660	592	1064	10344	4880	25	7695	31668	8052	60	78240	120	37289	5875	940	693	

Total value $499,197

* Cwt=100 lb. † Quintal=112 lb.

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State and of the Quantities and Values of all Fish and Fish Products Marketed in a Fresh, dried, pickled, canned, etc., State, for the Province of **Prince Edward Island**, during the year 1914–15.

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total marketed value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Salmon	cwt.	348	3,480			
" used fresh	"			299	2,990	
" canned	cases.			56	672	
						3,662
Lobsters	cwt.	88,341	515,300			
" canned	cases.			44,158	883,140	
" shipped in shell	cwt.			25	175	
						883,315
Cod	"	29,542	47,624			
" used fresh	"			2,725	5,621	
" green—salted	"			5,576	17,129	
" dried	"			5,219	31,314	
						54,064
Haddock	"	625	625			
" used fresh	"			314	628	
" dried	"			103	412	1,040
Hake	"	22,500	17,510			
" used fresh	"			92	184	
" dried	"			7,462	29,973	
						30,157
Herring	"	55,032	28,859			
" used fresh	"			10,141	10,164	
" pickled	brl.			2,089	10,227	
" used as bait	"			19,307	38,614	
						59,005
Mackerel	cwt.	9,215	41,090			
" used fresh	"			1,379	12,154	
" salted	brl.			2,616	32,241	
						44,395
Alewives	cwt.	300	330			
" used fresh	"			30	60	
" salted	brl.			90	270	330
Smelts	cwt.	19,326	96,630	19,326		111,552
Trout	"	131	1,122	131		1,310
Eels	"	284	1,591	284		2,840
Tom-cod	"	80	80	80		160
Mixed fish	"	175	86	175		175
Oysters	brls.	7,823	39,115	7,823		49,769
Clams and Quahaugs	"	2,748	7,689			
" " used fresh	"			2,288	10,170	
" " canned	cases.			460	2,760	
						12,930
Tongues and Sounds	cwt.			162		3,000
Fish Oil	gal.			14,040		3,962
Totals			801,131			1,261,666

RECAPITULATION

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in the Province of **Prince Edward Island**, for the year 1914–15.

—	Number.	Value.
	$	$
Sailing and gasoline vessels	20	10,250
Boats (sail)	759	28,714
" (gasoline)	1,170	212,390
Carrying smacks	8	1,850
Gill nets, seines, trap and smelt nets, etc	6,135	45,745
Trawls	990	8,180
Hand lines	2,020	1,668
Lobster traps	388,751	384,370
Lobster canneries	189	193,085
Clam canneries	5	300
Freezers and ice-houses	4	2,300
Smoke and fish-houses	335	21,812
Fishing piers and wharves	38	119,800
Total	.....	1,030,464

Number of men employed on vessels	83
" " boats	3,265
" " carrying smacks	12
Number of persons employed in fish-houses, freezers, canneries, etc	2,472
	5,832

APPENDIX No. 3.

NOVA SCOTIA.

District No. 1.—Comprising the four counties of Cape Breton Island. Inspector, A. G. McLeod, Whitney Pier.

District No. 2.—Comprising the counties of Cumberland, Colchester, Pictou, Antigonish, Guysboro, Halifax, and Hants. Inspector R. Hockin, Pictou.

District No. 3.—Comprising the counties of Kings, Annapolis, Digby, Yarmouth, Shelburne, Queens and Lunenburg. Inspector Ward Fisher, Shelburne.

REPORT ON THE FISHERIES OF DISTRICT No. 1.

To the Superintendent of Fisheries,
Ottawa, Canada.

SIR,—I have the honour to submit my third annual report as fishery inspector for District No. 1 (the Island of Cape Breton), Province of Nova Scotia, for the fiscal year ended March 31, 1915, together with tabulated data, indicating the quantities and value of fish caught in the four counties, and in the several sections of each county within this district, materials used, and the persons employed in these fisheries.

The total value of the fisheries for the district amounts to $1,029,650, as against $998,084 for the preceding year, showing an increase of $31,566.

INVERNESS COUNTY.

Shows an increase of 620 cwts. salmon, 2,890 cwts. haddock, 1,770 cwts. alewives, 30 cwts. halibut, 190 cwts. smelts, 121 cwts. eels, 220 cwts. swordfish, and 280 brls. oysters, and a decrease of 2,972 cwts. lobsters, 10,184 cwts. cod, and 2,278 cwts. hake, as compared with the preceding year.

VICTORIA COUNTY.

Shows an increase of 1,088 cwts. salmon, 15,936 cwts. cod, 9,346 cwts. haddock, 808 cwts. hake, 64 cwts. pollock and 37 brls. squid. With a decrease of 2,909 cwts. lobsters, 4,841 cwts. herring, 768 cwts. mackerel, 70 cwts. halibut, 75 cwts. swordfish, and 330 brls. oysters, as compared with the preceding year.

CAPE BRETON COUNTY.

Shows an increase of 25,570 cwts. cod, 4,882 cwts. haddock, 8,868 cwts. pollock, 429 cwts. herring, and 2,041 cwts. halibut. With a decrease of 57 cwts. salmon, 8,056 cwts. lobsters, and 1,685 cwts. mackerel, as compared with the preceding year.

RICHMOND COUNTY.

Shows an increase of 112 cwts. salmon, 14,301 cwts. cod, 12,443 cwts. haddock, 2,290 cwts. pollock, 5,389 cwts. herring, 130 cwts. eels, and 564 cwts. squid. With a decrease of 4,646 cwts. lobsters, 662 cwts. hake, 391 cwts. swordfish, as compared with the preceding year.

Sailing and gasoline vessels, an increase of 6. Sail boats, a decrease of 163, gasoline boats, an increase of 204, trawls, a decrease of 898, lobster traps, an increase of 9,253; also an increase of one new lobster cannery, two freezers and ice houses, and 84 smoke and fish houses, value therefor, $1,213,686, as compared with $1,072,098, of the preceding year.

Number of persons employed, 7,352, as compared with 7,326 of the preceding year.

The decrease in the lobster fishery is due to the drift ice having remained on the coast so late in the spring, which caused a month to elapse before the fishermen were able to set any traps; also to a heavy gale which occurred about the 5th June, which destroyed more than one-half the lobster gear.

Mackerel fishing was below an average catch. The early June storms destroyed a great many of the fishermen's nets, and interfered with the fishing.

Fly fishing was a failure, owing, altogether, to the rivers being very low, and the water warm.

The sawmill owners are endeavouring to observe the law, so far as it lies in their power, and very little sawdust finds its way into waters frequented by fish.

Proceedings have been taken against seven persons for violations of the Fisheries Act, and convictions made in every case.

There were two boats, one salmon net, and one trout net confiscated.

I regret to have to report that during the year, five fishermen have lost their lives by drowning while engaged in their calling.

Thanking the officers of the Department for kindly treatment during the year,

I have the honour to be, sir,
Your obedient servant,

A. G. McLEOD,
Inspector of Fisheries.

REPORT ON THE FISHERIES OF DISTRICT No. 2.

To the Superintendent of Fisheries,
Ottawa, Canada.

SIR,—I have the honour to submit my annual report on the fisheries of District No. 2 of the Province of Nova Scotia for the year ended March 31, 1915, together with tabulated statements showing the quantities and values of the fish caught in the several counties of the district, and the material used and persons employed in the fisheries.

The aggregate value of the catch for the year is $1,939,299 as compared with the value of last year's catch, which was $2,207,721, and shows a decrease of about 12 per cent.

Of the deep-sea fish the catch of cod shows a decrease of about 6 per cent; haddock an increase of about 31 per cent; hake a decrease of about 50 per cent; pollock an increase of about 10 per cent; herring an increase of about 20 per cent; mackerel a decrease of about 40 per cent; halibut a decrease of about 40 per cent.

LOBSTERS.

It may be as well to repeat the fact that in the year 1896, 68,352 cases of these fish were packed in this district and 5,810 cwts. shipped in shell. Since that year, there has been a gradual decrease. The total pack for the present year having been 31,723 cases, and 10,892 cwts. shipped in shell. The catch for this year was 15 per cent less than that of last year, this decrease was largely in the Atlantic coast counties of Halifax and Guysboro.

On the Straits of Northumberland, the counties of Antigonish and Cumberland show a larger catch than last year, while for Pictou county, the quantity returned shows a decline of about 15 per cent.

SALMON.

I have for several years had the pleasure of reporting an increase in the quantity of these fish taken, but regret to have to report a considerable decrease during the past year, about 45 per cent.

On the Straits of Northumberland, the decrease was about 25 per cent, while on the Bay of Fundy where the returns are never large, the decrease was about 80 per cent.

The decrease in the Bay of Fundy may be largely owing to the fact that salmon were caught largely in nets set for shad, and owing to the failure of the shad fishing the prosecution of salmon fishing alone does not pay.

The weather conditions during the spawning months were not favourable, the rivers being very low until well on in the autumn.

SHAD.

The total quantity reported as caught in the district is 306 barrels; twenty years ago, an average catch was about one thousand barrels. There does not appear to be any probability of restoring this fishery unless there be more stringent regulations made and enforced.

Overseer Thomas C. Rose, Hants county, whose district includes the Shubenacadie river, near which most of the fishermen reside who would be affected by a close season, says that in interviews with many of the fishermen, he finds that they favour a close season until about the middle of June, as there are too many shad caught before they spawn. He suggests that such a season should be enforced by prohibiting the setting of nets with a mesh larger than such as is used to capture gaspereaux.

OYSTERS.

A promising incident for the future of the oyster fishery has been a lease by the Provincial Government of about approximately 27,255 acres of barren bottoms in Tatamagouche bay, in the counties of Colchester, Cumberland and Pictou for the purpose of oyster culture. The conditions of the lease require the lessee to expend a sum of not less than $5,000 per annum to cultivate, propagate and make same productive.

ALEWIVES.

The catch is about the same as that for last year.

Fishways have been built in dams on Indian river, Osier river, and Prospect river in the county of Halifax, and notices have been served for one on River Philip, Cumberland county.

There have been twenty-seven prosecutions by fishery officers for violation of the Fisheries Act. Eleven for pollution of streams by sawdust, eight for violations of lobster fishery regulations, four for oyster fishery regulations, three for salmon fishery regulations and one for trout.

I am, sir,
Your obedient servant,
R. HOCKIN,
Inspector of Fisheries.

REPORT ON THE FISHERIES OF DISTRICT No. 3.

To the Superintendent of Fisheries,
Ottawa, Canada.

SIR,—I have the honour to submit the annual statistical report for District No. 3 for the year ended March 31, 1915.

The year has been an eventful one, and of unusual problems. The war greatly affected the marketing of some lines of the industry, particularly the pack of the lobster canneries. A large proportion of the pack of that year was unsaleable at profitable prices, and consequently the trade suffered severely. A considerable portion still remains in stock with little prospect of a sale, particularly as the new pack is much larger than anticipated.

The heavy, unsold stock, resulted in a strong agitation for either closing the factories for 1914-15, or greatly curtailing the pack. The packers could not arrive at a satisfactory mutual agreement, and the fishermen were unwilling that any regulations of the fishery should be made that would interfere with the largest possible profits, as it was fully expected that the season would be disastrous at the best. For the two first months of the opening of the winter season, the conditions were serious. Many of the factories were closed and the number of men and traps engaged was greatly reduced. Also the prevailing weather of December and January was very unfavourable. Exceptionally fine weather prevailed during February and March, and operations became more active both on the part of the fishermen and the packers. With only several exceptions all the factories were in operation for the spring catch, and in several districts the pack exceeded that of the previous year.

A noteworthy feature of the lobster fishery was the extraordinary percentage of the large and medium sized fish. For some years past the proportion of the catch of export size lobsters to the catch of "shack" averaged about one to three. The past season the proportion has been reversed, and this unusual condition has been general throughout the district.

Although the year has been the most prosperous the fishermen have experienced for many years. With the exception of mackerel, the shore fisheries gave greater returns than for any year in the history of the district. This will be particularly evident when it is noticed that the catch of the Lunenburg banking fleet was greatly reduced from the previous year, resulting in a very large shortage in the total marketed value of the catch of cod, haddock, hake and cusk.

The revised American tariff resulted in the establishment of a number of new companies. Three were established in Yarmouth county. The ready market afforded and the prices secured, greatly revived the fisheries of this county, and was the cause of a considerable number of men fishing from home instead of from United States ports. This latter effect was true, also, in other counties.

The total marketed value of the catch, including by-products, amounted to $4,755,060, a decrease from the previous year of $336,761. It will be noted in the summary following that the decrease is more than accounted for in the shortage in

lobsters and mackerel. It is, therefore, evident that the other fisheries were profitably prosecuted.

The summary follows:—

LOBSTERS.

The lobster fishery was remarkably successful, when the conditions stated in the introductory paragraph are considered. The total catch was 120,693 cwts., as compared with 157,577 cwts. the preceding year. The total marketed value was $1,535,156, a decrease of $344,955.

The pack decreased from 35,194 to 28,282 cases of forty-eight pounds, or 6,912 cases. Owing to the greatly reduced prices, the total marketed value of the pack decreased $229,998. The prices dropped from an average of about $23 per case, to an average of about $18. The quantity shipped in shell was 64,130 cwts., as compared with 69,597 for the preceding year. The comparatively small decrease in the quantity shipped in shell was due to the unusual run of export size lobsters, and the decrease in value to the low prices owing to the frequently glutted condition of the market.

Digby and Kings show an increase in the catch from 18,972 cwts. to 20,599, and 136 to 196 respectively. Shelburne and Yarmouth, the principal counties, made a good showing, as little fishing was done for the first two months, owing to the prevailing uncertainty of the trade outlook, resulting in few factories operating, and consequently a much less number of men engaged in fishing. The opening of the spring fishing season, and the active operations of the factories, brought vigorous activity to the industry, and large profits to the fishermen, notwithstanding that the prices for small lobsters were the lowest for years, varying from two cents to four and one-half cents per pound, instead of from six to ten and one-half in the preceding year.

The Shelburne catch was 36,287 cwts. as compared with 47,557 the preceding year. The decrease in the pack in this county was in the Lockeport district, western Shelburne having an actual increased pack over the previous year. In Yarmouth county the catch was 51,519 cwts., as compared with 64,281 cwts. for the previous year. It should, perhaps, be noted that the catch for April and May of 1914, the two first months of the fiscal year covered by this report, was very large, and consequently the heavy pack for these two months made up for the shortage in the first months of the season of the winter of 1915.

COD AND HADDOCK.

The total catch of cod and haddock was 937,379 cwts., as compared with 930,195 cwts. the preceding year. The total marketed value was $2,246,250 as compared with $1,916,369. The spring catch of the Lunenburg banking fleet was small compared with the previous year, as there was scarcity of bait, and much ice prevented early access to the northern waters. With the exception of a small decrease in Queens, the other counties report substantial increases. Western Shelburne had a decrease of 12,000 cwts., but the total was more than equalized by the increase in the Lockport district.

There was a considerable quantity of cod prepared for the boneless and shredded fish trade, and a large quantiy of finnan haddie marketed from Digby and Lockeport. About 4,000 cwts. of the cod catch of Cape Sable Island was purchased for the boneless trade, being put up in boxes of thirty pounds.

It should be noted that complaints have been received that pollock is being put up and labelled "finnan haddie." This deceptive labelling of the much cheaper fish affects the general trade for the genuine haddie. Also some canned goods of inferior quality have been put on the market. It is hoped that the inspection of canned goods will prevent packing of this sort.

The Digby district put up 3,559 cwts. fillets, and 16,719 cwts. for the canned finnan haddie trade. The canned finnan haddie were put up at Centreville, 7,334 cases of 48 pounds, and Little River 3,215 cases.

HAKE, CUSK AND POLLOCK.

The total catch of hake, cusk and pollock was 214,563 cwts., as compared with 257,911 cwts. for the preceding year. The total value of the catch marketed was $276,932, as compared with $477,869. Digby shows a decrease in hake and cusk of 39,643 cwts. The catch of pollock increased 13,480 cwts., while the catch of hake and cusk decreased 56,828 cwts., the decrease in hake and cusk being in the catch of the Lunenburg fleet. For the season of 1913-14 the fleet reported a very large and unusual catch of 37,431 cwts., as compared with only 2,265 cwts. the past season.

HERRING.

The total catch was 228,285 cwts., as compared with 220,361 cwts. in preceding year. The total marketed value $306,588 as compared with $262,195 the preceding year. There were large decreases in the catches of Yarmouth and Digby counties. The decrease in the latter being in the Digby district. A considerable increase was made in the Clare district, owing to the operation of trap nets. Shelburne showed an increase of about 10,000 cwts., and western Lunenburg about 9,000 cwts.

Immense quantities of herring can be taken each year, if preparations were made for the care of it. For the first time for some years, there was a large run in Annapolis and Kings counties, but advantage was not taken of the harvest, owing to lack of preparation. At Avonport a run of small herring continued for a month, and great quantities could have been taken.

Owing to the low prices received for pickled fish, a small quantity, comparatively, is put up. The fishermen, both net and trap, rely largely on the bait business for the disposal of the catch. Many fishermen take up their nets when a hand-to-mouth bait supply has been secured. It is a general practice to put out the nets only when bait is needed. The yearly scarcity of bait is accounted for by reason of the fact that the fishermen lack facilities for storing a supply when the demand is greatest. For months during the cod season, the Lockeport Cold Storage had the only available supply on the south shore. This company, with its excellent facilities for storage, is making a specialty of the bait business, and is often the only market for herring in the absence of vessels seeking bait. A fine article of smoked and kippered was put up at Lockeport also about 2,000 barrels of round herring.

MACKEREL.

The mackerel catch was a failure as compared with the previous year, the catch being 23,544 cwts., as compared with 66,610 the preceding year. The total marketed value was $117,425, as compared with $365,203 the preceding year. The chief decreases were in Yarmouth, Lunenburg, Digby, and Shelburne counties, the only county showing an increase being Queens.

HALIBUT, SWORDFISH AND ALBACORE.

While the catch of halibut shows a small decrease, from 8,759 cwts. to 8,722 cwts. the marketed value increased from $65,522 to $70,583. Swordfish decreased from 3,471 cwts. to 1,185 cwts., the decrease being chiefly in Lunenburg county. The albacore catch increased from 788 cwts. to 3,758 cwts., and the marketed value from $3,145 to $16,514. The principal increase was in Shelburne from 746 to 2,145 cwts. As a food fish "tuna" finds a ready market in the United States. Tuna fishing as a sport is becoming very popular, particularly in Queens and Lunenburg waters, where special accommodation is provided for visiting sportsmen at "Tuna Inn," Port Medway. For sport purposes a strong rod and reel is used, and as the fish are of great size, strength and liveliness, the capture of a tuna demands the highest sporting powers and expertness. The fish weigh as high as 800 lbs. Mr. Alfred Vanderbilt, who was lost in the *Lusitania* tragedy, had engaged accommodation for the 1915 tuna fishing.

SALMON, TROUT AND ALEWIVES.

The salmon catch increased from 1,360 cwts. to 1,827 cwts., and in marketed value from $26,458 to $35,102. The principal increase was in Kings county, from 657 to 1,099 cwts., owing chiefly to large size of fish, some of which weighed over 40 lbs.; one weighing 47 lbs. The quantity of trout reported was 509 cwts. The value of this fishing cannot be estimated by the returns, as large quantities are caught by the thousands of sportsmen, for which no return can be procured. Alewives increased from 15,004 cwts. to 18,573 cwts., the value of the catch being $25,755. The county of Digby showed the large increase of 1,810 cwts.—where the catch was the first of any consequence for some years.

CLAMS AND SCALLOPS.

The clam fishing decreased from 20,789 brls. to 9,564 brls. The decrease is accounted for by the small demand in the United States, and by the depletion of some of the beds. In Annapolis county, beds comprising large areas are now non-productive, owing to over-fishing. Scallops increased from 1,345 brls to 5,660 brls., and in value from $4,035 to $18,180. The increase is due to fishing being continued during the winter months.

MEN AND PROPERTY.

The total number of men directly employed was 14,312, as compared with 14,330 the preceding year. While the decrease in men employed in vessels of over ten tons, was large, there was an increase of 759 in the number of men boat-fishing. The change is due almost wholly to the large increase in the number of gasoline boats, which last year numbered 2,299, as compared with 2,027 the preceding year. Powerful gasoline boats, of the best models, with every labour saving appliance, are proving a good investment to the fishermen. These boats are well adapted for offshore fishing, and the fishermen realize the top prices for their catches of cod and haddock, which are landed quickly, and in prime condition, for the fresh and smoked fish trade. Also many of these boats are equipped with special machinery for hauling lobster traps, enabling the fishermen to more quickly operate the traps, and at much less labour. The increase in the number of new boats was greater than the totals shown, as a considerable number of smaller and inferior boats were replaced. The number of sailing boats decreased 24, and the decrease will doubtless be constant, as the fishermen are alive to the importance of better equipment.

The total value of vessels, boats and gear invested in the fishing was $4,390,506, as compared with $4,066,791 for the preceding year.

FISHERMEN'S RELIEF ASSOCIATION.

The bank fishermen of Lunenburg formed a relief association in 1913. Each vessel pays a fee of $10 per year, the master $2 and each man $1 per year. The beneficiaries of any man lost receive $500. If the losses aggregate a greater amount than is in the treasury, beneficiaries are paid pro rata. Six lives were lost the past season. The association has proven its worth.

PATROL BOATS.

The patrol boat system has been invaluable particularly in connection with the protection of the lobster industry, although much assistance is given to the regulation of net and men fishing. The regular patrol established make unprofitable any attempt at continued violation of the regulations. Also the enforcement of the law has been

highly beneficial to a wholesome respect for the law, and has gained the support of the fishermen generally, many of whom were led into the poaching habit by the ease with which they escaped observation, and it was impossible for shore officials to guard against the landing and disposal of illegally caught fish. The patrol boats constantly cover the fishing grounds, and have been able to prevent the selling of illegal gear. Also, many were provoked by their more careless neighbours in making a practice of lobster fishing for some weeks before and after the opening and closing of the season. This practice has been prevented, and the fishermen are unanimous in their approval of this feature of the protective work. It affords great satisfaction to be able to report that the observance of the closed lobster season was highly satisfactory, and the efforts of the officers have the approval of the fishermen. It is necessary that care be exercised in selecting the best available men for the patrol boat service. Vigilance, tact, judgment and courtesy are more necessary than seamanship, and a knowledge of men than the exercise of authority.

THE RIVER CONDITIONS.

The inland fisheries are becoming more important and valuable each year, and the conditions are being steadily improved. Many of the rivers and streams are blocked by dams, which even the best available system of fish passes make difficult the free access of fish to the spawning grounds. In some instances wing dams only should have been permitted. Millmen and others are apparently free to erect any kind of a dam, as there seems to be no control established in the important matter of river obstructions.

The following improvements were effected during the year:—

LUNENBURG COUNTY.

One hundred and fifty dollars was expended in improving the pass at Morgan Falls, New Germany. This work required considerable blasting, and the formation of suitable resting pools for fish ascending the falls.

Seventy-five dollars was expended in removing forest fire and other rubbish from Roby brook. This brook is a tributary of the Medway river, Queens county.

Seventy-five dollars was expended in removing obstruction from Wallace brook. The river was badly obstructed by forest and other rubbish. This river is a tributary of the Petite rivière.

Twenty-five dollars was expended in removing forest fire rubbish from Martin's river.

Two new fish passes were installed in the Mush-a-Mush river, and several others remodelled. This work was done at the expense of the owners of the dams.

QUEENS COUNTY.

The conditions on the Mersey river, both in respect to sawdust and other mill refuse, and the access of fish to the spawning grounds have been improved. Free passage has been provided. The only dam on the river without a regulation fish-pass is the dam at Indian Section. As the five gates in the dam are open for part of the year, and two open practically all the time, the conditions are reported to be sufficiently satisfactory.

SHELBURNE COUNTY.

Extensive work was done, at a cost of $700, in improving the Barrington river for a distance of about seven miles. The passage of fish through a series of falls obstructed by large boulders, was made possible at the season of the year when low water pre-

vailed. For several years large quantities of young fish perished owing to the obstructions preventing access from pool to pool. The waters were frequently deflected by the boulders, and small streams were formed running into the swamps. Young fish coming from the spawning grounds, entered these streams and died in the swamps. The total number of days' labour involved was 236.

The dam at the head of the river which prevented free access of fish into Lake Sabimm was removed, and no obstructions to the free passage of fish now exist.

On the Shelburne river conditions were improved by the removal of an additional section from the Hervey dam so-called.

Below the railroad bridge at the entrance of the river at Barrington, a small channel is needed for the passage of fish from a pool at the bridge. At low water fish are trapped in this pool, and as the water gradually runs out in tiny rivulets, the fish perish. The cost would be small.

DIGBY.

Salmon river, Digby, has been improved by the removal of a number of stone wall dams, which were built ostensibly for the catching of eels, but which were a serious obstruction to the free passage of salmon and alewives.

ANNAPOLIS COUNTY.

A new Hockin pass was installed in the dam of the Canada Iron Corporation at Nictaux Falls. The dam was of concrete, through which an opening was made connecting with the pass. The conditions are now good and salmon have free passage.

The pass at the Rogers dam on the Nictaux river was also greatly improved, as were the conditions in respect to the Davidson dam at Alpena.

The hatchery at Middleton is doing important work under the efficient manager Mr. Birton.

KINGS COUNTY.

A new fish pass was constructed at the Patterson mill, Gaspereau lake, and a small sum of money expended in removing obstructions near the entrance to the lake.

In general the inland fisheries of each county are important, and should very greatly increase in value. Under proper conditions the re-stocking of rivers and streams in western Nova Scotia should not have been necessary for many years. The territory is large and sparsely settled. Visiting sportsmen usually frequent the few well-known resorts, and over-fishing is the consequence. Many ideal places, with abundance of fish, are seldom visited by anglers.

CONFISCATIONS.

Twenty-three nets, illegally set, were confiscated during the year, sixteen being set in the Tusket river, Yarmouth; five in the Medway river, Queens, and two in the Nictaux river, Annapolis. Nets of value were held for sale, and the remainder destroyed. A considerable number of lobster traps and gear were seized. The traps were destroyed and rope and buoys of any value held for sale. Much of the gear seized for illegal lobster fishing is worthless, as the fishermen do not use traps and gear of any value when engaged in illegal work. Six persons were prosecuted for violation of the lobster regulations and fines imposed in each instance, three for illegal gaspereaux fishing, two for illegal salmon fishing, and one for operating unlicensed herring net weir. The fines aggregated $115.

I am, sir,

Your obedient servant,

WARD FISHER,

Inspector of Fisheries.

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels, Industry in the County of **Richmond**, Province

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.													
		Sailing and Gasoline Vessels.					Boats.					Carrying Smacks.			
		(40 tons and over.)	(20 to 40 tons).	(10 to 20 tons).	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	
	Richmond County.	No.	No.	No.	$			$		$			$		
1	Fourchu, Framboise and vicinity	....	....	....	....	....	150	3400	9	2850	250	3	2200	6	
2	Grand River and vicinity	....	....	....	....	....	121	2300	9	3000	155	2	900	3	
3	Point Michaud and L'Ardoise	....	....	2	1650	7	366	16300	14	5200	385	..	..	....	
4	Rockdale and Grande Grève	..	....	....	....	....	168	6500	2	900	190	2	675	2	
5	St. Peter's and River Bourgeois	1	3	7	13800	84	55	1100	7	2500	130	7	1500	20	
6	Louisdale and River Inhabitants	....	1	....	600	6	30	600	....	....	60	..	.....	....	
7	Ports Malcolm and Richmond	....	....	....	....	....	20	200	....	....	40	..	.....	....	
8	West Bay	....	....	....	.....	....	10	120	....	.....	20	..	.....	....	
9	Ile Madame	2	4	17	13150	109	323	3400	46	11500	308	5	1300	9	
	Totals	3	8	26	29200	206	1243	33920	87	25950	1538	19	6575	40	

Boats, and the Quantity and Value or all Fishing Gear, etc., used in the Fishing of **Nova Scotia**, during the Year 1914 15.

Fishing Gear.										Canneries.		Other Material.						Persons employed in Canneries, Freezers and Fish Houses.	
Gill Nets, Seines, Trap & Smelt Nets		Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freez'rs and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number	Value.		Number.
	$		$		$		$		$		$		$		$		$	$	
130	1040	...	...	...	.....	200	100	8000	7200	1	4000	..	.....	22	780	8	1400	80	1
400	3200	...	...	...	.....	100	50	3000	2700	1	1000	..	.....	28	950	2	280	50	2
1901	16400	...	...	27	243	950	475	1500	1500	...	.....	..	.....	141	5400	8	1200	390	3
901	8608	..	...	3	28	300	140	4800	3600	1	1000	..	.....	36	1600	3	380	160	4
150	1000	1	10	100	350	200	100	2300	2300	1	1000	1	2650	30	4500	4	8000	40	5
200	2640	1	20	....	.....	40	20	....	.. ..	...	.....	..	.....	2	130	1	100	.....	6
80	640	...	....	...	....	20	10	.....	....	...	.. ..	..	...	3	90	..	.....	... .	7
25	200	..	....	20	70	50	25	..	.....	...	.....	...	.....	...	.....	..	.....	.. .	8
3300	26400	...	....	810	4860	550	550	7800	7200	5	4500	3	600	155	1850	34	12100	132	9
7087	60128	2	30	960	5551	2410	1470	27400	24500	9	11500	4	3250	417	15300	60	23460	852	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels Industry in the County of **Cape Breton**, province

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												Fishing	
		Sailing and Gasoline Vessels.				Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.	
		20 to 10 ton	10 to 20 ton.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Cape Breton County.	No.	No.	$			$		$			$			$
1	Little Bras d'Or District	2	6	1850	30	30	600	20	3000	100	3	1000	6	90	450
2	Leitches Creek, Long Island and Boisdale	..	..	..	..	18	260	..	..	31	..	..	..	42	210
3	North Sydney to Cranberry Head	..	7	2100	28	10	200	3	450	30	..	..	..	120	1200
4	Sydney, Lingan and Glace Bay	..	..	..	..	21	540	19	5930	96	3	900	5	126	860
5	Port Morien and vicinity	..	1	250	3	14	625	36	7200	76	5	1600	10	230	1980
6	Main-à-Dieu and vicinity	..	3	1800	16	30	3000	24	2400	162	4	1600	8	330	3300
7	Scatari Island	..	..	..	..	20	1640	13	3250	60	1	250	2	126	1260
8	Louisburg and vicinity	..	..	..	..	25	3400	15	2500	120	2	1100	6	300	3000
9	Gabarus to Fourchu	..	..	..	..	84	4200	26	6500	270	2	1000	6	390	2730
	Totals	2	17	6000	77	252	14465	156	31230	945	20	7450	43	1754	14990

and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing of Nova Scotia, during the year 1914-15.

Gear.						Canneries.		Other Material.						Persons employed in Canneries, Freezers and Fish-houses.	
Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		
40	160	150	60	5000	5000	1	4000	1	1200	30	750	25	1800	50	1
14	140	38	76	...	...	....	...	...	....	2	3000	.....	...	4	2
30	75	116	33	300	300	...	...	1	4000	5	20000	2	13000	16	3
170	680	151	76	4000	4000	2	2500	....	.....	...	....	4	450	38	4
39	390	84	84	7150	7150	4	2900	....	....	24	600	5	210	60	5
80	240	270	135	9600	5280	2	1600	....	.....	20	400	20	1000	109	6
20	200	180	180	1200	1000	....	.....	....	...	20	200	....	.....	.....	7
15	150	230	100	3800	2280	2	3200	....	.....	....	....	20	2500	25	8
....	....	260	195	9030	6030	3	4600	....	....	26	520	6	700	46	9
408	2035	1479	939	40080	31040	14	18800	2	5200	127	25470	82	19660	348	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Victoria,** Province of

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												Fishing	
		Sailing and Gasoline Vessels.			Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.	
		10 to 20 tons.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Victoria County.	No.	$			$		$			$			$
1	Iona, Washabuck & Little-Narrows	..	.....	..	52	1300	2	300	42	1	125	1	90	900
2	Baddeck and vicinity	..	.....	..	8	175	.	....	8	..	....	..	20	200
3	Big Bras D'Or District	..	.....	..	51	491	9	1300	75	.	....	..	70	450
4	Englishtown to Breton Cove and vicinity	..	....	..	80	1600	3	450	160	2	300	4	170	4250
5	Wreck Cove to Cape Smokey	..	.....	..	50	1000	1	150	100	2	300	4	130	1300
6	Ingonish	12	9600	60	119	11210	10	4625	275	..	....	..	316	8100
7	Neil's Harbour and New Haven	..	....		97	5723	5	1100	118	1	300	2	160	3360
8	White Point, Dingwall & Sugar Loaf	1	500	4	51	1275	20	4200	120	2	600	4	159	3270
9	Meat Cove, Bay St. Lawrence and vicinity	..	....	..	53	1060	10	2000	102	7	1400	11	100	1500
	Totals	13	10100	64	561	23834	60	14125	1000	15	3025	26	1215	23330

SESSIONAL PAPER No. 39

Boats, and the Quantity and value of all Fishing Gear, etc., used in the Fishing **Nova Scotia**, during the Year 1914-15.

Gear.						Canneries.		Other Material.						Persons employed in Canneries, Freezers and Fish-Houses.	
Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		
73	365	105	52	185	148	....	.....	....	.....	....	.....	....	.. .	.. ..	1
5	40	6	18	.....	.. .	....	...	...	.....	. .	.....	....	.....	....	2
12	87	107	42	1360	1360	....	.....	....	...	7	80	....	.....	....	3
35	350	350	175	2700	2700	2	1000	3	366	120	4800	1	2500	21	4
25	250	250	125	800	800	1	400	1	100	18	720	1	3800	12	5
568	3976	136	115	2530	1430	5	1450	6	4150	30	9650	14	81450	200	6
50	750	394	394	3925	3925	7	3050	1	750	37	4600	4	3000	61	7
29	290	327	327	3100	3100	3	3500	2	700	15	3800	12	2900	43	8
18	216	198	198	5300	5300	2	2300	3	600	13	2600	....	.. ..	38	9
815	6324	1873	1446	19900	18763	20	11700	16	6666	240	26250	32	93650	375	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Inverness**, Province

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												Fishing	
		Sailing and Gasoline Vessels.				Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.	
		(20 to 40 tons.)	(10 to 20 tons.)	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Inverness County.	No.	No.	$			$		$			$			$
1	Pollet's Cove to Pleasant Bay	.....	.	.....		12	185	30	3275	75	..	.....	..	66	3625
2	Cap Rouge, Eastern Harbour, Cheticamp and Grand Etang	3	27	15550	140	44	2370	35	8350	195	5	2350	10	328	1640
3	Friar's Head, Margaree Harbour to Smith's Cove.	... .	2	1700	8	107	8810	60	17940	424	5	1380	5	569	14188
4	Broad Cove, Port Ban to Mabou Harbour	.....	. .	. ...	....	28	840	16	1920	105	2	750	4	156	1248
5	West Lake Ainslie and Whycocomah Bay.	.....	... ..	.....	..	36	700	....	...	60	..	....	..	60	280
6	Little Mabon and Port Hood to Hawkesbury	....	1	500	6	...	..	100	20000	175	7	2000	10	500	4500
7	West Bay, Malagawatch and Deny's Basin..	....	...	..	..	120	1440	....	.....	121	..	....	..	415	830
	Totals	3	30	17750	154	341	14345	241	51485	1155	19	6480	29	2094	26311

SESSIONAL PAPER No. 39

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing of **Nova Scotia**, during the Year 1914-15.

Gear.								Canneries.		Other Material.						Persons Employed in Canneries, Freezers and Fish Houses.	
Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Fish houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
Number.	Value	Number.	Value.	Number	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		$		
....	..	....		80	112	3700	3200	2	1600	5	155	15	370	....	.....	27	1
.....	..	30	750	670	888	14840	13815	8	6750	6	2175	18	5650	17	11800	180	2
50	1250	180	2160	1290	1483	6270	6270	7	2950	4	4100	103	7190	49	14400	44	3
....	....	11	110	315	315	8200	8200	2	2000	...	....	....	.....	3	4500	49	4
....	.....	4	40	80	80	.....	....	...	.....	....	....	....	.....	1	100.00	.. ..	5
.	....	100	2000	200	200	19800	14500	6	6300	4	262500	2	2500	8	39200	200	6
....	....	64	192	240	60	...	..	..	....	...	....	14	152	6	72	.....	7
50	1250	389	5252	2875	3138	52810	45985	25	19600	19	268930	152	15862	84	79972	500	

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Richmond**, Province of **Nova Scotia**, during the Year 1914-15.

Number.	Fishing Districts.	Salmon, cwt.*	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Number.
	Richmond County.		$		$		$		$		$		$		$		$	
1	Fourchu, Framboise and vicinity	.....	.....	1188	5346	2034	3051	39	39	...	.....	204	184	18	18	450	1125	1
2	Grand River and vicinity	50	171	718	3231	330	495	18	18	...	.....	21	19	283	283	369	922	2
3	Point Michaud and L'Ardoise	68	635	.....	.....	6738	10107	7644	7644	.....	.....	2517	2265	1829	1829	4479	11197	3
4	Rockdale and Grand Grève	3	31	531	2389	298	447	1325	1325	.....	.....	618	556	2120	2120	1872	4679	4
5	St. Peters and River Bourgeois	8	80	246	1107	8000	12000	300	300	....	...	10	10	948	711	300	900	5
6	Louisdale and River Inhabitants	5	50	.....	.....	100	150	161	161	....	....	.. ...	....	1500	1125	789	2367	6
7	Ports Malcolm and Richmond	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1200	900	54	162	7
8	West Bay	.....	.....	.....	.....	86	124	.....	.....	.....	.....	.....	.....	216	162	.....	.....	8
9	Ile Madame	101	1015	1616	7272	23650	23650	27809	32088	1131	610	360	180	3700	3610	1124	4496	9
	Totals	235	2282	4299	19345	41236	50024	37296	41575	1131	610	3730	3214	11814	10758	9137	25848	

*Cwt = 100 lbs.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Richmond**, Province of **Nova Scotia**, during the Year 1914-1915 —*Concluded.*

Number.	Fishing Districts.	Shad, cwt.*	Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value	Eels, cwt.	Eels, value.	Sword-Fish, cwt.	Sword-Fish, value.	Squid, brl.	Squid, value.	Clams, bil.	Clams, value.	Number.
	Richmond County.		$		$		$		$		$		$		$		$		$	
1	Fourchu, Framboise and vicinity					29	232									21	42	18	36	1
2	Grand River and vicinity																	3	6	2
3	Point Michaud and l'Ardoise					21	192							54	162	43	86			3
4	Rockdale and Grand Grève			66	53	5	40							52	156	5	10			4
5	St. Peters and River Bourgeois							5	2	115	575	80	80							5
6	Louisdale and River Inhabitants									223	1115	70	70							6
7	Ports Malcolm and Richmond																			7
8	West Bay																			8
9	Ile Madame	1	5	15	15	11	55	15	15	202	1010	60	120	480	1920	675	1350			9
	Totals	1	5	81	68	69	519	20	17	540	2700	210	270	580	2238	744	1488	21	42	

*Cwt.—100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state for the County of **Richmond**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Salmon, canned, cases.	Salmon, salted, cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell.	Cod, used fresh, cwt.	Cod, shipped green, salted, cwt.	Cod, dried, † quintals.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Pollock, dried, quintals.	Herring, used fresh, cwt.	Herring smoked, cwt.	Number.
	Richmond County.																		
1	Fourchu, Framboise and vicinity				594		150	60	588			13				68			1
2	Grand River and vicinity	50			359				110			6				7			2
3	Point Michaud and L'Ardoise	68					375		2121	930		2238			150	789			3
4	Rockdale and Grand Grève	3			265		148		50	53		424			3	205	320		4
5	St. Peter's and River Bourgeois	8			123		5		2666			100			10				5
6	Louisdale and River Inhabitants	5							33	2		53							6
7	Ports Richmond and Malcolm																		7
8	West Bay								28								3		8
9	Ile Madame	101			808		2421	755	6573	12560		5083		377		120			9
	Totals	235			2149		3099	815	12169	13545		7917		377	163	1189	323		
	Rates	15			18		1.50	2.50	5	1.50		4.50		3	1	3.50	1		
	Values	3525			38682		4648	2037	60845	20317		35625		1131	163	4161	323		

* Cwt. = 100 lbs. † Quintals = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned etc., State, for the County of **Richmond**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded*

Number.	Fishing Districts.	Herring, pickled, brl.	Herring used as bait, brl.	Herring used as fertilizer, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Shad, used fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Eels, used fresh, cwt.	Tom-cod, used fresh, cwt.	Swordfish, used fresh, cwt.	Squid, used as bait, brl.	Clams and quahaugs, used fresh, brl.	Tongues and sounds, pickled, and dried, cwt.	Fish oil, gal.	Number.
	Richmond County.																		
1	Fourchu, Framboise and vicinity	2	6			150			29						21	18		320	1
2	Grand River and vicinity	87	11			123										3		40	2
3	Point Michaud and L'Ardoise	463	219		30	1483			24					54	43			1025	3
4	Rockdale, and Grand Grève	565	52		357	505		22	5					52	5			50	4
5	St. Peter's and River Bourgeois	283	50		150	50				5	115	80						1200	5
6	Louisdale and River Inhabitants	473	40		53	245					223	70						25	6
7	Ports Richmond and Malcolm	393	10			18													7
8	West Bay	66	8															20	8
9	Ile Madame	1050	275		440	228	1	5	11	15	202	60		480	675			600	9
	Totals	3382	671		1027	2802	1	27	69	20	540	210		586	744	21		3280	
	Rates $	4	2		4	10	5	4.50	8	1.50	5.50	1.50		4	3	2		30c.	
	Values $	13528	1342		4108	28020	5	121	552	30	2727	315		2344	2232	42		984	

Total value $227,808

Cwt. = 100 lb. † Quintals = 112 lb

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a the year

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value	Pollock, cwt.	Pollock, value.
	Cape Breton County.		$		$		$		$		$		$
1	Little Bras d'Or District	15	150	2222	9999	2297	4594	.....	.....	....	....	.....	....
2	Leitches Creek, Long Island, and Boisdale	....	....	....	.....	158	237	.....	.....	....	....	.....	...
3	North Sydney to Cranberry Head	....	....	.....	....	1789	2683	128	182	20	30	50	75
4	Sydney, Lingan and Glace Bay	....	....	1987	8941	1000	1500	54	81	...	....	70	70
5	Port Morien and vicinity	33	396	2340	10530	3270	4905	63	95	....	....	24	43
6	Main-à-Dieu and vicinity	156	1572	2404	10818	34520	51780	9530	9530	....	....	9566	6478
7	Scaterie Island	5	50	.....	.....	1617	2475	425	266	....	...	270	161
8	Louisburg and vicinity	15	180	550	2475	3563	5344	2178	2178	10	10	40	40
9	Gabarus to Fourchu	....	..	1593	7160	3735	5602	454	454	....	....	420	420
	Totals	224	2348	11096	49923	51949	79129	12832	12786	30	40	10440	7287

*Cwt.—100 lbs.

SESSIONAL PAPER No. 39

CATCH.

Green State in the County of **Cape Breton**, Province of **Nova Scotia**, during 1914-15.

Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Smelts, cwt.	Smelts, value.	Sword-fish, cwt.	Sword-fish, value.	Squid, brl.	Squid, value.	Oysters, brl.	Oysters, value.	Number.
	$		$		$		$		$		$		$		$		$	
310	245	.....	.....	.....	.....	.....	.....	16	128	.....	.....	.....	.....	.....	.....	.....	.....	1
80	40	.....	.....	.....	.....	.....	.....	.....	.....	20	120	.....	.....	.....	.....	.....	.....	2
500	500	36	144	.....	.....	.....	.....	15	120	.....	.....	.....	.....	.....	.....	.....	.....	3
3826	2516	72	288	.....	.....	.....	.....	.....	.....	.....	.....	61	244	.....	.....	.....	.....	4
1615	1915	16	80	.....	.....	.....	.....	33	231	50	350	.....	.....	1	3	26	52	5
9223	13654	2769	22289	2	14	.....	.....	2376	12996	.....	.....	12	36	15	30	.....	.....	6
148	184	60	240	.....	.....	.....	.....	40	200	.....	.....	.....	.....	24	48	.....	.....	7
640	640	339	1870	.....	.....	6	9	11	55	26	130	.....	.....	15	15	.....	.....	8
3450	3675	1050	3150	.....	.....	.....	.....	.....	.....	101	456	.....	.....	.....	.....	.....	.....	9
19792	23369	4342	28061	2	14	6	9	2491	13730	197	1056	73	280	55	96	26	52	

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish, and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Cape Breton**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing District.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, case.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †qtls.	Haddock, used fresh, cwt.	Haddock, dried, qtls.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, qtls.	Pollock, used fresh, cwt.	Pollock, dried, qtls.	Herring, used fresh, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Number.
	Cape Breton County.																
1	Little Bras d'Or District	15	1,111	....	902	.. .	465	....	.....	.....	....	.. ..	.....	10	....	150	1
2	Leitches Creek, Long Island and Boisdale	....	... .	.....	158	.....	.....	.....	. . .	.....	....	.....	.....	.....	. .	40	2
3	North Sydney to Cranberry Head	.....	.....	.....	210	152	425	..	42	. .....	6	.....	16	.....	....	250	3
4	Sydney, Lingan and Glace Bay	....	993	....	180	54	235	12	14	.....	.....	.....	23	...	51	1,835	4
5	Port Morien and vicinity	33	1,170	.....	490	150	826	23	13	.....	.....	....	7	30	95	659	5
6	Main-à-Dieu and vicinity	156	1,202	.....	12,353	10,998	57	4,679	1,617	.. . ...	.....	9,500	22	5,415	.....	1,904	6
7	Scaterie Island	5	...	. ...	1,160	161	45	425	.....	.....	....	270	.....	.....	12	56	7
8	Louisburg and vicinity	15	275	.... .	15	751	682	17	720	10	.....	....	13	16	192	24	8
9	Gabarus to Fourchu		771	49	239	140	1,071	.....	151	.....	....	....	140	.....	1,150	.....	9
	Totals	224	5,522	49	15,707	12,406	3,806	5,156	2,557	10	6	9,770	221	5,471	1,500	4,909	
	Rates.....$	15	18	10	2	3.50	6	2	4.50	1 75	4	1.50	3.50	1	4.50	2	
	Values.....$	3,360	99,396	490	31,414	43,421	22,836	10,312	11,507	17	24	14,655	774	5,471	6,750	9,818	

* Cwt. = 100 lbs †Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Cape Breton**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Shad, used fresh, cwt.	Shad, salted, brl.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Sardines, canned, case.	Sardines, sold fresh or salted, brl.	Halibut, used fresh, cwt.	Smelts, used fresh cwt.	Swordfish, used fresh, cwt.	Squid, used as bait, brl.	Clams and Quahaugs, used fresh cwt.	Clams and Quahaugs, canned, case.	Fish oil, gal.	Number.
	Cape Breton County.																
1	Little Bras d'Or District	.....	.....	.....	.....	....	.....	.....	.....	16	.....	.....	.. ..	..	.....	.. ..	1
2	Leitches Creek, Long Island and Boisdale	.....	.. ..	.....	.....	.....	.....	.....	.....	.....	20	...	.. ..	..	..	....	2
3	North Sydney to Cranberry Head	...	12	....	.....	.....	.....	.....	.....	15	... .	...	.....	.....	..	.....	3
4	Sydney, Lingan and Glace Bay	6	22	....	.....	.. ..	.....	..	....	...	.....	61	.....	.....	....	.....	4
5	Port Morien and vicinity	1	5	....	.....	.....	.....	..	.....	33	50	.....	1	26	.....	.....	5
6	Main-à-Dieu and vicinity	2,633	45	2	.....	....	.. ..	....	.....	2,376	....	12	15	.....	.....	1,200	6
7	Scaterie Island	60	....	.....	....	6	.. ..	.....	.....	40	.....	...	24	.....	.....	550	7
8	Louisburg and vicinity	32	102	....	....	.....	....	.....	....	11	26	.....	15	.....	.....	.....	8
9	Gabarus to Fourchu	150	300	...	....	...	...	.....	.....	...	101	....	.....	...	.....	.....	9
	Totals	2,882	486	2	.....	6	.....	....	... ..	2,491	197	73	55	26	.....	1,750	
	Rate...$	5	12	7	.. ..		....	.....	.. ..	8	7	5	4	4	.....	25c	
	Value...$	14,410	5,832	14	...	12	.	.....	.....	19,928	1,379	365	220	104		437	
	Total value															$ 302,946	

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and Landed in a Green State in the County of **Victoria** Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing District.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Halibut, cwt.	Halibut, value.	Number.
	Victoria County.		$		$		$		$		$		$		$		$		$	
1	Iona, Washabuck and Little Narrows	59	708	.....	...	381	571	.....	.....	.....	.....	.....	...	40	40	.....	.....	.....	.....	1
2	Baddeck and vicinity	16	160	.....	.....	315	472	15	20	.....	...	.....	.....	201	201	5	20	...	.....	2
3	Big Bras d'Or District	.....	.....	.....	.....	547	820	.....	.....	.....	.....	39	39	331	141	6	18	.....	.....	3
4	Englishtown to Breton Cove and vicinity	667	5336	756	3402	249	249	15	11	.....	...	270	202	2265	1242	28	56	.....	.....	4
5	Wreck Cove to Cape Smokey	560	1480	376	1691	570	570	45	33	.....	.....	39	29	98	49	63	126	.....	.....	5
6	Ingonish	65	520	814	3663	18275	28898	25287	25287	486	486	896	896	960	1237	725	1160	1	8	6
7	Neil's Harbour and New Haven	14	98	802	3974	11094	15753	3931	3695	330	264	125	101	1529	1223	160	504	33	100	7
8	White Point, Dingwall and Sugar Loaf	164	1148	738	3657	4465	5805	440	396	30	24	222	184	1345	1077	95	299	65	260	8
9	Meat Cove, Bay St. Lawrence and vicinity	110	770	1202	5956	2716	3359	222	200	10	8	95	76	958	767	48	150	71	213	9
	Totals	1655	13220	4688	22343	38606	56497	29955	29642	856	782	1686	1530	7727	5977	1130	2333	170	581	

*Cwt. = 100 lbs.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Victoria**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Seals, No.	Seals, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Capelin, cwt.	Capelin, value.	Eels, cwt.	Eels, value.	Sword-fish, cwt.	Sword-fish, value.	Mixed fish, cwt.	Mixed fish, value.	Squid, brl.	Squid, value.	Oysters, brl.	Oysters, value.	Clams, brl.	Clams, value.	Number.
	Victoria County.		$		$		$		$		$		$		$		$		$		$	
1	Iona, Washabuck and Little Narrows																	119	348			1
2	Baddeck and vicinity			4	12													12	36			2
3	Big Bras d'Or District													33	20							3
4	Englishtown to Breton Cove and vicinity																					4
5	Wreck Cove to Cape Smokey																					5
6	Ingonish			7	39							68	340									6
7	Neil's Harbour and New Haven	17	17					23	23			2	6			23	46					7
8	White Point, Dingwall and Sugar Loaf	4	4	5	20	1	8	36	36	7	21	53	106			16	32			21	21	8
9	Meat Cove, Bay St. Lawrence and vicinity	14	14	1	4			4	4			71	147			7	14					9
	Totals	35	35	17	75	1	8	63	63	7	21	194	599	33	20	46	92	131	384	21	21	

*Cwt. = 100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Victoria**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon used fresh and frozen, *cwt.	Lobsters, canned, cases.	Cod, used fresh, cwt.	Cod, slipped green-salted, cwt.	Cod, dried, †quintal.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintal.	Haddock, green-salted, cwt.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintal.	Hake and Cusk, green-salted, cwt.	Pollock, used fresh, cwt.	Pollock, dried, quintal.	Pollock, green-salted, cwt.	Herring, used fresh, cwt.	Number.
	Victoria County.																	
1	Iona, Washabuck and Little Narrows	59	.....	107	80	38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
2	Baddeck and vicinity	16	.....	137	14	50	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	32	2
3	Big Bras d'Or district	.....	.....	98	25	133	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	98	3
4	Englishtown to Breton Cove and vicinity	667	378	.....	.....	83	.....	.....	.....	.....	.....	.....	.....	3	12	.....	89	4
5	Wreck Cove to Cape Smokey	560	188	.....	.....	190	.....	.....	5	.....	.....	.....	.....	.....	90	.....	.....	5
6	Ingonish	65	407	4574	5780	713	5170	440	1434	7167	150	.....	168	.....	13	.....	.....	6
7	Neil's Harbour and New Haven	14	401	150	3972	1000	91	.....	1280	.....	.....	88	.....	1	.....	448	.....	7
8	White Point, Dingwall and Sugar Loaf	164	366	165	1718	288	77	.....	124	.....	.....	32	.....	.....	74	.....	51	8
9	Meat Cove, Bay St. Lawrence and vicinity	110	601	105	1264	25	69	.....	51	.....	1	3	.....	.....	32	.....	46	9
	Totals	1655	2341	5336	12853	2520	5407	440	2911	7167	151	123	168	4	262	448	341	
	Rates	8 15	18	2	3.50	6	1.50	2.50	5	2	1	4	2	1.50	4	2	1	
	Values	8 24825	42138	10672	44985	15120	8110	1100	14555	14934	151	492	336	6	1048	896	341	

*Cwt=100 lbs. †Quintal=112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Victoria**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Herring, smoked, cwt.	Herring, pickled, brls.	Herring, used as bait, brls.	Mackerel, used fresh, cwt.	Mackerel, salted, brls.	Halibut, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Capelin, used fresh, cwt.	Eels, used fresh, cwt.	Swordfish, used fresh, cwt.	Mixed fish, used fresh, cwt.	Squid, used as bait, brls.	Oysters, used fresh, brls.	Clams and Quahaugs used fresh, brls.	Tongues and Sounds, pickled or dried, cwt.	Hair Seal Skins, No.	Fish oil, gals.	Number.
	Victoria County.																			
1	Iona, Washabuck and Little Narrows			4											119					1
2	Baddeck and vicinity		33	2	5			4							12				8	2
3	Big Bras d'Or District	50		71	3	1								33					30	3
4	Englishtown to Breton Cove and vicinity		12	1132		9													60	4
5	Wreck Cove to Cape Smokey		12	13		21													80	5
6	Ingonish		110	315	220	168	1	7				68								6
7	Neil's Harbour and New Haven		168	487	109	17	33			23		2		23			30	17	3800	7
8	White Point, Dingwall and Sugar Loaf		46	683	77	6	65	5	1	36	7	53		16		21	5	4	1400	8
9	Meat Cove, Bay St. Lawrence and vicinity		50	289	33	5	71	1		1		71		7				14	730	9
	Totals	50	431	2996	447	227	170	17	1	63	7	194	33	46	131	21	35	35	6108	
	Rates	2	4	2	4	8	9	5	10	1	4	5	1	3	3	2	5	1	30c.	
	Values	100	1724	5992	1788	1816	1530	85	10	63	28	970	33	138	393	42	175	35	1832	
	Total value																			$196,463

*Cwt. = 100 lbs. †Quintal = 112 lbs.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Inverness**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Alewives, cwt.	Alewives, value.	Number.
	Inverness County.		$		$		$		$		$		$		$		$		$	
1	Pollet's Cove to Pleasant Bay	337	2864	707	3535	316	417	2	2	.....	.....	.....	.....	255	255	699	2121	..	....	1
2	Cap Rouge, Eastern Harbour, Cheticamp and Grand Etang	538	5380	3122	15610	16050	22376	1322	1008	957	620	247	152	2479	1859	4183	13996	....	....	2
3	Friar's Head, Margaree Harbour to Smith's Cove	873	11249	1729	8645	6999	10615	1407	1407	.	....	.....	....	1026	1026	4116	12348	3220	3220	3
4	Broad Cove, Port Ban to Mabou Harbour	147	1470	1370	7960	1248	2496	396	792	150	150	....	..	949	949	750	3000	..	....	4
5	West Lake Ainslie and Whycocomagh Bay	....	....	.....	.....	100	200	.....	.....	....	.....	.....	....	99	99	.....	.....	100	100	5
6	Little Mabou and Port Hood to Hawkesbury	160	800	5832	35092	2500	4500	11300	14125	2100	1587	.....	....	3490	1745	780	2784	....	....	6
7	West Bay, Malagawatch and Deny's Basin	...	.....	...	.....	662	993	.....	.....	....	.....	..	....	300	150	.....	....	....	....	7
	Totals	2055	21763	12760	70842	27875	41597	14427	17334	3207	2357	247	152	8598	6083	10528	34249	3320	3320	

*Cwt. = 100 lb.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in the County of **Inverness**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Halibut, cwt.	Halibut, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Eels, cwt.	Eels, value.	Swordfish, cwt.	Swordfish, value.	Seals, No.	Seals, value.	Squid, brl.	Squid, value.	Oysters, brl.	Oysters, value.	Number.
	Inverness County.		$		$		$		$		$		$		$		$	
1	Pollet's Cove to Pleasant Bay									143	491	684	684					1
2	Cap Rouge, Eastern Harbour, Cheticamp and Grand Etang	38	190			3	30	64	320	131	655			17	34			2
3	Friar's Head, Margaree Harbour to Smith's Cove							90	270									3
4	Broad Cove, Port Ban to Mabou Harbour			80	480													4
5	West Lake, Ainslie and Whycocomagh Bay					10	50											5
6	Little Mabou and Port Hood to Hawkesbury			250	1250													6
7	West Bay, Malagawatch and Deny's Basin															580	1740	7
	Totals	38	190	330	1730	13	80	154	590	274	1146	684	684	17	34	580	1740	

Cwt. = 100 lb.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Inverness**, Province of **Nova Scotia**, during the Year 1914–15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Salmon, canned, cases.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, smoked, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, green-salted, cwt.	Haddock, dried, quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Pollock, dried, quintals.	Number.
	Inverness County.																
1	Pollet's Cove to Pleasant Bay	328	10	333	...	3	156	.....	.....	.....	.....	1	.....	.....	.....	.....	1
2	Cap Rouge, Eastern Harbour, Cheticamp and Grand Etang	532	6	1561	...	65	6098	.....	1263	5	.....	.....	439	.....	319	82	2
3	Friar's Head, Margaree Harbour to Smith's Cove	873	.....	864	...	80	3429	.....	20	.....	.....	.....	469	.....	.....	.....	3
4	Broad Cove, Port Ban to Mabou Harbour	147	.	679	12	249	.....	.....	333	296	....	.....	33	.....	50	.....	4
5	West Lake Ainslie, and Wyecomagh Bay	.....	...	..	....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
6	Little Mabou and Port Hood to Hawkesbury	160	...	2916	.....	500	...	500	333	5600	2250	.....	400	1050	350	.....	6
7	West Bay, Malagawatch and Deny's Basin	....	.....	.....	...	130	266	.....	.....	.....	.....	.....	.....	.....	.....	..	7
	Totals	2041	16	6353	12	1127	9949	500	1949	5901	2250	1	1341	1050	719	82	
	Rates	15	8	19	8	1.60	3.56	8	5.50	1.75	6	2	4.50	1	3	3	
	Values	30615	128	120707	96	1803	34821	4000	10720	10327	13500	2	6034	1050	2157	246	

*Cwt.=100 lb. †Quintals=112 lb.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Inverness**, Province of **Nova Scotia**, during the Year 1914-15—*Concluded.*

Number.	Fishing Districts.	Herring, fresh, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Eels, used fresh, cwt.	Swordfish, used fresh, cwt.	Squid, used as bait, brl.	Oysters, used fresh, brl.	Hair seal skin, No.	Fish oil, gal	Number.
	Inverness County.																	
1	Pollet's Cove to Pleasant Bay		45	60		233							143			684	3000	1
2	Cap Rouge, Eastern Harbour, Cheticamp and Grand Etang		323	755	28	1385			38		3	64	131	17			5480	2
3	Friar's Head, Margaree Harbour to Smith's Cove		100	363		1372	121	1033				90					4034	3
4	Broad Cove, Port Ban to Mabou Harbour		72	366	102	216				80							125	4
5	West Lake Ainslie, and Wycocomagh Bay		33					33			10						10	5
6	Little Mabou and Port Hood to Hawkesbury	3000	100	95		260				250								6
7	West Bay, Malagawatch and Deny's Basin	50		125											580			7
	Totals	3050	673	1764	130	3466	121	1066	38	330	13	154	274	17	580	684	12649	
	Rates	75c.	4.50	2	5	12	1	4	10	8	10	4	5	2	3	1	25c.	
	Values	2287	3029	3528	650	41592	121	4264	380	2640	130	616	1370	34	1740	684	3162	
	Total value																$302,433	

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, &c., State, for District No. 1, Province of **Nova Scotia**, during the year 1914-15.

Kinds of Fish.	Caught and Landed in a Green State.		Marketed.		Total Marketed Value.
	Quantity.	Value.	Quantity.	Value.	
		$		$	$
Salmon ... cwt.	4,169	39,613			
" used fresh ... "			4,155	62,325	
" canned ... cases.			16	128	
					62,453
Lobsters ... cwt.	32,843	162,453			
" canned ... cases.			16,365	300,923	
" shipped in shell ... cwt.			61	586	
					301,509
Cod ... "	159,666	227,238			
" smoked ... "			500	4,000	
" used fresh ... "			25,269	48,537	
" green—salted ... "			36,023	125,264	
" dried ... "			20,444	109,521	
					287,322
Haddock ... "	94,510	101,337			
" green—salted ... "			7,468	14,936	
" used fresh ... "			30,009	49,066	
" smoked (finnans) ... "			2,690	14,600	
" dried ... "			14,726	67,722	
					146,324
Hake ... "	5,224	3,789			
" green—salted ... "			168	336	
" used fresh ... "			1,211	1,218	
" dried ... "			1,225	3,804	
					5,358
Pollock ... "	16,103	12,183			
" green-salted ... "			448	896	
" used fresh ... "			9,938	14,824	
" dried ... "			1,754	6,229	
					21,949
Herring ... "	47,931	46,187			
" used fresh ... "			9,185	8,422	
" smoked ... "			50	100	
" pickled ... brl			5,986	25,031	
" used as bait ... "			10,340	20,680	
					54,233
Mackerel ... cwt.	25,437	90,491			
" used fresh ... "			4,486	20,956	
" salted ... brl.			6,981	77,260	
					98,216
Shad ... cwt.	3	19			
" used fresh ... "			3		
					19
Alewives ... "	3,407	3,397			
" used fresh ... "			127	133	
" salted ... brl.			1,093	4,385	
					4,518
Halibut, used fresh ... cwt.	2,768	15,020	2,768		22,390
Flounders ... "	20	17	20		30
Smelts ... "	1,084	5,561	1,084		6,831
Trout ... "	14	88	14		140
Eels ... "	371	881	371		959
Capelin ... "	63	63	63		63
Swordfish ... "	1,127	4,263	1,127		5,049
Mixed Fish ... "	33	20	33		33

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, &c., State, for **District No. 1**, Province of **Nova Scotia**, during the year 1914-15.— *Concluded.*

Kinds of Fish.		Caught and Landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Seals	No.	719	719			
Squid	brl.	862	1,710	862		2,624
Oysters	"	711	2,124	711		2,133
Clams	"	68	115			
" used fresh	"			68		188
Tongues and Sounds	cwt.			35		175
Hair Seal Skins	No.			719		719
Fish Oil	gall.			23,787		6,415
Totals			717,288			1,029,650

RECAPITULATION.

Of the Number of Fishermen, &c., and of the Number and Value of Fishing Vessels, Boats, Nets, &c., in **District No. 1**, Province of **Nova Scotia**, for the year 1914-15.

—	Number.	Value.
		$
Steam Fishing Vessels (tonnage)		
Sailing and Gasoline Vessels	102	63,050
Boats (sail)	2,397	86,564
" (gasoline)	544	122,790
Carrying Smacks	73	23,530
Gill Nets, Seines, Trap and Smelt Nets, etc	12,150	124,759
Weirs	52	1,280
Trawls	2,572	19,162
Hand Lines	8,637	6,993
Lobster Traps	140,190	120,288
Lobster Canneries	68	61,600
Salmon "		
Clam "		
Freezers and Ice-houses	41	284,046
Smoke and Fish-houses	936	82,882
Fishing Piers and Wharves	258	216,742
		1,213,686

Number of men employed on Vessels	501
" " Boats	4,638
" " Carrying Smacks	138
" persons employed in Fish-houses, Freezers, Canneries, &c.	2,075
Total	7,352

DISTRICT

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Cumberland**, Province

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												Gill Nets, Seines, Trap and Smelt Nets, &c.	
		Steam Vessels.				Boats.					Carrying Smacks.				
		Number.	Tons.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Cumberland County.			$			$		$			$			$
1	Malagash, East Wallace and Fox Harbour					25	1310	123	18756	152					
2	Pugwash and Gulf Shore					17	1050	61	11280	85				35	350
3	Port Philip, Northport and Amherst Shore					7	350	14	2350	27				32	320
4	Wallace River					19	415	3	555	22				12	170
5	River Philip					4	80			4				38	850
6	Minudie to Apple River					2	60	2	600	12					
7	Advocate					10	300	3	1200	34				12	96
8	Spencers Island					4	120	2	800	16				6	48
9	Port Greville					6	180			18				5	40
10	Parrsboro and Two Islands							3	750	9				2	25
	Totals					94	3865	211	36285	377				142	1899

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Colchester**, Province

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.					Fishing	
		Boats.					Gill Nets, Seines, Trap and Smelt Nets, &c.	
		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.
	Colchester County.		$					$
1	Sterling	3	90	8	720	15		
2	Stewiacke	100	1000			165	120	1400
3	Five Islands to Economy	1	75			1	1	100
4	Little Bass River to Highland Village	5	375			5	5	500
5	Great Village to Queen Village	13	975			13	13	1300
	Totals	122	2515	8	720	199	139	3300

No. 2.

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing of **Nova Scotia,** during the Year 1914-15.

Fishing Gear.								Canneries.		Other Material.				Persons Employed in Canneries, Freezers and Fish-houses.	
Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	$		$		$		$		$		$		$		
						33707	30197	13	36900					231	1
						19800	17300	11	12850					109	2
3	300					5575	3500	7	875			4	4000	62	3
												7	210		4
															5
2	150					50	50								6
2	150			34	68	50	50								7
				16	32	50	50								8
				18	36										9
6	450			9	18	25	25			1	1000			3	10
13	1050			77	154	59257	51172	31	50625	1	1000	11	4210	405	

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing of **Nova Scotia,** during the Year 1914-15.

Gear.								Canneries.		Other Material.				Pers ns Employed in Canneries, Freezers, and Fish-houses.	
Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	$		$		$		$		$		$		$		
						2700	2060	2	1350					27	1
										2	200				2
2	100	4	160									2	40		3
1	100														4
															5
3	200	4	160			2700	2060	2	1350	2	200	2	40	27	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Pictou**, Province of

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.								Fishing	
		Boats.					Carrying Smacks.			Gill Nets, Seines Trap and Smelt Nets, etc.	
		Sail.	Value.	Gasoline	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Pictou County.		$		$			$			$
1	West Pictou	24	870	164	26590	206	....	....	....	103	1100
2	Pictou Island	2	75	58	8880	119	2	200	2	98	830
3	Pictou Harbour	9	360	....	....	12	3	11500	7	50	365
4	Little Harbour and East Branch St. Mary's River	16	640	8	1200	31	....	....	....	42	2600
5	Merigomish Island	13	520	5	1000	29	1	400	2	80	1460
6	Ponds	5	200	18	3600	36	....	....	....	76	1762
7	Lismore	6	220	....	....	9	....	....	....	14	900
	Totals	75	2885	253	41270	442	6	12100	11	463	9017

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Antigonish**, Province of

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.										Fishing	
		Sailing and Gasoline Vessels.			Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.	
		(10 to 20 tons) No.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Antigonish County.		$			$		$			$			$
1	Harbour au Bouche, Linwood and Cape Jack	2	1150	6	50	909	17	2045	89	3	1250	4	473	2559
2	Tracadie, Bayfield, Monk's Head & South Side Antigonish Harbour	....	....	....	26	564	20	3915	62	2	550	2	155	864
3	North Side Antigonish Harbour, Lakevale and South Side of Cape George	.	....	....	33	572	17	2820	73	3	600	3	169	1100
4	North side of Cape George, Georgeville and Malignant Cove to Knoydart	.	....	....	17	293	13	1760	26	2	400	2	107	694
	Totals	2	1150	6	126	2338	67	10540	250	10	2800	11	904	5217

Boats, and the Quantity and Value of all Fishing Gear, etc. used in the Fishing **Nova Scotia**, during the year 1914–15.

Gear.						Canneries		Other Material.						Persons Employed in Canneries, Freezers and Fish Houses.	
Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		
...	....	170	85	45180	45000	13	25000	.....	.....	...	.....	.....	...	250	1
....	.....	32	16	21400	18400	3	15000	.....	.....	.....	....	.....	...	121	2
....	.....	18	9	...	.....	....	.....	.....	.....	.....	.....	....	..	....	3
....	.....	16	16	2000	1000	1	300	.....	.....	....	.....	....	.....	17	4
6	42	14	7	2800	2500	1	1200	4	1400	4	80	.....	.....	25	5
4	28	22	11	5800	5800	1	1800	10	1180	10	200	.	. .	29	6
2	14	7	3	600	600	....	.....	2	50	.....	.....	1	1500	15	7
12	84	279	147	77780	73300	19	43300	16	2630	14	280	1	1500	455	

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing **Nova Scotia**, during the year 1914–15.

Gear.						Canneries.		Other Material.						Persons Employed in Canneries, Freezers and Fish Houses,	
Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		
79	395	146	73	7000	3500	1	1000	1	1000	57	499	2	4000	42	1
30	150	80	40	5000	2500	2	1400	2	1800	39	470	....	.....	45	2
60	300	50	25	9000	4500	2	3000	1	1000	19	310	....	.. ...	70	3
39	195	48	24	6700	3350	2	2000	2	2200	23	415	....	.. ..	44	4
208	1040	324	162	27700	13850	7	7400	6	6000	138	1694	2	4000	201	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Guysboro**, Province of **Nova Scotia**, during the Year 1914-15.

Number.	Fishing Districts	Vessels, Boats and Carrying Smacks.													Fishing Gear.						Number.
		Sailing and Gasoline Vessels.					Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, etc.		Weirs.		Trawls.		
		(20 to 40 tons.) Number.	(10 to 20 tons.) Number.	Value.	Men.		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	
	Guysboro County.			$				$		$			$			$		$		$	
1	Ecum Secum						26	420	15	2500	44	2	300	2	64	260			22	140	1
2	Marie Joseph						30	800	11	2000	38				85	425	2	50	48	290	2
3	L scombe and Spanish Ship Bay						41	1000	20	3900	52	3	600	4	115	575			30	220	3
4	Gegoggin						16	300	9	1350	23				32	150			10	100	4
5	St. Mary's Bay and River						15	3 0	8	1100	22				45	200			9	50	5
6	Wine Harbour						15	350	1	150	15				60	500			5	50	6
7	Port Hilford						20	400	1	200	30	1	100	1	90	600			20	150	7
8	Hollands Harbour and Indian River						4	100	1	500	8				24	180			4	40	8
9	Port Beckerton						25	700	14	5400	50	1	250	2	220	1850			80	750	9
10	Fisherman's Harbour						20	400	11	2000	36	1	600	2	140	856			20	200	10
11	Country Harbour						8	200			9				10	50					11
12	Isaac's Harbour						10	1000	15	4500	45	1	1200	7	180	1800			40	400	12
13	Drum Head		1	800	4		10	1000	16	4800	46	5	1500	10	250	2500			130	1300	13
14	Seal Harbour						6	450	12	3600	30				168	1880			70	700	14
15	Coddles Harbour						3	225	10	3000	25				162	1620			24	240	15
16	New Harbour						4	300	29	8700	75	1	500	3	540	5400			75	750	16
17	Tor Bay						20	1500	4	1200	29	1	200	2	175	1750			20	200	17
18	Larry's River		3	1700	10		65	3500	4	1200	75	2	400	3	875	8750			75	750	18
19	Charlo's Cove		10	5700	41		60	3000	5	1500	45	1	450	2	576	5760			115	1150	19
20	Cole Harbour		2	1000	7		35	3500	7	2100	41				367	3670			62	620	20
21	Port Felix		2	1200	9		85	4250	8	2400	90	1	275	2	978	9780			149	1490	21
22	Whitehead	1	8	7600	36		85	4300	11	4200	95	5	1500	5	1150	11500			198	1980	22
23	Raspberry and Dover		3	2500	15		50	2000	8	1600	35				145	1450			67	670	23
24	Canso and Canso Tittle	2	18	20000	94		160	6500	40	12000	150	12	3600	15	2086	20860			570	5700	24
25	Fox Island Main						18	900	2	400	22				178	1780			32	320	25
26	Half Island Cove						45	2700	10	2000	60	2	700	4	900	9000			95	950	26

27	Philip's Harbour	....	1	450	5	31	1500	6	1200	36	....	....	....	640	6400	....	....	62	620	27
28	Queensport	....	1	450	5	45	2700	8	1600	54	3	900	5	587	5870	....	....	89	890	28
29	Peas Brook	....	....	....	....	34	1700	....	....	36	....	....	....	345	3450	....	....	54	540	29
30	Halfway Cove	....	....	....	....	53	2650	2	600	53	....	....	....	620	6200	....	....	86	860	30
31	Sandy Cove and Cook's Cove	....	....	....	....	32	1200	2	450	48	1	80	1	420	4200	....	....	49	490	31
32	Guysboro and Manchester	....	....	....	....	18	600	2	350	20	1	150	1	278	2780	....	....	19	190	32
33	Port Shoreham	....	....	....	....	19	670	....	....	22	....	....	....	395	3950	....	....	52	520	33
34	St. Francis	....	....	....	....	36	1240	....	....	36	....	....	....	502	5020	....	....	29	290	34
35	Oyster Ponds	....	....	....	....	34	1020	....	....	34	....	....	....	390	3900	....	....	30	300	35
36	Sand Point	....	....	....	....	25	1475	....	....	18	....	....	....	420	4200	....	....	34	340	36
37	Middle Melford	....	....	....	....	38	2200	3	900	41	....	....	....	900	9000	....	....	9	90	37
38	Mulgrave and Auld's Cove	....	....	....	....	7	325	....	....	10	3	8600	8	85	850	....	....	....	....	38
	Total	3	49	41400	226	1248	57375	301	77400	1598	50	21905	79	15217	148960	2	50	2183	24340	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Guysboro**, Province of **Nova Scotia**, during the Year 1914-15—*Concluded.*

Number.	Fishing Districts.	Fishing Gear.				Canneries.				Other Material.						Persons employed in Canneries, Freezers and Fish houses.	Number.
		Hand Lines.		Lobster Traps.		Lobster Canneries.		Clam Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Guysboro County.		$		$		$		$		$		$		$		
1	Ecum Secum	60	30	2000	2000	....	.....	....	..	2	100	25	400	4	200	.....	1
2	Marie Joseph	40	20	2200	2200	....	.....	....	....	1	50	25	500	6	300	.....	2
3	Liscombe and Spanish Ship Bay	88	44	3000	3000	1	1200	....	....	3	100	37	850	6	200	20	3
4	Gegoggin	30	15	1300	1300	1	100	....	....	1	50	14	150	2	100	....	4
5	St. Mary's Bay and River	36	18	1300	1300	.....	.....	1	100	6	400	12	200	1	50	2	5
6	Wine Harbour	30	15	1000	1000	.....	.....	....	....	1	100	12	300	.....	.....	.....	6
7	Port Hilford	40	20	1200	1200	.....	.....	....	.....	2	200	16	350	.....	.....	2	7
8	Holland's Harbour and Indian River	10	5	700	700	....	.....	....	.....	1	50	3	80	1	40	.....	8
9	Port Beckerton	80	40	3000	3000	....	.....	....	.....	10	1000	20	800	8	400	2	9
10	Fisherman's Harbour	60	30	1600	1600	1	800	.....	...	.....	.....	10	350	4	200	....	10
11	Country Harbour	12	6	100	100	.....	.....	.....	.....	.....	.....	6	100	.....	.....	.....	11
12	Isaac's Harbour	60	60	1800	1800	1	1000	.....	.....	3	3000	19	2000	8	10000	40	12
13	Drum Head	70	70	2500	2500	1	500	.....	.....	1	3000	20	2600	8	5060	30	13
14	Seal Harbour	89	89	1900	1900	.....	.....	....	....	1	1000	15	2000	2	500	3	14
15	Coddles Harbour	150	150	1900	1900	.....	.....	.....	....	.....	.....	8	800	5	700	1	15
16	New Harbour	390	390	3500	3500	.....	.....	.....	..	1	2000	39	9900	2	3000	8	16
17	Tor Bay	125	125	1900	1900	.....	.....	.....	....	.....	.....	13	1300	3	700	.....	17
18	Larry's River	216	216	2500	2500	.....	.....	.....	..	.....	.....	33	3050	20	10000	.....	18
19	Charlo's Cove	189	189	2300	2300	.....	.....	.....	....	.....	.....	25	2300	2	3000	3	19
20	Cole Harbour	105	105	2000	2000	.....	.....	.....	....	.....	.....	18	350	15	3500	....	20
21	Port Felix	252	252	4000	4000	1	500	.....	..	.....	.....	42	4500	27	12500	15	21
22	Whitehead	269	269	3400	3400	2	3300	.....	....	1	5000	39	9760	28	12970	65	22
23	Raspberry and Dover	105	105	2500	2500	1	1000	.....	....	.....	.....	11	1800	5	4200	36	23
24	Canso and Canso Tittle	1000	1000	9000	9000	2	2600	.....	.....	9	89400	56	17050	30	15000	150	24
25	Fox Island Main	49	49	1000	1000	..	.....	.....	....	1	150	5	900	.....	.....	.....	25
26	Half Island Cove	112	112	2000	2000	1	500	.....	....	2	8000	21	6700	1	800	12	26

27	Philip's Harbour	72	72	2100	2100	....	....	....	....	....	5	17800	14	2600	1	900	2	27
28	Queensport	98	98	3000	3000	1	2000	....	....	....	....	....	25	6530	2	5300	40	28
29	Peas Brook	65	65	1200	1200	....	....	....	....	....	....	....	14	2600	....	....	....	29
30	Halfway Cove	109	109	2700	2700	....	....	....	....	....	....	....	25	6750	....	....	....	30
31	Sandy Cove and Cook's Cove	54	54	1800	1800	....	....	....	....	....	1	400	14	1400	1	75	....	31
32	Guysboro and Manchester	26	26	500	500	....	....	....	....	....	2	1000	25	3400	5	10000	....	32
33	Port Shoreham	23	23	1000	1000	....	....	....	....	....	....	....	16	2700	....	....	....	33
34	St. Francis	60	60	2200	2200	....	....	....	....	....	....	....	10	5700	....	....	....	34
35	Oyster Ponds	44	44	1800	1800	....	....	....	....	....	....	....	16	2000	2	800	....	35
36	Sand Point	32	32	500	500	....	....	....	....	....	....	....	22	3450	....	....	....	36
37	Middle Melford	50	5	2200	2200	....	....	....	....	....	....	....	18	2800	....	....	....	37
38	Mulgrave and Auld's Cove	....	....	900	900	....	4000	....	....	....	3	15000	15	2105	3	13700	50	38
	Totals	4300	4057	79500	79500	15	17500	1	100	57	147800	758	111125	202	114135	485		

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Halifax**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.														Number.
		Sailing and Gasoline vessels.					Boats.					Carrying Smacks.				
		(40 tons and over) Number.	(20 to 40 tons) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.		
	Halifax County.				$			$		$			$			
1	North Shore						140	2200	4	1200	85	1	200	2		1
2	East St. Margaret's	1			3000	18	230	9000	4	800	140	1	300	2		2
3	Indian Harbour	1	1	6	9500	40	156	9200	56	12500	139	2	500	4		3
4	Peggy's Cove						100	5000	2	400	40					4
5	Dover			14	8000	43	380	11325	4	1500	140	1	200	2		5
6	Prospect		2		1200	8	100	3300	4	1000	90					6
7	Terence Bay		3	8	8200	48	200	8000	18	4450	148	1	400	3		7
8	Pennant			8	4300	32	20	600	3	900	29					8
9	Sambro		3	5	5000	34	63	4600	19	2850	21	1	5000	4		9
10	Ketch Harbour		1	2	3000	20	67	4200	5	1600	70					10
11	Portuguese Cove						20	4800	9	3000	30					11
12	Herring Cove	1	2	3	4200	30	70	3600	2	600	86					12
13	Ferguson's Cove						6	200	1	200	10					13
14	Bedford and Grand Lake						16	425			16					14
15	Halifax						10	200			10					15
16	Dartmouth, Eastern Passage and Devil's Island			1	900	3	63	1692	30	5400	65					16
17	Cow Bay and Lawrencetown						14	210	4	435	16					17
18	Seaforth and Three Fathom Harbour	1			6000	18	43	735	2	430	35					18
19	West Chezzetcook	2			3600	34	107	1520	3	800	67					19
20	East Chezzetcook						21	316	1	125	20					20
21	Petpeswick Harbour						36	560	14	2400	43	1	200	2		21
22	Musquodoboit Harbour						54	1400	25	4100	54	1	70	2		22
23	Jeddore		4	1	3500	35	80	1188	32	5555	80	1	125	2		23
24	Clam Harbour and Owl's Head			3	2700	17	59	1075	15	2015	58	1	380	2		24
25	West Ship Harbour			1	850	4	16	450	5	480	17					25
26	East Ship Harbour						6	416	8	1425	35					26
27	Pleasant Harbour and Tangier								15	2670	35					27

28	Pope's Harbour and Gerrard's Island					1	800	4	3	175	13	2080	33	1	200		128
29	Spry Bay, Taylor Head and Musshaboom					4	1500	14	36	1735	12	1950	114				29
30	Sheet Harbour and Sober Island					4	2100	17	9	855	10	2200	44				30
31	Beaver Harbour and Port Dufferin										7	1850	12	2	250		231
32	Quoddy and Harrigan Cove					1	600	3	7	150	9	1150	28	1	1000		432
33	Moser River and Smith's Cove								6	185	3	475	14				33
34	Mitchell's Bay and Ecum Secum								3	190	10	1695	22				34
	Totals				6	16	62	68950	422	2141	79502	319	67635	1846	15	8825		32

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Halifax**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Fishing Gear.								Canneries.		Other Material.						Persons employed in Canneries Freezers, and Fish-houses.	Number.
		Gill Nets.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Halifax County.		$		$		$		$		$		$		$		$		
1	North Shore	960	10120	20	100	300	150	1500	750	...	.....	6	1200	60	8500	60	4500	16	1
2	East St. Margaret's	2300	2860	80	2000	300	150	2300	1150	1	350	3	1000	72	11000	72	5600	5	2
3	Indian Harbour	2300	15125	220	7100	225	113	2000	1000	...	....	3	450	45	5000	40	3000	5	3
4	Peggy's Cove	530	6500	45	850	90	45	1000	500	...	.....	...	.....	23	5600	14	1050	.....	4
5	Dover	3135	50100	300	4600	300	150	5000	2500	....	.....	3	1400	61	8000	60	3600	3	5
6	Prospect	1840	25260	75	1775	220	110	3100	1550	1	400	2	1200	35	10500	36	4700	2	6
7	Terence Bay	768	11500	270	3400	220	110	4800	2400	1	700	3	1250	50	7500	50	2500	1	7
8	Pennant	359	5250	34	720	40	20	1900	950	...	.....	2	30	12	2400	12	900	.....	8
9	Sambro	912	9600	300	2000	120	60	3000	1500	1	2000	3	1300	20	3000	21	2500	20	9
10	Ketch Harbour	243	3810	70	720	76	39	300	150	...	.....	2	1200	25	3000	14	1000	2	10
11	Portuguese Cove	511	6080	40	560	60	30	885	442	...	...	....	.....	19	2850	20	500	.....	11
12	Herring Cove	125	1400	110	2490	90	45	300	150	....	...	....	.....	20	3000	20	500	.....	12
13	Ferguson's Cove	10	225	3	15	5	3	300	150	....	....	....	.....	7	1400	7	700	.....	13
14	Bedford and Grand Lake	28	1225	4	20	10	5	250	125	..	....	..	..	6	300	.....	.....	.....	14
15	Halifax	20	200	.....	.....	12	6	50	25	...	...	6	30000	9	30000	6	62000	260	15
16	Dartmouth, Eastern Passage and Devil's Island	270	1080	68	1040	220	110	2000	1000	....	....	..	....	35	6500	27	800	.....	16
17	Cow Bay and Lawrencetown	62	248	...	...	34	17	1000	500	....	.....	....	.....	13	260	5	250	.....	17
18	Seaforth and Three Fathom Harbour	140	560	...	.....	100	50	1200	600	....	.....	....	....	53	1275	5	500	.....	18
19	West Chezetcook	444	1776	5	100	250	125	1750	875	....	.....	....	.....	10	300	3	300	.....	19
20	East Chezetcook	50	200	..	.....	35	18	1000	500	....	.....	....	.....	25	500	10	600	.....	20
21	Petpeswick Harbour	120	600	....	.....	70	35	1000	500	1	1360	....	.....	16	375	7	300	.....	21
22	Musquodoboit Harbour	170	2048	5	80	108	54	1750	875	1	1000	...	.....	26	550	12	350	.....	22
23	Jeddore	326	1320	7	150	181	91	3000	1500	2	3000	....	.....	46	950	14	700	23	23
24	Clam Harbour and Owl's Head	225	1680	...	.....	188	94	4200	2100	2	1850	2	275	25	1200	12	1000	20	24
25	West Ship Harbour	78	320	2	40	35	17	1000	500	....	....	....	.....	11	350	9	700	.....	25
26	East Ship Harbour	141	564	4	65	79	49	1000	700	....	....	....	....	14	366	12	260	10	26
27	Pleasant Harbour and Tangier	159	636	5	40	75	40	1500	900	...	.....	1	25	18	650	11	540	15	27

28	Pope's Harbour and Gerrard's Island	209	836	1	8	79	45	1600	1000	1	500	1	20	17	445	12	279		20	38
29	Spry Bay, Taylor Head and Mushaboom	514	2056	3	40	214	115	3000	2000	1	100	1	30	40	900	23	435		30	29
30	Sheet Harbour and Sober Island	235	940	11	137	120	60	2000	1500			1	30	22	453	15	245		18	30
31	Beaver Harbour and Port Dufferin	29	116			22	11	3000	2000	2	2500	1	40	9	120	3	50		39	31
32	Quoddy and Harrigan Cove	110	240	4	30	68	31	3000	2000	1	2000			12	150	5	50		29	32
33	Moser River and Smiths Cove	26	100			25	13	1000	700					5	62	1	10		5	33
34	Mitchell's Bay and Ecum Secum	80	320	6	45	29	15	2000	1500	2	1300			9	171	6	95		41	34
	Totals	17459	147895	1692	28125	4000	2029	62685	34592	17	17000	40	39450	870	117627	624	100565		555	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Hants**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.					Fishing Gear.					
		Boats.					Gill Nets.		Weirs.		Hand Lines.	
		Sail.	Value.	Gasoline.	Value.	Men.	Number	Value	Number	Value	No.	Value
	Hants County.		$		$			$		$		$
1	Hantsport to Tenny cape	6	800	3	875	16	17	700	3	110	..	.....
2	Tennycape to. Maitland	8	170	...	.....	12	10	100	... ..	.....	25	13
3	Maitland to Shubenacadie	22	200	.....	.....	25	35	150	.. ....	.....	20	10
4	Shubenacadie to Grand Lake	24	100	.. ...	....	20	30	100	.....	.....	20	10
		60	1270	3	875	73	92	1050	3	110	65	33

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Cumberland**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Oysters, brl.	Oysters, value.	Number.
	Cumberland County.		$		$		$		$		$		$		$		$		$		$		$		$		$		$		$		
1	Malagash, East Wallace and Fox Harbour			11372	56860									375	188											39	195					1
2	Pugwash and Gulf Shore			5822	29110									1200	600					20	40					309	1545			125	500	2
3	Port Philip, Northport and Amherst Shore			1592	7960									24400	7320					1000	1000					107	535					3
4	Wallace River																	13	65	192	288					105	525	1	8	450	2250	4
5	River Philip	2	24															20	100							478	2390	2	16			5
6	Minudie to Apple River	6	72	400	2000									300	300																	6
7	Advocate	7	84			900	1800	180	225	62	62	1710	1710	1000	1025							20	160									7
8	Spencers Island	7	84			400	800	100	125	50	50			1000	1025							17	136									8
9	Port Greville					405	810	100	125			1000	1000	200	200							10	80									9
10	Parrsboro and Two Islands	20	240	125	625	200	400	165	206			800	800	206	205	3	21					10	80	14	70							10
	Totals	42	504	19311	96555	1905	3810	545	681	112	112	3510	3510	2681	10864	3	21	33	165	1212	1328	57	456	14	70	1038	5190	3	24	575	2750	

*Cwt.=100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, &c., state, for the County of **Cumberland**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintals.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Pollock, dried, quintals.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Number.
	Cumberland County.															
1	Malagash, East Wallace and Fox Harbour	.....	5686	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
2	Pugwash and Gulf Shore	.....	2911	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
3	Port Philip, Northport and Amherst Shore	.....	794	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	2200	10250	3
4	Wallace River	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
5	River Philip	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
6	Minudie to Apple River	5	.....	400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
7	Advocate	7	.....	.....	300	165	90	60	.....	40	20	200	500	100	.....	7
8	Spencers Island	7	.....	.....	150	80	30	20	10	20	17	.....	.....	180	.....	8
9	Port Greville	.....	.....	.....	165	75	30	10	.....	30	.....	100	300	150	.....	9
10	Parrsboro and Two Islands	20	.....	125	140	3	18	15	.....	50	..	50	250	40	.....	10
	Totals	42	9391	530	755	323	168	105	10	140	37	350	1050	2690	10250	
	Rates.....$	15	18	10	2	3	6	2	6	4.50	4	1.50	4	2	3	
	Values.....$	630	169038	5300	1510	969	1008	210	60	630	148	525	4200	5380	30750	

* Cwt. = 100 lbs. † Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, &c., state for the County of **Cumberland**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Herring, pickled, brl.	Herring, used as bait, brl.	Herring, used as fertilizer, brl.	Mackerel, used fresh, cwt.	Shad, used fresh, cwt.	Shad, salted, brl.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Oysters, used fresh, brl	Number.
	Cumberland County.														
1	Malagash, East Wallace and Fox Harbour	.....	187	.....	.....	.....	.....	.....	.....	.....	.....	39	.....	.....	1
2	Pugwash and Gulf Shore	.....	600	.....	.....	.....	.....	20	.....	.....	.....	309	.....	125	2
3	Port Philip, Northport and Amherst Shore	.....	125	700	.....	.....	.....	.....	.....	.....	.....	107	.....	.....	3
4	Wallace River	.....	.....	.....	.....	.....	.....	.....	334	.....	.....	105	1	450	4
5	River Philip	.....	.....	.....	.....	13	.....	.....	66	.....	.....	478	2	.....	5
6	Minudie to Apple River	50	25	.....	.....	5	5	.....	.....	.....	.....	.....	.....	.....	6
7	Advocate	160	170	.....	.....	.....	.....	.....	.....	20	.....	.....	.....	.....	7
8	Spencers Island	180	150	.....	.....	.....	.....	.....	.....	17	.....	.....	.....	.....	8
9	Port Greville	50	5	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	9
10	Parrsboro and Two Islands	60	10	.....	3	.....	.....	.....	.....	10	14	.....	.....	.....	10
	Totals	500	1272	700	3	18	5	20	400	57	14	1038	3	575	
	Rates	4.50	1.75	50c.	7	10	15	2	4	10	5	7	10	6	
	Values	2250	2226	350	21	180	75	40	1600	570	70	7266	30	3450	

Total Value $238,486

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a the year

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Shad, cwt.
	Colchester County.		$		$		$		$		$	
1	Sterling			508	2540							
2	Stewiacke	21	252									70
3	Five Islands to Economy					224	336	17	17	39	39	4
4	Little Bass River to Highland Village	3	36									45
5	Great Village to Queens Village	5	60									60
	Totals	29	348	508	2540	224	336	17	17	39	39	179

*Cwt. = 100 lb.

CATCH.

Green State in the County of **Colchester**, Province of **Nova Scotia**, during 1914-15.

Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Bass, cwt.	Bass, value.	Oysters, brl.	Oysters, value.	Number.
$		$		$		$		$		$		$	
					140	700	1	8			20	100	1
560	610	1220					6	48	4	20			2
32			5	40			6	48	1	6			3
360					10	30							4
480													5
1432	610	1220	5	40	150	730	13	104	5	26	20	100	

THE CATCH

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in **Nova Scotia,** during

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Cod, used fresh, cwt.	Cod, dried, †quintals.	Pollock, used fresh, cwt.
	Colchester County.					
1	Sterling		254			
2	Stewiacke	21				
3	Five Islands to Economy			110	38	8
4	Little Bass River to Highland Village	3				
5	Great Village to Queens Village	5				
	Totals	29	254	110	38	8
	Rates	$ 15	18	2	6	1.50
	Values	$ 435	4572	220	228	12
	Total value					

*Cwt.=100 lb. †Quintal=112 lb.

MARKETED.

a fresh, dried, pickled, canned, etc., State, for the County of **Colchester**, Province of the year 1914-15.

Pollock, dried, † Quintals.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, cwt.	Herring, used as bait, brl.	Shad, used fresh, cwt.	Alewives, used fresh, cwt.	Halibut, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Bass, used fresh, cwt.	Oysters, used fresh, brls.	Number.
.....	.....	.....	.....	.....	.....	.....	.....	140	1	.....	20	1
.....	.....	.....	.....	.....	70	610	.....		6	4	.....	2
3	1	1	3	13	4	.....	5	..	6	1	.....	3
...	.....	.....	.....	.....	45	.....	.....	.....	.....	.....	.....	4
.....	.....	.....	.....	.....	60	.....	.....	10	.....	.....	.....	5
3	1	1	3	13	179	610	5	150	13	5	20	
4	2	3	4.50	1.75	10	2	10	7	10	10	6	
12	2	3	13	23	1790	1220	50	1050	130	50	120	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$9,930		

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State

Number.	Fishing Districts.	Salmon, cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and cusk, cwt.	Hake and cusk, value.
	Pictou County.		$		$		$		$		$
1	West Pictou			10876	54380	117	234	70	105	100	125
2	Pictou Island			5246	26230	75	150	14	21		
3	Pictou Harbour			10	50	46	92	64	96	39	44
4	Little Harbour and East Branch, St. Mary's River	185	1850	758	3790	8	16			5	8
5	Merigonish Island	320	3200	726	3630	10	20			30	38
6	Ponds	60	600	1892	9460	38	76			40	50
7	Lismore	70	700			40	80			240	300
	Totals	635	6350	19508	97540	334	668	148	222	454	565

*Cwt. = 100 lbs.

SESSIONAL PAPER No. 39

CATCH.

in the County of **Pictou**, Province of **Nova Scotia**, during the year 1914-15.

Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Alewives, cwt.	Alewives, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Eels, cwt.	Eels, value.	Mixed fish, cwt.	Mixed fish, value.	Oysters, srl.	Oysters, value.	Clams, brl.	Clams, value.	Number.
	$		$		$		$		$		$		$		$		$	
4937	4937	117	702	15	30	72	360	2	16	....	.....	....	....	95	475	....	.....	1
1320	1320	15	90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
675	675	10	60	10	20	238	1190	4	32	....	... ..	...	....	...	...	2	4	3
953	953	.....	.....	60	120	80	400	2	16	20	100	....	...	.....	.....	.....	.....	4
270	270	.	.....	.....	.....	820	4100	.....	.....	.....	.....	...	.....	.....	.....	.....	...	5
560	560	....	...	....	...	.....	.....	2	16	....	.....	....	...	.....	.....	.....	.....	6
740	740	14	84	...	..	...	....	5	40	60	300	...	.....	. .	...	.....	.....	7
9455	9455	156	936	85	170	1210	6050	15	120	80	400	....	...	95	475	2	4	

THE CATCH

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in **Nova Scotia**, during

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.
	Pictou County.						
1	West Pictou		5438		20	32	10
2	Pictou Island		2623		8	23	5
3	Pictou Harbour			10	46		64
4	Little Harbour and East Branch St. Mary's River	185	379		8		
5	Merigomish Island	320	363		10		
6	Ponds	60	946		38		
7	Lismore	70			40		
	Totals	635	9749	10	170	55	79
	Rates $	15	18	10	2	6	2
	Values $	9525	175482	100	340	330	158
	Total Value						

*Cwt=100 lb. †Quintal=112 lb.

MARKETED.

a fresh, dried, pickled, canned, etc, State, for the County of **Pictou**, Province of the year 1914-15.

Haddock, dried, quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Herring, used fresh, cwt.	Herring, pickled, brls.	Herring, used as bait, brls.	Mackerel, used fresh, cwt.	Alewives, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Eels, used fresh, cwt.	Oysters, used fresh, brls.	Clams and Quahaugs, used fresh, brls.	Number.
20	.....	33	37	96	2300	117	15	72	2	.... .	95	....	1
3	.....	.. ....	20	100	500	15	.....	....	..	....	.....	....	2
.. ..	.....	13	200	125	50	10	10	238	4	.....	....	2	3
.....	5	.. ....	644	76	40	.....	60	80	2	20	.....	....	4
.....	.....	10	150	20	30	.....	.. . .	820	.....	.....	.. .	....	5
.. . ..	.....	13	300	....	130	.. .	.. ..	.....	2	....	.....	....	6
.....	....	80	200	60	180	14	.....	.....	5	60	. ....	....	7
23	5	149	1551	477	3230	156	85	1210	15	80	95	2	
4.50	1.50	4	2	4.50	1.75	7	2	7	10	5	6	2	
104	7	596	3102	2147	5652	1092	170	8470	150	400	570	4	

.... $208,399

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a the year

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and cusk, cwt.	Hake and cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.
	Antigonish County.		$		$		$		$		$		$	
1	Harbour au Bouche, Linwood and Cape Jack	19	490	2390	14340	146	146	142	142	780	390	25	13	822
2	Tracadie, Bayfield, Monk's Head and South Side Antigonish Harbour	430	4306	1430	8580	149	149	100	100	573	286	....	....	1380
3	North Side Antigonish Harbour Lakevale and South Side Cape George	212	2120	3650	21900	388	388	75	75	770	385	....	....	2059
4	North Side Cape George, Georgeville and Malignant Cove to Knoydart	52	520	2090	12540	171	171	20	20	860	430	....	....	1521
	Totals	743	7430	9560	57360	854	854	337	337	2983	1491	25	13	5782

*Cwt.=100 lb.

SESSIONAL PAPER No. 39

CATCH.

Green State in the County of **Antigonish**, Province of **Nova Scotia**, during 1914–15.

Herring, value.	Mackerel, cwt.	Mackerel, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Bass, cwt.	Bass, value.	Eels, cwt.	Eels, value.	Tom-cod, cwt.	Tom-cod, value.	Mixed fish, cwt.	Mixed fish, value.	Squid, brl.	Squid, value.	Oysters, brl.	Oysters, value.	Number.
$		$		$		$		$		$		$		$		$		$		$	
616	129	516	6	6	24	120	1	10	....	...	5	25	10	10	120	60	40	80	....	. .	1
1025	71	284	....	....	220	1200	1	10	75	375	60	300	6	6	30	15	10	20	415	1660	2
1546	75	300	....	...	250	1250	4	40	...	...	10	50	.. .	...	10	5	.. .	....	....	...	3
1141	483	1932	....	....	...	....	....	....	10	50	...	...	....	....	20	10	.. .	....	....	....	4
4338	758	3032	6	6	494	2570	6	60	85	425	75	375	16	16	180	90	50	100	415	1660	

THE CATCH

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in **Nova Scotia**, during

Number.	Fishing Districts.	Salmon, used fresh and frozen, cwt.*	Lobsters, canned, cases.	Cod, used fresh, cwt.	Cod, shipped green salted, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock, dried qtls.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Herring, used fresh, cwt.
	Antigonish County.											
1	Harbour au Bouche, Linwood and Cape Jack.....	49	1193	146	.....	.....	12	44	.....	259	25	8
2	Tracadie, Bayfield, Monks Head and South Side Antigonish Harbour	430	714	40	.....	32	20	25	.....	170	....	20
3	North Side Antigonish Harbour, Lakevale and South Side Cape George..	212	1823	.....	100	56	21	14	.....	254	....	21
4	North Side Cape George, Georgeville and Malignant Cove to Knoydart..	52	1045	60	.....	31	20	.....	.....	284	....	22
	Totals.....	743	4775	246	100	119	73	83	....	967	25	71
	Rates..... ....$	15	18	2	3	6	2	4.50	.....	4	1	2
	Value.....$	11145	85950	492	300	714	146	374	.....	3868	37	142
	Total Value.....											

*Cwt. = 100 lbs. †Quintal = 112 lbs.

MARKETED.

a fresh, dried, pickled, canned, etc., State, for the County of **Antigonish,** Province of the year 1914–1915,

Herring, pickled, brl.	Herring, used as bait, brl.	Herring, used as fertilizer, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Bass, used fresh, cwt.	Eels, used fresh, cwt.	Tom-cod, used fresh, cwt.	Mixed Fish, used fresh, cwt.	Squid, used as bait, brl.	Oysters, used fresh, brl.	Tongues and Sounds, pickled or dried, cwt.	Fish Oil, gal.	Number.
99	258	.....	30	33	6	24	1	.....	5	10	120	40	.....	2	255	1
119	503	.....	11	20	....	220	1	75	60	6	30	10	415	.....	110	2
124	833	.....	15	20	...	250	4	.....	10	....	10	....	....	2	161	3
106	591	.....	97	127	....	.....	.....	10	.....	....	20	.....	.....	11	300	4
448	2185	.....	153	200	6	494	6	85	75	16	180	50	415	15	826	
4.50	1.75	.....	7	13	5	7	10	10	5	5	1	5	6	5	40c	
2016	3824	.....	1071	2600	30	3458	60	850	375	80	270	250	2490	75	330	

.... $120,947

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Guysboro**, Province of **Nova Scotia**, during the Year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Alewives, cwt.	Alewives, value.	Number.
	Guysboro County.		$		$		$		$		$		$		$		$		$	
1	Ecum Secum	10	100	393	1965	1285	2570	71	106	11	11	135	135	853	853	6	18	.....	.....	1
2	Marie Joseph	.....	.....	738	3690	1129	2258	22	33	48	18	22	22	963	963	6	18	.....	.....	2
3	Liscomb and Spanish Ship Bay	8	80	462	2310	1573	3146	90	135	7	7	96	96	1952	1952	.....	.....	21	21	3
4	Gegoggin	18	180	150	750	690	1380	33	49	.....	.....	9	9	591	591	.....	.....	.....	.....	4
5	St. Mary's Bay and River	148	1480	159	795	292	584	21	31	.....	.....	4	4	500	500	.....	.....	.....	.....	5
6	Wine Harbour	39	390	137	685	198	396	.....	.....	.....	.....	.....	.....	360	360	.....	.....	.....	.....	6
7	Port Hilford	14	140	143	715	493	986	29	43	10	10	10	10	425	425	36	108	.....	.....	7
8	Holland's Harbour & Indian River	8	80	69	345	105	210	.....	.....	.....	.....	.....	.....	353	353	60	180	.....	.....	8
9	Port Beckerton	6	60	398	1990	1017	2034	43	64	22	22	32	32	1910	1910	1517	4551	.....	.....	9
10	Fisherman's Harbour	16	160	242	1210	491	982	40	60	4	4	13	13	1503	1503	985	2955	.....	.....	10
11	Country Harbour	52	520	.....	.....	50	100	.....	.....	.....	.....	.....	.....	66	66	9	27	.....	.....	11
12	Isaac's Harbour	8	80	1573	9816	763	1037	59	78	18	12	57	35	436	501	512	1823	.....	.....	12
13	Drum Head	.....	.....	2033	12686	1416	1925	97	128	40	27	247	151	460	529	2400	8514	.....	.....	13
14	Seal Harbour	.....	.....	.....	.....	1180	1604	181	239	4	3	355	217	454	522	700	2492	.....	.....	14
15	Coddle's Harbour	.....	.....	.....	.....	901	1225	149	197	6	4	195	119	377	431	900	3214	.....	.....	15
16	New Harbour	2	20	.....	.....	1685	2291	1472	1945	60	40	888	542	153	176	700	2492	.....	.....	16
17	Tor Bay	.....	.....	.....	.....	250	304	300	396	5	3	274	167	150	173	80	285	.....	.....	17
18	Larry's River	.....	.....	.....	.....	925	1258	675	891	45	30	396	242	820	943	150	534	.....	.....	18
19	Charlo's Cove	.....	.....	.....	.....	1716	2333	825	1089	769	525	410	250	917	1055	127	452	7	5	19
20	Cole Harbour	4	40	.....	.....	307	417	1050	1386	62	42	110	67	407	468	130	463	15	11	20
21	Port Felix	.....	.....	96	599	1486	2020	572	755	102	68	190	116	1060	1219	470	1673	70	35	21
22	Whitehead	3	30	1215	7582	4430	6024	1300	1716	310	208	675	412	820	943	505	1798	70	49	22
23	Raspberry and Dover	.....	.....	534	3332	738	1003	3400	3509	72	48	98	60	98	113	100	356	.....	.....	23
24	Canso and Canso Tittle	122	1220	2168	13550	27672	37634	70198	93363	3107	1264	1367	831	1497	1622	2172	7732	80	56	24
25	Fox Island Main	2	20	.....	.....	500	680	678	895	25	17	50	31	100	115	175	623	.....	.....	25
26	Half Island Cove	.....	.....	485	3026	1017	1383	3268	4714	326	218	376	229	210	276	293	1043	15	11	26
27	Philip's Harbour	.....	.....	.....	.....	501	681	1272	1679	215	144	365	223	91	105	175	623	.....	.....	27
28	Queensport	25	250	1000	6250	3062	4160	3440	5545	597	401	679	414	760	874	337	1200	.....	.....	28
29	Peas Brook	.....	.....	.....	.....	367	499	180	238	70	47	150	92	109	115	40	142	.....	.....	29
30	Half Way Cove	.....	.....	.....	.....	391	531	370	488	100	67	102	62	765	880	175	623	.....	.....	30

31	Sandy Cove and Cook's Cove	.....	.....	.....	.....	86	116	180	238	45	30	190	116	279	321	100	356	.....	.....	31
32	Guysboro and Manchester	60	600	.....	.....	85	115	50	66	6	4	130	79	56	61	75	267	.....	.....	32
33	Port Shoreham	80	800	.....	.....	103	140	90	119	15	10	140	85	70	81	65	231	.....	.....	33
34	St Francis	.....	.....	.....	.....	225	309	280	370	8	5	50	31	200	230	40	142	10	7	34
35	Oyster Ponds	.....	.....	.....	.....	206	280	80	106	4	3	19	12	220	251	20	71	.....	.....	35
36	Sand Point	.....	.....	.....	.....	73	105	40	53	3	2	18	11	100	115	10	36	8	6	36
37	Middle Melford	.....	.....	.....	.....	32	52	60	79	22	15	91	56	270	311	110	392	.....	.....	37
38	Mulgrave and Auld's Cove	70	700	2068	12925	1000	1300	8978	12120	3	2	19	12	50	58	40	112	.....	.....	38
	Totals	695	6950	14063	84221	58390	83976	99593	132921	6141	3341	7962	4986	20126	21973	13220	15606	276	201	

*Cwt. = 100 lbs.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Guysboro**, Province of **Nova Scotia**, during the Year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Soles, *cwt.	Soles, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Eels, cwt.	Eels, value.	Swordfish, cwt.	Swordfish, value.	Squid, brl.	Squid, value.	Clams, brl.	Clams, value.	Seals, number.	Seals, value.	Number.
	Guysboro County.		$		$		$		$		$		$		$		$		$		$	
1	Ecum Secum			17	85					2	16							14	14	4	4	1
2	Marie Joseph			73	365							30	150	7	14			9	9	2	2	2
3	Liscomb and Spanish Ship Bay			27	135			12	60	1	8							20	20			3
4	Gegoggin	2		10														12	12			4
5	St. Mary's Bay and River			23	115			7	35	4	32	35	175					35	35	2	2	5
6	Wine Harbour									1	8	8	40							1	1	6
7	Port Hilford			7	35			15	75									5	5			7
8	Holland's Harbour & Indian River			2	10					2	16			6	12			10	10	1	1	8
9	Port Beckerton			162	810									12	24							9
10	Fisherman's Harbour													40	80			6	6	2	2	10
11	Country Harbour									2	16											11
12	Isaac's Harbour			4	24					1	8			67	268							12
13	Drum Head			51	306									389	1556							13
14	Seal Harbour			6	36									78	312							14
15	Coddle's Harbour			8	48					1	8	20	40	20	80							15
16	New Harbour			23	138			70	350					188	752							16
17	Tor Bay			10	60									190	760							17
18	Larry's River			20	120					3	24											18
19	Charlo's Cove			50	300							5	10									19
20	Cole Harbour			30	180					5	40	40	80	4	16							20
21	Port Felix			64	384									270	1080							21
22	Whitehead			500	3000					7	56			250	1000							22
23	Raspberry and Dover			30	180									100	400							23
24	Canso and Canso Tittle	342	274	2582	15492									793	3172	400	2000					24
25	Fox Island Maine			2	12									10	40							25
26	Half Island Cove			6	36																	26
27	Philip's Harbour			30	180																	27
28	Queensport			5	30					2	16	4	8			150	750					28
29	Peas Brook																					29
30	Half Way Cove					40	80															30

31 Sandy Cove and Cook's Cove								20	100															31
32 Guysboro and Manchester								49	245	7	56	6	12											32
33 Port Shoreham										1	8													33
34 St. Francis										2	16	2	4											34
35 Oyster Ponds												3	6											35
36 Sand Point																								36
37 Middle Melford												1	2					200	1000					37
38 Mulgrave and Auld's Cove										2	16	2	4											38
Totals	342	272	3734	22091	40	80	173	865	43	344	156	551	2424	9566	750	3750	111	111	12	12				

* Cwt. = 100 lbs.

THE CATCH

RETURN showing the Quantities and Values of all Fish and Fish the County of **Guysboro**, Province of

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Salmon, canned, cases.	Salmon, smoked, cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †qtl.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, qtls.	Hake and Cusk, dried, qtl.	Pollock, dried, qtl.
	Guysboro County.													
1	Ecum Secum	10				393			428			24	4	45
2	Marie Joseph					631			376			7	16	7
3	Liscomb and Spanish Ship Bay	8			362	66			524			30	2	32
4	Gegoggin	18				30			230			11		3
5	St. Mary's Bay and River	111	24	10		58			97			7		1
6	Wine Harbour	39				137			66					
7	Port Hilford	14				143			164			10	3	3
8	Hollands Harbour and Indian River	8				69			35					
9	Port Beckerton	6				398			339			14	7	11
10	Fisherman's Harbour	16				242			164			13	1	4
11	Country Harbour	52							17					
12	Isaac's Harbour	8			488	497		243	92			20	6	19
13	Drum Head				633	767		236	371			32	13	82
14	Seal Harbour							295	196			60	1	118
15	Coddle's Harbour							150	199			50	2	65
16	New Harbour	2						421	271			490	20	296
17	Tor Bay							42	56			100	2	91
18	Larry's River							231	154			225	15	132
19	Charlo's Cove							286	380			275	256	137
20	Cole Harbour	4						76	49			350	21	37
21	Port Felix				48		75	352	239			191	34	63
22	Whitehead	3			500	215	658	943	628	356		317	105	225
23	Raspberry and Dover				162	210		123	164	1,000		800	24	32
24	Canso & Canso Tittle	122			1,084		5,606	2,758	5,516	27,300	3,008	12,293	1036	455
25	Fox Island Main	2						125	83			226	8	17
26	Half Island Cove				232	21	872	24	32	2,473		265	109	125
27	Philip's Harbour							50	133			424	72	122
28	Queensport	25			475	30	1,539	253	339	1,496		648	199	226
29	Peas Brook							61	81			60	23	50
30	Halfway Cove							50	97			123	34	34
31	Sandy Cove and Cook's Cove							20	15			60	15	63
32	Guysboro and Manchester	60						15	18			17	2	44
33	Port Shoreham	80						25	18			30	5	47
34	St. Francis							22	64			93	3	17
35	Oyster Ponds							10	62			26	1	6
36	Sand Point							9	18			13	1	6
37	Middle Melford							8	5			21	7	30
38	Mulgrave and Auld's Cove	70			1,03 1		989	2	2	8,405	276	7	1	6
	Totals	658	24	10	5,015	3,907	9,739	6,830	11,722	41030	3,284	17,332	2046	2,651
	Rates	15	8	20	18	10	2	3	6	2	6	4 50	4	4
	Values	9870	192	200	90270	39070	19478	20490	70332	82060	19704	77994	8184	10,604

*Cwt. = 100 lbs. †Quintal = 112 lbs

MARKETED.

Products Marketed in a fresh, dried, pickled, canned, etc., State for **Nova Scotia**, during the year 1914-15.

Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Eels, used fresh, cwt.	Swordfish, used fresh, cwt.	Clams and Quahaugs, used fresh, brl.	Clams, and Quahaugs, canned, case.	Soles, used fresh, cwt.	Flounders, used fresh, cwt.	Squid, used as bait, brl.	Hair Seal skins, No.	Fish oil, gals.	Number.
244	60	.....	2	....	17	....	2	....	.....	14	....	....	....	....	4	200	1
288	50	....	2	....	73	....	..	30	7	9	....	....	....	....	2	230	2
543	162	.. ...	.....	7	27	12	1	....	.....	20	.....	...	....	...	.....	310	3
181	24	....	.....	....	2	....	...	...	.....	12	.....	....	....	...	.....	110	4
148	28	....	.....	...	23	7	4	35	.....	.....	35	....	....	...	2	90	5
105	22	....	.....	....	.....	....	1	8	.....	.....	.....	....	....	...	1	40	6
106	54	.....	12	....	7	15	...	...	.....	5	.....	....	....	....	.....	80	7
92	38	.....	20	....	2	...	2	...	6	10	.....	....	....	....	1	30	8
471	248	.....	506	....	162	....	...	....	12	.....	.....	....	....	....	.....	220	9
272	344	.....	328	....	... .	....	...	....	40	6	.....	....	....	....	2	160	10
22	.....	.....	3	....	.....	....	2	....	.....	.....	.....	....	.	...	.....	.....	11
73	109	..	170	....	4	....	1	....	67	...	.....	....	..	...	.....	175	12
77	115	672	576	....	51	....	...	....	389	.....	.....	....	..	....	.....	208	13
76	113	....	233	....	6	....	...	....	78	...	.....	....	..	....	.....	100	14
47	118	... ..	300	....	8	....	1	20	20	.....	.....	....	....	....	.	126	15
25	38	....	233	....	23	70	...	....	188	.....	.....	...	....	...	.....	560	16
25	37	.....	27	....	10	....	...	..	190	....	.....	....	....	....	.....	203	17
137	205	.....	50	....	20	...	3	....	.....	.....	.....	....	....	....	.....	300	18
153	229	.....	42	2	50	....	....	5	.....	...	.....	..	...	....	.....	720	19
68	102	.....	43	5	30	...	5	40	4	..	.....	....	....	....	.....	59	20
100	380	.....	157	17	64	....	...	...	270	.....	.....	....	....	....	. . .	604	21
137	205	505	.....	23	500	....	7	...	250	.....	.....	....	....	....	.....	502	22
16	24	.....	33	....	30	....	...	....	100	.....	.....	....	....	....	.....	50	23
441	87	....	....	27	2,582	....	....	....	793	.....	.. ...	342	....	400	.....	1,572	24
17	25	2,172	58	....	2	....	....	....	....	.....	.....	....	....	....	.....	70	25
40	60	.....	98	5	6	....	....	....	10	.....	.....	....	40	....	.....	350	26
15	22	.....	58	....	30	....	....	....	.....	.....	.....	....	....	....	.....	115	27
. ....	380	. ....	. ...	....	5	....	2	4	.....	.....	.....	....	....	150	.....	540	28
17	25	337	13	...	.....	....	....	....	....	....	.....	....	....	....	.....	150	29
127	192	.....	58	....	.. .	....	....	....	.....	.....	.....	....	....	...	.....	200	30
46	69	.....	33	....	.....	20	....	....	.....	.....	.....	..	....	....	.....	150	31
9	14	.....	25	....	.. .	49	7	6	.....	.....	.....	....	....	....	.....	65	32
12	17	.....	21	...	. ....	....	1	...	.....	.....	.....	....	....	....	.....	42	33
17	75	.....	13	3	.....	....	2	2	.....	.....	.....	..	....	....	.....	80	34
36	55	.....	7	....	.....	....	..	3	.....	.....	.....	....	....	....	.....	56	35
17	25	.....	3	2	.....	....	....	.	...	....	.....	....	..	....	....	30	36
41	69	.....	37	...	.....	.	....	1	...	.....	.....	....	...	200	.....	5	37
5	12	....	13	..	.....	....	2	2	.....	.....	.....	....	....	....	.....	4	38
4,246	3,332	3,686	3,174	91	3,734	173	43	156	2,424	76	35	342	40	750	12	8,506	
4 50	1 75	7	13	4	10	7	10	5	4	2	4 50	5	5	3	1 25	40c.	
19,107	6,706	25802	41,262	364	37,340	1211	430	780	9,696	152	157	1710	200	3750	15	3,402	

Total Value..... ....,.....$660,532.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught in a Green State in the County of **Halifax**, Province of **Nova Scotia**, during the year 1914-15,

Number.	Fishing Districts.	Salmon, cwt.*	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and cusk, cwt.	Hake and cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Shad, cwt.	Shad, value.	Number.
	Halifax County.		$		$		$		$		$		$		$		$		$	
1	North Shore	12	120	100	1100	975	1950	500	1000			225	450	300	600	1500	9000			1
2	East St. Margarets	59	590	300	3300	3255	6510	3000	6000	350	525	425	850	600	1200	2000	12000			2
3	Indian Harbour	48	480	350	3850	5400	10800	4500	9000	1500	2250	675	1350	900	1800	3500	21000			3
4	Peggys Cove	34	340	150	1650	1200	2400	700	1400	75	113	250	500	400	800	1000	6000			4
5	Dover	100	1000	500	5500	5600	11200	4340	8680	1500	2250	615	1230	1500	3000	3040	18240			5
6	Prospect	90	900	315	3465	3300	6600	2500	5000	200	300	675	1350	800	1600	1400	8400			6
7	Terrence Bay	9	90	400	4400	5000	10000	4000	8000	1600	2400	575	1150	1450	2950	1500	9000			7
8	Pennant	30	300	175	1925	3300	6600	2900	5800	400	600	340	680	700	1400	200	1200			8
9	Sambro	28	280	200	2200	3600	7200	2500	5000	350	525	440	880	700	1400	600	3600			9
10	Ketch Harbour	15	150	150	1650	2625	5250	1300	2600	500	750	430	860	800	1600	1000	6000			10
11	Portuguese Cove	65	650	200	2200	500	1000	500	1000	50	75	295	590	1100	2200	1100	6600			11
12	Herring Cove	75	750	250	2750	4500	9000	3500	7000	1650	2475	580	1160	2000	4000	2500	15000			12
13	Ferguson's Cove	2	20	10	110	200	400	100	200			10	20	105	210	10	60			13
14	Bedford and Grand Lake	5	50	10	110	25	50	5	10			8	16	25	50	5	30	60	360	14
15	Halifax	2	20	6	66	25	50	5	10			7	14	50	100	5	30			15
16	Dartmouth, Eastern Passage and Devils Island			1236	8652	2743	4115	1400	2100			255	255	2507	2507	314	2198			16
17	Cow Bay and Lawrencetown	11	132	600	4200	140	210	18	27			18	18	700	700	4	28			17
18	Seaforth and Three Fathom Harb.	6	72			2815	4223	109	164			126	126	1830	1830	28	196			18
19	West Chezzetcook					6828	10243	279	279			273	273	5075	5075	60	420			19
20	East Chezzetcook					267	401	53	80			72	72	1106	1106					20
21	Petpeswick Harbour					1979	2969	233	400			310	310	1430	1430	16	112			21
22	Musquodoboit Harbour	74	888			3040	4560	538	807			909	909	2911	2911	20	140			22
23	Jeddore	2	24	1678	8390	5690	8535	448	672	156	156	1263	1263	8145	8145	56	392			23
24	Clam Harbour and Owls Head	7	84	1135	5675	1745	2518	96	144	126	126	91	91	6000	6000	38	266			24
25	West Ship Harbour	2	26			604	906	40	60			36	36	1400	1400	10	70			25
26	East Ship Harbour			52	364	1010	1515	52	52			96	96	2401	2401	56	280			26
27	Pleasant Harbour and Tangier	15	150	100	700	1472	2208	373	373			750	750	3155	3155	65	325			27
28	Pope's Harbr. and Gerrard's Island			310	2170	2205	3307	134	134			93	93	4554	1554	103	515			28
29	Spry Bay, Taylor's Head and Musquodoboom	20	200	150	1050	2903	4354	390	390	30	30	453	453	11501	11501	200	1000			29

30	Sheet Harbour and Sober Island..	110	1100	100	700	1930	2895	71	71	117	117	120	120	5000	5000	80	400	....	...	30
31	Beaver Harbr. and Port Dufferin.	15	150	1266	8862	452	678	61	61	. .	.... .	84	84	420	420	.....	....	....	....	31
32	Quoddy and Harrigan Cove. . .	20	200	818	5726	1127	1690	25	25	9	9	30	30	620	620	10	50	....	....	32
33	Moser River and Smith's Cove....	20	200	50	350	239	358	....	.	.....	....	12	12	450	450	.... .	....	....	....	33
34	Mitchell Bay and Ecum Secum....	......	.....	1512	10584	760	1140	75	75	. .	......	102	102	1627	1627	......	....	....	....	34
	Totals....................	876	8964	12123	91699	77454	135834	34745	66614	8613	12701	10643	16193	72262	83742	20420	122552	60	360	

*Cwt. =100 lbs.

RETURN showing the Quantities and Values of all Fish caught in a Green State in the County of **Halifax**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Albacore, cwt.	Albacore, value.	Eels, cwt.	Eels, value.	Swordfish, cwt.	Swordfish, value.	Mixed fish, cwt.	Mixed fish, value.	Squid, brls.	Squid, value.	Oysters, brls.	Oysters, value.	Clams, brls.	Clams, value.	Number.
	Halifax County.		$		$		$		$		$		$		$		$		$		$		$		$	
1	North Shore	12	24	.....	.....	325	163	.....	.....	30	240	80	160	120	360	10	40	40	20	40	80	.....	.....	60	120	1
2	East St. Margarets	18	36	834	5838	300	150	25	175	25	200	170	340	90	270	12	48	60	30	50	100	.....	.....	75	150	2
3	Indian Harbour	15	30	1200	8400	100	50	.....	.....	5	40	120	240	20	60	25	100	20	10	50	100	.....	.....	45	90	3
4	Peggys Cove	6	12	50	350	75	38	.....	.....	1	8	40	80	9	27	16	64	12	6	30	60	.....	.....	15	30	4
5	Dover	40	80	1500	10500	400	200	.....	.....	22	176	60	120	90	270	10	40	60	30	50	100	.....	.....	80	160	5
6	Prospect	6	12	700	4900	200	100	.....	.....	18	144	110	220	30	90	45	180	40	20	25	50	.....	.....	60	120	6
7	Terrence Bay	21	42	1000	7000	160	80	.....	.....	21	168	90	180	60	180	7	28	20	10	57	114	.....	.....	60	120	7
8	Pennant	60	120	1300	9100	40	20	.....	.....	8	64	20	40	9	27	3	12	30	15	20	40	.....	.....	30	60	8
9	Sambro	6	12	650	4550	30	15	.....	.....	7	56	75	150	6	18	15	60	10	5	12	24	.....	.....	20	40	9
10	Ketch Harbour	60	120	400	2800	20	10	.....	.....	3	24	20	40	6	18	9	36	20	10	10	20	.....	.....	15	30	10
11	Portuguese Cove	21	42	20	146	35	18	.....	.....	4	32	30	60	9	27	10	40	16	8	12	24	.....	.....	27	54	11
12	Herring Cove	18	36	1000	7000	40	20	.....	.....	8	64	120	240	6	18	40	160	20	10	25	50	.....	.....	22	44	12
13	Fergusons Cove	6	12	....	.....	15	8	.....	.....	2	16	15	30	6	18	..	.....	.....	.....	1	2	.....	.....	8	16	13
14	Bedford and Grand Lake	86	172	.....	.....	10	5	.....	.....	31	248	.....	.....	60	180	.....	.....	.....	.....	1	2	.....	.....	35	70	14
15	Halifax	....	....	.....	.....	10	5	.....	.....	1	8	....	....	5	15	.....	.....	.....	.....	2	4	.....	.....	3	6	15
16	Dartmouth, Eastern Passage and Devils Island	8	8	293	1465	20	20	.....	.....	.....	.....	.....	.....	4	8	32	128	....	.....	.....	.....	.....	.....	70	70	16
17	Cow Bay and Lawrencetown	4	4	1	5	18	18	5	20	2	18	.....	.....	2	4	.....	.....	.....	.....	.....	.....	.....	.....	40	40	17
18	Seaforth and Three Fathom Harb.	8	8	10	50	22	22	45	180	3	27	.....	.....	4	8	.....	.....	.....	.....	.....	.....	.....	.....	200	200	18
19	West Chezetcook	....	....	24	120	21	21	34	136	2	18	.....	.....	4	8	.....	.....	.....	.....	.....	.....	.....	.....	1900	1900	19
20	East Chezetcook	....	...	3	15	17	17	14	56	5	45	.....	.....	8	16	.....	.....	.....	.....	.....	.....	.....	.....	1500	1500	20
21	Petpeswick Harbour	10	10	27	135	20	20	2	8	4	36	.....	.....	9	18	7	28	.....	.....	.....	.....	.....	.....	1000	1000	21
22	Musquodoboit Harbour	....	....	31	155	22	22	135	540	11	99	1	3	10	20	.	.....	.....	.....	.....	.....	8	24	1200	1200	22
23	Jeddore	2	2	75	375	20	20	3	12	3	27	10	30	7	11	....	.....	.....	.....	.....	.....	.....	.....	50	50	23
24	Clam Harbour and Owls Head	6	6	21	120	20	20	5	20	4	36	18	54	5	10	5	20	....	.....	.....	.....	.....	.....	1850	1850	24
25	West Ship Harbour	10	10	15	75	13	13	4	16	6	54	4	12	5	10	..	.....	.....	.....	.....	.....	.....	.....	25	25	25
26	East Ship Harbour	....	....	19	95	....	....	....	....	3	18	.....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	9	27	26
27	Pleasant Harbour and Tangier	....	...	35	175	...	....	....	....	6	36	.....	.....	8	24	...	.....	.....	.....	.....	.....	.....	.....	10	30	27
28	Pope's Harbour & Gerrard's Island	....	....	11	55	...	....	....	....	2	12	....	....	...	....	.....	.....	.....	.....	.....	.....	.....	.....	5	15	28
29	Spry Bay, Taylors Head & Musha-boom	....	....	29	145	....	....	....	....	10	60	...	...	7	21	.....	.....	....	.....	.....	.....	.....	.....	10	30	29

30 Sheet Harbour and Sober Island..	....	....	105	525	....	....	17	102	15	90	....	....	10	30	....	....	....	....	....	....	....	....	5	15	30
31 Beaver Harbr. and Port Dufferin.	....	....	10	50	....	....	....	....	7	42	....	....	15	45	....	....	....	....	....	....	....	....	3	9	31
32 Quoddy and Harrigan Cove......	....	....	10	50	....	....	19	114	12	72	....	....	....	....	....	....	....	....	....	....	....	....	2	6	32
33 Moser River and Smith's Cove...	....	....	5	25	....	....	....	....	8	48	....	....	....	....	....	....	....	....	....	....	....	....	2	6	33
34 Bay Mitchell and Ecum Secum...	....	....	22	110	....	....	12	72	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	9	34
Totals..................	423	798	9403	64323	1953	1075	320	1451	289	2226	983	1999	624	1811	246	984	348	174	385	770	8	24	8139	9992	

Cwt.=100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State for the County of **Halifax**, Province of **Nova Scotia**, during the year 1914–15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, * cwts.	Salmon, smoked, cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, dried, † quintals.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Pollock, dried, quintals.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, brl.	Herring used as bait, brl.	Number.
	Halifax County.																		
1	North Shore	12			80	230	248	500						75	50		67	25	1
2	East St. Margarets	59			225	500	918	800	25	717		117		142	100		100	100	2
3	Indian Harbour	48			260	500	1634	1200	25	1083		500		225	50		150	200	3
4	Peggy's Cove	34			135	'00	367	600		34		25		83	20		110	25	4
5	Dover	100			400	400	1733	900	10	1140		500		205	15		378	175	5
6	Prospect	90			215	400	967	693	10	596		67		225	40		187	100	6
7	Terrence Bay	9		50	300	200	1600	600	8	1128		533		192	50		333	200	7
8	Pennant	30			135	400	967	500	5	797		134		113	20		127	150	8
9	Sambro	28		294	152	800	933	500	3	665		117		146	25		125	150	9
10	Ketch Harbour	15			115	300	775	300	293	138		167		144	25		152	160	10
11	Portuguese Cove	65			165	300	67	300	6	63		17		99	25		258	150	11
12	Herring Cove	75			220	500	1333	1000	10	423		550		193	25		525	200	12
13	Ferguson's Cove	2			10	20	60	10		30				3	15		30		13
14	Bedford and Grand Lake	5			10	25		5						3	25				14
15	Halifax	2			6	25		2	605					2	25		8		15
16	Dartmouth, Eastern Passage and Devil's Island				1236	700	681	800		200			20	77	40		389	650	16
17	Cow Bay and Lawrencetown	11			600	8	44	6		4				6	3		225	10	17
18	Seaforth and Three Fathom Harbour	6				10	935	7		34				42	10		566	60	18
19	West Chezzetcook					12	2272	12		89				91	10		1555	200	19
20	East Chezzetcook					3	88	2		17				24	4		354	22	20
21	Petpeswick Harbour					50	643	35		66				103	8		425	72	21
22	Musquodoboit Harbour	74				13	1069	13		175				303	5		927	65	22
23	Jeddore	2		470	738	20	1890	16		144		52		421	7		2620	137	23
24	Clam Harbour and Owl's Head	7		346	443	5	580	6		39		42	1	30	7		1800	300	24
25	West Ship Harbour	5				4	200	4		12				12	4		450	22	25
26	East Ship Harbour				52	5	335	1		17				32	3		786	20	26
27	Pleasant Harbour and Tangier	15			100	8	488	4		123				250	5		1035	25	27
28	Pope's Harbour and Gerrard's Island			95	120	9	732	2		44				31	4		1500	25	28

29	Spry Bay, Taylor's Head and Mushaboom	20	.....	.....	150	20	961	6	.....	128	.....	10	....	151	5	... .	3822	15	29
30	Sheet Harbour and Sober Island	55	32	.....	100	7	641	2	.....	23	.....	39	.....	40	5	.....	1649	20	30
31	Beaver Harbour and Port Dufferin	15	.....	519	228	2	150	1	. .	20	.. .	.. .	.....	28	2	.....	136	5	31
32	Quoddy and Harrigan Cove	20	....	209	400	2	375	1	.....	8	.....	3	... .	10	1	.....	203	5	32
33	Moser River and Smith's Cove	10	6	.....	50	2	79	.....	.....	.....	.....	....	....	4	1	.....	147	4	33
34	Mitchell's Bay and Ecum Secum	.....	.....	556	400	3	251	2	.....	24	.....	.....	.....	34	3	....	536	8	34
	Total	814	38	2539	7045	5583	23956	8830	1000	7972	... ..	2873	21	3539	637	.....	21675	3300	
	Rates ... . $	15	20	18	10	2	6	2	6	4.50	.	4	1.50	4	2	.....	4 50	1.75	
	Values ..... $	12210	760	45702	70450	11166	143736	17660	6000	35874	.....	11492	32	14156	1274	.....	97537	5775	

* Cwt. = 100 lb. † Quintal = 112 lb.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products, Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Halifax**, Province of **Nova Scotia**, during the year 1914–15—*Concluded.*

Number.	Fishing Districts.	Mackerel, used fresh, cwt.	Mackerel, salted, cwt.	Shad, used fresh, cwt.	Alewives, used fresh, cwt.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Albacore, used fresh, cwt.	Eels, used fresh, cwt.	Sword Fish, used fresh, cwt.	Mixed Fish, used fresh, cwt.	Squid, used as bait, brl.	Oysters, used fresh, brl.	Clams and Quahaugs, used fresh, brl.	Clams and Quahaugs, canned, cases.	Tongues and Sounds, pickled or dried, cwt.	Fish Oil, gal.	Number.
	Halifax County.																			
1	North Shore	1410	30	.....	12	.....	325	....	30	80	120	10	40	40	.....	60	....	7	540	1
2	East St. Margarets	1865	45	.....	18	834	300	25	25	170	90	12	60	50	.....	75	.....	20	2200	2
3	Indian Harbour	3350	50	.....	15	1200	100	.....	5	120	20	25	20	50	.....	45	.....	20	4025	3
4	Peggy's Cove	955	15	.....	6	50	75	.....	1	40	9	16	12	30	.....	15	.....	5	775	4
5	Dover	2815	75	....	40	1500	400	.....	22	60	90	10	60	50	....	80	.....	30	4018	5
6	Prospect	1250	50	.....	6	700	200	....	18	110	30	45	40	25	.....	60	.....	15	2225	6
7	Terrence Bay	1320	60	..	21	1000	160	...	21	90	60	7	20	57	.....	60	.....	30	3725	7
8	Pennant	170	10	....	60	1300	40	.....	8	20	9	3	30	20	...	30	.....	5	2313	8
9	Sambro	555	15	.....	6	650	30	...	7	75	6	15	10	12	...	20	.....	4	2296	9
10	Ketch Harbour	925	25	.....	60	400	20	....	3	20	6	9	20	10	.....	15	....	3	1618	10
11	Portuguese Cove	1085	5	.....	21	20	35	.....	4	30	9	10	16	12	.....	27	....	5	448	11
12	Herring Cove	2140	20	.....	18	1000	40	.....	8	120	6	40	20	25	.....	22	...	16	3410	12
13	Ferguson's Cove	10	.....	.....	6	...	15	.....	2	15	6	.....	.....	1	.....	8	.....	.....	.....	13
14	Bedford and Grand Lake	5	.....	60	86	...	10	.....	31	.. .	60	.....	.....	1	.....	35	.....	.....	.....	14
15	Halifax	5	.....	.....	.....	.....	10	.....	1	.....	5	.....	.....	2	.....	3	.....	.....	.....	15
16	Dartmouth, Eastern Passage and Devil's Island	14	100	.....	8	293	20	.....	.....	.....	4	32	....	....	.....	70	....	.....	1066	16
17	Cow Bay and Lawrencetown	1	1	....	4	1	18	5	2	.....	2	.....	.....	.....	.....	40	.....	.....	55	17
18	Seaforth and Three Fathom Harbour	4	8	.....	8	10	22	45	3	.....	4	.....	.....	.....	.....	200	....	.....	705	18
19	West Chezzetcook	6	18	.....	.....	24	21	31	2	.....	4	....	.....	.....	.....	1900	.....	.....	2000	19
20	East Chezzetcook	.....	.....	.....	.....	3	17	14	5	.....	8	.....	.....	.....	.....	1500	.....	.....	60	20
21	Petpeswick Harbour	7	3	.....	10	27	22	2	4	....	9	7	.....	....	.....	1000	.....	.....	770	21
22	Musquodoboit Harbour	2	6	.....	.....	31	20	135	11	1	10	.....	.....	..	8	1200	.....	.....	1220	22
23	Jeddore	6	16	....	2	75	20	3	3	10	7	...	.....	.....	.....	50	.....	.....	1900	23
24	Clam Harbour and Owl's Head	2	12	.....	6	24	20	5	4	18	5	5	...	.....	.....	1790	60	.....	508	24
25	West Ship Harbour	4	2	.....	10	15	13	4	6	4	5	....	.....	.....	...	25	.....	.....	116	25
26	East Ship Harbour	2	18	.....	.....	19	.....	.....	3	.....	.....	.....	.....	.....	.....	9	.....	4	250	26
27	Pleasant Harbour and Tangier	2	21	.....	....	35	.....	....	6	.....	8	.....	.....	.....	.....	10	.....	8	682	27
28	Pope's Harbour and Gerrard's Island	1	14	.....	.....	11	.....	.....	2	.....	.....	.....	.....	..	.....	5	.....	7	700	28

29	Spry Bay, Taylor's Head and Mushaboom	2	66			29			10		7					5		10	840	29
30	Sheet Harbour and Sober Island	2	26			105		17	15		10					10		6	318	30
31	Beaver Harbour and Port Dufferin					10			7							3			123	31
32	Quoddy and Harrigan Cove	1	3			10		19	12		15					2			200	32
33	Moser River and Smith's Cove					5			8							2			25	33
34	Mitchell's Bay and Ecum Secum					22		12								3			125	34
	Totals	18216	714	60	423	9403	1953	320	289	983	624	246	348	385	8	8379	60	195	39256	
	Rates $	7	13	10	2	10	5	7	10	2.50	5	4	1 50	5	6	2	4 50	5	46c	
	Values $	127512	9282	600	846	94030	9765	2240	2890	2457	3120	984	522	1925	48	16758	270	975	15702	

Total value $763,750

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in the County of **Hants**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Cod, cwt.	Cod, value.	Herring, cwt.	Herring, value.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Trout, cwt.	Trout, value.	Bass, cwt.	Bass, value.	Clams, brl.	Clams, value.	Number.
	Hants County.																	
1	Hantsport to Tennycape	10	120	42	84	10	15	14	112	455	569	20	160	....	....	24	36	1
2	Tennycape to Maitland	8	96	5	10	4	6	5	40	....	....	4	32	....	....	6	10	2
3	Maitland to Shubenacadie	10	120	..	..	..	..	6	48	285	427	3	24	3	15	..	....	3
4	Shubenacadie to Grand Lake	5	60	..	..	..	..	9	72	225	337	4	32	6	30	..	....	4
	Totals	33	396	47	94	14	21	34	272	965	1333	31	248	8	45	30	46	

Cwt. = 100 lb.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Hants**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Cod, used fresh, cwt.	Herring, used fresh, cwt.	Shad, used fresh, cwt.	Alewives, used fresh, cwt.	Trout, used fresh, cwt.	Bass, used fresh, cwt.	Clams and Quahaugs, used fresh, bbl.	Number.
	Hants County.									
1	Hantsport to Tennycape	10	42	10	14	455	20	....	24	1
2	Tennycape to Maitland	8	5	4	5	..	4	....	6	2
3	Maitland to Shubenacadie	10	....	..	6	285	3	3	....	3
4	Shubenacadie to Grand Lake	5	....	.....	9	225	4	6	....	4
	Totals	33	47	14	34	965	31	9	30	
	Rates $	15	2	2	10	2	10	10	2	
	Values $	495	94	28	340	1930	310	90	60	

Total value $3,347

*Cwt. = 100 lb. †Quintal = 112 lb.

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried pickled, canned, etc., State, for **District No. 2**, Province of **Nova Scotia**, during the year 1914-15.

Kinds of Fish.	Caught and Landed in a Green State.		Marketed.		Total Marketed Value.
	Quantity.	Value.	Quantity.	Value.	
		$		$	$
Salmon ..... cwts.	3,053	30,942	.....	.....	
" used fresh ..... "	.....	.....	2,954	44,310	
" canned ..... cases	.....	.....	24	192	
" smoked ..... cwts.	.....	.....	48	960	
					45,462
Lobsters ..... "	75,073	429,915	.....	.....	
" canned ..... cases	.....	.....	31,723	571,014	
" shipped in shell ..... cwts.	.....	.....	11,492	114,920	
					685,934
Cod ..... "	139,208	225,572	.....	.....	
" used fresh ..... "	.....	.....	16,650	33,300	
" green, salted ..... "	.....	.....	7,253	21,759	
" dried ..... "	.....	.....	36,058	216,348	
					271,407
Haddock ..... "	135,368	200,775	.....	.....	
" used fresh ..... "	.....	.....	50,117	100,234	
" smoked (finnans) ..... "	.....	.....	4,294	25,764	
" dried ..... "	.....	.....	25,550	114,976	
					240,974
Hake ..... "	18,303	18,210	.....	.....	
" used fresh ..... "	.....	.....	5	7	
" dried ..... "	.....	.....	6,072	24,288	
					24,295
Pollock ..... "	22,157	24,719	.....	.....	
" used fresh ..... "	.....	.....	404	606	
" dried ..... "	.....	.....	7,243	28,972	
					29,578
Herring ..... "	136,659	130,432	.....	.....	
" used fresh ..... "	.....	.....	4,964	9,928	
" smoked ..... "	.....	.....	10,251	30,753	
" pickled ..... brls.	.....	.....	27,349	123,070	
" used as bait ..... "	.....	.....	13,332	24,206	
" used as fertilizer ..... "	.....	.....	700	350	
					188,307
Mackerel ..... cwts.	34,557	172,147	.....	.....	
" used fresh ..... "	.....	.....	22,214	155,498	
" salted ..... brls.	.....	.....	4,088	53,144	
					208,642
Shad ..... cwts.	306	2,229	.....	.....	
" used fresh ..... "	.....	.....	291	2,910	
" salted ..... brls.	.....	.....	5	75	
					2,985
Alewives ..... cwts.	3,571	5,050	.....	.....	
" used fresh ..... "	.....	.....	2,103	4,206	
" salted ..... brls	.....	.....	491	1,964	
					6,170
Halibut, used fresh ..... cwts.	13,199	86,910	13,199	.....	131,990
Flounders ..... "	2,013	1,231	2,013	.....	10,065
Smelts ..... "	3,385	16,856	3,385	.....	23,695
Trout ..... "	400	3,126	400	.....	4,000
Albacore ..... "	983	1,999	983	.....	2,457
Soles ..... "	342	274	342	.....	1,710
Bass ..... "	99	496	99	.....	990
Eels ..... "	935	3,120	935	.....	4,675
Tom-cod ..... "	16	16	16	.....	80
Swordfish ..... "	2,670	10,550	2,670	.....	10,680
Mixed Fish ..... "	528	264	528	.....	792

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products marketed in a fresh, dried pickled, canned, etc., State, for **District No. 2**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded.*

Kinds of Fish.	Caught and Landed in a Green State.		Marketed.		Total Marketed Value.
	Quantity.	Value.	Quantity.	Value.	
		$		$	$
Squid ..... brls.	1,185	4,620	1,185	.....	5,925
Oysters ..... "	1,113	5,009	1,113	.....	6,678
Clams ..... "	8,582	9,253			
" canned ..... cases.	.....	.....	8,487	16,974	.....
" used fresh	.....	.....	95	427	
					17,401
Tongues and Sounds ..... cwt.	.....	.....	210	.....	1,050
Hair Seal Skins ..... No.	.....	.....	12	.....	15
Fish Oil ..... galls.	.....	.....	48,588	.....	19,434
Totals	.....	1,383,715	.....	.....	1,945,391

RECAPITULATION.

Of the number of Fishermen, etc., and of the number and Value of all Fishing Vessels Boats, Nets, etc., in **District No. 2**, Province of **Nova Scotia**, for the year 1914-15.

	Number.	Value.
		$
Sailing and Gasoline Vessels	138	111,500
Boats (sail)	3,866	149,750
" (gasoline)	1,192	234,725
Carrying Smacks	81	45,630
Gill Nets, Seines, Trap and Smelt Nets, etc.	34,416	317,338
Weirs	21	1,410
Trawls	4,399	53,749
Hand Lines	9,045	6,582
Lobster traps	309,622	254,474
" Canneries	91	137,175
Clam "	1	100
Freezers and Ice-houses	122	197,080
Smoke and Fish-houses	1,793	234,976
Fishing Piers and Wharves	829	220,140
Total value	.....	1,964,629

Number of men employed on Vessels	654
" " Boats	4,785
" " Carrying Smacks	133
" Persons employed in Fish-houses, Freezers, Canneries, etc.	2,128
Total persons employed	7,700

DISTRICT No. 3.

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, &c., used in the Fishing Industry, in the County of **Lunenburg**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.														Fishing Gear.		
		Sailing and Gasoline Vessels.						Boats.					Carrying Smacks.			Gill Nets, Seines, Trap and Smelt Nets, &c.		
		(40 tons and over.) Number.	(20 to 40 tons). Number.	(10 to 20 tons). Number.	Value.	Men.		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.	Number.
	Lunenburg County.				$				$		$			$			$	
1	Fox Point							100	2200	5	1200	54				157	5000	1
2	Mill Cove			1	600	4		120	3000	4	800	55				175	3800	2
3	Lodge and N. W. Cove			1	600	2		60	1500	5	1000	35				130	3900	3
4	Aspotogan							30	1000	5	1500	14				95	3700	4
5	Bayswater, Blandford and Deep Cove		2	15	11500	49		165	4500	15	4000	66				360	7500	5
6	Chester Bay			3	1500	6		75	2000	8	2000	32				150	5000	6
7	Mahone and Martin's River	10		12	50000	171		120	3000	10	3000	32				160	2300	7
8	Tancooks		1	17	10000	59		250	18000	50	15000	110				800	14000	8
9	Lunenburg Harbour to Kingsbury	77		26	896280	1685		115	4370	27	13500	193	1	230	2	828	18880	9
10	LaHave River and Islands	34	2	8	390840	709		136	5168	9	4500	175	1	230	2	1156	11000	10
11	Petite Rivière to Vogler's Cove							78	2964			109	1	230	1	680	6440	11
	Totals	121	5	83	1361320	2685		1249	47702	138	46500	875	3	690	5	4691	81520	

RETURN showing the Number of Fishermen, etc,, the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry, in the County of **Lunenburg,** Province of **Nova Scotia,** during the year 1914–15.

Number.	Fishing Districts.	Fishing Gear.						Canneries.		Other Material.						Persons employed in Canneries, Freezers, and Fish-houses.	Number.
		Trawls.		Hand Lines		Lobster Traps.		Lobster Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Lunenburg County.		$		$		$		$		$		$		$		
1	Fox Point	50	750	100	50	1000	1000			1	200	15	1000	5	500		1
2	Mill Cove	60	1000	100	50	1000	1000					18	720	5	500		2
3	Lodge and N. W. Cove	35	500	75	35	1500	1500					20	800	15	600		3
4	Aspotogan	5	75	40	20	2000	2000	1	600			8	400	7	350	20	4
5	Bayswater, Blandford and Deep Cove	50	1200	300	150	3500	3500			1	100	65	2150	25	1200		5
6	Chester	3	90	25	12	1500	1500	1	600	1	200	10	400	8	800	20	6
7	Mahone Bay and Martin's River	70	2600	30	15	1000	1000			1	100	35	6500	25	6000	75	7
8	Tancooks	185	3200	600	300	4000	4000	1	600	1	100	60	2500	40	1000	20	8
9	Lunenburg Harbour to Kingsbury	474	11850	640	320	12500	12500	1	600	1	2500	199	29850	12	175000	14	9
10	LaHave River	228	5700	296	148	14200	14200	1	600			190	28500	6	52000	10	10
11	Petite Rivière to Vogler's Cove	18	450	218	109	9050	9050	1	600			42	6300			10	11
	Totals	1178	27415	2424	1209	51250	51250	6	3600	6	3200	662	79120	148	237950	169	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Queens**, Province of

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.															
		Steam Vessels.				Sailing and Gasoline Vessels.				Boats.					Carrying Smacks.		
		Number.	Tons.	Value.	Men.	(20 to 40 tons.) Number.	(10 to 20 tons.) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.
	Queens County.			$				$			$		$			$	
1	Port Medway	..	..	..	..	..	5	2350	18	26	2050	15	2750	90	..	..	..
2	Mill Village	..	..	..	..	..	..	..	..	16	240	..	..	32	..	..	..
3	Greenfield	..	..	..	..	..	..	..	..	13	260	..	..	13	..	..	..
4	Liverpool, Western Head and Brooklyn	1	76	7000	25	1	2	4600	18	10	500	55	8250	87	1	1500	2
5	Gull Islands, White and Hunt's Point, Summerville	..	..	..	..	..	..	..	..	11	500	27	4000	45	..	..	..
6	Port Mouton & S.W.P. Mouton	..	..	..	..	..	3	1200	9	10	500	25	3500	75	6	15000	18
7	Port Joli, Port L'Hebert, Sandy Bay	..	..	..	..	..	..	..	..	..	..	30	4500	40	..	..	..
8	East and West Berlin, Beach Meadows and Eastern Head	..	..	..	..	..	1	500	2	20	1600	15	2250	65	1	500	2
	Totals	1	76	7000	25	1	11	8650	47	106	5050	167	25250	447	8	17000	22

SESSIONAL PAPER No. 39

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing **Nova Scotia**, during the year 1914-15.

Fishing Gear.								Canneries.				Other Material.							
Gill Nets, Seines, Trap & Smelt Nets, etc.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Clam Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves		Persons employed in Canneries, Freezers and Fish-houses.	
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	
	$		$		$		$		$		$		$		$		$		
350	2950	20	100	240	144	3200	3200	1	1800	..	....	3	250	69	1780	20	720	12	1
60	360	....	....	....	....	.....	.....	....	.....	..	....	4	160	18	180	12	120	....	2
.....	....	....	....	....	....	....	.....	....	....	..	....	5	250	14	200	....	....	....	3
30	15000	500	2000	300	225	8000	8000	1	2000	..	....	2	6000	60	3000	8	400	4	4
.....	.....	150	600	300	225	8000	8000	....	.....	..	....	..	..	50	2500	4	200	....	5
6	3000	300	1200	400	300	10000	10000	4	8000	..	....	2	1000	25	1250	10	500	55	6
1	500	100	400	200	150	5000	5000	1	500	..	....	....	...	10	500	4	200	....	7
2	1000	200	800	300	225	8000	8000	1	500	1	250	1	500	25	1250	8	400	....	8
449	22810	1270	5100	1740	1269	42200	42200	8	12800	1	250	17	8160	271	10660	66	2540	71	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Shelburne**, Province of **Nova Scotia**, during the year 1914–15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.																Number.
		Steam Vessels.				Sailing and Gasoline Vessels.						Boats.					Carrying Smacks.			
		Number.	Tonnage.	Value.	Men.	(40 tons and over) Numb.	(20 to 40 tons) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	
	Shelburne County.			$					$			$		$			$		
1	Woods Harbour						1	7	2150	32	13	350	98	19600	214				1
2	Shag Harbour and Bear Point							2	500	6	30	350	43	11580	110	4	975	5	2
3	Cape Island							19	2900	59	10	1200	256	65000	546	2	800	2	3
4	Barrington							12	350	7	2	75	14	2800	28				4
5	Port La Tour and Baccaro							7	1750	33	25	375	83	10600	131				5
6	Cape Negro and Blanche										13	400	38	7600	85				6
7	Port Saxon, Clyde Riv. N.E. and N.W. Harb.										42	650	10	2025	90				7
8	Red Head, Black Point, and Round Bay										69	950	15	1875	140				8
9	Roseway, Carleton Village and McNutt's Hd.										90	1500	35	5100	200	1	200	2	9
10	Gunning Cove, Churchover and Birchtown							1	1000	3	40	500	12	1800	80				10
11	Shelburne and Sandy Point					4	2	5	17525	81	87	3600	39	8000	225				11
12	Jordan East and West						1		3400	14	16	420	34	6100	121				12
13	Lockeport					5	7	11	50000	179	210	4150	96	14420	512	3	11300	10	13
	Totals					9	11	57	79575	414	677	14520	743	156500	2195	10	13275	25	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the County of **Shelburne**, Province of **Nova Scotia**, during the year 1914-15.—*Con.*

Number.	Fishing Districts.	Fishing Gear.								Lobster Canneries.		Other Material.						Persons Employed in Canneries, Freezers and Fish-houses.	Number.
		Gill Nets, Seines, Trap and Smelt Nets, etc.		Trawls.		Hand Lines.		Lobster Traps.				Freezers and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Shelburne County.		$		$		$		$		$		$		$		$		
1	Woods Harbour	376	4700	21	105	64	64	12655	12655	7	4000	1	100	9	1350	12	7700	122	1
2	Shag Harbour and Bear Point	290	2320	22	110	55	55	10700	10700	2	750	....	...	44	2215	18	4200	20	2
3	Cape Island	1548	13940	750	3750	755	755	49380	49380	4	3500	6	1250	42	9500	51	32400	167	3
4	Barrington	30	180	..	.....	60	60	2000	2000	.....	.....	3	300	....	.....	.....	.....	.....	4
5	Port La Tour and Baccaro	883	5425	35	175	522	522	6225	6225	.....	.....	3	275	81	5000	7	1400	26	5
6	Cape Negro and Blanche	284	2090	63	320	75	75	4265	4265	1	200	1	20.	6	1500	6	1700	30	6
7	Port Saxon, Clyde Riv. N. E. and N. W. Harb.	190	1600	50	350	65	65	690	690	...	.....	...	.....	24	240	11	285	.....	7
8	Black Point, Red Head and Round Bay	301	3560	45	315	90	90	4060	4060	...	.....	...	.....	55	1550	11	500	.....	8
9	Roseway, Carleton Village and McNutt's Ild.	450	2700	95	665	220	220	4500	4500	1	200	....	.....	90	2000	34	2600	5	9
10	Gunning Cove, Churchover and Birchtown	300	1200	25	125	88	88	1200	1200	.....	.....	...	.....	25	2950	15	1500	14	10
11	Shelburne and Sandy Point	726	6800	720	3600	320	320	3800	3800	.....	.....	...	.....	70	7800	45	5000	20	11
12	Jordan, East and West	375	2150	64	320	155	155	3100	3100	2	300	...	.....	67	2600	41	980	.....	12
13	Lockeport	412	4633	810	5670	420	420	8540	8540	2	6500	5	146500	44	5670	70	65900	174	13
	Totals	6165	51298	2700	15505	2889	2889	111115	111115	19	15450	19	148625	557	42375	321	124165	578	

RETURN showing the Number and Value of Vessels and Boats, and the Quantity and
Yarmouth, Province of **Nova Scotia**,

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.																	
		Steam Vessels.				Sailing and Gasoline Vessels.					Boats.					Carrying Smacks.		
		Number.	Tons.	Value.	Men.	(40 tons and over) No.	(20 to 40 tons.) Number.	(10 to 20 tons.) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.
	Yarmouth County.			$					$			$		$			$	
1	Port Maitland							1	500	5	2	700	51	15300	110			
2	Sandford							1	300	4	12	190	36	10800	94			
3	Yarmouth	6	180	21000	26	6	3	12	33600	185	10	800	82	24600	174	1	350	3
4	Arcadia							1	500	5	5	280	32	9600	74	1	250	2
5	Pinkney's Point										6	320	33	9900	76			
6	Comeau Hill										12	500	62	18600	140	2	600	4
7	Wedgeport	3	70	11000	18	1	1	1	5500	35	16	320	117	34100	264	2	600	5
8	Salmon River										20	100			24			
9	Tusket							1	300	3	85	540			90			
10	Eel Brook							2	900	15	11	120	2	600	12			
11	Argyle						1	5	2500	33	9	150	34	10200	77			
12	Pubnico					5	3	9	23800	161	19	280	66	19800	170	2	600	4
	Totals	9	250	32000	44	12	8	33	67900	446	207	4300	515	153500	1305	8	2400	18

Value of all Fishing Gear, etc., used in the Fishing Industry in the County of during the year 1914-15.

Fishing Gear.										Canneries.		Other Material.						Persons employed in Canneries, Freezers and Fish-Houses.	
Gill Nets, Seines, Trap and Smelt Nets, etc.		Weirs		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Freezers and Ice-Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		$		$		
190	3400	..	....	100	500	300	300	8100	8100	3	1800	3	200	15	1500	1	1200	75	1
185	7905	..	....	60	300	200	200	6150	6150	1	900	1	150	4	1000	1	100	55	2
420	4275	..	....	160	800	940	940	14004	14004	3	3200	4	5000	22	20800	15	220500	400	3
130	650	1	200	12	60	70	70	6440	6440	2	1200	....	....	3	150	2	1200	36	4
160	810	..	....	15	75	90	80	4008	4008	....	....	....	....	3	150	2	400	5	5
260	1300	3	900	42	210	290	290	12600	12600	3	3000	....	....	5	3000	3	2400	80	6
425	4160	13	2600	64	320	550	550	19150	19150	3	3600	1	400	25	2000	7	7700	125	7
45	250	..	....	....	....	....	....	....	....	....	....	....	....	2	60	....	....	4	8
350	1620	5	1500	....	....	....	....	....	....	....	....	....	....	22	1950	2	1000	36	9
92	445	..	....	....	....	....	....	200	200	....	....	....	....	....	....	2	600	....	10
210	1260	..	...	32	160	70	70	5080	5080	....	....	....	....	8	1000	2	1200	20	11
410	3280	3	700	20	100	420	420	12950	12950	4	4400	3	1400	33	4300	6	6200	138	12
2877	29355	25	5900	505	2525	2930	2930	88682	88682	19	18100	12	7150	142	35910	43	242500	974	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Digby**, Province

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.																		Gill Nets, Seines, Trap and Smelt Nets, etc.	
		Steam Vessels.				Sailing and Gasoline Vessels.					Boats					Carrying Smacks.					
		Number.	Tons.	Value.	Men.	40 tons & over	20 to 40 tons.	10 to 20 tons.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.
	Digby County.			$		No.	No.	No.	$			$		$			$			$
1	Digby and vicinity					5		2	37000	140			15	4500	30	3	2000	6		
2	Bay View and Cullodden										12	600	17	3400	58				34	340
3	Gullivers Cove and Waterford										15	750	16	3200	38				74	740
4	Centerville	1	32	6000	5	1		1	8200	27	25	500	25	10000	60	1	400	2	50	400
5	Sandy Cove and Mink Cove						1		1000	3	20	410	16	4000	50	1	200	2	55	1290
6	Little River and Whale Cove							1	1000	2	30	860	22	6600	50	3	2700	6	51	600
7	Tiddville and East Ferry										17	650	18	4500	53				68	680
8	Tiverton and Central Grove					1	2		5500	26	20	600	80	30000	200	2	1200	4	202	2200
9	Freeport					3		1	7500	48	75	1000	65	19500	170	4	5000	12	130	1300
10	Westport					1		1	3700	23	50	500	70	21000	180	2	1500	4	250	2500
11	Smith's Cove and Brighton										33	650	8	1500	37				8	80
12	Plympton to Weymouth										16	320	25	6250	60				104	1040
13	New Edinburgh										5	70	22	5500	54				110	1100
14	Belliveau and White Cove										14	280	17	4250	62				75	750
15	Grosses Coques										4	80	10	2500	28				15	150
16	Church Point							3	1000	15	10	200	5	1200	30				20	200
17	Little Brook and Comeauville							1	1200	5	26	390	20	5000	92				4	40
18	Saulnierville										12	180	9	1850	42				10	100
19	Meteghan River										9	320	7	1750	34				20	200
20	Meteghan							2	1000	10	20	400	14	3150	68	1	1800	3	40	400
21	Comeau's Cove										9	180	5	1250	28				10	100
22	Bear Cove										20	300	12	3000	64				20	200
23	Cape St. Mary's					1	11		4800	64	10	500	45	15750	110	1	400	2	100	1000
24	Salmon and Beaver Rivers										15	360	14	3250	58				20	200
	Total	1	32	6000	5	11	4	23	71900	363	467	9980	557	162900	1656	18	15200	41	1470	15610

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing of **Nova Scotia**, during the year 1914-15.

Fishing Gear.								Canneries.				Other Material.						Persons employed in Canneries Freezers and Ice-houses.	
Weirs.		Trawls.		Hand Lines		Lobster Traps.		Lobster Canneries		Salmon Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
Number	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	
	$		$		$		$		$		$		$		$		$		
2	700	500	3500	25	25	1500	1500	..	.....	....	....	9	11400	32	45000	12	33000	150	1
.	.....	78	546	20	20	2000	2000	..	....	....	....	..	.....	6	200	....	.....	....	2
4	2000	96	672	50	50	2000	2000	..	.....	....	....	..	.....	7	300	....	....	.....	3
..	.....	260	1820	25	25	1500	1500	1	27000	..	...	5	500	22	4700	1	500	75	4
2	1300	66	462	45	45	1600	1600	1	1500	....	....	8	1500	13	1800	....	.....	.....	5
2	1300	150	1050	25	25	2000	2000	4	12000	....	....	4	600	22	3000	15	10000	50	6
1	1800	74	518	320	320	1600	1600	..	.....	....	....	1	25	15	1000	4	1000	.....	7
..	.....	750	5250	500	500	4500	4500	1	1500	...	....	2	900	47	7500	24	22000	100	8
.	.....	430	3110	250	250	3000	3000	..	.....	....	....	4	750	73	8300	26	4100	15	9
..	.....	340	2380	300	300	3500	3500	2	2500	..	....	5	1500	24	3110	35	11600	55	10
3	2600	15	105	36	36	200	200	..	....	....	....	3	75	7	300	....	.....	.....	11
2	600	80	560	106	106	1100	1100	.	..	....	....	4	205	17	500	5	2000	.....	12
1	150	175	1050	54	54	2000	2000	1	300	....	....	3	75	10	4200	....	.....	10	13
1	800	150	900	50	50	400	400	.	....	....	....	6	150	19	4140	....	.....	25	14
4	600	40	240	10	10	400	400	1	1800	....	....	1	25	4	200	....	.....	18	15
..	.....	25	150	60	60	750	750	..	.....	....	...	..	.....	11	1850	...	.....	25	16
..	.....	12	72	100	100	2400	2400	1	500	....	....	..	....	22	850	..	.....	25	17
..	.....	10	60	80	80	1800	1800	..	.....	....	....	.....	24	960	....	.....	....	18	
2	300	20	120	40	40	1000	1000	..	.	...	....	.....	3	300	....	.....	5	19	
..	.....	20	120	80	80	2100	2100	1	400	...	...	2	100	13	800	....	.....	30	20
..	.. ...	....	. ..	65	65	1700	1700	..	....	....	...	..	.....	7	175	....	.....	.....	21
..	.....	20	120	100	100	2000	2000	.	..	...	....	..	..	10	2060	....	.....	.....	22
..	.....	20	120	400	400	5000	5000	2	900	...	....	..	.....	35	875	....	....	80	23
..	.....	..	....	76	76	400	400	..	.....	....	...	..	...	3	45	....	.....	. ..	24
30	12150	3331	22925	2817	2817	44450	44450	15	48400	....	....	57	17805	446	92105	122	84200	663	

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in the County of **Annapolis,**

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.										
		Sailing & Gasoline Vessels.					Boats.					
		(40 tons and over Number.	(20 to 40 tons) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline	Value.	Men.
	Annapolis County.				$			$		$	
1	Margaretsville						7	140	9	2500	30
2	Port George						35	720	9	2250	50
3	Port Lorne						5	150	8	2000	25
4	Hampton						8	400	3	750	14
5	Phinney Cove						30	600	10	2500	65
6	Parker's Cove		1		800	10	30	600	25	5500	75
7	Hilsburne	1	1		2500	24	20	400	15	3700	50
8	Litchfield						10	200	17	4000	50
9	Port Wade	3		2	6500	68	10	200	7	1400	24
10	Victoria Beach						35	700	48	10000	120
11	Deep Brook and Clementsport						8	160	7	1500	25
12	Annapolis, Lequille and Nicteaux Rivers						40	600			40
	Totals	4	2	2	9800	102	238	4870	158	36100	568

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels Industry in the County of **Kings,**

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.								
		Sailing and Gasoline Vessels.			Boats.					
		(10 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.
	Kings County.		$			$		$	
1	Morden and vicinity				6	120	5	1400	20
2	Victoria Harbour and Ogilvie's Wharf				3	60	2	500	12
3	Harbourville	1	300	3	2	30	2	500	10
4	Canada Creek				7	140	1	250	15
5	Chipman's Brook and Hunting Point	1	400	4	4	90	1	150	10
6	Hall's Harbour	3	1500	9	10	200	4	1000	25
7	Race Point and Sheffield Vault				2	40			6
8	Baxter's Harbour				9	135	1	250	25
9	Whalen Beach and Wells Cove				2	40			4
10	Scott's Bay				4	100	3	900	14
11	Blomidon and Kingsport				2	40	2	300	12
12	Inland waters								
	Totals	5	2,200	16	51	995	21	5250	153

Boats and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Province of **Nova Scotia**, during the year 1914-1915.

Fishing Gear.										Other Material.						Persons employed in canneries, freezers and fish-houses.	
Gill Nets, Seines, Trap & Smelt Nets, &c.		Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		Number.
	$		$		$		$		$		$		$		$		
30	300	2	400	6	150	125	125	100	100	3	200	10	1000	2	1000	..	1
50	500	2	300	30	360	200	200	500	500	9	450	15	750	....	.....	.. ..	2
50	500	2	300	15	180	125	125	300	300	2	150	10	500	...	.. ..	.....	3
20	200	2	200	16	192	50	50	300	300	3	200	4	400	...	.....	.....	4
80	800	..	...	50	1250	200	200	1500	1500	....	..	20	600	....	.....	.....	5
60	600	.	.....	150	1800	200	200	2000	2000	2	400	30	2500	1	1000	10	6
45	450	..	...	175	2190	100	100	400	400	3	2200	7	1500	2	800	40	7
30	300	..	.....	109	2500	75	75	1000	1000	1	100	12	1200	....	.....	...	8
.....	.....	3	400	250	6525	55	55	400	400	2	1000	11	3000	3	3000	10	9
25	250	.....	.....	240	6000	200	200	2000	2000	1	700	40	2000	10	2000	40	10
4	40	6	800	8	200	50	50	.	.....	1	1500	10	1500	7	1500	.. .	11
.....	.....	3	300	....	....	.....	.....	...	.....	....	....	..	....	10	1000	.....	12
394	3940	20	2700	1040	21347	1380	1380	8500	8500	27	6900	169	14950	35	10300	100	

and Boats and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Province of **Nova Scotia**, during the year 1914-15.

Fishing Gear.										Other Material.						
Gill Nets, Seines, Trap & Smelt Nets, &c.		Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.		
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.
	$		$		$		$		$		$				$	
5	50	5	1000	..	.....	40	40	150	150	4	100	5	100	1	5000	1
4	40	2	400	....	.....	20	20	100	100	1	15	1	20	2	7000	2
6	60	3	600	....	.....	10	10	...	.....	2	40	4	100	1	12000	3
10	100	3	800	....	.....	30	30	190	190	3	50	6	120	1	8000	4
9	90	3	700	4	20	20	20	..	.....	1	20	3	45	1	5000	5
16	160	2	500	10	50	30	30	100	100	4	80	5	100	1	10000	6
....	.....	2	400	....	....	6	6	....	.....	2	30	2	40	.....	.....	7
15	150	2	400	5	25	40	40	25	25	2	30	5	100	1	4000	8
2	20	1	250	....	....	8	8	..	.....	1	15	1	15	.....	.....	9
10	100	6	1500	7	35	25	25	100	100	5	100	7	200	1	5000	10
4	40	1	200	....	.. ..	14	14	....	.....	1	15	2	40	1	10000	11
.. .	.....	1	200	....	.....	...	.....	....	.....	....	.....	.....	.. ..	.....	...	12
81	810	31	6950	26	130	243	243	665	665	26	495	41	880	10	66000	

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a
the year

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.
	Lunenburg County.		$		$		$		$		$		$
1	Fox Point	....	....	93	778	360	739	485	740	....	....	75	75
2	Mill Cove	....	....	93	778	495	1019	648	1029	150	150	108	108
3	N. W. Cove and Lodge	....	...	222	1616	213	457	312	479	15	15	3	3
4	Aspotogan	....	..	94	840	180	426	.....	.....	....	....	....	....
5	Bayswater, Blandford and Deep Cove	..	...	501	4670	2655	8258	135	216	....	....	710	710
6	Chester	19	435	1718	16665	214	451	.....	...	....	....	9	9
7	Mahone Bay and Martins River	8	170	25	150	18263	40605	2775	4406	2100	2100	1260	1260
8	Tancooks	...	....	396	3720	3735	8892	2300	3580	...	....	2310	2310
9	Lunenburg Harbor to Kingsbury	....	...	557	5570	213279	462104	51975	69300	....	....	9	10
10	La Have River	62	1364	463	4630	124188	269074	26691	35588	...	....	237	276
11	Petite Rivière to Vogler's Cove	31	682	429	4290	3345	7247	405	540	....	....	381	444
	Totals	120	2651	4591	43707	366927	799272	85726	115878	2265	2265	5102	5205

Cwt. = 100 lb.

SESSIONAL PAPER No. 39

CATCH.

Green State in the County of **Lunenburg**, Province of **Nova Scotia**, during 1914–15.

Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Smelts, cwt.	Smelts, value.	Albacore, cwt.	Albacore, value.	Sword-Fish, cwt.	Sword-Fish, value.	Squid, brl.	Squid, value.	Scallops, brl.	Scallops, value.	Number.
	$		$		$		$		$		$		$		$		$	
320	171	305	1440	....	....	...	.....	....	....	81	81	9	45	....	...	.....	.....	1
117	117	223	1102	....	....	...	.....	....	....	140	140	21	105	....	....	.....	.....	2
127	70	831	3524	....	...	....	....	..	....	99	99	33	165	....	....	.. ...	.....	3
490	320	687	2838	....	....	....	.....	....	....	60	60	33	165	. ..	....	... .	... .	4
4863	4826	585	2370	....	....	20	100	...	...	21	21	49	245	....	....	.....	.....	5
925	525	132	528	33	33	....	....	83	830	. ..	....	...	....	40	160	385	1095	6
310	260	122	488	12	12	50	250	69	690	....	....	....	....	....	....	....	....	7
14566	14426	1672	6688	....	....	5	25	...	....	....	....	20	100	. ..	...	5275	15620	8
6225	8340	1632	6528	....	....	120	600	17	170	...	....	62	310	....	....	. ...	.. ...	9
4383	5844	1569	6276	....	....	121	605	41	410	...	....	16	80	....	....	....	. .	10
648	864	408	1632	....	....	14	70	11	110	....	....	....	.....	....	...	....	.....	11
32974	35763	8166	33414	45	45	330	1650	221	2210	401	401	243	1215	40	160	5660	16715	

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Lunenburg**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, cwts*	Lobsters, canned, cases.	Lobsters, shipped in shell, cwts.	Cod, used fresh, cwts.	Cod, dried, † quintals.	Haddock, fresh, cwts.	Haddock, dried, quintals.	Hake and Cusk, fresh, cwts.	Hake and Cusk, dried, quintals.	Pollock, fresh, cwts.	Pollock, dried, quintals.	Herring, pickled, brls.	Herring, as bait, brls.	Number.
	Lunenburg County.														
1	Fox Point	.....	10	73	21	103	264	74	...	....	24	17	10	117	1
2	Mill Cove	.....	10	73	12	161	410	79	....	50	15	31	39	.....	2
3	Lodge and N.W. Cove	.....	22	178	207	2	112	67	15	....	3	....	4	58	3
4	Aspotogan	.....	38	19	.....	60	.....	.....	.....	.....	.....	.....	50	170	4
5	Bayswater, Blandford and Deep Cove	.....	199	103	.....	885	135	.....	.....	.....	.....	237	1593	42	5
6	Chester	19	720	278	.....	71	.....	.....	.....	.....	.....	3	42	400	6
7	Mahone Bay and Martin's River	8	.....	25	.....	6088	.....	925	....	700	...	420	70	50	7
8	Tancooks	.....	60	276	.....	1245	240	686	...	....	....	770	4762	140	8
9	Lunenburg Harbour to Kingsbury	.....	28	501	.....	71093	.....	17325	....	....	...	3	2085	.....	9
10	La Have River	62	45	373	.....	41396	.. ...	8897	.....	.....	....	79	1461	.....	10
11	Petite-Rivière to Vogler's Cove	31	62	305	.....	1115	... .	135	....	....	....	127	216	....	11
	Totals	120	1194	2204	240	122219	1161	28188	15	750	42	1687	10332	1007	
	Rates	22	18	16	2.50	7	1.75	4.50	1.50	3	1.50	3.50	4	2	
	Values	2640	21492	35264	600	855533	2032	126846	22	2250	63	5904	41328	2014	

* Cwt. = 100 lbs. † Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Lunenburg**, Province of **Nova Scotia**, during the year 1914-15.— *Concluded.*

Number.	Fishing Districts.	Mackerel, fresh, cwts.	Mackerel, salted, brls.	Alewives, fresh, cwts.	Alewives, salted, brls.	Halibut, fresh, cwts.	Smelts, fresh, cwts.	Albacore, fresh, cwts.	Swordfish, fresh, cwts.	Squid, used as bait, brls.	Scallops, fresh, brls.	Fish Oil, gallons.	Number.
	Lunenburg County.												
1	Fox Point	305						81	9			30	1
2	Mill Cove	185	16					140	21			80	2
3	N.W. Cove and Lodge	365	155					99	33			50	3
4	Aspotogan	165	174					60	33			10	4
5	Bayswater, Blandford and Deep Cove	130	152			20		21	19			400	5
6	Chester	12	40	21	4		83			40	385		6
7	Mahone Bay and Martin's River	20	33	6	2	50	69					5000	7
8	Tancooks	57	539			5			20		5275	509	8
9	Lunenburg Harbour to Kingsbury		544			120	17		62			19800	9
10	La Have River		523			121	41		16			13200	10
11	Petite-Rivière to Vogler's Cove		136			14	11						11
	Totals	1239	2312	27	6	330	221	401	243	40	5660	39070	
	Rates	$ 5	12	1	4	5	10	2	5.50	4	3	29c.	
	Values	6195	27744	27	24	1650	2210	802	1337	160	16980	11330	
	Total value											$1,164,447	

* Cwt = 100 lbs. † Quintal = 112 lbs.

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a Green

Number.	Fishing Districts.	Salmon, *cwts.	Salmon, value.	Lobster, cwts.	Lobster, value.	Cod, cwts.	Cod, value.	Haddock, cwts.	Haddock, value.	Hake and Cusk, cwts.	Hake and Cusk, value.	Pollock, cwts.	Pollock, value.	Herring, cwts.	Herring, value.
	Queens County.		$		$		$		$		$		$		$
1	Port Medway	58	1044	672	7392	1563	2344	220	330	84	168	306	459	1684	1684
2	Mill Village	43	774	...	...	...	...	...	...	...	...	...	...	...	...
3	Greenfield	26	468	...	...	...	...	...	...	...	...	...	...	...	...
4	Brooklyn, Liverpool and Western Head	26	468	1000	7800	560	840	500	750	150	175	100	125	7530	7500
5	Gull Island, White and Hunts Point and Summerville	...	...	900	7020	415	622	400	600	50	57	600	750	1000	1000
6	Port Mouton and S. W. Port Mouton	...	..	1362	10700	1000	1500	500	750	200	230	200	250	7500	7500
7	Port Joli, Port L'Hébert and Sandy Cove	..	...	800	6240	200	300	200	300	100	115	100	125	4000	4000
8	East and West Berlin, Beach Meadows and Eastern Head	...	...	1000	7800	440	660	400	600	300	345	150	187	2200	2200
	Totals	153	2754	5734	46952	4178	6266	2220	3330	884	1090	1456	1896	23884	23884

*Cwt. = 100 lbs.

SESSIONAL PAPER No. 39

CATCH.

State, in the County of **Queens**, Province of **Nova Scotia**, during the year 1914-15

Mackerel, cwts.	Mackerel, value.	Alewives, cwts.	Alewives, value.	Halibut, cwts.	Halibut, value.	Smelts, cwts.	Smelts, value.	Trout, cwts.	Trout, value.	Albacore, cwts.	Albacore, value.	Eels, cwts.	Eels, value.	Sword-fish, cwts.	Sword-fish, value.	Mixed fish, cwts.	Mixed fish, value.	Squid, brls.	Squid, value.	Seals, No.	Seals, value.	Claws, brls.	Claws, value.	Number.
	$		$		$		$		$		$		$		$		$		$		$		$	
77	385	69	55	30	240	50	500	..	....	10	50	20	100	6	24	8	16	4	8	70	70	8	24	1
....	.....	695	556	....	....	..	...	16	160	....	...	..	....	..	....	..	..	...	....	..	..	..	....	2
....	.....	600	480	...	....	..	....	33	330	...	....	...	....	..	..	....	..	....	....	..	..	..	..	3
1500	7500	250	250	10	65	..	.. ..	..	....	50	250	100	250	10	90	....	..	...	....	..	....	....	....	4
100	500	.. .	. ..	20	130	..	.....	..	....	....	....	....	....	..	....	....	..	...	....	..	....	....	....	5
500	2500	.. ...	....	20	130	..	.....	..	....	75	375	....	...	10	90	....	..	....	.	..	....	....	....	9
275	1375	.....	...	15	97	.	....	..	....	....	....	....	....	10	90	....	..	....	....	..	....	....	....	7
2000	10000	.....	....	20	130	..	....	..	....	50	250	....	....	20	180	....	..	....	....	..	....	....	....	8
4452	22260	1614	1341	115	792	50	500	49	490	185	925	120	350	56	474	8	16	4	8	70	70	8	24	

RETURN showing the Quantities and Values of all Fish caught and landed in a year

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †quintal.	Haddock, used fresh, cwt.	Haddock, dried, quintal.	Hake and cusk, dried, quintal.	Pollock, used fresh, cwt.	Pollock, dried, quintal.	Herring, used fresh, cwt.	Herring, pickled, brl.
	Queens County.													
1	Port Medway	58	.....	672	225	. ...	398	82	43	25	...	91	...	408
2	Mill Village	43	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	Greenfield	26	.....	.....	...	.....	.....	.....	.....	...	....	.....	....	.....
4	Liverpool, Western Head, Brooklyn	26	.....	300	110	....	150	200	134	50	25	25	25	2000
5	Gull Islands, White and Hunt's Point, Summerville	.....	.....	100	40	.....	125	100	75	17	....	200	....	300
6	Port Mouton and S. W. Port Mouton	.....	1606	1200	150	200	150	200	150	66	.. .	66	....	2000
7	Port Joli, Port L'Hebert Sandy Cove	.....	.....	100	40	.....	57	100	25	17	....	33	....	1000
8	East and West Berlin, Beach Meadows, & Eastern Head	.....	.....	150	254	... .	62	100	50	100	....	50	....	125
	Totals	153	1606	2522	819	200	942	782	477	275	25	465	25	5833
	Rates	$ 18	18	16	2	3	6.25	2	5	4	1	4	1	4
	Values	$ 2754	28908	40352	1638	600	5887	1564	2385	1100	25	1860	25	23332
	Total value	$												

*Cwt. = 100 lb. Quintal—112 lb.

SESSIONAL PAPER No. 39

CATCH.

Green State in the County of **Queens**, Province of **Nova Scotia**, during the 1914-15.

Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Alewives, fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, Cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Albacore, used fresh, cwt.	Eels, used fresh, cwt.	Swordfish, used fresh, cwt.	Mixed fish, used fresh, cwt.	Squid, used as bait, brl.	Clams, and quahaugs, used fresh, brl.	Hair seal skins, No.	Fish oil, gal.	Number.
203	77	.....	23	30	50	.....	10	20	6	8	4	8	70	90	1
.....	.....	500	65	.....	.....	16	.....	.....	.....	.....	.....	.....	.....	.....	2
.....	.....	390	70	.....	.....	33	.....	.....	.....	.....	.....	.....	.....	.....	3
738	1500	100	50	10	.....	.....	50	100	10	.....	.....	.....	.....	.....	4
50	100	.....	..	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
750	500	.....	.....	20	.....	.....	75	.....	10	.....	.....	.....	.....	.....	6
500	275	.....	.....	15	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	7
912	2000	.....	.....	20	.....	.....	50	.....	20	.....	.....	.....	.....	.....	8
3153	4452	990	268	115	50	49	185	120	56	8	4	8	70	90	
2	5	2	4	7	10	10	5	5	9	2	2	3	1	40c.	
6306	22260	1980	832	805	500	490	925	600	504	16	8	24	70	36	

..... $145,786

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in the County of **Shelburne**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Number.
	Shelburne County.		$		$		$		$		$		$		$		$		$		$	
1	Wood's Harbour	....	....	7741	83418	1045	1568	155	155	.....	.....	....	.....	8554	8554	1430	6435	....	....	91	637	1
2	Shag Harbour and Bear Point	....	....	2722	29332	535	802	117	117	.....	.....	449	449	3402	3402	37	166	...	....	...	.....	2
3	Cape Island	...	....	13241	142688	19814	29721	5366	5366	40	40	763	763	7800	7800	1235	5558	...	....	1328	9296	3
4	Barrington	....	....	692	7457	1803	2705	52	52	.....	.....	675	675	650	650	....	.....	900	900	....	..	4
5	Port-La-Tour and Baccaro	....	....	126	1357	9223	13834	2194	2194	.. ..	.....	1118	1118	10735	10735	37	166	....	....	51	357	5
6	Cape Negro and Blanche	10	130	249	2683	4198	6297	2139	2139	....	.....	30	30	2740	2740	500	2250	...	....	....	....	6
7	Port Saxon, Clyde River, N.E. and N.W. Harbour	12	156	105	980	833	1302	397	439	.....	.....	.....	.....	178	133	50	250	1250	938	....	.....	7
8	Black Point, Red Head and Round Bay	....	....	183	1738	624	1080	377	412	.....	.....	103	79	2400	1800	87	612	....	....	3	18	8
9	Roseway, Carleton Village and McNutt's Island	...	....	1119	11040	2680	5360	2110	2954	.....	.....	630	527	9645	7234	455	2525	110	83	....	. ..	9
10	Gunning Cove, Churchover and Birchtown	....	...	308	2990	710	1149	582	783	.....	...	200	170	4225	3169	30	150	37	28	..	.....	10
11	Shelburne and Sandy Point	5	69	430	4140	2920	5256	2160	3024	.....	.....	450	390	8536	6402	750	3750	110	82	150	1350	11
12	Jordan, East and West	10	136	776	7643	947	1616	643	817	.....	.....	88	66	7531	5648	233	1447	6	4	10	60	12
13	Lockeport	....	....	8595	82628	46700	84060	24450	34230	11520	11520	7209	6488	40631	31464	1001	7140	28	21	1508	10135	13
	Totals	37	491	36287	378094	92032	154750	40742	52682	11560	11560	11715	10755	107027	89731	5845	30449	2441	2056	3141	21853	

* Cwt. = 100 lbs.

THE CATCH.

39—11½

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State, in the County of **Shelburne**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Smelts, cwt.	Smelts, value.	Albacore, cwt.	Albacore, value.	Sturgeon, cwt.	Sturgeon, value.	Eels, cwt.	Eels, value.	Swordfish, cwt.	Swordfish, value.	Clams, brl.	Clams, value.	Number.
	Shelburne County.		$		$		$		$		$		$	
1	Wood's Harbour	..	....	91	364	2	14	.....	....	3	27	....	.....	1
2	Shag Harbour and Bear Point	.....	.....	293	1172	.....	.....	.... ..	..	32	288	.....	.. ..	2
3	Cape Island	.....	...	554	2216	.....	.....	.....	.....	60	540	....	.....	3
4	Barrington	.....	....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	4
5	Port La Tour and Baccaro	.. ..	....	45	180	.....	.....	.....	.....	.....	.....	.....	...	5
6	Cape Negro and Blanche	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
7	Port Saxon, Clyde River, N.E. and N.W., Harbour	3	39	.....	.....	.....	.....	.....	.....	.....	.....	..	.....	7
8	Black Point, Red Head and Round Bay	...	.....	.. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
9	Roseway, Carleton Village and McNutt's Island	.....	.....	.....	.....	.....	.....	.....	.....	10	75	.....	.....	9
10	Gunning Cove, Churchover and Birchtown	66	858	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
11	Shelburne and Sandy Point	21	273	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11
12	Jordan, East and West	59	767	5	20	.....	.....	.....	.....	.....	.....	200	200	12
13	Lockeport	.....	....	1157	5637	.. ....	... ..	100	35	567	4246	805	805	13
	Totals	149	1937	2145	9589	2	14	100	35	672	5176	1005	1005	

Cwt. = 100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Shelburne**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt	Cod, shipped green-salted, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock smoked, cwt.	Haddock, dried, quintals.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Pollock, dried, quintals.	Herring, used fresh, cwt.	Number.
	Shelburne County.															
1	Wood's Harbour		2652	2437	....	261	174	5		50					5170	1
2	Shag Harbour and Bear Point		730	1262		134	90	5		38				150	1382	2
3	Cape Island		3282	6677	....	4954	3302	16		1783		13	....	254	520	3
4	Barrington			692		451	301	2		17				225	80	4
5	Port La Tour and Baccaro			126		2306	1538	14		767				375	655	5
6	Cape Negro and Blanche	10		249		1050	700	8		718				10	734	6
7	Port Saxon, Clyde River, N. E. and N. W. Harbour	12		105	62	100	170			118					106	7
8	Black Point, Red Head and Round Bay			183	100	....	156	125		75			22	24	250	8
9	Roseway, Carleton Village and McNutt's Island		209	701	411	450	455	1200		301			45	174	4181	9
10	Gunning Cove, Churchover and Birchtown			308	162		163	98		144				59	2225	10
11	Shelburne and Sandy Point	5		430	1566		450	1259		299				134	2856	11
12	Jordan, East and West	10		776	49	120	196	300		102			10	23	1931	12
13	Lockeport		1814	4967	13521	6646	6619	8091	3573	3063	1333	339	720	2163		13
	Totals	37	8687	18913	15871	16472	14314	11123	3573	7467	1333	3405	797	3591	25990	
	Rates $	18	18	16	3 25	4	6	2	7	5	1.50	4	1.50	5	1.50	
	Values $	666	156366	302608	51580	65888	85884	22246	25011	37335	1999	13620	1195	17955	38985	

*Cwt. = 100 lbs. Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Shelburne**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Herring, smoked, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Smelts, used fresh, cwt.	Albacore, used fresh, cwt.	Sturgeon, used fresh, cwt.	Eels, used fresh, cwt.	Swordfish, used fresh, cwt.	Clams and Quahaugs, used fresh, cwt.	Tongues & Sounds, pickled or dried, cwt.	Fish Oil, gals.	Number.
	Shelburne County.																	
1	Wood's Harbour	..	264	1296	1430	.....	.	.. ..	91	.....	91	2	.....	3	.. ..	.....	....	1
2	Shag Harbour and Bear Point	.....	340	500	37	.....	.....	.....	.....	.....	293	...	...	32	.....	.	...	2
3	Cape Island	.....	1060	2140	1235	.....	...	.. ..	1328	....	554	.....	.....	60	.....	..	5208	3
4	Barrington	...	90	150	..	.....	.....	.....	.....	....	...	.....	.....	.....	.. ..	.....	...	4
5	Port La Tour and Baccaro	.....	450	1415	37	.....	150	250	.....	....	...	.....	.....	.....	.....	.....	...	5
6	Cape Negro and Blanche	.....	336	499	500	.....	.....	..	51	.....	45	....	.....	.....	.....	.....	...	6
7	Port Saxon, Clyde River, N.E. and N.W. Harbour	..	24	.....	20	10	1250	.....	.....	.....	... ..	.....	.....	.....	... ..	.....	...	7
8	Black Point, Red Head and Round Bay	.....	420	445	....	29	.....	.....	.. ..	3	... ..	.....	.....	.....	.....	.....	...	8
9	Roseway, Carleton Village and McNutt's Island	.....	920	1352	20	145	110	.....	3	.....	... ..	....	.....	10	.....	.....	...	9
10	Gunning Cove, Churchover and Birchtown	..	320	520	3	9	37	.....	.....	.....	... ..	.....	.....	.....	... ..	.....	...	10
11	Shelburne and Sandy Point	.....	1100	1190	450	100	110	.....	150	66	21	....	.....	.....	.....	.....	...	11
12	Jordan, East and West	....	1200	1000	233	....	6	.....	10	59	... ..	5	.....	.....	...	200	..	12
13	Lockeport	2618	4331	11201	539	154	28	.....	1508	....	1157	.....	100	567	805	10	2250	13
	Totals	2618	10795	21708	4504	447	1691	250	3141	149	2145	2	100	672	1005	10	7458	
	Rates ..... $	6	3.50	2.50	5.50	13	1.50	4	7.50	15	4.50	7	7	8 50	2	20	35c.	
	Values ..... $	15708	37782	54270	24772	5811	2536	1000	23557	2235	9652	14	700	5712	2010	200	2610	

Total value $1,017,456

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Yarmouth**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, cwt*	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Number.
	Yarmouth County.		$		$		$		$		$		$		$		$	
1	Port Maitland	57	912	3924	42946	1680	2973	1020	1530	530	530	1900	1900	1453	1453	416	2170	1
2	Sandford	78	1218	4130	45053	1568	2775	900	1350	525	525	1600	1600	1362	1362	615	3209	2
3	Yarmouth	.....	...	8496	91211	37700	65975	30100	45150	10905	10855	12159	12159	7461	7461	217	1134	3
4	Arcadia	.....	.....	2311	24812	686	1214	360	540	130	130	370	370	1557	1557	16	84	4
5	Pinkney's Point	.....	....	2821	31456	672	1189	600	900	115	115	445	445	1162	1162	42	220	5
6	Comeau Hill	.....	...	8850	95297	2367	4189	1500	2250	925	925	586	586	3642	3642	237	1239	6
7	Wedgeport	.....	.....	9255	99174	2286	4046	1174	1761	950	950	425	425	6072	6072	440	2289	7
8	Salmon River	5	82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
9	Tusket	56	938	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
10	Eel Brook	.....	....	83	861	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
11	Argyle	.....	.....	2400	26856	641	1134	340	510	125	125	126	126	2552	2552	67	351	11
12	Pubnicoes	.....	..	9249	99165	21100	36925	4700	7050	1705	1695	5680	5680	5591	5591	330	1716	12
	Totals	196	3180	51519	556834	68698	120420	40694	61041	15910	15850	23291	23291	30852	30852	2380	12412	

Cwt. = 100 lbs.

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Yarmouth**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Smelts, cwt.	Smelts, value.	Albacore, cwt.	Albacore, value.	Eels, cwt.	Eels, value.	Swordfish, cwt.	Swordfish, value.	Mixed Fish, cwt.	Mixed Fish, value.	Clams, brl.	Clams, value.	Dulse, Crabs, Cockles and other Shell Fish, cwt.	Dulse, Crabs, Cockles and other Shell Fish, value.	Number.
	Yarmouth County.		$		$		$		$		$		$		$		$		$		$	
1	Port Maitland					6	48									460	345	4	8			1
2	Sandford					7	56									520	390	6	12			2
3	Yarmouth			15	15	2067	16497							214	1274	900	675	250	500			3
4	Arcadia			35	35			35	420									25	50	6	14	4
5	Pinkney's Point																	10	20	8	19	5
6	Comeau Hill					19	152									64	48	23	46	12	28	6
7	Wedgeport			30	30	41	328			481	2071					84	63	54	108	26	62	7
8	Salmon River			1600	1600			36	432			20	130									8
9	Tusket	26	205	6119	6119			366	4380			76	494									9
10	Eel Brook			110	110			138	1656			52	338									10
11	Argyle			65	65			18	216			50	325									11
12	Pubnicoes			9	9	195	1560	224	2688	16	69	24	156			260	195	150	300	36	86	12
	Totals	26	205	7983	7983	2335	18641	817	9792	497	2140	222	1443	214	1274	2288	1716	732	1464	171	408	

Cwt. = 100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Yarmouth**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt	Cod, shipped green-salted, cwt.	Cod, dried, †quintal.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, qtl.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, qtl.	Pollock, used fresh, cwt.	Pollock, dried, qtl.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, brl.	Herring, used as bait, brl.	Number.
	Yarmouth County.																		
1	Port Maitland	57	1081	1761		390	268			304		158		565	18		93	578	1
2	Sandford	78	1087	1957		385	238			265		156		476	16		86	544	2
3	Yarmouth		1391	5715	8709	11286	2122	9878	8206	1246	397	3494	254	3935	1006	1814	800	213	3
4	Acadia		678	955		1 0	91			107		39		110	8	32	423	105	4
5	Pinkney's Point		735	1352		186	89			179		34		133	40	21	326	48	5
6	Comeau Hill		2537	3775	3	150	614			447		275		175	440	1120	160	241	6
7	Wedgeport		2743	3768	29	164	574			350		283		126	420	1070	676	742	7
8	Salmon River	5																	8
9	Tusket	56																	9
10	Eel Brook		28	27															10
11	Argyle		694	1011	9	136	107			102		37		37	28	1262			11
12	Pubnicoos		2909	3432	11	9052	969			1540		538		1860	505	1250	819	64	12
	Totals	196	13883	23753	8761	21939	5072	9878	8206	4540	397	5014	254	7417	2481	6572	3385	2535	
	Rates $	20	18	16	2 10	4	6.10	2	8	4.10	1.10	3.20	1 10	4.20	1.60	4 10	3.60	2	
	Values $	3920	249894	380048	18398	87756	30939	19756	65648	18614	436	16044	279	31151	3969	26945	12186	5070	

* Cwt. = 100 lbs. † Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Yarmouth**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Shad, used fresh, cwt.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Smelts, used fresh, cwt.	Albacore, used fresh, cwt.	Eels, used fresh, cwt.	Sword fish, used fresh, cwt.	Mixed fish, used fresh, cwt.	Clams and Quahaugs, used fresh, brl.	Dulse, Crabs, Cockles and other Shell Fish, used fresh, cwt.	Fish Oil, gall.	Number.
	Yarmouth County.															
1	Port Maitland	416					6					460	4		90	1
2	Sandford	615					7					520	6		36	2
3	Yarmouth	217			15		2067				214	900	250		920	3
4	Acadia	16			35			35					25	6		4
5	Pinkney's Point	24	6										10	8		5
6	Comeau Hill	201	12				19					64	23	12	46	6
7	Wedgeport	365	25		30		41		481			84	54	26	42	7
8	Salmon River				1300	100		36		20						8
9	Tusket			26	3095	1008		366		76						9
10	Eel Brook				20	30		138		52						10
11	Argyle	37	10		20	15		18		50			210	36		11
12	Pubnicoes	285	15		9		195	224	16	24		266	150	83	1800	12
	Totals	2176	68	26	4524	1153	2335	817	497	222	214	2288	732	171	2934	
	Rates	$ 8 20	12.50	10	1.50	3.50	9	16	5	6.50	7	1	2	4	30c.	
	Values	$ 17843	850	260	6786	4035	21015	13072	2485	1443	1498	2288	1464	684	880	

Total value $1,045,656

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Digby**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and cusk, cwt.	Hake and cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Shad, cwt.	Shad, value.	Number.
	Digby County.		$		$		$		$		$		$		$		$		$	
1	Digby and vicinity	12	180	315	3780	16550	28962	44000	110000	8025	7623	1679	1670	1045	784	10	50	....	....	1
2	Bay View and Culloden	....	....	500	6000	550	962	1000	2500	1100	1045	500	500	20	15	..	.....	....	....	2
3	Gulliver's Cove to Waterford	60	900	500	6000	970	1697	1200	3000	4000	3800	1500	1500	2425	1819	570	2850	....	....	3
4	Centreville	....	....	760	9120	3560	23730	29119	72796	6312	5996	350	350	2430	1825	.....	....	....	....	4
5	Sandy Cove and Mink Cove	....	....	620	7440	1500	2625	1200	3000	1500	1425	460	460	2160	1620	900	4500	....	....	5
6	Little River and Whale Cove	....	....	1800	21600	1275	2231	12200	30500	7225	6864	150	150	1900	1425	20	100	....	....	6
7	Tiddville and East Ferry	....	....	350	4200	986	1726	400	1000	3250	3087	1520	1520	1046	785	420	2100	....	....	7
8	Tiverton and Central Grove	....	....	2000	24000	13450	23537	3450	8625	27170	25812	4000	4000	460	345	20	100	....	....	8
9	Freeport	....	....	1650	19800	5814	10175	2300	5750	19562	18581	5200	5200	1100	825	..	.....	....	....	9
10	Westport	....	....	2400	28800	11550	20213	4200	10500	12500	11875	6300	6300	1260	945	.....	.....	....	....	10
11	Smith's Cove and Brighton	2	30	10	120	85	149	50	125	30	29	124	124	1660	1245	20	100	5	75	11
12	Plympton and Weymouth	....	....	185	2220	234	409	310	775	240	228	300	300	250	187	30	150	..	....	12
13	New Edinburgh	....	....	1000	16000	5	10	421	526	.....	.....	30	30	70	70	40	200	..	....	13
14	Belliveau and White Cove	....	....	64	1024	35	70	9110	11387	.....	.....	200	250	4032	4032	436	2952	....	....	14
15	Grosses Coques	....	....	.....	.....	9	18	1388	1735	.....	.....	.....	.....	2400	2400	12	60	....	....	15
16	Church Point	....	....	284	3968	245	490	42	53	.....	.....	.....	.....	14	14	..	.....	....	....	16
17	Little Brook and Comeauville	....	....	1922	30752	815	1630	129	161	.....	.....	.....	.....	14	14	....	.....	....	....	17
18	Saulnierville	....	....	350	5600	690	1380	115	144	.....	.....	.....	.....	50	50	28	140	....	....	18
19	Meteghan River	....	....	338	5408	715	1430	573	716	.....	.....	.....	.....	76	76	36	252	....	....	19
20	Meteghan	....	....	1102	17632	1949	3898	1295	1295	300	300	170	212	90	90	18	90	....	....	20
21	Comeau's Cove	....	....	266	4256	1058	2116	332	332	.....	.....	37	37	.....	.....	.....	.....	....	....	21
22	Bear Cove	....	....	304	4864	846	1692	100	100	.....	.....	.....	.....	50	50	2	10	....	....	22
23	Cape St. Mary's	....	....	3879	62064	1921	3842	816	820	..	....	275	275	840	840	....	.....	....	....	23
24	Salmon and Beaver River	4	120	.....	.....	365	730	131	131	.....	.....	.....	.....	38	38	.....	.....	....	....	24
	Totals	78	1230	20599	284648	65177	133722	113881	266871	91214	86668	22786	22878	23430	19494	2562	13654	5	75	

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the County of **Digby**, Province of **Nova Scotia**, during the year 1914-15—*Concluded.*

Number.	Fishing Districts.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Soles, cwt.	Soles, value.	Albacore, cwt.	Albacore, value.	Eels, cwt.	Eels, value.	Tom-cod, cwt.	Tom-cod, value.	Mixed fish, cwt.	Mixed fish, value.	Squid, brl.	Squid, value.	Clams, brl.	Clams, value.	‡Scallops, cwt.	Scallops, value.	Crabs, Cockles and other shell fish, cwt.	Crabs, Cockles and other shell fish value.	Dulse, cwt.	Dulse, value.	Number.
	Digby County.		$		$				$				$						$		$		$						$			
1	Digby and vicinity	20	20	200	1400	105	210	15	75	8	80	142	142	8	32	2	24	3	1	35	9	8	8	4897	7590	..	..	879	879	1150	1150	1
2	Bay View and Culloden	..	..	5	35	..	..	5	25	2	20	..	..	..	..	..	..	5	3	10	2	12	..	..	..	..	..	..	..	..	..	2
3	Gulliver's Cove and Waterford	25	25	12	84	5	10	..	..	..	..	..	..	20	80	3	36	6	3	65	16	1	4	50	78	..	..	..	..	..	..	3
4	Centreville	45	4	14	98	..	..	..	..	..	..	..	..	..	..	..	..	..	..	75	19	2	8	..	..	150	300	..	..	..	..	4
5	Sandy Cove and Mink Cove	30	30	3	21	10	20	5	25	1	10	..	..	215	860	..	..	4	2	50	13	1	4	75	116	..	..	..	..	..	..	5
6	Little River and Whale Cove	20	20	4	28	10	20	5	25	1	10	..	..	30	120	4	48	2	1	22	5	2	8	..	..	..	..	..	..	..	..	6
7	Tiddville and East Ferry	100	100	2	14	..	..	..	..	1	10	..	..	257	1028	..	..	..	..	10	2	2	8	..	..	..	..	..	..	..	..	7
8	Tiverton and Central Grove	40	40	20	140	..	..	..	..	2	20	..	..	..	..	..	..	..	..	45	11	5	20	50	78	..	..	..	..	..	..	8
9	Freeport	..	..	500	3500	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	8	20	80	250	387	..	..	..	..	..	..	9
10	Westport	..	..	210	1470	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35	9	25	100	100	155	..	..	..	..	..	..	10
11	Smith's Cove and Brighton	1500	1500	..	..	12	24	10	50	5	50	..	..	..	..	..	..	..	..	60	15	..	..	50	78	..	..	..	..	..	..	11
12	Plympton and Weymouth	..	..	..	..	..	..	88	1056	8	80	..	..	..	..	20	240	110	55	5	1	..	..	450	697	..	..	..	..	..	..	12
13	New Edinburgh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	95	142	..	..	..	..	..	..	13
14	Belliveau and White Cove	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	..	..	..	..	182	273	..	..	..	..	..	..	14
15	Grosses Coques	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	8	..	..	..	..	106	159	..	..	..	..	..	..	15
16	Church Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	20	..	..	..	..	..	..	16
17	Little Brook and Comeauville	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	6	..	..	..	..	15	22	..	..	..	..	..	..	17
18	Saulnierville	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	38	..	..	..	..	..	..	18
19	Meteghan River	10	20	6	48	..	..	..	..	..	..	..	..	..	..	..	..	6	12	..	..	..	..	25	37	..	..	..	..	..	..	19
20	Meteghan	..	..	8	56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	73	110	..	..	..	..	..	..	20
21	Comeau's Cove	..	..	1	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	22	..	..	..	..	..	..	21
22	Bear Cove	..	..	9	63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22
23	Cape St. Mary's	..	..	16	112	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	55	83	..	..	..	..	..	..	23
24	Salmon and Beaver Rivers	30	60	..	..	..	..	..	..	6	60	..	..	..	..	50	200	..	..	..	..	..	..	15	23	..	..	..	..	..	..	24
	Totals	1820	1860	1010	7076	142	284	128	1256	34	340	142	142	530	2120	79	548	145	95	442	109	63	252	6548	10118	150	300	879	879	1150	1150	

* Cwt. =100 lbs. ‡ Taken on the Campobello Banks.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Digby**, Province of **Nova Scotia**, during the year 1914–15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, shipped green-salted, cwt.	Cod, dried, †quintal.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintal.	Hake and Cusk, used fresh, cwt.	Hake and Cusk, dried, quintal.	Pollock, dried, quintal.	Herring, used fresh, cwt.	Herring, canned, cases.	Herring, pickled, brl.	Herring used as bait, brl.	Mackerel, used fresh, cwt.	Mackerel, salted, brl.	Shad, used fresh, cwts.	Alewives, used fresh, cwt.	Number.
	Digby County.																					
1	Digby and vicinity	12	....	315	4259	2000	2747	5000	19590	.....	....	2675	557	.....	.....	.....	522	10	....	....	20	1
2	Bay View and Culloden	..	....	500	50	125	83	1000	.....	.....	1100	.....	167	.....	.....	.....	10	.....	.....	.....	.....	2
3	Gulliver's Cove to Waterford	60	....	500	200	.....	265	1200	.....	.....	.....	1333	500	....	....	.....	1012	90	160	....	25	3
4	Centreville	.....	267	226	.....	.....	1187	759	14180	.....	.....	2104	117	....	1000	.....	465	.....	....	....	45	4
5	Sandy Cove and Mink Cove	.....	..	620	.....	.....	500	1200	.....	.....	.....	500	153	..	.....	.....	1080	180	240	....	30	5
6	Little River and Whale Cove	.....	438	924	.....	.....	425	....	6100	.....	.....	2408	50	.....	.....	.....	950	20	....	....	20	6
7	Tiddville and East Ferry	.....	.....	350	.....	.....	328	400	.....	.....	.....	1083	507	.....	.....	.....	523	420	....	....	100	7
8	Tiverton and Central Grove	.....	76	1848	.....	.....	4483	.....	1725	.....	.....	9056	1334	.....	.....	.....	230	20	....	....	40	8
9	Freeport	.....	....	1650	.....	.....	1938	2300	.....	.....	.....	6521	1733	.....	.....	.....	5 0	....	....	....	.....	9
10	Westport	.....	536	1328	.....	.....	3850	4200	.....	.....	.....	4167	2100	....	.....	.....	630	.....	....	....	.....	10
11	Smith's Cove and Brighton	2	.....	10	10	.....	.....	50	.....	.....	30	.....	41	.....	.....	.....	830	20	....	5	1500	11
12	Plympton and Weymouth	.....	.....	185	40	.....	48	310	.....	.....	240	.....	100	.....	.....	.....	125	30	....	....	.....	12
13	New Edinburgh	.....	185	630	..	.....	1	421	.....	.....	.....	.....	10	..	.....	.....	35	40	....	....	.....	13
14	Belliveau and White Cove	....	.....	64	....	.....	12	...	4555	.....	.....	.....	67	26	.....	.....	2003	436	..	....	....	14
15	Grosses Coques	.....	.....	...	...	.....	3	.....	691	....	.....	.....	.....	.....	.....	.....	1200	12	...	....	....	15
16	Church Point	.....	...	284	....	.....	82	42	.....	.....	.....	.....	.....	.....	.....	.....	7	....	...	....	.....	16
17	Little Brook and Comeauville	.....	487	948	.....	.....	271	129	.....	.....	.....	.....	.....	.....	.....	.....	7	.....	....	....	.	17
18	Saulnierville	..	.....	350	...	.....	230	115	.....	.....	.....	.....	.....	.....	.....	.....	10	28	....	....	..	18
19	Meteghan River	.....	.....	338	90	.....	208	273	.....	100	.....	.....	.....	.....	.....	10	20	36	....	....	10	19
20	Meteghan	....	347	408	100	.....	616	795	.....	166	.....	100	56	.....	.....	15	22	18	....	....	....	20
21	Comeau's Cove	.....	.....	266	.....	.....	353	332	.....	.....	.....	.....	12	.....	.....	.....	.....	.....	....	....	....	21
22	Bear Cove	.....	.....	304	.....	.....	282	100	.....	.....	.....	.....	.....	.....	.....	10	10	2	....	....	.....	22
23	Cape St. Mary's	.....	576	2727	101	.....	606	216	.....	200	.....	.....	92	.....	.....	112	252	.....	....	....	.....	23
24	Salmon and Beaver Rivers	4	.....	.....	.....	.....	121	131	.....	.....	.....	.....	.....	.....	.....	.....	19	.....	....	....	30	24
	Totals	78	2912	14775	4850	2125	18639	18973	46854	466	1370	29947	7596	26	1000	159	16712	1362	400	5	1820	
	Rates...$	20	18	16	7	5.50	6.50	2.50	8	4	1.50	3.50	5	1	3.50	4	2	5	10	15	1.50	
	Values...$	1560	52416	236400	33950	11687	121153	47432	374832	1864	2055	104814	37980	26	3500	636	21424	6810	4000	75	2730	

Cwt. = 100 lbs. Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State for the County of **Digby**, Province of **Nova Scotia**, during the year 1914–15—*Concluded.*

Number.	Fishing Districts.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Soles, used fresh, cwt.	Albacore, used fresh, cwt.	Eels, used fresh, cwt.	Tom cod, used fresh, cwt.	Mixed fish, used fresh, cwt.	Squid, used as bait, brl.	Clams and Quahaugs, used fresh, brls.	Crabs, Cockles & other Shell Fish used fresh, cwt.	Tongues and Sounds, pickled or dried, cwt.	Scallops, canned, cases.	Hake Sounds, dried, cwt.	Dulse, dried, cwt.	Fish Oil, gall.	Number.
	Digby County.																		
1	Digby and vicinity	200	105	15	8	142	8	2	3	35	2	4897	879	..	.....	65	230	2908	1
2	Bay View and Culloden	5	.....	5	2	....	....	.....	5	10	3	.....	.....	...	.....	10	....	.....	2
3	Gulliver's Cove to Waterford	12	5	....	.....	....	20	3	6	65	1	50	....	.....	.....	30	....	.....	3
4	Centerville	14	.....	.....	.....	.....	.....	.....	.....	75	2	.....	.....	.....	150	13	....	2300	4
5	Sandy Cove and Mink Cove	3	10	5	1	.....	215	..	4	50	1	75	....	.....	.....	75	....	760	5
6	Little River and Whale Cove	4	10	5	1	.....	30	4	2	22	2	.....	.....	.....	.....	15	...	2150	6
7	Tiddville and East Ferry	2	.....	.....	1	.....	257	....	.....	10	2	.....	.....	.....	.....	12	.....	.....	7
8	Tiverton and Central Grove	20	.....	.....	2	.....	.....	.....	.....	45	5	50	....	..	...	90	....	11600	8
9	Freeport	500	....	.	...	.....	.....	..	...	30	20	250	....	.....	.....	50	...	1650	9
10	Westport	210	.....	...	.....	.....	.....	.....	.....	35	25	100	....	.....	.....	75	....	1900	10
11	Smith's Cove and Brighton	....	12	10	5	...	...	...	...	60	....	50	....	.....	.....	..	.....	.....	11
12	Plympton and Weymouth	...	...	88	8	...	.....	20	110	5	....	450	....	.....	.....	...	....	.....	12
13	New Edinburgh	.....	.....	.....	.....	.....	.....	.....	.....	...	...	95	....	.....	.....	...	.....	.....	13
14	Belliveau and White Cove	.....	.....	.....	.....	.....	.....	.....	2	....	.....	182	....	.....	.....	.....	.....	.....	14
15	Grosses Coques	.....	.....	.....	.....	.....	.....	.....	4	....	.....	106	....	.....	.....	.....	.....	.....	15
16	Church Point	...	.....	.....	.....	.....	.....	.....	...	....	.....	20	....	.....	.....	.....	.....	.....	16
17	Little Brook and Comeauville	.	..	.....	.....	.....	.....	.....	3	.....	.....	15	....	.....	.....	.....	...	25	17
18	Saulnierville	....	.....	.....	.....	.....	.....	.....	...	.....	.....	25	....	.....	.....	.....	.....	.....	18
19	Meteghan, River	6	.....	.....	.....	.....	.....	.....	6	.....	.....	25	....	.....	.....	.....	.....	15	19
20	Meteghan	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	....	.....	.....	.....	.....	30	20
21	Comeau's Cove	1	.....	.....	.....	.....	.....	.....	...	.....	.....	15	..	.....	....	.....	.....	.....	21
22	Bear Cove	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	..	.....	.....	.....	.....	10	22
23	Cape St. Marys	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	7	.....	.....	200	23
24	Salmon and Beaver Rivers	....	.....	.....	6	.....	.....	50	....	.....	.....	15	.....	.....	.....	...	.....	6	24
	Totals	1010	142	128	34	142	530	79	145	442	63	6548	879	7	150	465	230	23564	
	Rates	$ 9	2.75	12	12	3	5	7	1	.50c.	4	2	2	5	8	28c.	5	30c.	
	Values	$ 9090	391	1536	408	426	2650	553	145	221	252	13096	1758	35	1200	130	1150	7069	

Total Value $1,109,264

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.
	Annapolis County.		$		$		$		$		$		$		$		$
1	Margaretsville.	24	480	57	912	1300	2600	400	800	105	105	65	65	620	620	..	....
2	Port George...	35	700	90	1440	980	1960	600	1200	130	130	75	75	740	740		....
3	Port Lorne....	20	400	90	1440	1550	3100	970	1840	120	120	300	300	1030	1030	.	....
4	Hampton.. ..	20	400	250	4000	760	1520	850	1700	400	400	125	125	560	560	..	....
5	Phinney's Cove	....	....	200	3200	1065	2120	1800	3600	950	950	150	150	850	850	..	....
6	Parker's Cove..	...	....	300	4800	1500	3000	1750	3500	2600	2600	110	110	409	400	..	....
7	Hillsburn.	.	. .	250	4000	7400	14800	5995	11990	5800	5800	50	50	321	321	..	. .
8	Litchfield.....	..	..	150	2400	1330	2660	1910	3820	4300	4300	...	. .	340	340	..	....
9	Port Wade...	..	....	100	1600	2650	5300	6900	13800	3300	3300	...	...	850	850	..	....
10	Victoria Beach.	....	..	280	4480	5500	11000	9025	18050	7200	7200	67	67	140	140	.	...
11	Deep Brook and Clementsport.	...	....	....	.....	700	1400	525	1050	50	50	...	...	525	525	50	250
12	Annapolis, Lequille and Nicteaux Riv.	45	900	....	.....	.....	....	.....	.....	....	. ....	..	...	..	....	..	....
	Totals... .	144	2880	1767	28272	24730	49460	30725	61350	24955	24955	942	942	6376	6376	59	250

* Cwt. = 100 lb.

SESSIONAL PAPER No. 39

CATCH.

in the County of **Annapolis**, Province of **Nova Scotia**, during the year 1914–15.

Shad, cwt.	Shad, value.	Sardines, brl.	Sardines, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Sturgeon, cwt.	Sturgeon, value.	Bass, cwt.	Bass, value.	Tom-cod, cwt.	Tom-cod, value.	Mixed Fish, cwt.	Mixed Fish, value.	Clams, cwt.	Clams, value.	Dulse, Crabs, etc., cwt.	Dulse, Crabs, etc., value.	Number.
	$		$		$		$		$		$		$		$		$		$		$		$	
..	....	....	..	....	.....	..	....	..	..	....	....	..	....	..	....	..	..	....	....	....	..	....	....	1
....	...	....	...	....	....	..	....	..	..	....	....	..	....	..	....	..	..	...	. .	...	....	....	....	2
....	...	....	...	....	. .	..	....	..	..	....	....	..	....	..	....	..	..	....	....	....	...	....	....	3
....	....	....	....	....	....	.	....	..	..	....	....	..	....	..	....	..	..	....	....	...	.	....	...	4
....	..	....	...	....	.....	..	....	.	..	....	....	..	....	..	....	..	..	....	....	..	...	..	...	5
....	..	....	...	....	.....	..	....	.	..	....	....	..	....	..	....	..	..	....	....	....	....	..	..	6
..	....	....	...	525	4200	..	....	..	..	....	....	..	....	..	....	..	..	....	....	....	....	....	...	7
..	....	....	....	....	.....	..	....	..	..	....	....	..	..	..	....	..	..	....	....	....	....	....	....	8
....	...	300	600	650	5200	20	40	..	..	..	....	..	....	..	....	..	..	....	....	812	1018	....	....	9
....	....	...	....	547	4376	..	...	..	..	....	....	..	....	..	....	..	..	....	....	....	...	125	625	10
....	....	....	...	....	...	20	40	20	40	150	2250	..	....	..	....	20	40	125	250	406	611	....	....	11
25	125	..	..	...	.....	10	20	20	40	250	3755	26	442	50	500	..	..	...	....	....	....	..	....	12
25	125	300	600	1722	13776	50	100	40	80	400	6005	26	442	50	500	20	40	125	250	1218	1629	125	625	

THE CATCH

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed of **Nova Scotia**, during

Number.	Fishing Districts.	Salmon used fresh and frozen, *cwt.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, smoked fillets, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock, smoked, cwt.	Haddock, dried, quintals.	Hake and cusk, dried, quintals.	Pollock, dried, quintals.	Herring, pickled, brl.
	Annapolis County.											
1	Margaretsville	24	57	200	.....	367	80	.....	107	35	22	120
2	Port George	35	90	90	.....	297	300	.....	100	43	25	135
3	Port Lorne	20	90	175	....	458	60	.....	303	40	100	252
4	Hampton	129	250	65	.....	232	125	.....	242	133	41	180
5	Phinneys Cove	.....	200	250	.....	270	310	....	497	317	50	175
6	Parkers Cove	.....	300	300	.....	400	300	.....	483	867	31	50
7	Hillsburn	.....	250	.....	.....	2467	500	1000	1165	1933	.....	45
8	Litchfield	....	150	460	.....	290	530	1147	460	1433	13	40
9	Port Wade	.....	100	1005	.....	548	2800	1300	602	1100	...	55
10	Victoria Beach	.....	280	1800	133	1100	3800	.....	875	2400	22	....
11	Deep Brook and Clementsport	....	...	50	....	217	125	.....	133	17	.....	50
12	Annapolis, Lequille and Nicteaux Rivers	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals	144	1767	4395	133	6646	8930	3447	4967	8318	304	1102
	Rates	$ 20	16	2	8	7	2	7	5	4	4	4.50
	Values	$ 2880	28272	8790	1064	46522	17860	24129	24835	33272	1216	4959
	Total value											

*Cwt. = 100 lbs. †Quintal = 112 lbs.

SESSIONAL PAPER No. 39

MARKETED.

in a fresh, dried, pickled, canned, etc., State, for the County of **Annapolis**, Province the year 1914-15.

Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Shad, used fresh, cwt.	Sardines, sold fresh or salted, brl.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Sturgeon, used fresh, cwt.	Bass, used fresh, cwt.	Tom-cod, used fresh, cwt.	Mixed Fish, used fresh, cwt	Clams and Quahaugs, used fresh, brl.	Dulse, Crabs, Cockles and other shell fish, used fresh, cwt.	Caviare or Sturgeon Roe, cwt.	Hake Sounds, cwt.	Fish Oil, gal.	Whale Oil, gal.	Number.
130	....	....	.....	.....	...	...	.....	.....	.....	...	...	....	.....	....	...	800	100	1
167	....	....	....	.....	....	.. .	.....	.....	.....	...	...	....	.....	....	...	500	50	2
122	....	..	.....	.....	....	....	.....	.....	.....	...	.....	....	.....	....	1	700	75	3
10	....	....	.....	.....	....	....	.....	.....	.....	...	.....	....	.....	....	1	400	50	4
162	...	....	.. ...	. .	....	....	.....	.....	.....	...	.....	...	.....	....	3	1000	100	5
125	...	..	.....	.....	....	....	... ..	. ....	.....	.. .	.....	....	.....	....	8	1200	100	6
93	...	...	.....	525	....	....	.....	.....	. .	...	.....	....	.....	.....	20	2000	200	7
110	....	..	.....	.....	....	....	.....	.....	.....	...	.....	...	... ..	....	14	800	80	8
343	....	....	300	650	20	....	.....	.....	.....	...	.....	812	.....	....	11	1060	100	9
70	....	....	.....	547	....	....	.....	.....	.....	...	.....	....	125	...	24	2500	200	10
187	50	.... ..	.. ...	.....	20	20	150	.....	.....	20	125	406	.....	....	...	.....	....	11
.....	....	25	.....	.....	10	20	250	26	50	....	.....	....	.. ..	2	...	.....	....	12
1519	50	25	300	1722	50	40	400	26	50	20	125	1218	125	2	82	19900	1055	
2	5	5	2	8	2	2	15	17	10	2	2	1.50	5	200	75c	30c	12c	
3038	250	125	600	13776	100	80	6000	442	500	40	250	1827	625	400	61	3270	126	

....$225,309

*The dulse is dried.

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a Green

Number.	Fishing Districts.	Salmon, cwt.*	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Pollock, cwt.	Pollock, value.	Herring, cwt.
	Kings County.		$		$		$		$		$		$	
1	Morden and vicinity	151	2718	19	285	315	630	11	16	45	45	529	529	466
2	Victoria Harbour and Ogilvie's Wharf.	56	1008	22	330	105	210	8	12	12	12	72	72	121
3	Harbourville	113	2034	....	....	319	638	8	12	27	27	90	90	236
4	Canada Creek	128	2304	72	1080	264	528	13	20	30	30	214	214	307
5	Chipman's Brook and Hunting Point.	83	1494	....	....	147	294	10	15	15	15	126	126	236
6	Hall's Harbour	201	3618	27	405	355	710	109	163	72	72	423	423	951
7	Race Point and Sheffield Vault.	102	1836	....	....	6	12	....	....	....	....	50	50	94
8	Baxter's Harbour	41	738	16	240	319	638	30	45	6	6	389	389	386
9	Whalen Beach and Well's Cove	40	720	....	....	19	38	....	....	....	....	60	60	95
10	Scott's Bay	90	1620	40	600	322	644	46	70	15	15	248	248	755
11	Blomidon and Kingsport	32	576	....	....	124	248	10	15	....	....	60	60	95
12	Avonport and inland waters	112	2016	....	....	109	218	....	....	....	....	....	....	....
	Totals	1149	20682	196	2940	2404	4808	245	368	222	222	2261	2261	3742

*Cwt. = 100 lbs.

CATCH.

State in the County of **Kings**, Province of **Nova Scotia**, during the year 1914-15.

Herring, value.	Mackerel, cwt.	Mackerel, value.	Shad, cwt.	Shad, value.	Alewives, cwt.	Alewives, value.	Halibut, cwt.	Halibut, value.	Trout, cwt.	Trout, value.	Squid, brl.	Squid, value.	Clams, brl.	Clams, value.	Number.
$		$		$		$		$		$		$		$	
466	11	110	.....	.....	....	.....	11	110	....	.....	...	....	.....	.....	1
121	8	80	.....	.....	.....	.....	3	30	.....	.....	.....	.....	.....	.....	2
236	8	80	.....	.....	.....	.....	6	60	.....	.....	.....	.....	.....	.....	3
307	10	100	5	50	....	.....	7	70	.....	.....	....	..	....	.....	4
236	18	180	1	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
951	8	80	.6	60	.....	.....	9	90	.....	.....	...	.....	.....	.....	6
94	2	20	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	7
386	4	40	1	10	....	.....	5	50	.....	.....	.....	..	..	.. ..	8
95	3	30	7	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
755	16	160	31	310	.....	.....	16	160	.....	.....	....	.....	.....	.....	10
95	1	10	10	100	.....	.....	12	120	.....	.....	....	....	53	159	11
.....	.....	.....	.....	.....	4670	4670	.....	.....	26	260	.....	.....	.....	.....	12
3742	89	890	61	610	4670	4670	69	690	26	220	.....	...	53	159	

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the County of **Kings**, Province of **Nova Scotia**, during the year 1914-15.

Number.	Fishing Districts	Salmon, used fresh and frozen, *cwt.	Lobsters, shipped in shell, cwt.	Cod, used fresh, cwt.	Cod, dried, †quintals.	Haddock, used fresh, cwt.	Haddock, dried, quintals.	Hake and Cusk, dried, quintals.	Pollock, used fresh, cwt.	Pollock, dried quintals.	Herring, used fresh, cwt.	Herring, smoked, cwt	Herring, pickled, brl.	Herring, used as bait, brl.	Mackerel, used fresh, cwt.	Shad, used fresh, cwt.	Alewives, used fresh, cwt.	Alewives, salted, brl.	Halibut, used fresh, cwt.	Trout, used fresh, cwt.	Clams and Quahaugs, used fresh, brl.	Fish Oil, gal.	Number.
	Kings County.																						
1	Morden and vicinity	151	19	45	90	8	1	15	82	149	20	5	68	116	11	...	....	....	11	.....	...	50	1
2	Victoria Harb. and Ogilvie's Wharf	56	22	....	35	8	...	4	14	19	5	....	16	34	8	.....	....	....	3	.....	...	20	2
3	Harbourville	113	...	7	104	8	...	9	18	24	10	35	12	60	8	....	..	....	6	.....	...	30	3
4	Canada Creek.....	12[illegible]	72	30	78	13	....	10	40	58	19	53	10	76	10	5	....	....	7	.....	....	100	4
5	Chipman's Brook & Hunting Point..	83	...	....	49	10	...	5	21	35	5	42	23	39	18	1	...	....	...	.....	...	...	5
6	Hall's Harbour...	201	27	100	85	103	2	24	84	113	31	87	132	175	8	6	..	...	9	....	....	150	6
7	Race Point and Sheffield Vault. ..	102	.....	...	2	.....	...	..	5	15	....	...	28	5	2	....	....	....	....	.....	....	...	7
8	Baxter's Harbour....	41	16	175	48	30	....	2	170	73	50	....	48	96	4	1	...	....	5	.....	....	25	8
9	Whalen Beach and Wells Cove.....	40	.....	....	6	.....	...	...	15	15	25	.. ...	....	35	3	7	....	....	..	.....	....	...	9
10	Scotts Bay	96	40	145	59	46	....	5	95	51	66	181	15	141	16	31	....	....	16	.....	....	75	10
11	Blomidon and Kingsport.....	32	....	85	13	10	....	....	30	10	35	... .	6	21	1	10	...	....	12	....	53	20	11
12	Avonport and Inland Waters		.....	109	.... .	.....	.....	...	....	.....	.....	.....	.....	...	....	.....	1070	1200	.....	26	....	....	12
	Totals..	1149	196	696	569	236	3	74	574	562	266	403	358	798	89	61	1070	1200	69	26	53	470	
	Rates...	18	16	3	6	2	6	4	2	4	1	4	4.50	2	10	10	1.50	3 50	10	10	3	30c	
	Values.....	20682	3136	2088	3414	472	18	296	1148	2248	266	1612	1611	1596	890	610	1605	4200	690	260	159	141	
	Total value.....																					$ 47,142	

*Cwt=100 lbs. †Quintal=112 lbs.

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state, for **District No. 3**, Province of **Nova Scotia**, during the year 1914-15.

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity	Value.	
			$		$	$
Salmon	cwt.	1,877	33,868			
" used fresh	"			1,877		35,102
Lobsters	"	120,693	1,341,447			
" canned	cases.			28,282	509,076	
" shipped in shell	cwt.			64,130	1,026,080	1,535,156
Cod	"	624,146	1,268,698			
" used fresh	"			35,392	117,044	
" smoked fillets	"			133	1,064	
" green—salted	"			40,736	165,931	
" dried	"			168,401	1,149,332	1,435,371
Haddock	"	314,233	561,520			
" used fresh	"			51,083	111,362	
" smoked (finnans)	"			61,980	489,620	
" dried	"			46,108	211,897	812,879
Hake and Cusk	"	147,010	142,610			
" used fresh	"			3,115	4,512	
" dried	"			47,783	171,396	175,908
Pollock	"	67,553	67,228			
" used fresh	"			1,692	2,710	
" dried	"			21,622	98,314	101,024
Herring	"	228,285	209,842			
" used fresh	"			28,788	43,271	
" smoked	"			10,593	47,765	
" pickled	brl.			31,964	121,834	
" used as bait	"			41,432	93,718	306,588
Mackerel	cwt.	23,544	113,329			
" used fresh	"			13,872	79,020	
" salted	brl.			3,227	38,405	117,425
Shad	cwt.	117	1,015			
" used fresh	"			117		1,070
Alewives	"	18,573	17,955			
" used fresh	"			10,122	15,664	
" salted	brl.			2,817	10,091	
Sardines	cwt.	300	600			25,755
" sold fresh or salted	brl.			300		600
Halibut, used fresh	cwt.	8,722	64,478	8,722		70,583
Flounders	"	192	384	192		491
Smelts	"	1,405	15,775	1,405		19,633
Trout	"	509	7,095	509		7,158
Soles	"	142	142	142		426
Albacore	"	3,758	15,175	3,758		16,514

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state, for **District No. 3**, Province of **Nova Scotia**, during the year 1914-15.—*Concluded.*

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total Marketed Value
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Sturgeon	cwt.	28	456	28		456
Bass	"	50	500	50		500
Eels	"	521	2,376	521		3,296
Tom-cod	"	165	135	165		185
Swordfish	"	1,185	8,139	1,185		9,051
Mixed Fish	"	2,863	2,091	2,863		2,775
Squid	brl.	107	420	107		420
Scallops	"	5,810	17,015	5,810		18,180
Clams	"	9,564	14,399			
" used fresh	"			9,564		18,580
Seals	No.	70	79			
* Dulse, Cockles and other shell fish	cwt.	2,325	3,062	*1,405		4,217
Tongues and Sounds	"			17		235
Caviare (sturgeon roe)	"			2		400
Hair Seal Skins	No.			70		70
Fish Oil	gal.			84,488		25,336
Whale Oil	"			1,055		126
Hake Sounds (dried)	cwt.			547		191
Fertilizer and Offal	ton.			1,692		6,129
Glue	gal.			6,080		4,560
Glue stock	ton.			31		310
Fish Skins	"			6		360
Totals			3,909,824			4,755,060

* The Dulse included is dried.

RECAPITULATION

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in **District No. 3**, Province of **Nova Scotia**, for the year 1914–15.

	Number.	Value.
		$
Steam fishing vessels (tonnage 358)	11	45,000
Sailing and gasoline vessels	402	1,601,345
Boats (sail)	2,995	87,417
" (gasoline)	2,299	586,000
Carrying smacks	47	48,565
Gill nets, seines, trap and smelt nets, etc	16,127	205,343
Weirs	106	27,700
Trawls	10,050	94,947
Hand lines	14,423	12,737
Lobster traps	346,862	346,862
" canneries	67	98,350
Clam "	1	250
Freezers and ice-houses	164	192,335
Smoke and fish-houses	2,288	276,000
Fishing piers and wharves	745	767,655
Total		4,390,506

Number of men employed on Vessels	4,147
" " Boats	7,499
" " Carrying Smacks	111
" persons employed in Fish-houses, Freezers, Canneries, etc	2,555
Total	14,312

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state, for the **whole** Province of **Nova Scotia**, during the year 1914-15.

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Salmon	cwt.	9,099	104,423			
" used fresh	"			8,986	141,737	
" canned	cases.			40	320	
" smoked	cwt.			48	960	
						143,017
Lobsters	"	228,609	1,933,815			
" canned	cases.			76,370	1,381,013	
" shipped in shell	cwt.			75,683	1,141,586	
						2,522,599
Cod	"	923,020	1,721,508			
" used fresh	"			77,311	198,881	
" smoked	"			500	4,000	
" green-salted	"			84,012	312,954	
" smoked fillets	"			133	1,064	
" dried	"			224,993	1,475,201	
						1,992,100
Haddock	"	544,111	863,632			
" used fresh	"			131,209	260,662	
" green-salted	"			7,468	14,936	
" smoked (finnans)	"			68,964	529,984	
" dried	"			86,384	394,685	
						1,200,267
Hake	"	170,537	164,609			
" used fresh	"			4,331	5,737	
" green salted	"			168	336	
" dried	"			55,080	199,488	
						205,561
Pollock	"	165,813	104,130			
" used fresh	"			12,034	18,140	
" green-salted	"			448	896	
" dried	"			30,619	133,515	
						152,551
Herring	"	412,875	386,461			
" used fresh	"			42,937	61,621	
" smoked	"			20,894	78,618	
" pickled	brl.			65,299	269,935	
" used as bait	"			65,604	138,604	
" used as fertilizer	"			700	350	
						549,128
Mackerel	cwt.	83,538	375,967			
" used fresh	"			40,572	235,474	
" salted	brl.			14,296	168,809	
						424,283
Shad	cwt.	426	3,263			
" used fresh	"			411	3,999	
" salted	brl.			5	75	
						4,074
Alewives	cwt.	25,551	26,402			
" used fresh	"			12,352	20,003	
" salted	brl.			4,401	16,440	
						36,443

OF the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state, for the **whole** Province of **Nova Scotia**, during the year 1914–15.—*Concluded.*

Kinds of Fish.		Caught and landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Sardines	cwt.	300	600			
" sold fresh or salted	brl.			300		600
Halibut, used fresh	cwt.	24,689	166,408	24,689		224,963
Flounders	"	2,225	1,632	2,225		10,586
Smelts	"	5,874	38,192	5,874		50,159
Trout	"	923	10,309	923		11,298
Soles	"	484	416	484		2,136
Albacore	"	4,741	17,174	4,741		18,971
Sturgeon	"	28	456	28		456
Bass	"	149	996	149		1,490
Eels	"	1,827	6,377	1,827		8,930
Tom-cod	"	181	151	181		265
Swordfish	"	4,982	22,952	4,982		24,780
Mixed Fish	"	3,424	2,375	3,424		3,600
Capelin	brl.	63	63	63		63
Squid	"	2,154	6,750	2,154		8,969
Oysters	"	1,824	7,133	1,824		8,811
Scallops	"	5,810	17,015	5,810		18,180
Clams	"	18,214	23,767			
" used fresh	"			18,119	35,742	
" canned	cases.			95	427	
						36,169
Dulse, cockles and other shell fish	cwt.	2,325	3,062	*1,405		4,217
Seals	No.	801	801			
Tongues and sounds	cwt.			262		1,460
Caviare (sturgeon roe)	"			2		400
Hair seal skins	No.			801		804
Fish oil	gal.			156,863		51,185
Whale oil	"			1,055		126
Hake sounds, dried	cwt.			547		191
Fertilizer and offal	ton.			1,692		6,129
Glue	gal.			6,080		4,560
Glue stock	ton.			31		310
Fish skins	"			6		360
Total			6,010,839			7,730,191

*The Dulse included is dried.

RECAPITULATION

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in the **whole** Province of **Nova Scotia**, for the year 1914-15.

——	Number.	Value.
		$
Steam fishing vessels (tonnage, 358)	11	45,000
Sailing and gasoline vessels	642	1,775,895
Boats (sail)	9,258	323,731
" (gasoline)	4,035	943,515
Carrying Smacks	201	117,725
Gill nets, seines, trap and smelts nets, etc	62,693	647,440
Weirs	179	30,590
Trawls	17,021	167,858
Hand lines	32,105	26,312
Lobster traps	796,674	721,624
" canneries	229	297,125
Clam canneries	2	350
Freezers and ice-houses	327	673,461
Smoke and fish-houses	5,017	593,858
Fishing piers and wharves	1,832	1,204,537
Total value		7,568,821

Number of men employed on Vessels	5,302
" " Boats	16,922
" " Carrying Smacks	382
" persons employed in Fish-houses, Freezers, Canneries, etc.	6,758
Total	29,364

APPENDIX No. 4.

QUEBEC

GULF DIVISION, SEA FISHERIES DISTRICT: COMPRISING THE COUNTIES OF BONAVENTURE, GASPE, SAGUENAY AND RIMOUSKI. INSPECTOR, WM. WAKEHAM, M.D., GASPE BASIN.

GULF DIVISION, INLAND FISHERIES DISTRICT: COMPRISING THE COUNTIES OF TEMISCOUATA, KAMOURASKA, L'ISLET, MONTMAGNY, CHICOUTIMI, CHARLEVOIX, MONTMORENCY AND QUEBEC. INSPECTOR, WM. WAKEHAM, M.D., GASPE BASIN.

THE EASTERN TOWNSHIPS, INSPECTOR, C. A. BERNARD, ST. CESAIRE.

THE ST. LAWRENCE RIVER FROM HUNTINGDON COUNTY TO BELLECHASSE, AND THE COUNTIES FROM PORTNEUF TO SOULANGES. INSPECTOR, JOSEPH RIENDEAU, LONGUEUIL.

No written report on the fisheries of the Gulf Division for 1914-15 was available for inclusion herein, owing to the sudden death of Inspector Wakeham since the close of the fiscal year.

N.B.—In the inland portions of Quebec, including the inland section of the Gulf Division, the fisheries are administered by the Provincial Government. The Department merely exercises a general supervision.

[*Translation.*]

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to forward herewith my annual report for the fiscal year 1914-15, together with the statistical returns.

From my own observation and from the information obtained from the local fishery officers, and from the fishermen of the district, I find that the improvement noted during the last two years in this district is more pronounced this year. This improvement, however, has only been noticed in the cases of such fish as perch and eels, the latter of which have been plentiful. There is a decrease in the catch of pike, trout and bass.

Owing to the greater demand for the fish this year, the prices obtained by the fishermen were slightly higher than for the previous season.

The catch of fish, especially eels, in the Richelieu river, in the counties of Chambly, Vercheres, St. John and Iberville, increased this year. At Iberville the quantity of eels taken was greater and the prices received for the catch shows an increase. This fishery, however, is carried on under greater difficulties since the dyke at Chambly was built.

The fishery regulations are well observed; the fishery officers do their duty, and illegal fishing at the mouth of the Richelieu river has stopped.

At the Bay of Missisquoi and at Rivière-aux-Brochets, in the counties of Iberville and Missisquoi, pickerel were abundant, but a decrease is reported in the other kinds of fish. The fishery regulations at this point are well observed.

In the different lakes to the east of the district, which are fished by amateur fishermen, the catch has been quite good. In Lake Memphremagog, however, it has been noted that the catch of trout and salmon shows a decrease. No illegal fishing is reported in this district.

An increase is reported in the catch of eels and a few other varieties of fish in the Yamaska river, in the counties of Richelieu, Ste. Hyacinthe, Rouville, Bagot and Shefford; but pickerel, bass, sturgeon and maskinonge were not so plentiful. In spite of the vigilant watch of the fishery officers along this river, illegal fishing is carried on, especially in the spring when the carp are going up-stream.

In the counties of Dorchester, Megantic and Beauce, rivers which have been polluted with saw-dust are being slowly re-stocked. The fishery officers in this district are very lax in enforcing the regulations, with the result that the people pay very little attention to the observance of the same.

I find that the regulations, in general, are better observed in localities where licenses are issued and the fishery officers are stricter in enforcing the regulations.

Fishing with nets of less than three-inch mesh should be made illegal, especially in small streams, also the use of nets should be prohibited from the 1st of October to the 31st of December.

I am, sir, your obedient servant,

C. BERNARD,
Inspector of Fisheries.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I beg to submit my report for the fiscal year ending March 31, 1915, together with the statistics relating thereto.

I may state, at the outset, that in last year's yield there is a decrease in what I call the game fish, such as bass, pike, pickerel, and maskinonge, and an increase in soft fish. This may be attributed to an exaggerated use of nets of all kinds with small mesh, which catch without distinction game or soft fish. The first, which is in a lesser quantity, suffer more than the second, which is much more abundant.

Although notified by myself and the district overseers, the fishermen in Lake St. Peter, counties of Lapriere, Chambly, Vercheres, Nicolet, Maskinonge and Berthier, though they knew of the harm done by using illegal implements during closed season, when the fish is in an immature condition or when it is even difficult for them to ascend the small rivers or tributaries, continue their misdoings and use freely all kinds of nets, day and night, and on Sundays as well as any other day of the week.

In small streams nets constitute a general blockade and the fish cannot ascend during the spawning season, also the immature, descending to the deeper waters, become entangled in the meshes.

I have remarked that, where licenses prevail, the improvement is more perceptible; there is more activity from the fishery officers, and the public, as well as the interested parties, are more careful in seeing that the by-laws are complied with.

In my opinion, the law should prohibit the use of hoop-nets or seines of less than three inches mesh, extension measure, while gill-nets and other nets should not be permitted in small streams.

Licenses are still being granted for the use of nets in small rivers, such as Lachenaie and L'Assomption, which are visited by game fish during the spawning season, and other streams in the southern part of my district.

I am able to state that, owing to a great decrease in the number of seines and other nets, I have noted a marked improvement in the fishing grounds in Lake St. Louis and Lake St. Francis, counties of Two Mountains, Richelieu, Jacques Cartier, Vaudreuil, and Soulanges. Compared with former years, the law is better observed.

Eels have been very abundant last year. From the best calculation I find that 120 cwts. have been sent to the United States.

At St. Regis, the Indians continue to send their fish to the United States.

I respectfully suggest that fishing through the ice in the winter season, if not prohibited, should be submitted to certain laws and closely watched, as large quantities of immature fish, including game fish, are destroyed yearly by such fishing.

I would also suggest that fishways should be constructed in the Maskinonge river, and at Delisle river, in the county of Soulanges. In both places the fish, in trying to ascend the rivers, are stopped by banks or dams which block the way, and they are obliged to spawn at the foot of these obstacles.

It is to be sincerely regretted that licenses for nets should be granted in Lakes St. Louis, St. Francis, and Two Mountains, where improvements were certainly marked. With the new system, I am afraid that before two years there will be a complete disappearance of game fish in these waters.

Night lines should be prohibited from October 15 to June 15 of each year.

As I said in my last report, the only remedy, in my humble opinion, against the consequences of illegal fishing and the abuse of net fishing, and to replenish our rivers, would be to prohibit the use of nets from the county of Champlain, on the north shore, and the county of Nicolet, on the south shore, of the St. Lawrence river and its tributaries, along both shores up to the Canadian Pacific railway bridge at Lachine, for a certain number of years.

The above is respectfully submitted.

I am, sir, your obedient servant,

JOS. RIENDEAU,
Inspector of Fisheries.

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the **Gulf Division**, (Sea Fisheries District) Province of **Quebec**, during the year 1914-15.

BONAVENTURE COUNTY.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.																		Fishing Gear.		
		Steam Vessels.				Sailing and Gasoline Vessels.					Boats.					Carrying Smacks.				Gill Nets, Seines, Trap and Smelt Nets, etc.		
		Number.	Tons.	Value.	Men.	(40 tons and over) Number.	(20 to 40 tons) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.	Number.	Value.	Number.	
				$					$			$		$			$			$		
1	Subdiv. of Restigouche	....	..	....	...	.....	... .	.....	.....	.....	53	1600	....	....	60	...	.	.. .	63	3000	1
2	" Bonaventure	....	....	....	....	5	.. ...	.....	10000	25	150	5000	2	1800	220	....	..	.. .	350	3400	2
3	" Port Daniel	...	...	...	..	...	.....	1	500	3	220	11500	3	1500	420	2	500	5	390	5700	3
	Totals	....	...	...	..	5	.....	1	10500	28	423	18100	5	3300	700	2	500	5	803	12100	

GASPÉ COUNTY.

4	Subdiv. of Grand River	....	....	...	...	.....	.....	.....	..	....	483	36480	9	2700	1057	2	450	4	1076	20812	4
5	" Gaspé Bay	....	....	....	..	.....	....	.....	....	... ...	832	68250	56	16400	1724	.....	.....	.... .	1913	39990	5
6	" Mont Louis and Ste. Anne	...	.. .	....	..	....	.....	.. .	.....	.....	500	12370	20	9750	720	.....	.....	... .	1350	16375	6
7	" Magdalen Islands, S.	....	....	....	...	6	.....	... .	3750	30	501	20040	30	6000	1266	4	3000	8	4312	55250	7
8	" " N.	...	....	...	....	3	.....	.....	2400	23	318	9930	40	10500	729	.....	... .	.....	960	17550	8
	Totals	....	....	... ..	...	9	... .	.. ..	6150	53	2634	147070	155	45350	5496	6	3450	12	9611	149977	

SAGUENAY COUNTY.

9	Subdiv. of Godbout							11	4150	24	200	5900	3	1200	210				369	12200	9
10	" Moisie	2	300	40000	20						35	2500	3	750	60				60	7500	10
11	" Mingan										184	16800			450				65	3420	11
12	" Natashquan										70	5000	3	2000	160				60	4525	12
13	" Romaine										31	1870	2	1200	53				68	910	13
14	" St. Augustin										176	7790	4	950	255				180	12000	14
15	" Bonne Espérance						3		4500	18	286	13550	16	6550	456	1	4060	2	165	47495	15
	Totals	2	300	40000	20		3	11	8650	42	982	53110	31	12650	1644	1	4000	2	967	88050	

RIMOUSKI COUNTY.

16	Subdiv. of Rimouski County											129	1872	4	3400	85				131	2425	16

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing Industry in the **Gulf Division**, (Sea Fisheries District) Province of **Quebec**, during the year 1914-15—*Concluded.*

BONAVENTURE COUNTY.

Number.	Fishing Districts.	Fishing Gear.								Canneries.				Other Material.						Persons Employed in Canneries Freezers and Fish Houses	Number.
		Weirs.		Trawls.		Hand Lines.		Lobster Traps.		Lobster Canneries.		Whaling Stations.		Freezers and Ice Houses.		Smoke and Fish Houses.		Fishing Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
			$		$		$		$		$		$		$		$		$		
1	Subdiv. of Restigouche	...	...	...	...	...	...	...	...	...	...	...	...	20	500	...	...	...	...	...	1
2	" Bonaventure	20	230	23	110	360	180	1500	1500	3	900	...	...	8	250	70	7500	2	18000	100	2
3	" Port Daniel	...	...	135	700	780	390	7500	7500	7	2500	...	...	10	650	40	3500	...	...	130	3
	Totals	20	230	158	810	1140	570	9000	9000	10	3400	...	...	38	1400	110	11000	2	18000	230	

GASPÉ COUNTY.

4	Subdiv of Grand River	...	...	102	2090	2376	2250	16560	16560	13	1300	...	...	17	1350	109	81400	5	3000	402	4
5	" Gaspé Bay	...	...	...	...	4516	5645	4200	4200	6	1900	...	...	49	2850	468	76675	16	31545	366	5
6	" Mont Louis and Ste. Anne	...	...	...	...	1350	2700	350	350	1	200	...	...	5	500	25	7500	5	2000	30	6
7	" Magdalen Islands, South	...	...	170	800	3380	1430	50450	50450	15	16050	...	...	11	4300	87	9300	6	3000	294	7
8	" " " North	...	...	135	690	750	375	69800	69800	25	19500	...	...	2	2800	9	3000	9	4900	97	8
	Totals	...	...	407	3580	12372	12400	141360	141360	60	38950	...	...	84	11800	698	177875	41	44445	1189	

SAGUENAY COUNTY.

9	Subdiv. of Godbout	80	8000	16	95	400	200	200	200	1	350	....	.....	92	3500	10	210	1	170	30	9
10	" Moisie	..	....	10	50	120	75	.....	.....	...	.....	1	50000	20	1000	25	670	1	150	60	10
11	" Mingan	..	.....	...	.....	1800	1169	400	400	1	250	..	.....	30	1500	59	30000	6	3000	10	11
12	" Natashquan	.	....	....	....	494	247	1675	1675	8	2375	....	.. .	2	850	91	14775	10	2050	40	12
13	" Romaine	...	.....	....	.....	63	63	2380	2380	7	550	....	.....	1	300	15	2500	17	800	56	13
14	" St. Augustin	...	.....	....	...	1408	704	2340	2340	26	1500	..	.. ..	....	....	50	1000	130	2500	57	14
15	" Bonne Espérance	...	.....	85	480	1188	299	25	25	1	100	....	.....	....	....	60	15000	80	1000	53	15
	Totals	80	8000	111	625	5473	2757	7020	7020	44	5125	1	50000	145	7150	301	64155	245	9670	306	

RIMOUSKI COUNTY.

16	Subdiv. of Rimouski County	43	3550	....	.....	200	200	... .	.....	....	....	...	....	8	806	5	1400	..	...	26	16

THE CATCH.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the **Gulf Division** (Sea Fisheries District), Province of **Quebec**, during the year 1914-15.

COUNTY OF BONAVENTURE.

Number.	Fishing District.	Salmon, *cwt.	Salmon, value.	Lobsters, cwt.	Lobsters, value.	Cod, cwt.	Cod, value.	Haddock, cwt.	Haddock, value.	Hake and Cusk, cwt.	Hake and Cusk, value.	Herring, cwt.	Herring, value.	Mackerel, cwt.	Mackerel, value.	Capelin, brl.	Capelin, value.	Flounders, cwt.	Flounders, value.	Number.
			$		$		$		$		$		$		$		$		$	
1	Restigouche Sub-division, (Head of tide, to Miguasha)	200	2000	...	....	.....	.....	...	....	.....	...	...	.....	.....	.....	....	.....	.....	.....	1
2	Bonaventure Sub-division, (Miguasha to Paspebiac Point)	2320	23200	180	810	11200	11200	.....	.....	....	.....	50230	25115	300	900	13500	3375	....	..	2
3	Port Daniel Sub-division (Paspebiac to Point Macquereau)	890	8900	964	4338	42350	42350	450	450	450	450	22050	11025	325	975	13500	3375	.. ..	.....	3
	Totals	3410	34100	1144	5148	53550	53550	450	450	450	450	72280	36140	625	1875	27000	6750	.....	.. .	

COUNTY OF GASPE.

4	Grand River Sub-division, (Point Macquereau to Barachois)	326	3260	1476	6642	216964	216964	840	840	.....	.....	56179	28089	584	1752	.....	.....	.....	.....	4
5	Gaspé Sub-division (Barachois to Fame Point)	749	7490	182	819	124428	124428	1368	1368	.....	.....	43310	21655	.....	.....	.....	.....	. . .	.....	5
6	Mont Louis and Ste. Anne Sub-division (Fame Point to Cape Chatte)	341	3410	.....	.....	26445	26445	.....	..	.....	.....	12015	6008	.....	.....	.....	.....	.....	.....	6
7	Magdalen Islands, Southern Sub-division	.....	. .	6544	29448	36300	36300	.....	.....	.....	.....	92850	46425	16500	49500	.....	.....	.....	.....	7
8	Magdalen Islands, Northern Sub-division	.....	....	11892	53514	4328	4328	.....	.....	.....	.....	72600	36300	3393	10179	.....	.....	.....	....	8
	Totals	1416	14160	20094	90423	408465	408465	2208	2208	.....	.....	276954	138477	20477	61431	... ..	.....	.....	.....	

*Cwt. = 100 lbs.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in the **Gulf Division** (Sea Fisheries District), Province of **Quebec**, during the year 1914 15—*Continued.*

COUNTY OF BONAVENTURE.

Number.	Fishing Districts.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Halibut, cwt.	Halibut, value.	Eels, cwt.	Eels, value.	Tom-cod, cwt.	Tom-cod, value.	Mixed Fish, cwt.	Mixed Fish, value.	Squid, cwt.	Squid, value.	Clams, cwt.	Clams, value.	Seals, No.	Seals, value.	Number.
			$		$		$		$		$		$		$		$		$	
1	Restigouche Sub-division, (Head of tide, to Miguasha)	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	.....	...	.....	.....	1
2	Bonaventure Sub-division, (Miguasha to Paspebiac Point)	.....	.....	25	175	....	....	....	.....	.....	.....	.....	..	40	60	350	700	.....	....	2
3	Port Daniel Sub-division, (Paspebiac to Point Macquereau)	55	275	...	.....	....	....	.....	....	.....	.....	.....	.....	160	240	380	760	....	.....	3
	Totals	55	275	25	175	.....	....	.....	.....	....	.....	....	.....	200	300	730	1460	.....	....	

COUNTY OF GASPE.

4	Grand River Sub-division, (Point Macquereau to Barachois)	680	3400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
5	Gaspé Sub-division, (Barachois to Fame Point)	300	1500	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
6	Mont Louis and Ste. Anne Sub-division, (Fame Point to Cape Chatte)	.....	....	66	462	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
7	Magdalen Islands, Southern Subdivision	180	900	.....	.....	115	690	110	550	20	30	60	60	10	15	375	750	...	.....	7
8	Magdalen Islands, Northern Subdivision	.....	.....	...	.....	..	.....	.....	...	.....	..	.....	.....	.....	.....	15	30	450	450	8
	Totals	1160	5800	66	462	115	690	110	550	20	30	60	60	10	15	390	780	450	450	

THE CATCH

RETURN showing the Quantities and Values of all Fish caught and Landed in a Green State in the **Gulf Division** (Sea Fisheries District), Province of **Quebec**, during the year 1914-15—*Concluded.*

SAGUENAY COUNTY.

Number.	Fishing Districts.	Salmon.		Lobsters.		Cod.		Herring.		Smelts.		Trout.		Halibut.		Eels.		Mixed Fish.		Clams.		Seals.		Whales.		Number.
		*Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Bbl.	Value.	No.	Value.	No.	Value.	
			$		$		$		$		$		$		$		$		$		$		$		$	
9	Godbout Subdivision (Tadoussac to Jambons)	2200	22000	50	225	414	414	1170	585	30	150	92	644	26	156	12	60	310	310	36	72	458	458	...	...	9
10	Moisie Subdivision (Jambons to Pigon)	1442	14120	....	...	3449	3449	87	43	....	....	....	....	132	792	...	...	....	....	...	...	...	....	85	59500	10
11	Mingan Subdivision (Pigon to St. Charles)	541	5410	....	....	37650	37650	57	28	....	....	....	....	...	....	....	....	2500	2500	....	....	684	684	....	..	11
12	Natashquan Subdivision (St. Charles to Natashquan Point)	1371	13710	178	801	9936	9936	852	426	..	....	....	....	....	..	..	...	....	....	....	..	..	....	. .	.....	12
13	Romaine Subdivision (Natashquan Point to Cape Whittle)	270	2700	626	2817	1517	1517	1218	609	....	..	..	...	1	6	....	....	....	..	35	70	143	143	....	..	13
14	St. Augustin Subdivision (Cape Whittle to Chicatica)	515	5150	718	3231	22062	22062	2473	1236	....	....	62	434	....	....	....	...	...	....	..	....	1659	1659	...	.....	14
15	Bonne Esperance Subdivision (Chicatica to Blanc Sablons)	120	1200	.	....	30600	30600	600	300	....	....	30	210	20	120	....	...	512	512	....	....	100	100	....	.....	15
	Totals	6459	64590	1572	7074	105628	105628	6457	3229	30	150	184	1288	179	1074	12	60	3322	3322	71	142	3044	3044	85	59500	

RIMOUSKI COUNTY.

16	County of Rimouski	25	250	...	..	21	21	158	79	...	..	4	28	....	...	...	...	35	35	..	....	....	....	....	.....	16

*Cwt.=100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Value of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the **Gulf Division**, Province of **Quebec** (Sea Fisheries District), during the year 1914-15.

COUNTY OF BONAVENTURE.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwts.	Salmon, canned, cases.	Salmon, salted, cwts.	Lobsters, canned, cases.	Lobsters, shipped in shell, cwts.	Cod, used fresh, cwts.	Cod, shipped green-salted, cwts.	Cod, dried, †quintals.	Haddock, used fresh, cwts.	Haddock, dried, quintals.	Hake and Cusk, dried, quintals.	Herring, used fresh, cwts.	Herring, smoked, cwts.	Herring, pickled, brls.	Herring, used as bait, brls.	Herring, used as fertilizer, brls.	Mackerel, used fresh, cwts.	Number.
1	Restigouche Subdivision (Head of tide to Miguasha)	200	.....	.....	.....	.....	.....	.....	.....	.. ..	....	.....	.....	.....	.....	.....	.....	....	1
2	Bonaventure Subdivision (Mignasha to Paspebiac Point)	2320	.....	.....	90	.....	.....	3500	1400	.....	. ..	.....	.....	.....	810	900	23000	300	2
3	Port Daniel Subdivision (Paspebiac to Point Macquereau)	890	.....	..	457	50	.....	10225	7300	.....	150	150	....	.....	250	2650	8000	220	3
	Totals	3410	.....	.....	547	50	.....	13725	8700	....	150	150	.....	.....	1060	3550	31000	520	
	Rates.....$	12	.....	.....	18	6·50	.....	2·50	6	.....	4	4	. .	....	4	1·50	50c	5	
	Values.....$	40920	. .	.....	9846	325	.....	34312	52200	....	600	600	.....	.....	4240	5325	15500	2600	

COUNTY OF GASPE.

4	Grand River Subdivision (Point Macquereau to Barachois)	326	...	. ...	713	50	629	31900	56845	93	249	.....	127	....	88	26014	1880	584	4
5	Gaspé Subdivision (Barachois to Fame Point)	749	.....	....	91	.....	271	7027	36701	102	422	.....	142	.....	186	20305	1000	.....	5
6	Mont Louis and Ste. Anne Subdivision Fame Point to Cape Chatte)	341	.....	.....	.....	.....	....	.....	8815	.....	.....	....	.....	.....	765	2335	2525	.....	6
7	Magdalen Islands (Southern Subdivision)	....	.....	.....	3272	.....	.....	.....	12100	....	.....	.....	.....	675	900	44000	400	.. ...	7

8	Magdalen Islands (Northern subdivision				5946		35		1431						600	35400			8
	Totals	1416			10022	50	935	38927	109892	195	671		269	675	2539	128054	5805	584	
	Rates $	12			18	6·50	1·50	2·50	6	1·50	4		75c	2	4	1·50	50c	5	
	Values $	16992			180396	325	1402	97317	659352	292	2684		201	1350	10156	192081	2903	2920	

COUNTY OF SAGUENAY.

9	Godbout Subdivision (Tadoussac to Jambons)	2200				50		207								585			9
10	Moisie Subdivision (Jambons to Pigon)	1442						862	575						29				10
11	Mingan Subdivision (Pigon to St. Charles)			361					12550						19				11
12	Natashquan Subdivision (St. Charles to Natashquan Point)		32	896	89				3312						284				12
13	Romaine Subdivision (Natashquan Point to Cape Whittle)			180	313			100	439						406				13
14	St. Augustin Subdivision (Cape Whittle to Chicatica)		15	368	359			2133	5932						539	428			14
15	Bonne Esperance Subdivision (Chicatica to Blanc Sablons)			80					10200						200				15
	Totals	3642	47	1885	761	50		3302	33008						1477	1013			
	Rates $	12	8	7	18	6·50		2·50	6						4	1·50			
	Values	43704	376	13195	13698	325		8255	198048						5908	1520			

COUNTY OF RIMOUSKI.

16	County of Rimouski	25					21						158						16
	Rates $	12					1·50						75c						
	Values $	300					32						119						

*Cwt. = 100 lbs. †Quintal = 112 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the **Gulf Division** (Sea Fisheries District), Province of **Quebec**, during the year 1914-15.—*Concluded.*

COUNTY OF BONAVENTURE.

Number.	Fishing Districts.	Mackerel, salted, brls.	Capelin, used fresh, brls.	Smelts, used fresh, cwts.	Trout, used fresh, cwts.	Halibut, used fresh, cwts.	Eels, used fresh, cwts.	Tom-cod, used fresh, cwts.	Mixed Fish, used fresh, cwts	Squid, used as bait, brls.	Clams and Quahaugs, used fresh, brls.	Tongues and Sounds, pickled or dried, cwts.	Whalebone, cwts.	Whale Fertilizer, tons.	Hair Seal Skins, No.	Fish Oil, gals.	Whale Oil, gals.	Number.
1	Restigouche Subdivision (Head of tide to Miguasha)	..	.....	....	....	.. ..	....	. ..	.....	....	.....	.....	..	.....	... .	.....	.....	1
2	Bonaventure Subdivision (Miguasha to Paspebiac Point)	.....	13500	.....	25	.....	.....	.....	.....	40	350	...	.....	.....	.....	2500	.....	2
3	Port Daniel Subdivision (Paspebiac to Point Macquereau)	35	13500	55	.....	.....	....	....	... .	160	380	.....	.....	...	.....	7500	.....	3
	Totals	35	27000	55	25	.....	. .	.....	.. ..	200	730	.....	.....	.....	.....	10000	.....	
	Rates $	10	25c	5	7	. ..	.....	.....	. . .	1·50	2·50	.....	.....	.....	.. ....	30c	.....	
	Values $	350	6750	275	175	.....	.....	.....	.....	300	1825	.....	.....	.....	.... ..	3000	.....	

Total value ..... $ 179,143

COUNTY OF GASPE.

4	Grand River Subdivision (Point Macquereau to Barachois)	....	.. ..	680	.....	... ..	.. ...	.....	. .	....	.....	.....	.....	.....	.....	23550	.....	4
5	Gaspé Subdivision (Barachois to Fame Point)	...	.....	300	.	.....	.....	... .	.....	... .	.....	....	....	.....	.....	21050	.....	5
6	Mont Louis and Ste. Anne Subdivision (Fame Point to Cape Chatte)	..	.. .	.. .	66	..	....	....	.. .	.....	. ..	36	.....	.. .	.. ..	14150	.....	6
7	Magdalen Islands (Southern Subdivision)	5500	.....	180	.....	115	110	20	60	10	275	.....	..	.....	.....	9850	... ...	7

8	Magdalen Islands (Northern subdivision	1131									15				450	100		8
	Totals	6631		1160	66	115	110	20	60	10	390	36			450	68700		
	Rates	$ 10		5	7	6	5	1·50	1	1·50	2·50	5			1·50	30c		
	Values	$ 66310		5800	462	690	550	30	60	15	975	180			675	20610		

Total value ..... $ 1,264,728

COUNTY OF SAGUENAY.

9	Godbout Subdivision (Tadoussac to Jambons)			30	92	26	12		310		36				458	1555		9
10	Moisie Subdivision (Jambons to Pigon)					132							135	30		1291	135600	10
11	Mingan Subdivision (Pigon to St. Charles)								2500						684	12628		11
12	Natashquan Subdivision (St. Charles to Natashquan Point)															1000		12
13	Romaine Subdivision (Natashquan Point to Cape Whittle)					1					35				143	603		13
14	St. Augustin Subdivision (Cape Whittle to Chicatica)				62										1659	7055		14
15	Bonne Esperance Subdivision (Chicatica to Blanc Sablons)				30	20			512						100	1506		15
	Totals			30	184	179	12		3322		71		135	30	3044	25638	135600	
	Rates	$		5	7	6	5		1		2·50		20	35	1·50	30c	30c	
	Values	$		150	1288	1074	60		3322		177		2700	1050	4566	7691	40680	

Total value $347,787

COUNTY OF RIMOUSKI.

16	County of Rimouski				4				35									16
	Rates				7				1									
	Values				28				35									

Total value ..... $ 514

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the **Gulf Division** (Sea Fisheries District) Province of **Quebec**, during the Year 1914–15.

Kinds of Fish.	Caught and landed in a Green State.		Marketed.		Total Marketed Value.
	Quantity.	Value.	Quantity.	Value.	
		$		$	$
Salmon cwt.	11,310	113,100			
" used fresh "			8,493	101,916	
" canned cases.			47	376	
" salted (dry) cwt.			1,885	13,195	
					115,487
Lobsters "	22,810	102,645			
" canned cases.			11,330	203,940	
" shipped in shell cwt.			150	975	
					204,915
Cod "	567,664	567,664			
" used fresh "			956	1,434	
" green—salted "			55,954	139,884	
" dried "			151,600	909,600	
					1,050,918
Haddock "	2,658	2,658			
" used fresh "			195	292	
" dried "			821	3,284	
					3,576
Hake "	450	450			
" dried "			150		600
Herring "	355,849	177,923			
" used fresh "			427	320	
" smoked "			675	1,350	
" pickled brl.			5,076	20,304	
" used as bait "			132,617	198,926	
" used as fertilizer "			36,805	18,403	
					239,303
Mackerel cwt.	21,102	63,306			
" used fresh "			1,104	5,520	
" salted brl.			6,666	66,660	
					72,180
Halibut, used fresh cwt.	294	1,764	294		1,764
Capelin brl.	27,000	6,750	27,000		6,750
Smelts cwt.	1,245	6,225	1,245		6,225
Trout "	279	1,953	279		1,953
Eels "	122	610	122		610
Tom-cod "	20	30	20		30
Mixed Fish "	3,417	3,417	3,417		3,417
Squid brl.	210	315	210		315
Clams "	1,191	2,382			
" used fresh "			1,191		2,977
Seals No.	3,494	3,494			
Tongues and Sounds cwt.			36		180
Whale Bone "			135		2,700
Whale Fertilizer Ton.			30		1,050
Hair Seal Skins No.			3,494		5,241
Whales "	85	59,500			
Fish Oil gal.			104,338		31,301
Whale Oil "			135,600		40,680
Totals		1,114,186			1,792,172

RECAPITULATION.

OF the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc,, in the **Gulf Division** (Sea Fisheries District), Province of **Quebec**, for the year 1914–15.

—	Number.	Value.
		$
Steam Fishing Vessels (tonnage 300)	2	40,000
Sailing and Gasoline Vessels	29	25,300
Boats (sail)	4,168	220,452
" (gasoline)	195	64,700
Carrying Smacks	9	7,950
Gill Nets, Seines, Trap and Smelt Nets, etc	11,512	252,552
Weirs	143	11,780
Trawls	676	5,015
Hand Lines	19,185	15,927
Lobster Traps	157,380	157,380
" Canneries	114	47,475
Whaling Stations	1	50,000
Freezers and Ice-houses	275	21,150
Smoke and Fish-houses	1,114	254,430
Fishing Piers and Wharves	288	72,115
Total		1,246,226

Number of men employed on Vessels	143
" " Boats	7,925
" " Carrying Smacks	19
" persons employed in Fish-houses, Canneries, etc	1,951
Total	9,838

INLAND FISHERIES.

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in the Inland Section of the **Gulf Division**, Province of **Quebec**, during the year 1914-1915.

Number.	Fishing District.	Steam Vessels or Tugs.				Boats.					Gill-Nets.		Seines		Weirs.		Freezers and Ice-houses.		Smoke and Fish-houses.		Persons employed in Freezers, Fish-houses, etc.	Number.
		Number.	Tons.	Value.	Men.	Skiffs and sail boats.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
				$			$		$			$		$		$		$		$		
1	Temiscouata County	5	42	3500	23	13	300	2	1500	21	34	1200	..	....	12	1400	3	500	4	800	13	1
2	Kamouraska "	4	55	4500	38	25	2400	4	2350	45	11	800	.	....	19	2950	2	430	5	900	10	2
3	L'Islet "	8	80	5200	24	20	1300	5	2800	18	.....	.....	..	....	24	3850	1	300	1	150	4	3
4	Montmagny "	3	18	1900	8	18	1400	4	1500	25	8	500	..	....	21	2100	2	595	....	.....	15	4
5	Chicoutimi "	9	95	2400	34	29	2000	7	1800	13	35	3400	4	950	15	2000	1	500	...	...	25	5
6	Charlevoix "	2	10	500	8	12	800	4	1200	16	3	150	1	50	20	2400	....	..	....	...	.....	6
7	Montmorency "	3	29	2900	12	10	500	5	2800	20	.....	.....	..	....	21	4200	...	....	..	.....	.....	7
8	Quebec "	2	13	1850	9	4	200	7	3500	24	.....	.....	4	200	5	500	....	.....	....	.....	.....	8
	Totals	36	342	22750	156	131	8900	38	17450	182	94	6050	9	1200	140	19400	9	2295	10	1850	67	

RETURN showing the Quantities and Values of all Fish caught and Marketed or consumed locally, for the Inland Section of the **Gulf Division**, Province of **Quebec**, during the Year 1914-1915.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Trout, cwt.	Trout, value.	Whitefish, cwt.	Whitefish, value.	Bass, cwt.	Bass, value.	Pickerel, cwt.	Pickerel, value.	Herring, cwt.	Herring, value.	Sturgeon, cwt.	Sturgeon, value.	Eels, cwt.	Eels, value.	Mixed Fish, cwt.	Mixed Fish, value.	Number.
			$		$		$		$		$		$		$		$		$	
1	Temiscouata County	8	89	13	145							254	508	5	28	16	107	34	152	1
2	Kamouraska "	15	168	5	84			5	56			229	458	29	163	49	329	42	188	2
3	L'Islet "	3	133	1	17	13	145	17	191	12	201	350	700	35	196	45	302	48	215	3
4	Montmagny "	4	44			20	224	75	840	18	302			238	1332	198	1330	65	290	4
5	Chicoutimi "	301	3375											59	335	49	329	48	215	5
6	Charlevoix "	19	212	14	235	8	95	15	168	5	84			32	179	152	1021	59	264	6
7	Montmorency "	8	89			25	280	12	134	29	487			110	616	241	1612	139	622	7
8	Quebec "	4	45	5	84	39	438	15	168	13	218			95	532	125	840	95	425	8
	Totals	362	4155	38	565	105	1182	139	1557	77	1292	833	1666	603	3381	878	5870	530	2371	

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in the **Eastern Townships**, Province of **Quebec**, during the Year 1913-14.

Number.	Fishing Districts.	Boats.					Seines.		Hoop-Nets.		Lines.	
		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.
	Eastern Townships.		$		$			$		$		$
1	Counties of Chambly, Vercheres and St. John	46	850	3	550	46	5	200	54	810	20	100
2	Counties of Missisquoi and Iberville	42	840	3	375	57	29	1160	.....	.....	12	60
3	Counties of Stanstead and Sherbrooke	30	600	5	750	35	....	....	.....	.....	30	150
4	Counties of Shefford and Brome	20	400	2	325	27	....	....	.....	.....	20	100
5	Counties of Yamaska, Ste. Hyacinthe, Bagot and Rouville	50	750	6	750	50	12	180	60	600	25	125
6	Counties of Richmond, Wolfe, Megantic and Beauce	25	250	1	150	25	....	....	.....	.....	20	100
	Totals	213	3690	20	2900	240	46	1540	114	1410	127	635

RETURN showing the Quantities and Values of all Fish caught and marketed or consumed locally, for the **Eastern Townships**, Province of **Quebec**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Trout, cwt.	Trout, value.	Whitefish, cwt.	Whitefish, value.	Bass, cwt.	Bass, value.	Pickerel, cwt.	Pickerel, value.	Pike, cwt.	Pike, value.	Sturgeon, cwt.	Sturgeon, value.	Eels, cwt.	Eels, value.	Perch, cwt.	Perch, value.	Maskinongé, cwt.	Maskinongé, value.	Mixed Fish, cwt.	†Mixed Fish, value.	Number.
	Eastern Townships.		$		$		$		$		$		$		$		$		$		$		$	
1	County of Chambly, Vercheres and St. John	....	....	...	....	....	....	66	660	55	550	180	1440	20	200	900	7200	490	2450	15	150	685	4795	1
2	Counties of Missisquoi and Iberville	....	....	....	....	75	750	40	400	775	7750	65	520	....	....	25	200	650	3900	....	....	850	5950	2
3	Counties of Stanstead and Sherbrooke	25	500	100	1500	60	600	50	500	67	780	125	1000	....	....	50	400	160	800	....	....	360	2160	3
4	Counties of Shefford and Brome	....	....	55	825	....	....	70	700	60	600	145	1015	....	....	40	320	80	400	....	....	180	900	4
5	Counties of Yamaska, Ste. Hyacinthe, Bagot and Rouville	....	....	....	....	12	120	40	400	35	350	70	560	15	150	50	400	150	750	20	200	500	2500	5
6	Counties of Richmond, Wolfe, Megantic and Beauce	...	....	8	96	....	....	12	120	25	250	40	160	...	....	25	100	75	375	....	..	150	650	6
	Totals	25	500	163	2421	147	1470	278	2780	1017	10280	625	4695	35	350	1090	8620	1605	8675	35	350	2705	16955	

*Cwt. = 100 lbs. † "Mixed Fish" includes greylings, bull-heads and ouananiche.

RETURN showing the Number of Fishermen, etc, the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material used in the Fishing Industry, from the boundary line, County of **Huntingdon**, to **Bellechasse** on the South Shore, and from the County of **Portneuf** to County of **Soulanges**, inclusive, on the North Shore, of the Province of **Quebec**, during the year 1914-15.

Number	Fishing Districts.	Boats.					Gill-Nets.		Seines.		Hoop-Nets.		Lines.		Weirs.		Freezers and Ice-Houses.		Number
		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
			$					$		$		$		$		$		$	
1	Huntingdon, Soulanges, Beauharnois, Vaudreuil and Lake St. Francis	60	720	....	.....	60	...	.....	.....	.....	.....	.....	500	300	.....	..	.....	.....	1
2	Lake St. Louis	20	240	....	...	20	....	...	.....	.....	.....	.....	400	300	.....	.....	.....	....	2
3	Laprairie County	5	60	.....	.. ..	10	10	30	2	50	1	10	30	20	.....	.....	.....	.....	3
4	Chambly "	15	180	.....	.. .	30	.....	.	10	300	....	.....	40	40	.....	.....	.....	.....	4
5	Verchères "	12	144	.....	...	20	.....	.....	6	150	30	180	75	75	....	....	. .	.....	5
6	Richelieu "	25	250	4	1200	34	.....	.....	5	125	300	2100	150	150	.. ..	... ..	.....	.....	6
7	Yamaska "	70	700	4	12 0	75	... ...	....	2	50	1000	5000	100	100	.....	.....	.....	.....	7
8	Nicolet "	50	500	5	1000	60	235	180	12	160	130	910	130	130	.....	.....	.....	.....	8
9	Champlain and St. Maurice Counties	40	400	.....	.... .	40	30	90	10	300	20	200	200	200	.....	.....	.....	.....	9
10	Maskinongé and Berthier "	50	500	.....	.....	50	20	40	5	125	600	4200	300	300	....	....	.....	.....	10
11	L'Assomption and Terrebonne "	25	250	....	.....	25	12	24	5	125	.....	.....	250	250	.....	.....	.....	.....	11
12	Laval and Lake of Two Mountains Counties	30	300	....	.....	30	.....	.....	.....	....	....	.. ..	400	400	....	....	.....	.....	12
13	Hochelaga and Jacques-Cartier Counties	25	250	....	.....	25	.....	.	.....	.....	.....	..	200	300	.....	.....	.....	.....	13
14	Bellechasse County	45	505	.....	.....	50	.. ..	.....	4	80	.....	.....	.....	.....	48	28750	27	1600	14
	Totals	472	4999	13	3100	529	307	364	61	1465	2081	12600	2875	2565	48	28756	27	1600	

RETURN showing the Quantities and Values of all Fish caught and marketed or consumed locally, from the boundary line, County of **Huntingdon**, to **Bellechasse** on the South Shore, and from the County of **Portneuf**, to County of **Soulanges**, inclusive, on the North Shore of the Province of **Quebec**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Trout, cwt.	Trout, value.	Whitefish, cwt.	Whitefish, value.	Bass, cwt.	Bass, value.	Pickerel, cwt.	Pickerel, value.	Pike, cwt.	Pike, value.	Sturgeon, cwt.	Sturgeon, value.	Eels, cwt.	Eels, value.	Perch, cwt.	Perch, value.	Maskinongé, cwt.	Maskinongé, value.	Catfish, cwt	Catfish, value.	†Mixed Fish, cwt.	Mixed Fish, value.	Number.
			$		$		$				$		$		$		$		$		$		$		$	
1	Lake St. Francis and tributaries	....	....	..	....	...	...	40	480	25	300	20	100	60	480	530	2650	30	150	15	180	20	100	60	240	1
2	Châteauguay and Lake St. Louis	.. ..	....	...	.	200	2000	90	1080	15	150	20	100	30	240	50	250	30	150	6	72	10	50	40	160	2
3	Laprairie County	..	....	...	....	...	..	20	300	10	100	5	25	3	24	12	72	10	50	2	24	3	15	10	40	3
4	Chambly "	....	....	....	..	5	50	3	36	4	40	5	25	3	24	10	70	5	25	1	12	2	10	802	3220	4
5	Verchères "	....	....	....	....	2	20	1	12	4	40	10	50	10	70	10	70	7	35	2	24	6	30	240	960	5
6	Richelieu "	....	....	....	...	. ..	....	2	24	15	150	25	125	10	80	50	350	30	150	2	24	20	100	250	1000	6
7	Yamaska "	.	....	..	....	...	....	4	48	10	100	40	200	25	200	80	400	70	350	3	36	25	125	1500	6000	7
8	Nicolet "	....	....	....	...	1	10	2	24	20	200	36	210	46	460	111	666	57	285	3	36	20	100	458	1936	8
9	Champlain and St. Maurice Counties	....	. .	10	150	....	....	4	48	10	100	15	75	30	240	137	685	20	100	4	48	25	125	1021	4232	9
10	Maskinongé and Berthier Counties	....	....	15	225	. .	....	2	24	10	120	50	250	60	480	80	560	60	300	5	60	20	100	120	480	10
11	L'Assomption and Terrebonne Counties	....	...	130	1950	....	. ..	5	60	8	80	5	25	4	32	15	105	10	50	2	24	6	30	50	200	11
12	Laval and Lake of Two Mountains Counties	..	....	...	....	...	....	10	120	10	100	5	25	15	120	10	70	5	25	3	36	20	100	10	40	12
13	Hochelaga and Jacques-Cartier Counties	....	....	...	....	..	...	5	60	5	60	5	25	5	40	10	70	5	25	2	24	4	20	10	40	13
14	Vaudreuil County	..	....	..	...	....	....	10	120	10	100	5	25	5	40	20	140	10	50	3	36	5	25	15	60	14
15	Bellechasse "	2	30	....	....	138	1380	....	...	39	390	....	....	131	655	1778	8890	....	...	..	....	...	....	173	1430	15
	Total	2	30	155	2325	346	3460	198	2436	195	2030	246	1260	437	3185	2903	15048	349	1745	53	636	186	930	4759	20038	

* Cwt. = 100 lbs. † Mixed Fish, "including greyling, bull-heads, ouananiche, bar-fish, and shad.

RECAPITULATION

Of the Yield and Value of the **Inland Fisheries** of the Province of **Quebec**, during the year 1914–15.

Kinds of Fish.		Quantity.	Value.
			$
Salmon	*Cwt.	389	4,685
Trout	"	356	5,311
Whitefish	"	598	6,112
Herring	"	833	1,666
Bass	"	615	6,773
Pickerel	"	1,289	13,602
Pike	"	871	5,955
Sturgeon	"	1,075	6,916
Eels	"	4,871	29,538
Perch	"	1,954	10,420
Maskinongé	"	88	986
Tullibee	"	.....	
Cat-fish	"	186	930
Goldeyes	"	.....	
Mixed Fish	"	7,994	39,364
Caviare	"	.....	
Total		.....	132,258

Quantity consumed in Canada, six-sevenths.
Quantity exported to United States, one-seventh.

*Cwt.=100 lb.

RECAPITULATION.

Of the Number and Value of Vessels, Boats, Nets, Traps, ets, used in the **Inland Fisheries** of the Province of **Quebec**, during the year 1914-15.

	Number.	Value.
		$
Steam Vessels or Tugs (tonnage 342)	36	22,750
Boats (sail)	816	17,589
" (gasoline)	71	23,750
Gill-nets, Seines and other nets	2,712	24,629
Weirs	188	48,150
Lines	3,002	3,200
Freezers and Ice-houses	36	3,895
Smoke and Fish-houses	10	1,850
Piers and Wharves (private)	.....	
Total	.....	145,813

Number of men employed in Vessels or Tugs	156
" " Boats	951
" persons employed in Fish-houses, Freezers, etc	67
	1,174

SESSIONAL PAPER No. 39

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state, for the **Whole Province of Quebec**, during the Year 1914-15.

Kinds of Fish.	Sea Fisheries.				Inland Fisheries.		Total, both Fisheries.		Total Marketed Value.
	Caught and Landed.		Marketed.		Marketed.		Marketed.		
	Quantity.	Value	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Salmon..... cwt.	11,310	113,100							
" used fresh..... "			8,493	101,916	389	4,685	8,882	106,601	
" canned..... case.			47	376			47	376	
" dry-salted..... cwt.			1,885	13,195			1,885	13,195	
									120,172
Lobsters..... "	22,810	102,645							
" canned ..... case.			11,330	203,940			11,330	203,940	
" shipp. in shell. cwt.			150	975			150	975	
									204,915
Cod ..... "	567,664	567,664							
" used fresh..... "			956	1,434			956	1,434	
" green salted ..... "			55,954	139,884			55,954	139,884	
" dried..... "			151,600	909,600			151,600	909,600	
									1,050,918
Haddock ..... "	2,658	2,658							
" used fresh.. "			195	292			195	292	
" dried ..... "			821	3,284			821	3,284	
									3,576
Hake and Cusk. ..... "	450	450							
" " dried . "			150	600			150		
									600
Herring ..... "	355,849	177,923							
" used fresh .... "			427	320	833	1,666	1,260	1,986	
smoked ..... "			675	1,350			675	1,350	
" pickled..... brl.			5,076	20,304			5,076	20,301	
" used as bait... "			132,617	198,926			132,617	198,926	
" " fertilizer "			36,805	18,403			36,805	18,403	
									240,969
Mackerel..... cwt.	21,102	63,306							
" used fresh.. "			1,104	5,520			1,104	5,520	
" salted..... brl.			6,666	66,660			6,666	66,660	
									72,180
Shad..... cwt.									
" used fresh. . "									
" salted..... brl.									
									.....
Alewives ..... cwt.									
" used fresh... "									
" salted..... brl.									
									.....
Halibut, used fresh.... cwt	294	1,764	294	1,764			294		1,764
Smelts ..... "	1,245	6,225	1,245	6,225			1,245		6,225
Trout..... "	279	1,953	279	1,953	356	5,311	635		7,264
Sturgeon..... "					1,075	6,916	1,075		6,916
Bass..... "					615	6,773	615		6,773
Eels ..... "	122	610	122	610	4,871	29,538	4,993		30,148
Tom-cod..... "	20	30	20	30			20		30
Whitefish ..... "					598	6,112	598		6,112
Pickerel..... "					1,289	13,602	1,289		13,662
Perch..... "					1,954	10,420	1,954		10,420
Pike..... "					871	5,955	871		5,955
Maskinongé..... "					88	986	88		986

RECAPITULATION

OF the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., state, for the **Whole** Province of **Quebec**, during the year 1914-15.—*Concluded.*

Kinds of Fish.	Sea Fisheries.				Inland Fisheries.		Total, both Fisheries.		Total Marketed Value.
	Caught and Landed.		Marketed.		Marketed.		Marketed.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		$		$		$		$	$
Catfish ..... cwt.	.....	.....	....	.....	186	930	186	....	930
Goldeyes. ..... "	....	.....	...	.....	...	...	.....	....	
Mixed fish..... .... "	3,417	3,417	3,417	3,417	7,994	39,364	11,411	.....	42,781
Squid... ..... brl.	210	315	210	315	.. .	....	210	.....	315
Clams..... ..... "	1,191	2,382	.....	.....	.. ...	.....	... ..	.....	
" used fresh..... "	. ...	....	1,191	2,977	.. ....	.... .	1,191	.....	2,977
" canned... .....cases.	....	....	.....	.....	.....	.. .	....	.....	
Capelin (bait or fert.).. brl.	27,000	6,750	27,000	6,750	.....	.....	27,000	.....	6,750
Whales..... No.	85	59,500	.....	.....	.....	.....	.....	.....	
Seals.... ..... "	3,494	3,494	...	.....	.....	....	.....	.....	
Tongues and Sounds..cwt.	.....	.....	36	180	.....	... .	36	.....	180
Hair Seal Skins..... No.	.....	.....	3,494	5,241	.....	.....	3,494	.....	5,241
Whale oil..... ... .galls.	.....	.....	135,600	40,680	.....	.....	135,600	... .	40,681
Fish oil..... ... . "	.....	.....	104,338	31,301	.....	.... .	104,338	.....	31,300
Whale fertilizer. .. . tons.	.....	.....	30	1,050	.....	.....	30	.....	1,050
Whale bone..... ..... cwt.	.....	.....	135	2,700	.....	.....	135	.....	2,700
Totals	.....	1,114,186	.....	1,792,172	.....	132,258	.....	.....	1,924,430

RECAPITULATION

OF the Number of Fishermen, etc, and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in the **Whole Province of Quebec** for the Year 1914-15.

	Sea Fisheries.		Inland Fisheries.		Total, both Fisheries.	
	Number.	Value.	Number.	Value.	Number.	Value.
		$		$		$
Steam Fishing Vessels (tonnage 642)	2	40,000	36	22,750	38	62,750
Sailing and Gasoline Vessels	29	25,300	.....	.....	29	25,300
Boats (sail)	4,168	220,452	816	17,589	4,984	238,041
" (gasoline)	195	64,700	71	23,750	266	88,450
Carrying Smacks	9	7,950	.....	.....	9	7,950
Gill Nets, Seines, Trap & Smelt Nets, etc	11,512	252,552	2,712	24,629	14,224	277,181
Weirs	143	11,780	188	48,150	331	59,930
Trawls	676	5,015	.....	.....	676	5,015
Hand Lines	19,185	15,927	3,002	3,200	22,187	19,127
Lobster Traps	157,380	157,380	.....	.....	157,380	157,380
Lobster Canneries	114	47,475	.....	.....	114	47,475
Freezers and Ice-houses	275	21,150	36	3,895	311	25,045
Smoké and Fish-houses	1,114	254,430	10	1,850	1,124	256,280
Fishing Piers and Wharves	288	72,115	.....	.....	288	72,115
Club Houses	.....	.....	.....	.....	.....	.....
Whaling Stations	1	50,000	.....	.....	1	50,000
Totals	.....	1,246,226	.....	145,813	.....	1,392,03

	Sea Fisheries.	Inland Fisheries.	Total, both Fisheries.
Number of men employed on Vessels	143	156	299
" " Boats	7,925	951	8,876
" " Carrying Smacks	19	.....	19
" persons employed in Fish-houses, Freezers, Canneries, etc	1,751	67	1,818
Totals	9,838	1,174	11,012

APPENDIX No. 5.

MANITOBA

REPORT ON THE FISHERIES OF DISTRICT NO. 1.

To the Superintendent of Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit my fourth annual report on the fisheries of District No. 1, Manitoba, for the fiscal year ended March 31, 1915, together with the statistics showing the quantity of fish taken.

The total value of the fisheries was $492,767, an increase over the previous year.

Increases were shown in the catches of whitefish, pickerel, tullibee, goldeyes, perch, catfish and jackfish.

The increase in the catch of whitefish is chiefly due to the large quantities of fry liberated from the hatcheries at Selkirk and lake Winnipeg. A great many whitefish and pickerel fry have also been placed in the lakes of southern Manitoba.

Setting lake, in the district of Officer Cowan, about one hundred miles from the Pas, was fished for the first time. There were thirteen licenses issued and the following catches made: whitefish, 924 cwts., pickerel, 141 cwts. and jackfish, 200 cwts. Whitefish were abundant in Landing and Matawkowan lakes. The fishing in Split lake was very poor, not enough being caught to supply the Indians.

Overseer Schanus, reporting for the Winnipeg river and Lac du Bonnet district, writes as follows:—

At the mouth of the Winnipeg river we have the Indian reservation of Fort Alexander, with a population of about 700 Indians. These Indians catch fish during the whole year, using nets of about 100 yards. In September, 1914, nine fishermen were granted licenses and caught 24,671 pounds of pickerel, 1,137 pounds of jackfish and 318 pounds of catfish. In November, 12 fishermen were granted licenses and caught 11,000 pounds of pickerel and 10,125 pounds of tullibee. Six miles further up the river is the village of St. George with a population of 200 people. At Pine Falls about 15 settlers are fishing on permits. To the southeast about 30 miles in Lac du Bonnet with a population of about 500, 25 of whom are fishing on permits. To the east of this is Point du Bois with a population of about 100 people, 5 of whom fish with domestic licenses.

During the year I went over the district several times and found the settlers and Indians obeying the regulations. The owners of sawdust mills are very careful not to allow refuse to escape into the streams. Fines were imposed on those who fished without a permit or in close season.

Pine Falls is the spawning ground of large numbers of sturgeon and whitefish, the latter coming from lake Winnipeg.

I am sir,
Your obedient servant,

J. A. HOWELL,
Inspector of Fisheries.

REPORT ON THE FISHERIES OF DISTRICT No. 2.

To the Superintendent of Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit my annual report for District No. 2, Manitoba, comprising all that portion of the province west of lake Winnipeg. Previous to this year this part of the province was supervised by the Inspector of Fisheries, Selkirk.

About the commencement of this year the Department decided to divide the province into two districts, and open an office in the city of Winnipeg, and conferred on me the honour of being its first Inspector. The office in this city, the centre of our increasing population, has become of great benefit to the general public.

I have had to assist me during the greater part of the year two overseers; and eight guardians during the summer. One guardian resigned on account of change of residence, and the others were only engaged for a stated period. At the end of the present year there were in this district nine officiers, including myself.

I have had no prosecutions in my district during the year 1914-15 and will endeavour to give you what information I can in this connection. In the early days fish was one of the principal food diets and for the past thirty years the residents have from time to time been permitted to catch all the fish they required for family consumption. In most cases of violation of the fishery regulations the only fish found with the offenders were suckers and jackfish, caught principally in the small lakes and rivers. Now as most of the illegal fishing has been done by actual residents with dip nets, spears and forks, I have been instructing the guardians to warn all parties that in future there could be no plea of ignorance to save them from prosecution. The licensed fishermen all through my district try to obey the rules and regulations, and there has been no trouble from that source.

Overseer Stevenson has the supervision of the numerous lakes in the northern part of the district, and is located at the Pas.

Overseer White has the supervision of lakes Winnipegosis, Water Hen, Dauphin, Red Deer, and a small part of lake Manitoba. He reports that the water in Lake Winnipegosis has been very low the past summer and winter, about two feet lower than usual, causing the fishermen much trouble.

Overseer Hackland has supervision on the east side of lake Manitoba and Dog lake.

Overseer Stewart has supervision over the west side of lake Maniitoba. Lake Manitoba, I consider, is one of the finest pickerel and jackfish (pike) lakes in the Dominion.

Some thirty years ago the first commercial fishing started on the southern part of this lake and about 400,000 pounds of fish were exported to the United States. It has been fished continually every winter since that time, and this year it produced close on 3,000,000 pounds of the same kinds of fish, as well as 300,000 pounds of whitefish, and large quantities of mixed fish, such as suckers, etc. The pickerel in this lake are very different from others. They run even in size, averaging nearly two pounds each. The fishing has been carried on principally by the residents on the border of the lake.

The other six guardians are distributed over the different points in the province. They look after the small lakes and rivers in their several localities.

Following is the number of licenses issued and quantities of the four principal varieties of fish caught in my district during the past two fiscal years, showing a large increase this year over last:—

1913-14.

Licenses	612	
Quantity of Fish Caught.		
Trout	150,500	lbs.
Whitefish	1,682,700	"
Pickerel	1,423,700	"
Pike	1,603,600	"
	4,860,500	"

1914-15.

Licenses	729	
Quantity of Fish Caught.		
Trout	74,200	lbs.
Whitefish	2,387,500	"
Pickerel	2,967,200	"
Pike	3,270,000	"
	8,698,900	"

The only kind of fish that shows a falling off is trout, which can be accounted for by the fact that all the trout are caught in the northern lakes, and during the year 1914 three of these lakes were closed for commercial fishing, and although two new lakes were opened up, one of these (Wekusko) contains no trout. The trout in the lakes that are open are not a desirable fish, being very large (averaging nine pounds) and not a particularly good food fish, besides being very hard on the nets.

As regards the old complaint of the fishermen leaving cull fish on the ice, I am pleased to state that the early notices given the fishermen before getting their licenses, i.e. "That any fish left on the ice would cause the refusal of a license in the future," has had a good effect, and the different officers tell me that on their last visits the ice was well cleaned up.

There is one matter that the department's attention should be particularly drawn to, and that is, the amount of drowned fish that are offered for sale during the winter, which does much injury to the trade. The fishermen, in my opinion, should be severely punished for freezing and selling any drowned fish taken out of their nets. These fish are, in a good many instances, unfit for food, the flesh falling away from the bones, although until thawed out and cleaned very few persons can detect the fraud. I believe it has done an endless amount of harm by turning people against eating our fish. During the winter some fishermen leave their nets for many days in the water, for such reasons as very cold or stormy weather, sickness, etc., and when these nets are eventually taken up the greater part of the catch are drowned fish, or called by some "dead" fish. Some are immediately frozen hard, while others are packed in boxes and then frozen, the buyers thus being unable to detect any difference. The boxes are loaded on cars and shipped to the different markets, and the dealers, after paying a good price for the fish, and, in addition, freight, find on thawing the fish out properly preparatory to cleaning them, that they are unfit for food. They have, therefore, to be thrown into the refuse box. You can thus readily see why it is that a retail dealer of fish has to add so much to first cost, on account of unscrupulous fishermen selling drowned fish. However, the same deception cannot be practiced during the warmer periods of the year.

I find it almost impossible to get in statements of the actual annual catch of fish by individual fishermen, because there are so many of the half-breeds and Indians who

change their residence, and living in such a vast and unsettled country, they congregate on the fishery grounds during the open season, after which they disperse to different parts of the country. With the regular resident fisherman it is well complied with.

On account of the war there were a great many idle men all over my district this winter, and a larger number than usual, turned to fishing as a means of livelihood, so it was rather a difficult matter to control the issuing of licenses in some localities. It is with satisfaction that I refer to the officers in my district, and also of District No. 1, assisting me at all times to the utmost of their ability, and in a friendly manner.

Yours respectfully,

(Sgd.) D. F. REID,
Inspector of Fisheries for Western Manitoba.

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in **District No. 1**, Province of **Manitoba**, during the Year 1914–15.

Number.	Fishing Districts.	Steam Vessels or Tugs.				Boats.					Gill-Nets.		Lines.		Freezers and Ice-houses.		Smoke and Fish-houses.		Piers and Wharves.		Persons employed in Freezers, Fish-houses, etc.	Number.
		Number.	Tons.	Value.	Men.	Skiffs and Sail Boats.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
				$			$		$			$		$		$		$		$		
1	Lake Winnipeg	7	536	98000	68	305	18945	1	1000	420	1404	14040	....	.....	53	52300	50	25000	12	9100	225	1
2	Red River	....	.....	.....	....	46	230	....	.....	46	....	....	46	92	....	.....	....	.....	....	.....	.....	2
3	Winnipeg River	...	..	....	...	155	775	....	...	155	225	1125	..	.....	...	.....	....	.....	....	....	....	3
4	Lac du Bonnet	....	.....	.....	..	25	125	..	.....	25	25	125	....	.....	...	.....	....	.....	....	.....	.....	4
5	Point du Bois	....	.....	.....	....	5	25	....	....	5	5	25	....	....	...	.....	....	.....	....	.....	.	5
6	Setting Lake (winter)	....	.....	....	....	.....	.....	....	...	26	104	1040	...	.. ..	....	.....	..	.....	...	....	....	6
7	Falcon Lake (winter)	...	....	.....	....	.....	.....	....	.....	2	10	100	..	.....	....	.....	....	.....	....	.....	....	7
*8	Nelson River District	....	....	...	....	...	.....	....	..	.....	.....	....	...	.....	....	.....	....	.....	....	.....	....	8
*9	Hawke Lake	....	...	.....	....	...	.....	....	....	.....	.....	...	...	....	..	.....	.	.....	....	. ...	.....	9
	Totals	7	536	98000	68	536	20160	1	1000	679	1773	16455	46	92	53	52300	50	25000	12	9100	225	

* Indians only.

RETURN showing the Quantities and Values of Fish caught, and Marketed or consumed locally, for **District No. 1**, Province of **Manitoba**, during the year 1914–15.

Number.	Fishing Districts.	Whitefish, cwt.	Whitefish, value.	Bass, cwt.	Bass, value.	Pickerel, cwt.	Pickerel, value.	Pike, cwt.	Pike, value.	Perch, cwt.	Perch, value.	Tullibee, cwt.	Tullibee, value.	Cat-fish, cwt.	Cat-fish, value.	Goldeyes, cwt.	Goldeyes, value.	†Mixed fish, cwt.	Mixed fish, value.	Number.
			$		$		$		$		$		$		$		$		$	
1	Lake Winnipeg (summer)	19365	125875	36	108	14118	70590	1432	4296	160	800	6239	15597			2589	4778	5000	10000	1
	" (winter)	3105	20182			9968	49840	2911	8733	195	975	28700	71750			4519	9038	1500	3000	
2	Red River (summer)													731	4020			5000	10000	2
	" (winter)													20	100			800	1600	
3	Winnipeg River (summer)																	8400	16800	3
	" (winter)																			
4	Lac du Bonnet (summer)																	7500	15000	4
5	Point du Bois (summer)																	3500	7000	5
6	Setting Lake (winter)	924	6006			140	600													6
7	Falcon Lake (winter)	380	2470																	7
*8	Hawke Lake																			8
*9	Nelson River District																	16800	33600	9
	Totals	23774	154533	36	108	24226	121030	4343	13029	355	1775	34939	87347	751	4129	6908	13816	48500	97000	

* Cwt. =100 lb. † "Mixed Fish" includes greyling, bull-heads and ouananiche.

RETURN showing the number of Fishermen, etc., the number and value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other material, used in the Fishing Industry in **District No. 2**, Province of **Manitoba**, during the year 1914-15,

Number.	Fishing Districts.	Steam Vessels or Tugs.				Boats.			Gill-nets.		Freezers and Ice-houses.		Fish-houses.		Piers and Wharves.		Number of Persons employed in Freezers, Fish-houses.	Number.
		Number.	Tonnage.	Value.	Men.	Sail and row.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Summer.			$			$			$		$		$		$		
1	Lake Winnipegosis	1	60	9000	12	99	5400	118	845	7180	8	4650	11	3700	4	1950	74	1
	Winter.																	
	Lake Winnipegosis							217	3210	24680								
2	" Manitoba							241	1952	15610								2
3	" Water Hen							24	360	2880								3
4	" Dauphin							16	280	2240								4
5	" Red Deer							16	150	1200								5
6	" St. Martin							66	330	1650								6
7	Dog Lake							10	80	640								7
8	Moose Lake							28	373	3730			3	4000			10	8
9	Beaver Lake, Sask							23	404	4040								9
10	Wekusko Lake							17	186	1860								10
11	Reed Lake							10	80	800								11
12	Sturgeon Lake, Sask							11	88	880								12
13	Cedar Lake							2	18	160								13
	Totals	1	60	9000	12	99	5400	796	8354	67536	8	4850	14	7700	4	1950	84	

RETURN showing the Quantities and Values of all Fish Caught and Marketed or Consumed locally, for **District No. 2**, Province of **Manitoba**, during the year 1914-15.

Number.	Fishing Districts.	Trout, cwt.*	Trout, value.	Whitefish, cwt.	Whitefish, value.	Pickerel, cwt.	Pickerel, value.	Pike, cwt.	Pike, value.	Mullets, cwt.	Mullets, value.	Perch, cwt.	Perch, value.	Tullibee, cwt.	Tullibee, value.	Goldeyes, cwt.	Goldeyes, value.	†Mixed Fish, cwt.	Mixed Fish, value.	Number.
	Summer.		$		$		$		$		$		$		$		$			
1	Lake Winnipegosis	.....	.....	987	4835	4684	18736	924	1849	2340	2340	....	....	.....	.....	...	.....	560	1120	1
	Winter.																			
	Lake Winnipegosis	.....	.....	8587	42935	5095	20380	13868	27736	5608	5608	5	20	237	474	206	206	2890	5780	
2	" Manitoba	.....	.. ..	3065	15335	15118	60472	12989	25978	689	689	583	2332	4494	8988	.....	...	3750	7500	2
3	" Water Hen	.. ...	....	494	2470	1493	5972	5	10	255	255	35	140	....	.....	.....	.....	380	760	3
4	" Dauphin	.....	.....	.....	...	594	2376	9	186	88	88	87	348	317	634	.....	.....	210	420	4
5	" Red Deer	....	.....	223	1115	631	2524	154	308	178	178	26	104	...	.. ..	26	25	90	180	5
6	" St. Martin	...	..	1436	7180	1090	4360	717	1534	.....	.....	.....	.....	.....	.....	.....	...	1634	3268	6
7	" Dog Lake	..	...	.....	.....	218	490	330	660	.....	.....	.....	.....	.....	.....	.....	.....	600	1200	7
8	" Moose	151	755	4125	20625	524	2620	2610	5220	.....	.....	.....	.....	.....	.....	.....	.....	982	1964	8
9	" Beaver, Sask	249	1245	1967	9835	41	205	364	728	.....	.....	.....	.....	.....	.....	.....	.....	469	938	9
10	" Wekusko	.....	.....	1657	8285	93	465	401	808	.....	.....	.....	.....	.....	.....	.....	.....	232	464	10
11	" Reed	117	585	904	4520	16	80	240	480	.....	.....	.. ..	.....	..	.....	.....	.....	106	212	11
12	" Sturgeon, Sask	225	1125	430	2150	75	375	2	4	.. ..	.....	.....	.....	.....	.....	.....	.....	80	180	12
13	" Cedar	...	....	.....	.....	.....	....	...	.....	.....	..	.....	.....	.....	...	....	.....	1354	2708	13
	Totals	742	3710	23875	119285	29672	119055	32700	65501	9158	9158	736	2944	5048	10096	232	232	13337	26674	

RECAPITULATION.

Of the Yield and Value of the Fisheries in the Province of **Manitoba**, during the year 1914-15.

Kinds of Fish.	Quantity.	Value.
		$
Trout *Cwt.	742	3,710
Whitefish "	47,649	273,818
Bass "	36	108
Pickerel "	53,898	240,085
Pike "	37,043	78,530
Mullets "	9,158	9,158
Perch "	1,091	4,719
Tullibee "	39,987	97,443
Cat-fish "	751	4,129
Goldeyes "	7,140	14,048
Mixed Fish "	61,837	123,674
Total		849,422

Quantity exported to U.S.A. $\frac{3}{5}$

*Cwt. = 100 lb.

RECAPITULATION.

Of the Number and Value of Vessels, Boats, Nets, Traps, etc., used in the Fisheries in the Province of **Manitoba**, during the year 1914-15.

	Number.	Value.
		$
Steam Vessels or Tugs (tonnage 596)	8	107,000
Boats (sail and row)	635	25,500
" (gasoline)	1	1,000
Gill-nets	10,127	83,991
Lines	46	92
Freezers and Ice-houses	61	56,950
Smoke and Fish-houses	64	32,700
Piers and Wharves (private)	16	11,050
Total value		318,283

Number of men employed in Vessels or Tugs	80
" " Boats, and Winter Fishing	1,475
" persons employed in Fish-houses, Freezers, etc.	309
	1,864

APPENDIX No. 6.

SASKATCHEWAN AND ALBERTA

REPORT ON THE FISHERIES OF THE PROVINCES BY CHIEF INSPECTOR G. S. DAVIDSON, INDIAN HEAD, SASK.

To the Superintendent of Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit my report on the fisheries of Saskatchewan and Alberta for the fiscal year ending March 31, 1915, together with statistical returns showing the kinds, quantities and value of fish caught, amount and value of gear used and the number of men employed.

Having received notice from the Department of Marine and Fisheries, on the 22nd September, 1914, that I had been appointed by an Order in Council to the position of Chief Inspector of Fisheries for the Provinces of Saskatchewan and Alberta, I at once proceeded to Fort Qu'Appelle to take over the office then at that place. As soon as the former Chief Inspector was able to close his books, I had the many files, documents and papers removed to Indian Head. Here I procured an office and began the laborious task of going through and arranging the many reports, documents, etc. However, I finally got matters in such a shape that I felt I was in a position to accomplish something.

I first got in touch with the several Fishery Officers in the two provinces through the medium of a circular letter, pointing out the necessary work to be done by each, and soliciting their assistance and co-operation. I was indeed pleased with the response given this letter and I feel justified in saying that no officer has spared himself in giving the best that was in him in the interests of the fisheries.

Owing to the failure of the crops in practically all of Alberta and a part of Saskatchewan, due to the drought last year, we had many requests made upon us to grant free fishing permits, but I felt that such privileges had to be dealt with very carefully in order that our waters should not become depleted and leave no source of a supply of fish for a number of years to come. In this regard I visited the Lac Pelletier district in response to a petition sent in from there asking for free permits and I felt that it was necessary that some measure of relief be afforded the settlers. I found that they were all practically without food for themselves and families, much less for their cattle, horses, etc. A number of them did not even have feed for their chickens. In all thirty-four free permits were issued to settlers in this district and from reports I have had from reliable sources, the assistance thus given was greatly appreciated. None of the fish taken here were marketed but were all consumed locally.

In the more northern parts of these provinces a much larger number of persons were engaged in the fishing industry than formerly. Owing to the fur trading companies refusing to buy the furs usually brought in by trappers, the latter then turned to fishing for a livelihood and the result was that in many places more fish were placed on the market than there was ready sale for. From my records I find that fishermen were obliged at times to sell their catch for as low a price as one half cent per pound. This of course caused a number of them to cease operations and finally the price went up from two to five cents per pound. Even at this it was the means of providing a great many people with a good substantial food at a very moderate price. Very few of the fish caught during the past year have been exported.

During the closed seasons every care and protection possible was given the fisheries so that I have very little fear that any of our lakes have become over-taxed or depleted.

In the Province of Saskatchewan the following licenses were granted during the past two years and by comparison it will be seen that Fisherman's licenses for the past year, have increased over fifty per cent, and while the number of Domestic licenses have fallen off, there is on the whole an increase of over 25 per cent in the total number of licenses issued:—

	1913-14.	1914-15.
Domestic licenses	231	158
Fishermen's licenses	405	642
Commercial licenses	9	11

During the year there has been a considerable decrease in the number of convictions for violation of the Fishery Act. This I think speaks well for the attention given the regulations by the different fishery officers and mounted police in seeing that the people were posted as to the requirements of the law.

The following are the number of charges and convictions made in the province during the year:—

Fishing in close season	13
Fishing without license	7
Being in possession of fish in close season	4
Using fish traps	6
Blocking streams	3
Total	33

The concessions given the Indians and half-breeds still require a great deal of attention. In the past there had been no accurate way of arriving at the number of persons thus engaged or the amount of fish taken by them each year. For the next season I have been successful in having the Department furnish me with suitable permit forms to be issued free to Indians and halfbreeds to fish for their own use only and to which is attached a form of statement to be filled in at the end of the year giving the necessary information as to catch, etc. This I believe is a step in the proper direction.

Practically nothing has been done in the way of stocking lakes during the past year and I am of the opinion that very little of this work will be undertaken during the coming year although there are now a great many applications in for permission to take fish from other waters for stocking purposes.

South Saskatchewan.

This part of the province is directly under the supervision and inspection of this office. The principal lake in the district is Long or Last Mountain lake. Here 164 licenses were granted during the year, but I do not consider that number excessive for these waters. The fish taken are mostly whitefish.

The next most important fishery is in the Qu'Appelle lakes where tullibee largely predominate. Last year authority was given to allow the use of 4½-inch mesh nets and the result has been that the catch of this variety was nearly ten times that of previous years. Other varieties remain about the same. No net fishing is allowed here during the open water season.

South Alberta.

Practically all the fishing done in this part of Alberta is for the sporting varieties such as trout, grayling, Rocky Mountain whitefish, etc., and during the summer season 5,592 angling permits were issued through the fishery officers, Mounted Police officers, forest rangers, and others vested with the necessary authority. This is an increase of over fifty per cent over the previous year.

A detailed report is furnished by Overseer N. J. Hoad, of Calgary, and is appended.

North Alberta.

Northern Alberta is rapidly coming to the front in regard to the fisheries and is already of very great importance, but with the advent of railway facilities to the more northern lakes a vast supply of the best varieties of fresh water fish will soon be placed on the market.

Up to the first of the present year this district has been under the supervision of Mr. J. D. Willson of Edmonton, who is at present an officer in the 49th Battalion, Canadian Expeditionary Force. Since he has been connected with that body the affairs pertaining to this district are being carried on from this office, with the assistance of a clerk in the Edmonton office.

Mr. Willson has been good enough to prepare a very interesting report and account of the fisheries of his district; which is appended.

The following is a comparison of the number of licenses issued during the past two years and shows a very substantial increase.

	1913-14.	1914-15.
Domestic licenses	192	241
Fishermen's licenses	259	322
Commercial licenses	5	13

Convictions for violations of the Fishery Act were also fewer in Alberta during the past year than the year previous and were as follows:—

Fishing in close season	13
Fishing without license	1
Using illegal nets	2

I may say a great deal of credit is due to the various officers of the Royal North West Mounted Police for the able assistance they are rendering from time to time in the protection of the fisheries.

I am, sir,
Your obedient servant.

(Sgd.) G. S. DAVIDSON,
Chief Inspector of Fisheries.

REPORT ON THE FISHERIES OF NORTHERN SASKATCHEWAN, BY THE INSPECTOR OF FISHERIES.

G. S. DAVIDSON, Esq.,
Chief Inspector of Fisheries,
Indian Head, Sask.

SIR,—I have the honour to submit my report on the Fisheries for the northern portion of the province of Saskatchewan, for the year ending March 31, 1915, together with statistical returns, showing the yield and value of fish, and the amount and value of equipment used.

Generally, if the markets were available for fresh frozen fish, this portion of the province of Saskatchewan would have produced a record amount of fish, owing to the favourable climatic conditions, winter fishing starting fifteen days earlier than last season, and to the increase in the number of licensed fishermen on the lakes.

Regarding the markets, I shall deal with this important matter further on in my report.

I venture to state that this northern country has never witnessed a more favourable season for winter fishing than the season ending March 31 last, when sufficient frost came during the latter part of November, and practically zero weather during the balance of the winter.

Regarding the opening of the winter season on November 15, I would not recommend this in future seasons, except it apply only to waters that have not been taxed to any great extent in past seasons.

No doubt the large number of prosecutions during the season of 1913-14 had a good effect on the fishermen in general, as the number of convictions were only some fifteen this past year as compared to the preceding year, when there were eighty-three.

Convictions this season were as follows:—

Obstructing streams	8
Fishing without license	3
Killing sturgeon	1
Hanging whitefish during closed season	3

The obstruction of streams and killing sturgeon were committed by Indians.

The hanging of fish during closed season by the Indians or half-breeds has practically ceased, as scarcely any fish have been killed for this purpose in districts patrolled by fishery officers. No doubt in the more remote places this practice is kept up as it has been for generations past.

It will be much easier this coming season to keep a more exact check on the Indians, since it will be necessary for them to have in their possession a license issued by the Department, the same as the white settler is compelled to possess before any fishing is permitted. No doubt it would be a further advantage if the fishery regulations were printed on such free permits in the syllabic language.

There have been some thirty-five more licenses issued this year than last season. (I make this comparison not including the Cold Lake district, which was not under my charge last year.) The increase in licenses was principally on Turtle, Dore and Jackfish lakes. This increase was probably due to the season opening fifteen days earlier than last season, and also to the lack of other employment during the winter.

If the market had been active during the early part of the winter fishing season, I venture to say that the output would have been double, as most of the fishermen stopped operations in the early part of January, on account of the uncertain markets.

The fishermen did not receive as large a price for their fish as last season, principally owing to the lateness of the larger eastern buyers in placing their orders with the local dealers. Up to January 15 practically no fish had been on order from points other than the province of Saskatchewan. This alarmed the fishermen to such an extent that some of them discontinued operations on the lakes.

There has been a considerable increase in the output of all species of fish except trout. In the marketable fish whitefish show an increase of 5,137 cwts. over last year, pickerel 110 cwts. and pike 1,377 cwts. I may say there has been an unusual demand for pike from points in the United States. When these fish were cleaned and packed in boxes they sold for practically the same prices as whitefish. The average fisherman did not anticipate such a demand for this fish and failed to clean and pack in a suitable condition for export. I have seen suckers peddled on the streets of the smaller towns and have a rapid demand.

Dore lake has contributed the largest increase for any one lake, with an output of 1,188 cwts. over last season. Turtle lake, which is a very important lake, had an increase of 1,695 cwts. over last season, while Jackfish and Murray lakes produced double the quantity taken last year.

The Saskatchewan river produced practically the same as last year, with five licenses fewer. It is noticeable on some of the returns sent in from fishermen on this river that their catch does not pay for the license. Of the 77 licenses the average catch per license is 618 pounds, principally suckers and other coarse fish. As this river flows through a well settled portion of the country, it would no doubt be a great advantage to the people who live adjacent to it if it were better supplied with some suitable fish. In my last year's report I had recommended introducing catfish, and I am more convinced now that this fish is suitable.

Of the total catch of fish, 50,657 cwts. have been consumed in Canada, with 2,203 cwts. shipped to the United States; an increase to the outside market of 1,628 cwts.

The local market has been well supplied this season, as the individual fishermen made shipments to points all through the province. The fish were peddled through the country districts by small dealers retailing them at from five to eight cents per pound, whereas last season the consumer paid from eight to fifteen cents per pound.

In the Battleford district the local secretary of the Grain Growers' Association undertook to find a market for the fish from that district. He worked through the other branches of the association, and disposed of a few carloads to the farmers in the south of the province, which was a great help to the fishermen in that district.

Practically all the fish from the Battleford district are shipped in sacks. From the Cold Lake district about one-half are packed in the regular fish box, which no doubt is the proper way to pack them for the outside market.

Summer fishing is not carried on to any great extent for commercial purposes in the northern district. The only lake fished to any extent this past summer was Turtle lake, and only two men were operating nets for market purposes. The lack of summer fishing is partly due to the impassable state of the trails leading to the lakes.

The quality of white fish has been somewhat better than last season; this is more noticeable in Jackfish, Dore, Turtle and Green lakes. While these lakes have been most taxed in the last three years, it is gratifying to note the improvement in quality of the fish caught, whereas in lakes such as Montreal, Stony, Loon, Candle, Trout and LaPlonge, which have not been fished to any great extent in recent years, the quality appears to be about the same. I would strongly recommend the use of a smaller mesh of net on some of these lakes for a few years, which no doubt would have a beneficial effect.

In conclusion, I wish to state that while we have a very efficient staff of fishery officers, no doubt the work could be done more effectively if some of them were provided with boats or canoes. It has been reported to me on different occasions that officers arrived. In some cases the fishery officer resides at the water's edge and in order places where the guilty parties were operating, the latter had disappeared when the officres arrived. In some cases the fishery officer resides at the water's edge and in order to perform his duties he must drive over land around the lake. Only occasionally he can reach the water's edge, and when he does arrive there is practically useless so far as patrolling is concerned.

I am, sir, your obedient servant,

G. C. MacDONALD,
Inspector of Fisheries.

SESSIONAL PAPER No. 39

REPORT ON THE FISHERIES OF NORTHERN ALBERTA, BY THE INSPECTOR OF FISHERIES.

G. S. Davidson, Esq.,
Chief Inspector of Fisheries,
Indian Head, Sask.

Sir,—I have the honour to submit my report for the year 1914-15 for the district of Northern Alberta.

By comparison of statistics with those of the previous year, it will be seen that there is a very considerable increase in the number of men employed as fishermen as compared with not only the previous year, but other years; with proportional increase of capital invested in fishing plant of all kinds.

The earnings of fishermen, however, for the past year do not appear to have been as large proportionately as during 1913-14, because though the prices have been about the same generally, the market has not always been as good, as a larger number of fishermen having been employed, improved facilities for transportation, the hard times brought on by the war and other economic reasons have had the effect of sometimes placing on the market more fish than there was regular sale for.

The increase in the number of men employed in the fishing industry may be attributed:—

First, to lack of employment which has forced many men who had been otherwise employed, to seek a livelihood as fishermen.

Second, improved railway facilities and better country roads.

Third, greater skill, better equipment and more knowledge of fishing conditions of some lakes.

Fourth, a belief that because of the war the price of food generally would have so risen as to have caused an increased demand and a higher price for fish.

Pigeon Lake District.—Since my annual report for 1913-14, there have been appointed local guardians for Buck lake and Conjuring lake respectively; which lakes had formerly been under the supervision of Overseer L. Ingram Wood. These recently appointed guardians have been instructed that the lakes they supervise are still within Overseer Wood's district, and that they may seek advice and instructions from him at any time, though they report directly to this office.

As I have already reported for 1913-14 the area of waters covered by Pigeon, Buck, Battle and Conjuring lakes with their tributaries and affluent streams are only large enough to supply the local demand for Wetaskiwin and other surrounding settlements.

At Pigeon lake and also at Buck lake during previous years an attempt had been made to restrict the number of fishermen's licenses; but because of economic conditions, such as lack of employment I did not feel justified in carrying out this plan for the past year as I found that to do so would be impossible without depriving many men of employment, and I was confronted with the difficulty of discrimination as to whom licenses should be issued.

During the year a dam was built by the Dominion Government at the head of Pigeon creek which is the affluent of Pigeon lake. During its construction Overseer Wood by my instructions saw that a proper fishway was placed in this dam. Overseer Wood has frequently recommended that it would be well to adopt some means of preventing the return of jackfish to Pigeon lake after spawning in the streams below, as he is of the opinion that this variety of fish is quite out of proportion to and most destructive to whitefish life in Pigeon lake. I am inclined to agree with him in so

far as to recommend that it be tried for a year or two at least. It could be done at little or no expense by closing the fishways of the dam at the time when the jackfish having spawned return to Pigeon lake.

Gull Lake District.—The fishing of Gull lake has been during the past year entirely restricted to angling, because of the comparatively thick settlement and the reported depletion of fish, and the fact that Gull lake is an important summer resort for the people of Edmonton and the surrounding towns.

The waters of Gull lake contain only jackfish, pickerel, suckers, and the like. The fisheries of this lake have been very much depleted for many years by a dam on Blindman's river built by the city of Lacombe to furnish electric power. This dam is quite unprovided with a fishway; in consequence jackfish going over the dam at spawning time never return. I have had an interview with the city authorities of Lacombe, following previous correspondence with the Chief Inspector of Fisheries, when I urged that this dam must be provided with a proper fishway. Their defence of the neglect to provide a fishway is: That the dam having been built in a very rude and primitive manner is not likely to withstand high water for many years and that the expense of building a proper fishway would be great. I have examined this dam and found that although the construction was extremely rude, in my opinion it is likely to last many years. I estimated that an effective fishway could be built for $500.

The Sylvan Lake district, in which is Burnt lake, near the town of Red Deer, is restricted to anglers. The local guardian has frequently reported during the past two years, persistent breaches of the regulations, such as the spearing and netting of fish in the close season and the use of nets without license. During April, 1914, he was able to prosecute and secure convictions against ten persons.

Buffalo Lake District.—In this district, by comparison with report of 1913-1914 there has been a very considerable decrease in the catch, this year the catch being only 144 cwt. as against 590 cwt. last year. No licenses have been issued for Buffalo Lake district for the past year; the fishing being restricted to angling which is of increasing importance.

The guardian, Mr. H. E. Stevenson, recommends that during the coming year licenses for other than strictly domestic purposes be not allowed. From information which I have obtained on the ground during the past year, I am disposed to think that he is right and that only domestic licenses should be issued.

Beaver Hills Lake.—Since my last report the Ministic, Miquelon and Oliver lakes have been taken from guardian A. W. Hunt's supervision, and are now under the charge of Mr. A. H. Graham, of Cooking lake. These lakes are well stocked with jackfish, their fisheries being of local importance only.

During the past fishing year Cooking lake has been restricted entirely to angling. I have frequently been urged by people living about Cooking lake to grant domestic licenses for that lake. I visited this district in September, 1914, and investigated the matter and formed the opinion that there had not been such depletion of fish in Cooking lake as to justify the withholding of domestic licenses from people living in the neighbourhood. From my own observation of the size of the fish caught I am convinced that this lake is well stocked with jackfish. I learned that because of the weedy nature of many parts of the lake it is ill-suited for angling and that the summer visitors from Edmonton are not successful with rod and line, nor much interested in the sport. Recently I forwarded to your office an application signed by a large number of settlers, and prominent persons of Edmonton who have summer cottages at the lake, urging that licenses be issued for domestic fishing in Cooking lake, in order that their tables may be supplied with jackfish. I would urge that in the interests of not only the summer visitors, but of the struggling settlers about the lake that they be allowed to use nets for domestic purposes.

The waters of Beaver Hills lake and Hastings lake contain only jackfish and other coarse fish, the fisheries are of only local importance, supplying the market of the neighbouring settlements.

Wabamún Lake District.—This district is, as was the case last year of great importance, because of its proximity to Edmonton with daily railway service; Wabamun lake being the only waters from which a regular supply of whitefish may be obtained by Edmonton and other towns throughout the province during the summer season. Since I have been the inspector of fisheries I have made every effort to limit the fishermen's licenses on Wabamun lake and Island lake to such a number as not to deplete these waters; but during the past year because of economic considerations I felt obliged to issue fishermen's licenses to all applicants legally eligible—excepting persons not living in the district—I felt justified in making this exception because of the large number of settlers living about the shores of these lakes, who are now, and have been for several years wholly or partially dependent on the fishing industry.

I have always had reason to suspect that there was a good deal of illegal fishing going on both at Wabamun lake and Island lake. During the past year I was able to prosecute and secure convictions against three persons and inflict such fines and penalties as to be an example to other fishermen, and I trust prevent similar offences in the future.

Notwithstanding that Wabamun lake has been fished by so many men and has furnished the market so liberally, I have no reason up to the present to fear that it has become depleted of whitefish.

Lac Ste. Anne District.—In this district an increased number of men engaged in the fishing industry, and with more success during the winter than formerly. The catch was mostly consumed in the neighbouring villages and settlements; though some attempt was made to haul fish to Wabamun station, some twelve miles distant, for shipment.

There is now a railway service by the Canadian Northern railway, so that the fisheries of Lac Ste. Anne will soon be of considerable importance; it being but fifty miles from Edmonton.

Up to the present Lac Ste. Anne has only been fished by families living in the neighbourhood; most of whom are half-breeds or Indians. I have not thought it desirable that licenses should be issued to persons not resident in that district.

It is most difficult to catch whitefish in Lac Ste. Anne in winter, and for that reason the settlers have for several years been allowed to fish for two days a week during the close season, for domestic use that they might provide themselves for winter. Notwithstanding this I am well satisfied, as well by my own observations as by the reports of the local guardian and the opinion of trustworthy settlers, that there is no diminution of whitefish.

Lac la Nonne is well stocked with whitefish, though but little fished by a few of the settlers, mostly for domestic use.

The other lakes of this district are not of much present importance, containing only coarse fish and being too far from railway service for shipping.

Shining Bank and Chip Lake Districts.—These are of minor importance, the former being of small area though well stocked with whitefish of large size. It is but little fished except for domestic use. Chip lake contains only coarse fish.

Saddle Lake District.—During the past year an increased number of fishermen's licenses have been issued, especially for the more northern waters of this district.

Though I have reason to think there was a larger catch this year than previously, I am unable to make a reliable comparison with that of former years; as during the winter fishing there has been no local guardian for this district. I am still of the opinion which I expressed in my report for the year 1913-1914 that as railway facilities are extended the fisheries of this district will be of great importance

Moose Lake District.—During the past year Fishermen's licenses have been issued for Moose lake, though during the previous year only domestic licenses had been issued.

Increased attention is being given to the more northern waters of this district with the spread of settlement and the improvement of roads.

Lac la Biche District.—For this district there has been a considerable increase in the number of licenses, caused as at many lakes by lack of employment, rather than by the demand for fish.

Athabaska District.—In this district there was also an increase in number of licenses as compared with former years.

At Calling lake the fishing is only carried on in winter, it being impossible for fish to be freighted to the rail head during summer.

Lesser Slave Lake District.—In this district there has been a very large increase in the number of licenses issued and men engaged in fishing. Many of the fishermen of this district have not heretofore followed this industry. For want of skill and proper equipment many of them have not been able to earn a decent living.

A considerable proportion of license holders have homes in or about Edmonton, and undertook fishing because they were unable to find other employment; they are not likely to apply for licenses in the future.

My information is that fishermen of Lesser Slave lake who understand their work and are properly equipped, have been fairly successful in their catch, though the market has not been as good as in former years.

Overseer Travers has been in charge of this district since May last; and has proved a painstaking and efficient officer.

The Indians and half-breeds of this district have been permitted to do a limited amount of fishing during November, under the supervision of the overseer; though this practice is not quite satisfactory it seems the only practicable course as these people have for many years been accustomed to fish at that season, in order to provide themselves with fish for the trapping season.

Lesser Slave lake has railway service to Edmonton, though not a very efficient one. This service will no doubt improve in the near future, when the fisheries of Lesser Slave lake will be of very great importance. As an indication of this I may say that during this last winter a shipment of about 40 cwt. of whitefish was made by a number of fishermen to New York, the price obtained being about two and a half cents per pound. The handling of the shipment for them was done by one of the wholesale firms of Edmonton. I am unable to give exact data of the profits of this enterprise as the full returns are not yet in, but the fishermen seemed well satisfied with the experiment and also their treatment.

Sturgeon Lake District.—This district is only of minor importance, the whole catch being used locally by the settlers except a small part which was shipped to Edson for consumption at that point.

Edson District.—The lakes in this district are small and contain only coarse fish except Buck lake, in which a few whitefish are taken. Many of the small creeks flowing into the McLeod river are well stocked with trout and greyling. In the past these have been considerably fished for sport.

Though during the year 1914-15 there has been considerable increase in the number of licenses issued, as compared with former years, it must not be assumed that fishermen have been more prosperous, as though transportation facilities have been somewhat improved, the market has not been so good because of hard times brought on by the war and other reasons.

The conditions of professional fishermen and those who have for years partially been dependent on the industry for their livelihood has been much injured by the competition of men who only took up fishing for the time being, having nothing else to do, most of whom have probably learned that a living is not easily made by fishing, and who are not likely to re-engage in it.

Since October last I have not visited any of the districts of my inspectorate; my military duties having made it impossible for me to do so.

I am of the opinion that there are changes in the Fishery Regulations which might be made with advantage to fishermen, and to the public; but that the time is hardly ripe for such changes.

I would recommend that until the end of the war no attempt be made to restrict the number of licenses issued to eligible persons and that most liberal interpretation be placed on the privileges which half-breeds and Indians appear to be entitled to.

I am, sir,
Your obedient servant,

JUSTUS WILLSON,
Inspector of Fisheries.

REPORT ON THE FISHERIES OF SOUTHERN ALBERTA.

G. S. DAVIDSON, Esq.,
Chief Inspector of Fisheries,
Indian Head, Sask.

SIR,—I have the honour to submit to you my report on the fisheries of Southern Alberta for 1914.

Trout angling during July and August was excellent, but fell off considerably During September and October, which I attribute to the fact that the streams remained very clear the whole season on account of lack of rain, a condition of which anglers took advantage, great numbers fishing continually.

Grayling were very plentiful the whole season. This fish has increased in numbers the last two years. They afford excellent sport, as they are quite game. I feel sure that the protection in the spring the last two years has been the means of providing better sport during the open season.

The number of anglers are increasing rapidly every year, and it will be necessary to stock all streams in this district as soon as it is possible to do so.

I am pleased to report that we are receiving the hearty co-operation of a great many anglers in the observation of the regulations, which makes the work both easy and a pleasure.

We had nine prosecutions and convictions during the season for angling during close season and without a permit. The guardian on Willow Creek noticed two instances of liming on that stream, but was unable to detect the perpetrator, and the guardian on Highwood River found two instances of dynamiting on that stream and is still following up a clue, which he hopes to bring to a successful conclusion.

The number of permits disposed of was 3,500, irrespective of those disposed of by the R.N.W.M.P., of which I have no record, but which should amount, approximately, to 2,000.

Anglers were distributed in about the following numbers on the different streams:

Bow river and tributaries	500
Elbow river and tributaries	500
Jumping pond and tributaries	500
Fish creek and tributaries	500
Sheep creek and tributaries	500
Highwood river and tributaries	500
Willow creek and tributaries	250
St. Mary's river and tributaries	250
Pincher creek and tributaries	750
Old Man's river and tributaries	1,250

The number and species of fish caught in the streams and tributaries are, approximately, as follows:

	Trout.	Grayling.
Bow river	30,000	12,000
Elbow river	20,000	20,000
Highwood river	40,000	25,000
St. Mary's river	10,000	10,000
Old Man's river	40,000	30,000
Pincher creek	30,000	10,000
Willow creek	20,000	5,000
Fish creek	35,000	12,000
Sheep creek	35,000	6,000
Jumping pond creek	20,000	12,000
Clearwater river	4,000	3,000

In conclusion I would say that we have received valuable assistance from the R.N.W.M.P. in all districts, and it will only be a short time before prosecutions will be very few. The different guardians have also performed their several duties in a very efficient manner.

We have very few lakes where there are any pike in Southern Alberta, but Nose Creek and Chestermere Lake afford good sport in this respect, about 3,000 being caught in each during the year.

I am, sir, your obedient servant,

N. J. HOAD,
Fishery Officer.

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RETURN showing the Number of Fishermen, etc., the Number of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in the **Southern Division**, Province of **Saskatchewan**, during the year 1914-1915,

Number.	Fishing Districts.	Boats.					Gill Nets.		Lines.		Freezers and Ice-houses.	
		Row.	Value	Gasoline.	Value	Men.	No.	Value	No.	Value	No.	Value
			$		$			$		$		$
1	Long and Buffalo Lakes...	28	700	1	250	160	758	8,304	.....	.....	12	550
2	Qu'Appelle Valley...	40	290	15	2,000	40	125	1,000	900	675	8	80
3	Lac Pelletier.....	15	225	1	100	34	29	147	.....	.....	...	.....
4	Devils and Fishing Lakes..	5	100	3	450	10	4	24	100	100	...	....
	Totals.....	88	1,315	20	2,800	244	911	9,473	1,000	775	20	630

RETURN showing the Quantities and Values of all Fish caught, and marketed or consumed locally, for the **Southern Division**, Province of **Saskatchewan**, during the year 1914–1915.

Number.	Fishing Districts.	Whitefish.		Pickerel.		Pike.		Perch.		Tullibee.		†Mixed Fish.	
		*Cwt.	Value	Cwt.	Value	Cwt.	Value	Cwt	Val	Cwt.	Value	Cwt.	Value
			$		$		$		$		$		$
1	Long and Buffalo Lakes.	2,985	14,925	544	2,178	864	3,458	..	. .	33	165	273	547
2	Qu'Appelle Valley.....	82	656	91	410	521	2,605	9	45	1,214	4,856	36	144
3	Lac Pelletier	37	370	.....	... ..	17	136	...	....	.....	.....	1	5
4	Devils and Fishing Lakes	....	.....	95	570	330	1,650	....	....	.....	....	100	400
	Totals.....	3,104	15,951	730	3,158	1732	7,849	9	45	1,247	5,021	410	1,096

Cwt. = 100 lb. † "Mixed Fish" includes greyling, bull-heads and ouananiche.

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in the **Northern Division**, Province of **Saskatchewan**, during the year 1914-15.

Number.	Fishing Districts.	Boats.					Gill-Nets.		Hoop-Nets		Lines.		Freezers and Ice houses.		Number.
		Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
			$		$			$		$		$		$	
1	Cold, Primrose, etc., Lakes	38	627	.....	.....	90	620	3346	....	....	35	52	....	....	1
2	Onion, Island and Frog Lakes	7	70	.....	.....	7	23	161	.....	....	20	20	.....	.....	2
3	Jack Fish and Murray Lakes	15	750	7	1900	66	208	1259	....	....	500	500	1	25	3
4	Turtle and Bright Sand Lakes	7	125	2	600	76	227	1778	....	.....	25	25	1	100	4
5	Loon, Waterhen and Fishing Lakes	.....	.....	.....	.....	32	83	671	....	....	33	33	.....	....	5
6	Green Lake	15	197	....	.....	23	74	710	.....	.....	.....	...	.....	.....	6
7	Doré Lake	.....	.....	.....	.....	59	379	3910	.....	.....	.....	.....	.....	.....	7
8	Isle à la Crosse Lake	144	2400	.....	.....	70	269	2053	.....	.....	.....	.....	.....	.....	8
9	Buffalo, Clear, etc., Lakes	50	1000	..	....	7	300	1500	.....	.....	.....	.....	.....	.....	9
10	La Plonge Lake	.	.....	....	.....	..	9	90	.....	....	.....	.....	....	.....	10
11	Stony, Devils and Ladder Lakes	10	250	.....	.....	35	87	609	.....	.....	42	42	....	....	11
12	Montreal, La Ronge and Trout Lakes	11	333	.....	...	10	118	799	.....	...	18	18	.....	.....	12
13	Candle, Sturgeon and other Lakes	8	89	.....	.....	9	27	216	....	.....	35	35	.....	.....	13
14	Wakaw Fishing and Lenora Lakes	35	996	.....	.....	8	10	50	.....	.....	290	290	.....	.....	14
15	Saskatchewan Rivers	14	231	1	700	77	43	215	71	355	190	190	.....	.....	15
	Totals	354	7062	10	3200	569	2477	17367	71	355	1188	1205	2	125	

RETURN showing the Quantities and Values of all Fish caught and marketed or consumed locally, for the **Northern Division**, Province of **Saskatchewan**, during the year 1914-15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Trout, cwt.	Trout, value.	Whitefish, cwt.	Whitefish, value.	Pickerel, cwt.	Pickerel, value.	Pike, cwt.	Pike, value.	Tullibee, cwt.	Tullibee, value.	†Mixed Fish, cwt.	Mixed Fish, value.	Number.
			$		$		$		$		$		$		$	
1	Cold, Primrose, etc., Lakes			2308	2731	3081	3232	228	132	269	133	22	54	89	89	1
2	Onion, Island and Frog Lakes					451	902			15	22	6	12	36	36	2
3	Jack Fish and Murray Lakes					1668	5095	23	69	1059	1588			52	52	3
4	Turtle and Bright Sand Lakes					2249	6664			208	351	52	104	41	41	4
5	Loon, Waterhen and Fishing Lakes					1687	3374	60	120	121	133	4	4	111	111	5
6	Green Lake					1017	2034	127	254	212	212	16	32	520	520	6
7	Doré Lake					9821	19642	50	100	71	71			667	667	7
8	Isle à la Crosse Lake					5000	10000	353	706	3684	3684	154	154	1738	1738	8
9	Buffalo Clear, etc. Lakes					4650	9300	206	4 0	2680	2680			2000	2000	9
10	La Plonge Lake			78	235	175	350	5	10	21	21			40	40	10
11	Stony, Devils and Ladder Lakes					986	2958	26	78	94	282			112	112	11
12	Montreal, La Ronge and Trout Lakes			112	586	1145	5698	69	179	149	381			196	407	12
13	Candle, Sturgeon and other Lakes					335	1675	7	35	64	256			32	32	13
14	Wakaw Fishing and Lenora Lakes					74	370	65	325	511	891			1200	2600	14
15	Saskatchewan Rivers							8	40	20	140			408	2040	15
	Totals			2498	3552	32339	71204	1221	2448	9181	10848	254	360	7342	10485	

* Cwt. = 100 lb. † "Mixed Fish" includes greylings, bull-heads and ouananiche.

RECAPITULATION.

Of the Yield and Value of the Fisheries in the Province of **Saskatchewan**, during the year 1914-15.

Kinds of Fish.		Quantity.	Value.
			$
Salmon	*Cwt.		
Trout	"	2,498	3,552
Whitefish	"	35,443	87,155
Herring	"		
Bass	"		
Pickerel	"	1,951	5,606
Pike	"	10,913	18,697
Sturgeon	"		
Eels	"		
Perch	"	9	45
Maskinongé	"		
Tullibee	"	1,501	5,381
Cat-fish	"		
Goldeyes	"		
Mixed Fish	"	7,752	11,581
Caviare	"		
Total			132,017

Quantity Consumed in Canada, 96⅓ p.c.
" exported to U.S.A., 3⅔ p.c.

*Cwt. = 100 lbs.

RECAPITULATION.

Of the Number and Value of Vessels, Boats, Nets, Traps, etc., used in the Fisheries in the Province of **Saskatchewan**, during the year 1914-15.

	Number.	Value.
		$
Steam Vessels or Tugs		
Boats (sail and row)	442	8,377
" (gasoline)	30	6,000
Gill-nets and other nets	3,459	27,195
Weirs		
Lines	2,188	1,980
Freezers and Ice-houses	22	755
Smoke and Fish-houses		
Piers and Wharves (private)		
		44,307

Number of men employed in Boats 813

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RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in **South Alberta**, during the year 1914-1915.

Number.	Fishing Districts.	Gill-nets.	
		No.	Value.
			$
1	Red Deer River	3	30
2	Lethbridge	2	20
	Totals	5	50

RETURN showing the Quantities and Values of all Fish caught and marketed or consumed locally, for **South Alberta**, during the year 1914-1915.

Number.	Fishing Districts.	Trout.		Pickerel.		Pike.		Goldeyes.		†Mixed Fish.	
		*Cwts	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.
			$		$		$		$		$
1	Red Deer River	....	.....	30	210	50	250	75	375	...	.....
2	Clearwater River	50	400	...	.....	....	.....	.....	.....	...	.....
3	Bow River	150	1,200	...	.....	....	.....	.....	.....	300	1,500
4	Jumping Pond Creek	75	600	.....	.....	.....	.....	...	.....	60	300
5	Elbow River	100	800	...	.....	.....	.....	.....	.....	100	500
6	Fish Creek	90	720	...	.....	.....	.....	.....	.....	75	375
7	Sheep Creek	90	720	.....	.....	.	.....	....	.....	35	175
8	Highwood River	160	1,280	.....	.....	...	.....	.....	.....	85	425
9	Old Man's River	200	1,600	...	.....	.....	.....	.....	.....	200	1,000
10	Pincher Creek	150	1,200	.....	.....	...	.....	.....	.....	150	750
11	St. Mary's River	60	480	...	.....	....	.....	...	.....	50	250
12	Chestermere Lake	.....	.....	.....	.....	300	1,500	....	.....	.....	.....
13	Nose Creek	....	.....	.....	.....	100	500	.....	.....	.....	.....
14	Belly River	.....	.....	....	.....	40	200	...	.....	.....	.....
	Totals	1,125	9,000	30	210	490	2,450	75	375	1,055	5,275

*Cwts = 100 lbs, † "Mixed Fish" includes greyling, bull-heads and ouananiche.

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in **North Alberta**, during the year 1914-15

Number.	Fishing Districts.	Boats.					Gill-Nets 60 yds.		Lines.		Freezers and Ice-houses.		Smoke and Fish-houses.		Piers and Wharves.		Number.
		Sail and Row.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
			$		$			$		$		$		$		$	
1	Pigeon, Buck, Battle, Conjuring Lakes	31	400	..	....	142	185	970	....	....	5	16	....	..	....	.....	1
2	Gull and Sylvan Lakes	....	....	....	....	151	1	10	150	150	....	....	....	....	....	....	2
3	Buffalo Lake	....	....	....	....	80	16	108	64	64	....	....	....	....	....	....	3
4	Beaver, St. Joseph, Oliver, Ministic and Cooking Lakes	19	440	4	125	50	58	580	....	....	1	10	....	....	....	....	4
5	Wabamun and Island Lakes	31	1,244	7	1,342	77	337	2,023	....	....	16	1,200	....	....	....	....	5
6	Lac Ste. Anne and Lac la Nonne	55	537	..	....	55	121	1,210	....	....	4	153	....	....	....	....	6
7	Shining Bank and Chip Lakes	7	100	..	..	8	7	50	....	..	..	....	....	....	....	....	7
8 9	Saddle Lake District. (Whitefish, Goodfish, Saddle and Island Lakes; Hollow, Mosquito, Pinehurst, Trout and Egg Lakes)	6	60	..	....	33	45	360	....	....	....	....	....	....	....	....	8 9
10	Moose, Muriel, Wolf and Keehewin Lakes	....	....	....	....	36	52	364	....	....	....	....	....	....	....	....	10
11	Lac la Biche and Beaver Lake	23	413	..	....	42	49	320	....	....	2	5	....	....	....	....	11
12	Athabaska District (Calling, Buck, Skeleton, Baptiste and Moose Lakes)	....	....	....	....	51	118	1,130	....	....	....	....	....	....	....	....	12
13	Lesser Slave and Whitefish Lakes	25	650	2	250	124	333	3,280	....	....	6	1,050	4	600	2	50	13
14	Sturgeon Lake	3	80	....	....	24	24	144	..	....	....	....	....	....	..	..	14
15	Edson, McLeod River and Tributaries	....	....	....	....	1	3	15	..	..	....	....	....	....	....	....	15
16	Sturgeon River, Big, Seymour and Mink Lakes	37	375	....	....	80	6	30	74	74	..	....	....	....	....	....	16
	Totals	245	4,299	13	1,717	947	1,355	10,605	288	288	34	2,625	4	600	2	50	

RETURN showing the Quantities and Values of all Fish Caught and Marketed or consumed locally for **North Alberta** during the year 1914-15.

Number.	Fishing Districts.	Trout.		Whitefish.		Pickerel.		Pike.		Perch.		Tullibee.		Goldeyes.		Mixed fish.		Number.
		Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.	
1	Pigeon, Buck, Battle and Conjuring lakes	...	...	1,356	6,780	21	105	134	402	...	....	...	.....	...	....	25	50	1
2	Gull and Sylvan lakes	....	...	..	..	1	5	130	650	50	100	...	....	2	10	57	114	2
3	Buffalo lake	....	....	....	....	..	.	144	432	....	...	....	....	....	....	14	7	3
4	Beaver, St. Joseph, Oliver, Ministic and Cooking lakes	...	....	20	100	..	.....	435	1,305	....	....	....	....	40	80	.....	....	4
5	Wabamun and Island lakes	..	....	5,427	16,281	150	450	1,188	2,376	...	...	..	....	10	10	10	10	5
6	Lac Ste. Anne and lac la Nonne	...	...	140	420	2	6	72	144	....	....	....	.....	....	....	2	2	6
7	Skinning Bank and Chip lakes	....	...	35	178	30	60	30	60	...	....	....	.....	10	20	10	20	7
8	Saddle lake district.	Whitefish, Goodfish, Saddle Island lakes, Hollow, Mosquito, Pinehurst, Trout and Egg lakes	40	160	500	1,500	5	15	50	100	....	..	9	18	....	....	....	....	8
9					394	1,182	34	68	135	270	....	..	115	345	....	....	174	174	9
10	Moose, Muriel, Wolfe and Keehewin lakes			....														10
11	Lac La Biche and Beaver lake	..	..	992	2,977	8	16	131	262	...	...	373	746	....	....	460	460	11
12	Athabaska district.	Calling, Buck, Skeleton, Baptiste and Moose lakes	...	...	3,220	6,440	262	393	48	72	60	120	260	390	.	....	50	50	12
13	Lesser Slave and Whitefish lakes		25	100	5,222	15,666	166	332	56	560	....	....	....	....	..	....	560	560	13
14	Sturgeon lake		....	....	64	2,208	.	.....	320	480	10	40	....	....	....	....	....	....	14
15	Edson, McLeod river and tributaries		10	40	....	....	.....	.....	20	60	....	..	....	.....	....	....	10	30	15
16	Sturgeon river, Big Seymour and Mink lakes		....	..	....	....	50	200	750	3,000	..	....	....	....	50	100	101	101	16
	Totals		75	300	17,370	53,730	729	1,650	4,147	10,173	120	260	757	1,499	112	220	1,473	1,578	

RECAPITULATION

Of the Yield and Value of the Fisheries in the Province of **Alberta** during the year 1914-15.

Kinds of Fish.		Quantity.	Value.
			$
Salmon	*Cwt		
Trout	"	1,200	9,300
Whitefish	"	17,370	53,730
Herring	"		
Bass	"		
Pickerel	"	759	1,860
Pike	"	4,637	12,623
Sturgeon	"		
Eels	"		
Perch	"	120	260
Maskinonge	"		
Tullibee	"	757	1,499
Catfish	"		
Goldeyes	"	187	595
Mixed fish	"	2,528	6,853
Caviare	"		
Total			86,720

*Cwt. = 100 lb.

Quantity exported to U.S.A., 40 cwt.

RECAPITULATION

Of the Number and Value of Vessels, Boats, Nets, Traps, etc., used in the Fisheries in the Province of **Alberta** during the year 1914-15.

——	Number.	Value.
		$
Steam vessels or tugs		
Boats (sail and row)	245	4,299
" (gasoline)	13	1,717
Gill-nets	1,360	10,655
Weirs		
Lines (under angling permits)	288	288
Freezers and ice-houses	34	2,625
Smoke and fish-houses	4	600
Piers and wharves (private)	2	50
Total		20,234

Number of men employed 947

APPENDIX No. 7.

YUKON TERRITORY

REPORT ON THE FISHERIES OF THE YUKON.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to submit the following report on the fisheries of the Yukon Territory for the fiscal year 1914-15, together with the statistical returns showing yield and value of fish and amount, and value of material used.

The Yukon river, from which the bulk of the salmon is taken, seems to yield as largely as ever, despite the fact that fish wheels are used in an unlimited number on the lower Yukon on the Alaskan side.

Our lakes appear to be well stocked and not to have suffered from the past eighteen years of fishing.

Lake La-Barge, the first lake to be fished for whitefish, still produces an abundance.

Teslin, Tagish and Big lakes are fished principally by Indians, but white fishermen have started to operate on Albert lakes and on the Little Salmon river.

Under the regulations of the Yukon Territory prospectors, travellers, surveyors or explorers are permitted to fish without license and as prospectors form a considerable part of our population, it will be readily seen that a large amount of fish is taken from the different lakes and streams which is unaccounted for in values.

The only river which shows a marked decrease in supply is the Klondike, where many of the large dredges are working, with the result that during the summer months the water is in a more or less muddy condition. The upper reaches of this river is also a favourite resort for Dawson anglers, as it empties into the Yukon river at Dawson and is very convenient for week-end parties.

The upper reaches of the Stewart and Pelly rivers abound in whitefish, grayling and trout, and more would be taken from these streams if the transportation facilities were more regular.

By reference to the returns I have forwarded you will observe that the catch by Indians and that by whites are under different headings.

The closed season during the past year has been well observed, no violations coming under my observation nor any reported by the guardians.

In regard to the violations of the fishing regulations, I beg to report that I have destroyed one fishwheel and eight nets of illegal size, but failed to secure sufficient proof to justify prosecutions.

With reference to the recommendations for the furthering of the fishery interests of this territory, I am of opinion that the new draft of regulations which I received from you some time ago are sufficient and adequate to fill all the seeming requirements.

I have the honour to be, sir,

Your obedient servant,

C. C. PAYSON.

RETURN showing the Number of Fishermen, etc., the Number and Value of Tugs, Vessels and Boats, and the Quantity and Value of all Fishing Gear and other Material, used in the Fishing Industry in the **Yukon Territory**, during the year 1914-15.

Number.	Fishing Districts.	Boats, Sail and Row.			Gill-Nets.		Lines.		Freezers and Ice-houses.		Smoke and Fish-houses.		Piers and Wharves.		Persons employed in Fish. Freezers, houses, etc	Number.
		Number.	Value.	Men.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
	Owned by Whites.		$			$		$		$		$		$	No.	
1	Dawson	10	325	16	42	500	45	22	1	4,500	1	100			14	1
2	Pelly district	4	120	8	20	200	20	10			1	125			2	2
3	Forty-Mile	6	180	12	14	140	40	20			1	100			1	3
4	Lake La Barge	5	150	10	17	160	61	31					1	300		4
5	Carcross	6	180	14	36	432	45	22								5
6	Klondike river	9	270	11	30	300	27	13			1	100				6
7	Thistle and Sixty-Mile	5	150	5	24	240	16	8								7
8	All other parts of Yukon Territory	8	240	8	26	270	60	15								8
	Owned by Indians.															
9	Salmon river	8	150	20	20	120										9
10	Teslin lake	6	90	13	9	90										10
11	Tagish	5	80	15	11	77										11
12	Big lake	2	40	6	8	56										12
13	McQuestion	4	80	7	7	49										13
14	Selkirk and Pelly	13	320	21	45	315	40	20								14
15	Duncan	4	80	8	12	84										15
16	Porcupine	5	100	12	9	63										16
17	Peel river	6	180	12	11	70										17
18	Rampart	8	250	16	14	98										18
19	Hootchi	6	200	12	12	80										19
	Totals	120	3,185	226	367	3,344	354	161	1	4,500	4	425	1	300	17	

RETURN showing the Quantities and Values of all Fish caught and marketed or consumed locally, in the **Yukon Territory** during the year 1914–15.

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Trout, cwt.	Trout, value.	Whitefish, cwt.	Whitefish, value.	Pickerel, cwt.	Pickerel, value.	Pike, cwt.	Pike, value.	Maskinongé, cwt.	Maskinongé, value.	†Mixed fish, cwt.	Mixed fish, value.	Number.
	Caught by Whites.		$		$		$		$		$		$		$	
1	Dawson	300	3,000	6	180	40	1,000	5	100	2	50	3	75	110	2,200	1
2	Pelly district	60	600	25	750	100	2,500					4	100	20	400	2
3	Forty-Mile	190	1,900	4	120	5	125					1	25	40	800	3
4	Lake La Barge			7	210	115	2,875							30	600	4
5	Carcross			50	1,500	35	875							20	400	5
6	Klondike river	70	700	12	360	15	375					2	50	85	1,700	6
7	Thistle and Sixty-Mile	38	380	5	150	8	200							70	1,400	7
8	All other parts of Yukon Territory	148	1,480	35	1,050	40	1,000					5	125	112	2,240	8
	Caught by Indians.															
9	Salmon river	155	1,550	10	300	40	1,000					2	50	70	1,400	9
10	Teslin lake			15	450	45	1,125							90	1,800	10
11	Tagish			10	300	54	1,350							70	1,400	11
12	Big lake			6	180	11	275							35	700	12
13	McQuestion	140	1,400	6	180	27	675							40	800	13
14	Selkirk and Pelly	310	3,100	25	750	80	2,000							55	1,100	14
15	Duncan	50	500	10	300	22	550							30	600	15
16	Porcupine	40	400	2	60	25	625							20	400	16
17	Peel river	135	1,350	20	600	50	1,250							25	500	17
18	Rampart	145	1,450	14	420	70	1,750							64	1,280	18
19	Hootchi	105	1,050	22	660	60	1,500							50	1,000	19
	Totals	1,886	18,860	284	8,520	842	21,050	5	100	2	50	17	425	1,036	20,720	

* Cwt. = 100 lb. † "Mixed fish" including greyling, bull-heads and ouananiche.

RECAPITULATION.

Of the Yield and Value of the Fisheries in the **Yukon Territory**, during the year 1914-15.

Kinds of Fish.	Quantity.	Value.
		$
Salmon *Cwt.	1,886	18,860
Trout "	284	8,520
Whitefish "	842	21,050
Pickerel "	5	100
Pike "	2	50
Maskinongé "	17	425
Mixed Fish "	1,036	20,720
Total		69,725

Quantity consumed in Canada.....All.

*Cwt.=100 lb.

RECAPITULATION.

Of the Number and Value of Vessels, Boats, Nets, Traps, etc., used in the Fisheries in the **Yukon Territory**, during the year 1914-15.

	Number	Value.
		$
Boats (sail and row)	120	3,185
Gill-nets, seines and other nets	367	3,344
Lines	354	161
Freezers and ice-houses	1	4,500
Smoke and fish-houses	4	425
Piers and wharves (private)	1	500
		11,915

Number of men employed in Boats	226
" persons employed in Fish-houses, Freezers, etc	17
	243

APPENDIX No. 8.

BRITISH COLUMBIA

To the Superintendent of Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit my report on the fisheries of the Province of British Columbia for the fiscal year ended March 31, 1915.

COMMERCIAL VALUE OF THE FISHERIES.

The total marketed value of the fisheries for the whole province for the past fiscal year amounts to $11,515,086, showing a decrease of $2,376,312 when compared with the value for the preceding fiscal year. The greater portion of this decrease is due to the fact that the statistics for 1913-14 covered the big salmon run to the Fraser river which occurs only every fourth year. Hence the number of cases packed on the Fraser river for 1914 was 328,390 cases, as against 732,000 cases for 1913. There is also a decrease of some 9,000 cwts. of halibut as compared with the previous season, which can only be attributed to the fact that halibut are becoming less plentiful each year. The statistical returns will show that the total value of the fishing vessels, boats and gear is $8,829,740 and 18,328 persons were employed in the fishing industry last season.

DISTRICT NO. 1.

This district includes the Fraser river, a portion of Howe sound, and the inland lakes of the southern part of the province.

The total quantity of all species of salmon canned in this district amounted to 328,390 cases giving a value of $1,641,950, and the total commercial value of the fisheries for the whole district is $3,984,091. There were 2,656 salmon gill-net licenses issued during the year, and 20 salmon canneries were in operation. The nationalities of the operators of these nets were 1,035 whites, 1,254 Japanese, and 367 Indians.

The protection of the fisheries of the Fraser river and Howe sound is supervised by four gasoline boats, which are commanded by patrolmen, and their efforts last season towards enforcing the Fisheries Regulations resulted in 368 prosecutions for violation of the Fisheries Act, and the collection of fines aggregated $3,426. The southern and northern portions of District No. 1, which include the inland lakes and the spawning grounds of salmon ascending the North Thompson and Fraser rivers are supervised by fishery overseers as follows:—

H. Shotton, Kamloops; C. Godwin, Vernon; J. MacLeod, Nelson; J. L. Hill, Quesnel; D. F. M. Perkins, Fort George.

These officers have large districts and are required to devote all their time to the enforcement of the Fishery Regulations.

The Fishery Regulations for the Province of British Columbia do not permit netting of any kind in inland waters, but the temptation to take fish by this means is great. Consequently these officers must of necessity be continually on the move,

throughout their districts. For the better protection of the district comprising the Fraser river north of Lytton, it was considered necessary to appoint two officers, J. L. Hill, of Quesnel, whose district is "that territory covered by Lillooet district, north of Clinton and part of Cariboo and including all lakes and streams west of the North Thompson river to Meridian 125 and north to and including Blackwater river with headwaters at Quesnel;" and D. F. M. Perkins, of Fort George, with district covering "that territory north of Blackwater river contained in Cariboo district including Upper and Lower Necacho rivers and all intervening streams extending north to and including Fraser and Stuart lakes with headquarters at Fort George;" thus resulting in proper protection of the great salmon spawning beds of the upper reaches of the Fraser river.

District No. 2.

The total value of the fisheries for this district amounts to $4,279,551 for the past season, the salmon industry alone producing $3,354,610, of which $2,998,240 represents the value of the sockeye pack which consisted of 599,648 cases, an increase of 182,195 cases over the pack of the previous year. The Skeena river yielded 237,634 cases as against 164,055 cases for 1913. This pack would have been exceeded had climatic conditions been conducive to fishing operations, but from this standpoint, the season was conceded to be one of the worst experienced for many years. In any event the pack was certainly good, and the spawning grounds of the Upper Skeena were well seeded with eggs.

The season on Rivers Inlet was also very satisfactory, there being an approximate increase of 40,000 cases over the previous year, and here again most undesirable climatic conditions prevailed. The spawning grounds for the Rivers Inlet salmon are in Oweekayno lake, and reports show that these grounds were fully stocked with salmon eggs.

There was also an increased pack on the Naas river of over 19,000 cases as compared with the previous year. The Meziaden watershed embraces the spawning grounds for the Naas river, and the quantity of parent fish reaching these grounds compares favourably with previous seasons. The fish ladder at the Meziaden falls, did good service, and undoubtedly affords great assistance in enabling the salmon to ascend to Meziaden lake.

The North coast and Queen Charlotte islands rendered good returns and 352,565 pounds of Red Spring Salmon were mild cured. These salmon are caught by means of trawling, and fishing ceased on the 8th of July owing to the fact that the Indians leave about that time for the gill-net fishing on the Skeena and the Naas rivers. No Humpback Salmon were caught for commercial purposes, as the canneries at Naden harbour and Aliford bay did not operate during 1814.

The whaling stations were in operation at Naden and Rose harbours on the Queen Charlotte islands. The season was a fairly successful one, resulting in the capture of 253 whales, including 9 sperm whales.

In my report of last year, reference was made to the encouragement of white fishermen to become permanent settlers in the north and assume a greater factor in the development of the northern fisheries. Towards this end, a number of licenses were reserved at each great fishing centre to be known as independent licenses, and to be operated by white fishermen only. This was taken advantage of in 1913, and 167 independent licenses were issued to white fishermen, and I am pleased to report that during the season of 1914, this number had increased to 456, thus showing that the white fishermen appreciate the department's efforts in this connection.

This district is supervised by Inspector J. T. C. Williams and he has as his assistants, seven fishery overseers, located at Rivers Inlet, Skeena river, Naas river, Bella Bella, and Queen Charlotte islands, and in addition to these, special guardians

patrol the upper reaches of the different rivers. The overseers are supplied with gasoline launches, which enables them to cover their respective districts, and the regulations are well enforced. Inspector Williams, is a most energetic officer and from personal knowledge I am pleased to state that his duties are performed in a most satisfactory manner.

District No. 3.

This district is under the supervision of Inspector E. T. Taylor, with Nanaimo as his headquarters, the area supervised being the whole of Vancouver island, and the mainland adjacent. The commercial value of the fisheries of this district for the past year is $3,251,444 as compared with $3,647,823 for the previous year. The quantity of salmon canned is not quite as large, being about 43,000 cases less than the previous year. This is accounted for in a large measure by the fact that three canneries in the district were not operated. A new cannery was located at Shushartie bay by the Goletas Fishing Co., and it is pleasing to note that in addition to the canning of salmon this firm is building up a fresh fish business, and thus bringing other valuable food fish before the public and giving employment to a number of fishermen throughout the whole of the year. Commercial trolling for salmon is increasing in this district, and it is a matter for consideration as to whether or not it would be advisable to control this mode of fishing by regulation, especially as it is growing in favour in many areas.

Another phase of commercial fishing which is assuming very large proportions in this district, is the catching of cod. During the season of 1913, 15,325 cwts. of cod were taken and this year, we find it has increased to 22,485 cwts. This fishing is conducted quite largely in the channels between Vancouver island and the mainland, and the waters being sheltered, fishing can be carried on practically during the whole year. The spawning season for cod is said to be from the middle of January to the end of February, during which time large quantities are taken, and at a time when conservation should be in force. However, the matter of a close season, or areas set apart for the propagation of cod is now before the Biological Board of Canada, and it is hoped their report will be available at an early date. Filletted cod is now being shipped from Nanaimo, and finds a ready market. They command a good price and this branch of the industry will no doubt continue to develop.

The herring fisheries of the district yielded 23,000 tons, and whilst the bulk of the herring taken were, as usual, dry salted, and shipped to the Orient, yet more attention is being paid to preparing the herring for other markets, and putting them up in such a way that they will command higher prices, and thus obtain a higher standard in the fish market.

The whaling station, located at Sechart, Barclay sound, had a good season, capturing 86 whales, including 4 sperm whales. At Kyuquot another whaling station is located, and in connection with this institution 234 whales were captured, including 12 sperm whales, thus bringing the total number of this valuable species to 16, being 5 over the catch of last year.

The Indians, engaged in fur sealing, had a more profitable season than in 1913, 257 fur seals being taken, as against 119. The killing of seals is prohibited by any other means than the use of spears, and considerable skill and energy must have been used on the part of the Indians to show such favourable results.

The commercial value of the fishing vessels, boats, nets, etc., is $1,750,385 and 2,866 persons find employment in connection with the fishing industry of this district.

Inspector Taylor has this district well organized, and pays close attention to the enforcement of the regulations, and faithful support is rendered him by the fishery officers coming under his jurisdiction.

OBSTRUCTIONS.

In my report of last year, I referred to the value to the salmon industry in the removal of obstructions to the free ascent of this species to their natural spawning grounds. From inspections of certain areas which have been made during the fiscal year, the value to the fishing industry to be placed on this class of work is in my opinion unlimited, as it is absolutely necessary for the life of the salmon industry that the parent fish should be given every possible assistance in reaching their spawning grounds.

The greatest work in this direction has just been completed by the Department under the supervision of Engineer J. McHugh, which consisted of the removal of the huge obstruction consequent upon the construction of the Canadian Northern Pacific Railway and a natural rock slide which occurred at Hell's Gate in the Fraser river, in February of 1914, the details of which are so ably set forth in Mr. McHugh's report attached hereto.

Obstructions to the ascent of fish were also removed from Finlayson and Ellerslie channels, and also from Mary cove, and Great cove. A stream at Smith's island, Skeena river, also received attention as well as minor work at Sproat River falls, and the Nicomekl river. Other streams throughout the province are now receiving attention, and it is hoped that the more important sockeye streams will soon be free of obstructions.

SEA LIONS AND HAIR SEALS.

In continuance of the department's policy to grant a bounty for the destruction of the above mammals, $4,329.50 was disbursed for the slaughtering of 1,237 seals at $3.50 each. 116 were destroyed in the Fraser river, 831 in the vicinity of Bella Coola, and Skeena river, and 290 on Vancouver island. The carcasses of the seals are very difficult to secure after being shot, as unless hit in a vulnerable spot, they immediately sink, and the carcasses cannot be secured. Thus while bounty was paid on 1,237 seals, it in no way represents the actual number of seals killed, as it is estimated that only one in every five seals destroyed is secured. Consequently the amount paid out possibly represents the destruction of 5,000 to 6,000 seals.

FISH CULTURE.

There are twelve fish breeding establishments operated in this province, ten of which are devoted exclusively to the incubation of the salmon species. During the past season, 72,810,000 fry were distributed as follows:—

Fraser River watershed, 30,363,000; Skeena River watershed, 13,874,000; Rivers inlet, 12,712,000; Vancouver island, 15,861,000.

These hatcheries are doing good work in assisting nature to keep up the great quantities of salmon required to meet the ever increasing demands. This work, together with the removal of obstructions to the ascent of salmon to their natural spawning grounds should insure to the province a continuation of one of its greatest assets. These hatcheries are under the supervision of capable officers, who are greatly interested in their work from a conservation stand-point, and the details of their operations are enumerated in their reports.

RIVER AND LAKE EXPLORATION WORK.

In order that some reliable information might be obtained in connection with the spawning grounds in Districts Nos. 2 and 3, Captain J. F. Crichton, officer in command of the fisheries patrol launch "Fispa" was placed in charge of this work, he being peculiarly adapted for this duty, owing to his previous experience and general knowledge of fish life.

During the season of 1914, he inspected and reported on the spawning areas of Phillips arm, Kingcome inlet, Bella Coola district, and Knight's inlet. These reports contain a great deal of valuable information, but are of too voluminous a nature to include in this report, but it is hoped that when his work is completed, they will appear as an appendix to the annual report of 1915-16.

CANNERY INSPECTIONS.

The administration of that portion of the "Act Respecting the Inspection of Canned Meats and Canned Foods," relating to fish having been assigned to the Department of Naval Service, it became necessary to arrange an organized service for its enforcement in this province. For this purpose, four districts were formulated as follows:—

No. I.—Fraser river and English bay.
No. II.—Vancouver island and waters of the mainland opposite thereto up to Seymour inlet.
No. III.—Smith's inlet to Lowe inlet, inclusive.
No. IV.—Skeena river, Naas river and Queen Charlotte islands.

Inspectors were appointed and during the season, a systematic inspection was made. At the close of the canning season, the cannery inspectors met in New Westminster, and submitted recommendations based on their observations of the canning operations. The information gleaned was valuable, but on consideration of proposed regulations by the Fisheries Advisory Board, it was decided that owing to the importance of the matter in hand, hasty action was not in the interests of the industry. Consequently, definite action was postponed, pending the experience of another season's operations, and the meeting of such new conditions as might develop consequent upon the war, and its effect upon trade generally.

Advisory Board.

The administration of the fisheries has been greatly assisted by the meetings of the Fisheries Advisory Board, held semi-annually in Ottawa. At these meetings full scope is given for a free discussion of all matters considered to be in the interests of the fisheries of the province with those officers of the department dealing with questions of policy. The representatives of this province on this Board are D. N. McIntyre, Esq., deputy commissioner of fisheries for the province, and the undersigned, and with the information laid before the Board pertaining to local conditions, it is felt changes have been made in the regulations, which are of general benefit to the fishing industry.

It may be of interest to mention one regulation which it is generally conceded will be of great benefit to the province, namely, the extension of the bonding privileges to American vessels, by which they are enabled to enter British Columbian ports, and dispose of their fish to Canadian buyers who assume the bonding privileges, and also enabling these American halibut vessels to purchase bait, supplies, and ship crews in Canadian ports. This concession is being taken advantage of to a large extent and Prince Rupert is today enjoying the benefits of a growing business in this respect, which although the regulation has been in force only a short period, is now assuming proportions which practically demonstrate the wisdom of the extended privileges granted. The parliamentary representative for the constituency of Comox Atlin took a very prominent part in laying before the government the beneficial results to be derived from legislation of this nature. The Provincial Government also added their favourable recommendation and results are proving that the policy adopted was in the direction of making Prince Rupert the fishing metropolis of the province.

Head Office.

The work of the head office is increasing year by year. Three thousand nine hundred and ninety-eight letters were received, 4,685 dispatched, 1,662 accounts were audited, and 5,638 licenses issued, together with the purchasing of supplies and the various statements required to carry on the business of the department. The office staff, district inspectors, and all other officers performed their duties in an unselfish and satisfactory manner, and I am pleased to bear testimony to the support received from all.

General Remarks.

I would like to refer to the efforts made by the department in placing before the public through the medium of the Toronto Exhibition the desirability of increasing the consumption of all fish foods by the masses. The action of the department in this direction is largely in the interests of the fishing industry, as greater consumption means greater demand. Unfortunately, the fishing industry of British Columbia does not appear to place the value on the department's efforts in this direction to which they are entitled as there appears to be an apathy on the part of those engaged in the fish business to assist the department in supplying specimens of fish indigenous to the Pacific waters. This to my mind, is regrettable, but it must not be overlooked that the efforts of the majority of those engaged in the business have been limited to the production of salmon and the capturing of halibut. However, I am pleased to state that other species of fish are now receiving increased attention, and it it hoped the display from the province at the coming exhibition will be more representative.

It is with pleasure I can again refer to the very amicable relations existing between the Provincial Fisheries Department and myself, and the many discussions which have been held have no doubt been beneficial. Careful consideration has been given to all suggestions, and it is hoped the decisions reached have been in the best interests of all concerned.

REPORT ON THE FISHERIES OF DISTRICT No. 1.

F. H. CUNNINGHAM, Esq.,
Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I have the honour to hand you, herewith, the annual statistical report for District No. 1, covering the fiscal year of 1914-15.

SALMON.

I am pleased to report a marked increase in the total salmon pack over the corresponding year in the four year cycle, namely, 1910-11, as the following table will indicate:—

Year.	Sockeye. Cases.	Other Varieties of Salmon. Cases.	Total. Cases.
1910–11..	133,045	90,103	223,148
1914–15..	185,485	142,905	328,390

Showing an increase in the sockeye pack of 52,440 cases, and in the other varieties, 52,802 cases, a total increase of 105,242 cases. This is accounted for perhaps largely by the increased number of licenses issued and nets operated. The following is a comparative statement:—

Year.	Licenses Issued.
1910–11	1,576
1914–15	2,656

Showing an increase of 1,080 salmon licenses issued, although there was one less cannery operated in 1914-15 than 1910-11.

While, as has been stated, the great number of nets operated, would account in a large degree for the increased catch, yet there can be no reasonable doubt but that the result of the fish breeding operations on the Fraser River watershed added considerably to the success, as there were liberated from these hatcheries, from ova taken in the autumn of 1910 of all varieties, 28,653,000 fry. I am very confident that the money expended in equipping and maintaining these establishments year after year is amply justified.

HALIBUT.

There is a considerable decrease in the catch of halibut as compared with last year. The following is a comparative statement:—

Year.	Cwt.
1913–14	93,677
1914-15	78,565
Decrease	15,112

It is regrettable to have to state that the reason for this is the fact that the halibut banks are being rapidly depleted. It has been found absolutely impossible to keep up the tonnage of the catch, although more boats and gear are being employed each year.

HERRING.

There is quite an increase in the catch of herring over last year, shown by the following table:—

Year.	Cwt.
1913–14	29,502
1914–15	34,540
Increase	5,038

This is very encouraging and there are great possibilities for the future of this branch of the industry as the quality of herring taken in this district is the very best.

OTHER VARIETIES.

There is a considerable increase in the quantity of the cheaper varieties of fish taken over last year, as the comparison shown below indicates:—

Year.	Value.
1913–14	$134,365
1914–15	215,331
Increase	$80,966

The demand for these rougher varieties of fish, such as soles, flounders, perch, skate, hake, etc., has been increasing year after year, and no doubt will continue to increase, as their value as food fish becomes better known.

DOG SALMON.

This commodity as you are aware, is almost altogether exported to the Orient. There is a slight falling off in the catch as compared with last year, due to the fact that the market last year was somewhat overstocked, and consequently a lesser quantity was taken this year.

BY-PRODUCTS.

This important branch of the industry is this year again to the front. The output is as follows:—

		Value.
Gallons of oil	31,749	$ 9,631
Tons of guano	415	14,272
	.....	$23,903

Under the able management of Mr. Williamson, the plant owned and operated by the Canadian Fish Products Company did excellent work in taking care of the offal from the various canneries, and its operation year after year is a great benefit to the fishing industry.

HAIR SEALS.

These pests continue their depredations with increasing detriment to especially the spring salmon fisheries. I am strongly of the opinion that a great number of these mammals might be slaughtered by the use of explosives wisely supervised by an expert. During the breeding season they are very numerous on the sandheads and shallows at the mouth of the Fraser river.

The total number killed in this district for which bounty was paid was 116.

TOTAL VALUE OF FISHERIES.

The decrease in the total value of the fisheries of this district as compared with last year, is of course due largely to the decrease in the salmon pack, last year being the big run for the sockeye variety, but the value of all other varieties compares very favourably with that of former years. The total value of the fisheries as you will observe is $3,984,091.

All of which is respectfully submitted.

Sgd. A. P. HALLADAY,
Assistant Inspector of Fisheries.

REPORT ON THE FISHERIES OF DISTRICT No. 2.

F. H. CUNNINGHAM, Esq.,
Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I have the honour to enclose my annual statistical report on the fisheries of the northern coast of British Columbia District No. 2, for the fiscal year ended March 31, 1915, including the salmon packs of the different divisions. These returns show an increase in the aggregate, the total value of fish and fish products for 1914-15 being $4,279,551 against $3,230,788 for 1913-14. This increase is accounted for entirely by the pack of canned salmon, which amounted to approximately 182,000 cases, a large percentage of which was sockeye salmon, also the substantial increase in price of the coarser grades of salmon, dog salmon being packed in larger quantities than ever before.

I am gratified at being able to inform you that sockeye salmon were extremely plentiful, and I have no hesitation in stating that had the climatic conditions been more favourable, a record sockeye pack would have been secured. Rain and storm prevailed during the greater portion of the sockeye season, and though the sockeye were reported by fishermen to be in vast quantities, they could not be captured as the water was so clear, on account of heavy rains, that the salmon could see the nets and avoid them by lying on the bottom and allowing the nets to pass over them.

The herring were again almost entirely neglected on account of the low figure they brought in the market. The herring gill-net fishermen operated mostly in Prince Rupert Harbour where there is a certain demand for the local market. The purse seines operated entirely to secure bait for the halibut fisheries which is generally placed in Cold Storage until required when it is sold to the fishermen. Until other markets are opened up and a better price obtainable I see no likelihood of further developments of our northern herring fisheries.

No new canneries or salteries were erected in the district during 1914-15, with the exception of a large addition to the Haysport Cold Storage.

The total pack of salmon for the season of 1914-15 is as follows:—

1914-15.

	Cases.
Sockeye	310,991
Spring	18,919
Cohoe	59,447
Humpback and dog salmon	210,291
Total	599,648

AS AGAINST 1913-14.

	Cases.
Sockeye	183,731
Spring	24,458
Cohoe	41,169
Humpback and dog salmon	168,095
Total	417,453

INCREASE IN DETAIL.

	Cases.
Skeena river	73,579
Rivers inlet	40,956
Naas river	19,247
North coast	48,413
Total	182,195

SKEENA RIVER.

The sockeye run on the Skeena was exceptionally good, large bodies of salmon being reported by the fishery officers and fishermen, and undoubtedly had the climatic conditions been more favourable, a record pack would have been secured. Most of the fishing contrary to precedent was outside the Skeena in Chatham sound, but the south-east gales were so violent that fishermen were a great portion of the time unable to

operate successfully outside, in fact several fishermen were drowned, while others lost their boats and nets.

The spring salmon fisheries were on an average with former years, the greater part of the catch being mild-cured for the markets abroad.

The run of humpback was exceptionally light, while the cohoe fishing was an absolute failure. Dog salmon and steelheads were fairly plentiful.

I herewith beg to enclose Overseer Norrie's report in which he touches on the spawning grounds of the Upper Skeena and other items of interest. The overseer also refers to the halibut and herring fisheries around Prince Rupert

RIVERS INLET.

I am pleased to be able to report a satisfactory increase in the sockeye pack in this area of water, approximately 40,000 cases over last year, in spite of the undesirable climatic conditions, vast quantities reached the spawning grounds in Oweekayno lake. During the season canners contributed about five hundred dollars and employed men to raid the rookeries of the sea lions at the mouth of the inlet, where large quantities were killed. This was found absolutely necessary on account of the depredations the sea lions committed amongst the nets of those operating in the vicinity of the mouth of the inlet. In previous years the sea lions were content to molest only those fish which ventured out from the mouth, but last season they followed the salmon fifteen miles up the inlet, and played havoc with the nets. I am pleased to see that the department has offered a bounty on the killing of these marauders as well as the hair seals. The patrol service under Overseer Saugstad, was most satisfactory, and few infringements of the regulations were recorded.

NAAS RIVER.

The pack of salmon on the Naas also shows a satisfactory increase; this was attributed chiefly to the packing of fall fish, especially dog salmon, though the run of sockeye was slightly better than last season.

With reference to patrolling the waters of the Upper Naas, our two officers stationed there, prevented the Indians from poaching to any serious extent, and entirely put a stop to them running salmon down the river and selling them to the canneries. Fishery Overseer Adamson has found it most difficult to prevent illegal fishing in the vicinity of the lower portion of Portland inlet, his launch being too small for the rough and dangerous waters, it will be necessary this coming season to have a larger boat for this outside work. The spawning grounds of the Upper Naas, for a distance of six miles from the head of Meziaden lake, were plentifully supplied with sockeye eggs, and compare favourably with former years. The water was extremely low last fall, consequently it made the ascent of salmon to the lake difficult. The spring salmon were more abundant than on previous seasons. The fish-ladder up the falls is undoubtedly of great assistance to the salmon in ascending to the lake. The run of all varieties of salmon to the Meziaden watershed compares favourably with previous seasons.

NORTH COAST AND QUEEN CHARLOTTE ISLANDS.

There is a good increase in the pack of salmon of the north coast in spite of the fact that neither of the two canneries on the Queen Charlotte islands operated. The Naden Harbour cannery put up only mild-cured salmon which were all captured by trolling. Overseer Harrison's report, which I enclose, deals with these fisheries. The sockeye pack at Kimsquit was better than for some years past, and the Bella Coola pack of sockeye was fair and the fall fish pack exceptionally good. The canneries in the

central division under the control of Overseer Boyd, secured fair packs, the Lowe Inlet pack of sockeye being average. All the other canneries increased their packs, but they are mostly composed of fall fish. Overseer Boyd reports that the regulations were well observed.

The whaling stations operated at Naden and Rose harbours on the Queen Charlotte islands, had a fairly successful season, the number of whales captured being two hundred and fifty-three, including nine sperm whales.

The sea lions and hair seals were a serious menace to the salmon fisheries again last season in all portions of my district, the sea lions destroy the nets as well as tearing the salmon out of them. Owing to the department appropriating a considerable amount of money as a bounty for the killing of hair seals, a large quantity were destroyed; it is estimated that four or five are killed for every one the department pays bounty on, so that many thousands were destroyed last season. If this policy is persisted in by the department undoubtedly these mammals will ultimately be practically exterminated.

I am, sir,

Your obedient servant,

(Sgd.) JOHN T. C. WILLIAMS,
Inspector of Fisheries.

J. T. WILLIAMS, Esq., S.M.,
Inspector of Fisheries,
Vancouver, B.C.

SIR,—I beg to submit my report on the fisheries of this district for the year 1914-15.

On May 11 the Indians and white fishermen agreed to fish for spring salmon at the rate of 3½ cents per pound as caught, and the fish had to be cleaned at the expense of the cannery owners. The Indians from Skidegate, Massett, and many Zimshians engaged in the fishing, also a large number of whites. The catch of the red spring salmon was mild-cured. Only one company operated this year, namely: the Wallace fisheries. Their total catch was as follows:—

Frozen.—1,170 white spring salmon, 424 cohoes.

Mild-cured.—352,565 pounds of red spring salmon which filled 261 tierces.

The fishing this year ceased on July 8, owing to the Indians leaving the fishing grounds around Langara island for the Skeena river and the Naas canneries. The greatest diffieulty experienced was the lack of women for cleaning the fish. When the Indian fishermen quit fishing their women also stopped work cleaning the fish and went with the men to the canneries referred to above. After the company had closed down their plant the salmon appeared to be more plentiful than during the time they were in operation. I have not the least doubt that had the company been able to continue operations and had good fishermen engaged until the end of August, their pack would have been three times as large.

During the run of spring salmon the sockeyes ascend the streams, but as the work is easier catching the spring salmon and the remuneration better, the fishermen do not care to catch the sockeyes, and never even make the attempt until the spring salmon run is over, and then also the sockeye run in these waters is practically at an end; consequently whether or not the sockeyes frequent our streams in marketable numbers is not yet definitely known.

The humpback salmon were plentiful but none were caught for commercial purposes, as the Wallace fisheries and the Aliford Bay Company did not want any. The few cohoes that were caught by the fishermen working for the Wallace fisheries were chosen. The run of cohoes continued until late in September. Dog salmon also were

plentiful, and whilst the settlers salted a few barrels of cohoes for their own consumption, the Indians smoked the dog salmon for their own winter supplies.

All the boats, canoes and gasoline launches were in good condition during the past season, and no possible fault could be found with any of them, with the exception of the gasoline launches that carried so many poles with baited hooks. I have already referred to this abuse in my former letters under the heading of suggestions for the regulation of the spring salmon fisheries. These suggestions are as follows: A close season for trolling for spring salmon should be enforced from Saturday noon to six o'clock on Sunday evening, of each week, as the spring salmon, although plentiful at present are by no means inexhaustible. The hook and line fishermen never catch these fish more than one mile off shore and in water no stormier than the waters of the Skeena and Naas rivers. When the water is too stormy on one side of Langara island they can fish on the other and vice versa.

No motor boats should be allowed to fish for spring salmon or salmon of any kind. This year again about twenty gasoline launches were engaged, and some of them had as many as seven poles erected around the mast and cabin with lines and baited hooks, besides using their hand. The Indians and some of the whites declared that these men in gasoline launches destroyed equally as many fish as they captured, for when the fish bite at the bait worked on these poles oftentimes their jaws are torn away and they escape only to die, a dead loss to all concerned. This is due to the lines tightening up at once on account of the rate at which the boats are going, and something has to give way, which most frequently is the jaws, etc., of the salmon and not the poles and lines. These motor boats also interfere a great deal with the row-boats and canoes, thereby causing much unpleasantness. The majority of the fishermen use row-boats and canoes, one man to a boat, and some of the fishermen who used row-boats made from $20 to $25 per day. This being the case I do not see the necessity of allowing motor boats to take part in these fisheries, and by prohibiting the use of motor boats entirely, more men would be able to find employment. My opinion is that only one line should be allowed each boat or canoe, as this mode of fishing is adopted by the Indians, and they catch on the average more fish than the whites. One man to one boat with one line is the way the Indians troll for spring salmon, and they are the successful fishermen.

Another point that should be considered is the numbering of the boats. All boats and canoes engaged in trolling should be numbered, so that in case of any disturbance or trouble, the number of the boat or boats of the men causing the trouble could be taken. Owing to the large number of boats on the fishing grounds it is impossible for strangers to know the names of the owners.

As the spring salmon fishermen by trolling make as much if not more than the average gill-net fishermen for the other kinds of salmon, I would suggest that at the commencement of each season the fishermen should be compelled to take out a license, the fee to equal that for a gill-net license. As soon as the license is granted the number should be painted on the boat in two conspicuous places.

None but British subjects and pre-emptors who have declared their intention to become British subjects should be allowed to obtain licenses.

The above after careful consideration is my opinion regarding the spring salmon fisheries, and most of these points I have referred to in my letters during the past two years.

From time to time during the past year I have visited the various saw-mills on these islands, and the owners are complying with the regulations by burning up the saw-dust, so that at the present time no fishing stream is polluted with either saw-dust or any other kind of mill refuse.

The *Gannet* is suitable in my opinion for the purpose for which she was intended i.e. for the purpose of protecting the salmon fiseheries from the 1st April to the end of October between Langara island, Skidegate and Kumshewa inlet, but not

quite suitable for patrol work during the stormy winter months. A larger vessel about 100 or 125 feet in length is necessary to protect the fisheries around these islands during the winter months, and this vessel also could be used to protect the salmon fisheries when the canneries are in operation.

Financial stringency and the war during the past year retarded the development of the fisheries in this district. As soon as the war is over I expect that all past records for the fisheries around Queen Charlotte islands will be eclipsed. With the opening of the Grand Trunk Pacific railway and the Panama canal fresh markets will be found for what we can produce. As stated before the fishing for spring salmon which was stopped at an early date this year will give large returns if carried on during the whole season in a businesslike manner. The halibut grounds will be thoroughly tested and all kinds of fish will be handled by the companies interested, thereby giving employment to fishermen the whole year through instead or two or three months during the summer season only. The cod banks and dog fish grounds will give good returns which will show as never before the wealth of the fish in the neighbourhood of the Queen Charlotte islands.

I am, sir,
Your obedient servant,

Sgd. C. HARRISON.

JOHN T. C. WILLIAMS, Esq.,
Inspector of Fisheries,
Vancouver, B.C.

SIR,—I beg to submit the following report, in connection with Prince Rupert division of the district.

The spawning beds of the Skeena river on the upper waters are on the whole better stocked this season than they have been for years, and the pessimist who declares that the river is being fished out, is wrong again.

Guardian Frank, in charge of Boat No. 1, reports an abundance of fish on all the principal streams that come under his care, and he says of the Copper river, "This stream is in good shape, and plenty of salmon are known to have gone up it this season, and there has been no one to molest them." Kitwancool lake which was visited by him is well stocked, so also is Kitsumkalum. The regulations have been well observed, both by whites and Indians, and he has had very little trouble.

No. 2 boat seems to have had the least success so far as quantities of salmon are concerned. Guardian D'Egville reports that the run on the Bulkley river was rather indifferent this season, the Indians complaining as to the poor run, which of course is always the case with the Indians, one can never gather from them anything authentic regarding the run of fish.

On account of complaints regarding the alleged abuse of salmon by the Indians at Kitgagas, D'Egville spent most of his time in that vicinity this season. He has discovered nothing unusual in the Indians treatment of the fish, they take what they want for food purposes, which of course must be considerable as the salmon is their staff of life, and the reports by new arrivals in the country are very misleading. As a consequence of this, our officer did not visit Blackwater, and it now appears that there is a serious obstruction in the canyon of this river draining Blackwater lake, which is an important spawning ground of the Naas river.

Guardian MacKendrick on Babine lake, boat No. 3, reports a splendid run of fish to this, the main spawning ground of the Skeena. Both hatcheries filled up easily, the Babine hatchery getting all the ova required right at the door.

The Stuart lake people came over for their supply for food purposes, there being no fish in their own lake, and this is another drain on our side of the divide. Anderson, Pierre, Fifteen-mile and Tatche rivers were all well stocked. Beaver river was below the average, and Mr. Crawford did not disturb it for his hatchery supply. On the lower spawning grounds there has been a very good run of soekeye, the best for years, also the spring salmon were very plentiful, but hardly any humpbacks. Last year there were thousands of this last variety in this particular place. Altogether it has been a most successful season for the river. Guardian Collins who assisted MacKendrick in his duties, has joined the Saskatchewan Light Horse, and will go to the front.

I am also pleased to report that the development of this city as a fishing port, although retarded by so many obstacles, is beginning to show signs of coming into its own, which no matter what may be said to the contrary, is so placed geographically and otherwise, that the results of these northern fisheries will eventually have to be credited to this port. The Canadian Fish and Cold Storage Company have now found a market for all the fish that they can handle, not halibut alone but all edible varieties.

The herring acted very strangely this season. For two weeks there was a considerable amount in the harbour, and everyone was in hopes that the supply would be as easily secured as heretofore, but they left in one night, and there have been none in since. The opening of the herring spawning reserve between this port and Port Simpson until March 10, simplifies matters, and has made it possible for the companies operating to secure all the bait necessary for the coming season.

I am, sir,
Your obedient servant,

STEWART NORRIE,
Overseer.

REPORT ON THE FISHERIES OF DISTRICT No. 3.

To the Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I have the honour to submit my annual statistical report of the fisheries of Vancouver island and the adjacent mainland, District No. 3, of the province of British Columbia, for the fiscal year ended March 31, 1915; including statement of fur seals taken in this portion of the province. The past season's operations would compare favourably with any previous year.

Salmon.—The returns in this branch of the fishing industry show an increase over the catch of the year previous, the catch taken being 365,528 cwts., as compared with 297,450 cwts., the catch of the year 1913-14. There was, however, a smaller quantity of salmon canned than in 1913-14, the number of cases canned being 206,792, while during the previous year the number of cases reached 250,740. This difference is accounted for by the fact that a larger number of spring salmon were taken in one or two of the traps on the southwest coast of Vancouver than in previous years. Three of the canneries being closed down, also accounts for the decrease in the number of salmon canned. This, however, was offset in a certain measure, by the erection of a new cannery at Shushartie bay on the east coast of Vancouver island. This cannery is situated well to the north end of the island, and the management are handling other fish as well as salmon, keeping their cannery operating during the greater part of the year. This is a movement in the right direction, as it will bring into the markets other valuable food fish which are to be found so plentifully on this coast, and will also give employment to the fishermen throughout the year. I am pleased to say that the trend of fishing operations is in this direction, and no doubt it will be more general in the future.

There was an advance in the prices paid for dry-salted salmon shipped to the Orient during the past season. Owing to the demand for this fish for canning purposes, however, a smaller quantity was shipped to the Orient.

Large numbers of salmon were caught by trolling during the past season. It is only within the last two or three years that trolling has been done to any extent, but now this mode of fishing is becoming general throughout the district.

One of the greatest enemies that assails the salmon and trout on this coast, is the merganser, which frequents the rivers. They are terribly destructive to ova, and salmon and trout fry. These birds have two large broods in the season and live altogether up the streams, feeding continually on the small fish, and must do an immense amount of harm. The most destructive period is when the water is low in the streams, then the merganser destroys large numbers of salmon fry in the shallow pools. It has been suggested that the Fishery Officers, and Provincial Game Wardens be allowed to shoot these birds during any time in the year.

Cod.—Cod fishing was more extensively engaged in than ever before, and the catch was the largest. In 1913-14, 15,325 cwts. of cod were taken, and in this year 22,485 cwts. an increase of 7,160 cwts. I would again bring to your attention the necessity of having a close season for the protection of this valuable food fish. As the cod fishing is done, principally in the extensive channels between Vancouver island and the mainland, where the waters are sheltered, the fishing can be carried on during the whole year, and very large quantities are taken during the spawning season, which extends from the middle of January to the end of February. For the proper conservation of the cod, operations during this period should be prohibited.

A fishery was opened in Nanaimo this season and cod was largely handled. Filletted cod was shipped to various parts, and found a ready market. When put up in this way, they command a good price, and I have no doubt this branch of the fishing industry will be more appreciated, as the excellent quality of our codfish becomes better known. If properly prepared for the market, cod fish on this coast ought to become one of the most important branches of our fisheries.

Herring.—The herring fisheries continue to occupy a prominent place in the fisheries of this district. Last season over 23,000 tons of herring were taken. A smaller number of salteries operated, but the fishing season began much earlier, and the catches were good up to the time of spawning. There was quite an advance in the development of this branch of the fisheries this year on the west coast of Vancouver island, where the catch reached 73,968 cwts. compared with the 1913-14 catch of 42,350 cwts.

Although as formerly the bulk of the herring taken were dry-salted and shipped to the Orient, yet I am pleased to report that more attention is now being given to preparing the herring for other markets in such a manner as command more satisfactory prices, and place them in the position that their quality deserves. As our waters teem with these fish, and they are so easily taken, there is no doubt that an extensive industry will develop in time. The spawning areas were well stocked with ova, fishing was prohibited in good time, and ample protection was afforded the fish, during the spawning season.

Halibut.—The halibut returns do not show such satisfactory results as in the previous year. This was owing to two reasons, first, the unusually unfavourable weather conditions, and secondly, the loss of one of the largest vessels engaged in this industry. This vessel operated from Victoria, and was lost on her way from the halibut banks, laden with halibut. The outlook however, for the coming season is much brighter, as near the end of the year two new vessels were fitted out, and will engage in the halibut fishing on the west coast of Vancouver island.

Oulachans.—The catch of oulachans was larger this year than ever before. Last year the catch was 550 cwts., but this year 800 cwts. were taken. These fish are nearly all taken in the waters adjacent to the mainland part of the district.

Trout.—The past season proved a very satisfactory one for the angler, 1,149 cwts. of trout were taken as compared with 650 cwts. taken during the previous year. The streams seem to be fairly well stocked and are well patrolled.

Clams.—5,045 cases of clams were put up by two clam canneries. The number of barrels taken this year was 9,322, as compared with 10,000 barrels for the previous year. There are extensive clam beds in the district, but owing to their distance from the market, being well to the north, nothing has been done with them. As the country develops however, these areas will prove valuable.

Whales.—The whaling station situated at Sechart on the west coast of Vancouver island at Barclay sound, reports taking 86 whales, comprising 4 sperm, 8 sulphur-bottom, 40 finbacks, and 34 humpbacks. The station at Kyuquot, west coast of Vancouver island, captured 234 whales, comprising 12 sperm, 23 sulphurbottom, 142 finback, and 57 humpback. The total number of sperm whales taken was 16, which is an increase of five over last year's catch, and equals the catch of 1912-13. The success of the whaling industry depends to a great extent on the weather conditions.

Fur Seals.—The Indians along the west coast of Vancouver island are practically the only ones who engage in the sealing operations. Their efforts during the past season resulted in the capture of 257 fur seals. This is a very favourable showing compared with the preceding year when only 119 were captured. When it is considered that seal hunting must be done by the most primitive methods, namely with spears, the use of guns being prohibited, it displays considerable skill on the part of the native when such good results are shown. The Indians were accustomed for many years to use guns on board the various sealing schooners, and it is now a very difficult matter to compel them to revert to the old method of using spears, but the overseers have been faithful in seeing that the regulations with regard to fur seal hunting were complied with in every way by the hunters.

It is with satisfaction that I report faithful patrol by the fishery overseers throughout the whole district, in enforcing the fishery regulations. They were enabled to do this by the facilities provided by the department in furnishing them with boats suited to their work. Although the fishing area is so extensive, and so many fishermen are engaged in the fishing operations, there were during the past year very few infringements of the fishery regulations.

I am, sir,

Your obedient servant,

E. G. TAYLOR,
Inspector of Fisheries.

REPORT ON THE WORK OF REMOVAL OF OBSTRUCTIONS TO THE ASCENT OF SALMON ON THE FRASER RIVER AT HELL'S GATE, SKUZZY RAPIDS, CHINA BAR AND WHITE'S CREEK DURING THE YEAR 1914, AND THE EARLY PORTION OF THE YEAR 1915.

To F. H. Cunningham, Esq.,
Chief Inspector of Fisheries,
New Westminster, B.C.

Sir,—I have the honour to submit herewith a report on the work conducted on the Fraser river in connection with the removal of obstructions to the ascent of salmon.

The writer's first introduction to this portion of the Fraser river occurred on December 3, 1913, after that year's run of salmon up the river had ceased. The remedial works as prosecuted by the department under the supervision of Mr. Napier, representing the provincial government, had been abandoned temporarily until some definite plan could be formulated for work on a more comprehensive scheme during the ensuing year. On this date, accompanied by Mr. F. H. Cunningham, Chief Inspector of Fisheries for the province of British Columbia, an inspection was made of the river at Hell's Gate, China bar, and Skuzzy rapids, the object being to make a superficial examination of the river at the points concerned, with the idea of continuing the work at a later date.

Concerning the movement of salmon up the Fraser river it might be well to mention here that five different varieties of salmon enter the river at certain times in the year in the following order: spring salmon, sockeye, cohoe, humpback and dog salmon. Of these, the sockeye being most favoured for canning purposes, is easily the most important from a commercial point of view.

Entering the mouths of rivers, these fish continue their journey to the headwaters of the main streams and their tributaries. For a thousand miles along the Fraser System, they are known to travel, seeking those shallow, gravelly bedded portions of the stream, in the upper reaches, which are their natural spawning grounds.

From observations gathered during the movements of salmon up stream it had been learnt that the movement is spasmodic in rough water. Fighting from eddy to eddy through heavy current velocity, the salmon remain for an indefinite period at times when in still water gathering sufficient energy and speed in order to overcome the obstacle in front and of which they seem to have instinctive knowledge. Having reached their chosen ground, exhausted, and with their bodies torn and wasted, (for they have abstained from food since leaving salt water), the spawn is deposited and fertilized. Then comes the final act in their life's drama, the act of death—for here, at the headwaters of our rivers where millions of eggs are deposited each year, for natural propagation, thousands of salmon annually die, their life's mission being accomplished.

The following extract from a communication of professor Roule to the French Academy of Sciences on the result of his observation of the migration of salmon to fresh water is of interest here; "The observations covered the rivers entering the sea on the Breton coast, and it was found that the proportion of oxygen dissolved in fresh water was the principal factor determining the ascent of the salmon. Like all fish of their family, the salmon have an intense need of breathing, and this increases in the reproduction period. Consequently they only enter rivers whose waters are able to satisfy

this need by the quantity of oxygen held in solution. It is the search for this water that leads them up the rivers, even where obstructions make it necessary to leap in their characteristic way."

Besides the scientific interest, Professor Roule's observations, if they could be but proved, would possess great practical value, as they would enable one immeditely to discern which rivers were worth an attempt to introduce salmon by purifying the water, providing ladders, etc., and which were the rivers in which much labour would be certain to be in vain.

On December 15 in company with Mr. Napier, a closer inspection of the river was made at the four points mentioned. Measurements were taken in an endeavour to estimate as closely as possible the amount of room taken up by the foreign material in the river and to determine the quantity of rock that would require to be moved in order to restore the banks to such a condition that the passage of salmon would not be impeded. Exhaustive reports and sketches were prepared later and forwarded to the Department at Ottawa.

These reports conveyed a very accurate description of the condition of the river at this period and it was obvious from them that the only remedy was to proceed with as much haste as possible, to continue the removal of the obstructions in much the same manner that had been adopted in the past year, taking full advantage of the lowest stage of the water in the river.

On the 23rd day of February however, conditions at Hell's Gate were very seriously changed by a rock slide that occurred at about 10 p.m. Residents of Camp 16, the quarry site on the C.P. Ry. at Hell's Gate, had observed during the day a continual rain of small rock from the shattered cliffs immediately above the C. N. R. track on the opposite side of the river. The day had been very mild with a light rain falling and it was assumed that possibly a few groups of disintegrated rock had detached themselves away from the main cliff after being frozen there during the winter. Later on in the evening however, the fall of rock became greater and at about 10 p.m. a tremendous rumbling roar was heard as a huge portion of the cliffs opposite detached itself and fell towards the river.

The following morning I received a communication from the C. P. R. timekeeper at the quarry at Camp 16 informing me that a slide had occurred at Hell's Gate: that the Fraser river looked like a creek, that the Canadian Northern tunnel was completely blocked and probably 50 feet of it carried away. A further inspection of Hell's Gate was therefore imperative.

Observations on the ground showed that there had been no exaggeration in the foregoing statement. The Fraser river certainly did look like a creek from the cliffs above. It was indeed so narrow that a stone with a line attached was thrown clear across the river at the waters edge and the width of the river showed only 75 feet. Further than this, the submerged material had created a partial dam, and seemed as though it stretched completely across the river though no sign of actual rock was visible on the C. P. R. side. The fall thus created measured fifteen feet in a distance measured along the stream of seventy-five feet, and the river was pouring through the gap like a mountain torrent. It surely seemed a most hopeless outlook. An examination of the other side of the river seemed an exceedingly hazardous undertaking. Any moment it seemed as though a further avalanche of rock might come down. A close inspection of the south side of the tunnel showed that an enormous quantity of rock had broken away from the precipitous cliffs above to a height of 300 feet and a portion of the tunnel had been swept away, leaving dangerous looking overhangs that seemed to threaten to detach themselves at any moment. This material had completely covered the former obstructions and protruded probably 50 feet further into the river.

Needless to say, the occurrence of this slide placed an entirely different aspect upon conditions. The obstruction at Hell's Gate—already admitted to be an exceedingly

grave one—had in a moment become increased to such an extent, that it seemed impossible to even think of restoring the channel to the condition it was in before the slide occurred, in the short space of time before the commencement of the sockeye run.

In view of the tremendously vital issues at stake, it was suggested that a conference of Engineers be held on the ground to consider the situation and advise. Seventeen days after the slide occurred, the Engineers, consisting of Messrs. F. C. Gamble, J. E. Griffit, Wm. Young and G. P. Napier, representing the Provincial Government, and Captain A. C. Powell and myself representing the Dominion Government, visited the ground. Messrs. F. H. Cunningham and J. P. Babcock representing the Dominion and Provincial Governments respectively, were present, also Mr. T. H. White, Chief Engineer of the C. N. P. Ry. Company.

The outcome of the inspection and conference was that the engineers were of the unanimous opinion that the Department should take immediate control of the work and be prepared to spend at least the sum of $50,000. They were not prepared however to say that this would suffice. The decision of this commission was that quickest relief could be obtained by employing a large force of men to blast and break the rock into small fragments, disposing of the refuse into the river, trusting to the current to carry away the major portion. This disposal it was suggested should continue as long as no bad effects were apparent in the river. The immediate removal of rock by means of cables and derricks was also suggested to be carried on simultaneously with the river disposal. The debris to be deposited on the C. P. R. side of the river where a flat bench from 30 to 40 feet below the railway was seemingly available.

The engineers suggested that the work of removal be given to some reliable contracting firm who possessed the necessary plant to perform the operations, and the Pacific Dredging Company was approached to ascertain if they could put in an equipment of cables and derricks that could handle the work. Their answer being in the affirmative, a contract was awarded to this company for the excavation of the foreign material at all four places, the work to be done as directed by the Department's Engineer on a cost plus 10 per cent basis.

During all this time the river was still falling and the river channel getting slightly narrower each day.

On Saturday, March 21, the Pacific Dredging Company sent out their first shipment of men and food supplies. Permission to use the C. P. R. buildings at Camp 16 was very kindly granted by Mr. Peters, General Superintendent of the C. P. R. and arrangements were completed whereby we were allowed the privilege of piling rock on C. P. R. property adjacent to their right of way.

Work actually commenced on the ground 12 days after the conference of Engineers and just one week after the contract had been awarded. Equipment was naturally lacking for the first few days, and men were considerably handicapped by the fact of work being done directly above them on the C. N. P. roadbed. Here the Northern Construction Company were making heroic efforts to clear the tunnel in order to open the track for the passage of material for the new Cisco bridge which was then under construction.

It was necessary to commence work at the water's edge in order to dispose of the huge angular rocks which lay at the toe of the slope. Some of these rocks were of tremendous size, measuring over one hundred cubic yards and much drilling was necessary preparatory to blasting. That portion of the slide directly adjoining the river lay on an approximate 2-1 slope. Passage of men and materials was extremely difficult and added to the already difficult conditions was the fact of similar work being done on the C. N. P. roadbed almost immediately above.

All possible precautions were taken to prevent injury to men while work was being done in both places, and arrangements were made whereby blasting was done, simultaneously, by both concerns. In fifteen days a passage was opened through the tunnel and danger from the men working on the track above was eliminated.

Meanwhile a change was beginning to take place in the river. The weather at this period was very warm and fine, and in consequence the river began slowly advancing, sometimes as much as a foot per day during the day time and it seemed impossible to do the clearing at the toe which seemed so necessary.

The debris at Hell's Gate occupied a portion of the river measuring about 500 feet along the stream. It was apparently necessary to concentrate the work on that portion, approximately in the centre of the slide and bounding the seventy-five feet of river which contained the fall of fifteen feet. It was clear on inspection here, that the huge broken rocks projected under water much on the same slope for at least twenty feet further across the river. Beyond here the bank appeared to be almost vertical. There was certainly tremendously deep water very close at hand. For this distance the debris was more or less visible when a temporary easement of the current would allow it to be seen. It was therefore imperative to remove as much as possible of this projecting point of the slide at, and above this present water level. Thus by releasing the lower portion of the weight above it, greater opportunity was given the river to carry loose material to safety during high water.

With this end in view, work was concentrated at this point for several days, gangs of drillers being engaged on the various individual rocks, several of which required from two to four holes varying in depth up to ten feet. The rock proved very hard to drill, the exposed seamy trap rock of the Canyon walls being of the hardest and most difficult nature. Holes were loaded with 60 per cent dynamite, well tamped and thirty or forty holes fired by battery; this concentration of explosives doing considerably more destruction than if the holes had been fired singly. Subsequent events showed that the work done at this time was very successful though it was not until January and February of this year that it was possible to observe the full effect. Much of this most projecting material had been carried away by the freshet and deposited lower down stream.

Meantime the cableway outfit had arrived at Hell's Gate, consisting as follows:—

One double drum American hoist, 7 x 10 with boiler.
One pull wheel.
One set derrick irons (10 ton derrick).
500 feet flat ribbon cable.
1,200 feet round 2¼-inch cable.
1,500 feet round 1¼-inch cable.
100 feet round 1-inch cable.
1,800 feet round ¾-inch cable.
One 10 x 12 "Flory" cable engine.
One large upright boiler.
One patent cable carrier.

Eight tower sheaves, together with an outfit of clamps, cable tighteners, spare sheaves, etc., etc.

This material arrived at the camp April 4, and unloading operations were immediately commenced. The sites of the cable towers had already been determined; that on the Canadian Pacific railway side being in the centre of a moderately flat bench between the Canadian Pacific railway track and the precipitous wall of the river which it was expected would hold all the excavated material. This landing place was thirty feet lower than the top of the bank on the Canadian Northern Pacific track on the opposite side of the river which controlled the height of the tower on that side. The span between the towers measured 510 feet, the distance between the centres of the two railway tracks, being 670 feet divided by the river 160 feet below.

Excavations were meanwhile proceeding for the placing of deadmen, and for the bedding of the engines and boiler. Logs were being cut in the woods for use as engine and tower sills, tower posts, and dead men.

The anchorage for the main cable on the Canadian Pacific railway side consisted of a green fir stick 20 feet long and 30 inches in diameter. This was laid in a trench excavated in ground well drained and weighted down with approximately 50 tons of rock, two openings being left in the face for the fastenings of the main cable. The anchorage on the Canadian Northern Pacific railway side consisted of a log of similar size in a similar trench excavated for that purpose in the solid rock forming that portion of the Canadian Northern Pacific railway roadbed adjacent to the cliffs and approximately 75 feet south of the broken end of the tunnel.

On the Canadian Pacific railway side a rough framed log tower, 30 feet high, was erected to hold the main 2¼-inch cable, and carry the tower sheaves which directed the course of the load and hauling lines. The cable engine was placed midway between the tower and the anchorage on this side of the river.

The tower on the opposite bank consisted of a low structure about four feet high set into the bank with the sheaves running on an approximately even level with the roadbed. This tower was replaced once, when the excavation of the lower portion of the slide had progressed so far that the supports were weakened.

The stretching of the main cable and auxiliary lines occupied but very little time. A small line attached to the main 2¼-inch cable was taken across the river and the main cable being paid out slowly on the Canadian Pacific railway side was hauled in by block and tackle on the opposite side.

The operation of the cable engine controlled two movements, firstly that of the load line in raising or lowering the ribbon cable from the carrier, as desired, and secondly the hauling line hauling the carriage to and forth on the cable when at work. In the loop of the ribbon cable formed below the carriage was held a block with hook attached for hooking on to the load.

Rapidity of handling heavy loads is the chief value of this machine. The biggest days average was 217 return trips in 10 hours, thus averaging 22 trips to the hour or 2 minutes and 46 seconds per return trip. This included picking up, lifting a vertical distance of approximately 70 feet, hauling across the river horizontally, approximately 400 feet, and unloading. Allowing 10 seconds each for attaching and detaching loads; this shows an average speed of 6 feet per second both vertically and horizontally with and without the load. The average load was estimated at about one cubic yard, weighing between 4,000 and 4,500 pounds. There were occasions when blocks measuring as much as six cubic yards and weighing between twelve and thirteen tons were lifted, but this was exceptional, though many individual rocks measuring two or three cubic yards were carried across the river. The number of loads hauled across the river during the first four days, April 14 to 17, inclusive, were as follows: 20, 50, 90 and 100, and from that time on till the end of the work the daily average haul was 130 loads. There were certain delays owing to breaking cables and so forth, but in the main, the machinery was kept in operation almost constantly and for three weeks, during which night shifts were working, the machine operated 22½ hours per day.

The crossing of the river from the camp to the work was at first made in a cage, which was hauled across a single span of 1¼-inch cable by a light line attached to revolving drums at each landing and operated by man power. This cable had been used during the construction of the Canadian Northern Pacific railway by one of the subcontractors. It had proved of great use, but was inadequate to handle the number of men who were now crossing the river each day.

This cable was later purchased and another cable thrown across the river parallel to it. Decking was laid on these two cables and guard lines placed on the sides and a very satisfactory foot bridge completed which saved more than its cost in men's time.

The span of this foot bridge was 230 feet and its location was just about 100 feet south of the narrowest portion of the channel of Hell's Gate.

Throughout this period work was being very diligently prosecuted in the other places mentioned. Separate gangs of from twenty to thirty men were employed at each, and

most of the blasting was done by battery. The big masses of rock fringing the water were first disposed of and then regular horizontal lines were excavated in the banks parallel with the river. The river was steadily rising as this work proceeded and the men were in many instances worked overtime and at top speed in order not to lose their drill holes by being covered with the rapidly advancing water.

Enormous quantities of rock were shattered and either thrown into the river in small fragments or left on the banks to be bulldozed if too big to be carried away by the current.

The bank at Skuzzy rapids having been the scene of the heaviest force was the earliest to show big progress in the form of a bench of fine small rock at the base of the sill extending into the river.

This flat bench began to increase in size so that when the work of blasting had reached a point between 60 and 80 feet above low water, the bench at the water's edge attained an average width of 30 feet for a distance of 450 feet along the river. A portion of this thirty foot bench projected further into the channel than the original bank, but the narrowing of the stream and consequent increase of current at this point, at this stage of the water was not a material consideration, since it was not expected that the main run of sockeye would be along here until the water was at least 30 feet higher. By the time the river reached this elevation, I expected the channel to have at least a twenty foot greater width than during the previous years run when such very grave difficulty existed. Sixty per cent dynamite was used in holes and 40 per cent for bull-dozing.

The work at China bar proved to be more difficult than had been expected. After the outer covering of big rocks on the face of the mass of broken material had been disposed of with sixty per cent dynamite, it was found that the uncovered material which had been almost entirely submerged during the previous freshet had become almost solidly cemented together by the silt which comes down the river when in flood. The digging and scraping away of this silt preparatory to blasting proved to be both slow and expensive and it was found necessary to adopt the method of sinking a series of holes from six to ten feet deep, from six to ten feet back from the water. These coyote holes were loaded with 40 per cent dynamite and occasionally 25 per cent stumping powder and a complete rim was torn off and shattered at each firing. There was also a tremendous back break and quantities of shattered rock and silt were carried down the river at each blast.

Work was continued at China bar until all that was left of the original deposit was completely covered with water and after April 29 no further work was done here until February of this year. Examination of the river at this point during the run showed a comparatively easy current with considerable eddy and the salmon passed by without undue exertion.

The work at White's creek proved an eye-opener in many respects. I am satisfied from the exposure of fish bones and rotting salmon that considerably more fish were destroyed here during the run of 1915 than at any other point of the river. Whether the originals of these remains had already experienced one successful trip through this place only to be turned back at Hell's Gate, I am not prepared to say, but certainly, more remains were uncovered here than at all of the other places together. It may have been owing to the much greater individual size of the debris at this point together with its freedom from cementing silt, or it may have been because it was the first place on the upward journey which blocked the fish and caused the weaker ones to find refuge in the still water behind the rocks. The whole bank seemed to be a series of cul-de-sacs filled full in many cases with putrefying fish. The odour was sickening and the place altogether horrible to work in. The whole face of the bank for a distance of approximately 450 feet along stream by about 80 feet in vertical height was cleaned of the surface debris. Many individual rocks measuring 100 cubic yards were drilled and

blasted in the endeavour to increase the stream section as much as possible and to destroy those places into which fish could be washed and stranded. This work as at Skuzzy rapids was commenced at the water's edge and worked upwards in parallel lines up the bank.

No flat low bench appeared here however as in the case of Skuzzy rapids, the water being presumably too deep and the slope of the fill being steeper below water than at Skuzzy rapids. From the work done, however, I presume that slightly less increase in stream section was obtained at White's creek, probably only about 10 feet at the stage of the main run.

My report at this time read as follows:—

"All three places are now in such condition that no difficulty should be experienced by the fish ascending the river this year. The big angular rocks on the surface of the embankments which presented so much difficulty last year have all been broken into small pieces and the majority of this small material removed. What is still left is now in the form of a layer covering and filling the interstices between the large angular rocks which still remain in the embankments at White's creek and Skuzzy rapids. It is quite possible that the effect of this year's high water may be to wash most of this small material away, in which case the underlying strata of big rocks is again likely to cause a repetition of former conditions. In the event of this contingency arising, further work will have to be done at these places at the time of next low water. I am of the opinion, however, that the action of the water will only remove a portion of this overlying material and that the remainder will wedge itself in between the bigger underlying rocks and remain there, thus maintaining the conditions we have endeavoured to create, namely, that of moderately rough banks presenting no great irregularities or projections, eliminating as far as possible all rough water and abrupt falls and restoring a regular flow to the river at these places.

"From April 14 onward to the end of the month, the work of excavation was continued at Hell's Gate without interruption, the men working Sundays, and even though the actual work accomplished during that time was great, yet it was feared that unless special efforts were made to force the work, very little could be accomplished towards diminishing the current and reducing the falls in time for the first run of sockeye which was expected to be along in the early part of July. A night gang was immediately organized and Milburn acetylene lights installed; and about five weeks after the commencement of the work a night gang of about thirty men commenced work. The location was extremely dangerous even in day time and at night time even though powerfully lit up, the danger was considerably greater. A fairly good output was, however, maintained during the night work, much small material coming across in skips. Thus day and night almost without a stop, the work continued for three weeks when the night gang was laid off. It had accomplished good work, 1,710 loads or an average of 80 trips per shift, and with the rising of the river it was decided no further benefit could accrue from the continuation of the night work."

When the cableway commenced operations at Hell's Gate, many difficulties were experienced, because of the irregularities of the bank owing to the enormous size of the individual rocks. Those nearest the water were broken into convenient size for handling and lifted first by chains and later by dogs. Efforts were first made to excavate a bench on which men could work conveniently without injury to themselves. This first bench was excavated at the closest place possible to the surface of the river at that time and on the most projecting point of the slide. As the river gradually advanced this bench became submerged and it was necessary to commence another one higher up. In all, five of these benches were excavated clear across the slide and much rock was barred down from bench to bench for convenient handling by the cableway, and to eliminate danger.

It became very evident at this time that quantities of sand were mixed in with the rock. This was observed after the top layer of detached pieces had been removed.

This sand of which nothing was visible before the big slide occurred, must have been a pocket on top of the cliff behind the main seam which collapsed. Its presence was quite fortunate for two reasons. Firstly, it acted as a bonding material for the big rocks which were embedded in it and minimized the possibility of accident from sliding rock to a great extent. Secondly, it was easy material for shovelling, cheaper and quicker to handle than rock. This sand together with much small rock was cast into the river where it was carried away to safety.

Meanwhile though the water passing through Hell's Gate was still very turbulent there was already sign of the returning eddy. The river had become sufficiently high, that the water instead of being forced through Hell's Gate direct was now held back to a certain extent by the projecting point of rock which formed the eastern wall of Hell's Gate proper. The whole theory of the possibility of correct restoration of the river at Hell's Gate, depended upon the success or non-success of being able to remove sufficient rock to enable the river on its downward course to strike this point with sufficiently great force to cause an almost complete diversion of current from bank to bank. It became more apparent with each days advance in the water that a return of this original condition was possible, the extent of the return only depending upon the amount of foreign material it was possible to remove.

Heavy rumblings on the river had begun to be heard at this time. Each day it was evident from the sound that masses of rock were rolling down the bed of the river, and at times it seemed quite possible that the lower portion of the slide was being undermined and that a collapse of the whole bank might occur at any moment.

With the rising water, the passage seemed to get rougher and rougher and a considerable fall was developing through "Hell's Gate." At the same time it was noticed that the abruptness of the fall at the slide was very noticeably easing down. A measurement taken May 20 showed that the total fall in the river from the central portion of the slide to the lower side of the "Gate" a total distance of 350 feet, to be fifteen feet as formerly, but instead of the fall occurring in a river distance of 75 feet, it was distributed, seven feet being taken up in that portion of the river from the most projecting point of the slide to the upper side of Hell's Gate, and the balance of eight feet through the "Gate" in a distance not greater than fifty feet.

Spring salmon were at this time being caught quite freely below Hell's Gate. Nets however stretched in the eddies above failed to show any catch and it was presumed that none were getting through the passage and up the river.

The river continued rising more or less steadily until the latter end of June when at Hell's Gate is was approximately seventy feet higher than it was at low water. All five benches which had been excavated in the bank had been covered with water and all the material handled during the high water stage was material which was combed and barred down from the uppermost portions of the bank. Between seventy and ninety men were being employed now and the output still maintained good average. On June 8 the Canadian Northern Pacific Railway Company awarded a contract for the removal of the balance of the slide still remaining on the track. This work enabled the rails which were very much off alignment towards the river, to be thrown into correct centre, and permitted the barring down of excess rock which lay on the edge of the roadbed, which needed to be removed before entire restoration of the channel were possible.

On Friday, July 3, salmon were first observed in the rough Hell's Gate passage struggling and fighting to get through. They were evidently the first of the run and the most interesting part of the work was at hand. It was impossible to obtain any correct measurement of surface velocity at this time, through the gap, but I should judge it to have been at least twelve miles per hour. Actual proof of salmon successfully negotiating the fall was not forthcoming until July 15 when three sockeye were caught with a dip net above the obstruction. This showed that some of the stronger

fish were able to get by safely but the majority were certainly being thrown back and were taking shelter behind the point of the "Gate" in the smooth water. Salmon were now getting so numerous here that it was necessary to do something to assist them. Platforms were erected on the down stream face of this smooth wall and three Indians hired to dip net fish and transfer them by means of a lumber chute to the other side of the point, immediately between the point and slide. These men were engaged in dip-netting fish for three or four days, and in all probability a thousand mixed sockeye and spring salmon were taken across in this manner. Once above the Gate, their journey past the slide was accomplished in a comparatively easy manner though help was given when required by removing protruding rocks that temporarily barred their way. The run, however, appeared to be increasing daily and the eddy below Hell's Gate was constantly occupied by sockeye in varying numbers. Several appeared to be getting through quite safely unaided, and as close a watch as possible was maintained on them. The majority seemed to be making their way up on the C.P.R. side of the river, the eddies along that side of the river and for a considerable distance down being crowded with fish. Occasionally they were seen endeavouring to cross the rough water to the opposite side of the river, some successfully but the majority unsuccessfully. Those which were unsuccessful were carried down stream where they joined those which had travelled up on the opposite side in the eddy below Hell's Gate. This place consequently showed more fish than any other portion of the river.

The gathering of these fish below Hell's Gate and their scarcity above, caused an influx of Indians from various parts of the canyon for fishing purposes. One band of Indians actually came down from the Nicola country with pack ponies evidently prepared for wholesale slaughter. It may be explained here that from time immemorial Indians had caught and preserved fish in this portion of the river. Rights on certain fishing rocks were handed down from father to son, through the generations, and the privilege was jealously guarded. It was evident from the wholesale manner in which these Indians were preparing to take salmon, that unless their operation were under some control, very few fish would pass through the "Gate" even though the present difficult conditions were ameliorated. This situation was taken in hand strongly by the department and certain temporary restrictions placed on the Indians. Special guardians were appointed to patrol the river to see that the new regulations were enforced. This curtailment of the liberties of the Indians was very strongly resented by them, it being probably the first time this ancestral privilege had been in any degree interfered with. However, the new regulations were enforced despite strong and organized objection, and the Indians doubtless obtained all the fish they required. The month of July brought the highest water of the year and the river remained within five feet of this elevation for a period of from twenty to thirty days alternately rising and falling. The river began to fall again during the early part of August and it was during this early period of falling water that the run of salmon became heaviest. As the water gradually lowered, the fall in the passage began to get easier while that at the slide increased again, the total fifteen feet being still maintained. This fall in the vicinity of the slide was, however, far more easily overcome by the construction of fish channels on the edge of the slide, where the removal of certain rocks and the disintegration of others facilitated the passage of salmon up stream. These fish channels maintaining a steady flow of water, were kept constantly open and new ones would be prepared just so soon as the water receded sufficiently to require the abandonment of the older ones.

Until August 14 the passage of Hell's Gate had seemingly been successfully accomplished by all the fish which had attempted it. Sockeye had been seen and counted between Hell's Gate and Skuzzy rapids. No trouble was evidenced in passing either White's creek, China bar, or Skuzzy rapids, and the easy current in all these three latter places showed that the work accomplished at these points during the early portion of the work had been exceedingly beneficial.

On this day, however, with the steady lowering of the water, a new condition presented itself at Hell's Gate. The point which projects itself into the river from the C.N.P. side being very narrow on top, increases in width towards the base and at this time the portion of the point exposed to the river measured 30 feet of smooth water worn rock by which the river passed with tremendous velocity. Further attempts at this time made to correctly determine the speed of the current in Hell's Gate were unavailing. Log debris being carried down the river would be drawn under water at times only to reappear in an eddy down stream and in some cases would seem to disappear entirely. This space of 30 feet of unduly swift current proved to be too great for the salmon to fight through, the current being absolutely direct and the rock worn smooth. This condition lasted long enough to realize that it was again necessary to resort to artificial means for transporting the fish, and, material being on hand, the construction of a 2 feet by 4 feet plain box flume was commenced. This flume was built on a grade of ·095 per cent down stream from slightly above the central portion of the slide to the lower side of Hell's Gate. The total length of the flume was 350 feet and the total fall fifteen feet, the majority of the fall being in the last 50 feet of the flume, which was built round the point of Hell's Gate. Construction of the upstream section of this temporary fishway presented but little difficulty. The greater portion of the flume from the intake down was constructed on a rock bank prepared for the purpose, approximately from six to nine feet above the level of the river at this time. The upstream end was partially submerged to admit water, and a series of pools arranged in the upper end to ease the entering current and to give the fish resting places before developing the last burst of speed necessary on entering the river. The greatest difficulty arose when rounding the point of Hell's Gate. It was necessary here to excavate a shelf in the solid ledge for the purpose of easing the grade and supporting that portion of the flume. This work was performed under the most difficult of conditions, the drillers working in a constant deluge of ice cold water thrown up from the river. Finally, however, the ledge was completed, and that portion of the flume constructed. It was found necessary to secure this end of the flume to the ledge by means of heavy iron bolts, split-keyed into the rock below in holes drilled for the purpose and long enough to bolt on to a wooden cross-piece resting on the upper edges of the flume. The upward thrust of the surging water was found to be so great that every possible means had to be adopted to make secure fastenings. Later it was found necessary to secure heavy timbers to the face of the vertical wall directly above, to hold diagonal timber bracing uniting with sills under the main body of the flume. This work was all completed in seven days. A lowering of the water during the next day made it necessary to add another twelve-foot section to the down-stream end. There it was absolutely impossible to continue the excavated ledge any further distance. A right-angle turn had to be made to round the point and to bring the mouth of the flume into smoother water. The top of the cliff here was at this period fifty feet above the level of the water, and the water below showed no sounding at seventy feet. The only possible support for this section of the flume therefore was an arrangement of timbers bolted on to the wall and supporting the section. The work on this section was also most difficult of accomplishment, the men being roped and bodily in the river most of the time. The spiking of boards had to be done in the intervals when the repeated surges of the river would allow, and I cannot speak too highly of the men who did the work.

Four more days were occupied in completing this section, and a steady flow of water was admitted into the flume. The lower portion, being on a heavy grade, was fitted with baffle or deflecting plates extending two-thirds the distance across the flume, and at about three foot intervals in order to cause the water to follow a longer sinuous route in its descent, thus easing velocity and providing suitable resting places.

Several salmon entered this fishway naturally, but the entrance being about two feet from the wall on the one side, and open to the eddy on the other, numbers of fish were carried on either side of the flume and past the opening, the eddy being very

powerful at this time. These fish passed by and made for the heavier flow in the passage. To these fish which entered the flume, the journey through was accomplished without difficulty and they reached the smooth water above the flume with great ease. In order to ease the blockade and to augment the numbers of fish entering the flume naturally, (there being insufficient time to reconstruct the entrance) Indians with dip nets were employed again both above and below Hell's Gate dipping fish into the flume. In a space of eight days, 16,500 sockeye and 850 spring salmon were placed in the flume by this means. Observation proved also at this time that the number of salmon making their way through Hell's Gate and past the obstruction without any assistance whatever was steadily increasing. It was impossible however, to obtain any idea of the total number of fish which passed up the river during this period.

While it was impossible for salmon to make way past the obstruction, and while the flume was in course of construction, the eddies in the river below Hell's Gate rapidly accumulated salmon. Those coming up the river, fresh, joined these, who after several attempts to make the passage, fell back exhausted and were carried down the river for a considerable distance before power of action returned to them.

During the seven days preceding September 3, the river fell steadily an average 12 inches per day. This total fall of seven feet resulted in a great difficulty to get sufficient water into the flume without undue lengthening of the upper end. The passage of Hell's Gate was becoming easier each day. More fish than I had previously seen were making the complete ascent without aid and after some experimenting on the water's edge by removing huge protruding boulders, and cleaning out small channels on an easy grade to carry water, it was found that an increasingly steady stream of fish worked their way through without difficulty.

The river at this time was forty feet lower than at high water and the run being practically over, attention was once again devoted to excavation.

Cars and track had been introduced on to the various benches which saved the dragging of stone by means of the cable that otherwise would have been necessary, and a track was laid on the second dump on the north side of the cable engine and the work of excavation proceeded.

A derrick had been placed at the commencement of the work on this landing and as each load was delivered by the cableway it was quickly picked up and placed on the dump.

Small numbers of spring, sockeye and cohoe salmon continued to travel up the river in decreasing numbers until December when the run ceased.

The river was now getting within a very few feet of its elevation at the commencement of the work and it was possible to observe the extent of the movement that had occurred during the freshet. The total amount of fall however remained about constant.

It was decided at this time to continue the work of excavation as long as the low elevation of the river would permit and it was continued until the 25th day of February, the river then being approximately five or six feet lower than it was at the former low water.

The bank of the Canadian Northern Pacific railway at this point had now been combed down and cleaned to an approximately uniform slope of one-to-one. At the water's edge, when the work had been performed, was a bench measuring approximately four hundred and fifty feet in length and having an average width from water's edge to toe of slope of sixty feet.

It was now possible to blast in the channel without danger of bringing further material into the river and towards the middle of February several charges of from six to twenty boxes of 60 per cent dynamite were lowered in the interstices of rock below water and exploded. Each separate blast in the river caused changes in the current and a lowering of the water above the dam. Finally it seemed as though further efforts

might possibly destroy the effect of the good which had been accomplished and blasting in the river was concluded.

The result of blasting in the channel was mainly shown in the decrease in the height of the total fall. From fifteen feet, the fall had been reduced to nine feet, this being only four feet greater than the fall as measured before the slide occurred. This nine feet furthermore was distributed evenly along three hundred and fifty feet of the river. The average surface current velocity at this time measured between four and five miles per hour, and it was felt that everything possible under the circumstances had been done, having due regard to the danger of further material possibly sliding into the river.

Examination of the condition of Skuzzy rapids, China bar and White's creek made at this time also showed that large quantities of material had been carried away during the freshet. In places all the broken material had washed away leaving the lower layer of big rock exposed and at other points certain subsidences had caused the falling of big loose material from higher up the bank.

At Skuzzy rapids, the entire bench which earlier has been shown to have formed at the toe of the slope had entirely disappeared and the natural rock was bare in many places. More rock seemed to have been carried away by the river than at either China bar or White's creek.

There only remained now the clearing up at Skuzzy rapids and China bar, of the big boulders that had either fallen from above during the freshet or had become exposed during the freshet. This clearing up took only a few days and Tuesday, March 9, the camp closed down.

It is estimated that sixty thousand cubic yards of material were removed from the bank at Hell's Gate. Of this quantity, possibly two thirds, or 40,000 cubic yards, were carried across the river, the remainder being either thrown into the river or carried away by the river. At the other places, it was practically impossible to determine quantities moved.

In conducting a work of this nature in a canyon surrounded by towering and disintegrating cliffs and where the use of much powerful explosive material is required, it is almost inevitable that there should be some accident to record.

The detail of accident on this particular work is, however, comparatively light, there having been only five what might be termed serious cases. The most serious of these was one in which the injured party was instantly killed by being struck with a rock which fell from the cliffs far above. This was an accident entirely due to natural causes. In the Fraser river canyon, disintegration has been going on for centuries, and rocks of various sizes are continually falling. The unfortunate man happened to be working in the path of this falling rock, which struck and instantly killed him. The inquiry of the coroner subsequently held, attributed no blame whatever to the contracting company or any of its employees.

The remaining four accidents resulting in one case in a severe injury to the head and in the other cases to broken limbs, were caused by either flying rocks from explosions or in one case, by being struck with a part of the moving machinery. Either the miscalculation or misunderstanding of signals, or the supreme indifference with which some men heedlessly expose themselves to danger was responsible for all of these accidents. Most rigid care was exercised throughout the work in the endeavour to avoid accident, and I think it was greatly owing to rigidity of this supervision that serious accidents were so few in number.

I have to thank the members of the staff of the Pacific Dredging Company for their painstaking zeal as evidenced during the performance of the work. There was perfect harmony throughout, and on this, in a great measure, often depends the success or non-success of such an undertaking.

A subsequent examination of the river at Hell's Gate shows that the work appears to have been very successful: at White's creek, China bar and Skuzzy rapids, there is no doubt whatever of the efficacy of the work done.

At Hell's Gate it is now possible to see the effect caused by the changed direction and the reduced velocity of the current. I made an examination on the ground, June 11, and was exceedingly gratified to learn that spring salmon had already been caught above Hell's Gate and when the sockeye again ascend the river, I have no doubt they will pass by the original points of obstruction with comparative ease. It will be necessary, however, to watch the river closely during the year with the object of learning whether further work requires to be done later.

At the time of writing, the river is of course high, and as in the case of the high water of last year, there is a considerable fall at Hell's Gate, where the water at this stage is backed up by the natural contour of the river bank. This fall will, I expect, diminish very considerably as the water lowers, and the time of the sockeye run approaches.

In my opinion, there is absolutely no doubt of the sockeye being able to ascend the river without difficulty during the present season.

The total net cost of the work done on the Fraser river under this contract, amounts to the sum of $108,728.65, apportioned as follows:—

Hell's Gate	$96,866 25
Skuzzy rapids	5,386 24
China bar	3,626 23
White's creek	2,849 93
	$108,728 65

The various costs are allocated as follows:—

Total of accounts and payrolls	$100,783 03
Plus 10 per cent (contractor's profit)	9,429 67
Total gross cost of work	$110,212 70
Less total of amounts received from sales to the C.N.P. Ry., the Dept. of Militia, and other sources of which details have been furnished	1,484 05
Total net cost of work	$108,728 65

Allocated Costs.

Explosives	$ 9,611 47
Machinery, including rental	15,636 67
Camp equipment, including rental of buildings	1,434 48
Provisions and kitchen utensils	16,604 90
Tools	1,575 23
Transportation and cash advances (deducted from gross payroll)	630 62
Store goods for sale in camp	2,357 29
Net payrolls	47,823 16
Medical services	1,890 94
Fishways	313 49
Contractor's profit (10 per cent)	9,429 67
Insurance premiums	2,003 92
Witness fees	345 10
Sundries	555 76
Total	$110,212 70

I have the honour to be, sir,

Your obedient servant,

J. McHUGH,

Resident Engineer,

Fisheries Branch.

DEPARTMENT OF THE NAVAL SERVICE,

New Westminster, B.C.

RECAPITULATION

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No. 1**, Province of **British Columbia**, during the year 1914-15.

Kinds of Fish.		Caught and Landed in a Green State.		Marketed.		Total Marketed Value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	$
Salmon	cwt.	439,283	2,152,557			
" used fresh	"			48,513	604,412	
" canned	cases.			328,390	1,641,950	
" salted (dry)	cwt.			*89,710	455,100	
" mild cured	"			385	3,850	
" smoked	"			504	8,568	
" pickled	"			900	13,500	
						2,727,380
Cod	"	13,772	62,705			
" used fresh	"			12,845	128,450	
" green-salted	"			147	1,470	
" dried	"			211	2,637	
						132,557
Herring	"	34,540	80,462			
" used fresh	"			20,238	101,190	
" salted	"			665	5,320	
" smoked	"			5,710	45,680	
" pickled	brl.			584	4,672	
						156,862
Shad	cwt.	158	1,196			
" used fresh	"			158		
						2,370
Halibut, used fresh	"	78,565	390,908	78,565		780,645
Flounders	"	607	1,385	607		3,642
Smelts	"	1,757	7,264	1,757		14,056
Trout	"	1	10	1		25
Oulachans	"	142	616	142		1,136
Perch	"	344	1,980	344		2,064
Sturgeon	"	1,149	9,471	1,149		22,980
Whiting	"	137	371	137		1,096
Soles	"	3,554	14,982	3,554		28,432
Tom-cod	"	20	40	20		120
Skate	"	763	1,647	763		6,104
Octopus	"	98	453	98		980
Shrimps	brl.	160	1,966	160		3,200
Oysters	"	1,768	13,840	1,768		28,619
Clams	"	2,519	8,922			
" used fresh	"			2,519		
						20,152
Crabs	cwt.	3,471	13,183	3,471		27,768
Fish oil	gal.			31,749		9,631
Guano	tons.			415		14,272
Totals			2,763,958			3,984,091

*Of this quantity, 52,000 cwts. are Dog Salmon, valued at $78,000.

RECAPITULATION.

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in **District No. 1,** Province of **British Columbia,** for the year 1914-15.

—	Number.	Value.
		$
Steam Fishing Vessels (tonnage 1236)	6	252,000
Sailing and Gasoline Vessels	19	75,750
Boats (sail)	1,199	81,745
" (gasoline)	1,457	595,579
Carrying Smacks		
Gill Nets, Seines, Trap and Smelt Nets, etc	2,450	195,054
Weirs		
Trawls	20	1,000
Hand Lines	406	1,000
Crab Traps	53	636
Lobster Canneries		
Salmon "	31	832,873
Clam "		
Freezers and Ice-houses	5	570,700
Smoke and Fish-houses	7	59,050
Fishing Piers and Wharves	14	33,847
Halibut Dories	42	4,200
Halibut gear (skates)	450	4,500
Oil Factory	1	40,000
Totals		2,747,934

Number of men employed on Vessels	211
" " Boats	5,312
" " Carrying Smacks	
" persons employed in Fish-houses, Freezers, Canneries	2,169
Totals	7,692

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Industry in **District No. 2**, Province of

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.												
		Steam Vessels.				Sailing and Gasoline Vessels.				Boats.				
		Number.	Tonnage.	Value.	Men.	20 to 40 tons, Number.	10 to 20 tons, Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.
				$				$			$		$	
1	Skeena River and Prince Rupert	5	764	156000	35	13	40	232300	214	910	99800	....	....	1820
2	Rivers Inlet	3	114	17000	15	....	13	47000	24	700	22500	....	....	750
3	Naas River	....	....	....	....	....	8	23000	16	240	24000	....	....	480
4	North Coast	4	136	40000	21	....	23	51600	52	400	22100	....	....	684
5	Queen Charlotte Islands	5	170	55000	49	....	....	.....	....	75	2625	25	8125	150
	Totals	17	1184	268000	120	13	84	353900	306	2325	171025	25	8125	3884

Boats, and the Quantity and Value of all Fishing Gear, etc., used in the Fishing **British Columbia**, during the year 1914–15.

Fishing Gear.								Canneries.		Other Material.							
Gill Nets.		Seines.		Skates of Gear 400 f= 1 skate.		Hand Lines.		Salmon Canneries.		Freezers and Ice-houses		Whaling Stations.		Fishing Piers and Wharves		Persons employed in Canneries, Freezers and Fish-houses	
Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	
	$		$		$		$		$		$		$		$		
1420	177401	14	4650	1400	28000	....	....	13	735000	5	583000	..	...	14	155000	1330	1
750	93750	2	600	.....	.....	....	....	7	400000	..	... ...	..	.....	8	68000	750	2
430	53750	4	1200	.....	.....	...	....	4	195000	..	.....	..	.....	6	39000	450	4
340	42500	42	12600	.....	.....	60	120	9	285000	..	.....	..	....	11	75000	800	4
....	.....	...	.....	.....	.....	400	800	2	80000	2	120000	2	240000	8	140000	130	5
2940	367401	62	19050	1400	28000	460	920	35	1695000	7	703000	2	240000	47	477000	3460	

THE

RETURN showing the Quantities and Values of all Fish caught and landed in a
during the year

Number.	Fishing Districts.	Salmon, *cwt.	Salmon, value.	Cod, cwt.	Cod, value.	Herring, cwt.	Herring, value.	Soles, cwt.	Soles, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.
			$		$		$		$		$	
1	Skeena and Prince Rupert.	235824	707472	10654	53270	45180	45180	356	1780	110418	552090	180
2	Fi rs Inlet	91944	275832							30	150	
3	Naas River	70328	210984	250	1250	1000	1000			7000	35000	
4	North Coast	153445	460335			4000	4000			700	3500	
5	Queen Charlotte Islands...	13388	40164			17880	17880			800	4000	
	Totals	564929	1694787	10904	54520	68060	68060	356	1780	118948	594740	180

* Cwt. = 100 lbs.

SESSIONAL PAPER No. 39

CATCH.

Green State, in **District No 2**, Province of **British Columbia**, 1914–1915.

Flounders, value.	Trout, cwt.	Trout, value.	Oulachans, cwt.	Oulachans, value.	Mixed fish, cwt.	Mixed fish, value.	Skate, cwt.	Skate, value.	Fur Seals, No.	Fur Seals, value.	Clams, brl.	Clams, value.	Hair Seals, No.	Hair Seals, val.	Dulse, crabs, cockles, and other shell fish.	Dulse, crabs, etc., value.	Whales, number.	Whales, value.	Number.
$		$		$		$		$		$		$		$		$		$	
900	40	400	1200	6000	120	600	5	25	95	2850	....	....	600	150	430	2580	....	.....	1
...	4	40	3000	15000	10	50	...	..	....	....	....	...	200	50	....	.....	.....	.....	2
....	5	50	8000	40000	50	250	..	..	....	...	....	....	100	25	....	.....	.....	.....	3
....	6	60	500	2500	60	300	..	..	....	....	....	....	850	212	...	.....	....	.....	4
....	5	50	.....	.....	200	1000	.	...	....	..	1100	2200	300	75	.. ..	.....	253	82200	5
900	60	600	12700	63500	440	2200	5	25	95	2850	1100	2200	2050	512	430	2580	253	82200	

THE CATCH

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed **Columbia**, during

Number.	Fishing District.	Salmon, used fresh and frozen, *cwt.	Salmon, canned, cases.	Salmon, salted, cwt.	Salmon, mild cured, cwt.	Salmon, smoked cwt.	Cod, used fresh, cwts.	Cod, shipped green-salted, cwt.	Herring, used fresh, cwt.
1	Skeena River and Prince Rupert	11044	237634	.....	16552	200	5787	2433	23540
2	Rivers Inlet	.....	109052	.....	.....	200	.....	.....	.....
3	Naas River	7500	72670	.....	850	300	250	.....	.....
4	North River	300	180292	.....	.....	1000	.....	.....	.....
5	Queen Charlotte Island	276	.....	4900	3525	1000	.....	.....	.....
	Totals	19120	599648	4900	20927	2700	6037	2433	23540
	Rates	5	5	5	10	10	5	10	1
	Values	95600	2998240	24500	209270	27000	30185	24335	23540
	Total value								

MARKETED.

in a fresh, pickled, canned, etc., State, for **District No. 2**, Province of **British** the year 1914–15.

Herring, pickled, brl.	Herring, used as bait, br	Soles, used fresh, cwt.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Trout, used fresh, cwt.	Oulachans, used fresh, cwt.	Mixed fish, used fresh, cwt.	Skate, cwt.	Clams, used fresh, cwt.	Dulse, Crabs, Cockles, and other shell fish, used fresh, cwt.	Fur seal skins, number.	Hair seal skins, number.	Fish oil, gal.	Whale oil, gal.	Number.
.....	10820	356	110418	180	40	1200	120	5	.....	430	95	600	700	....	1
.....	.....	.....	30	.....	4	3000	10	.....	.....	.....	.....	200	400	.....	2
.....	500	.....	7000	.....	5	8000	50	.....	.....	.....	.....	100	8000	.....	3
.....	2000	.....	700	.....	6	500	60	.....	....	....	.....	850	400	.....	4
5960	.....	.....	800	.....	5	.....	200	.....	1100	.....	.....	300	.....	361575	5
5960	13320	356	118948	180	60	12700	440	5	1100	430	95	2050	9500	361575	
5	2	5	5	5	10	5	5	5	2	6	30	25c.	30c.	32c	
29800	26640	1780	594740	900	600	63500	2200	25	2200	2580	2850	512	2850	115704	

....$4,279,551

*Cwt. = 100 lbs.

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No. 2**, Province of **British Columbia**, during the year 1914–15.

Kinds of fish.		Caught and Landed in a Green State.		Marketed.		Total marketed value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	
Salmon	Cwt.	564,929	1,694,787			
" used fresh	"			19,120	95,600	
" canned	Cases.			599,648	2,998,240	
" salted (dry)	Cwt.			4,900	24,500	
" mild cured	"			20,927	209,270	
" smoked	"			2,700	27,000	
						3,354,610
Cod	"	10,904	54,520			
" used fresh	"			6,037	30,185	
" green—salted	"			2,433	24,335	
						54,520
Herring	"	68,060	68,060			
" used fresh	"			23,540	23,540	
" pickled	Brl.			5,960	29,800	
" used as bait	"			13,32	26,640	
						79,980
Soles	Cwt.	356	1,780			
" used fresh	"			356		1,780
Halibut, used fresh	"	118,948	594,740	118,948		594,740
Flounders	"	180	900	180		900
Trout	"	60	600	60		600
Oulachans	"	12,700	63,500	12,700		63,500
Mixed fish	"	440	2,200	440		2,200
Skate	Brl.	5	25	5		25
Clams	"	1,100	2,200			
" used fresh	"			1,100		2,200
Crabs, Dulse, Cockles and other shell fish	Cwt	430	2,580	430		2,580
Fur Seals	No.	95	2,850			
Fur seal skins	"			95		2,850
Hair seals	"	2,050	512			
Hair seal skins	"			2,050		512
Whales	"	253	82,200			
Fish oil	Gal.			9,500		2,850
Whale oil	"			361,575		115,704
Totals			2,571,454			4,279,551

RECAPITULATION.

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in **District No. 2**, Province of **British Columbia**, for the year 1914–15.

——	Number.	Value.
		$
Steam Fishing Vessels (tonnage 1184)	17	268,000
Sailing and Gasoline Vessels	97	353,900
Boats (sail)	2,325	171,025
" (gasoline)	25	8,125
Gill Nets	2,940	367,401
Seines	62	19,050
Skates of Gear (400 fath=1 Skate)	1,400	28,000
Hand Lines	460	920
Salmon Canneries	35	1,695,000
Freezers and Ice-houses	7	703,000
Fishing Piers and Wharves	47	477,000
Whaling Stations	2	240,000
Totals	.....	4,331,421

Number of men employed on Vessels	426
" " Boats	3,884
" persons employed in Fish-houses, Freezers, Canneries, etc	3,460
Totals	7,770

RETURN showing the Number of Fishermen, etc., and the Number and Value of Vessels and Boats, and the Quantity and Value of Fishing Gear, etc., used in the Fishing Industry of **District No. 3**, Province of **British Columbia**, during the year 1914-15.

Number.	Fishing Districts.	Vessels, Boats and Carrying Smacks.																		Number.
		Steam Vessels.				Sailing and Gasoline Vessels.					Boats.					Carrying Smacks.				
		Number.	Tonnage.	Value.	Men.	(40 tons and over) Number.	(20 to 40 tons) Number.	(10 to 20 tons) Number.	Value.	Men.	Sail.	Value.	Gasoline.	Value.	Men.	Number.	Value.	Men.		
				$					$			$		$			$			
1	Nanaimo	1	40	7,000	6		1	11	34,800	23			140	98,000	220	72	16,560	128	1	1
2	Cowichan	2	114	25,000	14	1			25,000	7			63	52,000	125	20	8,000		2	2
3	Alberni	4	172	107,450	43			7	31,780	34	15	3,250	15	10,700	29	9	6,300		3	3
4	Clayoquot					1		3	25,500	27			29	14,000	31	12	8,400		4	4
5	Quatsino	2	61	50,000	22			1	4,600	3	12	980	2	1,600	22	14	1,400		5	5
6	Alert Bay	1	20	7,000	2	1	2	4	34,500	15	86	3,980	2	3,800	150	12	7,800		6	6
7	Quathiaski						3	3	14,500	19			35	29,000	70	4	2,000	16	7	7
8	Comox						1		8,000	3			2	1,500	4				8	8
9	Pender Harbour	1	12	750	5						29	3,625	191	101,200	340	12	13,000	41	9	9
	Totals	11	419	197,200	92	3	7	29	178,680	131	142	11,835	479	311,800	991	155	63,460	185		

RETURN showing the Number of Fishermen, etc., the Number and Value of Vessels and Boats, and the Quantity and Value of Fishing Gear, etc., used in the Fishing Industry of **District No. 3**, Province of **British Columbia**, during the year 1914-15.—*Concluded.*

Number.	Fishing Districts.	Fishing Gear.						Canneries.				Other Material.						Persons employed in Canneries, Freezers and Fish-houses.	Number.
		Gill-Nets, Seines, Trap & Smelt Nets, etc.		Hand Lines.		Whaling Stations.		Salmon Canneries.		Clam Canneries.		Freezers and Ice-houses.		Smoke and Fish-houses.		Fishing Piers and Wharves.			
		Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.		
			$		$		$		$		$		$		$		$		
1	Nanaimo	96	29,650	350	350	....	.....	1	10,000	....	.....	....	.....	15	54,000	....	.....	296	1
2	Cowichan	75	97,000	500	500	....	.....	1	50,000	1	3,000	2	125,000	1	50	11	38,000	257	2
3	Alberni	21	7,300	150	150	1	35,000	1	27,000	....	.....	2	105,000	4	12,000	6	21,500	295	3
4	Clayoquot	8	5,600	250	250	....	.....	1	25,000	....	.....	....	.....	....	.....	4	16,000	80	4
5	Quatsino	16	5,000	150	150	1	35,000	1	22,500	....	.....	....	.....	....	.....	1	3,000	62	5
6	Alert Bay	102	9,960	150	150	....	.....	5	156,840	....	....	1	5,000	....	.....	3	8,000	211	6
7	Quathiaski	20	4,380	1,130	1,130	....	.....	1	20,000	....	.....	1	1,000	1	500	11	21,300	160	7
8	Comox	1	750	150	150	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....	8
9	Pender Harbour	184	28,700	650	650	....	.....	....	.....	....	.....	....	.....	1	300	3	600	6	9
	Totals	523	188,340	3,480	3,480	2	70,000	11	311,340	1	3,000	6	236,000	22	66,850	39	108,400	1,467	

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in **District No. 3**, Province of **British Columbia**, during the year 1914–15.

Number.	Fishing Districts.	Salmon,* cwt.	Salmon, value.	Cod, cwt.	Cod, value.	Herring, cwt.	Herring, value.	Halibut, cwt.	Halibut, value.	Flounders, cwt.	Flounders, value.	Smelts, cwt.	Smelts, value.	Trout, cwt.	Trout, value.	Number.
			$		$		$		$		$		$		$	
1	Nanaimo	33843	135372	6750	33750	375050	375050	...	.....	256	512	35	245	34	340	1
2	Cowichan	130814	522648	5970	29850	3500	3500	10200	51000	386	772	100	700	585	5850	2
3	Alberni	45501	181604	.....	....	73361	73361	5731	28655	125	250	17	119	300	3000	3
4	Clayoquot	9344	37376	...	.. ...	245	245	350	1750	55	110	28	196	45	450	4
5	Quatsino	3100	12400	....	.. ..	362	362	150	750	35	70	14	98	39	390	5
6	Alert Bay	73237	292948	150	750	240	240	160	800	135	270	53	371	21	210	6
7	Quathiaski	25642	102568	6570	32850	120	120	265	1325	173	346	65	455	45	450	7
8	Comox	2042	8168	550	2750	356	366	75	375	150	300	35	245	45	450	8
9	Pender Harbour	42005	168020	2495	12475	7572	7572	.....	.....	200	400	33	231	35	350	9
	Totals	365528	1461104	22485	112425	460806	460806	16931	84655	1515	3030	380	2660	1149	11490	

* Cwt. = 100 lbs.

RETURN showing the Quantities and Values of all Fish caught and landed in a Green State in **District No. 3**, Province of **British Columbia**, during the year 1914–15.—*Concluded.*

Number.	Fishing Districts.	Oulachans, cwt.	Oulachans, value.	Soles, cwt.	Soles, value.	Mixed fish, cwt.	Mixed fish, value.	Clams, cwt.	Clams, value.	Fur Seals Number.	Fur Seals, value.	Crabs, cwt.	Crabs, value.	Whales, Number.	Whales, value.	Number.
			$		$		$		$		$		$		$	
1	Nanaimo			135	540	1200	3600	4037	8070			455	1820			1
2	Cowichan			52	208	1866	5598	4027	8054			675	2700			2
3	Alberni			16	64	424	1272	308	616			35	140	86	25800	3
4	Clayoquot			18	72	276	828	135	270	257	7710	15	60			4
5	Quatsino			14	56	253	759	132	264			17	68	234	70200	5
6	Alert Bay			25	100	381	1143	155	310			158	632			6
7	Quathiaski	800	4000	15	60	655	1965	165	330			165	660			7
8	Comox			35	140	642	1926	175	350			175	700			8
9	Pender Harbor			120	480	350	1050	190	380			85	340			9
	Totals	800	4000	430	1720	6047	18141	9322	18644	257	7710	1780	7120	320	96000	

*Cwt. = 100 lbs.

THE CATCH MARKETED.

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for **District No. 3,** Province of **British Columbia,** during the year 1914–15.

Number.	Fishing Districts.	Salmon, used fresh and frozen, *cwt.	Salmon, canned, cases.	Salmon, salted, cwt.	Salmon, mild cured, cwt.	Salmon, smoked, cwt.	Cod, used fresh, cwt.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, dry salted, cwt.	Herring, used as bait, brl.	Halibut, used fresh, cwt.	Flounders, used fresh, cwt.	Number.
1	Nanaimo	1453	5300	22350	.....	.....	6750	1050	50	217647	1950	.....	256	1
2	Cowichan	101873	20904	.....	3055	4000	5970	3400	50	.....	.....	10200	386	2
3	Alberni	5107	44104	.....	2005	200	.....	42448	30	18149	.....	5731	125	3
4	Clayoquot	3800	6600	.....	.....	.....	.....	245	.....	.....	.....	350	55	4
5	Quatsino	3100	.....	.....	.....	.....	.....	362	.....	.....	.....	150	35	5
6	Alert Bay	4000	82425	.....	.....	.....	150	240	.....	.....	.....	160	135	6
7	Quathiaski	5414	23069	.....	.....	500	6570	120	.....	.....	.....	265	173	7
8	Comox	2042	.....	.....	.....	.....	550	356	.....	.....	.....	75	150	8
9	Pender Harbour	19680	24390	1470	.....	.....	2495	4632	1470	.....	.....	.....	200	9
	Totals	146469	206792	23820	5060	4700	22485	52853	1600	235796	1950	16931	1515	
	Rates, $	5	5	2	15	10	8	5	10	1.50	3	11	5	
	Values $	732345	1033960	47640	75900	47000	179880	264265	16000	353694	5850	186241	7575	

RETURN showing the Quantities and Values of all Fish and Fish Products Marketed in a Fresh, dried, pickled, canned, etc., State, for **District No. 3**, Province of **British Columbia**, during the year 1914–45—*Concluded.*

Number.	Fishing Districts.	Smelts, used fresh, cwt.	Trout, used fresh, cwt.	Oulachans, used fresh, cwt.	Soles, used fresh, cwt.	Mixed Fish, used fresh, cwt.	Clams and Quahaugs, used fresh, brl.	Clams and Quahaugs, canned, cases.	Crabs, used fresh, cwt.	Fur Seal Skins, number.	Bone Meal, ton.	Fertilizer, ton.	Whale oil, gal.	Number.
1	Nanaimo	35	34		135	1200	2000	2055	455					1
2	Cowichan	100	585		52	1866	1017	3010	675					2
3	Alberni	17	300		16	424	308		35		20	229	112500	3
4	Clayoquot	25	45		18	276	135		15	257				4
5	Quatsino	14	39		14	253	132		17		55	600	315270	5
6	Alert Bay	53	21		25	381	135		158					5
7	Quathiaski	65	45	800	15	655	165		165					7
8	Comox	35	45		35	642	175		175					8
9	Pender Harbour	33	35		120	350	190		85					9
	Totals	380	1149	800	430	6047	4277	5045	1780	257	75	829	427770	
	Rates $	10	10	8	10	5	5	8	8	30	22	40		
	Values $	3800	11490	6400	4300	30235	21385	40360	14240	7710	1650	33160	126364	

Total value $3,251,444

* Cwt. = 100 lb. † Quintal = 112 lb.

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed ina Green State, and of the Quantities and Values of all Fish and Fish Products marketed in a fresh, dried, pickled, canned, etc., State, for **District No. 3**, Province of **British Columbia**, during the year 1914–15.

Kinds of fish.		Caught and Landed in a Green State.		Marketed.		Total marketed value.
		Quantity.	Value.	Quantity.	Value.	
			$		$	
Salmon	cwt.	365,528	1,461,104			
" used fresh	"			146,469	732,345	
" canned	cases.			206,792	1,033,960	
" salted (dry)	cwt.			23,820	47,640	
" mild cured	"			5,060	75,900	
" smoked	"			4,700	47,000	
						1,936,845
Cod	"	22,485	112,425			
" used fresh	"			22,485		179,880
Herring	"	460,806	460,806			
" used fresh	"			52,853	264,265	
" smoked	"			1,600	16,000	
" dry salted	"			235,796	353,694	
" used as bait	brl.			1,950	5,850	
						639,809
Halibut, used fresh	cwt.	16,931	84,655	16,931		186,241
Flounders	"	1,515	3,030	1,515		7,575
Smelts	"	380	2,660	380		3,800
Trout	"	1,149	11,490	1,149		11,490
Oulachans	"	800	4,000	800		6,400
Soles	"	430	1,720	430		4,300
Mixed Fish	"	6,047	18,141	6,047		30,235
Clams	brl.	9,322	18,644			
" used fresh	"			4,277	21,385	
" canned	cases.			5,045	40,360	
						61,745
Crabs	cwt.	1,780	7,120	1,780		14,240
Fur seals	No.	257	7,710	257		7,710
Whales	"	320	96,000			
Whale oil	gal.			427,770		126,364
Bonemeal	tons.			75		1,650
Fertilizer	"			829		33,160
Totals			2,289,505			3,251,444

RECAPITULATION.

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats, Nets, etc., in **District No. 3**, Province of **British Columbia**, during the year 1914-15.

	Number.	Value.
		$
Steam Fishing Vessels (tonnage 419)	11	197,200
Sailing and Gasoline Vessels	39	178,680
Boats (sail)	142	11,835
" (gasoline)	479	311,800
Carrying Smacks	155	63,460
Gill Nets, Seines, Trap and Smelt Nets, etc	523	188,340
Hand Lines	3,480	3,480
Whaling Stations	2	70,000
Salmon Canneries	11	311,340
Clam "	1	3,000
Freezers and Ice-houses	6	236,000
Smoke and Fish-houses	22	66,850
Fishing Piers and Wharves	39	108,400
Totals		1,750,385

Number of men employed on Vessels	223
" " Boats	991
" " Carrying Smacks	185
" persons employed in Fish-houses, Freezers, Canneries, etc	1,467
Totals	2,866

RECAPITULATION.

Of the Quantities and Values of all Fish caught and landed in a Green State, and of the Quantities and Values of all Fish and Fish Products Marketed in a fresh, dried, pickled, canned, etc., State, for the **Whole** Province of **British Columbia**, during the year 1914–15.

Kinds of Fish.	Caught and landed in a Green State.		Marketed.		Total Marketed. Value.
	Quantity.	Value.	Quantity.	Value.	
		$		$	$
Salmon ..... cwts.	1,369,740	5,308,448	.....	.....	
" used fresh ..... "	.....	.....	214,102	1,432,357	
" canned ..... cases.	.....	.....	1,134,830	5,674,150	
" salted (dry) ..... cwts.	.....	.....	118,430	527,240	
" mild cured ..... "	.....	.....	26,372	289,020	
" smoked ..... "	.....	.....	7,904	82,568	
" pickled ..... "	.....	.....	900	13,500	
					8,018,835
Cod ..... "	47,161	229,650	.....	.....	
" used fresh ..... "	.....	.....	41,367	338,515	
" green-salted ..... "	.....	.....	2,580	25,805	
" dried ..... "	.....	.....	211	2,637	
					366,957
Herring ..... "	563,406	609,328	.....	.....	
" used fresh ..... "	.....	.....	96,631	388,995	
" salted ..... "	.....	.....	236,461	359,014	
" smoked ..... "	.....	.....	7,310	61,680	
" pickled ..... brls.	.....	.....	6,544	34,472	
" used as bait ..... "	.....	.....	15,270	32 490	
					876,651
Shad ..... cwts.	158	1,196	.....	.....	
" used fresh ..... "	.....	.....	158	.....	2,370
Halibut ..... "	214,444	1,070,303	214,444	.....	1,561,626
Flounders ..... "	2,302	5,315	2,302	.....	12,117
Smelts ..... "	2,137	9,924	2,137	.....	17,856
Trout ..... "	1,210	12,100	1,210	.....	12,115
Oulachans ..... "	13,642	68,116	13,642	.....	71,636
Sturgeon ..... "	1,149	9,471	1,149	.....	22,980
Tom-cod ..... "	20	40	20	.....	120
Soles ..... "	4,340	18,482	4,340	.....	34,512
Skate ..... "	768	1,672	768	.....	6,129
Octopus ..... "	98	453	98	.....	980
Shrimps ..... "	160	1,966	160	.....	3,200
Whiting ..... "	137	371	137	.....	1,096
Perch ..... "	344	1,980	344	.....	2,064
Mixed fish ..... "	6,487	20,341	6,487	.....	32,435
Oysters ..... brl.	1,768	13,840	1,768	.....	28,619
Clams ..... "	12,941	29,766	.....	.....	
" used fresh ..... "	.....	.....	7,896	43,737	
" canned ..... cases.	.....	.....	5,045	40,360	
					84,097
Crabs ..... cwt.	5,681	22,883	5,681	.....	44,588
Fur seals ..... No.	352	10,560	.....	.....	
Fur seal skins ..... "	.....	.....	352	.....	10,560
Hair seals ..... "	2,050	512	.....	.....	
Hair seal skins ..... "	.....	.....	2,050	.....	512
Whales ..... "	573	178,200	.....	.....	
Fish oil ..... gal.	.....	.....	41,249	.....	12,481
Whale oil ..... "	.....	.....	789,345	.....	242,068
Fish Guano ..... ton.	.....	.....	1,244	.....	47,432
Bonemeal ..... "	.....	.....	75	.....	1,650
Totals	.....	7,624,917	.....	.....	11,515,086

SESSIONAL PAPER No. 39

RECAPITULATION-

Of the Number of Fishermen, etc., and of the Number and Value of Fishing Vessels, Boats. Nets, etc., in the **Whole** Province of **British Columbia**, for the year 1914–15.

	Number	Value.
		$
Steam Fishing Vessels (tonnage, 2,839)	34	717,200
Sailing and Gasoline Vessels	155	608,330
Boats (sail)	3,666	264,605
" (gasoline)	1,961	915,504
Carrying Smacks	155	63,460
Gill Nets, Seines, Trap and Smelt Nets, etc	5,975	769,845
Trawls	20	1,000
Hand Lines	4,340	5,400
Crab Traps	53	636
Salmon Canneries	77	2,839,213
Clam "	1	3,000
Freezers and Ice-houses	18	1,509,700
Smoke and Fish-houses	29	125,900
Fishing Piers and Wharves	100	619,247
Oil Factory	1	40,000
Halibut Dories	42	4,200
Halibut Gear (Skates)	1,850	32,500
Whaling Stations	4	310,000
Totals		8,829,740

Number of men employed on Vessels	860
" " Boats	10,187
" " Carrying Smacks	185
" persons employed in Fish-houses, Freezers, Canneries, &c	7,096
Totals	18,328

APPENDIX No. 9.

ONTARIO

DISTRICT NO. 1.—COMPRISING RAINY RIVER, THUNDER BAY, PARRY SOUND, ETC., DISTRICTS. INSPECTOR T. J. FOSTER, SAULT STE. MARIE, ONT.

DISTRICT NO. 2.—COMPRISING PART OF THE COUNTY OF BRUCE, THE COUNTIES OF HURON, LAMBTON, ESSEX, KENT, ELGIN, ETC., AND LAKES HURON, ST. CLAIR AND ERIE. INSPECTOR, O. B. SHEPPARD, TORONTO, ONT.

DISTRICT NO. 3.—COMPRISING LAKE ONTARIO AND THE EASTERN COUNTIES OF THE PROVINCE. INSPECTOR, J. S. HURST, BELLEVILLE, ONT.

N.B.—The Fisheries of Ontario are administered by the Provincial Government. This Department merely exercises a general supervision.

REPORT ON THE FISHERIES OF DISTRICT NO. 2.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to submit my report on the fisheries of my district in the fiscal year 1913-14.

The angling or sportsman's fishing, especially late in the fall, was particularly good. I am pleased to report that many firms and private individuals are making a business of taking carp from inland, as well as the international waters; and are making a success of the business, both from a financial standpoint and reducing to a certain extent the number of that fish in the waters. I am inclined to think that the use of this fish will greatly increase as it becomes better known, and the methods of preparing it for the table better understood. I do not think it will ever be popular with the better class of people, but with a certain class who desire a cheap fish food it will be used more than at present. I am also of the opinion that the eggs of the carp would make a splendid substitute for the eggs of the sturgeon in the production of caviare, which is in such demand, as the two fish, the sturgeon and the carp, are very much alike in their habits. I would strongly advise the Department to have the matter tested. The law has been enforced fairly well. The supply of fish in Lake Erie still keeps up to its normal standard, and, considering the number of licenses issued and the great quantities of fish taken from these waters speaks wonders for its producing powers. The government fish hatcheries are doing excellent work.

I am, sir,
Your obedient servant,

O. B. SHEPPARD,
Inspector of Fisheries.

SESSIONAL PAPER No. 39

REPORT ON THE FISHERIES OF DISTRICT NO. 1.

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to submit my annual report on the fisheries of the north west division of the Province of Ontario for the fiscal year 1914-15. I am pleased to be able to report continued improvement in all commercial fishing in this district.

Although more licenses have been issued, all licensees report larger catches than in previous years. There has also been less illegal fishing.

Game fishing continues to improve in spite of the fact that a larger number of tourists are being attracted to this district each season. I still regret that no "close season" has been ordered for "Rainbow Trout."

The fishery laws are being vigourously and efficiently enforced.

I am, sir,
Your obedient servant,

T. J. FOSTER,
Inspector of Fisheries.

Number.	Fishing District.	Fishing Material.																Number.
		Tugs				Gasoline Launches.			Sail or Row Boats.			Gill Nets.		Seines.				
		No.	Tonnage.	Value.	Men.	No.	Value.	Men.	No.	Value.	Men.	Yards.	Value.	No.	Yards.	Value.		
				$			$			$			$			$		
1	Kenora and Rainy River	9	59	14950	19	49	15780	105	36	2830	64	127600	16206	....	....	.....		1
2	Lake Superior	19	302	67200	88	6	2850	14	18	8695	142	869570	44832	..	.....	.....		2
3	Lake Huron (North channel)	25	512	82600	117	43	17500	94	73	4322	97	996120	58362	...	.....	.....		3
4	Georgian Bay	18	305	52000	82	36	13120	54	87	7620	124	1093990	60119	....	.....	.....		4
5	Lake Huron (proper)	12	194	29950	57	17	7550	35	93	7103	139	368470	31131	7	324	410		5
6	Lake St. Clair, etc	....	....	....	.....	52	13250	114	119	3755	204	.....	.....	57	8989	3759		6
7	Lake Erie	50	1173	262550	283	80	41380	255	258	50649	434	681672	161320	62	20110	7318		7
8	Lake Ontario	....	....	....	.....	110	30660	216	460	18885	711	719250	40742	8	670	235		8
9	Inland waters	....	....	....	.....	14	3450	17	435	7340	611	13132	1381	21	859	572		9
	Totals	133	2545	509250	646	407	145540	904	1639	111199	2526	5069804	414093	155	30952	12294		

Number.	Fishing District.	Fishing Material.										Other fixtures used in Fishing.				Number.
		Pound Nets.		Hoop Nets.		Dip or Roll nets.		Night Lines.		Spears.		Freezers and Ice Houses.		Piers and Wharves.		
		No.	Value.	No.	Value.	No.	Value.	No. Hook.	Value.	No.	Value.	No.	Value.	No.	Value.	
			$		$		$		$				$		$	
1	Kenora and Rainy River	36	11525	14	2075	.....	.....	....	.....	.....	.....	16	8750	11	2325	1
2	Lake Superior	38	6880	.....	....	.....	.....	..	.....	.....	....	19	11200	11	3550	2
3	Lake Huron (north channel)	126	39925	.....	..	.....	.....	3900	180	.....	.....	23	7025	20	15800	3
4	Georgian Bay	9	3900	12	350	.....	.....	16900	1710	.....	.....	20	2465	15	1805	4
5	Lake Huron (proper)	68	19950	.....	.....	29	50	.....	..	....	..	15	5750	4	280	5
6	Lake St. Clair, etc	12	2825	163	9465	37	155	4300	132	.....	.....	37	12700	7	2250	6
7	Lake Erie	499	261150	.....	.....	68	153	11410	167	.....	.....	115	84185	44	15580	7
8	Lake Ontario	.....	.....	532	12570	*55	129	32315	901	144	216	†193	6055	13	890	8
9	Inland waters	.....	.....	163	3245	83	227	20700	341	46	92	7	945	2	100	9
	Totals	788	346155	884	27705	271	709	89525	3431	190	308	445	139075	127	42580	

* One machine used in the Niagara River.

† 144 of these are spearing houses valued at $1,440.

RETURN showing the Yield and Value of the Fisheries of Ontario, for the year 1914-15.

Number.	Fishing Districts.	Herring, used fresh, cwt.	Herring, smoked, cwt.	Herring, pickled, brl.	Whitefish, used fresh, cwt.	Whitefish, salted, brl.	Trout, used fresh, cwt.	Trout, salted, brl.	Pike, used fresh, cwt.	Pickerel, used fresh, cwt.	Sturgeon, used fresh, cwt.	Eels, used fresh, cwt.	Perch, used fresh, cwt.	Tullibee, used fresh, cwt.	Catfish, used fresh, cwt.	Carp, used fresh, cwt.	Mixed fish, cwt.	Caviare, lb.	Sturgeon bladders, number.	Number.
1	Kenora and Rainy River	.....	..	.....	9,950	150	1,617	....	7,606	9,230	958	..	5	1,271	664	1,247	1,639	1,685	93	1
2	Lake Superior	7,819	....	1,915	3,376	313	14,388	690	2,013	1,293	85	.. ...	2	75	35	....	260	1	.....	2
3	Lake Huron (north channel)	121	....	145	7,167	4	15,037	68	1,261	4,085	304	....	149	918	21	14	4,917	303	..	3
4	Georgian Bay	352	.....	239	4,158	391	8,358	558	740	678	68	.....	68	195	29	25	516	1,026	300	4
5	Lake Huron (proper)	1,634	.....	468	618	39	6,696	315	11	1,912	144		1,152	3,676	1	100	1,038	1,435	25	5
6	Lake St. Clair, etc	.....	.....	.. .	466	.....	.....	...	628	462	410	85	2,837	.	784	10,277	11,154	1,719		6
7	Lake Erie	59,815	.....	.....	19,926	.....	25	18	29,268	20,858	563	.....	14,080	2,543	491	13,951	8,616	2,683	319	7
8	Lake Ontario	9,914	1,202	315	5,156	1,413	6,004	163	2,480	643	2	2,999	1,051	20	2,686	855	3,489	....	.	8
9	Inland waters	148	...	9	211	2	48	....	251	12	7	391	189	3	1,175	1,468	3,018	....	103	9
	Totals	79,803	1,202	3,089	51,028	2,312	52,173	1,812	44,258	39,173	2,541	3,475	19,536	8,701	5,886	27,897	34,647	8,852	837	
	Rates	5	10	10	10	10	10	10	8	10	15	6	5	6	8	2	5	1	60c.	
	Total values	399,015	12,020	30,890	510,280	23,120	521,730	18,120	354,064	391,730	38,115	20,850	97,680	52,206	47,088	55,794	173,235	8,852	502	

RECAPITULATION

Of the Yield and Value of the Fisheries in the Province of **Ontario**, during the year 1914–15.

Kinds of Fish.		Quantity.	Value.
			$
Trout	*Cwt	57,609	539,850
Whitefish	"	57,964	533,400
Herring	"	91,474	441,925
Carp	"	27,897	55,794
Pickerel	"	39,173	391,730
Pike	"	44,258	354,064
Sturgeon	"	2,451	38,115
Eels	"	3,475	20,850
Perch	"	19,536	97,680
Tullibee	"	8,701	52,206
Catfish	"	5,886	47,088
Mixed fish	"	34,647	173,235
Caviars	"	89	8,852
Sturgeon bladders	Number.	837	502
Total			2,755,291

*Cwt. = 100 lb.

RECAPITULATION

Of the Number and Value of Vessels, Boats, Nets, Traps, etc., used in the Fisheries in the Province of **Ontario**, during the year 1914–15.

—	Quantity.	Value.
		$
Steam Vessels or Tugs (tonnage 2,545)	133	509,250
Boats (sail)	1,639	111,199
" (gasoline)	407	145,540
Gill-nets, Seines and other nets	.....	800,956
Weirs	190	308
Lines	895	3,431
Freezers and Ice-houses	445	139,075
Piers and Wharves (private)	127	42,580
Total	....	1,752,339

Number of men employed on vessels or tugs	646
" " boats	3,430
	4,076

APPENDIX No. 10.

Imports and Exports of Fish

IMPORTS.

STATEMENT showing the Quantities of the chief Commercial Fish and Fish Products, imported into Canada, for Home Consumption, during the fiscal year 1914-15.

(From Report of Customs Department.)

Cod, Haddock, Hake and Pollock (fresh)	cwts.	2,955
" " (dried)	"	77,481
" " (smoked)	"	4
" " (green-salted)	"	1,040
" " (pickled)	"	394
Halibut (fresh)	"	33,936
Herring "	"	5,728
" (pickled)	"	90,289
" (smoked)	"	2,148
Mackerel (fresh)	"	8
" (pickled)	"	46
Salmon (fresh)	"	2,809
" (smoked)	"	36
" (canned)	"	164
" (pickled)	"	4,184
Bait Fish	"	2,093
Lobsters (canned)	"	332
Oysters (fresh, in shell)	brls.	3,385
" (shelled, in bulk)	gals.	173,958
" (canned, one pint and under)	cans	231,728
" (" one quart and under)	"	3,094
" (" over one quart)	quarts	484
" (preserved)	cwts.	261
Fish oil, Cod	gals.	136,728
" " " liver	"	18,006
Seal "	"	10,836
Whale "	"	6,531
Other "	"	43,337

The value of the imports of Fish and Fish Products for the year 1914-15 amounted to $2,002,759.

EXPORTS.

STATEMENT showing the Quantities of the Chief Commercial Fish and Fish Products (the Produce of Canada) Exported during the fiscal year 1914-15.

—From Report of Customs Department.

To.	Cod, including Haddock, Hake and Pollock.				Herring.				Mackerel.		Lobsters.	
	Fresh.	Dry.	Green Salted.	Pickled.	Fresh.	Pickled.	Smoked	Canned.	Fresh.	Pickled.	Fresh.	Canned.
	cwts.	cwts.	cwts.	cwts.	cwts.	brls.	cwts.	cwts.	cwts.	brls.	cwts.	lbs.
United Kingdom	3	12,411	14,360	...	...	30,651	49	590	...	...	...	2,796,102
United States	34,027	244,334	48,295	34,386	297,355	45,508	38,110	4	32,296	19,691	55,006	2,268,838
British West Indies	2	103,493	...	...	...	31,910	2,280	...	...	6,092	...	1,450
Bermuda	...	3,057	...	...	...	18	87	92	...	89	...	264
British Guiana	...	10,239	...	...	...	1,258	83	...	...	591	...	3,035
British Honduras	...	12	...	...	...	...	...	...	...	...	...	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...
Newfoundland	...	5,826	4,562	...	...	36	61	...	...	...	...	...
Austria-Hungary	...	...	...	...	...	...	...	...	...	...	...	...
Brazil	...	66,798	...	...	...	...	...	...	...	...	...	...
Costa Rica	...	3,299	...	...	...	...	...	...	...	16	...	...
Cuba	...	72,050	...	...	...	50	618	...	...	...	...	360
Danish West Indies	...	443	...	...	...	184	...	...	...	11	...	...
Dutch Guiana	...	6,995	...	...	...	...	442	...	...	1	...	7
Siam	...	...	...	...	...	...	...	...	...	...	...	...
French West Indies	...	45	...	...	...	...	...	...	...	...	...	...
Guatemala	...	...	...	...	...	...	...	...	...	...	...	...
Hawaii	...	1,629	...	...	...	...	...	...	...	...	...	...
Hayti	...	90	...	...	...	...	...	...	...	...	...	...
Italy	...	52,055	...	...	...	...	...	...	...	...	...	...
Miquelon and St. Pierre	...	1	...	...	...	6	9	...	...	...	...	48
Nicaragua	...	8	...	...	...	...	...	...	...	...	...	...
Panama	...	9,216	...	...	...	60	185	...	...	949	...	...
Porto Rico	...	63,820	...	...	...	3,326	10	...	...	327	...	...
Portugal	...	2,919	...	...	...	...	...	...	...	...	...	...
San Domingo	...	...	...	...	...	...	...	...	...	...	...	...
Spain	...	...	...	...	...	...	...	...	...	...	...	...
United States of Colombia	...	610	...	...	...	3	...	...	...	9	...	...

Venezuela		10			2								18,585
Australia						4							
Hong Kong		120				66,362							
China						54,135							
Fiji													
British Straits Settlements													
Norway													54,546
Alaska					9,900								
Japan						96,659							156,318
Sweden													
Chili									5,500				1,396,909
France									13				2,450
New Zealand													
British Oceania, other than above		303				261							228,874
Belgium													78,875
Denmark													415,384
Germany													86,040
Holland													
Mexico													
Russia-in-Europe		21											
British South Africa													
British India													
Dutch East Indies		80											
Ecuador													
French Oceania													
Philippines													
Dutch West Indies		19											2,780
Uruguay						625							
Korea													7,876
Argentina													
German Oceania													
French Guiana													
Totals	34,032	659,903	67,217	34,386	307,257	331,056	41,934	6,199	32,296	27,776	55,006	7,518,741	

EXPORTS—*Concluded.*

STATEMENT showing the Quantities of the Chief Commercial Fish and Fish products (the Produce of Canada) Exported during the fiscal year 1914-15.

—From Report of Customs Department.

To.	Salmon.				Oysters.	Bait Fish and Clams.	Oil.			Halibut.
	Fresh.	Canned.	Smoked.	Pickled.	Fresh.		Cod.	Seal.	Whale.	Fresh.
	cwts.	cwts.	cwts.	brls.	brls.	brls.	galls.	galls.	galls.	cwts.
United Kingdom	8,544	253,851	1	43	14	250	4,248	3,120	25,633	1,940
United States		2,747	19	8,126	577	28,894	581,928	6,566	172,870	70,719
British West Indies		427		659			905			
Bermuda	6	118		15	1					
British Guiana				164			80			
British Honduras										
Malta										
Newfoundland		11		36	10	202	8,976			45
Austria-Hungry										
Brazil										
Costa Rica				3						
Cuba										
Danish West Indies				15						
Dutch Guiana				167						
Siam		2,017								
French West Indies										
Guatemala										
Hawaii										
Hayti										
Italy										
Miquelon and St. Pierre	33	12	1		21	36				1
Nicaragua										
Panama				221						
Porto Rico										
Portugal										
San Domingo										
Spain										
United States of Colombia										
Venezuela										

Australia	136	25,775	1							
Hong Kong	6	403		11,958						
China		16								
Fiji		6,751								
British Straits Settlements	34	21,928								
Norway									135,720	
Alaska										
Japan	7,835			17,066						
Sweden				7						
Chili										
France	49	11,888			1					
New Zealand	1	13,982								
British Oceania, other than above		557								
Belgium		200		5						
Denmark				1,065						
Germany				1,127						
Holland										
Mexico										
Russia-in-Europe		12								
British South Africa		135								
British India		2,208								
Dutch East Indies		3,632								
Equador										
French Oceania		192								
Philippines										
Dutch West Indies										
Uruguay										
Korea										
Argentina										
German Oceania		288								
French Guiana				15						
Totals	55,695	346,551	22	40,692	623	29,382	596,137	9,686	334,223	72,705

The value of Fish and Fish Products (the Produce of Canada) exported during the year 1914-15, amounted to $19,687,086.

APPENDIX No. 11.

FISH BREEDING

To the Deputy Minister of the Naval Service,
Ottawa, Ontario

SIR,—I have the honour to submit herewith my annual report on the Fish Breeding operations of the department for the season of 1914-15. The total distribution for 1915 from 64 hatcheries that were in operation was 1,643,725,212, an increase of 415,748,623 over last season. This increase was principally in whitefish and lobsters. The distribution of the former in the Great Lakes of Ontario was increased by 106,130,000 and in Manitoba waters by 90,078,000. The lobster distribution in Quebec and the Maritime Provinces was increased by 190,689,696. There was also a considerable increase in atlantic salmon, speckled trout and pickerel, while the salmon trout and pacific salmon distribution was not as large as last year. Most unusual weather conditions were encountered on the Great Lakes during the salmon trout egg collecting season, while the collection of pacific salmon eggs of the different varieties was affected unfavourably by weather and river conditions.

The decrease in the last mentioned species was, however, almost entirely due to 1914 being an "off year" in the Fraser River watershed when the number of parent salmon available for hatchery purposes was small as compared with the preceding year of the "big run." This distribution, although smaller than that of last year, was greater by nearly ten millions than that of 1911, the corresponding year of the preceding four year cycle in the Fraser River watershed.

While the Fish Breeding operations of the department have in the past been almost entirely in the interests of the commercial species, greater attention was last season given to the sporting varieties, as is shown by the increased distribution of Atlantic salmon and speckled trout. The commercial species, which are hatched in lots of many millions are necessarily distributed mostly as fry just before the food sac is completely absorbed, but during the past season, a limited number of the different kinds of trout and salmon, according to the facilities existing at the various hatcheries, were reared to the advanced fry and fingerling stage. The distribution of such fish was increased by 747,902 over the previous year.

Some 400 yearling jackfish were transferred from the Carrot river to Hoodoo lake, in the province of Saskatchewan. With a view to extending this work, where conditions warrant, a considerable number of smaller lakes in the provinces of Alberta, Saskatchewan and Manitoba were examined by the fishery officers, and in the last mentioned province a man was employed specially for the purpose.

TRANSFER OF HATCHERIES TO THE PROVINCE OF QUEBEC.

Following the decision of the Privy Council in the Fisheries Reference in 1898, the administration of and the revenue from the fisheries of Ontario and the inland fisheries of Quebec was handed over to these provinces. Pending the settlement of those questions of fishery rights then outstanding the Federal Government continued the policy that it had previously followed of propagating both sporting and commercial fish for stocking both the inland and coastal waters.

As there was little prospect of the fisheries in question being again placed under the federal authorities and as the Provincial Governments derive all the revenue from these fisheries, an arrangement was entered into with the Ontario Government in 1912, whereby it will in future attend to the stocking of waters resorted to by anglers, while this department will confine its fish breeding work in that province to the propagation of the commercial species for stocking waters resorted to by the regular fishermen to earn a livelihood.

A similar arrangement has recently been entered into with the province of Quebec, and the four hatcheries that have been operated by the department for stocking the inland waters of that province, i.e., Lake Lester, Magog, St. Alexis and Mont Tremblant, have been handed over to the Department of Colonization, Mines and Fisheries. This department's fish breeding operations in Quebec will hereafter be confined to the propagation of the commercial species, such as Atlantic salmon and lobster, for stocking the coastal waters.

SPECIES PROPAGATED.

ATLANTIC SALMON.

The eggs of the atlantic salmon are obtained from fish that are either purchased from the commercial fishermen or taken in nets operated by the department's employees and impounded at Tadoussac, Restigouche, St. John, Miramichi and the Margaree retaining ponds.

The number of eggs obtained from each pond and the manner in which they were distributed to the various hatcheries is as follows:—

Tadoussac Pond. . . . . 3,820,400 eggs.

The parent fish are here taken in nets operated by the hatchery employees at Point Rouge and Bark cove. Last season, 550 were placed in the pond in good condition, of which 331 were females and 169 males. All the eggs were brought to the eyed stage in the Tadoussac hatchery and in March last, 600,000 were transferred to the St. Marguerite subsidiary hatchery and in the early part of April, 1,260,000 to the Bergeronnes sub-hatchery. The balance was distributed as fry from Tadousac.

New Mills Pond. . . . . 1,688,000 eggs.

Previous to last year, the parent salmon in the Restigouche district were taken in a net operated by the department at Tidehead, and were retained in a nearby fresh water pond. The operation of this net met with the strongest opposition from the anglers and lessees of the fishing rights in the rivers above, on the grounds that it captured only such fish as had already run the gauntlet of the numerous commercial nets of the lower reaches of the river and of the Baie Chaleur, and whose numbers should therefore not be further diminished for hatchery purposes and that it also to a large extent blocked the river and prevented,—especially during periods of low water,—the salmon from ascending to the pools until late in the season. The number of fish taken at this place was somewhat limited, and with a view to obtaining a larger number the tidehead net and pond were last year discontinued and a saltwater pond built at New Mills, where parent fish could be purchased from the commercial nets. The results unfortunately were not as satisfactory as could be desired, and a considerable loss occurred after the fish were impounded. This loss was largely due to numerous storms, during which it was almost impossible to prevent the fish from receiving slight injuries, which were not at the time discernible to the staff but which afterwards developed in the pond; to large meshed nets, which were used by some of the fishermen, and, being the initial season, to inexperience on the part of the officer in charge in this particular kind of work. The heavy storms, above referred to, also brought a large quantity of sediment and broken seaweed into the pond, which aggravated the injuries to the fish.

This season, fish were accepted at the pond and only such as were taken in the nearby nets to the westward thereof, where the bay is usually not so rough as on the east side and then only from nets of 3-inch mesh or under. All crates and pontoons, in which the salmon were retained, were lined with canvas; the front of the pontoons, which were previously open, were closed; spaces about one and one-half inches wide were opened along the sides to provide circulation, and the towing attachment was changed from the upper to the lower side of the slope in front. Canvas cradles were provided the fishermen, in which to transfer the fish from the nets to the pontoons, which were towed to the pond only when the tide was favourable. With these precautions and the benefit of last year's experience the loss up to the present this season has been no greater than usual under similar conditions.

From the 208 females and 220 males that were stripped in 1914, 1,688,000 eggs were obtained, all of which were hatched and distributed as fry from the Restigouche hatchery.

Miramichi Pond . . . . . 11,927,000 eggs.

The number of salmon impounded, 2,636, was larger than in any previous season, 2,403 were taken previous to October 19, and the balance 233 subsequent thereto. There was no loss whatever and all fish were reported to be in good condition at spawning time with the exception of twenty-one whose eggs were not utilized, as they were not in satisfactory condition owing to slight injuries received in the nets or when being transferred to the pond. The balance, however, 1,607 females, and 1,008 males, yielded 11,927,000 eggs, which were distributed as follows:—

Kelly's Pond hatchery	1,015,000
Bedford hatchery	1,065,000
Windsor hatchery	2,023,000
Gaspé hatchery	3,800,000
Miramichi hatchery	4,024,000

After the eggs were well eyed the following quantities were transferred from the Miramichi hatchery, viz.:—

Sparkle hatchery	800,000
Nepisiguit hatchery	400,000
Restigouche hatchery	100,000

St. John Pond . . . . . 7,664,000 eggs.

The parent fish are purchased from the commercial stands on the west side of St. John harbour and have to be conveyed in pontoons across Courtenay bay to the pond at Little River. As the pontoons can be taken to the pond only when tide and wind are favourable it is always necessary to hold the fish for varying periods in crates or pontoons in the harbour. Even with the greatest care it is almost impossible to absolutely prevent chafing and small bruises, which afterwards develop in the pond during the warm weather and cause the death of a certain number of fish. Notwithstanding these conditions, last year's operations were most satisfactory and the 832 females and 469 males that were stripped between October 29 and November 12 yielded 7,664,000 eggs, which were distributed as follows:—

St. John hatchery	3,064,000
Grand Falls hatchery	4,600,000

After they had reached the eyed stage the following shipments were made from Grand Falls:—

Cowichan Lake hatchery	290,000
New Westminster	10,000
Banff hatchery	100,000
Magog hatchery	90,000
St. Alexis hatchery	65,000
Tobique hatchery	1,000,000
Margaree Pond	6,170,000 eggs.

635 females and 265 males were stripped between November 13 and 30 at the Margaree pond, which yielded 6,170,000 eggs, which were distributed as follows:—

Margaree hatchery	4,120,000
Middleton hatchery	2,050,000

These were laid down in the hatcheries in splendid condition and in March, 1,000,000 were transferred from Margaree to the Lindloff hatchery, near St. Peter's.

All the atlantic salmon eggs were laid down in an exceptionally good condition last season and the results throughout were satisfactory. At the Lindloff hatchery, where the eggs were almost a total loss in 1914, the results were exceptionally good. The eggs were laid down in this establishment in an eyed condition and the total loss in eggs and fry was only four and one-half per cent.

PACIFIC SALMON.

The distribution of the various species of pacific salmon was not as large as in the previous year. This decrease, as previously stated, was largely due to the smaller number of parent fish available in the Fraser River watershed in 1914 as compared with the preceding year of the "big run" and to some extent to unfavourable conditions experienced at several points during the egg collecting season.

A very small number of spawning salmon reached the Granite Creek district, and the officer in charge reports that in his opinion if all of the nine principal salmon streams that flow into the Shuswap lakes were fenced they would not have furnished 1,000,000 eggs. Several of the principal spawning streams, such as Silver, Trout, and Morris creeks, which have always been depended upon to supply a large proportion of the Harrison Lake hatchery collection were disappointing and some of them were practically non-productive last season. On the other hand, there was a good run of salmon in the Skeena river, and no difficulty was experienced in filling the Lakelse Lake and Babine Lake hatcheries.

The Rivers Inlet, Anderson, Kennedy and Cowichan Lake hatcheries received their usual supply of eggs; but exceptionally high water, which, at Kennedy lake, prevented working one of the best seining grounds and at Cowichan lake made seines impractical, delayed the operations and increased the work and time usually found necessary to fill these establishments.

The Stuart Lake hatchery, which is located on the headwaters of the Fraser river was filled with eggs collected in Pierre and Fifteen-Mile creeks, which flow into Babine lake on the Skeena River watershed, and a portion of the fry was this spring returned to the waters in which the eggs were collected. This transfer of eggs and fry involves a great deal of work, and the transfer of the hatchery operations at Stuart lake to some other point on the Skeena River watershed is receiving attention.

SPECKLED TROUT.

The distribution of speckled trout fry and fingerlings was increased by 69,140 over the previous year. The increase in the distribution does not fairly indicate the exten-

sion of the collecting operations for the eggs of this species. The officers in charge of practically all the hatcheries in Quebec and the Maritime Provinces were working in this direction; but as it was new work with most of them, a number were not successful as far as the number of eggs obtained is concerned; but they have gained experience as regards the spawning period and favourable collecting grounds, which will be of value in future operations.

At St. Alexis, the collection has during recent years been somewhat hampered by misunderstandings between the hatchery officers and the lessees of some of the most productive waters. Last season, however, arrangements were made with the lessees in question, which proved satisfactory and it is expected that the difficulty above referred to will not obtain in future. The total collection in the district was 486,000 speckled and 3,700 red trout eggs, which were distributed as follows:—

	Speckled Trout.	Red Trout.
St. Alexis hatchery	386,000	700
Bedford hatchery	100,000	
Banff hatchery	.....	3,000

A large number of lakes were inspected by the officer in charge of the Mont Tremblant hatchery, who, unfortunately did not locate satisfactory grounds until late in the season. He, however, collected some 98,000 eggs, and it is hoped that with last season's experience this number will be largely increased this season.

The officer in charge of the Tadoussac hatchery after inspecting various lakes located a good seining ground in the Bergeronnes river, where he succeeded in taking 450 trout of the sea run variety, from which 76,000 eggs were obtained. A large percentage of these fish, as was the case with similar trout at Margaree, did not yield, and showed no signs of yielding when they had to be liberated.

The officers of the Restigouche hatchery operated in the Causapscal lakes. Owing to the nature of these lakes, seines could not be operated and the fish had all to be taken with the fly. Some 1,200 spawning fish were captured in this way, which yielded 325,000 eggs. The work was conducted under difficult conditions; the fish were stripped and the eggs transferred, over a rough road, during very cold weather, which caused a heavy loss. Arrangements have been made to overcome the difficulties mentioned, and it is expected that under normal conditions last season's collection can be largely increased. 50,000 of these eggs in the eyed stage were transferred to the Miramichi hatchery and the balance were distributed from Restigouche.

There was a considerable falling off in the collection of speckled trout eggs in Prince Edward Island; but this was more than made up by the increased collection at Margaree. The Kelly's Pond hatchery, P.E.I., collection decreased to 265,000; but the Margaree collection was increased to 350,000. While there was a material increase in the number of eggs, the trout taken at Margaree did not yield as well as was expected. Quite a number of these appeared to be old fish and no eggs whatever were obtained from them.

The Miramichi hatchery staff succeeded in capturing some 245 fish in the upper waters of Green brook and the Bartibog river. These yielded some 170,000 eggs; but, unfortunately, owing to extremely cold weather and poor transportation facilities there was a heavy loss after the eggs were laid down in the hatchery. The resultant fry were returned to the Bartibog.

In addition to the above, the staffs of the Gaspé, Grand Falls and Windsor hatcheries, inspected the most promising trout waters in their respective districts, with a view to collecting such eggs, if conditions warranted, and for which arrangements have already been made this season.

The wild trout eggs collected were supplemented by the purchase of nearly 850,000 eggs of domesticated fish which were distributed as follows:—

St. John hatchery	300,000
Magog hatchery	168,000
Lake Lester hatchery	120,000
Mont Tremblant hatchery	100,000
Cowichan hatchery	128,000
New Westminster hatchery	32,000

SALMON TROUT.

The salmon trout egg collection was not as large as during the past season, although every reasonable effort was made. It has been customary, and no difficulty has been found in doing so, to fill the hatcheries from the commercial catch of fish. When it was found, towards the end of the fishing season, that the collection would not be as large as was desired, two tugs fishing out of Southampton, and two out of Meaford were employed, with their equipment, to take fish for hatchery purposes. This method was not satisfactory and resulted in a collection of less than 2,000,000 eggs. A pound-net was also operated in Colpoy's bay, which yielded 2,700,000 excellent eggs.

Six pound-nets, which had been previously fishing in the neighbourhood of Meldrum bay, were employed during the whole of November. While a considerable number of fish were taken, the yield from them was small and when they were liberated at the end of the season, the majority were still unripe. The most unusual weather conditions prevailed throughout the whole collecting season on lake Huron and Georgian bay, where the majority of salmon trout eggs have been obtained in the past. Owing to the extremely mild weather, very few of the commercial fish were ripe and the yield of eggs from this source was consequently small. The fish that were taken and retained in pound-nets, although they appeared to be in splendid condition, did not ripen as was expected and a large number had to be liberated when weather conditions made it necessary to remove the nets.

The collection, however, in lake Superior by the staff of the Port Arthur hatchery was the most successful of recent years. The hatchery was filled to its full capacity, a total of 8,800,000 eggs being taken, from which the following shipments were made in the eyed stage:—

Banff hatchery	560,000
Lake Lester hatchery	370,000
Mont Tremblant hatchery	630,000
Magog hatchery	1,000,000

CUTTHROAT TROUT.

The usual difficulties were encountered in the collection of Cutthroat trout eggs for the Banff hatchery. This season the trap-nets which were set in the most accessible streams in the Foothills were swept out by freshets on several occasions and during those periods of high water when the nets could not be kept in place the run of trout escaped to the spawning grounds at the headwaters of the various creeks. The operations were then transferred to Boom lake, near Laggan, where 112,000 eggs were obtained. These eggs had to be eyed where taken and afterwards carried seven miles by hand to the nearest point where they could be shipped by rail to the hatchery. The number collected in Boom lake was supplemented by a shipment of 60,000 from British Columbia.

KAMLOOPS TROUT.

The Kamloops trout are propagated in the Gerrard hatchery only. The collection this season is slightly smaller than in previous years, amounting to about 640,000. The resultant fry and fingerlings were all distributed in the Kootenay district.

WHITEFISH.

The three new hatcheries for whitefish, which were referred to in my last report as being under construction, i.e., Thurlow, Kenora and Fort Qu'Appelle, were completed in time for operation last season. To obtain a supply of eggs for them the whitefish egg collecting operations were conducted on a larger scale than in any previous season, and which, as previously stated in this report, resulted in an increased distribution of over 106,000,000 in Ontario, and over 90,000,000 in Manitoba.

The collection work in Ontario was conducted under the most unfavourable weather conditions that have obtained in recent years, while on the other hand in lakes Winnipeg and Winnipegosis the conditions were more favourable than usual, and all the eggs required for the Manitoba hatcheries were obtained before the heavy frosts set in.

As many eggs as possible are obtained from the commercial catch of fish as they are taken from the nets, but the number obtained in this way is a comparatively small proportion of the total collection.

In the Bay of Quinte, where there is a close season, seine fishermen are employed. The fish taken during the open season are returned to the fishermen, while those taken during the close season are liberated after they are stripped. Two camps were operated here, from which 50,000,000 eggs were obtained.

Spawn collectors were also stationed at Dunnville, Port Dover and Kingsville on lake Erie, and at Bois Blanc and Fighting island in the Detroit river; at French river, Georgian bay; at Thunder bay, lake Superior; at Whitefish lake and at Oak island in the lake of the Woods. Ordinarily the fish taken during the early days of November are well advanced and have to be retained only for a short period until they ripen. Last season, however, owing to the mild weather the fish at this time were quite hard and later in the month, when prospects were promising for a good supply of eggs, continuous heavy storms set in that not only drove the fish off shore, but damaged the nets of the commercial fishermen to such an extent that many were not reset.

The Detroit River fisheries, especially those at Fighting island, which it was claimed could be depended upon for a large number of eggs when weather conditions in the open lake were unfavourable, were as disappointing as the other districts, and less than 43,000,000 eggs were obtained there last season, a decrease of nearly 65,000,000 from the previous year. Fortunately, however, just at the close of the season, when all hope of filling the hatcheries had almost been abandoned, a run of ripe fish took place in the Kingsville district, from which upwards of 108,000,000 eggs were obtained, which were distributed among the various hatcheries. The following statement shows the number of eggs collected at the various points and the distribution of the same, viz.:—

Camp.	No. Eggs Collected.	Hatchery.
Bay of Quinte	50,000,000	Thurlow.
Dunnville	12,000,000	Collingwood
Port Dover	27,000,000	Sarnia.
Kingsville	108,720,000	Sandwich.
Amherstburg	18,520,000	"
Bois Blanc	11,640,000	"
Fighting Island	42,720,000	"
Meldrum Bay	2,300,000	Thurlow.
French River	48,000,000	Collingwood.
Thunder Bay	2,000,000	Port Arthur.
Whitefish Lake	6,000,000	"
Lake of the Woods	10,320,000	Kenora.

The various shipments above mentioned, that were sent to Sandwich from the collecting grounds, were distributed as follows:—

Sarnia hatchery	30,000,000
Kenora hatchery	41,400,000
Port Arthur hatchery	21,600,000
Sandwich hatchery	79,600,000
Thurlow hatchery	9,000,000

As previously stated, the mild weather, which was so detrimental to the work on the Great Lakes, was the reverse in lakes Winnipeg and Winnipegosis. No difficulty has ever been experienced at Dauphin river, where the eggs for the Lake Winnipeg hatcheries are obtained, on account of a shortage of fish; but on more than one occasion owing to the severe and sudden frosts it has not been possible to retain the fish in the crates until they ripened or to transfer the eggs to the hatcheries in the southern part of the lake on account of the close of navigation. Last season, however, an abundance of fish were taken and no difficulty would have been encountered in obtaining a considerably larger number of eggs than was necessary to fill all three hatcheries on the lake. 227,000,000 eggs were obtained at this place.

At Waterhen river, lake Winnipegosis, the conditions were somewhat similar to what they were at Dauphin river, and for the first time since the hatchery was started it was filled to its full capacity and upwards of 16,000,000 eggs were sent to the new hatchery at fort Qu'Appelle. This gratifying result, however, was not obtained without a great deal of perseverance on the part of the staff as owing to the extremely low water in the lake the fish did not resort to their usual spawning grounds and it was necessary to move the pound-nets from their first location and also towards the end of the season to take a considerable number of parent fish in gill-nets.

Conditions at Long lake were somewhat similar to what they were in the Great Lakes of Ontario. Some 4,000 whitefish, averaging 5 pounds in weight were taken and impounded previous to October 13. These fish were retained in pound-net pots, where they kept in good condition; but on November 9 were still quite hard. Shortly afterwards decidedly cold weather with high winds set in, which so damaged the pound-net pots that all the fish escaped. The retaining crates are being removed this season to a more sheltered location, where a breakwater has been erected, which it is hoped will prevent a recurrence of last season's mishap and enable the fish to be held until they are ripe.

PICKEREL.

The pickerel operations were continued at Sarnia and Collingwood, Ontario, and Gull harbour, Manitoba, and were also extended to the new Kenora hatchery on the lake of the Woods. The catch of pickerel in the Sarnia district before the spawning season was this year unusually large, which consequently resulted in a decreased number of ripe fish, which could be utilized for hatchery purposes. The operations, however, resulted in an increased distribution of 12,000,000 fry over last season. The pickerel work, which was started at the Collingwood hatchery last year, was more successful and resulted in a distribution of nearly 7,000,000 fry. The work was also extended to the Kenora hatchery, where for the initial season the operations were quite satisfactory, resulting in a distribution of upwards of 21,000,000 fry. The collecting operations of this species for the Gull Harbour hatchery were this season removed from Swampy island to Sandy point, Big island. In conjunction with the North Dakota Fish Commission an effort was made to collect such eggs in the Red river, near Selkirk; the eggs to be hatched in the North Dakota hatchery and the resultant fry to

be equally divided between the two departments, those for Canadian waters to be distributed in lakes in southern Manitoba adjacent to the boundary, which it is difficult to stock from the hatcheries on lake Winnipeg. A considerable number of fish were taken; but the results were disappointing. Owing to the high temperature of the water, the eggs could not be eyed at Selkirk, and had to be transferred as they were taken. This transfer necessarily took place during somewhat warm weather, with, as above stated, disappointing results. The distribution from Gull harbour was however slightly increased over last season.

SHAD.

The floating shad hatchery was this season removed from Washademoak lake to the head of Darlings island on the Kennebecasis river. The first ripe fish were obtained on May 31, and between that date and June 22, 3,661 fish, a catch of 36 nets, were handled, of which 130, or nine per cent of the females, were productive, yielding 2,055,000 eggs, from which 1,100,000 fry were hatched and distributed on the spawning beds in Darlings lake in the neighbourhood of the hatchery. The run of shad in the St. John harbour and river is reported by dealers as being the best in recent years and from thirty to fifty per cent better than last season.

The propagation of shad was extended to the Nictaux river, N.S., as the fishery regulations for Annapolis county were amended so as to allow shad fishing in the Annapolis and Nictaux rivers on Mondays and Tuesdays throughout the fishing season previous to June 1. Upwards of 500,000 eggs were collected from the catch of the net fishermen; hatched in the Middleton hatchery and the resultant 250,000 fry returned to the Nictaux river.

LOBSTERS.

Notwithstanding the prevalence of ice on the shores, which prevented the fishermen from setting their traps as early as they otherwise would have done, and local storms, which caused considerable damage, and at Charlottetown and Port Daniel carried away the hatchery intake pipes, I am pleased to report a general increase in the number of lobster eggs collected and the satisfactory increase of over 190,000,000 in the lobster distribution. In continuation of the test of the efficacy of the hatching and planting of lobsters in accordance with the recommendation of the Shellfish Fisheries Commission, a shipment of 8,000,000 fry was made with small loss from the Canso hatchery and distributed in Bedford basin in splendid condition.

The Long Beach lobster retaining pound was also in operation under Dr. A. P. Knight, of the Biological Board, and Mr. Andrew Halkett, the naturalist of the department. One hundred and sixty-five berried lobsters, from twelve to sixteen inches in length, were obtained during the legal fishing season, which expires on June 15, in Digby county, and subsequent thereto eighty-seven, two-thirds of which were upwards of fourteen inches in length, were obtained in the waters of Kings and Annapolis counties.

The work at the pound this season is largely of a scientific nature and the result of the investigation will be embodied in a separate and later report.

The following tables give the number of the different species of fry and fingerlings distributed during the season of 1915, viz:—

Species.	Fry.	Fingerling.	Total.
Atlantic Salmon	25,570,200	635,409	26,205,609
Pacific Salmon—			
Sockeye	72,713,613		
Spring	2,865,300		
Cohoe	4,425,720		
Humpback	16,000		
Dog	125,000		
Steelhead	55,000		
Kennerly's (Little Redfish)	5,500		80,205,633
Salmon Trout	16,727,000	477,700	17,204,700
Speckled Trout	1,611,600	186,583	1,798,183
Grey Trout	15,500		15,500
Kamloops Trout	564,625		564,625
Cutthroat Trout	9,862	114,000	123,862
Dolly Varden Trout	500		500
Red Trout	600		600
Whitefish	493,148,000		493,148,000
Pickerel	118,550,000		118,550,000
Lobsters	904,600,000		904,600,000
Shad	1,350,000		1,350,000
Grand Totals	1,642,353,520	1,411,692	1,643,725,212

RESULTS.

The popular demand for fry is increasing on a large scale from year to year, as the results from the distribution are becoming more apparent. The following extracts from the individual reports of the officers in charge are of interest in this connection, viz:—

"WINDSOR HATCHERY.

"More salmon were taken from the Avon river than in any previous season, and large numbers were taken from all the rivers in Hants, Kings and Colchester counties that empty into the bay of Fundy, as is evidenced by the enclosed clippings from the local press:—

"Salmon are reported very plentiful on the bay of Fundy shores. Most of the fishing weirs along the shore have caught large numbers. One fisherman at St. Croix cove had in his weir alone more than five hundred pounds of good-sized salmon.

"Great quantities of salmon are now being taken from weirs along the bay of Fundy. The disastrous storm of last month destroyed all the weirs along the bay; but they have been repaired and replaced. It is not uncommon to catch 200 to 400 pounds of salmon at a tide."—*Kentville Advertiser.*

"RESTIGOUCHE HATCHERY.

"In nearly all the lakes where I have distributed fry in past years I have had excellent reports. Mr. J. A. Pratt, of Rivière du Loup says the salmon and salmon trout have done splendidly in the lakes in that vicinity. Mr. Boulay, M.P., of Sayabec, also says salmon which were planted three years ago have grown splendidly in the Sayabec lakes. Last year, the Reverend Mr. Purdy of this town caught three fine salmon in one day in the Murray lake, so-called, eight miles from this town. The fish averaged about 5 pounds in weight and gave fine sport. One can of fry was planted in this lake five years ago.

"1896 was long remembered as being the banner year for angling on the Restigouche and was certainly a great year. The fish were large and conditions of water just right. Previous to this there were a great many off years, perhaps every second or third year there would be a drop in the angling score of 25 per cent or 30 per cent; but since 1896 there has not been one real poor year with the anglers, but a great many equal and even better. Last year, 1914, the fish were the largest in the history of the river and very plentiful, both anglers and netters claiming it was far ahead of 1896.

"The present year, 1915, for angling, however, has surpassed them all, there never was anything known to equal it on the Restigouche for angling. No matter what river or whether it is in the pools, stretches of the river, or in the rapids, wherever the fly fisher chose to cast his fly he was certain of success.

"I might enumerate just a few of the scores which are authentic and came under my notice. Mr. R. Ronalds and party, three rods, dropped in at the Kedgewick on the 8th of June and in two weeks landed 90 fish. This is 75 miles above Campbellton and tide water and is evidence that a great many fish must have been migrating up the rivers even in May. Messrs. Rogers and Thompson at Kedgewick took 140 odd salmon in less than two weeks from the 20th of June. Mr. Perkins, of the Restigouche Club, one rod, caught at Matapedia 146 fish in three weeks. Mrs. Dexter, at the mouth of the Upsalquitch, a few weeks ago, hooked 25 salmon and landed 15 in one day. Messrs. Munnell and Pratt, on the Upsalquitch, three or four rods, are reported to have taken over 300 salmon. At times there would be upwards of 100 rods on the Restigouche and its tributaries making similar scores."

The officers in charge of the Tadoussac, Mont Tremblant, Sandwich and Sarnia hatcheries all report an improvement in the fisheries of their respective districts, which is almost universally attributed by the fishermen to the fry distributed from their hatcheries.

The officer in charge of the Anderson Lake hatchery also reports that for the first time during the four years since his appointment sockeye salmon were last fall seen in Ternan creek, being the return of the fry planted therein shortly after the hatchery was established.

It is also interesting to note that results are now quite apparent from the atlantic salmon fry that have been distributed in various inland waters. This distribution was made partly to satisfy the demand for ouananiche, which are not propagated by this department, and also to ascertain if such fry would become acclimated and reproduce in fresh water. The growth according to the character of the lakes in which they have been planted has been quite satisfactory; but up to the present no fish have been obtained that showed evidence of reproduction. The salmon have been reported from two to three pounds weight from the lakes of the seigniory of Perthius, Quebec; Lake Superior (two year old) and 5 pounds in weight from Lake Joe Bob and Sacacomie and the chain of Three Lakes in Maskinonge county, Que.

The catfish that were planted in 1914 in a number of lakes in Manitoba, which are unsuitable for a better class of fish, are reported as doing splendidly; and a number have been seen this season five and six inches in length.

EXAMINATION OF RIVERS.

The survey of salmon rivers, referred to in my last report, was, during the past season, extended to the following branches of the St. John river and also to rivers in Gloucester county, N.B., viz:—

Kennebecasis river, St. John county.
Belleisle river, St. John County.
Nashwaak river, St. John county.

Jemseg, Grand Lake, St. John county.
Salmon river and branches, St. John county.
Washademoak river, St. John county.
Nerepis river, St. John county.
Keswick river, St. John county.
Oromocto river, St. John county.
Eel river, Carleton county.
Nigado river, Gloucester county.
Millstream river, Gloucester county.
Tetagouche river, Gloucester county.
Middle river, Gloucester county.
Little river, Gloucester county.
Caraquet river, Gloucester county.
Pokemouche river, Gloucester county.
Little Tracadie river, Gloucester county.
Big Tracadie river, Gloucester county.

MARKING OF SALMON.

The tagging of salmon referred to in last season's report, was continued at each of the salmon retaining ponds during the fall of 1914. The fish that were tagged in 1914 and the previous fall are now returning to fresh water and 19 tags taken from such fish have been returned to the department. One of these was brass and the remaining 18 were silver. The following statement shows the weight, length, condition, sex, date and place of liberation and of capture.

Number.	Weight.	Length.	Condition.	Sex.	Date.	Where Liberated. Where Caught.
	Lbs.	Ins.				
RESTIGOUCHE POND.						
1586	14½	36	Kelt	F.	Oct. 30, 1913	Tidehead, Restigouche river.
			"		June 30, 1914	Bay of Chaleur.
680	15	38	"	"	Nov. 6, 1914	New Mills.
	14½	38	"		June 3, 1915	Matapedia.
MAGAREE POND.						
152	16	36	Kelt	M.	Nov. 13, 1913	Margaree river, in tidal waters.
	18	36	Clean		June 3, 1914	Below Margaree Forks Bridge.
183	18	36	Kelt	F.	Nov. 13, 1913	Margaree river, in tidal waters.
		36	Clean		June 10, 1914	Below Margaree Forks Bridge.
187	10	24	Kelt	"	Nov. 13, 1913	Margaree river, in tidal waters.
	26		Clean		Aug. 15, 1914	Below Margaree Forks Bridge.
217	12	24	Kelt	"	Nov. 13, 1913	Margaree river, in tidal waters.
	18		Clean		Aug. 27, 1914	Below Margaree Forks Bridge.
246	16	36	Kelt	"	Nov. 17, 1913	Margaree river, in tidal waters.
			Clean		June 2, 1914	Margaree river, N.E.
161	10	24	Kelt	M.	Nov. 13, 1913	Margaree river.
	24½	39	Clean		July 12, 1915	½ mile from Margaree Harbour entrance.

Number.	Weight.	Length.	Condition.	Sex.	Date.	Where Liberated. Where Caught.
	Lbs.	Ins.				
MARGAREE POND—*con.*						
164	12	24	Kelt	M.	Nov. 13, 1913	Margaree river.
	21½	37	Clean.		July 15, 1915.	3 miles from entrance.
204	14	36	Kelt	F.	Nov. 15, 1913	Margaree river.
	16		Clean.		June 2, 1915	" "
819	9	28	Kelt	"	Nov. 14, 1914	Margaree Harbour.
	20		Clean.		June 10, 1915	Barrick Pool.
844	18	39	Kelt	"	Nov. 14, 1914	Margaree Harbour.
	18		Clean.		June 3, 1915	Barrick Pool.
929	16	35	Kelt	"	Nov. 17, 1914	Margaree Harbour.
	19	38	Clean.		June 5, 1915	Creek.
MIRAMICHI POND.						
296	13	36	Kelt	F.	Oct. 27, 1913	South Esk, N.W. Miramichi.
			"		June 1914	Lower Newcastle river.
388	5½	27	"	M.	Oct. 31, 1913	South Esk, N.W. Miramichi.
	5		"		June 1914	Loggieville river.
461	10	33	"	F.	Nov. 13, 1913	South Esk, N.W. Miramichi.
	10		"		June 1914	Lower Newcastle river.
435	8	31	Kelt	"	Nov. 6, 1913	Miramichi river.
	21½	37	Clean.		July 5, 1915.	N.W. Branch of Miramichi.
ST. JOHN POND.						
107	7	30	Kelt	F.	Nov. 6, 1913	St. John Harbour.
	14½	34½	Clean.		July 5, 1915.	Branch Pool, Forks of Tobique.
TADOUSSAC POND.						
525	15	35	Kelt	F.	Nov. 4, 1914	Saguenay river, at Tadousac.
	13	35	"		June 12, 1915	St. Lawrence river, at mouth of Saguenay river.

With a view to obtaining definite information with regard to the age at which the different varieties of Pacific salmon return to their native streams, a number were, on the recommendation of the British Columbia Fisheries Advisory Board marked this season, before they were liberated, by the removal of the adipose fins. 1,000 spring and 1,000 coho fry were marked in this way at the Cowichan Lake hatchery, and 1,200 sockeye at the Anderson Lake hatchery, both on Vancouver Island, by Dr. McLean Fraser of the Biological Board.

The term kelt is applied to the salmon at the time they were tagged, as they had been in the respective retaining ponds for varying periods during the previous summer, and had all been stripped before they were tagged and liberated. They were taken as clean run fish in set nets in the vicinity of the respective ponds and were liberated in the same neighbourhood. At the Tadoussac, Restigouche and St John Ponds they were taken and impounded previous to Aug. 15th, and at the Miramichi and Margaree Ponds during September and October.

NEW HATCHERIES.

The Tobique hatchery which was referred to in my last report as being under construction, was completed and operated during the past season. It is operated in connection with the Grand Falls, N.B., establishment, and is situated on the main road, sixteen miles above Plaster Rock, on a small stream flowing into the Tobique river. The building is 25 feet long, 20 feet wide, with a living room in the second story 11 feet 6 inches by 14 feet by 8 feet high for the officer in charge. It is fitted up with ten hatching troughs, each 15 feet 6 inches long, 6½ inches deep, 10½ inches wide inside measurement. Nearly one million salmon fry were distributed from this establishment during the present season on the nearby spawning beds and in the numerous small spring creeks tributary to the Tobique river.

The trout pond and fry tanks were also completed at the Middleton hatchery. This pond is in the shape of an irregular rectangle, 28 feet wide at the upper end and 50 feet wide at the lower with two sides each 66 feet long. The sides of the pond and the supply ditch from the dam and fry tanks are enclosed with plank. The fry tanks are also built of plank and are fed from the hatchery dam and some small adjacent springs. The fry tank proper is divided into five compartments, each 5 feet wide by 6 feet long and 14 inches deep at the upper side, grading to 20 inches at the lower. The other tank is not divided into compartments and is of the same dimensions as the first mentioned, except that it is 40 feet in length.

The transfer of the hatchery equipment from the old establishment at Bon Accord, Fraser river, to the Fisheries Building in Queen's Park, New Westminster, and the construction of rearing ponds in connection therewith, as well as the rearing ponds at the Cowichan hatchery, B.C., also referred to in my last report, have been completed and are now in operation.

As was previously intimated, the discontinuance of the Bon Accord hatchery was necessary on account of the laying out of the townsite of Port Mann around it. The present establishment adds to the attraction of the park, as the greater part of its output is distributed as fingerlings and fish of the various varieties and ages are retained throughout the whole year. Two rearing ponds have been built, each 80 feet by 12 feet at the surface, sloping to 72 feet by 6 feet at the bottom, with a depth of 3 feet. One pond is divided into six compartments, and a series of seven smaller ponds, each 8 feet by 3 feet and 6 inches deep run parallel to the larger ponds. All the walls are faced with stone and the bottoms covered with gravel. The water supply is obtained from the overflow of the town reservoir.

The Cowichan hatchery ponds, six in number, are each 35 feet long by 6 feet wide at the top and 4 feet wide at the bottom throughout their length. They are three feet deep at the upper end, grading to 3 feet 6 inches at the lower end. The water enters the upper end in the form of a spray and passes out through an overflow at the surface of the lower end. One of the tanks is divided into sections for the younger fry. A salting trough or gutter, one foot square and 16 feet long extends out through the lower end of each trough and connects with the outlet drain.

A dwelling house was also erected for the officer in charge of the Anderson Lake hatchery. The main building is one and one-half stories high, 25 feet wide by 38 feet long and contains seven rooms, with an extension 12 feet by 16 feet in the rear.

Two small ponds have been built in connection with the St. John, N.B. hatchery. The smaller is in the shape of an irregular rectangle, 15 feet wide and 28 feet long on the outer side and 45 feet wide on the inner side where it adjoins the larger pond, which is 46 feet 6 inches wide and 75 feet long. The depth of water in the latter is four feet in the centre, grading to three feet near the sides, while the smaller is three feet in the centre grading to two feet. The grounds adjacent to these ponds have been graded, levelled and prepared for the installation of thirty fry tanks, each 6 feet long by 2½ feet wide. These ponds and tanks obtain their water supply from a number of springs on adjoining city property.

Two ponds for brood fish have also been built in connection with the Banff, Alberta, hatchery. The larger, which is in the form of a crescent, is 120 feet long by 52 feet wide at water level and four feet in the centre, grading to three and one-half feet deep at the sides. The smaller pond is 82 feet by 28 feet at water level and is three feet deep in the centre, grading to two and one-half feet at the sides.

The grounds surrounding the Banff hatchery, which was built in a totally unimproved portion of the park, have been levelled, graded and sodded, and now compare favourably with any portion of the Banff park in which it is located.

A dwelling house for the officer in charge of the Kennedy Lake hatchery, Vancouver Island, 24 feet by 28 feet, containing nine rooms with a 12 foot by 28 foot addition, has been authorized and is now under construction.

REPAIRS AND IMPROVEMENTS.

A protection crib has been built in front of the Buctouche lobster hatchery, where the sea was encroaching on the hatchery property; and a new boiler was installed in the Little Bras D'Or lobster hatchery.

The grounds surrounding the Thurlow, Ontario, hatchery have been levelled, graded and seeded; concrete walks built and arrangements made to extend the pipe line 185 feet further from the shore and to build a dock and protection cribs for the retention of parent fish.

A complete set of galvanized iron hatchery troughs on a wooden frame-work have been installed in the Wiarton hatchery. The dock at this establishment has also been repaired and the space between it and the front of the hatchery filled in with earth, graded and seeded, which greatly improves the general appearance.

The pumping wells at the Sarnia and Collingwood hatcheries, which were referred to in a previous report, were completed and gave entire satisfaction during the past season, as by their use a filtered water supply is always available.

In Manitoba, a new channel is now being dredged into the lagoon at the Snake Island, lake Winnipegosis, hatchery. The intake pipe of this establishment was formerly laid into the main lake; but has been transferred to the lagoon adjacent to the hatchery and a channel in connection has been dug to give the necessary circulation.

In British Columbia, a flume 100 feet long, 10 feet wide and 4 feet deep, has been built to facilitate the capture of parent fish in Trout creek, one of the main spawning streams of the Harrison lake district. A new foundation, new head tank and a number of new troughs have been placed in the Babine hatchery. Four new fry ponds, 60 feet by 26 feet, 42 feet by 19 feet, 42 feet by 19 feet, and 46 feet by 23 feet, respectively, grading from two feet deep in the centre to nothing at the edges, have been built at the Rivers Inlet hatchery. These, with the old ones previously in use give a total pond area of 7,455 square feet. The grounds at the Gerrard hatchery have been improved, levelled, graded and sodded and the cleared area around the Kennedy Lake hatchery has been extended, levelled and otherwise improved. The fry ponds have also been improved and a new floor tank installed.

A new dam, concrete floor and other extensive repairs have also been authorized and are now under way at the Kelly's Pond, P.E.I., trout hatchery.

At the present time, the department has, including those that are being transferred to the province of Quebec, fifty-six hatcheries, eight subsidiary hatcheries, five salmon retaining ponds, and one lobster pond in operation.

I have the honour to be, sir,
Your obedient servant,

J. A. RODD,
Superintendent of Fish Culture.

The following tables give the hatcheries that were operated, their location, date of establishment, species and number of each species of fish distributed from each one during the season of 1915, viz:—

Distribution of Fry, 1915.

Established.	Hatchery.	Location.	Species.	Quantity.		Total Distribution.
				Fry.	Fingerling.	
1876.	Bedford	Halifax Co., N.S.	Atlantic salmon	790,000	200,000	
	"	" "	Speckled trout	99,000	200	891,200
1902.	Margaree	Inverness Co., N.S.	Atlantic salmon	2,628,000		
	"	" "	Speckled trout	92,000		2,720,000
1906.	Windsor	Hants "	Atlantic salmon	1,655,000	8,000	1,663,000
1912.	Middleton	Annapolis "	" "	1,295,000	185,000	
	"	" "	Speckled trout	100,100	64,000	
	"	" "	Shad	250,000		1,894,100
1912.	*a* Lindloff	Richmond "	Atlantic salmon	955,000		
	"	" "	Speckled trout	24,500		979,500
1891.	Bay View	Pictou "	Lobster	92,000,000		92,000,000
1905.	Canso	Guysborough Co., N.S.	"	100,000,000		100,000,000
1911.	Isaac's Harbour	" "	"	28,700,000		28,700,000
1911.	Inverness	Inverness "	"	114,500,000		114,500,000
1911.	Arichat	Richmond "	"	32,000,000		32,000,000
1911.	Antigonish	Antigonish "	"	55,000,000		55,000,000
1912.	Little Bras D'Or	Cape Breton "	"	40,600,000		40,600,000
1913.	*b* Long Beach Pond	Digby "	"	219		219
1874.	Restigouche	Restigouche, N.B.	Atlantic salmon	1,252,000	27,500	
	"	" "	Speckled trout	70,000		1,349,500
1874.	Miramichi	Northumber'd Co., N.B.	Atlantic salmon	2,150,000	46,000	
	"	" "	Speckled trout	65,000		2,261,000
1880.	Grand Falls	Victoria Co., N.B.	Atlantic salmon	2,235,600	68,000	2,303,600
1914.	St. John	St. John Co. "	" "	2,700,000	10,000	
	"	" " "	Speckled trout	150,000		2,860,000
1914.	*a* Nepisiguit	Gloucester Co. "	Atlantic salmon	390,000		390,000
1915.	*a* Tobique	Victoria " "	" "	994,300		994,300
1915.	*a* Sparkle	Carleton " "	" "	724,000		724,000
1912.	Shad, St. John R.	River Queens Co., N.B.	Shad	1,100,000		1,100,000
1903	Shemogue	Westmoreland " "	Lobster	61,000,000		61,000,000
1904.	Shippegan	Gloucester " "	"	47,050,000		47,050,000
1912.	Buctouche	Kent " "	"	47,000,000		47,000,000
1906.	Kelly's Pond	Queen's Co., P.E.I.	Atlantic salmon	870,000	24,909	
	" "	" " "	Speckled trout	201,000	20,383	1,116,292
1904.	Charlottetown	" " "	Lobster	169,000,000		169,000,000
1909.	Georgetown	King's " "	"	50,000,000		50,000,000
1875.	Tadoussac	Saguenay Que.	Atlantic salmon	1,540,000	10,000	
	"	" "	Speckled trout	86,000	2,000	1,638,000
1875.	Gaspe	Gaspe Co. "	Atlantic salmon	2,300,000	160,000	2,460,000
1881.	Magog	Stanstead Co., Que.	" "	87,000		
	"	" " "	Salmon trout	970,000		
	"	" " "	Speckled trout	181,000		
	"	" " "	Grey trout	15,500		1,253,500
1905.	Lac Tremblant	Terrebonne Co. "	Salmon trout	330,000	1,700	
	" "	" " "	Speckled trout	62,000	22,000	415,700
1904.	St. Alexis	Maskinonge "	" "	260,000	8,000	
	" "	" " "	Atlantic salmon	49,000		
	" "	" " "	Red trout	600		317,600
1904.	Lake Lester	Stanstead " "	Salmon trout		223,000	
	" "	" " "	Speckled trout	80,000	70,000	
	" "	" " "	Atlantic salmon		26,000	399,000
1906.	*a* Ste. Marguerite	Saguenay " "	" "	600,000		600,000
1909.	*a* Bergeronnes	" " "	" "	1,260,000		1,260,000
1915.	*a* Dartmouth River	Gaspe " "	" "	737,000		737,000
1910.	Port Daniel	Bonaventure " "	Lobster	14,000,000		14,000,000
1910.	House Harbour	Magdalen Islands, Que.	"	53,750,000		53,750,000
1876.	Sandwich	Essex Co., Ont.	Whitefish	65,000,000		65,000,000
1908.	Sarnia	Lambton " "	"	54,000,000		
	"	" " "	Pickerel	66,000,000		120,000,000
1912.	Collingwood	Simcoe " "	"	6,800,000		
	"	" " "	Whitefish	40,000,000		46,800,000
1908.	Wiarton	Bruce " "	Salmon trout	6,725,000	31,700	6,756,700
1912.	Port Arthur	Port Arthur City, Ont.	" "	4,350,000	132,700	
	" "	" " "	Whitefish	28,000,000		32,482,700

Distribution of Fry, 1915—*Concluded.*

Established.	Hatchery.	Location.	Species.	Quantity.		Total Distribution.
				Fry.	Fingerling.	
1912.	Southampton	Bruce Co., Ont	Salmon trout	2,372,000		2,372,000
1915.	Thurlow	Hastings " "	" "	1,500,000		
	"	" " "	Whitefish	45,000,000		46,500,000
1915.	Kenora	Rainy River Dist	"	49,620,000		
	"	" "	Pickerel	21,750,000		71,370,000
1894.	Selkirk	Selkirk, Man.	Whitefish	35,078,000		35,078,000
1912.	Gull Harbour	Big Island, Lake Winnipeg, Man.	"	10,000,000		
	" "	Big Island, Lake Winnipeg, Man.	Pickerel	24,000,000		64,000,000
1914.	Dauphin River	Dauphin River, Lake Winnipeg, Man.	Whitefish	75,500,000		75,500,000
1909.	Winnipegosis	Snake Island, Lake Winnipegosis, Man.	"	50,000,000		50,000,000
1915.	Fort Qu'Appelle	Sask.	"	10,950,000		10,950,000
1914.	Banff	Banff, Alta.	Salmon trout	480,000	88,600	
	"	"	Atlantic salmon		88,000	
	"	"	Cutthroat trout		114,000	770,600
1914.	*a* Pirmez Creek	Pirmez Creek	No distribution			
1902.	Granite Creek	Shuswap Lake, B.C.	Sockeye salmon	93,000		
	" "	" " "	Spring salmon	36,700		
	" "	" " "	Cohoe "	213,000		342,700
1905.	Harrison Lake	Harrison Lake "	" "	495,000		
	" "	" " "	Sockeye "	7,000,000		
	" "	" " "	Spring "	2,578,000		
	" "	" " "	Dog "	125,000		10,198,000
1906.	Pemberton	Birkenhead River "	Sockeye "	14,935,000		
	"	" " "	Cohoe "	788,000		15,723,000
1908.	Stuart Lake	Stuart Lake "	Sockeye "	5,283,000		5,283,000
1883.	Fraser River	Fraser River "	Cohoe "	700,000		
	"	" "	Atlantic "	20,000		
	"	" "	Cutthroat trout	4,000		
	"	" "	Speckled "	18,000		742,000
1903.	Skeena River	Lakelse Lake "	Sockeye salmon	4,200,990		
	"	" "	Humpback "	16,000		
	"	" "	Cutthroat trout	5,862		4,222,852
1908.	Babine Lake	Babine Lake "	Sockeye salmon	7,698,623		7,698,623
1906.	Rivers Inlet	Owekayno Lake "	" "	12,712,000		12,712,000
1910.	Anderson Lake	Anderson Lake, Vancouver Island, B.C.	" "	7,400,000		7,400,000
1910.	Kennedy Lake	Kennedy Lake, Vancouver Island, B.C.	" "	8,511,600		8,511,000
1910.	Cowichan Lake	Cowichan Lake, Vancouver Island, B.C.	Spring "	250,600		
	" "	" " "	Cohoe "	2,229,220		
	" "	" " "	Atlantic "	278,300		
	" "	" " "	Steelhead "	55,000		
	" "	" " "	Lake trout	13,600		
	" "	" " "	Speckled trout	123,000		2,949,720
1914.	Gerrard	Trout Lake, Kootenay District, B.C.	Kamloops trout	549,025		
	"	" " "	Kokanee "	5,500		
	"	" " "	Dolly Varden trout	500		555,025
	Nimpkish	Alert Bay, B.C.	Sockeye salmon	4,880,000		4,880,000
	c New Westminster	New Westminster, B.C.				
			Grand total			1,643,725,212

a Subsidiary or distributing hatcheries.
b Berried lobsters from twelve to sixteen-and-a-half inches long, not included in total distribution.
c Rearing ponds. Present season's distribution not commenced.

The total distribution of the various species in each province in 1915 was as follows, viz :—

Nova Scotia—		
Atlantic salmon	7,517,000	
Speckled trout	378,800	
Shad	250,000	
Lobster	462,800,000	
		470,945,800
New Brunswick—		
Atlantic salmon	10,626,900	
Speckled trout	285,000	
Shad	1,100,000	
Lobster	155,050,000	
		167,061,900
Prince Edward Island—		
Atlantic salmon	894,909	
Speckled trout	221,383	
Lobster	219,000,000	
		220,116,292
Quebec—		
Atlantic salmon	6,768,000	
Salmon trout	1,523,700	
Speckled trout	769,000	
Grey trout	15,500	
Red trout	600	
Lobster	67,750,000	
		76,826,800
Ontario—		
Whitefish	281,620,000	
Salmon trout	15,150,700	
Pickerel	94,550,000	
		391,320,700
Manitoba—		
Whitefish	200,578,000	
Pickerel	24,000,000	
		224,578,000
Saskatchewan—		
Whitefish		10,950,000
Alberta—		
Salmon trout	568,600	
Atlantic salmon	88,000	
Cutthroat trout	114,000	
		770,600
British Columbia—		
Pacific Salmon—		
Sockeye	72,713,613	
Spring	2,865,300	
Cohoe	4,425,220	
Humpback	16,000	
Dog	125,000	
Kennerly's, little redfish	5,500	
Steelhead	55,000	
		80,205,633
Atlantic Salmon		298,300
Trout—		
Kamloops trout	564,625	
Speckled trout	141,000	
Cutthroat trout	9,862	
Dolly Varden trout	500	
		715,987
Total distribution	1,643,765,212	81,219,920

NOVA SCOTIA.

Bedford Hatchery.

Waters.	County.	Atlantic Salmon.		Speckled Trout.	
		Fry.	Fingerling.	Fry.	Fingerling.
Big Salmon River	Halifax	60,000			
Little Salmon "	"	60,000			
Mushamush "	Lunenburg	50,000			
Martin "	"	50,000			
Indian "	Halifax	60,000			
Pennant "	"	60,000			
Gold "	Lunenburg	50,000			
Middle "	"	50,000			
St. Marys "	Guysborough	60,000			
Nine Mile "	Halifax	60,000			
Roseway "	Shelburne	60,000			
Shubenacadie "	Halifax	60,000			
Musquodobit "	"	60,000			
Sackville "	"	50,000	2,000		200
Mill Lake	"			14,000	
Spectacle Lake	Lunenburg			14,000	
Ponhook "	Hants			14,000	
Fiddle "	Halifax			15,000	
Frederick "	"			14,000	
Ragged "	"			14,000	
Hatchet "	"			14,000	
		790,000	2,000	99,000	200

Total distribution 891,200

Margaree Hatchery.

	Atlantic Salmon Fry.	Speckled Trout Fry.
Hatchery creek		92,000
Cranton bridge	140,000	
Etheridge crossing	200,000	
Joseph Ross crossing	150,000	
Harvard lake brook	100,000	
Whitley pool	140,000	
Black rock	140,000	
McDermid crossing	140,000	
Coady crossing	80,000	
Tingley crossing	140,000	
Margaree forks	120,000	
McLeod bridge	80,000	
Croudis bridge	120,000	
Baddeck river	80,000	
Cameron brook, South West	60,000	
Rock pool	100,000	
Phillip's crossing	100,000	
Little river, Cheticamp	75,000	
Greigg's crossing	120,000	
Middle river	80,000	
Plaster rock	80,000	
Gallant brook	80,000	
Iron Bridge, Big Intervale	233,000	
Island Pool	100,000	
	2,628,000	92,000

Total distribution 2,720,000

WINDSOR HATCHERY.

	Atlantic Salmon Fry.	Fingerling.
Avon river, Hants Co.	350,000	8,000
Meander river, Hants Co	260,000	
Kennetcook river, Hants Co.	50,000	
Herbert river, Hants Co.	100,000	
Panuke lake, Hants Co.	100,000	
Gaspereaux river, Kings Co.	335,000	
Cornwallis river, Kings Co.	110,000	
Great Village river, Colchester Co.	150,000	
Economy river, Colchester Co.	50,000	
Middle river, Pictou Co.	150,000	
	1,655,000	8,000
Total distribution	1,663,000	

MIDDLETON HATCHERY.

	Atlantic Salmon.		Speckled Trout.		
	Fry.	Fingerling.	Fry.	Fingerling.	Shad fry.
Annapolis river—					
Fales brook	60,000				
Crawford's brook		30,000		5,000	
Morton brook	80,000				
Walker brook	80,000				
Delancey's brook	40,000				
Parker brook	50,000	25,000		6,000	
Vroom's brook	50,000				
Fales brook	150,000				
Chipman brook	150,000				
Nictaux river	30,000				250,000
Critchell brook		30,000		6,000	
Pritcher brook, Nictaux river	80,000				
Cedar lake		10,000		6,000	
Hart's Intervale		25,000			
Shannon Nictaux river	75,000				
Pike brook				6,000	
Sloan's lake	30,000				
Barteaux Meadows		25,000			
Sandy bottom brook, Nictaux river				6,000	
Pearl lake	40,000				
Nictaux brook				6,000	
Hooper lake	30,000				
Mersey river	50,000				
Paradise river	55,000				
Tusket river	25,000		10,000		
Sissiboo river	25,000				
Gaspereau river	40,000				
Round Hill river	25,000				
Lequille river	25,000				
Quillan's lake	75,000				
Bear river	30,000				
Lake Hill waters			10,000		
Annis lake			10,000		
Skinner lake			10,000		
George lake			10,000	3,000	
Checoggin lake			10,000		
Gaspereaux lake			10,000		
Trout lake				6,000	
Meadow brook				6,000	
Kedgemakooge lake			10,000		
Winthrop lake			10,000		
Silver river			10,000		
Morse brook, Paradise river			100		
Hatchery brook				5,000	
George lake				3,000	
Whistler lake		40,000			
Rogers Mills				3,000	
	1,295,000	185,000	100,100	64,000	250,000
Total distribution					1,894,100

LINDLOFF HATCHERY.

Subsidiary to Margaree Hatchery.

	Atlantic Salmon Fry.	Speckled Trout Fry.
Pattles lake		15,000
McIntyres lake		9,500
Lillard river	100,000	
Lillard river, west branch	145,000	
Black river	100,000	
Scott's river	100,000	
Salmon river	60,000	
Grand river	120,000	
Dennys river	75,000	
Washabuck river	75,000	
Inhabitants river	80,000	
Maddans river	60,000	
Hatchery lake and creek	40,000	
	955,000	24,500
Total distribution		979,500

BAY VIEW HATCHERY.

	Lobster.
Cariboo harbour	18,000,000
Cariboo island	10,000,000
Pictou island	20,000,000
Pictou harbour	16,000,000
Little Cariboo island	5,000,000
Gull rock	5,000,000
Bay View	18,000,000
Total distribution	92,000,000

CANSO HATCHERY.

	Lobster.
Bedford basin	8,000,000
Little island	9,700,000
Cranberry island	12,755,000
Cape island	9,110,000
Black rock	1,820,000
Glasgow harbour	3,035,000
St. Andrew's channel	3,035,000
St. Georges island	9,715,000
Canso harbour	1,820,000
Fox island	7,895,00
Little dover	3,035,000
Ball rock	3,645,000
White head	4,860,000
Queensport	4,555,000
Man of War rock	5,465,000
Dover bay	4,860,000
Big Dover	3,645,000
Net Ledge	2,125,000
Grassie island	915,000
Total distribution	100,000,000

ISAAC'S HARBOUR HATCHERY.

	Lobster.
Bear Trap head	500,000
Country harbour	1,200,000
Salodan point	500,000
Black ledge	1,500,000
Fesunman Harbour bay	2,000,000
Betty Cove point	1,000,000
Western Strove Country harbour	1,000,00
Ram Head island	1,000,000
Island harbour	5,000,000
West Side Tor bay	3,000,000
New harbour	3,000,000
Coddles harbour	2,000,000
Lucas beam	1,000,000
Big island	2,000,000
Goose island	1,000,000
Graham shoal	1,000,000
Buckerton island	2,000,000
Total distribution	28,700,000

INVERNESS HATCHERY.

	Lobsters.
Chimney corner	12,000,000
Margaree harbour	11,000,000
Grand Etang	11,500,000
Cheticamp	13,000,000
Inverness	6,000,000
Pleasant bay	6,000,000
Friar's head	5,000,000
Broad Cove marsh	14,000,000
Belle Cote	4,000,000
Point Cross	9,000,000
Eastern harbour	7,000,000
Little river	7,000,000
Cap Rouge	9,000,000
Total distribution	114,500,000

ARICHAT HATCHERY.

	Lobster.
Madame island	2,700,000
Bourgeois river	200,000
Rockdale	5,500,000
Lennor passage	2,000,000
Little Anse	2,000,000
Jersey island	4,000,000
West Arichat	4,300,000
Cape Auguet	3,800,000
Rocky bay	2,000,000
Green island	3,500,000
Petit de Grat	2,000,000
Total distribution	32,000,000

ANTIGONISH HATCHERY.

	Lobster.
Tracadie head	7,000,000
Little Tracadie head	6,000,000
Boman head	4,000,000
Cape Jock	7,000,000
Monk head	6,000,000
Mayett beach	8,000,000
Harbour au Bouchie	6,000,000
Bayfield	4,000,000
Breen beach	5,000,000
Pourquet island	2,000,000
Total distribution	55,000,000

LITTLE BRAS D'OR HATCHERY.

	Lobster.
Little Bras d'Or	15,600,000
Low point	9,000,000
South bay	10,000,000
Bird island	5,000,000
Dolphor cape	1,000,000
Total distribution	40,600,000

LONG BEACH POND.

Central Grove, St. Mary's Bay	15,000,000
Petite Passage, to serve Tivinton and East Ferry	10,000,000
Tommy's Beach, to serve area between Whale Cove and Mink Cove	22,000,000
Centreville	4,000,000
Westport	70,000,000
St. Mary's Bay	73,000,000
Parker's Cove	4,000,000
Hampton	21,000,000
*Total	219,000,000

*Not included in the distribution figures.

NEW BRUNSWICK.

RESTIGOUCHE HATCHERY.

	Atlantic Fry.	Salmon. Fingerling.	Speckled Trout fry.
Restigouche river—			
Christopher Brook		10,000	
Tracy brook	325,000		
Copeland's Brook		4,000	
Down's gulch	320,000		
Hatchery brook	2,000	5,000	
Matapedia river—			
Salmon lake	40,000	8,500	
Lapells siding	40,000		
St. Florence	35,000		
Routherville	35,000		
Glenn Emma	40,000		
Mill stream	25,000		
Upsalquitch river, near falls	320,000		
Carr lake	30,000		
Causapscal river	40,000		
Montagne lake			10,000
Minguy lake			10,000
Boulay lake			10,000
Causapscal lake			40,000
	1,252,000	27,500	70,000
Total distribution			1,349,500

MIRAMICHI HATCHERY.

	Atlantic Fry.	Salmon. Fingerling.	Speckled Trout fry.
Main North West Miramichi	800,000	46,000	
Little South West Miramichi	700,000		
Buctouche river	75,000		
Black river	100,000		
Petitcodiac river	75,000		
Nashuaak river	75,000		
Sevogle and Millstream, (tributaries of Miramichi)	200,000		
Richibucto river	125,000		
Little Buclouche river			30,000
Bartibog river			35,000
	2,150,000	46,000	65,000
Total distribution			2,261,000

SPARKLE HATCHERY.

Subsidiary to Miramichi Hatchery.

	Atlantic Salmon Fry.
South West Miramichi river—	
Main river—	
Five Mile brook	60,000
Gold brook	40,000
Bigger brook	60,000
Below hatchery	60,000
South branch—	
Elliott brook	50,000
Teague brook	30,000
Clearwater brook	80,000
Bogan brook	30,000
Falls brook	30,000
Lake brook	10,000
South branch	54,000
North branch—	
McKenzie brook	40,000
West brook	50,000
Bedall brook	50,000
North branch	40,000
Nashwaak river—	
Hallett brook	40,000
Total distribution	724,000

GRAND FALLS HATCHERY.

	Atlantic Fry.	Salmon Fingerling
St. John river	1,150,600	68,000
Salmon river	985,000	
Becaguimac river	100,000	
Total	2,235,600	68,000
Total distribution	2,303,600.	

In addition to the above distribution, Atlantic Salmon eyed eggs were also shipped to the following hatcheries :—

Banff hatchery	100,000
Magog hatchery	90,000
St. Alexis hatchery	65,000
Cowichan Lake hatchery	290,000
New Westminster hatchery	10,000
	455,000

TOBIQUE HATCHERY.

Subsidiary to Grand Falls Hatchery.

	Atlantic Salmon Fry.
Burnt Land brook	65,000
Two brooks	225,000
Tobique forks	260,000
Haley brook	260,000
Riley brook	50,000
Tobique river, near hatchery	134,300
Total distribution	994,300

ST. JOHN HATCHERY.

	Atlantic Salmon Fry.	Fingerling.	Speckled Trout Fry.
Kennebecasis river—			
Smith river	100,000		
Studholm brook	50,000		
Trout creek	100,000		
McLeod brook	100,000		
South branch	100,000		
Hammond river	100,000		
Washademoak river—			
North forks	100,000		
Jamseg river	200,000		
Washademoak lake	100,000		
Caanan river	200,000		
Salmon river, Queens Co.	100,000		
Musquash river—			
Wetmore brook	150,000		
Hanson brook	150,000		
Belle Isle river	150,000		
St. Croix river	200,000		
Pocologan river	150,000		
Cramberry lake	40,000		
Little Salmon river	100,000		
Salmon river, St. John Co.	100,000		
Black river	100,000		
Nerepis lake	50,000		
Skiff lake	75,000		20,000
Shogomoc lake	75,000		20,000
Tynemouth creek	100,000		
Weldon creek	10,000		10,000
Bolton lake			10,000
Mackins lake			10,000
Roulsons lake			10 000
Minote and Casey lakes			20,000
Disappointment lake			10,000
McCormick lake			10,000
Puddington lake			20,000
Glen Severn lake			10,000
Loch Lomond lake		10,000	
	2,700,000	10,000	150,000
Total distribution		2,860,000.	

NEPISIGUIT HATCHERY.

Subsidiary to Restigouche Hatchery.

	Atlantic Salmon Fry.
Nepisiguit river—	
Camp pool	50,000
Papineau river	40,000
Knights brook	10,000
Chain pool	30,000
Bear Island pool	60,000
Club H. pool	20,000
Marcell Boudreau's pool	40,000
Grilse pool	50,000
Church point	45,000
Gilmores brook	6,000
Basin beech, south shore opposite hatchery	35,000
Hatchery creek	4,000
Total distribution	390,000

SHAD HATCHERY.

	Shad.
Kennebecasis river—	
Darling's Lake spawning grounds	1,100,000

SHEMOGUE HATCHERY.

	Lobster.
Cadman point	2,000,000
Little cape	11,500,000
Cape Bald	6,500,000
Cape Tourmentine	6,000,000
Dupuis corner	4,500,000
Grants corner	3,000,000
Off hatchery	2,000,000
Leger's brook	10,500,000
Jourimain factory	2,000,000
Botsford	9,000,000
Murray corner	3,000,000
Total distribution	61,000,000

SHIPPEGAN HATCHERY.

	Lobster.
Pointe Brule	12,500,000
Pointe à Peinture	12,500,000
Alexander's point	6,000,000
Caribou creek	6,000,000
Shippegan gully	10,050,000
Total distribution	47,050,000

BUCTOUCHE HATCHERY.

	Lobster.
St. Edwards	6,000,000
Cornierville	3,000,000
St. Anne's	9,000,000
Cocagne head	5,000,000
Cocagne island	4,000,000
Buctouche harbour	17,000,000
Between St. Anne's and St. Edwards	3,000,000
Total distribution	47,000,000

PRINCE EDWARD ISLAND.

KELLY'S POND HATCHERY.

	Salmon Fry.	Fingerling.	Speckled Trout Fry.	Fingerling.
North river	60,000		10,000	
East river	60,000		10,000	
" McQuirk's brook			10,000	
Winter river	100,000	24,909	12,000	
Indian river	60,000		15,000	
Dunk river	160,000		15,000	
Acorns brook			5,000	
West river	70,000		15,000	
Whealty river	70,000		15,000	
Morell river	230,000		15,000	
Belle river	60,000		15,000	
Hardys brook			35,000	
Sherrys brook			5,000	
Black river			24,000	
Hatchery pond				20,383
	870,000	24,909	201,000	20,383
Total distribution			1,116,292	

CHARLOTTETOWN HATCHERY.

	Lobster.
St. Peters island	21,000,000
Point Prim reef	27,000,000
Crown point	12,000,000
Governor's island	33,000,000
Rice point	12,000,000
Seal rock	12,000,000
Keppock reef	12,000,000
†Charlottetown harbour	40,000,000
Total distribution	169,000,000

GEORGETOWN HATCHERY.

	Lobster.
St. Mary's and Cardigan bays	10,000,000
Brudenel river	9,000,000
Annandale bay	11,000,000
Rollo bay	6,000,000
Murray harbour	5,000,000
Launching bay	5,000,000
Fortune bay	4,000,000
Total distribution	50,000,000

QUEBEC.

TADOUSAC HATCHERY.

	Atlantic Fry	Salmon Fingerling.	Speckled Fry.	Trout Fingerling.
Mars river	300,000			
Anse St. Jean river	300,000			
Lac du Juge	50,000			
Malbaie river	300,000			
Little Saguenay river	300,000			
Baude river	200,000			
Hatchery lake	90,000			
Boulanger lake			10,000	
Sapin lake			10,000	
Chisholm lake		2,000	8,000	2,000
Des Equerres lake			6,000	
Rond lake			6,000	
Emmuraille lake			6,000	
Bergeronnes river			23,000	
Long lake			7,000	
Chicoutimi lakes			10,000	
Hatchery pond		2,000		
Ruisseau de la Chute		6,000		
	1,540,000	10,000	86,000	2,000
Total distribution				1,638,000

† The quantity, 40,000,000, distributed in Charlottetown Harbour, was eggs on the point of hatching.

STE. MARGUERITE HATCHERY.

Subsidiary to Tadousac Hatchery.

	Atlantic Salmon fry.
Portage river	600,000
Total distribution	600,000

BERGERONNES HATCHERY.

Subsidiary to Tadousac Hatchery.

	Atlantic Salmon Fry.
Long lake	300,000
Gobeil lake	300,000
Caribou lake	300,000
Boulanger lake	300,000
A la Truite lake	60,000
Total distribution	1,260,000

GASPE HATCHERY.

	Atlantic Fry.	Salmon Fingerling.
St. John river	950,000	60,000
York river	990,000	100,000
Malbaie river	30,000	
Grand Pabos river	80,000	
Grand river	80,000	
Bonaventure river	70,000	
Port Daniel river	35,000	
Cape Chat river	65,000	
	2,300,000	160,000
Total distribution		2,460,000

DARTMOUTH RIVER HATCHERY.

Subsidiary to Gaspe Hatchery.

	Atlantic Salmon Fry.
Dartmouth river, about 4 miles from hatchery	737,000

LAC TREMBLANT HATCHERY.

	Speckled Fry.	Trout Fingerling.	Salmon Fry.	Trout Fingerling.
Chapleau lake	8,000			
Bleu lake	8,000			
Ouareau lake	8,000			
Artificial lake, St. Faustin	4,000			
Nantel lake	8,000			
Long lake	8,000			
Des Laurentides lake	8,000			
Vert lake		10,000		
Cache lake	10,000	12,000		
Lac Tremblant				1,700
La Truite lake			35,000	
Grosse lake			10,000	
Long lake			25,000	
Des Sables lake			20,000	
Superieur lake			20,000	
Deroche lake			20,000	
Mercier lake			20,000	

LAC TRAMBLANT HATCHERY—*Con.*

	Speckled Fry.	Trout Fingerling.	Salmon Fry.	Trout Fingerling.
Gelinas lake			10,000	
Duhamel lake			15,000	
Clair lake			15,000	
Bark lake			20,000	
St. Esprit lake			10,000	
Loon lake			10,000	
Pilon lake			10,000	
Petit Nomininge lake			5,000	
Grand Nomininge lake			10,000	
St. Germain lake			10,000	
Brunet lake			10,000	
A la Francaise lake			10,000	
Eau Claire lake			25,000	
Lajeunesse lake			10,000	
Bisson lake			5,000	
Babite lake			5,000	
	62,000	22,000	330,000	1,700
Total distribution			415,700	

ST. ALEXIS HATCHERY.

	Speckled Fry.	Trout Fingerlings.	Salmon Fry.	Red Trout Fry.
Marigot brook	10,000			
Paquin lake (Val Morin)	15,000			
Mandeville lake	10,000			
Durocher lake	15,000			
Paquin lake (Ste. Agathe)	15,000			
Lac des Français	20,000			
Rouge lake	20,000			
Castor lake (application of N. Juneau)	5,000			
Mirror lake	15,000			
Castor lake (application of E. Morin & A. Dho.)	10,000			
A la Loutre lake	10,000			
Caribou lake	10,000			
McCrea lake	10,000			
Sixteen island lake	10,000			
Seigniory of Perthuis lakes	15,000		10,000	
Brodeur lake	10,000			
St. Bernard club waters	40,000		20,000	
Macks lake	10,000			
Carufel lake	5,000			
Dickarmen brook	5,000			
Chain of 3 lakes (5 miles from hatchery)			5,000	600
Chain of 3 lakes (15 miles from hatchery)			5,000	
Joe Bob lake			5,000	
Lambert lake			4,000	
A la Truite lake		5,000		
Des Iles lake		1,500		
Yamachiche river and Lavergne creek		1,500		
	260,000	8,000	49,000	600

Total distribution, 317,600.
100,000 Eyed Speckled Trout eggs shipped to Bedford hatchery.
3,000 Eyed Red Trout eggs shipped to Banff hatchery.

MAGOG HATCHERY.

	Speckled Trout.	Salmon Trout.	Grey Trout.	Atlantic Salmon.
Lake Libby	20,000			
Pond brook	15,000			
St. George lake	15,000			
Wattopekak river	15,000			
Hamilton Meadow brook	15,000			
Howard Private pond	5,000			

MAGOG HATCHERY—*Con.*

	Speckled Trout.	Salmon Trout.	Grey Trout.	Atlantic Salmon.
Lac Tortue	20,000			
Castle brook	16,000			
Castle brook, North Branch	15,000			
North Opening brook	15,000			
Cherry river, Upper Source	15,000			
Cherry river, East Branch	15,000			
Lake Memphremagog		245,000	15,500	87,000
Brome lake		75,000		
Lake Massawippi		175,000		
Smooth pond		50,000		
Orford lake		75,000		
Little Magog lake		50,000		
Brompton lake		75,000		
Lac Trois Saumons		50,000		
Lake Seaswaninipus		75,000		
Lake Megantic		100,000		
	181,000	970,000	15,500	87,000

Total distribution, 1,253,500.

LAKE LESTER HATCHERY.

	Speckled Trout fry.	Speckled Trout fingerling.	Salmon Trout fingerling.	Atlantic Salmon fingerling.
Breeches lake	50,000		25,000	
Coaticook river	20,000			
Baldwin's brook	10,000			
Mullen's lake		10,000		5,000
Magog Lake			45,000	21,000
Gravel Pond		10,000		
Blue sea lake		5,000		
Tomfobia river		16,000		
Nizger river		16,000		
Campeau Fish and Game club lakes		1,000		
Orford lake			40,000	
Massawippi lake			78,000	
White River, Acton Vale		9,500		
Megantic lake			35,000	
Lake Orrich		2,000		
Curley's Pond, (Sutton)		500		
	80,000	70,000	223,000	26,000
Total distribution				399,000

PORT DANIEL HATCHERY.

	Lobster.
Between hatchery and St. Godfroi	9,000,000
Between Port Daniel Wharf to McInnis Cove	* 5,000,000
Total distribution	14,000,000

*Fry and semi-hatched eggs.

HOUSE HARBOUR HATCHERY.

*Cape Vere	10,000,000
*Red cape	15,000,000
*Little harbour	16,000,000
*Broad Cove	5,000,000
*Hospital cape	4,000,000
*Green point	2,000,000
*Seal cove	1,000,000
*Fletcher's cove	750,000
Total distribution	53,750,000

*The distribution was made in the lagoons at these places.

ONTARIO.

SANDWICH HATCHERY.

	Whitefish.
Lake St. Clair—	
Mitchell's bay	3,000,000
Peach island	3,000,000
Turkey island	4,000,000
Detroit River—	
Bay Below Fighting island	5,000,000
Bois blanc	10,000,000
At hatchery	25,000,000
Lake Erie—	
Port Stanley	2,000,000
Donneville	2,000,000
Kingsville	2,000,000
Port Dover	2,000,000
Bar Point	3,000,000
Leamington	1,000,000
Pidgeon Bay	3,000,000
Total	65,000,000

SARNIA HATCHERY.

	Whitefish.	Pickerel.
Lake Huron—		
Along lake shore from 15 to 30 miles from mouth of St. Clair river	54,000,000	
Point Edward and Sarnia spawning grounds, from 8 to 15 miles from hatchery		56,000,000
Port Frank		5,000,000
Bayfield		5,000,000
	54,000,000	66,000,000
Total distribution		120,000,000.

COLLINGWOOD HATCHERY.

	Whitefish.	Pickerel.
Georgian Bay—		
Three Mile point	10,000,000	
Six Mile point	10,000,000	
Dows bay	10,000,000	
Finy island	10,000,000	
Nottawasaga river		6,800,000
	40,000,000	6,800,000
Total distribution		46,800,000

THURLOW HATCHERY.

	Whitefish.	Salmon Trout.
Lake Ontario—		
Bay of Quinte	45,000,000	
Newcastle		100,000
Cobourg		200,000
Toronto		200,000
Brighton		550,000
Kingston		200,000
Lower Gap		200,000
Rideau lakes		50,000
	45,000,000	1,500,000
Total		46,500,000.

WIARTON HATCHERY.

	Salmon Trout Fry.	Fingerling.
Lake Huron—		
Providence bay	350,000	
South bay	400,000	
Tobermory	393,700	
Georgian Bay—		
White Cloud island	532,000	
Hay island	500,000	
Griffiths island	350,000	
Cape Croker	400,000	
Cape Rich and Meaford	500,000	
Presqu' Ile	400,000	
Cameron's point	400,000	
Gravelly point	400,000	
Pruder's landing	350,000	
Jackson shoal	400,000	
Four Mile point	350,000	
Barrier island	700,000	
‡Lake of bays	100,000	
‡Temiskaming lake	100,000	
‡Temagami lake	100,000	
Colpoy's bay		317,00
	6,725,000	31,700
Total distribution		6,796,000

‡ Distributed by the Ontario Provincial Government.

PORT ARTHUR HATCHERY.

	Whitefish.	Salmon Fry.	Trout Fingerling.
Blind river	4,000,000		
Caribou island	2,000,000		
Sawyer bay	2,000,000		
Wild Goose point	4,000,000		
Mary's island	4,000,000	400,000	
Papoose island	6,000,000		
Bare point	1,500,000	200,000	60,000
Black bay	2,000,000		
Nepigon bay	2,000,000		
Whitefish lake	500,000		
Point Magnet		400,000	
Pie island		400,000	
Thunder cape		400,000	40,000
Thunder bay		400,000	
Tee harbour		400,000	
Carp river		400,000	
Mink island		400,000	
Silver island		400,000	
Rossport		400,000	
Welcome Island shoal		400,000	32,700
Jackfish bay		50,000	
‡Minaki lake		100,000	
	28,000,000	4,350,000	132,700
Total distribution			32,482,700

In addition to above salmon trout eyed eggs were shipped as follows:—

Banff hatchery	560,000
Lake Lester hatchery	370,000
Mont Tremblant hatchery	630,000
Magog hatchery	1,000,000
Total	2,560,000

‡ Distributed by the Provincial Government.

SOUTHAMPTON HATCHERY.

	Salmon Trout.
Lake Huron—	
Chief's point	989,000
Nine Mile point	406,000
Main station	733,000
Black point	250,000
Total distribution	2,372,000

KENORA HATCHERY.

	Whitefish.	Pickerel.
Shoal lake	10,000,000	
Big Stone bay	10,000,000	
Clear Water bay	10,000,000	
Whitefish bay	10,000,000	
Henies point	7,000,000	
Bay at hatchery	2,620,000	750,000
Hay island		4,000,000
Kenora Cask island		5,000,000
Coplar bay		7,000,000
Welcome channel		3,000,000
Channel island		2,000,000
	49,620,000	21,750,000
Total distribution	71,370,000	

MANITOBA.

SELKIRK HATCHERY.

Waters.	Whitefish.
Lake Winnipeg, at Gimli	848,000
" " Icelandic river	458,000
" " at Winnipeg beach	458,000
" " Mouth of Red river	916,000
" " at Hnausa	458,000
" " near Big island	458,000
Red river, at Selkirk	31,482,000
Total	35,078,000

GULL HARBOUR HATCHERY.

Waters.	Whitefish.	Pickerel.
Lake Winnipeg	40,000,000	23,840,000
Pelican lake		60,000,000
Max lake		50,000
Killarney lake		50,000
Total	40,000,000	24,000,000
Total distribution	64,000,000	

DAUPHIN RIVER HATCHERY.

Waters.	Whitefish.
Dauphin river	75,500,000

WINNIPEGOSIS HATCHERY.

	Whitefish.
Lake Winnipegosis, in neighbourhood of Snake island	50,000,000
Total	50,000,000

SASKATCHEWAN.

FORT QU'APPELLE HATCHERY.

	Whitefish.
Long lake	2,000,000
Lebret lake	3,000,000
Ketepwa lake	1,000,000
Sioux lake	500,000
Upper Fishing lake	4,450,000
Total distribution	10,950,000

ALBERTA.

BANFF HATCHERY.

	Salmon Trout.		Atlantic Salmon.	Cut-Throat Trout.
	Fry.	Fingerling.	Fingerling.	Fingerling.
Minnewanka lake	480,000	88,600	88,000	
Healy Creek				15,000
Boom lake				25,000
Whiskey Creek Tributaries				12,000
Canmore Creek				15,000
Forty Mile Creek				12,000
Moraine lake				10,000
Massive creek				15,000
Lake Louise				10,000
	480,000	88,600	88,000	114,000
Total distribution				770,600

BRITISH COLUMBIA.

Fraser River Watershed.

GRANITE CREEK HATCHERY.

	Sockeye.	Spring.	Cohoe.
Shuswap lake	93,000	36,700	213,000
Total distribution		342,700	

NOTE.—In addition to the quantities given in the last report, 1913-14, the following distribution was made from the Granite Creek hatchery in 1914: Harpeis lake, 14,000 Kamloops trout; Confluence of Chase and Charcoal creeks, 600 speckled trout.

PEMBERTON HATCHERY.

	Sockeye.	Cohoe.
Birkenhead River	14,935,000	788,000
Total distribution	15,723,000	

HARRISON LAKE HATCHERY.

Sockeye.	Spring.	Cohoe.	Dog.
7,000,000	2,578,000	495,000	125,000
Total distribution			10,198,000

All the fry were liberated on the spawning grounds in Harrison lake on a distance of about 70 miles.

NOTE.—In addition to the distribution given in the last report 260,000 Cohoe fingerlings were distributed from Harrison Lake hatchery in 1914.

STUART LAKE HATCHERY.

	Sockeye.
Stuart lake, Cunningham creek	3,360,000
Babine lake	1,923,000
Total distribution	5,283,000

SKEENA RIVER WATERSHED.

SKEENA RIVER HATCHERY.

	Sockeye.	Humpback.	Cut-throat trout fry.
Lakelse lake	4,200,990	16,000	
Lakelse river			5,862
Total distribution			4,222,852

BABINE LAKE HATCHERY.

	Sockeye.
Salmon river	7,698,623

RIVERS INLET HATCHERY.

	Sockeye.
Oweekayno lake, hatchery ponds	8,350,000
Quarp creek	1,812,000
Jennissi creek	1,350,000
Deer creek	1,200,000
Total distribution	12,712,000

FRASER RIVER HATCHERY.

	Cohoe Salmon.	Atlantic Salmon.	Cut-throat Trout.	Speckled Trout.
Creeks emptying into Fraser river, near hatchery	700,000			
Prospect lake, Victoria		5,000		
Trout lake, Kamloops		3,000	3,000	
Hatchery ponds		12,000	1,000	
Small lake on Bowen island				5,000
Small lake on Lasqueta island				7,000
Small lake near Pitt lake				3,000
Reservoir Victoria				3,000
	700,000	20,000	4,000	18,000
Total distribution				742,000

60,000 cut-throat eggs were sent to Banff hatchery.

VANCOUVER ISLAND.

ANDERSON LAKE HATCHERY.

	Sockeye.
Anderson lake—	
Clements creek and different sand bars around head of lake	7,400,000

KENNEDY LAKE HATCHERY.

	Sockeye.
Kennedy lake	8,511,000

GERRARD HATCHERY.

	Kamloops Trout	Kokanee Trout.	Dolly Varden Trout.
Arrow lakes	10,000		
Lardo river	365,000	5,000	
Kootenay lake	36,000		
Slocan lake	12,000		
Violin lake	12,000		
Meadows and Kokanee lakes on Kaslo creek	12,000		
Christina lake	30,000		
Premier lake	10,000		
Swansea lake (Munro lake)	5,000		
North Fork Kettle river	6,000		
Loon lake	10,000		
South Fork Kettle river	12,000		
Similkameen river and Otter creek	12,000		
Columbia and Champion lakes	10,000		
Trout lake	10,000		
Canyon creek	9,025	500	500
	549,025	5,500	500
Total distribution			555,025

COWICHAN LAKE HATCHERY.

Waters.	Spring Salmon.	Cohoe Salmon.	Atlantic Salmon.	Steelhead.	Lake Trout.	Speckled Trout.
Sutton creek	116,600	277,000	109,800	10,000	10,200	25,000
Oliver's creek	59,000	170,000	18,000	9,000	3,400	15,500
Green's creek	25,000	170,000		9,000		11,000
Beadnall's creek	22,000					13,500
Beaver creek	13,000	120,000	76,500			21,500
Robinson river		560,000	21,000	12,000		10,500
Cowichan lake		752,220				
Cameron lake			3,000			
Bear Lake creek		180,000				
Hatchery creek						25,000
Hatchery ponds	15,000		50,000	15,000		
Total	250,600	2,229,220	278,300	55,000	13,600	123,000
Total distribution						2,949,720

NIMPKISH HATCHERY.

(Operated by British Columbia Packers' Association.)

	Sockeye.
Nimpkish lake	4,880,000

APPENDIX No. 12.

FISHING BOUNTIES.

The payments made for this service are under the authority of the Revised Statutes, 1906, chap. 46, intituled: "An Act to encourage the development of the Sea Fisheries, and the building of fishing vessels," which provides for the payment of the sum of $160,000 annually, under regulations to be made from time to time by the Governor General in Council.

REGULATIONS.

The regulations governing the payment of fishing bounties were established by the following Orders in Council:—

AT THE GOVERNMENT HOUSE AT OTTAWA.
TUESDAY, the 30th day of June, 1908.

PRESENT:

HIS EXCELLENCY THE GOVERNOR GENERAL IN COUNCIL.

Whereas in view of the revision of the Statutes of Canada in 1906, it is necessary that the regulations governing the payment of fishing bounties which were adopted by order in council on the 10th December, 1887, be readopted under chapter 46 of the Revised Statutes of Canada, 1906, "The Deep Sea Fisheries Act":

And whereas new conditions require certain changes in the existing regulations in order to establish a better interpretation of the bounty system.

Therefore, His Excellency the Governor General in Council is pleased to order that the regulations established by the order in council of the 10th December, 1897, under the provisions of the Bounty Act, 1891, 54-55 Victoria, chapter 42, shall be and the same are hereby rescinded and the following substituted therefor:—

1. Resident Canadian fishermen who have been engaged in deep-sea fishing in Canadian vessels or boats for fish other than shell-fish, salmon and shad, or fish taken in rivers or mouths of rivers, for at least three months, and have caught not less than 2,500 pounds of sea fish, shall be entitled to a bounty; provided always that no bounty shall be paid to men fishing in boats measuring less than 13 feet keel, and not more than 3 men (the owner included) will be allowed as claimants in boats under 20 feet.

2. No bounty shall be paid upon fish caught in trap-nets, pound-nets and weirs, nor upon the fish caught in gill-nets fished by persons who are pursuing other occu-

pations than fishing, and who devote merely an hour or two daily to fishing these nets but are not, as fishermen, steadily engaged in fishing.

3. Only one claim will be allowed in each season, even though the claimant may have fished in two vessels, or in a vessel and a boat or in two boats.

4. The owners of boats measuring not less than 13 feet keel, whether propelled by oars, sails or other motive power, which have been engaged during a period of not less than three months in deep-sea fishing for fish other than shell-fish, salmon or shad, or fish taken in rivers, or mouths of rivers, shall be entitled to a bounty on each such boat.

5. Canadian registered vessels owned and fitted out in Canada, of 10 tons and upwards (up to 80 tons), by whatever means propelled, contained within themselves, which have been exclusively engaged during a period of not less than three months in the catch of sea-fish other than shell-fish, salmon or shad, or fish taken in rivers, or mouths of rivers, shall be entitled to a bounty to be calculated on the registered tonnage which shall be paid to the owner or owners.

6. Owners or masters of vessels intending to fish and claim bounty on their vessels, must, before proceeding on a fishing voyage, procure a license from the nearest collector of customs or fishery overseer, said license to be attached to the claim when sent in for payment.

7. The date when a vessel's fishing operations shall be considered as having begun shall be the day upon which she sails from port on her fishing voyage, after the license has been procured, and the date upon which her fishing season shall end shall be the day upon which she arrives in port from her last fishing voyage prior to the 1st December. The three months during which a vessel must have been engaged in fishing to be entitled to the bounty, shall not include such periods as she may have been lying in port, provided that not more than three days may be permitted for the sale, transfer or discharge of her cargo of fish and refitting.

8. Dates and localities of fishing must be stated in the claim, as well as the quantity and kinds of sea-fish caught.

9. Ages of men must be given. Boys under 14 years of age are not eligible as claimants.

10. Claims must be sworn to as true and correct in all their particulars.

11. Claims must be filed on or before the 30th November in each year.

12. Officers authorized to receive claims will supply the requisite blanks free of charge, and after certifying the same will transmit them to the Department of Marine and Fisheries.

13. No claim in which an error has been made by the claimant or claimants shall be amended after it has been signed and sworn to as correct.

14. Any person or persons detected making returns that are false or fraudulent in any particular may be debarred from any further participation in the bounty, and be liable to be prosecuted according to the utmost rigour of the law.

15. The amount of the bounty to be paid to fishermen and owners of boats and vessels will be fixed from time to time by the Governor in Council.

16. All vessels fishing under bounty license, are required to carry a distinguishing flag, which must be shown at all times during the fishing voyage at the main topmast head. The flag must be four feet square in equal parts of red and white, joined diagonally from corner to corner. Any case of neglect to carry out this regulation reported to the Department of Marine and Fisheries will entail the loss of the bounty, unless satisfactory reasons are given for its non-compliance.

RODOLPHE BOUDREAU,
Clerk of the Privy Council.

AT THE GOVERNMENT HOUSE AT OTTAWA,
WEDNESDAY, the 22nd day of February, 1911.

PRESENT:

HIS EXCELLENCY THE GOVERNOR GENERAL IN COUNCIL.

His Excellency in Council, in virtue of the provisions of section 7 of chapter 46 of the Revised Statutes of Canada,—An Act to encourage the development of the Sea Fisheries and the building of Fishing Vessels,—is pleased to order and it is hereby ordered that section 5 of the regulations governing the payment of claims for Fishing Bounty be rescinded and the following substituted in lieu thereof:—

5. Canadian registered vessels, owned and fitted out in Canada, of ten tons and upwards (up to eighty tons), by whatever means propelled, contained within themselves, which have been exclusively engaged during a period of not less than three months in the catching of sea-fish, other than shell-fish, salmon or shad, or fish taken in rivers, or mouths of rivers, shall be entitled to a bounty to be calculated on the registered tonnage, which shall be paid to the owner or owners: Provided that vessels known as 'Steam Trawlers,' operating 'Beam,' 'Otter,' or other such trawls, shall not be eligible for any such bounty.

RODOLPHE BOUDREAU,
Clerk of the Privy Council.

The bounty for the year 1914 was distributed on the basis authorized by the following order in council, approved by his Royal Highness the Governor General on the 26th January, 1915.

His Royal Highness the Governor General in Council is pleased to order, and it is hereby ordered that the sum of one hundred and sixty thousand dollars, payable under the provisions of chapter 46 of the Revised Statutes of Canada, 1906, intituled: "An Act to encourage the development of the Sea Fisheries and the building of fishing vessels," be distributed for the year 1914-1915, upon the following basis:—

Vessels: The owners of the vessels entitled to receive bounty, shall be paid one dollar ($1) per registered ton, provided, however, that the payment to the owner of any one vessel shall not exceed the sum of eighty dollars ($80), and all vessel fishermen entitled to receive bounty, shall be paid the sum of six dollars and forty cents ($6.40) each.

Boats: Fishermen engaged in fishing in boats who shall also have complied with the regulations entitling them to receive bounty, shall be paid the sum of three dollars and sixty-five cents ($3.65) each, and the owners of fishing boats shall be paid one dollar ($1) per boat.

RODOLPHE BOUDREAU,
Clerk of the Privy Council.

During the year 1914, 14,281 claims were received, being an increase of 869 over 1913, while the number paid was 14,216, an increase of 683 over the previous year.

The amount of bounty paid to vessels and their crews is $62,985.84, and to boats and boat fishermen $96,598.30, making the total payments for the year $159,584.14.

Bounty was paid to 955 vessels, the aggregate tonnage being 23,811 tons, being an increase of 45 vessels and 978 tons over 1913. The number of vessel fishermen receiving bounty is 6,122, an increase of 443.

Bounty was also paid to 13,261 boats and 22,828 fishermen, an increase of 638 boats and 1,271 men, as compared with the previous year.

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DETAILED STATEMENT of Fishing Bounty Claims received and paid during the year 1914.

Provinces.	Counties.	Number of Claims.			
		Received.	Rejected.	Held in abeyance.	Paid.
Nova Scotia	Annapolis	180	1	4	175
	Antigonish	185			185
	Cape Breton	512			512
	Cumberland	7			7
	Digby	462	1		461
	Guysborough	953			953
	Halifax	1,354	3	1	1,350
	Inverness	442			442
	Kings	70			70
	Lunenburg	891			891
	Pictou	111			111
	Queens	206	1		205
	Richmond	586			586
	Shelburne	754			754
	Victoria	376			376
	Yarmouth	271			271
	Totals	7,360	6	5	7,349
New Brunswick	Charlotte	506			506
	Gloucester	446	2		444
	Kent	38			38
	Northumberland	13			13
	Restigouche				
	St. John	80			80
	Totals	1,083	2		1,081
Prince Edward Island	Kings	586	1	1	584
	Prince	527		7	520
	Queens	112			112
	Totals	1,225	1	8	1,216
Quebec	Bonaventure	975		4	971
	Gaspé	2,926	6	33	2,887
	Rimouski	67			67
	Saguenay	645			645
	Totals	4,613	6	37	4,570
	Grand totals	14,281	15	50	14,216

DETAILLED STATEMENT of Fishing Bounties paid to Vessels and Boats during the year 1914.

Provinces.	Counties	Number of Vessels.	Tonnage.	Average Tonnage.	Number of Men.	Amount paid.	Number of Boats.	Number of Men.	Amount paid.	Total Bounty Paid to Vessels and Boats in 1914.
						$ cts.			$ cts.	$ cts.
Nova Scotia	Annapolis	7	261	37·28	64	670 60	168	273	1,169 40	1,840 00
	Antigonish	2	27	13·50	5	59 00	183	244	1,073 60	1,132 60
	Cape Breton	21	312	14·86	83	836 80	491	841	3,560 65	4,397 45
	Cumberland						7	13	54 45	54 45
	Digby	19	776	40·84	177	1,908 80	442	769	3,248 85	5,157 65
	Guysboro	53	798	15·05	230	2,270 00	900	1,419	6,079 65	8,349 65
	Halifax	92	1,768	18·13	453	4,667 24	1,258	1,734	7,587 10	12,254 34
	Inverness	36	489	13·58	169	1,570 60	406	757	3,168 35	4,738 95
	Kings	1	13	13·00	3	32 20	69	102	441 30	473 50
	Lunenburg	196	19,572	53·94	2,534	26,789 60	695	875	3,888 75	30,678 35
	Pictou						111	148	651 20	651 20
	Queens	11	127	11·54	37	363 80	194	316	1,347 40	1,711 20
	Richmond	37	825	22·30	193	2,060 20	549	970	4,089 80	6,150 00
	Shelburne	71	1,318	18·56	364	3,647 60	683	1,172	4,960 80	8,608 40
	Victoria	13	181	13·92	62	577 80	363	541	2,337 95	2,915 75
	Yarmouth	55	1,511	28·02	415	4,197 40	216	401	1,679 65	5,877 05
	Totals	614	19,008	30·96	4,789	49,651 64	6,735	10,575	45,338 90	94,990 54
New Brunswick	Charlotte	28	447	15·96	102	1,099 80	178	744	3,195 40	4,295 20
	Gloucester	255	3,486	13·67	1,030	10,078 00	189	451	1,835 15	11,913 15
	Kent	13	136	10·46	35	360 00	25	43	181 95	541 95
	Northumberland	11	119	10·81	23	266 20	2	4	16 60	282 80
	Restigouche									
	St. John	2	53	26·50	8	104 20	78	88	399 20	503 40
	Totals	309	4,241	13·72	1,198	11,908 20	772	1,330	5,628 30	17,536 50
Prince Edward Island	Kings	10	218	21·80	39	467 60	574	810	3,530 50	3,998 10
	Prince	6	84	14 00	21	218 40	514	1,207	4,925 85	5,144 25
	Queens	4	47	11·75	18	162 20	108	254	1,035 10	1,197 30
	Totals	20	349	17·45	78	848 20	1,196	2,271	9,491 45	10,339 65

Quebec	Bonaventure	1	15	15·00	3	34 20	970	1,724	7,263 60	7,297 80
	Gaspé	9	165	18·03	48	472 20	2,878	5,655	23,518 10	23,990 30
	Rimouski						67	101	435 95	435 95
	Saguenay	2	33	16·50	6	71 40	643	1,172	4,922 00	4,993 40
	Totals	12	213	17·75	57	577 80	4,558	8,652	36,139 65	36,717 45
	Grand totals	955	23,811	24·93	6,122	62,985 84	13,261	22,823	96,598 30	159,584 14

GENERAL STATISTICS.

The fishing bounty was first paid in 1882.

The payments were made each year on the following basis:

1882, vessels $2 per ton, one-half to the owner and the other half to the crew; boats at the rate of $5 per man, one-fifth to the owner and four-fifths to the men.

1883, vessels $2 per ton, and boats $2.50 per man, distributed as in 1882.

1884, vessels $2 per ton as in 1882 and 1883.

Boats from 14 to 18 feet keel, $1; from 18 to 25 feet keel, $1.50; from 25 feet upwards, $2. Boat fishermen, $3.

1885, 1886 and 1887, vessels, $2 per ton paid as formerly. Boats the same as in 1884, with the admission of boats measuring 13 feet keel, and fishermen, $3.

1888, vessels $1.50 per ton, paid as formerly. Boats, the same as 1885, 1886 and 1887.

1889, 1890 and 1891, vessels $1.50 per ton as in 1888. Boats $1 each. Boat fishermen, $3.

1892, vessels $3 per ton, paid as formerly. Boats $1 each. Boat fisherman $3.

1893, vessels $2.90 per ton, paid as formerly. Boats $1 each. Boat fisherman $3.

1894, vessels $2.70 per ton, paid as formerly. Boats $1 each. Boat fishermen $3.

1895, vessels $2.60 per ton, paid as formerly. Boats $1 each. Boat fishermen $3.

1896, vessels $1 per ton, which was paid to the owners, and vessel fishermen $5 each, clause No. 5 of the regulation having been amended accordingly. Boats $1 each, and boat fishermen $3.50 each.

	Vessels.		Men.	Boats.	Men.
1897..	$1 00	per ton.	$6 00 each	$1 00 each.	$3 50 each
1898..	1 00	"	6 50 "	1 00 "	3 50 "
1899..	1 00	"	7 00 "	1 00 "	3 50 "
1900..	1 00	"	6 50 "	1 00 "	3 50 "
1901..	1 00	"	7 00 "	1 00 "	3 50 "
1902..	1 00	"	7 25 "	1 00 "	3 80 "
1903..	1 00	"	7 30 "	1 00 "	3 90 "
1904..	1 00	"	7 15 "	1 00 "	3 75 "
1905..	1 00	"	7 10 "	1 00 "	3 65 "
1906..	1 00	"	7 10 "	1 00 "	3 75 "
1907..	1 00	"	7 40 "	1 00 "	4 00 "
1908..	1 00	"	7 25 "	1 00 "	3 90 "
1909..	1 00	"	7 50 "	1 00 "	4 25 "
1910..	1 00	"	7 60 "	1 00 "	4 30 "
1911..	1 00	"	7 15 "	1 00 "	4 10 "
1912..	1 00	"	6 90 "	1 00 "	3 95 "
1913..	1 00	"	6 70 "	1 00 "	3 95 "
1914..	1 00	"	6 40 "	1 00 "	3 65 "

Since 1882, 28,007 vessels, totalling 890,916 tons, have received the bounty. The total number of vessel fishermen who received bounty is 201,446, being an average of 7·1927 per vessel.

The total number of boats to which bounty was paid since 1882 is 435,362, and the number of fishermen 779,518. Average number of men per boat 1·7858.

The highest bounty paid per head to vessel fishermen was $21.75 in 1893; the lowest 83 cents, while the highest to boat fishermen was $4.30, the lowest $2.

SESSIONAL PAPER No. 39

COMPARATIVE STATEMENT by Provinces for the Years 1882 to 1914, inclusive, showing; (1) Total number of fishing Bounty Claims received and paid from 1882 to 1914 inclusive.

Year.	Nova Scotia.		New Brunswick.		P. E. Island.		Quebec.		Totals.	
	Received.	Paid.	Received.	Paid.	Received.	Paid.	Received.	Paid.	Received.	Paid.
1882...	6,730	6,613	1,257	1,142	1,169	1,100	3,162	3,117	12,318	11,972
1883...	7,171	7,076	1,693	1,579	1,138	1,106	3,602	3,325	13,604	13,086
1884...	7,007	6,930	1,252	1,224	923	885	3,470	3,429	12,652	12,468
1885...	7,646	7,599	1,609	1,588	1,117	1,025	3,943	3,912	14,315	14,124
1886...	7,639	*7,702	1,767	1,763	1,131	1,080	4,275	*4,355	14,812	14,900
1887...	8,262	8,227	1,975	1,958	1,201	1,126	4,138	4,105	15,576	15,416
1888...	8,481	8,429	2,065	2,026	1,153	834	4,328	4,310	16,027	15,599
1889...	8,816	8,523	2,428	2,392	1,211	*1,511	4,664	4,652	17,119	17,078
1890...	9,337	*9,429	2,522	2,469	1,352	1,257	4,860	4,804	18,071	17,959
1891...	10,242	10,063	2,831	2,084	1,482	1,446	5,108	4,913	19,663	18,506
1892...	8,272	8,186	1,067	1,001	1,065	1,051	4,425	4,204	14,829	14,442
1893...	7,926	7,844	967	881	1,027	1,012	4,059	3,898	13,979	13,635
1894...	8,640	8,600	925	911	983	963	3,948	3,876	14,496	14,350
1895...	8,835	8,825	979	975	1,009	*1,025	3,904	*3,955	14,727	14,780
1896...	8,597	8,562	1,137	1,064	1,111	*1,120	4,366	4,229	15,211	14,975
1897...	8,450	8,418	1,042	991	1,175	1,171	4,180	4,149	14,847	14,729
1898...	8,446	8,347	934	917	1,143	*1,145	4,156	4,092	14,679	14,501
1899...	7,894	7,754	849	825	1,016	947	4,134	4,102	13,893	13,628
1900...	7,484	7,452	904	904	1,119	*1,169	4,264	4,251	13,771	13,776
1901...	7,346	7,344	829	826	941	937	4,277	4,267	13,393	13,374
1902...	6,710	6,671	802	794	913	912	4,371	4,346	12,796	12,723
1903...	6,297	6,284	832	830	978	974	4,110	4,090	12,217	12,178
1904...	6,750	6,732	879	866	1,027	994	4,095	4,079	12,751	12,671
1905...	7,034	7,018	881	873	921	921	4,350	4,329	13,186	13,141
1906...	7,434	7,415	930	923	918	916	4,251	4,249	13,533	13,503
1907...	7,124	7,087	904	895	1,000	984	4,239	4,227	13,267	13,193
1908...	7,690	7,648	1,002	988	1,030	993	4,250	4,212	13,972	13,841
1909...	7,276	7,250	834	830	877	872	4,024	4,004	13,011	12,956
1910...	6,670	6,659	915	903	900	898	4,159	4,150	12,644	12,610
1911...	6,735	6,722	923	905	1,001	877	4,220	4,141	12,879	12,645
1912...	6,717	6,709	904	830	1,052	*1,142	4,299	4,223	12,972	12,964
1913...	6,962	6,942	960	957	1,169	*1,195	4,321	*4,439	13,412	13,533
1914...	7,360	7,349	1,083	1,081	1,225	1,216	4,613	4,570	14,281	14,216
Totals..	253,980	252,409	40,881	39,255	35,477	36,804	138,565	137,004	468,903	463,472

* Includes a number of claims held over from previous year.

(2) NUMBER of vessels, tonnage and number of men who received Bounty in each year

Year.	Nova Scotia.			New Brunswick.			P. E. Island.			Quebec.			Totals.		
	No. of Vessels.	Tonnage.	No. of Men.	No. of Vessels.	Tonnage.	No. of Men.	No. of Vessels.	Tonnage.	No. of Men.	No. of Vessels.	Tonnage.	No. of Men.	No. of Vessels.	Tonnage.	No. of Men.
1882....	588	22,841	5,343	120	2,171	531	15	389	74	63	2,210	538	786	27,611	6,486
1883....	700	29,788	6,238	126	2,102	496	16	450	66	62	2,236	443	904	34,576	7,243
1884....	700	29,828	6,327	139	2,289	560	16	582	92	56	1,965	382	911	34,664	7,361
1885....	629	27,709	5,897	128	2,120	496	19	597	113	55	1,791	317	831	32,217	6,823
1886....	562	25,375	5,022	145	2,628	520	32	1,071	215	52	1,730	320	791	30,804	6,077
1887....	566	24,520	4,900	154	2,889	563	38	1,677	338	54	1,883	334	812	30,969	6,135
1888....	589	26,008	5,450	150	2,545	544	37	1,245	249	51	1,842	388	827	31,640	6,631
1889....	597	27,123	5,684	153	2,590	565	35	1,274	239	48	1,729	330	833	32,716	6,818
1890....	540	23,955	4,935	133	2,129	447	32	1,002	203	34	1,182	220	739	28,268	5,805
1891....	527	22,780	4,618	124	2,051	411	27	778	155	27	924	168	705	26,533	5,352
1892....	507	22,279	4,611	108	1,683	343	30	983	139	23	803	159	668	25,748	5,252
1893....	536	23,195	4,780	210	2,922	634	27	910	151	32	952	179	805	27,979	5,744
1894....	602	24,735	5,077	238	3,189	721	21	594	114	38	1,066	178	899	29,584	6,090
1895....	603	25,018	5,184	238	3,107	764	27	769	129	39	1,262	173	907	30,156	6,250
1896....	553	23,415	4,607	250	3,337	800	23	656	114	36	1,143	144	862	28,551	5,665
1897....	507	21,323	4,829	239	3,079	816	20	490	109	24	833	116	790	25,725	5,870
1898....	505	20,868	4,840	239	3,155	859	24	561	125	16	524	77	784	25,108	5,901
1899....	519	22,538	5,323	238	3,131	885	15	373	76	17	497	78	789	26,539	6,362
1900....	525	22,474	5,352	234	2,969	890	29	737	153	14	459	76	802	26,639	6,471
1901....	508	21,469	5,158	242	3,229	872	23	541	115	13	366	69	786	25,605	6,214
1902 ...	505	21,248	5,126	249	3,293	972	28	630	135	13	350	51	795	25,521	6,284
1903....	546	21,992	5,173	259	3,454	971	36	765	169	10	290	48	851	26,501	6,361
1904....	552	21,285	5,040	257	3,429	981	30	594	126	15	382	73	854	25,690	6,220
1905....	620	21,240	5,238	264	3,600	1,035	28	587	125	10	259	56	922	25,686	6,454
1906....	644	20,008	4,891	273	3,753	1,066	32	732	147	8	139	33	957	24,632	6,137
1907 ...	612	17,041	4,178	265	3,720	1,010	41	916	178	9	154	34	927	21,831	5,400
1908....	616	17,804	4,364	269	3,672	1,034	34	643	140	6	87	25	925	22,206	5,563
1909....	591	16,180	3,919	247	3,344	935	30	572	113	6	99	26	874	20,195	4,993
1910...	588	17,567	4,294	249	3,321	976	31	612	117	8	178	37	876	21,678	5,424
1911....	664	19,555	4,931	266	3,528	1,025	27	540	115	8	177	41	965	23,800	6,112
1912...	668	20,649	4,983	255	3,336	987	33	648	131	9	267	46	965	24,900	6,147
1913....	594	18,288	4,484	285	3,970	1,074	25	466	91	6	109	30	910	22,833	5,679
1914....	614	19,008	4,789	309	4,241	1,198	20	349	78	12	213	57	955	23,811	6,122
Totals.	19,177	739,106	165,585	7,055	99,976	35,981	901	23,733	4,634	874	28,101	5,246	28,007	890,916	201,446

(3) NUMBER of Boats and Boat Fishermen who received Bounty in each year.

Year.	Nova Scotia.		New Brunswick.		Prince Edward Island.		Quebec.		Totals.	
	No. of Boats.	No. of Men.	No. of Boats.	No. of Men.	No. of Boats.	No. of Men.	No. of Boats.	No. of Men.	No. of Boats.	No. of Men.
1882	6,043	12,130	1,024	2,530	1,087	3,070	3,071	5,716	11,225	23,446
1883	6,458	13,553	1,453	3,369	1,098	3,106	3,266	6,188	12,275	26,156
1884	6,257	12,669	1,086	2,505	869	2,346	3,344	6,416	11,556	23,936
1885	6,970	13,396	1,460	3,254	1,006	2,606	3,857	7,485	13,293	26,741
1886	7,140	13,351	1,618	3,567	1,048	2,547	4,303	7,981	14,109	27,446
1887	7,662	13,997	1,804	3,994	1,088	2,711	4,051	7,550	14,605	28,252
1888	7,840	14,115	1,876	4,148	797	2,141	4,259	7,852	14,772	28,256
1889	7,926	14,118	2,237	5,032	1,475	3,568	4,602	8,807	16,240	31,525
1890	8,886	15,738	2,324	5,242	1,192	3,024	4,766	9,241	17,168	33,245
1891	9,525	16,552	1,928	4,126	1,383	3,427	4,865	9,402	17,701	33,507
1892	7,679	12,307	893	1,765	1,021	2,047	4,181	7,693	13,774	23,812
1893	7,308	11,748	671	1,314	985	1,962	3,866	7,245	12,830	22,269
1894	7,956	12,899	661	1,281	913	1,813	3,821	7,139	13,351	23,132
1895	8,222	13,106	737	1,434	998	2,141	3,916	7,877	13,873	24,558
1896	8,008	12,454	814	1,553	1,095	2,126	4,189	7,688	14,106	23,821
1897	7,911	12,542	752	1,351	1,151	2,147	4,125	7,572	13,939	23,612
1898	7,872	12,438	678	1,237	1,121	2,199	4,076	7,627	13,747	23,501
1899	7,235	11,305	587	1,027	932	1,710	4,085	7,696	12,839	21,738
1900	6,927	10,645	670	1,184	1,140	2,198	4,237	8,004	12,974	22,031
1901	6,836	10,464	584	1,001	914	1,735	4,254	8,017	12,588	21,217
1902	6,166	9,442	545	966	884	1,638	4,333	8,180	11,928	20,226
1903	5,738	8,775	571	964	938	1,722	4,080	7,688	11,327	19,149
1904	6,180	9,556	609	1,082	964	1,792	4,064	7,648	11,817	20,078
1905	6,398	9,822	609	1,047	893	1,630	4,319	8,002	12,219	20,501
1906	6,771	10,138	650	1,139	884	1,648	4,241	7,946	12,546	20,871
1907	6,475	9,739	630	1 158	943	1,750	4,218	7,873	12,266	20,520
1908	7,032	10,685	719	1,365	959	1,810	4,206	7,809	12,916	21,669
1909	6,659	10,163	583	1,069	842	1,583	3,998	7,314	12,082	20,129
1910	6,071	9,353	654	1,195	867	1,672	4,142	7,451	11,734	19,671
1911	6,058	9,403	639	1,048	850	1,574	4,133	7,682	11,680	19,707
1912	6,040	9,324	635	1,096	1,109	2,131	4,214	7,860	11,998	20,411
1913	6,348	9,816	672	1,151	1,170	2,237	4,433	8,353	12,623	21,557
1914	6,735	10,575	772	1,330	1,196	2,271	4,558	8,672	13,261	22,828
Totals	233,332	386,318	32,145	65,464	33,812	72,072	136,073	255,654	435,362	779,518

(4) TOTAL Number of Men who received Bounty in each year.

Year.	Nova Scotia.	New Brunswick.	P. E. Island.	Quebec.	Totals.
	No. of Men.	No. of Men.	No. of Men.	No. of Men.	
1882	17,473	3,061	3,144	6,254	29,932
1883	19,791	3,805	3,172	6,631	33,399
1884	18,996	3,065	2,438	6,798	31,297
1885	19,293	3,750	2,719	7,802	33,564
1886	18,373	4,087	2,762	8,301	33,523
1887	18,897	4,557	3,049	7,884	34,387
1888	19,565	4,692	2,390	8,240	34,887
1889	19,802	5,597	3,807	9,137	38,343
1890	20,673	5,689	3,227	9,461	39,050
1891	21,170	4,537	3,582	9,570	38,859
1892	16,918	2,108	2,186	7,852	29,064
1893	16,528	1,948	2,113	7,424	28,013
1894	17,976	2,002	1,927	7,317	29,222
1895	18,290	2,198	2,270	8,050	30,808
1896	17,061	2,353	2,240	7,832	29,486
1897	17,371	2,167	2,256	7,688	29,482
1898	17,278	2,096	2,324	7,704	29,402
1899	16,628	1,912	1,786	7,774	28,100
1900	15,997	2,074	2,351	8,080	28,502
1901	15,622	1,873	1,850	8,086	27,431
1902	14,568	1,938	1,773	8,231	26,510
1903	13,948	1,935	1,891	7,736	25,510
1904	14,596	2,063	1,918	7,721	26,298
1905	15,060	2,082	1,755	8,058	26,955
1906	15,029	2,205	1,795	7,979	27,008
1907	13,917	2,168	1,928	7,907	25,920
1908	15,049	2,399	1,950	7,834	27,232
1909	14,082	2,004	1,696	7,340	25,122
1910	13,547	2,171	1,789	7,488	24,995
1911	14,334	2,073	1,689	7,723	25,819
1912	14,307	2,083	2,262	7,906	26,558
1913	14,300	2,225	2,328	8,383	27,236
1914	15,364	2,528	2,349	8,709	28,950
Totals	551,803	91,445	76,716	260,900	980,864

(5) TOTAL annual payments of Fishing Bounty.

Year.	Nova Scotia.	New Brunswick.	P. E. Island.	Quebec.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1882	106,098 72	16,997 00	16,137 00	33,052 75	172,285 47
1883	89,432 50	12,395 20	8,577 14	19,940 01	130,344 85
1884	104,934 09	13,576 00	9,203 96	28,004 93	155,718 98
1885	103,999 73	15,908 25	10,166 65	31,464 76	161,539 39
1886	98,789 54	17,894 57	10,935 87	33,283 61	160,903 59
1887	99,622 03	19,699 65	12,528 51	31,907 73	163,757 92
1888	89,778 90	18,454 92	9,092 96	32,858 75	150,185 53
1889	90,142 51	21,026 79	13,994 53	33,362 71	158,526 54
1890	91,235 64	21,108 33	11,686 32	34,210 72	158,241 01
1891	92,377 42	17,235 96	12,771 30	34,507 17	156,891 85
1892	109,410 39	10,864 61	9,782 79	29,694 35	159,752 14
1893	108,060 67	12,524 09	9,328 62	28,320 72	158,234 10
1894	111,460 03	12,690 80	7,875 79	28,040 18	160,066 80
1895	110,765 27	12,919 32	9,285 13	30,598 27	163,567 99
1896	98,048 95	13,602 88	9,745 50	32,992 44	154,389 77
1897	102,083 50	13,454 50	9,809 00	32,157 00	157,504 00
1898	103,730 00	13,746 00	10,188 00	31,795 00	159,459 00
1899	106,598 50	13,514 50	7,822 00	32,065 00	160,000 00
1900	101,448 00	13,562 50	10,589 00	33,203 00	158,802 50
1901	101,024 50	13,420 50	8,335 50	33,161 50	155,942 00
1902	100,455 70	14,555 80	8,716 55	36,125 45	159,853 50
1903	99,714 15	14,872 75	9,652 50	34,704 30	158,943 70
1904	99,286 44	15,110 80	9,179 35	33,651 65	157,228 24
1905	100,664 35	15,379 50	8,317 20	34,185 60	158,546 65
1906	99,518 80	16,247 55	8,839 40	34,410 00	159,015 75
1907	93,381 70	16,454 50	10,175 95	36,101 35	156,113 50
1908	98,156 20	17,203 75	9,708 90	34,931 05	159,999 90
1909	95,413 60	15,480 15	8,973 85	35,354 25	155,221 85
1910	96,468 20	16,531 05	9,557 80	36,609 70	159,166 75
1911	99,424 90	15,795 00	8,669 85	36,109 95	159,999 70
1912	97,904 25	15,109 75	11,119 00	35,863 40	159,996 40
1913	93,456 00	16,385 05	11,081 85	37,738 35	158,661 25
1914	94,990 54	17,536 50	10,339 65	36,717 45	159,584 14
Totals	3,287,875 72	511,258 52	332,187 42	1,087,123 10	5,218,444 76

List of Vessels which received Fishing Bounty for the Year 1914–15.

PROVINCE OF NOVA SCOTIA.

ANNAPOLIS COUNTY.

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
121818	Albert J. Lutz	Digby	95	John D. Apt	Port Wade	18	195 20
77740	Elmer	"	15	David Hayden	"	1	21 40
80803	Exenia	Windsor	18	B. Longmire	Hillsburn	7	62 80
122249	Florence May	St. Andrews	14	James Ellis	St. Andrews		14 00
133962	Grace Darling	Digby	45	Ansel Casey	Digby	13	128 20
126873	Myrtle L	"	47	B. Longmire	Hillsburn	14	136 60
94832	Venus	Weymouth	42	Jno. W. Snow	Port Wade	6	80 40

ANTIGONISH COUNTY.

130787	Cora Wells	Pt Hawkesbury	13	Jno. Munroe	Auld's Cove	2	25 80
111794	Volunteer	"	14	Henry Brow	Harbourau Bonche	3	33 20

CAPE BRETON COUNTY.

112376	Agnes	Arichat	15	William Martell	Mainadieu	4	40 60
103858	B. & B. Holland	Halifax	26	John Stacey	Glace Bay	6	64 40
126561	Caberfeidgh	Sydney	12	Alex. McDonald	Alder Point	5	44 00
122188	Charles A. H	Arichat	10	Louis Longue	Nth. Sydney	3	29 20
121909	Emmie G.	Barrington	10	Arthur Perry	Barrington	3	29 20
116343	Eva May	Arichat	11	M. J. McPherson	Nth. Sydney	4	36 60
116348	Florence M	"	16	Robert Fudge	"	3	35 20
112380	Florence M	"	25	A. Ferguson	Sydney	5	57 00
126568	M. E. Wherry	Sydney	14	Jno. Arsenault	Alder Point	4	39 60
126569	Madona May	Sydney	16	James Bonar	Glace-Bay	4	41 60
116915	Maggie and Esther	Picton	11	S. Buckland	"	3	30 20
117144	Mary E. Faulkner	Halifax	14	A. Nicholson	Nth. Sydney	3	33 20
121803	Mary J.	Yarmouth	11	Wm Hawley	Port Morien	3	30 20
107999	Maud S	Canso	12	Jacob Rogers	Nth. Sydney	4	37 60
107375	Minnie B	Sydney	10	Malcolm Prince	Glace Bay	4	35 60
83104	Minnie Long	Richibucto	20	W. R. Tobin	"	3	39 20
115392	Nyanza	Sydney	15	Geo. Herridge	Nth. Sydney	4	40 60
122128	Reliance	Halifax	18	Jno. Petite	"	4	43 60
111799	Rosie G	Pt Hawkesbury	16	John Gallant, sr	Mainadieu	6	54 40
112386	Shamrock	Sydney	11	John Lake	Nth. Sydney	3	30 20
122184	Two Brothers	Arichat	19	Thomas Campbell	Mainadieu	5	51 00

DIGBY COUNTY.

111528	Alart	Digby	11	Benj. Doucette	Cape St. Mary's	2	23 80
112102	Ariadne	St John	48	D. C. Outhouse	Tiverton	11	118 40
116236	Cora May	Digby	64	C. E. Finigan	Freeport	15	160 00
103181	Curlew	"	63	George Denton	Westport	15	159 00
126879	Dorothy G. Snow	"	98	Jos E. Snow	Digby	31	278 40
126874	Dorothy M. Smart	"	94	H. B. Short	"	12	156 80
116446	Emerson Faye	"	47	Milton Hains	Freeport	13	130 20
107604	Emma D	Weymouth	20	F. S. Doucette	Cape St. Mary's	4	45 60
126880	Gyno	Digby	11	Edward Thomas	Westport	3	30 20
111530	Island Girl	"	10	Esrom Thurber	Freeport	2	22 80
100540	Linnie & Edna	St Andrews	30	R. J. Devean	Mavillette	5	62 00
121816	Loren B. Snow	Digby	85	Jos. E. Snow	Digby	11	150 40
116660	Nora	Yarmouth	11	P. Doucette	Cape St. Mary's	4	36 60
111471	Quickstep	Digby	83	David Sproul	Digby		80 00
130630	Racordo	Weymouth	13	G. E. Doucette	Cape St. Mary's	4	38 60
111835	Roxana	Digby	11	F. B. Comeau	Meteghan River	2	23 80
100609	Swan	"	56	Milton Hains	Freeport	13	139 20
121659	Viola	Yarmouth	10	V. Frontain	Cape St. Mary's	4	35 60
121812	Wilfred L. Snow	Digby	51	H. B. Short	Digby	9	108 60

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LIST of Vessels which received Fishing Bounty for the year 1914-15—Nova Scotia—*Con.*

GUYSBORO COUNTY.

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
121700	Agnes E.	Yarmouth	10	S. W. Horne	Dover	4	35 60
116344	Annie B. M.	Arichat	18	Thomas Fanning	Canso	3	37 20
126106	Bonnie B.	Lunenburg	19	Frank Hawes	"	6	57 40
112016	Blanche	Canso	12	Mark Richard	Charlos Cove	3	31 20
112375	C. G. Munroe	Arichat	14	Vincent Richard	"	5	46 00
117060	Dorothy Aleta	Canso	11	Daniel Pitts	"	2	23 80
126112	Dorothy G.	Lunenburg	17	J. S. Rhynold	Canso	5	49 00
116520	Evelyn	"	17	Almon Hawes	"	2	29 80
126911	Edna H.	Halifax	17	R. L. Mosher	"	6	55 40
117054	Emma Jane	Canso	16	Jno. George	Whitehead	6	54 40
117093	Florence D.	Arichat	11	Robt. Creamer	Philips Harbour	5	43 00
107993	Florence May	Canso	10	Jno. Kennedy, Sr.	Canso	4	35 60
112373	Flying Cloud	Arichat	13	Simon Mannett	Larry's River	2	25 80
107996	Green Linnet	Canso	12	Felix Sampson	Dover	6	50 40
126297	H. C. R.	"	18	Harry Kavanagh	Canso	5	50 00
122430	Hattie Maud	Halifax	10	John J. Berrigan	"	5	48 00
126294	Horman Lee	Canso	17	Edward Kavanagh	"	5	49 00
103470	Ida M. Burke	Arichat	16	Jos. Fougere	Larry's River	3	35 20
126292	Irbessa	Canso	17	Edward Hearn	Canso	5	49 00
112374	J. B. Saint	Arichat	18	Samuel Snow	White Head	5	50 00
116747	Jessie W.	Halifax	12	Jacob Manuel	Canso	5	44 00
111910	Lizzie J. Greenleaf	Arichat	11	J. H. Richard	Charlo's Cove	4	36 60
117097	Lizzie May	"	12	W. C. Richard	"	5	44 00
117100	Louisa Ellen	"	11	Angus Feltmate	White Head	3	30 20
117094	Maggie Alice	"	11	Jno. Guyse	Port Felix	4	36 60
126291	Marg. Katheleen	Canso	16	Jno. Boudroit	Dover	5	48 00
111909	Margaret May	Arichat	12	Stephen C. Richard	Charlo's Cove	5	44 00
126300	Mary Edna	Canso	15	D. L. Richard	"	5	47 00
112379	Mary S.	Arichat	18	A. D. Feltmate	Canso	5	50 00
126295	Mary W. Catherine	Canso	13	Wm. Pelrine	Port Félix	5	45 00
107757	Mayflower	Charlottetown	18	Jas. R. Lumsden	Canso	5	50 00
100450	Minto	Canso	18	Henry A. Richard	Charlo's Cove	6	56 40
126296	Murray R. Munroe	"	21	Charlo Munroe	White Head	3	40 20
126299	Nina Clare	"	16	Chas. O'Hara	Drum Head	5	48 00
116500	Oreda	Lunenburg	16	Abner Munroe	Cole Harbour	4	41 60
126298	Petawawa	Canso	33	Frank Lohnes	Canso	6	71 40
112024	Reta S.	"	13	Wm. Shrader	"	4	38 40
126472	Shiloh	Halifax	22	Chas. A. Mosher	"	6	60 40
111413	Sigdrifa	Lunenburg	13	Alden Munroe	White Head	3	32 20
112023	Silver Bell	Canso	14	Simon J. Pelrine	Larry's River	4	29 60
116884	Silver Swan	Arichat	20	Chas. Richard	Charlo's Cove	4	45 60
112025	Squanto	Halifax	13	Freeman Casey	White Head	3	32 20
122317	Stanley Hubley	Lunenburg	17	Jas. J. Lukeman	Canso	5	49 00
116885	T. Lilly	Arichat	10	Levi W. Ehler	Queensport	5	42 00
117055	Thelma	Canso	15	Geo. Ryan, Sr.	Canso	4	40 60
116532	Togo	Lunenburg	14	Wm. Peitzsch	White Head	4	39 60
107994	True Love	Canso	10	David Walsh	Canso	2	22 80
117057	Utowana	"	15	Geo. Shrader	"	4	40 60
130351	Vennie May	Arichat	17	Thos. L. Richard	Charlo's Cove	2	29 80
116887	Wenona	"	10	Wesley Munroe	White Head	5	42 00
126293	Winnie May	Canso	10	Geo. C. Jamieson	Cole Harbour	3	29 20
130721	Winnifred Marr	Lunenburg	17	Martin Meagher	Canso	4	42 60
122000	Zoraya	"	16	Louden Munroe	White Head	4	41 60

LIST of Vessels which received Fishing Bounty during the year 1914-15.
Province of Nova Scotia.—*Continued.*

HALIFAX COUNTY.

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
135096	A. Hubley	Halifax	69	Ainsley Hubley	Hackett's Cove	15	165 00
94632	A. C. Greenwood	Shelburne	15	John Beaver	Spry Bay	4	40 60
130952	Adamantine	Lunenburg	10	Thomas Covey	Indian Harbour	3	29 20
126812	Adana C	Halifax	17	Wm. Hubley, Sr.	Spry Bay	4	42 60
116526	Adelaide	Lunenburg	13	J. F. Gray	Pennant	4	38 60
133802	Adonia S	"	18	David Slaunwhite	Terence Bay	5	50 00
130591	Aileen Gladys	Halifax	16	Geo. E. Siteman	W. Ship Harbour	4	41 60
122302	Albata	Lunenburg	19	Jas. Westhaver	Sober Island	5	51 00
130578	Alice M. C	"	12	Creighton Covey	Indian Harbour	3	31 20
130960	Alvin S	"	27	W. L. Smith	Terence Bay	8	78 20
122422	Annie G. W	Halifax	17	Edward Markie	Sober Island	4	42 60
126380	Annie Hilton	"	10	John May	Owls Head	4	35 60
133665	Arena	"	12	Edwd. Marryatt	Pennant	3	31 20
116824	Avis Pauline	Barrington	12	P. M. Niekerson	Spry Bay	2	24 80
130571	Brenda C	Lunenburg	11	Carter Harry	Terence Bay	5	43 00
130574	C. L. Miller	"	10	A. Zinck	West Dover	3	29 20
130954	Comet G	"	11	Herbert Little	Terence Bay	4	36 60
126033	D. C. Mulhall	Halifax	42	Geo. Pelham	Herring Cove	17	150 80
130567	Denton S	Lunenburg	11	Edward Corney	East Dover	2	23 80
90834	Diego	Port Medway	27	Alex. Faulkner	Head Jeddore	7	71 80
130585	Edith Adele	Halifax	33	John C. Martin	Ketch Harbour	8	84 20
130568	Ella M. Young	Lunenburg	12	Maynard Young	West Dover	3	31 20
122424	Ella May	Halifax	57	Leander Hubley	Indian Hbr	4	82 60
90726	Ellen Maud	"	16	Richard Drew	Terence Bay	5	48 00
117141	Etha May	"	11	Geo. Johnson	West Dover	3	30 20
130565	Ethel M. J	Lunenburg	11	Arthur Johnson	Indian Harbour	2	23 80
134060	Eunice F	"	15	R. W. Fleming	Ketch Hbr	3	34 20
130687	Eva E. L	"	11	Manuel Morash	West Dover	3	30 20
133668	F. C. Twohig	Halifax	10	Andrew Twohig	Pennant	3	29 20
100247	Fairy Queen	"	11	Geo. H. Nickerson	"	4	36 60
116290	Flora M. J	"	78	Jas. Julien et al	Grand Desert	17	186 80
100259	Florence G	"	15	Caleb Gray	Sambro	3	34 20
130738	Frances Lenore	Lunenburg	12	Frank Ring	Indian Harbour	2	24 80
122282	G. M. Stephens	Shelburne	12	Lindsay Zwicker	" "	3	31 20
107330	Gertie M. Starr	Halifax	16	Arthur Day	West Jeddore	4	41 60
130584	Gladys E. B	"	24	Walter Brown	Herring Cove	6	62 40
111432	Gladys Elena	"	16	Chas. Twohig	Pennant	4	41 60
126817	Gladys G. Hart	"	27	Jas. L. Hart	Sambro	8	78 20
116731	Grand Desert	"	65	Martin Julien et al	Grand Desert	17	173 80
116758	Gretta	"	14	Edward Drake	Clam Harbour	4	39 60
116287	Handy Andy	"	15	J. C. Westhaver	Sheet Har. Passage	4	40 60
112129	Hattie	Lunenburg	12	Raymond Beck	East Dover	4	37 60
130472	Hattie M. J	"	12	Richard Coolen	"	3	31 20
126374	Hazel Levy	Halifax	14	Cyrus Levy	Owls Head	4	39 60
100544	Helen Maud	"	26	Howard Jennex	East Jeddore	9	83 60
131072	Howker	"	12	Chas. H. Thomas Jr.	Herring Cove	3	32 10
130594	I Wonder Y	"	16	Wm. S. Henneberry	Sambro	7	60 80
126373	Ideal	"	16	Chas. Schnare	Pennant	5	48 00
130577	Irene L	Lunenburg	11	Wm. C. Slaunwhite	Terence Bay	4	36 60
130564	James L	"	32	Herbert Little	"	7	76 80
130735	Jennie P. S	"	34	O. Dauphinee	Hackett's Cove		34 00
126825	Joseph Earle	"	29	R. A. Slaunwhite	Terence Bay	11	99 40
126136	Kathleen W	Halifax	22	Robt. J. Slaunwhite	"	8	73 20
133675	Leone V	"	11	J. J. Smith	Sambro	5	43 00
126915	Lola B	"	10	C. Boutilier	Spry Bay	3	29 20
131078	Lola R	Lunenburg	13	Jas. Reyno	Herring Cove	3	32 20
126132	Lottie V. M	Halifax	10	Isaac Morash	West Dover	3	29 20
131075	Margaret E	Lunenburg	11	Neil Fleming	Ketch Harbour	3	30 20
130592	Margaret M. Gray	Halifax	23	Angus Gray	Pennant	5	55 00
126916	Marion R	"	22	Wm. C. Power	E. Jeddore	4	47 60

LIST of Vessels which received Fishing Bounty, etc.—Nova Scotia—*Continued.*

HALIFAX COUNTY—*Concluded.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner, or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
133667	Marjory N.	Halifax	11	H. W. Nickerson	Pennant	3	30 20
130595	Marona	"	25	Peter Murphy	Owls Head	3	44 20
133669	Mary K	"	12	Wm. Henneberry	Eastern Passage	3	31 20
131071	Mary Maude	Lunenburg	10	E. Johnson	West Dover	2	22 80
131064	Mattapex	"	12	Chas. Scott	Indian Harbour	3	31 20
130821	Mianus	"	15	M. Duggan	East Dover	3	34 20
103539	Neva	Halifax	11	H. Marryatt	Pennant	4	36 60
131167	Ovila	Lunenburg	23	G. Henneberry	Sambro	6	61 40
130727	Pearl Beatrice H.	"	32	Wm. Hubley	Indian Harbour	7	76 80
116745	Perseverance	Halifax	12	F. A. Boutilier	"	4	37 60
130563	Phoebe M.	Lunenburg	12	David Morash	West Dover	3	31 20
131076	Plymouth Rock	"	24	Otis Scott	East Dover	5	56 00
116749	Reliance	Halifax	14	J. Howard	Terence Bay	5	46 00
126823	Rosie L	Lunenburg	20	Geo. Little	"	7	64 80
122307	Sadie H	"	17	Chas. Beaver	Harrigan Cove	3	36 20
130722	Tacoma	Halifax	11	A. J. Wambolt	Indian Harbour	3	30 20
130949	Titus McLeod	Lunenburg	11	Jas. Berringer	West Dover	3	30 20
133661	Una E. Hart	Halifax	21	J. L. Hart	Sambro	6	59 40
122429	Uncas	"	11	M. L. Nickerson	"	5	43 00
131171	Valerie S.	Lunenburg	17	J. Slaunwhite	Terence Bay	7	61 80
117142	Valkyria	Halifax	13	David Levy	Sober Island	4	38 60
130686	Vera May	Lunenburg	22	Joel Zinck	Halifax	3	41 20
130579	Victor S.	"	11	C. Young	Boutilier's Cove	3	30 20
133666	Village Leaf	Halifax	78	G. Gaetz et al.	Seaforth	18	193 20
126912	Viola G. Hartlin.	"	25	P. Hartlin, Sr.	East Jeddore	8	76 20
133673	Viola M. Hutt	"	23	R Hutt et al	Owls Head	5	55 00
126917	Violet C.	"	14	Jas. H. Smith	Sambro	3	33 20
130566	Violet F.	Lunenburg	12	W. Frederick	Indian Harbour	2	24 80
134392	Vivian C.	"	10	A. Cleveland	West Dover	3	29 20
116283	Vixen	Halifax	15	H. McKenzie	Gerrard's Island	4	40 60
126478	Willetta	"	15	Jos. Gray	Sambro	6	53 40
130600	Willie Roy	"	13	A. Sullivan	Herring Cove	2	25 80

INVERNESS COUNTY.

96778	Campania	Pt. Hawkesbury	11	Robin, Jones & Whitman	Eastern Harbour	5	43 00
126575	Cheticamp	"	10	L. Chiasson	"	4	35 60
103325	Elizabeth Ann	"	11	David Bourgeois	"	4	36 60
130781	Flora Matthews	"	16	Matthews & Scott	"	7	60 80
103317	Flying Star	"	11	S. Bellefontaine	"	4	36 60
130945	Gladys Irena	Lunenburg	16	D. A. Cormier	Grand Etang	5	48 00
126573	Great Dipper	Pt. Hawkesbury	10	J. R. Doucet	"	4	35 60
126577	Gros Ours	"	14	E. LeBlanc	"	5	46 00
126579	Hattie L. B	"	12	Matthews & Scott	Eastern Harbour	4	37 60
126578	Hennepin	"	12	J. M. Cormier	Grand Etang	6	50 40
130785	J. S. M	"	16	J. S. Muise	Cape Rouge	4	41 60
130782	Karina II	"	21	L. S. Chiasson	Little River	7	65 80
126101	Lantana	Lunenburg	17	Robin, Jones & Whitman	Eastern Harbour	5	49 00
103316	Laura	Pt. Hawkesbury	10	"	"	4	35 60
126574	Laurent Aucoin	"	10	L. L. Aucoin	Point Cross	4	35 60
103315	Lillie	"	12	Matthews & Scott	Eastern Harbour	5	44 00
96775	Louise	"	11	S. Bellefontaine	"	4	36 60
103330	Lucy	"	11	Robin, Jones & Whitman	"	5	43 00
126104	M. Unity	Lunenburg	26	"	"	5	58 00

LIST of Vessels which received Fishing Bounty for the year 1914-15—Nova Scotia—*Con.*

INVERNESS COUNTY—*Concluded.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
126576	M.C.G. Boudreau.	Pt. Hawkesbury	22	Simon Bellefontaine..	Eastern Harbour..	5	54 00
117056	Margaret.....	Canso	16	Matthews & Scott....	"	6	54 40
96771	Marie	Pt Hawkesbury.	10	Robin, Jones & Whitman.....	"	4	35 60
130784	Marie H. Leblanc.	" ..	10	G. Leblanc	Belle Cote.....	3	44 20
96777	Marie Joseph.....	" ..	11	Robin, Jones & Whitman.....	Eastern Harbour..	4	36 60
103314	Mary..... ..	" ..	10	W. R. Doucet.....	Grand Etang.....	6	48 40
111797	Mermaid	" ..	13	Thomas Harris.....	Plateau	4	38 60
103326	Mizpah.....	" ..	10	Thos. LeBrun..... ..	Grand Etang.....	6	48 40
121893	Orinoco	Liverpool.....	13	Jas. White	Margaree Harbour	5	45 00
126580	Paul V.....	Pt Hawkesbury.	14	Robin, Jones & Whitman.....	Eastern Harbour..	5	46 00
130786	St. Clements.. ...	"	12	"	" ..	4	37 60
111792	Saint Aubin	" ..	15	"	" ..	5	47 00
111800	Tallahassee.....	" ..	12	S. Bellefontaine.....	" ..	4	37 60
122238	Violet and Annie.	Halifax	12	Robin, Jones & Whitman.....	" ..	4	37 60
96773	Virgin	Pt. Hawkesbury.	10	"	" ..	4	35 60
126571	Warbler.....	" ..	10	"	" ..	5	42 00
130783	Zambuck	" ..	17	"	" .	4	42 60

KINGS COUNTY.

97150	Gleaner	St. Andrews....	13	E Spicer, jr.....	Harbourville.....	3	32 20

LUNENBURG COUNTY.

130466	A. G. Eisnor.....	Lunenburg	93	J. Ernst & Son.....	Mahone Bay.....	17	188 80
130675	A. L. Conrad. ...	"	11	Albert Conrad. . .	Rose Bay	3	30 20
130947	Abacena.....	"	88	J. W. Sarty...	Pleasantville.....	19	201 60
130739	Ada M. Westhaver	"	100	E. F. Zwicker.....	Lunenburg.....	20	208 00
131173	Accrescent..	" ...	11	E. Smeltzer.....	"	2	23 80
130956	Alfarata.....	"	92	J. Ernst & Son ...	Mahone Bay.....	17	188 80
134046	Allis n H. Maxner	"	92	E. F. Zwicker.....	Lunenburg..	20	208 00
130475	Alma M.....	"	15	Henry Miller.....	Eastern Point.....	3	34 20
130942	Amy B. Silver....	"	100	Kenneth Silver.....	La Have.....	22	220 80
116522	Anita	"	16	Wm. Cleversey	West La Have....	5	48 00
133816	Anita P.....	"	12	C. Publicover	Blandford	2	24 80
126585	Annie L. Spindler.	"	95	E. F. Zwicker.....	Lunenburg.	20	208 00
134391	Annie Lunn.....	"	10	Foster Young.....	"	1	16 40
131165	Araminta.....	"	95	E. F. Zwicker... ...	"	20	208 00
134047	Aranoka.....	" ..	94	Robert Hiltz.....	Indian Point.....	17	188 80
130818	Araucania.....	"	92	J. M. Rhodenizer....	Lunenburg.	19	201 60
131176	Arcola.....	"	97	H. W. Adams..	"	19	201 60
134058	Ard	"	11	F. Mason.	"	3	30 20
130465	Artisan	" ...	98	Wm. Arenburg.. ..	"	20	208 00
130737	Asaph F.....	"	14	Reuben Fleet	Blandford	3	33 20
131163	Associate.....	"	96	Wm. Duff.	Lunenburg...	21	214 40
126587	Assurance.... .	"	99	Wm. C. Smith.....	"	19	201 60
133814	Austin B	"	10	Albert Bush	West Dublin.... .	3	29 20
134041	Azanetta..	"	35	B. Cleveland.	Bayswater.	4	60 60
126830	Benevolence.....	"	99	Wm. C. Smith.....	Lunenburg.	19	201 60
130468	Benjamin C. Smith	"	100	"	"	19	201 60
131061	Bernice..... . .	" . ..	10	James Langille.....	Tancook	2	22 80
130679	Bessie A. P.	"	11	M. Publicover.....	Blandford.....	3	30 20

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LIST of Vessel which received Fishing Bounty for the year 1914-15—Nova Scotia—*Con.*

LUNENBURG COUNTY—*Continued.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew Paid.	Amount of Bounty Paid.
							$ cts.
130726	Beulah W.	Lunenburg	11	Herbert Young	Tancook	2	23 80
111734	Blake	"	99	J. N. Rafuse	Conquerall	20	208 00
131080	Blanche	"	10	Noah Baker	East River Pt.	3	29 20
131070	Blanche L. G.	"	11	Henry Gates	Blandford	3	30 20
126393	Burnett C.	"	105	A. V. Conrad	Parks Creek	17	188 80
130953	Cantow	"	13	E. Publicover	Blandford	2	25 80
134054	Carl S.	"	88	A. V. Conrad	Parks Creek	18	195 20
134062	Carranza	"	99	Harris Conrad	Voglers Cove	24	233 60
126119	Carrie L. Hirtle	"	99	Wm. C. Smith	Lunenburg	19	201 60
121999	Cavalier	"	13	K. Cleveland	Blandford	4	38 60
126586	Cecil L. Beck	"	93	Wm. C. Smith	Lunenburg	19	201 60
130987	Cecil P. L.	"	11	V. Langille	Tancook	3	30 20
130944	Cento	"	90	Dean Fralick	Pleasantville	19	201 60
122315	Clintonia	"	96	Wm. C. Smith	Lunenburg	20	208 00
111736	Coronation	"	98	H. W. Adams	"	18	195 20
130731	Daisy Z.	"	11	S. Zinck	Blandford	3	30 20
126824	Dan Patch	"	12	Robert Levy	Lunenburg	3	31 20
111711	Defender	"	98	A. Knickle	"	17	188 80
131177	Delawana	"	95	Wm. C. Smith	"	19	201 60
130948	Delia H.	"	11	Joseph Hirtle	Tancook	3	30 20
130562	Donald L. Silver	"	94	Wm. Arenburg	Lunenburg	20	208 00
130728	Dora C.	"	12	H. Cleveland	Blandford	3	31 20
130463	Doris V. Myra	"	99	Clarence Myra	Riverport	19	201 60
116540	Douglas Adams	"	99	H. W. Adams,	Lunenburg	18	195 20
133805	E. B. Walters	"	98	Cyrus Walters	Parks Creek	22	220 80
116566	E. M. Zellars	"	84	Fraser Gray	La Have	20	208 00
122009	Earl Grey	"	96	E. F. Zwicker	Lunenburg	17	188 80
126391	Edith Marguerite	"	95	F. Himmelman	Riverport	16	182 40
112099	Electro	"	88	W. N. Reinhardt	La Have	19	201 60
83308	Ella	Liverpool	10	J. C. Hanson	Mahone Bay	1	16 40
121994	Ella Mason	Lunenburg	74	J. W. Publicover	La Have	13	157 20
133815	Elma M.	"	10	S. McDonald	Black Rocks	3	29 20
130690	Elsie C.	"	10	Wm. Cross	Tancook	4	35 60
130827	Elsie L. Corkum	"	97	Amiel Corkum	M. La Have	19	201 60
130819	Elsie Porter	"	100	W. N. Reinhardt	"	20	208 00
131079	Elsie S.	"	10	Robert Schnare	Blandford	3	29 20
134059	Elva M. Y.	"	11	M. Young	Tancook	3	30 20
131073	Estey	"	10	N. Silver	Lunenburg	4	35 60
112087	Ethel	"	99	W. N. Reinhardt	La Have	17	188 80
116518	Eva June	"	93	Wm. C. Smith	Lunenburg	17	188 80
126814	Evelyn V. Miller	"	99	H. W. Adams	"	20	208 00
130728	F. M. Toro	"	100	E. F. Zwicker	"	20	208 00
122304	Falcon	"	85	E. Walters	Parks Creek	19	201 60
130734	Falka	"	100	E. F. Zwicker	Lunenburg	19	201 60
122004	Florence B.	"	46	C. Iversen	"	9	103 60
130575	Forman F.	"	14	Obed Fleet	Blandford	2	26 80
126581	Frank H. Adams	"	93	F. Anderson	Lunenburg	20	208 00
130825	Frank J. Brinton	"	92	William Gillfoy	"	18	195 20
130464	Gigantic	"	99	A. V. Conrad	Parks Creek	19	201 60
130812	Gladys and Lillian	"	84	H. W. Adams	Lunenburg	20	208 00
121851	Gladys B. Smith	"	100	Wm. C. Smith	"	22	220 80
134049	Golden West	"	82	W. N. Reinhardt	LaHave	19	201 60
122003	Grace Darling	"	64	A. Lantz	Mahone Bay	5	96 00
133810	Granite	"	92	Wm. Richard	W. La Have	24	233 60
116527	Guide	"	73	W. N. Reinhardt	LaHave	17	181 80
131068	H. Mason	"	10	Casper Mason	Lunenburg	3	29 20
133807	H. H. McIntosh	"	99	Wm. C. Smith	"	20	208 00
130678	Harper	"	11	H. Publicover	Blandford	3	30 20
130461	Harry W. Adams	"	99	H. W. Adams	Lunenburg	19	201 60
126392	Hawanee	"	99	Wm. C. Smith	"	19	201 60

LIST of Vessels which received Fishing Bounty for the year 1914-15—Nova Scotia—*Con.*

LUNENBURG COUNTY—*Continued.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew Paid.	Amount of Bounty Paid.
							$ cts.
126102	Hazel L. Ritcey	Lunenburg	92	Reuben Ritcey	Riverport	18	195 20
122005	Hy. L. Montague	"	96	Wm. C. Smith	Lunenburg	18	195 20
130684	Hollo	"	11	O. Hubley	Bayswater	4	36 60
131077	Hosie	"	10	S. Wilneff	Tancook	3	29 20
132813	Howard Stanley	"	15	S. Langille	"	4	40 60
130673	Hughie V. L	"	10	Rodgers Levy	"	3	29 20
130950	Hurrah	"	13	Otis Stevens	"	5	45 00
131162	Ida M. Zinck	"	113	H. Wynacht	Lunenburg	19	201 60
126813	Itaska	"	100	E. F. Zwicher	"	19	201 60
126584	J. B. Young	"	100	John B. Young	"	21	214 40
130943	J. D. Hazen	"	99	Wm. C. Smith	"	20	208 00
134053	J. W. Margeson	"	79	Jos. Conrad	La Have	22	219 80
134045	J. Henry MacKenzie	"	100	Wm. C. Smith	Lunenburg	20	208 00
133819	Jas. Burton Cook	"	100	"	"	22	220 80
130467	Jennie E. Duff	"	99	Wm. Duff	"	19	201 60
126822	Jennie E. Ritcey	"	97	Wm. C. Smith	"	20	208 00
133804	John Parker	"	99	W. N. Reinhardt	La Have	20	208 00
126819	Laura M. Levy	"	11	Maynard Levy	Lunenburg	3	30 20
134043	Lauretta Frances	"	95	E. F. Zwicker	"	21	214 40
130473	Lavina B	"	11	M. Boutilier	Mill-Cove	4	36 60
131170	Leone G	"	12	Alex. Creek	Eastern Point	4	37 60
130959	Leta J. Schwartz	"	95	E. F. Zwicker	Lunenburg	22	220 80
130462	Lewis H. Smith	"	98	Wm. C. Smith	"	19	201 60
130815	Lillian B. Corkum	"	97	E. F. Zwicker	"	20	208 00
133817	Lillian G	"	11	David Graves	Chester	1	17 40
130811	Lillian M. Richard	"	98	Fraser Gray	La Have	22	220 80
126821	Lloyd George	"	99	G. Himmelman	Riverport	21	214 40
133820	Lobelia L	"	25	Chas. Levy	Tancook	4	50 60
131065	Lois M. C	"	12	Alvin Cross	"	3	31 20
130820	Lottie A. Silver	"	96	R. Silver	Lunenburg	20	208 00
130570	Lottie B. L	"	11	Albert Levy	Tancook	3	30 20
130688	Lottie M. Blanche	"	12	David Moland	East Chester	2	24 80
130730	Lowell F. Parks	"	99	R. D. Parks	Parks Creek	20	208 00
134055	Loyola	"	91	J. N. Rafuse	Conquerall	18	195 20
130814	Lucille B. Creaser	"	99	Arthur Creaser	Riverport	19	201 60
131074	Lunenberg	"	10	George Baker	Cross Island	2	22 80
130732	M. M. Gardner	"	100	Wm C. Smith	Lunenburg	18	195 20
130477	Madge A. P	"	10	C. Publicover	Blandford	2	22 80
131180	Malada	"	21	Harris Fleet	"	4	46 60
116523	Mankato	"	76	Edmen Walters	Parks Creek	18	191 20
121862	Marina	"	78	W. N. Reinhardt	La Have	19	199 60
126829	Mark Twain	"	12	William Wight	Eastern Point	3	31 20
130829	Marion A. Silver	"	99	Robert Silver	Riverport	20	208 60
130816	Marion Adams	"	99	H. W. Adams	Lunenburg	20	208 00
126820	Marion Mosher	"	93	J. M. Rhodenizer	"	19	201 50
130941	Mary & Mildred	"	100	C. Iversen	"	20	208 00
131169	Mary D. Young	"	99	J. B. Young	"	15	176 00
133803	Mary F. Fleming	"	94	C. Iversen	"	20	208 00
130822	Matanzas	"	96	Wm. C. Smith	"	19	201 60
130736	Matapedia	"	98	Wm. Duff	"	22	220 80
130676	Matilda H	"	11	C. Heisler	Tancook	4	36 60
133818	Mildred Baker	"	10	Howard Baker	Lunenburg	3	29 20
121865	Millie Louise	"	80	J. Ernst & Son	Mahone Bay	16	182 40
126107	Minnie M. Mosher	"	73	William Duff	Lunenburg	16	175 40
134051	Monarchy	"	80	J. Lohnes	La Have	20	208 00
126113	Muriel B. Walters	"	98	Wm. Arenburg	Lunenburg	20	208 00
130733	Muriel E. Winters	"	100	F. Anderson	"	20	208 00
130573	Muriel L	"	15	Peter Lowe	Mahone Bay	3	34 20
122004	Muriel M. Young	"	100	J. B. Young	Lunenburg	19	201 60
126663	Nellie J. Banks	"	35	Fraser Gray	La Have	10	99 00
94833	News Boy	Port Medway	16	James Bell	"	4	41 60

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List of Vessels which received Fishing Bounty, etc.—Nova Scotia.—*Continued.*

LUNENBURG COUNTY—*Concluded.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
126827	Nobility	Lunenburg	99	Wm. Duff	Lunenburg	19	201 60
131178	Nordica	"	98	"	"	22	220 80
134044	Norma P. Coolen	"	95	W. D. McLean	Mahone Bay	17	188 80
130955	No Tow	"	15	H. Publicover	Blandford	2	27 80
130826	Original	"	98	Wm C. Smith	Lunenburg	19	201 60
130572	Otokia	"	89	J. Ernst & Son	Mahone Bay	17	188 80
131067	P. C. Mason	"	11	P. Mason	Eastern Point	3	30 20
133801	Pasadena	"	91	J. Ernst & Son	Mahone Bay	19	201 60
130671	Pauline L	"	15	H. Ernst	Lunenburg	4	40 60
126589	Percival S. Parks	"	109	Simon Parks	Parks Creek	19	201 60
130828	Phyllis L. Westhaver	"	99	J. M. Rhodenizer	Lunenburg	20	208 00
130817	R. L. Borden	"	99	A. Himmelman	Rose Bay	19	201 60
130951	Rakwana	"	11	Albert Meisner	Lunenburg	4	36 60
130569	Rebecca M. L	"	11	N. Levy	Tancook	3	30 20
126114	Revenue	"	99	Wm C. Smith	Lunenburg	20	208 00
130478	Review	"	74	Wm. Duff	"	16	176 40
130561	Right Away	"	19	C. W. Vogler	Vogler's Cove	4	44 60
134043	Rita H	"	10	P. Himmelman	LaHave	3	29 20
130480	Roland A. T	"	11	Henry Tanner	Black Rocks	3	30 20
130946	Ronald C	"	14	C. Tanner	"	5	46 00
130689	Rosanna T	"	10	I. Tanner	Eastern Point	3	29 20
126034	Russel H. Pentz	"	99	A. V. Conrad	Parks Creek	19	201 60
130685	S. F. Levy	"	12	C. Levy	Tancook	3	31 20
130580	Sadie Evelyn	"	11	M. Publicover	Blandford	2	23 80
130724	Sealer	"	11	Amos Levy	Cross Island	4	36 60
133808	Selma M	"	11	Albert Mason	Tancook	2	23 80
126582	Sesame	"	15	J Ernst	Pleasantville	2	27 80
130474	Shant Alee	"	11	Robert Wight	Eastern Point	2	23 80
130471	Skip	"	11	Arthur Mason	Lunenburg	4	36 60
134050	Tancook	"	37	Ernest Covey	Tancook	5	69 00
131161	Thelma C	"	13	F. Cleveland	N. W. Cove	2	25 80
126590	Uda A. Saunders	"	95	E. F. Zwicker	Lunenburg	19	201 60
122306	Undaunted	"	15	C. Whynot	Vogler's Cove	3	32 20
131179	Vera E. Himmelman	"	99	Wm. Duff	Lunenburg	19	201 60
130681	Verna L	"	12	E. Corkum	East La Have	3	31 20
134042	Viola May	"	100	J. Ernst & Son	Mahone Bay	19	201 60
131166	W. Cortada	"	108	E. F. Zwicker	Lunenburg	19	201 60
131174	W. C. McKay	"	99	J. D. Lohnes	Riverport	20	208 00
131172	W. G. Robertson	"	90	J. W. Publicover	LaHave	19	201 60
130824	W. H. Smith	"	94	Wm C. Smith	Lunenburg	17	188 80
131175	W. T. White	"	99	"	"	19	201 60
130682	Warren G. C	"	10	Jos. Levy	Feltzen South	2	22 80
126120	Warren G. Winters	"	95	F. Anderson	Lunenburg	18	195 20
133809	Warren M. Colp	"	92	Wm. Duff	"	21	214 40
126115	Watauga	"	99	H. W. Adams	"	19	201 60
126818	William C. Smith	"	99	Wm. C. Smith	"	19	201 60
121852	Winnifred	"	99	J. Ernst & Son	Mahone Bay	20	208 00
				QUEENS COUNTY.			
121685	Augusta	Yarmouth	11	Jno. Wagner	Port Medway	3	30 20
130677	Cunner	Lunenburg	10	Thomas Smith	S. W. Port Mouton	3	29 20
122235	Ena A	Barrington	12	A. Leaman	Port Medway	3	31 20
116352	G. B. Zwicker	Port Medway	13	Chas. Zwicker	"	3	32 20
130247	Gaetta	"	16	S. Parke	"	3	35 20
122239	Hilda Brannen	Liverpool	10	M. Pentz	Beach Meadows	2	22 80
121887	Lena	Yarmouth	11	W. Fraser	Port Mouton	3	30 20
126184	Marion C	Liverpool	11	Bert Payzant	Port Medway	3	30 20
131205	Oliver Twist	"	10	A. Huskins	Port Mouton	3	29 20
131062	Three Cousins	Lunenburg	13	Henry Leslie	Liverpool	3	32 20
130725	W. Baker	"	10	Wm. Baker	"	3	29 20

LIST of vessels which received Fishing Bounty, etc.—Nova Scotia—*Continued.*

RICHMOND COUNTY

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner. or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
130740	Albert A. Young	Lunenburg	92	L. N. Poirier	Descousse	22	220 80
116657	Alice M	Yarmouth	26	T. R. Boudrot	Petit de Grat	4	51 60
111472	Annie May	Arichat	17	Peter Landry	"	4	42 60
103463	Annie May	"	11	H. LeLacheur	Martinique	4	36 60
130355	E. L. Comeau	"	14	A. A. Boudrot	Petit de Grat	5	46 00
121866	Eldora	Lunenburg	79	F. J. Poirier	Descousse	17	187 80
80829	Florence B.	Arichat	32	Chas. Boudreau	River Bourgeois	10	96 00
117049	H. C. Phillips	Barrington	11	A. LeBlanc	Martinique	3	30 20
117091	Hazel Maud	Arichat.	10	A. Goyetche	Cape Auguet	4	35 60
126346	Hobo	Barrington	12	Jas. Marchand	Petit de Grat	3	31 20
122183	Justina	Arichat	10	L. LeBlanc	Port Royal	2	22 80
103469	Katie B	"	16	G. McDonald	River Bourgeois	2	28 80
111795	Katie J	Pt. Hawkesbury	11	R. McDonald	Janvrin Island	3	30 20
111480	Lady Laurier	Arichat	12	Paul LeBlanc	Poulamond	2	24 80
117092	Lass of Gowrie	"	14	Jos. Petitpas	Arichat	5	46 00
1073 4	Leah Hardy	Sydney	20	Jno. Burke	River Bourgeois	4	45 60
111905	Lena Jane	Arichat	11	Leo Miller	Poulamond	3	30 20
130359	Lina May	"	10	Daniel T. Wilson	Arichat	1	16 40
116350	Maggie F	"	15	Wm. N. Burke	River Bourgeois	2	27 80
107995	Maggie M. F.	Canso	15	I. Boudreau	"	2	27 80
111798	Marie C	Pt. Hawkesbury	18	A. R. Boudrot	Petit de Grat	6	56 40
116345	Mary Alice	Arichat	10	P. Sampson	L. L'Ardoise	3	29 20
111479	Mary Atalanta	"	15	I. Burke	River Bourgeois	3	34 20
122182	Mary Elizabeth	"	11	P. Burke	"	3	30 20
117099	Mary J.	"	33	H. Sampson	"	9	90 60
103462	Maud	"	20	Henry Duon	Arichat	3	32 80
72067	Minnie	Pt. Hawkesbury	26	Jno. Pelham	Janvrin Island	3	45 20
121869	Petite	Lunenburg	61	A. P. Poirier	Poirierville	16	163 40
130358	Risk	Arichat	11	S. Briand	Cape Auguet	3	30 20
117095	Rodrid Grace	"	17	H. Birrette	L. L'Ardoise	3	36 20
116272	Rosie M. B.	Halifax	75	A. Sampson	River Bourgeois	16	177 40
107318	St. Stephen	Arichat	19	I. Burke	"	3	38 20
130357	S. D. Boudrot	"	11	A. C. Boudrot	Poulamond	3	30 20
96962	Sunrise	Yarmouth	18	Chas. Fougère	River Bourgeois	5	50 00
122190	Virginie S	Arichat	16	E. V. Landry	Petit de Grat	7	60 80
116292	Wilena Fraser	Charlottetown	13	Isaac Dugas	West Arichat	2	25 80
100812	Wyvern	Barrington	25	Jas. D. Walker	Walkerville	4	49 60

SHELBURNE COUNTY.

116235	Alcyone	Digby	52	Lockeport Cold Storage Co., Ltd	Lockeport	11	122 40
122149	Alva	Yarmouth	11	L. Cunningham	Stoney Island	4	36 60
122579	Amerite	"	12	S. B. Nickerson	South Side	4	37 60
122093	Anita	"	11	W. Mathews	E. Ragged Island	3	30 20
117134	Annie Lue	"	10	J. A. Smith	Port La Tour	5	42 00
121890	Annie Smith	"	13	E. Crowell	Up. "	4	38 60
100612	Ardella	Shelburne	10	E. Crowe	Sandy Point	4	35 60
122453	Bertha A	Yarmouth	12	D. H. Flemming	Cape Negro	3	31 20
130508	Blanchard C.	Shelburne	11	A. Swansburg	Little Harbour	4	36 60
121806	Blanche	Yarmouth	10	P. W. Stoddart	Woods Harbour	4	35 60
103186	Brittania	Shelburne	11	Ross Enslow,	West Green H'br.	6	49 40
121681	Claymore	Yarmouth	10	J. R. Shand	Bear-Point	4	35 60
131683	D. E. Nickerson	"	10	J. W. Hemeon	Sandy Point	4	35 60
122462	Daniel S	"	10	A. P. Ross	Stoney Island	3	29 20
121791	Eddie C	"	10	N. E. Smith	Smithville	4	35 60
122570	Edna M	"	11	W. M. Halliday	Bear Point	3	30 20

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LIST of Vessels which received Fishing Bounty, etc.—Nova Scotia—*Continued.*

SHELBURNE COUNTY—*Concluded.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
130504	Ella M. Rudolph-	Shelburne	54	Wm. McMillan	Lockeport	14	143 60
122479	Elva Belle	Yarmouth	11	B. McKenzie	East Green Hbr.	3	30 20
122467	Enterprise	"	10	Oscar Gardner	Port La Tour	3	29 20
121901	Eva M	Barrington	11	Edwd. Goodick	Sandy Point	4	36 60
126345	Eva S	"	10	L. Crowell	Port La Tour.	3	29 20
117048	Evangeline	"	11	F. Crowell	Clark's Harbour	1	17 40
122106	Florence M	Yarmouth	10	Percy Ross	Stoney Island	4	35 60
122146	Flirt	"	16	H. D. Smith	Port La Tour.	3	35 20
117045	Fred. C.	Barrington	12	C. Nickerson	Clam Point	4	37 60
122142	Gertrude	Yarmouth	10	M. Smith	Doctor's Cove	3	29 20
112138	Gladiator	Shelburne	11	Hugh McAlpine	Lockeport	5	43 00
122463	Gladys M	Yarmouth	10	R. Chetwynd	Up. Port La Tour.	3	29 20
130507	Gladys Thorburn	Shelburne	39	J. T. Thorburn	Sandy Point	10	103 00
121797	Hattie & Ina	"	10	Arnold Doane,	Carleton Village	1	16 40
122139	Hazel	Yarmouth	10	G H Crowell	Atwoods Brook	4	35 60
122232	Helen Davis	Barrington	12	F. Ross	Stoney Island	3	31 20
131094	Helen G. McLean	Shelburne	33	K. B. Backman	Shelburne	8	84 20
122141	Hillside	Yarmouth	10	Jno. Williams	W. Green Hbr	3	29 20
123347	IdaM.Cunningham	Barrington	16	W. Hemeon	E. Ragged Island	4	41 60
117131	Ilona & Ida	Yarmouth	13	H. H Brannen	Stoney Island	5	45 00
121904	Ilona & Maggie	Barrington	11	W. Ross	"	4	36 60
122138	Jennie L.	Yarmouth	10	J. A. Smith	Smithville	4	35 60
121795	John L.	"	11	B. Hipson	Sandy Point	3	30 20
121692	Josephine	"	10	H. F. Snow	Vi lagedale	4	35 60
1266.0	Ju ie Opp.	Shelburne	38	H. R. Swim	Lockeport	9	95 60
122290	Kenwood	Yarmouth	84	W. M. Hodge	"	9	137 60
122458	Lila A.	Barrington	10	H. Atkinson	Stoney Isld	4	35 60
130628	Lily M. Hodge	Yarmouth	31	Lockeport Cold Storage	Lockeport	9	88 60
121693	Little Charley	"	10	H. Newell	West Head	2	22 80
121201	Lydia May	Liverpool	39	D. C. Mulhall	Liverpool	11	109 40
122240	Mabel L.	Yarmouth	10	C. Malone	Woods Hbr	3	29 20
83434	Mary May	Shelburne	20	A. J. Firth	Shelburne	3	39 20
117043	Mattie & Charlie	Barrington	10	Wm. Hipson	"	1	16 40
121905	Mira L. Smith	"	14	E. P. Crowell	Port La Tour	4	39 60
121687	Monitor	Yarmouth	10	C. W. Nickerson	Thomasville	3	29 20
122103	Muriel S	"	10	David Hardy	Lit. Port LeHerbert	3	29 20
103800	Nellie I. King	Shelburne	98	G. H. King	Sandy Point	18	195 20
131091	Nellie Viola	"	40	J. T. McKenzie	Lockeport	13	123 20
117132	Nema D.	Yarmouth	10	G. S. Firth	Shelburne	3	29 20
131096	Ohio	Shelburne	42	Roseway Fish Co	"	14	141 60
117050	Olive R	Barrington	14	H. R. Swim	Lockeport		14 00
131099	Opitza	Shelburne	41	"	"	13	124 20
130506	R. L. McKenzie	"	33	R. McKenzie	"	10	97 00
131095	Ronald B.	"	30	F. F. Hunter	Shelburne	11	110 40
130509	Roseway	"	37	Roseway Fish Co	"	12	113 80
126343	Sakotis	Barrington	11	B. J. Newell	West Head	4	36 60
122236	Thelma B.		12	H. R. Swim	Lockeport	3	31 20
90893	Thomas H	Yarmouth	13	J. A. Crowell	Clark's Hbr.	5	45 00
117046	Three Brothers	Barrington	13	R Chetwynd	Up. Port LaTour.		13 00
116448	Togo	Shelburne	18	E. C. Locke	Lockeport	5	50 00
121792	Twin Sisters	Yarmouth	10	Wm. Connell	Clark's Hbr	4	35 60
117143	Valmore	Halifax	11	Clayton Collupy	Lockeport	4	76 20
121873	Viola S.	Yarmouth	16	C. E Van Amburg	"	4	41 60
121690	Winnifred	"	10	L. Goodwin	Woods Harbour	4	35 60
121656	Zilpha	"	10	A. Atwood	Hawk	3	29 20

LIST of Vessels which received Fishing Bounty, etc.—Nova Scotia—*Continued.*

VICTORIA COUNTY.

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
117028	Anna F.	Sydney	14	J. G. Brewer	South Ingonish	3	33 20
126028	Beatrice Donovan.	"	18	Robin, Jones & Whitman	Halifax	5	50 00
130369	Edna R. Hines.	"	18	A. J. Hines	Ingonish Ferry	6	56 40
131213	Elizabeth Donovan	"	11	Wm. T. Donovan	South Ingonish	5	43 00
126562	Hawley Brothers	"	11	Jas. Hawley	Ingonish Ferry	5	43 00
122120	Julia F. C.	"	12	T. A. Young	South Ingonish	5	44 00
126563	Katie Margaret	"	15	J. W. Dunphy.	"	4	40 60
130362	M. C. McDonald	"	17	A. McDonald	"	3	36 20
107355	Mary E	"	10	A. McIntyre	Ingonish Ferry	5	42 00
131214	Phœbe Jordan	"	15	C. J. Williams	South Ingonish	5	47 00
100444	Stella May	Canso	12	Simon P. Hawley	Ingonish Ferry	6	50 40
126567	T. W. J. Whittier.	Sydney	15	T. Whitty.	South Ingonish	5	47 00
130363	V. F. Williams	"	13	Vincent Williams	"	5	45 00

YARMOUTH COUNTY.

121876	Adoriam	Yarmouth	15	Oscar Van Amburg	Pubnico Head	4	40 60
122132	Aerolite	"	16	S. B. Hines	Central Argyle	4	41 60
116898	Agnes M	"	11	Geo. Doucette	Tusket	3	30 20
126808	Agnes Pauline	"	71	R. N. D'Entremont	West Pubnico	19	192 60
111879	Annie B	"	20	Theo. D'Entremont	"	7	64 80
121695	Aroma S.	"	10	L. A. D'Entremont	"	2	22 80
122586	Aspinet	"	14	T. McComiskey	L. E. Pubnico	6	52 40
116828	Beatrice	Barrington	12	W. Goodwin	Argyle Sound	3	31 20
122109	Bella	Yarmouth	18	H. F. Amiro	West Pubnico	4	43 60
122288	Buema.	Shelburne	36	Daniel Ryder	Central Argyle	9	93 60
121654	Charles E.	Yarmouth	13	A. Brannen	Kelley's Cove	6	51 40
121694	Columbia	"	10	F. H. Murphy	Pubnico Head	3	29 20
100605	Dawn	"	49	H. A. Amiro	Yarmouth	10	113 00
103066	Eddie J.	Digby	23	"	"	7	67 80
116205	Eddie James	Yarmouth	79	"	"	20	207 00
116528	Edith F. S.	"	67	"	"	16	169 40
122584	Emilien Burke	"	99	Henry Lewis	"	13	163 20
126807	Elizabeth D	"	79	S. D. D'Entremont	W. Pubnico	21	213 40
122572	Eva	"	12	Thos. Amiro	M. E. Pubnico	5	44 00
122461	Eva E.	"	10	Aaron Allen	Yarmouth	3	29 20
121872	Francis A	"	93	H. A. Amiro	"	20	208 00
122092	Georgie M. Smith.	"	13	W. K. Pierce	Cedar Lake	5	45 00
122468	Gladys	"	11	P. W. Nickerson	Yarmouth	1	17 40
122574	Gladys Olia.	"	10	Wm. McNair	Argyle Sound	2	22 80
117137	Glorianna	"	10	Henry White	Abram's River	3	29 20
122099	Hilda	"	17	Jas. A. Boudreau	Wedgeport	6	55 40
134161	James R. Clarke	"	47	H. P. LeBlanc	"	13	130 20
130626	Joseph Lester.	"	15	J. R. Amiro	West Pubnico	4	40 60
117136	Laura B.	"	10	Moses Doucette	Morris Island	5	42 00
116104	Laurie J.	"	65	J. D'Entremont	West Pubnico	19	186 60
103709	Lizzie E.	"	19	E. J. Ellis	Port Maitland	3	38 20
130625	Louis P.	"	60	L. P. D'Entremont	West Pubnico	12	136 80
116210	Lucy A.	"	32	R. E. LeBlanc	Wedgeport	9	89 60
116899	Lydia L.	"	14	A. LeBlanc	"	2	26 80
122240	M. L. Nickerson	Barrington	10	H. Nickerson	Argyle Sound	3	29 20
121879	Matilda	Yarmouth	10	Wm. Hatfield	Yarmouth	4	35 60
111523	Mildred P.	"	11	H. McManus	"	3	30 20
122231	Minola	Barrington	13	Stillman Smith	Lr. Argyle		13 00
126187	Nathalie	Yarmouth	28	Yarmouth Trading Co	Yarmouth	9	85 60
111875	Nelson A.	"	72	H. A. Amiro	"	14	161 60
122451	Olga A.	"	10	J. E. White	"	3	29 20
103706	Regina	"	10	T. A. D'Entremont	West Pubnico	4	35 60

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LIST of Vessels which received Fishing Bounty, etc.—Nova Scotia—*Concluded.*

YARMOUTH COUNTY—*Concluded.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
107610	St. Bernard	Weymouth	24	Robt. Wilson	L. E Pubnico	10	88 00
117044	S. B. Millard	Barrington	20	A. Amiro	West Pubnico	7	64 80
116656	Silver Spray	Yarmouth	11	C. J. O'Hanley	Yarmouth	3	30 20
103783	Springwood	Shelburne	98	Wm. McMillan	Lockeport	18	195 20
117138	Two Brothers	Yarmouth	11	A. Cosman	Yarmouth	4	36 60
121699	Una	"	10	S S. Nickerson	Yarmouth Bar	4	35 60
103711	Venite	"	24	J. E. Crosby	Yarmouth	3	43 20
121894	Vice Reine	"	12	Hugh McManus	"	6	50 40
134163	Viola A	"	20	J. E. Pothier	Eel Brook	2	32 80
122452	Virginia	Barrington	17	Wm. A. Surette	Yarmouth	4	42 60
107542	W. E. Gladstone	St. John	19	Alex. Shaw	Sandford	2	31 80
122465	White Wing	Yarmouth	11	Joseph Harris	Yarmouth	2	23 80
126348	Wm. N. Ryder	Barrington	70	Don. C. Smith	Woods Harbour	18	185 20

PROVINCE OF NEW BRUNSWICK.

CHARLOTTE COUNTY.

92517	Ada	St. Andrews	10	Wm. Matthews	Letete	3	29 20
107903	Ava M	"	17	Geo. A. Johnson	Woodward's Cove	5	49 00
107911	Bertie	"	13	W. Johnson	"	2	25 80
122573	Bohemia	"	10	T. M. Dakin	North-Head	5	42 00
122250	Bonita	"	15	J. Carter	Seeley's Cove	3	34 20
111898	Catherine	Weymouth	11	R. A. Main	Woodward's Cove	4	36 60
103114	Edward Morse	St. Andrews	32	Alex. Calder	Campobello	7	76 80
111522	Elizabeth	Digby	21	F. W. Avery	North Head	5	53 00
111515	Ena & Elsie	St. John	13	Wm. J. Sparks	Beaver Harbour	1	19 40
111527	Etta H	Digby	10	G. Justason	Black's Harbour	3	29 20
130428	Fannie May	St. Andrews	25	Wm. McLellan	Campobello	7	69 80
107902	Fin Back	"	24	Jno. Ingersoll	Woodward's Cove	4	49 20
111552	Flora B	"	13	N. Ingersoll	"	2	25 80
112282	Florence H	Digby	20	John Malloch	Wilson's Beach		20 00
122247	Frances L	St. Andrews	11	Jno. Ingersoll	Woodward's Cove	3	30 20
111839	Harry C	Digby	16	Lewis Matthews	Letete	4	41 60
122248	Hattie B	St. Andrews	10	W. Benson	Seal Cove	3	29 20
117437	Hattie L	"	12	Edwd. Ingalls	Grand Harbour	3	31 20
103121	Island Girl	"	17	B Lambert	Woodward's Cove	4	42 60
122591	Jennie T	"	31	Jas. Nesbitt	North Head	8	82 20
103997	Jessie James	"	11	J Frankland	White Head	2	23 80
88273	Lillian E	"	13	A. Wallace	Black's Harbour	1	19 40
122571	Lita C	Yarmouth	13	C. B. Cross	Beaver Harbour	3	32 20
130427	Mollie G. Gaskill	St. Andrews	23	Jos. Gaskill	North Head	7	67 80
121660	Squanto	Yarmouth	11	L. Newman	Campobello		11 03
59387	Telephone	St. Andrews	19	Alfred Stanley	North Head	8	79 80
103111	Volunteer	"	14	Geo. Ingersoll	Woodward's Cove	2	26 80
97149	Winnie	"	12	H. Holland	Seeley's Cove	3	31 20

GLOUCESTER COUNTY.

130658	Abutilon	Chatham	19	Jos. Lacroix	Caraquet	4	44 60
72099	Adelina	"	12	P. Blanchard	"	4	37 60
103081	Albatross	"	13	Wm. Fruing & Co.	"	4	38 60
112156	Albert W	"	10	P. Chiasson	"	4	35 60
130985	Alexisna	"	17	R. A. Noel	Little Lamèque	5	49 00
122057	Alice	"	15	S. Duguay	"	5	47 00

List of Vessels which received Fishing Bounty, etc.—New Brunswick—*Continued.*

GLOUCESTER COUNTY—*Continued.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	Number of Crew paid.	Amount of Bounty paid.
							$ cts.
130332	Alika P.	Chatham	15	Joel Paulin	Lamèque	3	34 20
112162	Alma	"	12	A. Duguay	"	5	44 00
92419	Anna	"	12	J.S. Ache	"	4	37 60
100960	Annie M.	"	11	W. S. Loggie Co.	Chatham	5	43 00
96739	Argeline	"	14	F. T. B. Young	Caraquet	5	46 00
134332	Arseneau Bros	"	10	J. E. Arseneau	Four Roads	3	29 20
130988	Aviator	"	17	P. S. Lanteigne	Caraquet	5	49 00
103072	Ben-Hur	"	12	A. Leclerc	"	5	43 00
100975	Big Bear	"	10	G. Plourde	"	3	29 20
100299	Blanchard	"	12	Robin, Jones & Whitman	"	4	37 60
103589	Blenheim	"	13	"	"	4	38 60
103780	Britannia	"	13	Wm. Fruing & Co.	"	4	38 60
130657	Bolina	"	20	Robin, Jones & Whitman	"	4	45 60
100780	Britannic	"	12	W. S. Loggie Co.	Chatham	5	44 00
111465	C. R. C.	"	13	Robin, Jones & Whitman	Caraquet	4	38 60
100988	Caesar	"	10	G. P. Chiasson	"	4	35 60
100774	Calliope	"	12	R. Hébert	"	4	37 60
134324	Canna	"	14	Robin, & Jones Whitman	"	4	39 60
130339	Caraquet	"	19	P. Doiron	"	5	51 00
130996	Castalenno	"	28	Robin, Jones & Whitman	"	4	53 60
134005	Catch Me	"	17	P. E. Le Bouthillier	"	4	42 60
103271	Celia	"	11	D. D. Landry	"	4	36 60
103585	Cerdric	"	14	H. X. Chenard	"	4	39 60
143911	Contribution	"	11	G. Chenard	"	3	30 20
100784	Charlotte	"	13	F. T. B. Young	"	4	38 60
103083	Corsair	"	10	Wm. Fruing & Co	"	3	29 20
133920	Cute	"	12	Noe Chiasson	Island River	5	44 00
100913	Daffodil	"	10	Wm. Fruing & Co	Caraquet	4	35 60
130998	De Grace	"	10	Jas. De Grace	Shippegan	3	29 20
103076	Dipper	"	12	W. S. Loggie Co.	Chatham	4	37 60
130982	Dit-on	"	12	J. A. Poirier	Caraquet	3	31 20
103948	Dora	"	12	Robin, Jones & Whitman	"	4	37 60
112155	Dora	"	10	S. Doiron	Miscou Harbour	3	29 20
122053	Dorie	"	10	P. P. Chiasson	Island River	3	29 20
100999	Dove	"	11	P. P. Morais	Caraquet	4	36 60
100998	Eagle	"	10	A. Gauvin	Mizonette	5	42 00
116979	Elie Anne	"	17	J. J. Doiron	Caraquet	4	42 60
100293	Eliza	"	15	F. T. B. Young	"	4	40 60
103590	Eliza	"	13	Robin, Jones & Whitman	"	4	38 60
130986	Emerencienne	"	17	T. Noël	Lameque	5	49 00
134009	Emily J	"	18	John Luce	Island River	4	43 60
92585	Emma	Gaspé	19	Wm. O'Keefe	Caraquet	4	44 60
100911	Emperor	Chatham	10	Wm. Fruing & Co.	"	3	29 20
100786	Empress	"	12	F. T. B. Young	"	4	37 60
133925	En Avant	"	11	Andre Ache	Lameque	3	30 20
100772	Estelle	"	13	Harry Rive	Caraquet	3	32 20
100787	Ethel	"	11	F. T. B. Young	"	5	43 00
133916	Etoile d'un Marin	"	20	Octave Noël	Lameque	5	52 00
122058	Evangeline	"	10	V. Frigault	Mizonette	3	29 20
103101	Falcon	"	10	J. H. Chiasson	Caraquet	3	29 20
103077	Fame	"	10	G. D. Mallet	Shippegan	4	35 60
133926	Fidelis	"	11	A. L. Duguay	Little Lameque	3	30 20
122621	Fillera	"	18	Harry Rive	Caraquet	5	50 00
100298	Fisher	"	12	L. Guignard	Lameque	4	37 60

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LIST of Vessels which received Fishing Bounty, etc.—New Brunswick—*Continued.*

GLOUCESTER COUNTY—*Continued.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
130654	Fish Seeker	Chatham	20	G. J. Gallien	Caraquet	3	39 20
111468	Fleetwing	"	14	Wm. Fruing & Co.	"	4	39 60
112165	Flying Cloud	"	13	W. Robichaud	Shippegen	5	45 00
112151	Flying Foam	"	18	Robin, Jones & Whitman	Caraquet	3	37 20
116479	Fortuna	"	10	X. Poirier	"	3	29 20
111467	Four Brothers	"	13	Henri Albert	"	4	38 60
134007	Fred L.	"	18	Fred Lanteigne	Island River	5	50 00
100778	Gambetta	"	13	W. S. Loggie Co.	Chatham	4	38 60
111464	Gazelle	"	13	Robin, Jones & Whitman	Caraquet	4	38 60
100954	Gazelle	"	10	W. S. Loggie Co.	Chatham	5	42 00
96733	Gem	"	12	Wm. Fruing & Co.	Caraquet	5	44 00
103766	Genesta	"	12	J. G. Chiasson	Island River	4	37 60
116980	Georgina	"	15	W. S. Loggie Co.	Chatham	4	40 60
103282	Gilknockie	"	11	J. N. LeBouthillier	Caraquet	3	30 20
130336	Ginger	"	19	L. L. Friolet	"	4	44 60
111848	Gipsy	"	15	Wm. Fruing & Co.	"	5	47 00
103086	Gipsy	"	20	W. S. Loggie Co.	Chatham	6	58 40
107775	Gold Seeker	"	13	Robin, Jones & Whitman	Caraquet	4	38 60
122491	Good Intent	"	10	A. D. Chiasson	Lameque	3	29 20
112157	Grasshopper	"	16	Harry Rive	Caraquet	4	41 60
92418	Grip	"	11	G. Chenard	"	4	36 60
111849	Happy Home	"	16	Harry Rive	"	4	41 60
100956	Harold N.	"	12	P. Mallet	Shippegan	5	44 60
122289	Helen and Hilda	"	12	Geo. Matthews	"	3	31 20
107771	Heron	"	13	Wm. Fruing & Co.	Caraquet	4	38 60
103765	Hirondelle	"	11	A. Leclerc	"	4	36 60
103934	Hope	"	11	Jno Michon	"	5	43 00
100906	Hotspur	"	10	I. Lanteigne	"	2	22 80
134336	Hughanna	"	11	J. H. B. Sewell	"	4	36 60
130992	Hoy	"	11	M. Noël	Lameque	3	30 20
117181	Ida	"	16	Jos. Savoy	"	4	41 60
103931	Irene	"	12	Wm. Fruing & Co.	Caraquet	4	37 60
96724	Isabel	"	11	J. B. Hebert	"	4	36 60
134337	J. H. L.	"	11	Robin, Jones & Whitman	"	3	30 20
131006	J. L. B.	"	13	J. N. Bouthillier	"	3	32 20
103289	Jersey Lily	"	12	Wm. Fruing & Co.	"	3	31 20
100958	John B	"	12	W. S. Loggie Co.	Chatham	4	36 60
130991	Joseph Marie G.	"	22	Charles Gauvin	Lit. Lameque	4	47 60
100965	Josephine	"	11	Harry Rive	Caraquet	4	36 60
112169	Kathleen	"	15	Wm. Fruing & Co.	"	5	47 00
111466	King Edward	"	14	Robin, Jones & Whitman	"	4	39 60
103949	Kingfisher	"	13	Wm. Fruing & Co.	"	5	45 00
103288	Kite	"	10	P. E. Lanteigne	"	3	29 20
107774	Klondyke	"	14	Robin, Jones & Whitman	"	4	39 60
103283	Koh-i-noor	"	13	J. A. Doiron	"	4	38 60
130984	L'Acadie	"	17	Lange Ache	Lameque	5	49 00
130337	L'Acadienne	"	18	J. S. Noël	"	4	43 60
111461	Ladysmith	"	17	H. Chiasson	Lit. Lameque	5	49 00
130983	Lamecca	"	19	C. Ache	Lameque	5	51 00
103003	Lark	"	10	Wm. Fruing & Co.	Caraquet	4	35 60
130987	L'Assomption	"	18	J. J. Z. Chiasson	"	5	50 00
133927	Lefebvre	"	11	S. Savoy	Shippegan Isld.	3	30 20
107773	L'Etoile	"	15	P. Gallien	Caraquet	5	47 00
122059	Letty Jane	"	15	Wm. Fruing & Co.	"	5	47 00

LIST of Vessels which received Fishing Bounty, etc.—New Brunswick — *Continued.*

GLOUCESTER COUNTY.—*Continued.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner. or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
112152	Lillian	Chatham	15	Robin, Jones & Whitman	Caraquet	4	40 60
134001	Lillie Florence	"	20	"	"	4	45 60
130981	Lobelia	"	21	"	"	4	46 60
126601	Loze	"	13	Gustave Jean	"	4	38 60
116977	Mabel	"	16	W. S. Loggie Co	Chatham	4	41 60
130999	Mabel Luce	"	11	Philip Luce	Island River	3	30 20
112154	Mac	"	11	Wm. J. Ward	Miscou Hbr	4	36 60
116480	Maggie	"	10	G. Albert	Caraquet	2	22 80
134326	Magloire	"	10	Jean Leger	"	4	35 60
100955	Majestic	"	10	W. S. Loggie Co	Chatham	5	42 00
134333	Malbaie	"	11	P. D. Lanteigne	Miscou Hbr	4	36 60
134325	Mallet	"	10	J. J Mallet	Shippegan	3	29 20
112158	Maple Leaf	"	13	Wm. Fruing & Co	Caraquet	5	45 00
116978	Margaret	"	16	W. S. Loggie Co	Chatham	5	48 00
112163	Margaret Ann	"	13	Jno. Jones	Lit. Lameque	4	38 60
72100	Marie	"	11	E. Chiasson	Caraquet	5	43 00
107779	Marie	"	15	G. Savoy	Robichaud Land'g	4	40 60
103278	Marie Celia	"	13	F. Baudin	Miscou Hbr	5	45 00
133919	Marie Delphine	"	16	J. H. Savoie	Lameque	5	48 00
117182	Marie Etoile	"	20	J. O. Bouthiller	Caraquet	5	52 00
1002 2	Marie Joseph	"	12	P. P. Noël	Lit. Lameque	4	37 60
133944	Marie Justine	"	24	J. A. Doiron	Caraquet	5	56 00
134000	Marie LeBouthillier	"	19	E. O. LeBouthillier.	"	4	44 60
100295	Marie Louisa	"	18	J. A. Paulin	"	3	37 20
116471	Marie Louise	"	10	G. Chiasson	"	4	35 60
134003	Marie Noela	"	11	C. G. Cormier	"	3	30 20
111847	Mary	"	14	D. Albert	"	4	39 60
130655	Mary E. Rive	"	21	Harry Rive	"	4	46 60
103084	Mary Emma	"	11	Wm. Fruing & Co	"	3	30 20
130995	Mary J. Margaret	"	25	Harry Rive	"	4	50 60
92413	Mary Jane	"	14	"	"	4	39 60
130994	Mary M. Florence	"	32	"	"	5	64 00
116478	Mary O	"	11	F. D. Robichaud	Shippegan	3	30 20
100957	Mary R	"	12	W. S. Loggie Co	Chatham	4	37 60
116475	Mary Rose	"	17	Robin, Jones & Whitman	Caraquet	4	42 60
112161	Mary Star	"	15	H. LeBouthillier	"	5	47 00
112150	Mary Star of the Sea	"	15	Luc Friolet	"	5	47 00
111844	Mary Star of the Sea	"	14	Robin, Jones & Whitman	"	1	39 60
11647	Mary Star of the Sea	"	20	F. Savoy	Robichaud L'd'g	4	45 60
103768	Mayflower	"	13	Robin, Jones & Whitman	Caraquet	4	38 60
107777	May Flower	"	11	Xavier Noël	Little Lameque	5	43 00
130997	Médaille d'Or	"	24	H. Lanteigne	Craquet	4	49 60
100779	Mermaid	"	11	W. S. Loggie Co	Chatham	4	36 60
112164	Merry Christmas	"	13	C. Jean	Little Lameque	4	38 60
133924	Merveille	"	12	A. J. Hache	Lameque	3	31 20
130659	Mildred Elaine	"	20	Wm. Fruing & Co	"	5	52 00
134006	Miscou	"	10	J. N. Bouthillier	Caraquet	3	29 20
134004	Mizonette	"	13	P. Boudreau	Mizonette	4	38 20
134002	Mona Lisa	"	17	J. E. LeBouthillier.	Caraquet	4	42 60
133922	Morning Dew	"	10	E. E. Robichaud.	Shippegan Island	3	29 20
88669	Morning Star	"	12	G. Gionet	St. Rose	2	24 80
117188	Morning Star	"	14	Mrs. R. Noël	Lameque	4	39 60

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LIST of Vessels which received Fishing Bounty, etc.—New Brunswick—*Continued.*

GLOUCESTER COUNTY—*Continued.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
134321	Noella	Chatham	18	D. Noël	Lameque	3	37 20
122055	Olive	"	14	T. A. Lanteigne	Caraquet	4	39 60
103005	Osprey	"	10	T. J. Mallet	Shippegan	3	29 20
103004	Oriole	"	11	Wm. Fruing & Co.	Caraquet	4	36 60
133917	Overseer	"	20	F. F. Chiasson	Island River	5	52 00
130656	P. A. L	"	17	P. A. Lanteigne	Caraquet	5	49 00
100904	P. T. S	"	11	R. Lanteigne	"	4	36 60
100297	Palma	"	14	A. Ache	Robichaud L'd'g	4	39 60
100776	Patrick	"	11	W. S. Loggie Co.	Chatham	5	43 00
112125	Pearl	Lunenburg	14	P. A. Doiron	Caraquet	4	39 60
103778	Pelican	Chatham	13	Wm. Fruing & Co.	"	5	45 00
133923	Pembina	"	17	Jean Ache	Lameque	5	49 00
103764	Petrel	"	12	P. Ross	Caaqruet	4	37 60
122623	Pride of the Fleet	"	24	Robin, Jones & Whitman	"	4	49 60
116974	Providence	"	18	M. L. Lanteigne	"	4	43 60
96740	Providence	"	13	P. Legere	"	4	38 60
100775	Redgauntlet	"	11	J. H. LeBouthillier	"	4	36 60
134322	Remon	"	12	J. T. Mallet	Shippegan	3	31 20
103586	Remus	"	17	W. S. Loggie Co.	Chatham	5	49 00
103078	Reward	"	13	L. B. Albert	Caraquet	4	38 60
130661	Richibucto Pearl	"	10	A. T. Mallet	Shippegan	3	29 20
97191	Rita	"	12	Robin, Jones & Whitman	Caraquet	4	37 60
111470	River Branch	"	11	Wm. Fruing & Co.	"	4	36 60
133992	Robichaud	"	10	F. Bizeau	Inkerman	2	22 80
103946	Robin	"	12	Robin, Jones & Whitman	Caraquet	4	37 60
103587	Romulus	"	19	W. S. Loggie Co.	Chatham	5	51 00
92404	Rosa	"	17	F. Lanteigne	Caraquet	4	42 60
100908	Rosalie	"	10	P. G. Lanteigne	"	4	35 60
100773	Rupert	"	12	E. L. Albert	"	4	37 60
116473	St. Anne	"	14	O. Chiasson, Sr.	Lameque	5	46 00
117187	Ste. Anne	"	13	J. P. Noel	"	4	38 60
116972	St. André	"	15	A. Noel	"	4	40 60
117189	Ste. Cecelia	"	13	G. Aché	Little Lameque	4	38 60
111469	St. John	"	13	J. A. Aché	Lameque	4	38 60
103008	St. Joseph	"	12	E. Gauvin	"	5	44 00
122051	Ste. Julie	"	12	M. Noel	"	4	37 60
112167	St. Joseph	"	16	R. Gionet	Caraquet	3	29 20
107776	St. Peter	"	12	J. G. Chiasson	"	3	31 20
130660	St. Sauveur	"	18	I. Chiasson	Lameque	4	43 60
134010	St. Urbain	"	21	P. Chiasson	"	5	53 00
133915	Samuel LeGrand	"	15	A. J. Robichaud	Shippegan	3	34 20
74401	Sara	"	11	F. S. Doiron	Caraquet	4	36 60
100907	Sarah	"	10	F. T. B. Young	"	2	22 80
117190	Saturn	"	10	D. Blanchard	Mizonette	4	35 20
134335	Sauvegarde	"	11	P. B. Savoy	Shippegan Island	4	36 60
103584	Saxon	"	13	J. Baudin	Caraquet	4	38 60
100959	Sea Bird	"	10	W. S. Loggie Co.	Chatham	4	35 60
126254	Sea Duck	"	16	L. J. B. Lanteigne	Caraquet	3	35 20
100901	Sea Flower	"	12	J. P. Lanteigne	"	4	37 60
100914	Sea Flower	"	11	E. Marks	Miscou Harbour	3	30 20
96926	Sea Foam	"	15	J. M. Ward	"	4	40 60
96731	Sea Star	"	13	P. Albert	Caraquet	4	38 60
133913	Selonia	"	11	A. Chiasson	Chiasson	3	30 20
133914	Shippegan Pearl	"	10	J. Brideau	Shippegan	3	29 20
130993	Shippegan's Best	"	10	W. S. Loggie Co.	Chatham	4	35 60
133928	Sillery	"	12	J. F. Aché	Lameque	3	31 20
100961	Silver Moon	"	14	W. S. Loggie Co.	Chatham	4	39 60
100788	Sir Charles	"	11	N. E. Gionet	Caraquet	4	36 60

LIST of Vessels which received Fishing Bounty, etc.—New Brunswick—*Continued.*

GLOUCESTER COUNTY—*Concluded.*

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
122060	Spark	Chatham	10	Wm. Fruing & Co.	Caraquet	3	29 20
100963	Stanley	"	10	A. D. Gionet	"	3	29 20
103087	Stanley	"	10	J. Chiasson	I land River	5	42 00
133912	Star of Shippegan	"	11	M. Chiasson	Shippegan	3	30 20
103767	Stella Maris	"	19	Robin, Jones & Whitman	Caraquet	4	44 60
122056	Sunbeam	"	14	Wm. Fruing & Co.	"	4	39 60
111845	Superior	"	14	Robin, Jones & Whitman	"	5	46 00
133995	Supple Jack	"	11	T. C. Roussell	Shippegan	4	36 60
103947	Swallow	"	13	M. Doiron	Caraquet	4	38 60
103006	Swallow	"	11	Wm. Fruing & Co.	"	4	36 60
103762	Swan	"	14	"	"	4	39 60
134008	T. H. B.	"	18	T. H. LeBouthillier	"	4	43 60
100777	Teutonic	"	11	W. S. Loggie Co.	Chatham	4	36 60
96738	Three Brothers	"	12	J. N. E. Lanteigne	Caraquet	4	37 60
117184	Three Brothers	"	16	W. S. Loggie Co	Chatham	5	48 00
100918	Tickler	"	12	Robin, Jones & Whitman	Caraquet	5	44 00
134323	Tuxedo	"	12	H. DeGrace	Shippegan	3	31 20
112159	United Empire	"	17	T. O. LeBouthillier	Caraquet	4	42 60
103285	Valkyrie	"	12	J. F. Hébert	"	4	37 60
103775	Victoria	"	16	W. S. Loggie Co.	Chatham	5	48 00
133921	Vika	"	29	M. Paulin	Little Lameque	5	61 00
117183	Vina	"	14	A. Noei	Lameque	5	46 00
134328	Vitaline	"	11	P. Gagnon	Inkerman	3	30 20
100995	Voltaire	"	10	L. Mailloux	Caraquet	4	35 60
100966	Von Moltke	"	11	P. J. Frigot	"	4	36 60
103588	Vulture	"	13	W. S. Loggie Co.	Chatham	4	38 60
122054	White Fish	"	13	E. Chiasson	Lameque	4	38 60
100953	White Wings	"	10	F. T. B. Young	Caraquet	4	35 60
100973	World's Fair	"	11	"	"	5	43 00
103079	Wren	"	11	J. B. Paulin	"	4	36 60
100920	Zephyr	"	12	G. J. Gionet	"	4	37 60

COUNTY OF KENT.

130665	Fulta	Richibucto	14	G. H. Long	Richibucto	2	26 80
116688	Harry Dickson	"	10	W. E. Forbes	"	3	29 20
130663	Herb Curwin	"	10	J. Curwin	"	3	29 20
116689	Joseph Doucette	"	10	A. Daigle	Little North West	2	22 80
130662	Jardineville	"	10	A. J. Arseneau	Jardineville	2	22 80
130664	Lapewalem	"	10	Mrs. J. Doucette	Rexton	2	22 80
116684	Ocelot	"	11	W. E. Forbes	Richibucto	3	30 20
126773	S. and G	"	10	S. Grav	St. Charles	3	29 20
126777	Samuel G	"	10	A. & R. Loggie	Richibucto	3	29 20
116685	Sea Adder	"	10	W. E. Forbes	"	3	29 20
126772	Sylvalee	"	10	James Legoof	"	3	29 20
126778	3 0 3	"	10	W. E. Forbes	"	4	35 60
126774	Wawota	"	11	Wm. H. Long	"	2	23 80

LIST of Vessels which received Fishing Bounty, etc.—New Brunswick—*Concluded.*

NORTHUMBERLAND COUNTY.

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid.
							$ cts.
126771	Dorothy F..	Chatham..	12	Jas. A. Mills..	Hardwick..	2	24 80
130338	Financier..	"	10	C. Chiasson	Eel River Bridge.	3	29 20
133991	Free and Easy..	"	10	Wm. G. Mills.	Hardwick..	..	10 00
133930	Icicle..	"	11	B. Martin..	Portage River ..	2	24 80
130333	Maggie Swift..	"	11	G. Murdoch.	Hardwick..	1	17 40
103511	Maple Leaf. .	"	13	Donald Loggie.	Burnt Church..	2	25 80
116683	Plum..	"	10	M. Jimmo.	Escuminac..	3	29 20
100952	Replevin ..	"	10	H. Albert..	Neguac . .	4	35 60
130334	Shrubb..	"	10	Wm. A. Mills.	Hardwick.. ..	2	22 80
130340	Skidoo.. ..	"	11	H. Murdoch.	"	2	23 80
126252	White Cap ..	"	11	H. Jimmo.	Escuminac..	2	23 80

ST. JOHN COUNTY.

134181	Olive Murray..	St. John..	22	Patk. Murray	Dipper Hbr..	4	47 60
103704	Whisper..	Yarmouth ..	31	Chas. Harkins..	"	4	56 60

PROVINCE OF PRINCE EDWARD ISLAND.

KINGS COUNTY.

134202	Aeneas P..	Charlottetown..	20	A. P. Campbell..	Campbell's Cove..	4	45 60
112021	Annie M. ..	Canso..	29	Thomas Poole..	Souris..	5	61 00
122086	Florence.. ..	Charlottetown..	14	P. Billiard..	Beach Point.	1	20 40
122081	Frank.. ..	"	10	J. M. Cheverie..	Souris..	5	42 00
116749	Hilda M. Horton..	Halifax..	29	P. J. Cheverie. ..	"	6	67 40
126063	JohnG.Scrimgeour	Charlottetown..	14	H. Williams..	Beach Point..	3	33 20
107751	Minnie Laura..	"	5	R. Penny..	Murray Hbr..	5	63 00
131168	N.A.F.	Lunenburg..	5	Matthew Munroe..	Souris..	5	56 00
112378	Olive S. ..	Charlottetown..	26	A. Gosbee ..	Murray Hbr..	1	32 40
116296	Outlook ..	"	21	H. Jackson..	"	4	46 60

PRINCE COUNTY.

121860	Aurora..	Lunenburg..	10	J. T. Stewart..	West Point.	3	29 20
134334	Cleaver..	Chatham..	12	J. P. Perry..	Tignish ..	4	37 60
130823	Dagon ..	Lunenburg.	12	J. Hutt.	Alberton..	4	37 60
122010	Ena T ..	"	16	G. McBeth..	"	5	48 00
116513	Laurie H..	"	16	W. C. Leavitt ..	"	2	28 80
103592	Rosamond..	Charlottetown..	18	Thos. Champion..	Stanciel ..	3	37 20

QUEENS COUNTY.

100445	Carrie O ..	Canso..	12	T. Hiscott, Sr..	Stanley Bridge..	5	44 00
117059	Fortune..	"	15	J. Delaney.	French River ..	3	33 20
107763	Guinea..	Charlottetown..	10	B. Harding..	"	5	42 00
130342	Libby P..	"	11	J. N. Pineau..	North Rustico ..	5	43 00

LIST of Vessels which received Fishing Bounty, etc.—*Concluded.*

PROVINCE OF QUEBEC.

BONAVENTURE COUNTY.

Official Number.	Name of Vessel.	Port of Registry.	Tonnage.	Name of Owner or Managing Owner.	Residence.	No. of Crew paid.	Amount of Bounty paid,
							$ cts.
103830	Annie Bennett....	Paspebiac	15	M. Bennett.....	Black Cape.....	3	34 20

GASPÉ COUNTY.

116294	Charlotte S	Charlottetown ..	14	J. Cassidy.....	Amherst.....	4	39 60
100696	Marion Emerson..	Pictou.....	30	W. C. Leslie.....	Grindstone.	8	81 20
85400	Minnie M.....	Magdalen Islds..	13	H. Cormier.....	Amherst.....	5	45 00
85399	Minnie May.....	"	10	Wm. Boudreau . .	"	4	35 60
85408	Onato.....	"	35	Wm. G. Leslie.	Grindstone.	9	92 60
92571	Primrose..	Halifax.....	14	F. Cormier.....	Amherst.....	4	39 60
96727	Ryse.....	Charlottetown. .	11	L. Boudreault.....	Capes.....	3	30 20
111430	Shamrock	Halifax	23	A. Vigneau....	Amherst.....	6	61 40
107188	Stella.....	Charlottetown ..	15	Levi Press.....	Grosse Isle.	5	47 00

SAGUENAY COUNTY.

103060	Edith M.....	Quebec.....	20	Horace Foley.....	Esquimaux. Pt...	2	32 80
100365	Marie Louise. ...	"	13	Wm. Ferguson	Sept. Iles	4	38 60

APPENDIX No. 13.

EXPENDITURE AND REVENUE.

The total expenditure for all fisheries services, except civil government, for the fiscal year ended March 31, 1915, amounted to $1,305,776.51.

The total net fisheries revenue from rents, fines, sales and license fees (including *modus vivendi* licenses to United States vessels) for the same period amounted to $101,635.77.

The following is a summary of the sums appropriated and those expended for the various services during 1914-15:—

FISHERIES EXPENDITURE, 1914-15.

Service.	Appropriation.	Expenditure.
	$	$ cts.
Salaries and disbursement of fishery officers	290,000	275,950 71
Fish breeding establishments	400,000	370,693 17
Fisheries Patrol Service	180,000	162,949 86
Cold storage and transportation of fresh fish	150,000	71,873 96
Dogfish Reduction Works	60,000	37,882 91
Canadian Fisheries Museum	16,000	6,086 08
Building fishways and clearing rivers	30,000	9,670 37
Legal and incidental expenses	4,000	3,737 87
Oyster culture	6,000	5,998 93
Services of customs officers in connection with issuing of modus vivendi licenses	900	478 80
Fisheries Intelligence Bureau	10,000	6,102 22
International Fisheries Commission	5,000	
Building Patrol Boats, Atlantic Coast	40,000	12,079 44
Exhibit of fresh fish (Toronto Exhibition)	15,000	12,417 89
Inspection of canned and pickled fish	50,000	4,891 75
Fisheries patrol steamer for Lake Winnipeg	184,400	163,183 51
Marine Biological Board	21,000	21,000 00
Investigation of Hudson Bay Fisheries	15,000	14,275 43
Removal of obstructions Fraser River	110,000	109,918 85
Expenses of investigating claims for compensation under the Pelagic Sealing Treaty	15,000	14,784 76
Compensation to families of drowned fishermen	2,400	2,400 00
Totals	1,604,700	1,305,776 51
Fishing Bounty	160,000	159,584 14

The following summaries show the salaries and disbursements of the fishery officers in the several provinces, the expense for maintenance of fish-breeding establishments throughout Canada, also the expense for that part of the Fisheries Protection Service called the Fisheries Patrol Service.

Details will be found in the Auditor General's Report under the proper headings.

SALARIES and Disbursements of Fisheries Officers, 1914-15.

Provinces.	OFFICERS.		GUARDIANS.		Miscellaneous.	Total.
	Salaries.	Disbursements.	Wages.	Expenses.		
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Nova Scotia	18,878 42	17,905 64	24,343 66	669 14		61,796,86
Prince Edward Island	3,504 21	2,482 40	3,599 33	47 42	174 95	9,808 31
New Brunswick	11,892 29	10,972 90	30,218 29	6,367 14	309 04	59,759 66
Quebec	7,241 11	3,288 56	187 00	264 35	25 00	11,006 02
Ontario	3,900 00	97 40				3,997 40
Manitoba	6,797 23	1,503 06	3,706 68	2,549 80	55 36	14,612 07
Alberta and Saskatchewan	12,619 75	6,469 85	9,262 00	5,523 71	124 94	34,000 25
British Columbia	40,925 12	5,916 82	7,750 63	716 78	4,337 97	59,647 32
Yukon	1,543 75	415 05	200 00			2,158 80
General account	3,225 00	2,575 00			13,083 18	18,883 18
Total	110,526 88	51,626 68	79,267 59	16,138 34	18,110 38	275,669 87
Outstanding advances						280 84
Total expenditure						275,950 71

Fish Breeding—1914–15.

Hatcheries.	Salaries.	Maintenance.	Total Expenditure of Hatcheries.	Total Expenditure of Provinces.
Nova Scotia.	$ cts	$ cts.	$ cts.	$ cts
Antigonish	1,107 11	1,171 48	2,278 59	
Arichat	1,443 24	1,407 13	2,850 37	
Bayview	1,701 95	1,517 56	3,219 51	
Bedford	2,190 50	484 85	2,675 35	
Canso	1,604 33	853 34	2,457 67	
Inverness	1,286 56	2,547 85	3,834 41	
Isaac's Harbour	1,300 46	894 45	2,194 91	
Lindloff	77 74	392 79	470 53	
Little Bras d'Or	1,272 00	2,145 09	3,417 09	
Long Beach Pond	534 20	821 79	1,355 99	
Margaree	2,226 92	1,379 73	3,606 65	
Margaree Pond	686 25	2,267 08	2,953 33	
Middleton	2,082 17	2,041 99	4,124 16	
Windsor	1,425 00	607 14	2,032 14	
				37,470 70
Prince Edward Island.				
Charlottetown	1,330 75	1,732 19	3,062 94	
Georgetown	1,406 94	1,438 00	2,844 94	
Kelly's Pond	1,625 00	539 05	2,164 05	
				8,071 93
New Brunswick.				
Buctouche	1,148 68	904 96	2,053 64	
Grand Falls	1,711 14	10,337 25	12,048 39	
Lakewood	40 00	8 11	48 11	
Miramichi	1,958 01	4,987 95	6,945 96	
New Mills Pond	1,210 25	5,660 89	6,871 14	
Nipisiguit	202 12	418 02	620 14	
Restigouche	2,574 25	1,624 42	4,198 67	
St. John Little River	1,102 61	2,058 06	3,160 67	
St. John Pond	1,802 50	5,705 57	7,508 07	
Sparkle		948 87	948 87	
Shad	88 00	765 47	853 47	
Shemogue	1,178 00	1,557 38	2,735 38	
Shippegan	1,377 99	1,655 76	3,033 75	
Tobique	8 87	1,524 95	1,533 82	
				52,560 08
Quebec.				
Dartmouth		1,180 34	1,180 34	
Gaspé	1,455 50	1,923 83	3,379 23	
House Harbour	1,414 09	1,451 55	2,865 64	
Lake Lester	1,375 00	1,223 45	2,598 45	
Lac Tremblant	745 40	682 59	1,427 99	
Magog	1,002 16	619 48	1,621 64	
Port Daniel	989 79	1,468 02	2,457 81	
St. Alexis	619 52	1,463 11	2,082 63	
Tadousac	3,005 47	1,380 78	4,386 25	
				22,000 08
Ontario.				
Collingwood	3,324 95	3,648 55	6,973 50	
Kenora	2,025 46	20,905 07	22,930 53	
Newcastle	652 45	556 25	1,208 70	
Port Arthur	4,217 90	3,594 93	7,812 83	
Sandwich	5,065 91	9,832 71	14,898 62	
Sarnia	3,262 47	9,911 88	13,174 35	
Southampton	1,885 37	2,429 65	4,315 02	
Thurlow	2,649 14	22,191 52	24,840 66	
Wiarton	2,534 52	4,493 47	7,027 99	
				103,182 20

FISH BREEDING—1914-15—*Concluded.*

Hatcheries.	Salaries.	Maintenance.	Total Expenditure of Hatcheries.	Total Expenditure of Provinces.
	$ cts.	$ cts.	$ cts.	$ cts.
Manitoba.				
Dauphin River	3,175 76	2,022 01	5,197 77	
" River Spawn Camp.	27 00	1,985 44	2,012 44	
Gull Harbour	3,055 54	5,812 76	8,868 30	
Selkirk	3,148 34	1,977 23	5,125 57	
Winnipegosis	3,862 49	6,466 38	10,328 87	
				31,532 95
Alberta.				
Banff	2,082 50	2,078 64	4,161 14	
Permiz Creek	50 00	1,397 28	1,447 28	
				5,608 42
Saskatchewan.				
Qu'Appelle	1,759 39	18,882 84	20,642 23	20,642 23
British Columbia.				
Anderson Lake	3,651 24	3,502 11	7,153 35	
Babine	4,266 25	3,962 40	8,228 65	
Cowichan	3,300 50	2,468 35	5,768 85	
Fraser River	720 00	534 42	1,254 42	
Gerrard	2,968 32	2,480 66	5,448 98	
Granite Creek	4,129 44	2,018 64	6,148 08	
Harrison Lake	5,105 26	3,049 76	8,155 02	
Kennedy Lake	3,331 51	2,400 66	5,732 17	
New Westminster		988 02	988 02	
Pemberton	4,489 00	2,903 49	7,392 49	
Rivers Inlet	4,370 58	2,802 59	7,173 17	
Skeena River	4,299 16	2,452 18	6,751 34	
Stuart Lake	3,647 82	3,498 06	7,145 88	
				77,340 42
General account	4,412 76	4,857 61	9,270 37	
				9,270 37
				367,679 38
Outstanding advances				2,413 79
Total expenditure				370,093 17

SESSIONAL PAPER No. 39

FISHERIES Revenue for Fiscal year ended March 31, 1915.

Provinces.	Amount Collected.	Refunds.	Net Amount.
	$ cts.	$ cts.	$ cts.
Ontario	918 80		918 80
Quebec	7,639 75		7,639 75
New Brunswick	14,273 99	10 00	14,263 99
Nova Scotia	7,415 80		7,415 80
Prince Edward Island	2,046 50		2,046 50
Manitoba	8,312 08		8,312 08
Saskatchewan	4,346 65	17 00	4,329 65
Alberta	6,168 50	66 00	6,102 50
British Columbia	41,673 95	250 00	41,423 95
Yukon	304 00		304 00
Totals	93,100 02	343 00	92,757 02
Modus vivendi licenses	8,973 50	94 75	8,878 75
Grand total			101,635 77

Fisheries Patrol Service, 1914–15.

Name of Vessels.	Pay Lists	Fuel.	Provisions	Repairs.		Supplies.		Clothing.	Sundry.	Totals.
				Hull.	Engine.	Engine.	Deck.			
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Alcedo	5,095 00	950 15	2,032 00	530 31	281 55	128 94	556 00	239 75	136 15	9,949 85
Bonila	1,218 03	893 98		55 68	100 10	146 61	179 31		605 55	3,199 26
Cohoe	1,020 00	549 30			9 50	8 80	130 55			1,718 15
Davies									74 50	74 50
Egret	891 00	408 33			48 30	95 63	322 96		87 25	1,853 47
Elk	2,040 00			108 54	185 41	83 65	28 05	9 62	37 15	2,492 42
Falcon	5,598 65	1,419 39	2,046 00	2,358 53	25 84	233 68	579 88	214 01	101 96	12,577 97
Fispa	6,678 00	2,971 57	2,018 45	437 48	522 80	187 03	887 91	342 83	643 97	14,690 04
Foam	3,360 00			180 15	49 81	18 24	61 95	14 36	132 72	3,820 56
Gannet	2,225 50	1,013 61		422 25	53 20	241 72	501 31	15 75	231 28	4,704 62
Gull	1,920 00	959 67			26 20	52 64	83 80		10 80	3,053 11
Hawk	1,330 00	500 50		15 00	41 00	69 45	169 98		67 61	2,193 54
Heron	1,128 45	565 21	14 80	9 00	149 35	163 24	366 18		37 70	2,433 90
Hudson	1,365 40	361 87		55 00	1,568 70	29 35	124 30		3,135 87	6,640 47
Iroquois									45 00	45 00
Kayex	1,377 50	1,133 90			2,532 90	106 74	230 74		23 00	5,404 78
Kingfisher	403 07	120 05			30 35	19 26	110 81		20 00	703 54
Lady of Lake	4,901 28	1,580 48	1,232 45	412 16	611 32	203 79	290 71	15 00	246 42	9,493 61
Linnett	573 06	498 80			93 50	47 13	113 27		32 50	1,358 26
Merlin	595 00	395 70			101 10	41 03	135 59		36 50	1,301 92
Merveil									390 00	390 00
Nelson	3,520 40	470 91		326 53		116 50	59 66	89 81	16 81	4,600 65
No. 1									72 50	72 50
No. 3		110 42				9 10				119 52
Patrol A	2,699 18	508 63			160 51	129 01	70 92	79 11	24 80	3,672 16
" B	2,183 32	343 30		46 53	389 66	91 81	72 72	248 70	18 58	3,394 62
" C	2,014 34	63 16		313 75	114 08	86 02	368 46	100 77	9 52	3,100 10
" D	2,303 12	419 33		185 41	113 97	79 83	175 69	70 13	83 81	3,431 29
" E	2,495 40	520 75	34 20	102 00	157 93	131 29	171 91	96 20	178 17	3,881 91
Phalarope	3,000 00	1,085 01		70 41	122 31	106 26	277 66	129 47	83 13	4,874 28
Princess	11,388 28	5,060 18	3,667 95	501 23	1,140 14	448 81	3,174 43	540 66	1,177 75	27,099 43
Raven	765 00	430 85			37 00	31 32	125 34		10 50	1,400 01
Sea Gull	2,700 00	201 31		5 95	47 03	65 43	126 50	124 45		3,270 67

Search		780 00	258 05				18 65	10 35		325 00	1,392 05
Semiahmo	2,226 00	213 05			68 99		80 32	83 78		107 60	2,778 24
Swan	3,180 00				771 03	4 50	5 85	73 83		136 85	4,297 30
Tanner	2,528 19	231 25	77 40			115 38	176 55		14 36	172 96	3,545 38
Three Sisters	780 00	49 35				10 40		218 03	130 60		1,214 49
General Account	1,639 00	1,307 53			6 63	16 80	59 32	83		325 00	4,327 65
							201 84	119 36		1,037 69	
Totals	86,946 23	25,595 59	11,153 25	6,982 29	8,860 67	3,714 81	10,065 77	2,469 61	9,846 00	164,574 22	
Less amounts of the following vessels chargeable to war appropriations while on that duty:—"Egret" $1,142.54; "Falcon" $1,347.62, and "Heron" $134.20										1,624 36	
Grand total										162,949 86	

COMPARATIVE STATEMENT of Expenditure and Revenue of the

Number.		1894-95.		1895-96.		1896-97.	
		Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	General Account Fisheries					2,198 47	
2	Ontario	21,938 56	33,211 60	24,917 48	35,681 68	21,592 40	32,814 66
3	Quebec	12,459 34	8,836 18	11,880 43	8,160 98	12,910 80	7,876 12
4	New Brunswick	21,370 94	11,170 36	20,526 56	10,696 87	21,671 92	10,110 77
5	Nova Scotia	23,555 38	7,075 07	23,049 41	6,180 93	23,682 33	5,239 55
6	Prince Edward Island	3,796 58	3,312 30	3,555 87	2,161 85	3,744 36	2,932 25
7	Manitoba and N. W. Territory	6,178 71	2,458 80	6,935 20	2,256 69	1,908 14 2,181 58	1,719 00 344 13
8	Alberta						
9	Saskatchewan						
10	British Columbia	6,218 74	23,517 25	6,226 77	26,410 75	8,841 64	39,388 82
11	Yukon						
12	Hudson Bay Territory						
13	Fish-breeding and fishways	39,730 93		38,050 41		27,330 73	
14	Fisheries Protection Service	100,207 29		102,021 72		99,357 01	
15	Miscellaneous	24,619 86		20,203 25		62,777 30	
	Total	260,076 33	89,581 56	257,237 10	91,549 76	289,197 01	100,025 30
	Fishing bounties	160,089 42		163,567 89		154,389 77	

		1901-02.		1902-03.		1903-04.	
16	General Account Fisheries	765 78		402 97		1,362 11	
17	Ontario	4,445 93	373 42	4,650 53	1,818 83	4,500 43	2,578 48
18	Quebec	6,242 58	2,498 85	6,785 86	4,379 15	7,619 67	4,670 64
19	New Brunswick	23,813 62	11,658 34	27,132 84	11,188 02	27,664 34	10,494 20
20	Nova Scotia	32,618 00	6,084 65	39,118 79	3,962 45	30,003 04	3,685 75
21	Prince Edward Island	7,814 02	1,843 45	7,081 60	2,007 35	7,320 96	1,983 42
22	Manitoba	2,624 87	2,279 00	3,129 70	1,784 00	2,786 74	4,002 70
23	N. W. Territory	5,928 22	950 07	7,076 26	1,350 50	7,317 49	922 50
24	Alberta						
25	Saskatchewan						
26	British Columbia	18,560 73	41,178 65	17,808 45	43,015 02	15,133 65	56,904 34
27	Yukon	2,066 66	1,130 00	1,522 00	320 00	1,100 00	240 00
28	Hudson Bay Territory						10 00
29	Fish-breeding	79,891 85		77,330 86		109,286 07	
30	Fisheries Protection Service	152,723 69		145,137 49		204,654 66	
31	Miscellaneous	56,131 26	11,223 65	30,903 27	8,925 40	56,858 18	10,166 50
	Totals	393,627 21	79,169 58	368,091 12	78,635 82	475,880 31	95,756 53
	Fish bounties	155,942 00		159,853 50		158,943 70	

		1908-09.		1909-10.		1910-11.	
32	General Account Fisheries	4,751 36		3,910 03		4,540 84	
33	Ontario	4,784 23	770 78	4,836 86	1,620 75	7,125 37	280 25
34	Quebec	7,895 53	6,797 91	7,886 85	4,947 46	7,695 49	5,336 61
35	New Brunswick	38,904 12	12,385 14	41,188 19	13,044 88	41,593 46	12,996 84
36	Nova Scotia	44,601 04	5,369 70	46,590 66	3,821 81	45,800 42	7,749 60
37	Prince Edward Island	8,410 25	2,393 66	9,396 08	2,359 93	9,415.09	2,499 63
38	Manitoba	3,945 73	3,704 22	5,323 82	6,962 88	7,163 36	8,137 75
39	†Alberta	5,713 80	915 00	7,938 22	703 00	7,867 27	698 50
40	Saskatchewan	6,591 20	1,085 50	6,474 57	1,209 44	7,597 87	1,246 00
41	N. W. Territory						
42	British Columbia	35,139 58	39,251 65	37,509 61	41,864 80	40,314 16	45,846 70
43	Yukon	* 1,019 50	228 00	2,316 63	457 00	1,964 95	907 50
44	Hudson Bay Territory		20 00		501 83		100 00
45	Fish-breeding	190,563 19		180,345 65		220,727 66	
46	*Fisheries Protection Service	242,601 14		295,443 47			
47	Miscellaneous	196,808 02	9,794 00	345,249 58	10,876 78	199,762 00	15,076 50
	Totals	791,728 69		994,355 22		601,567 94	
	Fishing bounties	159,999 90		155,221 85		159,166 75	
	Grand Totals	951,728 59	82,715 56	1,149,577 07	85,070 56	760,734 69	100,875 88

* The Fisheries Protection Service being now under the control of the Naval Department, this expen-
† Since 1912-13 Saskatchewan is included with Alberta.

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Fisheries Department July 1, 1894 to March 31, 1915.

1897-98.		1898-99.		1899-00.		1900-01.		Number.
Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
2,389 66	.....	2,632 12	.....	652 41	.....	1,117 49	.....	1
19,239 34	30,574 57	11,784 22	5,830 85	3,804 94	794 12	3,819 57	717 35	2
11,440 16	7,571 15	11,350 27	6,287 71	5,452 41	2,543 04	7,934 03	4,738 92	3
17,063 58	5,317 08	22,922 50	10,430 08	21,659 94	12,015 27	28,452 51	10,150 40	4
21,683 91	11,511 85	25,348 11	6,668 22	27,461 91	5,494 49	35,760 39	6,595 94	5
6,775 78	2,707 57	6,832 85	2,242 24	7,364 30	2,207 12	7,934 03	1,525 30	6
1,206 26	1,515 00	1,883 37	1,537 35	1,723 59	2,028 00	2,669 74	1,103 00	7
2,324 66	393 87	4,065 68	150 50	3,848 25	1,522 50	6,251 39	1,222 55	8
.....	.....	.....	.....	.....	.....	.....	.....	9
.....	.....	.....	.....	.....	.....	.....	.....	10
8,508 79	47,864 75	8,459 47	45,801 75	13,662 17	53,195 35	17,886 36	52,960 35	11
.....	.....	.....	.....	.....	.....	.....	.....	12
.....	.....	.....	.....	.....	.....	.....	.....	13
28,002 32	.....	34,522 57	.....	38,070 12	.....	68,961 40	.....	14
101,807 96	.....	105,133 27	.....	97,370 11	.....	124,211 21	.....	15
59,919 56	.....	23,207 73	.....	31,125 67	.....	27,833 79	9,178 50	
280,061 98	107,455 84	427,599 16	75,949 20	411,717 35	79,799 89	332,767 07	88,145 11	
157,504 00	.....	159,459 00	.....	160,000 00	.....	158,802 50	.....	

1904-05.		1905-06.		1906-07.		1907-08.		
1,314 75	.....	3,135 91	.....	2,261 66	.....	1,437 28	.....	16
4,294 60	1,471 51	4,857 23	458 00	4,949 67	499 15	3,188 34	349 10	17
6,769 16	4,648 86	8,200 02	6,185 63	8,123 04	7,564 39	5,590 94	8,145 97	18
25,253 16	11,887 19	36,445 88	11,541 20	35,856 38	11,395 84	24,987 70	9,153 08	19
32,619 86	6,448 88	45,241 50	4,470 45	49,351 10	4,934 43	24,989 09	3,118 73	20
6,879 05	2,046 50	9,455 8.	3,013 85	9,351 81	2,206 25	5,792 32	1,300 94	21
2,800 64	4,875 70	4,638 51	3,527 05	3,687 07	4,148 00	2,173 33	2,285 98	22
7,003 55	1,151 50	12,718 15	1,151 10	.....	.....	.....	.....	23
.....	.....	31,964 83	48,737 55	.....	.....	.....	.....	24
.....	.....	1,226 30	274 00	11,124 22	868 97	.....	969 50	25
16,631 37	47,436 00	.....	360 00	30,141 33	51,532 50	.....	29,903 95	26
1,400 00	340 00	235,660 26	.....	1,083 31	282 00	6,359 22	173 00	27
.....	10 00	225,279 96	.....	.....	10 00	20,381 97	10 00	28
149,419 24	.....	181,267 38	395 15	209,279 78	.....	1,030 35	.....	29
462,082 12	.....	956,196 23	.....	249,876 37	.....	.....	.....	30
105,892 97	10,472 00	156,114 50	.....	194,993 61	14,568 16	118,681 62	.....	31
						204,837 82	.....	
822,360 46	90,988 14	.....	.....	968,626 00	.....	115,219 92	4,134 00	
157,228 24	.....	1,118,310 79	80,113 98	158,546 65	.....			
.....	.....	.....	.....	.....	.....	534,669 90	.....	
.....	.....	.....	.....	.....	.....	159,015 75	.....	

1911-12		1912-13.		1913-14.		1914-15.		
9,392 19	.....	11,563 48	.....	11,549 63	.....	18,883 18	.....	32
20,255 96	658 45	4,332 25	548 74	3,932 55	806 69	4,047 40	918 80	33
10,558 70	6,044 75	9,784 38	8,095 79	10,086 98	5,286 89	11,006 02	7,639 75	34
42,708 01	13,902 15	45,136 31	15,152 52	50,210 68	17,930 96	59,759 66	14,263 99	35
49,540 37	5,912 65	45,828 11	6,780 00	54,919 95	7,682 50	61,796 86	7,415 80	36
9,116 56	2,477 50	8,890 15	2,927 96	8,830 24	2,245 60	9,808 31	2,046 50	37
7,152 24	6,334 00	6,862 15	6,039 00	11,075 76	4,846 50	14,612 07	8,312 08	38
8,537 07	709 00	17,413 00	4,268 50	24,931 14	8,253 05	34,100 25	10,432 15	39
8,587 31	1,304 75	.....	.....	.....	.....	.....	.....	40
.....	.....	.....	.....	.....	.....	.....	.....	41
37,028 05	44,898 51	45,826 40	48,824 50	52,390 23	52,835 50	59,778 16	41,423 95	42
2,094 75	203 25	1,909 83	342 00	1,520 00	226 00	2,158 80	304 00	43
.....	.....	.....	.....	.....	.....	.....	.....	44
235,699 52	.....	283,793 43	.....	354,675 13	.....	370,093 17	.....	45
92,666 65	.....	36,843 18	.....	135,330 87	.....	162,949 86	.....	46
150,519 90	13,785 00	193,764 07	13,500 00	351,404 78	11,728 50	496,782 77	8,878 75	47
683,857 28	.....	761,956 74	.....	1,070,857 94	.....	1,305,776 51	.....	
159,999 70	.....	159,996 40	.....	158,661 25	.....	159,584 14	.....	
843,856 98	96,230 01	921,953 14	106,469 01	1,229,519 19	110,994 63	1,465,360 65	101,635 77	

diture, from the year 1911-12, is for the Fisheries Patrol Service.

APPENDIX No. 14.

NATURAL HISTORY REPORT.

To the Superintendent of Fisheries,—

SIR,—I have the honour to submit my report of the Canadian Fisheries Museum for the fiscal year 1914-15.

Since the re-opening of the museum on March 23, 1914, until March 31, 1915, or to the end of the fiscal year, the museum was visited by 29,934 persons.

Specimens of the following mentioned species of fishes, mounted, have been added to the collection since the list mentioned in the report of the preceding fiscal year; and, conformably, the geographical range of these species is given.

15. GREAT BLUE SHARK.

(*Prionace glauca.*)

Maritime Provinces and banks of Newfoundland; coasts of California and Brazil; more common in seas of Europe; 'an inhabitant of the Mediterranean, and appears to occur much more frequently on the Devonshire and Cornish coasts than on any other part of the British Islands; it has been taken in the Bristol Channel, and in Swansea Bay; also off the south and east coasts of Ireland, and has been known to wander even as far north as Zetland.'

34. BIG-SKATE-OF-CALIFORNIA.

(*Raja binoculata.*)

British Columbia; ranges from coast of Alaska southward to Bay of Monterey, California.

92. OUANANICHE.

(*Salmo salar ouananiche.*)

Saguenay River and Lake St. John regions, and lakes and rivers northward to the Ungava region, and eastward to Labrador; occurs also in lakes in Newfoundland —such as Red Indian and Terra Nova lakes, and lakes at the head of Gambo river.

101. DOLLY VARDEN TROUT.

(*Salvelinus parkeri.*)

Ranges from California, embracing British Columbia, northward to Aleutian Islands, and Herchel Island, Beaufort Sea, Arctic Ocean; and extending westward to the South Saskatchewan and Montana.

135. QUILLBACK.

(*Carpiodes velifer.*)

Prairie provinces, Mississippi valley, and Upper Missouri river, extending southward to the Rio Grande.

139. COLUMBIA RIVER SUCKER.

(*Catostomus macrocheilus.*)

Kootenay lakes; Shuswap lake, Sicamous; and Thompson river, Kamloops; British Columbia; Columbia River basin, and rivers and lakes of the States of Oregon, Washington, Idaho and Montana.

357. TUNNY.

(*Thunnus thynnus.*)

Occurs on the Atlantic coast of Canada and the United States, around the coast of Newfoundland and at the Loffoden Islands; also on the Pacific coast as far northward as California and Japan; abundant in the Mediterranean and ranging to the south coast of England and Tasmania; Yarrell says "It has been taken among the islands west and north of Scotland and at a few other Scottish localities," and mentions two instances of its having been taken on the Irish coast; occurs also in the Indian Ocean.

379. "SOLE."

(*Psettichthys melanostictus.*)

British Columbia: ranges from coast of Alaska southward to coast of California.

390. SLIPPERY SOLE.

(*Microstomus pacificus.*)

British Columbia: ranges from coast of California northward to the Aleutian Islands.

Besides the foregoing, additional specimens of the following mentioned species have been acquired, and the geographical range of these is to be found in the report of the preceding fiscal year.

43. Common Sturgeon (Acipenser sturio oxyrhynchus).

90. Atlantic Salmon (Salmo salar).

389. Starry Flounder (Platichthys stellatus).

The numbers which the species bear, as before, are those of my "Check List of the Fishes of the Dominion of Canada and Newfoundland."

A magnificent acquisition to the collection of the museum consists of specimens of the undermentioned species of aquatic mammals artistically mounted:

A sea lion, a fur seal, and two hair seals, from Pacific coast waters; and a walrus, also a juvenile walrus, a skeleton of a fin-back whale (51½ feet in length), and a papier-maché model of a grampus, from Atlantic coast waters.

The whale's skeleton is suspended from the roof of the building, and special cases for the other specimens are to be made.

A case is also to be made for the reception of two specimens of the American lobster.

Already exhibited in cases are the following which have been acquired since the publication of the report of last year:

Two octopi from the coast of British Columbia, and various specimens of sponges, corals, sea-fans, echinoderms, and shells of mollusks from the Bahama Islands.

A model of the twin Canadian Government steamers *Malaspina* and *Galiano;* and two gold medals awarded to the Department for the Fisheries Exhibition at the Toronto Exhibition for the years 1913 and 1914, respectively, are also under display.

The latest acquirement of the museum is a large sponge from St. Mary's bay, and a few cast off shells from moulted lobsters, and gastric-mills of lobsters, from the Long Beach lobster retaining pound, Nova Scotia.

The doors of the museum are open to visitors on week days from 9.30 a.m. to 5.30 p.m.; and on Sundays from 2 to 5 p.m.

ANDREW HALKETT,
Naturalist, Marine and Fisheries.

Canadian Fisheries Museum,
Ottawa, September 30, 1915.

APPENDIX No. 15.

The following are lists of United States Fishing Vessels which have entered Canadian Ports on the Atlantic and Pacific Coasts, and of United States Fishing Vessels to which *Modus Vivendi* Licenses were issued during the year ended March 31, 1915.

ATLANTIC COAST PORTS.

Number.	Name of Vessel.	Tonnage.	No. of Men.	Magdalen Island.	Charlottetown and Outports.	North Sydney and Outports.	Sydney and Outports.	Arichat and Outports	Port Hawkesbury and Outports.	Canso and Outports.	Halifax and Outports.	Lunenburg and Outports.	Liverpool and Outports.	Lockeport and Outports.	Shelburne and Outports.	Barrington Passage and Outports.	Yarmouth and Outports.	Digby and Outports.	Totals.
1	Arethusa	107	23	1						1			1	1	6	2			12
2	Alice	63	17	1						3			1		1	1	3		10
3	Atlanta	74	18	1		1		2		1									5
4	Agnes	75	18	1		1					1								3
5	Aspinet	83	18							3			1	1	8	1	1		18
6	Avalon	85	18							1			2	2	5	1			11
7	A. Pratt Andrew	92	20			1				4				1	2				8
8	Albert D. Willard	23	8											1	1		1		3
9	Athlete	96	20				1			2				1	2				6
10	Arkona	97	19												1				1
11	Aloha	101	19		1	1	1			2		1	1						7
12	Annie M. Parker	100	20			1	1			2							1		5
13	Angus . Watson	36	9			1	7			2	1						4		15
14	Advance	10	7			1	4	1		1						1			8
15	Anna	8	5			1	2			2	1								6
16	Arkena	97	7			1													1
17	Arthur James	95	18		1	1				1	2		2						7
18	Arabia	86	18		1	1	2			1	1								6
19	Adeline	58	17										1						1
20	Alert	74	19		1						1		2						4
21	Arbitration	72	8				2				1								3
22	Bay State	102	22	1		1	1	1		1				2	6				13
23	Blanche	78	8	1		1	1			2							2		7
24	Bohemia	86	20	1		1	1			4	1								10
25	Benjamin A. Smith	91	18		1	1	1			3	4	1	1	1	10				23
26	Blanche F. Irving	14	8			1	1				1	2	2		1		1		9
27	Catherine Burke	92	22	1		1	1			6				1	1				11

28	Corona	7[illegible]	19				3			3	1	1	4		4				16
29	Corsair	71	18		1	1				1	3	1	1						8
30	Constellation	89	19			1				4	1	2			1				9
31	Cavalier	96	22	1				2		2			1			1	1		8
32	Conqueror	95	23							1				1	7				9
33	Croeole	104	22			1													1
34	Clintonia	105	18		1	1		3		2	3		2						12
35	Commonwealth	93	19							1	1		4				6		12
36	Claudia	79	18										1						1
37	Constitution	89	19		1														1
38	Curlew	63	20														2		2
39	Cruiser	10	7														1		1
40	Dorcas	14	7										1	4			1		6
41	D. C. Baker	26	3													2			2
42	Elizabeth N	102	21				2												2
43	Essex	84	7			1	1								1		3		3
44	Eva and Mildred	46	9				2												2
45	Eleanor	36	10				9			1		1	1		2				14
46	Eva L. Sparling	49	10				4			1							1		6
47	Edmund F. Black	35	10				3			2									5
48	Elk	83	23	1									1	1	4	1			8
49	Elmer E. Gray	84	20			1							1	2	3				7
50	Evelyn N. Thompson	57	19							1			1		2				4
51	Elsie	98	22					1		2	1				4				8
52	Eliza A. B.	14	6														1		1
53	Ellen and Mary	97	20												2				2
54	Esperanto	91	23		1	1				4	3	1			1				11
55	Etta Mildred	45	15												1				1
56	Ethel B. Penny	56	18												2	1	1		4
57	Effie M. Morissey	83	6			1													1
58	E. McNichol	21	7													1	6		7
59	Elizabeth W. Nunan	102	9										1						1
60	Ella G. King	52	6								1								1
61	Francis S. Greeley	94	19				2												2
62	Fanny Reed	20	8			1	4			1			1	2	1				10
63	Florilla	36	10				9			1			2	1	1		1		15
64	Francis J. O'Hara	83	18	1	1	1	1	1		2			4		5				16
65	Fannie A. Smith	87	18		3					2	1	1	1		1				9
66	Fannie E. Prescott	87	22							5				2	6				13
67	Francis P. Mosquito	71	17	1						2			4		3				10
68	Flora S. Oliver	71	17										6		2				8
69	Fannie Bell Atwood	82	23							1			3		1				5
70	Florence Nolan	49	16									1							1
71	Florida	19	8			1				1			4		1				7
72	Fanny Hodskin	83	5													2			2
73	Gertrude de Costa	61	16			1	2			1			8		2				14
74	Governor Foss	88	22							1					7				8
75	Georgiana	87	23							6			1	3	5	2			17
76	Gladiator	75	17			1									2				3
77	Georgia	87	18												2				2

ATLANTIC COAST PORTS—*Continued.*

	Name of Vessel.	Tonnage.	No. of men.	Magdalen Is.	Charlottetown and Outports	North Sydney and Outports.	Sydney and Outports.	Arichat and Outports.	Port Hawkesbury and Outports.	Canso and Outports.	Halifax and Outports.	Lunenburg and Outports.	Liverpool and Outports.	Lockeport and Outports.	Shelburne and Outports.	Barrington Passage and Outports.	Yarmouth and Outports.	Digby and Outports.	Totals.
78	Gladys and Nellie	52	19	....	....	....	....	....	....	5	....	....	4	....	4	....	....	....	13
79	Gossip	91	6	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
80	Gladys B. Simons	9	6	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	3
81	Governor Russell	129	19	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
82	Hazel R. Hines	79	18	1	....	1	4	....	....	3	....	....	....	....	1	....	3	....	13
83	Hockward	22	10	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
84	Hockomack	22	10	....	....	....	2	....	....	3	....	....	1	....	....	....	1	....	7
85	Harry and Thelma	10	5	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2
86	Hammond	67	20	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
87	Harmony	80	18	1	....	1	2	....	....	1	....	....	....	2	5	....	....	....	12
88	Helen E. Murley	5	5	....	....	....	....	....	....	....	....	1	1	....	1	....	....	....	3
89	Hortense	52	15	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	2
90	Harvard	76	18	....	....	....	....	....	....	1	1	1	....	....	....	....	....	....	3
91	Hellen G. Wells	66	16	....	1	1	....	....	....	....	1	....	....	....	....	....	2	....	5
92	Hiram Lowell	95	19	....	....	....	....	....	....	4	....	....	2	....	....	....	....	....	6
93	Hattie A. Hickman	72	19	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
94	Independence	109	22	1	....	....	2	....	....	....	....	....	....	....	....	....	....	....	3
95	Ingomar	103	22	1	....	....	1	1	....	1	....	....	3	1	6	....	....	....	14
96	Imperator	99	18	....	....	....	....	....	....	2	....	....	1	1	4	....	....	....	8
97	J. B. Hodgson	85	7	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
98	James W. Parker	96	24	....	....	1	1	....	....	2	....	....	3	4	8	....	3	....	22
99	James and Esther	47	10	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	6
100	Juno	85	16	1	....	1	3	....	....	2	....	....	1	....	3	....	....	....	11
101	John J. Fallon	77	18	....	1	1	1	....	....	2	1	....	10	....	....	....	....	....	16
102	J. J. Flaherty	124	28	1	....	....	....	....	....	2	....	....	....	....	4	....	2	....	9
103	Jeanette	66	18	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
104	John Hays Hammond	92	21	....	....	....	....	....	....	1	....	....	....	1	5	3	2	....	12
105	Josephine de Costa	84	23	....	....	....	....	....	....	....	....	....	1	....	1	2	....	....	4
106	Jessie de Costa	89	22	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
107	J. R. Atwood	41	11	....	....	....	....	....	....	....	....	....	....	....	....	12	....	....	12
108	Jorgina	42	17	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
109	Jubilee	61	18	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2

110	Juanita	49	16						2	1										3
111	Kineo	83	16						2			1	2	2						7
112	Lucinda Lowell	107	23												1					1
113	Lizzie Griffin	71	17			1														1
114	Laverna	95	22	1	1	3			4											9
115	Lafayette	13	8						1	4		2		1						8
116	L. M. Nickerson	90	9											1						1
117	Lillian	95	22						1					1						2
118	Lottie G. Merchant	76	18						1	2	3									6
119	Luca A.	22	9													1				1
120	Lenora Silveria	63	16									2		1						3
121	Mary J. Beale	20	8			1	5						2							8
122	Monitor	100	20	1		1	1	1	1					3						8
123	Maxime Elliott	75	9	1		1	1	2						2		1				8
124	Mary F. Curtis	85	21				1		5					8		1				15
125	Maud Sawyer	23	7				5													5
126	Motor	17	9				5		2	6		1		1						15
127	Mettacomet	22	8				4		1			4								9
128	Manomet	40	10				1		2	1										4
129	Margaret Haskins	70	18		1	1	1		2	3	1		1							10
130	Mary E. Hardy	77	17		1	1	1		3	1	2	1								10
131	Muriel	83	18	1			5		4	1			2	11						24
132	Matilda Hammond	67	18	1																1
133	Margaret	79	15	1				1	1			7	2	7	1					20
134	Mystery	78	18											10	4					14
135	Margie Turner	44	11						1				1	1	2					5
136	Morning Star	85	20									1	1	3	1	15				21
137	Marsala	54	14											2						2
138	Myrtle H. Perry	36	8			2								1		2				5
139	Mildred Robinson	86	18									4		5						9
140	Manhassett	64	19									11		4		1				16
141	Mary	93	23						1					1						2
142	Margaret Dillon	48	16											3						3
143	Mathew S. Greer	66	20									1								1
144	Mary F. Fallon	48	18			1	2		4		1	1								9
145	Mabelle E. Lovette	12	5					1	2			1								4
146	Mary F. Sears	69	17									2								2
147	Mary F. Ruth	33	11						1	1		2								4
148	Mary P. Goolart	80	20									2		1						3
149	Moonam	72	18						2					4	2	1				9
150	Monarch	33	19		1	1			1	3										6
151	Mewinak	86	19				1													1
152	Nettie Dixon	68	19				1		2	1										4
153	Natalie Hammond	67	20				4	1	1			1		4						11
154	Nellie G. Davis	36	11													6				6
155	Norma	77	18			2	1		1	2	1	1								8

ATLANTIC COAST PORTS—*Continued.*

Number.	Name of Vessel.	Tonnage.	No. of Men.	Magdalen Islands.	Charlottetown and Outports.	North Sydney and Outports.	Sydney and Outports.	Arichat and Outports.	Port Hawkesbury and Outports.	Canso and Outports.	Halifax and Outports.	Lunenburg and Outports.	Liverpool and Outports.	Lockeport and Outports.	Shelburne and Outports.	Barrington Passage and Outports.	Yarmouth and Outports.	Digby and Outports.	Totals.
156	Nora D. Sawyer	33	7			1							2	1			2		6
157	Oriole	104	23	1	1	1	1			1	1		2	1	8	2			17
158	Onato	105	25	1		1				3			2						4
159	Olga	77	7			1					1				1				1
160	Orwell	104	23			1													1
161	Premier	97	22	1			1			3			2	1	3	5	1		17
162	Pythian	39	11							2	1		1						4
163	Priscilla	27	8				4	3			1				1				7
164	Pontiac	75	19							3			3		2		4		8
165	Paragon	80	18								1		3	1	6				11
166	Priscilla Smith	47	18										3		3	1			6
167	Patriot	58	14							1		1	2	1	2				7
168	Preceptor	89	18	1			1			1		1	1	1	1		1		7
169	Paul Revere	4	4			1	1	1		1	3	1	1						12
170	Pinta	59	18							5									11
171	Rose Standish	25	9				6			2			1						9
172	Ramona	58	7	1			1			1									3
173	Richard J. Newman	55	12				12			1									13
174	Rob Roy	77	18		1		1						2		3				6
175	Ralph Hall	91	18		1	1	1			1	4		1						9
176	Richard	90	22	1		1				3			1		6		1		13
177	Rebecca	49	16		1	1							5		2				8
178	Regina	111	19			2									1				3
179	Romance	96	18							2	1	1			1				5
180	Rhodora	81	20							2			3		6				11
181	Ralph Brown	58	17										1		1				2
182	Robert & Arthur	78	18										1		2				3
183	Reading	92	25												5				5
184	Ruth	50	18												3		9		12
185	Reliance	22	11													16			16

186	Russell	77	18										2								2
187	Ralph Russell	48	18										2				1				3
188	Senator	74	18				1	2					1								4
189	Stranger	26	10				2			1			1								6
190	Senator Gardiner	94	18	1		1	1			1					1		4				9
191	Stiletto	99	22	1			6	1		8			1	1	6	2					25
192	Smuggler	91	20	1			2			8		2	3	4	2						22
193	Sadie M. Nunan	36	16										2	1	1						4
194	Sylvania	99	22			1		1		4				1	2						9
195	Somerville	82	23												2						2
196	Saladin	90	20		1	1				2	2	1									6
197	Squanto	95	22			1				2											3
198	Tattler	135	26			1	1								3						5
199	T. M. Nicholson	90	9				1														1
200	Tecumseh	41	5				4														4
201	Topsail Girl	33	10				7			1	3		2		1						14
202	Thomas S. Gordon	92	22	1		1		1		1			1	1	6	1					13
203	Thelma	28	12									1	1		1						3
204	Teazer	59	19												2						2
205	Thalia	47	17												1						1
206	Tempest	34	4														1				1
207	Tacoma	71	14							1											1
208	Vida A. McGowan	83	20							2	1	1	1								5
209	Volant	52	18							2					4						6
210	Viking	40	8												1						1
211	Victor	75	20		1	1				1	1	1			1						6
212	Vanessa	81	20		1					2	1				3						7
213	Virginia	73	20								1		3		1						5
214	Waldo L. Stream	81	18							2					2						4
215	Washakie	47	20										4		3						7
216	W. M. Goodspeed	54	11												1						1
217	Wm. Mathewson	15	8				1														1
218	Yankee	18	8				5			7	1										13
219	Yakima	71	20	1						1				2	2						6
	Totals	14,865	3,155	35	26	67	197	26		248	79	31	198	65	345	71	107				1,495

PACIFIC COAST PORTS.

Name of Vessel.	Tonnage.	No. of Men.	Nanaimo.	Prince Rupert.	Vancouver and Outports.	Totals.
Atlantic	25	11	1	.....	.....	1
King Fisher	141	37	11	4	10	25
Knickerbocker	101	28	.....	5	7	12
New England	70	32	5	2	1	8
	337	108	17	11	18	46

SESSIONAL PAPER No. 39

LIST OF UNITED STATES fishing vessels to which *Modus Vivendi* Licenses were issued during 1914-15.

Name of Vessel.	Port of Registry.	Tonnage.	Port of Issue.	Amount.
				$ cts.
Catherine Bushie	Gloucester	92	Lockeport	138 00
Muriel	Boston	83	"	124 50
Fannie E. Prescott	"	87	"	130 50
Bay State	Portland	110	Canso	165 00
Kineo	Gloucester	84	Halifax	126 00
A. Pratt Andrew	"	92	Canso	138 00
Atlanta	"	74	"	111 00
Ramona	"	58	"	87 00
Richard	"	90	"	135 00
Stiletto	"	99	"	148 50
Elsie	Boston	98	Shelburne	147 00
Conqueror	Gloucester	104	Sand Point	156 00
Mary F. Curtis	"	85	"	127 50
Premier	"	97	"	145 50
Blanche	"	78	Tusket	117 00
Smuggler	"	91	Canso	136 50
Maxime Elliott	"	75	Arichat	112 50
Francis J. O'Hara	"	83	Canso	124 50
Paragon	"	80	Halifax	120 00
Preceptor	"	89	Canso	133 50
Senator	"	74	Arichat	111 00
Monitor	"	100	Canso	150 00
Juno	"	85	Sand Point	127 50
Clintonia	"	105	Canso	157 50
Laverna	"	95	"	142 50
Natalie Hammond	"	67	Arichat	100 50
Cavalier	"	96	"	144 00
Thomas S. Gordon	"	92	Shelburne	138 00
Governor Foss.,	"	88	Sand Point	132 00
Oriole	"	104	Liverpool	156 00
Elk	Boston	83	"	124 50
Squanto	Plymouth	95	Canso	142 50
Moonam	Gloucester	72	Sand Point	108 00
Margaret	"	79	"	118 50
Rhodora	"	81	Canso	121 50
Tatler	"	135	Shelburne	202 50
Elmer E. Gray	Boston	84	Liverpool	126 00
Rebecca	"	49	North Sydney	73 50
Onato	"	105	White Haven	157 50
Waldo L. Stream	Gloucester	81	"	121 50
Regina	Bucksport	111	Shelburne	166 50
Olga	Gloucester	77	North Sydney	115 50
Margie Turner	Boston	45	Canso	67 50
Alice	"	63	House Harbour	94 50
Avalon	Gloucester	85	Sand Point	127 50
Agnes	"	75	Amherst	112 50
Aspinet	Boston	83	Clark's Harbour	124 50
Fannie A. Smith	Gloucester	87	Souris	130 50
Marsala	"	54	Sand Point	81 00
Helen G. Wells	"	66	Port Hawkesbury	99 00
Hiram Lowell,	Bucksport	95	Liverpool	*143 00
John J. Fallon	Boston	77	"	115 50
Francis P. Mosquita	Gloucester	72	Halifax	108 00
Paragon	"	80	Canso	120 00
James W. Parker	Boston	96	Shelburne	144 00
Morning Star	Gloucester	85	Yarmouth	127 50
Mystery	"	78	Shelburne	117 00
Mildred Robinson	Boston	86	Liverpool	129 00
Athlete	Gloucester	96	Shelburne	144 00
Viking	Boston	40	Liverpool	60 00
Ruth	"	56	Yarmouth	84 00
Conqueror	Gloucester	95	Sand Point	142 50

*Overpaid, 50cts.

LIST OF UNITED STATES fishing vessels to which *Modus Vivendi* Licenses were issued during 1914-15—*Concluded.*

Name of Vessel.	Port of Registry.	Tonnage.	Port of Issue.	Amount.
				$ cts.
Hazel R. Hines	Gloucester	79	Pubnico	118 50
Patriot	"	58	Sand Point	87 00
Maxime Elliott	"	75	Yarmouth	112 50
Annie M. Parker	"	100	Tusket	150 00
Bohemia	"	86	"	129 00
Reuben Burke	"	94	Wedgeport	141 00
J. J. Flaherty	"	124	"	186 00
Somerville	Boston	82	Sand Point	123 00
				8,879 00
Less commission on draft				0 25
				8,878 25

APPENDIX No. 16.

REPORT ON OYSTER CULTURE BY THE DEPARTMENT'S EXPERT, FOR THE SEASON OF 1914.

To the Superintendent of Fisheries,
Ottawa.

CHARLOTTETOWN, P.E.I.

Sir,—I have the honour to submit to you my annual report on last season's work in connection with oyster culture in the lower provinces.

RICHMOND BAY, P.E.I.

On the opening of navigation the "Ostrea" was removed from her winter quarters and put into commission for the season's work.

Your department, having been informed of the increasing numbers of starfish growing on the oyster beds in Richmond bay, it was decided to make an effort to reduce the number as far as possible, and after definite arrangements had been made, I obtained the necessary outfit, which consisted of a number of mops or tangles attached to frames and towed over the oyster beds; these were then brought to the surface and the starfish removed. The body of the starfish being of a very rough and horny nature is easily caught when it comes in contact with the mops by becoming entangled in the gear,—hence the name tangle mops. These mops are about two feet long, and seven of them are attached to an iron bar six feet long, which is towed over the oyster beds. The "Ostrea" towed three sets of mops, and I found that after a little labour had been spent over the beds they had the effect of cleaning the area worked on, by disturbing and removing the sediment and acted as a broom, and the current running over the beds carried this accumulation away, leaving the bottom entirely clean, the shells and cultch being in good condition for the spat to adhere to, so that dragging these mops over the beds serves a double purpose, viz., that of clearing the beds of starfish and removing the sediment which accumulated there during the previous winter. While engaged in this work, I was assisted by Fishery Patrol Boats "D" and "E," and owing to the backward and unsettled state of the weather we were not able to make a start at the above work until the early part of June; the three boats working during the month, and at the end of the month Patrol "E" left for her patrol station in Nova Scotia on lobster protection, and Patrol "D" left on the same errand on the north coast of Prince Edward Island. The "Ostrea" continued fishing for starfish in the bay until the 21st August, and during that time the number of starfish caught were as follows:—June, Patrol "D" worked 10 days, caught 46 baskets; Patrol "E" worked 9 days, caught 35 baskets; "Ostrea" worked 11 days, caught 56 basket. July, "Ostrea" worked 12 days, caught 113 baskets, and August, worked 14 days and caught 144 baskets of starfish. Several of these baskets of starfish were counted and averaged 1,000 per basket, it being an ordinary half-bushel potato basket. The total number caught from the public beds during the season by patrol boats and "Ostrea" amounted to three hundred and

ninety-four baskets, or 394,000 starfish. These had to be picked off by hand, which was a tedious undertaking.

There were also other boats belonging to private firms and oyster companies who were engaged part of their time in trying to destroy this pest to the oyster, which appears to have multiplied exceedingly during this last few years. It is very strange that notwithstanding all the fishermen know of the injury the starfish does to the oysters, yet so very few of them will go to the trouble of saving and removing them from the beds while fishing for oysters. I have repeatedly told them and done my best to point out the necessity of keeping the starfish under control, but without much effect.

Early in the morning of the 30th of June the fishing schooner "Ellen Mary," of Jersey, 66 tons register, ran upon the rocks on the east end of Fish Island. The mate of the vessel came on shore and informed us that they required immediate assistance. Patrol "D" and "Ostrea" then started for the scene and after some trouble owing to the rough sea, succeeded in getting hold of towlines, and at high water managed to pull her afloat. She was making considerable water, and the captain asked me to tow him to Malpeque wharf for safety, which I did, and docked soon after noon, where he managed to stop the leak temporarily, as she was making about one thousand strokes of the pump per hour after she floated. The captain was very grateful to us for our prompt assistance, and no doubt she would have become a total wreck had she not been floated that tide, as the wind increased from the northeast, making a heavy sea which would have forced her further on the rocks.

I sent samples of oysters, quahaugs, mussels and soft-shelled clams to Toronto exhibition as specimens.

BIRD ISLAND BED.

Before leaving the bay I examined Bird Island bed and noticed that eelgrass appears to be growing thinly over the area in spots. I had two hauls of the dredge and took up 71 and 50 oysters and brood, respectively. The samples of oysters appeared to be small and have spat there since the bed was planted and the original oysters that were laid on this area are scarce, although I found one or two well grown ones. There were no starfish to be found here, and if this area was under private cultivation no grass would be found growing on it, as the ordinary dredging would be sufficient to keep it under.

RICHIBUCTO, N.B.

While engaged in Richmond bay I was instructed by your department to proceed to Point du Chene for the purpose of obtaining one hundred bushels quahaugs which had been previously arranged for, and transplant them in Village bay, situated within the waters of Richibucto harbour. This was accordingly done, having taken the quahaugs on board in the morning and arriving in Richibucto same evening. On the following morning I proceeded with the aid of a pilot to Village bay, where eighty bushels were planted on an area selected for their reception the previous season, and twenty bushels were planted while going through the Narrows. These were all received and planted in good condition. These quahaugs were planted as an experiment, as none are to be found growing in these waters, and I see no reason why they should not thrive here as well as they do in the adjacent waters of Buctouche bay and harbour.

Later in the season I was instructed to meet you here for the purpose of conferring as to the advisability of removing oysters for planting purposes from the Richibucto river above Chapel point to private areas, which are being developed in Shemogue harbour and elsewhere. The question arose as to the taking of undersized oysters

from this river, and the time of transplanting same, so it was decided to go over the area and examine the ground the following morning, which was done. In the first place I may state that oysters grow in this river from Kingston (or Rexton) bridge up the river for a distance of about thirteen miles. The oysters are of an inferior quality, but some are caught for market between the bridge and Chapel point, a distance of about four miles up the river; above that line the water becomes so fresh that the oysters are not edible. They are found practically the whole way up the remaining nine miles along the sides of the channel and over many parts of the bottom which is composed of comparatively soft mud, but sufficiently hard to support an oyster. They are growing in clusters and the spat falling each year adheres to the parent oyster eventually burying it and killing it. There has been no market whatever for these oysters as they are not edible, and when the Shemogue Oyster Company wanted to take them for planting purposes objection was made on account of taking small sized oysters, but upon examination it was found to be impossible to separate them, as the oysters are all growing in clusters of all sizes. This meant loss of much valuable time in attempting to separate them, besides causing no end of mortality to the young and growing oysters, and when this condition of affairs was seen to exist there could be no further objection raised, as they are growing in such large quantities and a never failing source of supply of spat can be found in these waters, which are sheltered from gales of wind from the sea and the river banks are well wooded. By the working of these beds in moderation there is every possibility of increasing the supply. One man informed me that they can catch anywhere from three to seven barrels of oysters per day as they come, that is without culling them, according to the weather. Indians report they can catch from three to five barrels per man per day. The most suitable time for transplanting oysters for growing purposes is not the time which our regulations stipulate, when fishing for market, and I would respectfully suggest that permission be granted to persons who desire to go into the cultivation of oysters to allow them an extension to obtain oysters during the months of May, June and September, as these months do not interfere with the spatting season. Persons who are enterprising enough to go into the cultivation of oysters should be granted every facility to assist them in the initial stages of their venture, as this industry if successfully carried out will become a very valuable asset to the provinces.

Permission was granted the above company to obtain the oysters they required for planting, and the work of removing them commenced as soon as arrangements could be made. I paid another visit to the Richibucto river while the men were fishing oysters above Chapel point and examined the oysters caught from several boats that were fishing. The fishermen informed me that from Chapel Point up, and above the bridge at Big Cove, oysters are taken from either side of of the channel practically all the way up, and the fishing that has been carried on from the 1st of October to the 17th has not made the slightest difference in the quantity of oysters found in the river. The Shemogue Oyster Company finished shipping oysters the 17th of October on account of bad weather setting in. Since they commenced fishing oysters they have obtained over two thousand barrels; about forty-five boats were engaged, with eighty men fishing and over three thousand dollars has been distributing among the residents living along the river front. Over two-thirds of the oysters were caught by white persons and the remainder by Indians. The above time has been broken by bad weather, so that they have not been working the full six days in the week. Seven small fishing boats have been employed in conveying the oysters from Richibucto to Shemogue, carrying from seventy-five to a hundred barrels each, and they have all arrived in good condition.

I also visited the oyster beds at Shemogue, which were planted last year with some of the above named oysters, and am glad to state that they have grown. The shells have improved and hardened, and the grounds appear to be in a satisfactory condition, the work being carried out under the direction of a very capable manager.

ST. MARY'S BAY, P.E.I.

I have examined the following areas in Sturgeon and St. Mary's bays, accompanied by Mr. Frank Conrad, and find the bottom of the channel leading into the bay between Panmure island and the mainland to consist of a firm bottom covered with small stones, quahaug, clam and mussel shells, with short weed growing on them, giving the area the appearance of a dirty bottom, but by raking over this ground I have no doubt that this short weed would be easily removed and the bottom cleaned. The stones on the western side of the channel appeared to be larger, but not too large to be removed. The depths of this channel vary from ten feet on each side, gradually sloping to a depth of twenty feet at low water. The length of this area would be, approximately, three-quarters of a mile with an average width of about two hundred yards.

Another firm area was found on the south side of the bay to the eastward of Sturgeon wharf and north of Oyster Cove, consisting of small stones and mussel shells, in about twenty feet of water at low tide, covering an area of about one hundred acres; this ground could also be cleaned and utilized as an oyster bed.

Another area was found between Sturgeon wharf and McDonald's point, Panmure island, called the middle ground, consisting of an old oyster bed thickly covered with long eel-grass, having a depth of about five feet at low water; this area could also be cleaned if required and converted into an oyster bed.

From Reynold's point to Hicken's point on the south side of St. Mary's bay the area consists of a firm sandy bottom covered with eel-grass, which runs out from the shore to a depth of ten feet, after which the bottom becomes softer. The same conditions were also found along the south side of Panmure island, the water very gradually deepening to ten feet with a firm bottom; outside of this the bottom is composed of soft mud.

There is a good current of water running through this bay, the water is clean, no impurities are emptied into it, and a small stream of fresh water empties itself from the head of Oyster cove, and is protected from the north with sand bars, thus making the bay a landlocked area.

Mussels and soft-shelled clams are to be found growing in these waters, quahaugs are also to be found in several parts of the bay and a great many have been taken from here in the past.

If this ground were cleaned and put in a state of cultivation, I see no reason why oysters could not be grown successfully. By placing them in the deeper water the growth of the oyster would not be as rapid as if they were laid in water of a shallower depth.

CARIBOU HARBOUR, N.S.

After leaving Georgetown I arrived in Caribou harbour and examined the bed here. I find the bottom appears to be a little uneven in spots, and I noticed a small percentage of mud in some places which apparently did not exist before. The Prince Edward Island oysters, although they show an improvement in size, look as if the larger ones had been removed, as I expected to see a much larger sample. I took three hauls from this area with the following numbers, 87, 95 and 78, with a few small ones attached, but not in any great numbers. Last year I examined the ground under the same conditions, and in two hauls of the dredge took up 251 and 179 oysters.

The American oysters are growing and look in a healthy condition. The shells are becoming harder, but have not increased in size very much, and with these I was looking forward for a larger sample. They also appear as if they have been culled over and the larger ones removed. I took three hauls of the dredge and found the following

numbers: 89, 110 and 98. Last year with three hauls I took up, 115, 125, and 195. The oysters were clean, and there appeared to be no mortality among them, and no starfish were seen or caught on the beds. One or two were opened and found to be fairly well filled and of good flavour.

SCALLOP AREAS.

It has been reported from time to time that scallops were to be found off the shores of Prince Edward Island, and I was instructed to ascertain if possible whether beds of any extent were in existence. Fishermen have reported that scallops will attach themselves to the hooks of their trawls in from twelve to sixteen fathoms water. I have dredged along the shores from Malpeque to Alberton without finding anything. While dredging off Alberton in from twelve to sixteen fathoms water I caught three dozen scallops; six was the most we had in one haul. In the others there were one and two and in several cases nothing but stones and sand dollars. In one haul we took up as many as eight hundred and thirty-six sand dollars, some quahaug shells were also found and two live quahaugs, and three live whelks. Dredging was also done off Tignish, North Cape and along the west coast of Prince Edward Island. We also fished off Miminegash in twelve and thirteen fathoms water and found fifteen scallops on a ridge on which the fishermen reported they were to be found. They also reported that further off the shore they can be caught. One man informed me that he tried with a dredge and caught about half a bushel of scallops off Miminegash, but he never repeated his experiment. The dredge comes to the surface generally filled with stones, shells, etc., and this man found the work of lifting the dredges in deep water no easy task, as it all had to be done by hand, and we have no other appliances for lifting dredges. It was my intention to try some ground while on the east coast of Prince Edward Island, but owing to strong winds prevailing, was unable to make any further experiments. To do this work effectively larger dredges are required and hoisting power is necessary, but we have none on the " Ostrea " and there is neither room nor accommodation to install such power.

PRIVATE OYSTER AREAS IN P. E. I.

The Provincial Government of Prince Edward Island have been carrying on their work of surveying the water bottoms around the shores and rivers and have not yet completed it. During the past season they have surveyed among other areas Foxley and Trout rivers, also the Narrows and have leased about five hundred acres of barren bottom for cultivating purposes.

In Richmond bay two of the largest oyster companies are using power boats for hoisting their gear and it facilitates the work in every way. Other smaller companies are using gasoline boats and towing a scow for dredging purposes, also for the laying of shells, oysters, etc., and the work is progressing favourably. These companies have laid both American and native oysters, but I am not in a position to give the correct quantities at the time of writing, as this is being carried on privately and it would, to a certain extent, be difficult to obtain the figures, but I have every reason to believe that the action they are taking will benefit the public beds as well as their own.

I am, sir,

Your obedient servant,

ERNEST KEMP,
Oyster Expert.

APPENDIX No. 17.

FISHERIES PATROL SERVICE.

The following reports on the work of the vessels comprising the Fisheries Patrol fleet in 1914-15, are submitted by the inspectors whose districts the boats respectively serve:—

REPORT ON THE WORK OF PATROL BOATS "C" AND "E."

DISTRICT No. 2, N.S.

To the Superintendent of Fisheries,
Ottawa.

"C"

SIR,—This boat, with Officer-in-charge Edward DeYoung, was employed from June 1 to the first day of July patrolling that part of the coast from Halifax city to Lunenburg county, the fishing season ending the first day of June.

It was found that the fishermen generally obeyed the law, but a few traps were found and confiscated. On June 11 between Herring cove and Terrence bay 13 traps were confiscated; on the 13th at Outer island, Lower Prospect, 26 traps were confiscated; on the 15th around Betty's island 20 were confiscated; on the 18th between Prospect and Shad bay, 3 traps were confiscated; on the 19th, 6 at Dover island.

On July 1 the boat patrolled the coast waters from Lunenburg county to Canso in Guysborough county, taking the local fishery overseers on board and going over their several districts to see that the law was observed.

From August 6 to 26, this boat was requisitioned by the manager in charge of the dockyard and used as a despatch boat, from that date until December 14 she continued to patrol the district. On August 26 at Pennant bay 5 traps were confiscated; on September 22, 15 traps at East Dover, which were without bait, and on October 8, 4 traps at Nicol's island and Shoal bay, Halifax county. No other violations were found.

"E"

This boat, with Officer-in-Charge A. E. Seaman during the months of May and June was under the oyster expert at Prince Edward Island. At the beginning of the close season, she patrolled the coast waters from the New Brunswick line eastward to the Straits of Canso.

On July	6,	7 traps were found at	Malagash Point, Cumberland county.
"	10, 98	"	Bay Verte, Cumberland county.
"	11, 2	"	East of Pugwash, Cumberland county.
"	14, 14	"	between Pugwash and Northport, Cumberland county.
"	15, 4	"	between Wallace and Pugwash, Cumberland county.
"	21, 70	"	at Rocky Point, near Brulé, Colchester county.

On July 25 some buoys were overhauled at Arisaig, nothing illegal was found.
" 31, 8 traps were confiscated off Pugwash Harbour.
August 1, 11 " east of Wallace, Cumberland County.
" 4, 8 " off Wallace, Cumberland County.
" 14, 68 " off Wallace at Saddle Island.
" 27, 10 " at Coldspring Head.
" 28, 8 " and canning utensils at Malagash.
Sept. 4, 45 " at Tatamagouche Bay.
" 5, 10 " between Tatamagouche Bay and Malagash.
" 7 chased a boat which managed to get into shoal water and escaped.

On the 8th the Officer-in-charge left at midnight and went to the Gulf Shore and watched for men reported fishing, but saw nothing.

On Sept. 9 got 92 traps between Pugwash and Northport.
" 11 " 12 " Wallace and Pugwash.
" 12 " 5 " Pugwash and Wallace with 4 bushels of lobsters in bags. These were all confiscated.

On Sept. 12 Officer-in-charge landed at the Gulf Shore and sent the Patrol boat to Pugwash, watched until daylight, saw boat coming out with two men, who hauled traps, waited until the boat came in and got 4 bushels of lobsters; confiscated boat and laid complaint against Wm. Allen and Montague Allen, who were fined by the local magistrate.

September 14, Officer-in-charge landed at Oak Island and sent Patrol boat westward, waited until daybreak but saw no illegal fishing.

September 22, confiscated 22 traps between Malagash and Brulè, saw boat in which were two men hauling traps, chased them until they got in shore, confiscated the dory and towed it to Pugwash.

September 24, confiscated 55 traps between Pugwash and Northport.

October 2, Officer-in-charge landed at Brulè at 3.30 a.m., sent Patrol boat back to Malagash Wharf, saw motor boats moving at daybreak. At 7.30 Patrol boat returned, took Officer on board and went to Tatamagouche, from there went in company with Overseer B. S. Langille and searched two houses, and an old schooner, but found nothing.

October 3, Officer-in-charge drove to Brulè with Overseer Langille to get information in regard to location of traps. At 7.30 p.m. again went to Brulè and stayed on bank of shore and watched boat. At 1.30 a.m. left to go on Patrol boat; saw nothing.

October 20, found some buoys at Sandy Cove, Pictou county, but no traps.

October 29, confiscated 73 traps between Pugwash and Northport.

November 5 landed at Saddle Island. Illegal fishing reported, but saw no signs of such.

I am, sir,
Your obedient servant,

(Sgd.) R. HOCKIN,
Inspector of Fisheries.

REPORT ON WORK OF PATROL BOATS "A" AND "B," DISTRICT NO. 3, NOVA SCOTIA.

To the Superintendent of Fisheries,
Ottawa.

"A"

SIR,—Patrol boat "A," in charge of Capt. Hadley Blackford, was engaged in Digby and Annapolis Counties, from April, 1914, until June 15, in the collection of seed lobsters for the Long Beach pound, after which date she was engaged in regular patrol for the prevention of illegal fishing. The number of miles was 1,976, consuming 1,820 gallons of gasoline. The number of illegal traps destroyed was 243, from which 197 lobsters were released.

At the opening of the lobster season, January 6, 1915, she proceeded to Shelburne for the over-hauling of the engines and repairs. It was thought wise to transfer "A" from Bay of Fundy shore to the south shore, where she will be engaged for the season 1915-16.

"B."

Patrol boat "B," in charge of Capt. John Bateman, was employed in the general patrol of Yarmouth County waters during the closed lobster season beginning June 1. Excellent service was given.

The number of miles travelled was 2,599, consuming 1,634 gallons gasoline. Six hundred and sixty-six illegal traps were destroyed, and 1,606 lobsters released, of which 42 were seed lobsters. Two hundred and fifty-five of these traps were discovered by grappling. Three hundred and ninety buoys, and about 1,400 fathoms of rope used in connection with illegal traps, were confiscated.

In addition to "A" and "B," the gasoline sloop *Search* was employed in the patrol of Lunenburg waters,and the *Three Sisters* in the patrol of the waters of western Shelburne. Both these boats rendered most valuable service. The *Search* destroyed about 200 lobster traps, and confiscated 1,330 fathoms of rope and 41 buoys, which being of no value were destroyed. The *Three Sisters* travelled 2,149 miles. One hundred and sixty-four lobsters were liberated from the traps discovered and confiscated.

I am, sir,
Your obedient servant,

(Sgd.) WARD FISHER,
Inspector of Fisheries.

REPORT ON WORK OF PATROL BOATS "SEA GULL" AND "PHALAROPE."

To the Superintendent of Fisheries,
Ottawa.

"PHALAROPE."

SIR,—The *Phalarope* was in commission all the year and performed very satisfactory services. Her district includes all of Charlotte and St. John Counties, excepting Grand Manan Island. With her assistance the close season for lobsters has been better

observed than it has been in the past. She has also been very useful in assisting to stop illegal seining and torching for herring in Charlotte County.

The *Phalarope* logged 9,005 miles during the season.

"SEA GULL."

This boat was stationed at Grand Manan Island during the past year. Her principal duties were in connection with the lobster fisheries. As a result of the patrol maintained by this boat the close season was well carried out. Some under size lobsters were no doubt taken and sold by some of the fishermen. I feel safe in asserting that the amount so handled was not very large and if it had not been for this boat much greater quantities of small lobsters would have been taken.

As you are aware the *Sea Gull* is too small for a large and exposed district like Grand Manan, and on that account a new patrol boat for that place is being built at Port Hawkesbury. When the new boat arrives the *Sea Gull* will be turned over to Overseer Worrell, St. Andrews, to be used in connection with the sardine herring fishery.

I am, sir,
Your obedient servant,

J. F. CALDER,
Inspector of Fisheries.

REPORT ON THE WORK OF THE PATROL BOATS "HUDSON" AND "MERVEIL."

To the Superintendent of Fisheries,
Ottawa.

"HUDSON."

SIR,—The patrol boat *Hudson* left Pictou for Port Elgin on September 22, 1914, but was obliged to call at Pugwash to allow engineer to adjust machinery; arrived at Port Elgin on September 23, and went on patrol work between Cape Tormentine and Chockfish. Destroyed several lines of lobster traps at Cape Bald on October 1 and south of Chockfish on October 14, and again on November 5.

Went from Port Elgin to Summerside with Mr. Cowie on November 10, and two days later or on the 12th got some lobster lines and traps off Cape Spear.

On November 14 I ordered boat to Bay Verte to go into winter quarters and discharged cook Anthony Arseneau and deck-hand Luther Trenholm. This boat did good work in this district to keep illegal lobster fishing down.

"MERVEIL."

Patrol boat *Merveil* engaged at $10 per day including boat, gasoline, captain and deck-hand. This patrol was put in charge of Overseer Arseneau of Inkerman and went on patrol duty August 26, 1914, district patrolled being Miscou Island, including Miscou Harbour, Shippigan Island, Little Pokemouche, and Green Point, all in the county of Gloucester. These points were noted for illegal lobster fishing especially Wilson's Point on Miscou Island, Cape Bateau on Shippigan Island and along the coast including Little River. Destroyed several lines and traps which were set with no visible sign, there being no buoys or anything to show there was any illegal gear in the water. Overseer Arseneau rigged up grappling irons and dragged along the shore at suspicious points and got lines and traps at Wilson's Point, Cape Bateau and West River.

This patrol boat d'd excellent work and I have reason to believe broke up illegal fishing which has been carried along this coast for years, especially at Wilson's Point and Cape Bateau.

I am, sir,
Your obedient servant,

D. MORRISON,
Inspector of Fisheries.

REPORT ON WORK OF PATROL BOATS "RICHMOND," "D" AND "J. L. NELSON."

PATROL "D" CAPT. J. B. M'CARTHY.

To the Superintendent of Fisheries,
Ottawa.

SIR,—This boat commenced work on the 25th of May, and left Tignish for Malpeque where she arrived on the 28th. She was employed in the interest of oyster culture, principally in catching and destroying star fish, and succeeded in getting between forty and fifty thousand up to the first of July. She then proceeded to Tignish and took up patrol work between North Cape, Alberton, Goose Harbour, and Richmond Bay, where a number of traps, lines, and anchors were taken and destroyed. During the remainder of the season she was employed protecting the different branches of the fisheries. The boat was beached on the 20th of November, and blocked up and secured for the winter. The crew was discharged on the 25th.

PATROL "RICHMOND," CAPT. PETER J. CAMERON.

Was employed, after opening of navigation, visiting the different lobster canneries in Richmond Bay and Goose Harbour, and preventing the landing of berried lobsters. After the 10th of May when the quahaug season opened, licenses were collected from the fishermen, and the illegal fishing of oysters looked after. Also destroyed several lines of lobster traps. On landing at Hog Island found where a lobster boiler had been set. The fishing boat tried to escape but was overtaken, throwing over lobster shells. The two occupants were sued and fined sixty dollars each. For the remainder of the season she was employed principally on Grand River, in preventing the taking of small oysters.

PATROL "J. L. NELSON," CAPTAIN WRAYTON.

Commenced patrolling early in July between North Cape, Cape Wolfe, Egmont Bay, Summerside and Miminigash, making headquarters at the latter place. During July, August, September and part of October, continued watching and dragging for lobster lines and traps and succeeded in destroying a quantity of each, and reports much less illegal fishing than in former years. This boat draws a good disc of water and often loses a great deal of time through having to wait for tides, to get out of the harbour.

She then proceeded to Halifax to continue patrol work.

I have the honour to be, sir,
Your obedient servant,

(Sgd.) J. A. MATHESON,
Inspector of Fisheries.

SESSIONAL PAPER No. 39

REPORT ON THE WORK OF THE "C. E. TANNER."

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to send you, herewith, a statement of the movements of the Patrol boat *C. E. Tanner*, and of the work performed during the season of 1914.

Having received instructions from Commander Wm. Wakeham to get the *Tanner* ready and afloat for the opening of navigation, we accordingly started work in this connection on the 15th day of April, but owing to the unusually late spring we did not begin our service in connection with the House Harbour Hatchery before the 21st day of May.

While awaiting the arrival of our engineer coming on the S.S. *Lady Sybil,* which was delayed by the ice, we secured the service of a small gasoline boat to visit several fishing schooners which had arrived here for their usual baiting, there being several American vessels amongst them.

On the 21st day of May we commenced our work of carrying the lobster spawn from the different canneries of Amherst, Grand Entry and Grindstone, to the House Harbour Hatchery, going alternately one day to Amherst calling at Grindstone, next to Grand Entry, which work we carried on until July 20, being afterwards employed in distributing the matured spawn, in the different lagoons of the Magdalens, ending our work in connection with the hatchery on the 30th day of July.

While thus employed four canneries were reported for having boiled spawn lobsters and were accordingly fined, after conviction, for this violation of the Fisheries Act.

I may say that although we had a late spring, and that we experienced cold and blowy weather during the months of May and June, the lobster catch was fairly good. The month of July being fine and the new regulation extending the fishing season to the 20th day gave the fishermen the opportunity to fish during this ten day extension with advantage.

On the 31st day of July we began our patrol in connection with the Fishery Protection Service, patrolling the lagoons of Grand Entry, House Harbour and Havre Aux Basques until October 12, during which time we destroyed 36 traps and seized about 87 fathoms of rope, all of which was reported to the Department of the Naval Service.

There was very little poaching or illegal fishing done this year. The new lobster regulations having no lobster season in the fall, consequently taking away the principal means of passing the illegal goods, have been the principal cause of stopping the illegal lobster fishing. The depression of the market, the abundance of codfish around the Magdalens, the fairly good catch of mackerel and our constant watch and patrol have all contributed to practically stopping the poaching here. The people also seem to understand the fact that the fall and illegal lobster fishing is detrimental to their spring catch and to the lobster industry in general.

I believe that throughout the season this is one of the best we have had on the Magdalen Islands, that is, in the quantity of fish landed, in herring, mackerel, codfish and lobsters, but the depression of the market, presumably caused by the war, especially the lobster trade which constitutes our principal exports and main industry has turned what would have otherwise been a very successful season into almost a disastrous one. On the 10th of October we were directed by Commander Wm. Wakeham to hold the *C. E. Tanner* ready for Pictou.

On the 16th we were taken in tow by S.S. Cruiser *Princess,* and arrived at Pictou on the morning of October 17, and according to instructions immediately left the *C. E. Tanner* in charge of Mr. R. Hockin, Inspector of Fisheries.

I am, sir,
Your obedient servant,

CAPT. WM. S. ARSENEAULT,
Fishery Officer.

REPORT ON THE WORK OF THE "LADY OF THE LAKE."

To the Superintendent of Fisheries,
Ottawa.

SIR,—I have the honour to report with respect to the *Lady of the Lake* patrol boat for the fiscal year ending March 31, 1915.

The *Lady of the Lake* was employed on Lake Winnipeg and tributaries, comprising all rivers flowing into and out of Lake Winnipeg.

This boat is built of wood, a screw steamer, 105 feet long, 18 feet 5 inches in width, 8 feet 9 inches of hold, fitted up with steeple compound. Her gross tonnage is 201 tons, net tonnage 155 tons. The engine and cylinders are 11 by 19 inches diameter, 15-inch stroke, locomotive type boiler.

This boat was fitted out on the last of April, and went into commission in May.

She was employed in protecting the fisheries, during the fishing season, and gathering spawn for the hatcheries. The *Lady of the Lake* accomplished this work very successfully and travelled about 7,000 miles. She was under orders from the writer, who was on board most of the time.

I am, sir,
Your obedient servant.

J. A. HOWELL,
Inspector of Fisheries.

REPORT ON WORK OF PATROL BOATS IN DISTRICT No. 1, BRITISH COLUMBIA.

To the Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I beg herewith to submit a report of the movements of the patrol launches in District No. 1 in the performance of their respective duties during the fiscal year 1914-15.

LAUNCH "SWAN," PATROLMAN CAPT. THOMAS HEMBROUGH.

This launch was employed on general patrol work covering the following waters:—Fraser River from Gulf of Georgia to Chilliwack, Coquitlam, Pitt, Sumas, Lillooet, Harrison and Stave Rivers, Gilley Slough, Silver Creek, Pitt and Sumas Lakes, Boundary Bay and the Gulf of Georgia.

At the beginning of the season this launch was replanked complete and strengthened in her framework, which has added greatly to her efficiency as a patrol boat. She travelled during the year, 7,317 miles, and found 288 cases of violation of the regulations.

The crew of this boat were employed as required during the spawning season in putting in fences, conveying ova to the hatchery and other work.

LAUNCH "FOAM," PATROLMAN CAPT. S. WADDELL.

This launch was employed during the season patrolling Fraser River between Mission Bridge and the mouth, also Boundary Bay and Gulf of Georgia. She also made a number of trips to Indian River, Squamish and Gibson's Landing. She found during the year 88 cases of infractions of the Regulations, and travelled in all 6,379 nautical miles.

LAUNCH "ELK," PATROLMAN CAPT. WM. DAUPHINEE.

This launch was employed patrolling the waters of the north and south branches of the North Arm of the Fraser river between New Westminster and the Sandheads. She also made several trips to Sumas, Pitt and Lillooet rivers; also the crew assisted as required at the Bon Accord Hatchery and in connection with the work on the spawning grounds. She travelled in all 5,028 miles and found 71 cases of violation of the regulations.

LAUNCH "SEMAHMO," PATROLMAN W. M'C. MOORE.

This launch has been employed during the year in patrolling the waters of Burrard Inlet, Howe Sound, Squamish and English Bay. The condition of this craft is such that she is unfit for further patrol service without extensive repairs. As this portion of District No. 1 is a very important area from the standpoint of the fisheries, it is highly important that an efficient patrol service be maintained. In order to do this, a new and up-to-date patrol boat should be purchased or built, and properly equipped.

All of which is respectfully submitted.

(Sgd.) A. P. HALLADAY,
Assistant Inspector of Fisheries.

"FISPA" GENERAL REPORT, APRIL 1, 1914, TO MARCH 31, 1915.

F. H. CUNNINGHAM, Esq.,
Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I have found it necessary to divide my annual report under two headings, so as to enable you to read the general report, with regard to the *Fispa's* movements, separately from the work accomplished upon the inland waters (big rivers and lakes).

Following your instructions given to me last March, 1914, to take the *Fispa* north, towards Queen Charlotte Sound, and there to remain on patrol, and at the same time to explore as far as possible the inner waters of the Sound for Pelagic Fish of commercial value, I sailed from New Westminster on the 14th of March, 1914, and commenced my work on arrival at Queen Charlotte Sound.

The Gordon group of islands, back to the head of Blackfish Sound hold enormous quantities of commercial fish of great value, halibut, cutins and red cod, rock fish, bass of various species, flounders, sole, herring, etc., and during the time I was engaged in this research work no fishing boats whatever were engaged commercially in these waters.

It has always been, and still remains a mystery to me how men with a geographical knowledge of fishing waters and with a knowledge of localities that must appear natural fish haunts, year after year pass over waters of this nature which abound in fish, and continue on and out to open sea in quest of halibut alone. I assume it has become traditional to do so.

I recollect the same thing occurring on the Irish coast many years ago. The boats year after year went out and fished the hake and haddock ground, 7 to 10 miles off the land, and when the new banks were discovered by the department the boats had to be virtually driven on to them, so habitual had it become to go out to the old grounds. I have suggested to many men interested in fishing here the advisability of trying our inner waters, but I regret to say my suggestions were only treated with more or less

contempt, as unless a man has spent half a life on this coast, in fishing halibut and halibut alone, he is not considered qualified to have an opinion until time has made him narrowed and methodical, two bad elements for a fisherman to possess.

However, now I am pleased to report that at last a commencement has been made to fish these inner waters. One firm in particular have started at Alert Bay, and Shushartie, and are meeting with very encouraging success, but I regret that they are seeking halibut alone, as if no other fish had any commercial value. There is no doubt that as a matter of fact, such fish as sole, arctic flounder, plaice, cod, etc. are of more actual commercial value, but no effort whatever has been made to harvest these fish. I venture to state that there are sufficient flounders and soles around these waters to supply the demand throughout every city on the prairie. I cannot conceive why these fish are passed over. I do not believe that in Vancouver or Victoria today there is offered for sale, sole or flounder or plaice, worthy of the name. I have taken the trouble to seek for them on the market, without success.

I feel I have done my part in pointing out to you where the fish are, and I sincerely trust that the time is not far off when these magnificent fish will be sought after, and offered for sale to what must necessarily be a ready market.

I know quite well how disappointed fishermen get, and how often they quickly abandon a locality, if the locality does not hold bait. So bearing this most important factor in mind, I explored the shore line of Queen Charlotte sound from Bond sound to Takush harbour, and I am pleased to report that I was rewarded by finding quantities of herring resorts at Bond sound, Turnbull cove, Drury inlet, Shelter cove, Villiagi island, and Takush harbour as far back as Fly basin. I have given all the assistance possible to those now engaged in prospecting the fishing grounds here, and in pointing out when they may expect to find herring.

While on this subject of bait, I feel it necessary to call your attention to an ancient and barbarous custom of the Indians in these waters that each year tends to weaken the supply of herring. Around the mainland the Indians each spawning season capture tons of herring simply to get the roe, the fish they reject and throw away after removing the roe, which they collect and sun dry in racks for their winter food. If this goes on for ever it must naturally have its evil result. Of course, years ago, it did not affect the supply, as there did not happen to be a demand; now that a demand will exist, we must take every means to check this waste of spawning fish. In addition to the ordinary capture of herring for this purpose, which really is the minor evil, the roe is collected in a far more destructive manner; all along the spawning ground branches of hemlock are sunk and the herring spawns and the fertilized roe deposits upon the fronds of the branches. Tons of fertilized roe are taken annually in this barbarous manner. Surely if the fishing industry is to progress these traditional remnants of barbarism must necessarily be wiped out. I want it to be thoroughly realized that any research work I have done around these waters, has been somewhat crude and superficial; it could not be otherwise, as the *Fispa* is not a boat equipped for research work on pelagic fish. If this work is to be done effectually, of course it would require a boat fitted with the proper gear and laboratory.

Towards the end of May, I returned at your request to Westminster, and went on special patrol duty close upon the Boundary Line and the gulf of Georgia. While upon this patrol I had a good opportunity of studying the run of salmon towards the Fraser river, and of closely observing the line of trap nets and the movements of the fish towards them, "those traps particularly in the United States waters." I have secured notes regarding the run of fish here, which will when completed be of considerable interest. However, I would very much like to have the opportunity given me of going further down Puget sound this summer, to allow of my collecting more information on this subject. I have ceased to entertain vague and conflicting reports on how the fish approach the Fraser. Personal observation only will give me the information I

seek for. I find the reports vague, and generally have their source in some self-interested scheme.

On the 11th July I had the honour of conveying Mr. Cowie, of Ottawa, and you on a cruise to the north, when you inspected all the fishing centres from Vancouver to the Naas river. We visited Quathiaski, Alert bay, all the canneries at Rivers inlet, Warke island, Lowe inlet, Skeena river, and the Naas. On the 23rd of July we left Prince Rupert and headed for the south again, touching at many of the canneries for further inspection. At Warke island (Grenville channel), Mr. Cowie had an opportunity of inspecting the quality of herring captured in the locality, and the gentlemen interested in their commercial capture had the opportunity of getting the opinion and advice of one of the best experts in the world as to the better handling, sorting and means of capturing these fish.

I would particularly like Mr. Cowie's opinion upon that part of my report dealing with the destruction of herring roe, as the same evil exists around the district which he visited. We arrived at Vancouver after touching at all the island canneries, on the 28th July, when you and Mr. Cowie left me.

The total distance covered during this cruise of inspection was 1,250 geographical miles.

Early in August, I took Mr. Cameron, a gentleman commissioned by the Government to explore the Kelp Patches, along the British Columbia coast line. His visit on board I regret to say was for a very short period, but sufficiently long to allow me to have many interesting matters discussed on the Kelp industry.

Towards the end of September, I left my patrol in Haro and Rosario straits, and ran down Juan de Fuca straits, and around the west coast of Vancouver island. I touched at practically all the fishing centres and inlets on the west coast, from Barclay sound north to Quatsino, and came round cape Scott, entering Goletas channel and worked the whole eastern shore line down to Vancouver.

Total distance patrolled from April 1, 1914, to March 31, 1915, 9,443 geographical miles.

I have the honour to be, sir,
Your obedient servant,

(Sgd.) J. T. CRICHTON,
Captain.

REPORT ON WORK OF PATROL BOATS IN DISTRICT No. 2, B.C.

To the Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I have the honour to submit my anual report in connection with the services performed by the Fishery Patrol boats under my control, during the fiscal year ended March 31, 1915.

C. G. S. "FALCON."

The *Falcon* was placed under my control as usual from April to November, and during that time logged 6,324 statute miles, making 250 official calls at the different canneries and fisheries in the district. Her principal work is patrolling the salmon fisheries of the district and to convey the Inspector from one portion of his district to another, which covers a coast area of some 1,100 miles. During the season the *Falcon* was placed at the disposal of several professors from Ottawa, who were visiting the district for the purpose of making investigations connected with fish and fish life, and also sea vegetation. The chief inspector and Mr. Cowie, the herring expert of the department, made extensive trips of inspection in this vessel, especially around the Skeena and Prince Rupert divisions.

Many seizures were made during the season by the vessel, for illegal fishing, and she contributed largely to the enforcement of the regulations all over the district, particularly in the exposed waters. Captain A. O. Copp who is in command of this vessel, has had many years experience on the coast, which is of much value to the department. He has always shown great zeal in looking after the fisheries of the district, taking an intelligent interest in his work.

April	878 miles,	26 calls.	August	1,333 miles,	45 calls.
May	986 "	46 "	September	655 "	29 "
June	814 "	38 "	October	655 "	29 "
July	1,003 "	37 "	Total	6,324 "	250 "

F. P. L. "BONILA."

The launch *Bonila* went into comission on the 25th June, 1914, and from that date until the 25th October was engaged patrolling between Addenbrook islands in Fitzhugh sound and Banks island in Hecate straits and also all channels and inlets contained in this area of water, excepting Burke and Dean channels. To cover all the waters in the division means a run of 1,500 miles or more. The *Bonila* averaged sixty miles per day during the season, making a total of about 8,000 miles. The Fishery Regulations in general were well observed. Several old Indian dams in streams were destroyed. Most of the waters patrolled have never been surveyed, and a greater portion of the area of water patrolled is not shown on the charts.

F. P. L. "KAYEX."

The *Kayex* went into commission in April, and has patrolled the southern portion of Chatham sound and the Skeena river, during the season. The mileage of the launch has been about 7,031 and the fuel consumed about 2,720 gallons of distillate. The Frisco standard engine which was installed last March has given great satisfaction.

F. P. L. "HAWK."

The *Hawk* had a very successful season and has an approximate mileage of 5,334 miles for the season. The Buffalo engine gave entire satisfaction. The launch patrolled the Skeena and Oxstahl rivers from the mouth to the fishing boundary.

F. P. L. "MERLIN."

This launch patrols Rivers inlet, from May until September, the mileage covered during that perod was about 3,500. The fishery regulations were well observed, very few cases of illegal fishing being reported.

F. P. L. "LINNET."

This launch patrols the waters of the lower Naas and Portland inlet. She was in commission from April to October, and during that time travelled about 4,600 miles.

Some seizures were made for infringements of the Fishery Regulations, but nothing of a serious nature. Overseer Adamson reports that the launch is in good condition considering the seven years of service, and states that it will be necessary for the adequate protection of the fisheries, to have a large and more powerful boat to patrol the lower portions of Portland inlet and the areas of water where seining operations are being conducted.

F. P. L. "KINGFISHER."

During last season this launch patrolled the waters of Burke and Dean channels which include the Bella Coola, Kimsquit, and Manitou fisheries. She was in commission from the middle of May to the middle of October. She travelled about two thousand statute miles, commencing with the spring salmon and finishing with the cohoe season in October. A few seizures were made at Kimsquit but none at Bella Coola. She is a good serviceable launch and has given entire satisfaction. She has never had a breakdown or mishap during the four years she has been in commission.

F. P. L. "GANNET."

On March 28 the *Gannet* left the Queen Charlotte islands under instructions to proceed to Prince Rupert, from there she made a trip to Bella Bella with Overseer Norrie to inspect improvements done to salmon streams in the vicinity; from there she returned by way of Prince Rupert to the Queen Charlotte islands. On July 17 she again left the islands for Prince Rupert to interview Chief Inspector Cunningham, as to proposed alterations to the *Gannet*. She then left for Vancouver where the alterations were made, after which she again left for the islands arriving there on September 2. From that time to January 31 the *Gannet* was employed patrolling different portions of the islands. Instructions were then received for her to proceed to Prince Rupert where she is at present employed patrolling the herring spawning grounds between Prince Rupert and Port Simpson.

The *Gannet* covered 10,071 statute miles during the season and the fishery regulations were strictly adhered to around the islands. During the season several foreign halibut fishermen were warned as to the consequence of illegal fishing within the three mile limit, and one vessel was chased but unfortunately got away owing to superior speed. The *Gannet* has on several occasions taken the mails to isolated points on the islands, during her regular runs. Captain John Haan is a fishery overseer as well as master of the *Gannet*.

I am, sir,
Your obedient servant,

(Sgd.) JOHN T. C. WILLIAMS,
Inspector of Fisheries.

REPORT ON WORK OF PATROL BOATS IN DISTRICT No. 3, B.C.

To the Chief Inspector of Fisheries,
New Westminster, B.C.

SIR,—I have the honour to submit reports of the service of the various Fisheries Patrol Boats, performed in my district during the fiscal year ended March 31, 1915:—

LAUNCH "HERON."

This launch with headquarters at Clayoquot, patrols the west coast of Vancouver Island in that vicinity. She went into commission early in May, 1914, and was used principally in enforcing the regulations governing the hunting of fur seals by the Indians, which are caught on the high seas outside Clayoquot sound. She also visited all the rivers and streams in connection with the free access of salmon to their spawning areas, and kept in touch with the movements of cod and halibut fishing vessels.

From November 28 to January 3 last, the *Heron* was engaged in naval patrol work at Bamfield, and on her return to Clayoquot, assisted in repairing and laying a new cable at that point. After completing this work, she was laid up early in February, having covered while in service 5,557 miles.

LAUNCH "EGRET."

This launch was in the Fisheries Patrol service for eight months during the past season and one month in the naval service at Bamfield. The area patrolled while in the fisheries service, was from Wreck Bay to San Juan harbour, west coast of Vancouver Island. The headquarters of the *Egret* is Port Alberni. She logged about 5,000 miles. Prof. Cameron had the use of the *Egret* from August 25 to 27, inclusive, visiting various kelp beds in Barclay Sound.

LAUNCH "RAVEN."

The *Raven* patrols the Alert Bay district, which comprises the waters on the east coast of Vancouver Island from Cape Scott to Adams river, and on the mainland from Cape Caution to the head of Knight Inlet. This launch was in commission for eight months during which time she logged about 5,200 miles. Mr. Jno. Broder, Inspector of Canneries, was taken to the various canneries in this district aboard the *Raven*.

LAUNCH "GULL."

During the season of 1914-15 the *Gull* patrolled the waters from Big Qualicum to Active Pass, east coast of Vancouver Island, and logged about 11,300 miles. The fishery regulations were well observed in this district, only two prosecutions for illegal fishing being recorded. This launch was placed at the disposal of Dr. Cameron for a week in July, to enable him to inspect the kelp beds along the coast.

LAUNCH "COHOE."

This launch was in commission during the whole of the fiscal year. She patrols the Pender Harbour district of the mainland coast, which has a coast line of 800 miles, exclusive of inland waters, and included in an area of 120 by 60 miles. The distance travelled by this launch was 7,400 miles. During the above period few infractions of the fishery regulations were found.

The *Cohoe* has done good service and is giving satisfaction.

C. G. S. "ALCEDO."

During the past season the *Alcedo* performed the usual patrol service between Vancouver Island and the mainland, from the south end of Vancouver Island to Queen Charlotte Sound. During this time over 9,000 miles were logged. The regulations were well observed and there was less infraction of the regulations than for some years. Dr. Cameron, of the Biological Board had the services of the *Alcedo* for seven days in July. During this time 325 miles were logged.

Under instructions from the department, I placed the *Alcedo* at the service of the Post Office Department, and Mr. Haynes, Assistant Inspector of Post Offices, made the inspection of the various outlying post offices in my district. The time occupied in this inspection was 13 days, in which a distance of 651 miles was covered, and thirty calls made.

I am, sir,
Your obedient servant,

((Sgd) EDWARD G. TAYLOR,
Inspector of Fisheries.

APPENDIX No. 18.

BIOLOGICAL STATIONS OF CANADA, SEASON 1914.

G. S. DESBARATS, Esq.,
Deputy Minister of Naval Service,
Ottawa.

SIR,—In accordance with the plan of work outlined by the Biological Board, at the annual meeting held in Ottawa, in May, 1914, the scientific stations at St. Andrews, N.B., and Departure Bay, British Columbia, carried on a series of elaborate fishery and technical researches, of which full reports, in the form of biological memoirs, will be completed for publication in due course.

ST. ANDREW'S BIOLOGICAL STATION.

There were thirteen biologists engaged in investigations during the season (1914), including Professors Macallum, Toronto University, W. T. MacClement, Queen's University, Kingston, L. W. Bailey, University of New Brunswick, Philip Cox, of the same University, and Dr. J. W. Mavor of the University of Wisconsin. Dr. Mavor was appointed Curator of the station, and he performed his duties with great zeal and success. Others at the station were Miss Duff, Toronto, Messrs. R. P. Woodhouse, Toronto, A. R. Cooper, Toronto, E. Horne Craigie, Toronto, J. D. Detweiler, Queen's Kingston, A. D. MacAllum, Toronto, and C. B. Waite, Kingston. As in previous years, a number of the members of the staff engaged in special researches at points on the coast of the Maritime Provinces more or less distant from the station. Mr. A. D. Robertson, Toronto University, continued oyster researches in Richmond Bay, Prince Edward Island, and Professor Julius Nelson of Rutgers College, New Jersey, the distinguished oyster authority, consented to aid the work of the stations by taking part in oyster work, and giving practical and theoretical instruction in "Oyster Culture," in Prince Edward Island.

One of the chief subjects taken up was the life-history of those Atlantic food-fishes which abound near St. Andrews, and the adjacent waters. Dr. Mavor superintended the investigations, and the several members of the staff took up the different species as follows:—

The haddock was studied by Miss Duff; the cod by Mr. Woodhouse; the pollock by Mr. A. D. MacAllum; the hake by Mr. Horne Craigie, and the salmon by Mr. Detweiler. Great progress was made by these workers and most interesting results have been obtained, and a number of reports, many of them illustrated with plates, have been completed.

Repeated cruises were made to important localities, such as Grand Manan and other places in the Bay of Fundy; trawling, dredging, tow-netting, and other work being carried on and a great variety of fish and invertebrate specimens, and a large amount of zoological and botanical material being secured. Professor Macallum, Professor Cox,

and Mr. A. R. Cooper took an active part in this work. Some special problems were also attacked, such as the fatal epidemic of disease among the herring, especially in northern New Brunswick, and a supposed disease among the quahaugs or hardshell clams at Richibucto, N.B. Dr. Philip Cox undertook both researches and has completed reports thereon. The parasitology of fishes was again taken up by Mr. Cooper, who investigated the Cestodes, and by Mr. Woodhouse who devoted attention to the Acanthocephala. Professor Macallum began some profound studies on the tissues of dog-fish and sharks, upon which he had previously obtained most remarkable results, but his work had not been completed. Professor Bailey continued his Diatom studies, and a number of other researches were commenced, and more or less completed, by the end of the season.

The station's motor vessel *Sea Gull* was again loaned to the department, and was engaged in fishery patrol duties, but the very seaworthy and well-equipped motor yacht *Prince* did splendid service, making no fewer than thirty trips of investigation in Passamaquoddy Bay and neighbouring waters, and enabling the staff to make important additions to the faunistic collections, two new fishes being added to the list of species in the district by Professor Philip Cox.

Once more the station was able to contribute a notable exhibit to the Provincial Exhibition, held at St. Sephen, and sent a fine series of specimens of fish and sea-products, which proved a great attraction. The equipment of the station was made more complete by the addition of a 12-foot beam-trawl, a hoisting engine for the *Prince* a Petterson-Nansen water-bottle, a Richter thermometer, and other necessary instruments, and by some important additions to the station's working scientific library.

DEPARTURE BAY STATION, VANCOUVER ISLAND.

Dr. McLean Fraser, with his staff, consisting of Professor Arthur Willey, McGill University; Professor A. T. Cameron, Manitoba University; Mr. A. B. Klugh, Queen's University; and Professor F. W. Weymouth, were able to accomplish some very remarkable scientific investigations. Mrs. McLean a trained biologist was able to aid notably in the work. The spawning and life-history of the halibut was one of the chief problems undertaken, in view of the vast value of the Pacific halibut fisheries, and Dr. Willey made a number of trips to the northern waters, with a view of securing specimens of the eggs and young of this important species. He has condensed his results in the form of a preliminary report, which will be published at an early date.

The eggs and life-history of the more important and abundant food-fishes of Vancouver island, including the Pacific herring, Rock-cod, and other kinds, occupied the Curator, and Dr. Fraser has already for the printer a preliminary report on the results. An extensive survey of the "kelp resources" of the province was largely completed by Professor Cameron and Dr. Fraser, while an elaborate study of the "Hydroids" of our Pacific waters was carried out by the Curator, and a memoir published by the Royal Society of Canada, illustrated by 36 fine plates. It is one of the most important biological papers published upon Pacific Marine Zoology. Professor Weymouth worked on some problems relating to the edible crab, and Mr. Klugh took up some faunistic and other work. In addition there have been referred to the Curator and staff numerous fishery problems, and practical questions, both by the Government and outside parties, and much important information has been disseminated. The station's vessel *Ordonez* and the boats and equipment generally, have proved of great assistance, but much must be done yet to make the equipment complete.

HERRING RESEARCHES ON THE ATLANTIC COAST.

The Biological Board have for some time contemplated a full and elaborate scheme of investigation, with a view to expanding our herring fisheries, and adding to their commercial value, as has been done in Norway. Fortunately the services of Dr. Johan Hjort, Bergen, were available by the kind arrangement of the Government of Norway. The Board fully discussed a scheme, and Dr. Hjort arrived in Canada in time to make a preliminary survey; but next season a complete survey scheme is being planned, and Dr. Hjort, with the aid of the biological staff, will carry out a comprehensive herring investigation on the Atlantic waters of the Dominion.

EDWARD E. PRINCE,
Chairman of the Biological Board.

APPENDIX No. 19.

THE OUTSIDE STAFF OF THE FISHERIES BRANCH

LIST OF INSPECTORS OF FISHERIES IN THE DIFFERENT PROVINCES OF THE DOMINION OF CANADA, 1914–15.

Name.	P.O. Address.	Extent of Jurisdiction.
McLeod, A. G.	Whitney Pier, Sydney, N.S.	District No. 1.—Cape Breton Island.
Hockin, Robt.	Pictou, N.S.	District No. 2.—Cumberland, Colchester, Pictou, Antigonish, Guysboro', Halifax and Hants counties.
Fisher, Ward	Shelburne, N.S.	District No. 3.—Lunenburg, Queens, Shelburne, Yarmouth, Digby, Annapolis and Kings counties.
Calder, John F.	Campobello, N.B.	District No. 1.—The counties of Charlotte and St. John.
Morrison, Donald	Newcastle, N.B.	District No. 2.—Restigouche, Gloucester, Northumberland, Kent, Westmorland and Albert counties.
Harrison, H. E.	Fredericton, N.B.	District No. 3.—Kings, Queens, Sunbury, York, Carleton, Madawaska and Victoria counties.
Matheson, J. A.	Charlottetown.	Prince Edward Island.
J. B. MacDonald	Charlottetown	Prince Edward Island—Assistant Inspector.
Capt. Joseph Chalifour (Acting Inspector.)	Gaspé Basin, Que.	Lower St. Lawrence river and gulf.
Howell, Capt. J. A.	Selkirk, Man.	District No. 1.
Reid, D. F.	509 Boyd Bldg, Winnipeg, Man.	District No. 2.
Davidson, Geo. S.	Indian Head, Sask.	Province of Saskatchewan. } Chief " Alberta and district of McKenzie } Inspector.
MacDonald, G.C.	Prince Albert, Sask.	Province of Saskatchewan.
Wilson, Justus	Noyes Crossing, Alta	Northern Alberta
Payson, C. C.	Dawson City.	Yukon District
Cunningham, F. H.	New Westminster.	Province of British Columbia—Chief Inspector for the Province.
Halladay, A. P.	"	Province of British Columbia—Assistant Inspector, No. 1, Southern district.
Williams, J. T	Port Essington.	Province of British Columbia—No. 2, Northern district.
Taylor, E. G.	Nanaimo.	" " No. 3, Vancouver Island.

SESSIONAL PAPER No. 39

LIST OF FISHERY OFFICERS IN THE DOMINION OF CANADA, 1914-15.*

NOVA SCOTIA.

Annapolis County.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
Purdy, Walter	Deep Brook	Annapolis county.

Antigonish County.

McDougall, Hugh	Cross Roads, Ohio	Antigonish county.

Cape Breton County.

King, H. A.	Little Bras d'Or	Cape Breton county.
McCuish, John	Scatarie	" "
Hall, Edward	Main-à-Dieu	" "
McDonald, Allan	Gabarouse Lake	" "
McLean, Murdock	Jacksonville	" "
Ferguson, N	Port Morien	" "
Sullivan, Timothy	Florence, Sydney M.	" "
Burke, Wm.	Albert Bridge.	" "
Gillis, J. A.	Grand Mira	" "

Colchester County.

Selden Fletcher	Upper Economy	Colchester county.
Langille, B. S.	Tatamagouche	"
McCleave, J. H.	Lower Stewiacke	"

Cumberland County.

Angevine, Frank	Middleboro	Cumberland county.
Hunter, Clark T.	Linden	"
Kirwan, Frank	Wallace	"
Smith, R. S	Pugwash	"
Marshall, Alex.	Port Howe	"

Digby County.

Torrie, G. E.	Digby	Municipality of Digby, Digby county.
Aymar, Wm.	Meteghan	" Clare, "

Guysboro County.

Dillon, John A	Guysboro	Guysboro county.
Cooper, R. V.	Wine Harbour	"

Halifax County.

Gaston, Robt.	Tangier	Halifax county.
Kennedy, Thos.	Black Point	"
Rowlings, George	Musquodoboit Harb.	"

* Revised up to September, 1915.

LIST of Fishery Officers in the Dominion of Canada—*Continued.*

NOVA SCOTIA—*Continued.*

Hants County.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
Salter, R. J. U	Newport	Hants county.
Rose, Thos	Urbanian	"

Inverness County.

LeBlanc, Lazare	Eastern Harbour	From Big Pond lobster factory north, including Chéticamp, Eastern Harbour, Little River, Pleasant Bay and Pollets Cove.
Coady, M. J	S. W. Margaree	Inverness coast from Broad Cove Chapel to Delany's Cove also East Lake Ainslie and streams, Loch Ban, S.W. Margaree river and tributaries, and Margaree river from forks of Margaree harbour.
Ross, Jas. J	N. E. Margaree	Coast of Inverness Co., from Delany's Cove northward, including Big Pond, Eastern Harbour, etc., also N.E. Margaree river from Margaree forks to source, and all other streams to Victoria county line.
McLellan, D. N	Dunvegan	Inverness county.
McIntosh, Geo. P	Pleasant Bay.	Coast of Inverness county extending from Pleasant Bay to Meat Cove (inclusive).
McLellan, Jno. B	Kingsville	Inverness county.
McDonald, A. J	Seaside, Port Hood	W. Division coast south of Mabou Harbour, including S.W. Mabou river, Port Hood, Judique, Long Point, Pt. Hastings and Hawkesbury, to N.W. Arm River Inhabitants in interior; and north side Victoria co., from Js. McKinnon's to Whycocomagh bay; and through Glencoe and S.W. ridge of Mabou to Mabou bridge

Kings County.

Chute, Capt. Edward	Canada Creek.	Kings county.
Rathbone, C. F. A	Hortonville	"

Lunenburg County.

Hebb, L. J.	Lunenburg	Lunenburg county.
Evans, Austin	Chester.	"

Pictou County.

Sutherland, Robert	River John	Western division Pictou co., comprising coast water from Colchester county line to Cole's reef, Pictou harbour and streams flowing into it, viz., River John and tributaries, Toney river, and Big and Little Cariboo rivers.
Germain, Wm.	Reidway	Pictou county.
McDonald, D. L.	Bailey's Brook	"
Pritchard, A. O.	New Glasgow	Pictou harbour, Pictou island, East, West and Middle rivers, Pictou county.

List of Fishery Officers in the Dominion of Canada—*Continued*

NOVA SCOTIA—*Concluded.*

Queens County.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
Fraser, W. E.	Liverpool	Queens county.
Young, Chas.	Mill Village	"

Richmond County.

Sampson, Anthony	Lower L'Ardoise	That portion of sea coast, lakes and inland waters lying east of St. Peter canal.
Boudrot, Capt. Sylvester.	Petit de Grat	Coast and inland waters of Isle Madame, including southerly half of waters of Lennox passage.
Thibeau, P. J.	Thibeauville	Richmond county.

Shelburne County.

Stoddart, Henry	Shag Harbour	From and including Clyde river to Yarmouth county line.
Walls, George	Allandale	Shelburne county.

Victoria County.

Campbell, Jno. M.	Care Marine Agent at Halifax.	St. Paul's Island.
McAulay, Allan	Big Baddeck	Victoria county.
Hellen, Wm.	Cape North	Northern part of Victoria county.
McDonald, A. M.	Plaster, North Shore.	Englishtown north to Smoky cape at South Ingonish.
Grant, Dan. J.	Boulardarie East	Big Bras d'Or north to Englishtown.
Donovan, J. T.	Ingonish Centre.	North and South Ingonish, including Ingonish island.
McDonald, Wm. A.	Lower Middle River.	Victoria Island.

Yarmouth County.

D'Entremont, J. G.	Middle, W. Pubnico.	Yarmouth county.

NEW BRUNSWICK.

Albert County.

Akerley, Miles P.	West River	Albert county.
McLaughlin, Wm. J.	Riverside	"

Charlotte County.

Worrell, Robert.	St. Andrews	Waters in vicinity of St. Andrews, extending from Owen head to Oak bay.
Fraser, W. A.	Woodward's Cove, Grand Manan.	Island of Grand Manan, and waters surrounding the same.
Brown, Burden	Wilson's Beach.	Campobello, and the West Isles, Charlotte county.
Lord, C. H.	Lord's Cove, Deer Is.	West Isles.
Justason, E. C.	Pennfield	Charlotte county.
McNichol, Elgin.	Letete.	"
Ellis, Jos.	Lepreaux	"

List of Fishery Officers in the Dominion of Canada—*Continued.*

NEW BRUNSWICK—*Continued.*

Gloucester County.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
Canty, Thomas	Bathurst	Gloucester County.
Doucet, Jas. P.	Petit Rocher	"
Arseneau, Edmond	Inkerman	"
Sewell, Edmund	Pokemouche	"
Mourant, John A.	Caraquette	"
Ache, Adolphe	Lameque	"

Kent County.

Hannah, Wm F.	Richibucto	Kent county.
Allain, P. A	Buctouche	Coast line and inland waters of the parishes of Wellington and St. Marie.
Després, E. T.	Cocagne Bridge	Kent county.

Madawaska County.

Gagnon, L. A.	Edmundston	Madawaska county.

Northumberland County.

Abbott, Lemuel H.	Chatham	Both shores of Miramichi river from Point au Quart on south and Oak point on north to junction of N.W. and S.W. Miramichi rivers, with all islands therein and tributary streams.
McDonald, Ronald	Bayside	Northumberland county.
Williston, Wathan	Baie du Vin	"
Parker, L. P	Derby	"
Sutherland, M.	Red Bank	"

Queens County.

Holmes, Wm.	Gagetown	Queens county.
Wiggins, Jas. B.	Cody's	"

Restigouché County.

Hamilton, Wm C.	Black Lands	Baie des Chaleurs, and tributaries, from Belledune to Dalhousie.
Ferguson, Ebenezer	Pointe La Nim	Restigouche river and its tributaries in the counties of Restigouche and Victoria.

Sunbury County.

Babbitt, Fred	Swan Creek	St. John River from Indiantown, Sunburn county, to the county line of York.

St. John County.

Brittain, B. B.	55 Middle street, St. John West	St. John county.

LIST of Fishery Officers in the Dominion of Canada—*Continued.*

NEW BRUNSWICK—*Concluded.*

Victoria County.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
Watson, Chas. F.....	Undine.....	Victoria county.

Westmorland County.

Vienneau, Siffroi	Dupuis Corner.....	Coastal and inland waters of parish of Shediac, and portion of Botsford parish, north of Big Shemogue Hr., and road from same to near Bristol corners, past Bristol corners and Lowthers to parish of Sackville, with jurisdiction in parishes of Moncton and Salisbury.
Belliveau, Philip..	Pré-d'en-haut.....	Parish of Dorchester, including Petitcodiac river.
Prescott, Robert.....	Baie Verte.	Part of Botsford parish, county of Westmorland.
Prescott, Joseph.....	"	Parishes of Westmorland and Sackville.

York County.

Niles, Thos.....	Fredericton.....	York county.
McNally, Alex.	Mouth of Keswick (R.R. No. 1.).....	"
Robinson, Geo.....	Cambridge, N. B....	Maritime Provinces.

PRINCE EDWARD ISLAND.

Kings County.

Keays, John.....	Souris	Kings county.

Prince County.

McFarlane, John.....	Cape Traverse .. .	Prince county.
Quinn, Geo.....	Leoville.....	"

Queens County.

McAulay, A. C.	Tracadie Cross.....	Queens county.

PROVINCE OF QUEBEC.

Gaspé and Bonaventure Counties.

Kennedy, Frederick	Douglastown.	That portion of the province south of the St. Lawrence, to and including county of Bellechasse, but especially the counties of Bonaventure and Gaspé.

Quebec County.

Migneault, T.....	140 St. François St., Quebec.	From Quebec to the Saguenay river on the north shore and from Quebec to Rimouski on the south shore.

List of Fishery Officers in the Dominion of Canada—*Continued.*

PROVINCE OF QUEBEC—*Concluded.*

Magdalen Islands.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
Chiasson, Cirice	House Harbour	Magdalen islands.
Chevrier, J. A	Havre Aubert	That part of Magdalen islands comprising Entry, Amherst and Grindstone islands, also Harbour Basque lagoons.

Saguenay County.

Comeau, N. A	Quebec	Saguenay county.
Levesque, Elzear	Seven Islands	"
Le Blanc, Wm	Esquimaux Point	"
Landry, Wilfrid	Natashquan	"
Cormier, A	Esquimaux Point	"
Evans, T. W	St. Augustine	"
Kennedy, Jas	Old Fort via Sydney	"
Annett, Geo	Blanc Sablons	"

PROVINCE OF MANITOBA.

White, C. L	Winnipegosis	Manitoba.
Stevenson, E. H	Le Pas	Keewatin district.
Daly, Daniel S	Selkirk	Manitoba.

SASKATCHEWAN.

McNicol, Duncan	Wadena	Wadena district.
Hunter, C. S	Regina Beach	District of Long Lake, Qu'Appelle river, bounded on south by base line Tp. No. 16, on north by Tp. No. 30, on east by east side of Range 19, and on west by west side of Range 27, all west of 2nd meridian.
Fitzgerald, Ira	Meota	Jackfish lake district.
Beatty, Edward	Green Lake, P.O.	Isle la Crosse district.

ALBERTA.

Hoad, Nelson J	639 6th Ave. west, Calgary.	Southern Alberta.
Wood, Ingram	Wetaskiwin	Pigeon lake, etc.
Travers, Oliver	Grouard	Lesser Slave Lake and vicinity.
Whitley, Jno. M	Ardmore	Cold Lake District.

BRITISH COLUMBIA.

District No. 1.

John McLeod	Nelson	Kootenay district.
Charles J. Godwin	Vernon	Yale district.
Horatio Shotton	Kamloops	Kamloops district.
J. H. Hill	Quesnel	Lillooet district, north of Clinton, Caribou and Cassias.
D. F. M. Perkins	South Fort George	

District No. 2.

Gunner Saugstad	Rivers Inlet	Rivers Inlet District.
Stewart Norrie	Prince Rupert	Prince Rupert District.
W. T. Adamson	Naas	Naas River District.
John Widsten	Bella Coola	Bella Coola and Kimsquit districts.
Chas. Harrison	Massett, Q.C.I.	Queen Charlotte Islands.
James Boyd	Vancouver	Central Division, District No. 2.

LIST of Fishery Officers in the Dominion of Canada—*Concluded.*

BRITISH COLUMBIA—*Concluded.*

District No. 3.

Name of Officer.	P.O. Address.	Extent of Jurisdiction.
W. M. Galbraith	Duncan's Station	Cowichan River district.
John Grice	Clayoquot	Clayoquot Sound district.
J. B. Wood	Alberni	Alberni district.
R. M. Colvin	Cowichan Bay	Cowichan district.
Harry McIndoo	Nanaimo	Nanaimo district.
Capt. Harry Beadnall	Courtney	Comox district.
A. F. Lloyd	Quathiaski Cove	Campbell River district.
Alex. Lucas	Alert Bay	Alert Bay District.
Arthur Newland	Welcome Pass, Pender Harbour	Pender Harbour district.

LIST OF OFFICERS IN CHARGE OF GOVERNMENT FISH HATCHERIES, ETC., 1914-15.

Name.	P.O. Address.	Province.	Rank.
Ogden, Alfred	Bedford	Nova Scotia	Officer in charge Government Fish Hatchery.
McDiarmid, Donald	N.E. Margaree	"	"
Burgess, Frank	Windsor	"	"
Burton, L. J	Middleton	"	"
Mowat, Alex	Campbellton	New Brunswick.	"
McCluskey, F. J	Grand Falls	"	"
Sheasgreen, Wm	South Esk	"	"
*Brittain, B. B	St. John West	"	"
McAfee, Geo	R. F. D. No. 4, Lakewood	"	"
Holroyd, A. W	Winslow Station	P.E. Island	"
Lindsay, R. C	Gaspé	Quebec	"
Meilleur, Jos	Mont Tremblant	"	"
Audet, L. A	Magog	"	"
Elliot, Jos	St. Alexis des Monts.	"	"
Catellier, J. N	Tadousac	"	"
Belknap, W. G	Baldwin's Mills	"	"
McLeod, A. W	Belleville	Ontario	"
Parker, Wm	Sandwich	"	"
Parker, Ray	Kenora	"	"
McNab, A. J	Port Arthur	"	"
Eldridge, W. J	Wiarton	"	"
Laschinger, A. G	Sarnia	"	"
McDougall, A	Southampton	"	"
Clark, Matthew	Collingwood	"	"
Paulson, C. P	Selkirk	Manitoba	"
Grenon, Jos. O	Winnipegosis	"	"
Craig, Samuel	Fort Qu'Appelle	Saskatchewan.	"
Rodd, R. T	Banff	Alberta	"
Robertson, Alex	Harrison Springs	British Columbia	"
Mitchell, D. S	Tappen	"	"
Graham, T. W	Lillooet	"	"
Gibbs, H. L	Hazelton	"	"
Martin, J. E	Tofine	"	"
Bothwell, David	Kildonan	"	"
Castley, J. H	Duncan	"	"
Crawford, H. C	Fort St. James	"	"
Hamer, J. N	Rivers Inlet	"	"
Catt, James	Lakelse	"	"
Ogilvie, L	Gerrard	"	"

* St. John Salmon Retaining Pond.

LIST OF OFFICERS IN CHARGE OF GOVERNMENT PATROL BOATS. *1914-15.

NOVA SCOTIA.

Name.	Boat.	District.
Young, Edward D	"C"	District No. 2.
Fanning, M. B	"E"	"
Stevens, G	"33"	"
Wrayton, N. B	"J. L. Nelson"	District No. 3.
Blackford, H	"A"	"
Bateman, John	"B"	"
Tibert, Chas	"St. Marys"	"
Blades, Chas	"F"	"
Wight, Benj	"Search"	"

NEW BRUNSWICK.

Green, Coleman	"G"	District No. 1.
Worrell, R	"Sea Gull"	"
Mitchell, A. E	"Phalarope"	"
Goodwin, C. A	"Hudson"	District No. 2.

PRINCE EDWARD ISLAND.

Cameron, J	"Richmond"	
McCarthy, J. B	"D"	

QUEBEC.

Arsenault, W. S	"Waldron W"	Magdalen Islands.

The Steamer Princess patrols in the Gulf of St. Lawrence, and is under the command of Acting Inspector Capt. Jos. Chalifour.

MANITOBA.

Bryan, H	"G. H. Bradbury"	Lake Winnipeg.

BRITISH COLUMBIA.

Crichton, J. T	"Fispa"	District No. 1.
Hembrough, Thos	"Swan"	"
Dauphinee, Wm	"Elk"	"
Waddell, S	"Foam"	"
Matheson, M	"Merry Sea"	"
Copp, A. O	"Thomas Crosby"	District No. 2.
Boyd, Jas	"Bonila"	"
Hauston, T. S	"Kayex"	"
Dawe, Thos	"Hawk"	"
Saugstad, G	"Merlin"	"
Adamson, W. T	"Linnett"	"
Widsten, John	"Kingfisher"	"
Haan, John	"Gannet"	"
Grice, John	"Heron"	District No. 3.
Wood, J. B	"Egret"	"
Lucas, Alex	"Raven"	"
McIndoo, C. E	"Gull"	"
Newlands, Arthur	"Cohoe"	"
Laird, F. S	"Alcedo"	"

* Revised up October, 1915.