CHAPTER II

The Hydrographic Survey of Canada from its Formation to the First World War 1904-1914

The South African, or Boer War (1899-1902), marked the first occasion when Canada sent troops overseas. It also marked the termination of the first post-Confederation era of surveying and mapping by the Departments of the Interior, Marine and Fisheries, Public Works, and Railways and Canals. This war had earned for Canada a greater international prestige towards nationhood, and within a few years of its ending, several long-term programs of national development and expansion were authorized by the Dominion government. Two of these undertakings of particular interest to this story were the expansion of its existing topographical and hydrographic surveys, and when the First World War began in 1914, Canada had progressed a long way in mapping more accurately its geographical features, and recharting its inland and coastal waters.

In 1904, the Royal Canadian Engineers, Department of Militia and Defence (National Defence, 1923), commenced contour mapping in the Niagara peninsula of Ontario. Also this year, the Canadian Hydrographic Survey came into being with the amalgamation of hydrographic units in the Departments of Public Works, Railways and Canals, and Marine and Fisheries. This formation was the nucleus of the present Canadian Hydrographic Service (renamed in 1928), and regional offices on the Atlantic and Pacific coasts. In 1905, the provinces of Alberta and Saskatchewan entered Confederation, and this year the Geodetic Survey of Canada was formed in the Department of the Interior. Finally, in 1908 a Topographic Survey unit was organized in the Geological Survey of Canada, Department of Mines.

As the Canadian Hydrographic Survey under a chief hydrographer in 1904, systematic charting surveys could now be extended beyond the horizons of the Great Lakes and Lake Winnipeg to the sea-coasts. This year former hydrographic engineers in the Departments of Public Works, and Railways and Canals, continued their ship channel surveys in the upper St Lawrence River between Quebec and Cornwall. The following year (1905), the first Atlantic coast salt-water survey was carried out in the lower St Lawrence River. Recharting the coastal waters of British Columbia actually began in 1906, and in 1908 the first Canadian surveys were made in the maritime provinces of Nova Scotia and New Brunswick. When the Department of the Naval Service was established in 1910, the

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hydrographic survey was transferred to it from the Department of Marine and Fisheries. In that year, the first northern charting parties were sent to Hudson Bay, and up to the First World War, this work was continued in James Bay and Hudson Strait.

In 1907, a district or regional office was permanently established at Victoria, BC, and the following year (1908), the hydrographic survey had its first reclassification with the amendment of the *Civil Service Act* and establishment of the Civil Service Commission. In 1912, an automatic gauges unit was organized at headquarters that assumed responsibility of former Public Works water gauges on the St Lawrence River and Great Lakes. From then until the commencement of the First World War, the chief hydrographer and his staff gave considerable time and attention to navigation problems in these waters, working in cooperation with other associates of the International Waterways (Joint 1909) Commission. During this period, the field staff was brought up to strength with several new appointments.

This brief outline is an indication of the rapid development of the Canadian Hydrographic Survey between the years of the South African (Boer) and First World Wars. It has been said that the period 1896-1911 was an era of great expansion for Canada. If the expansion of the Survey from 1904-1914 is any criterion, then this statement [ ].[1]

This chapter begins with the amalgamation in 1904, and continues as a chronological narrative up to the year of the First World War.

THE HYDROGRAPHIC SURVEY OF CANADA, 1904

FORMATION OF THE HYDROGRAPHIC SURVEY OF CANADA, MARCH 1904

Order-in-Council P.C. 461

The authority for the Canadian Hydrographic Survey is contained in a manuscript Order-in-Council P.C. 461 over the signature of the prime minister of Canada, and the president of the Privy Council, Wilfred Laurier, and officially approved by the Earl of Minto, governor general of Canada, on 11 March 1904. A few of the reasons for this formation given in this order-in-council are of historical significance, and were recommendations by the minister of Marine and Fisheries at that time, the Honourable Mr Raymond Prefontaine:

> (i) with a view of systematizing and facilitating the work in connection with Hydrographic Surveys, the administration of which branch of the public service is assigned to the Department of Marine and Fisheries under the provisions of 55-56 Vict. c. 17, and the work thereof has been continuously performed by the Department for many years past, that all the Hydrographic work of the Departments of Public Works and Railways and Canals be transferred to the Department of Marine and Fisheries, and that Department alone be charged in future with the management and control of such

[1] Words appear to be missing.[Ed.]

> surveys.
> (ii) that any records and plans in the possession of the Department of Public Works or of Railways and Canals ... be transferred to the last named Department, upon its asking applications for...
> (iii) that all moneys voted by Parliament to either the Department of Public Works or that of Railways and Canals ... be placed to the credit of the last named Department.
> (iv) that the changes as recommended above take effect from this date ...

By P.C. 461, provision was also made for the transfer, management and control of the St Lawrence River ship channel from the Department of Public Works to the Department of Marine and Fisheries (Transport, 1936). All dredging and sweeping equipment, along with small craft, steamers and other survey appliances were then transferred to Marine and Fisheries as of 1 July 1904. The Sorel Shipyard continued to be the headquarters and base of operations for the ship channel survey. Above Montreal, the depot at Prescott, Ontario, became more a centre of Marine and Fisheries activities between Montreal and Kingston, and here smaller craft of the hydrographic survey were wintered and serviced.

THE "AMALGAMATED" HYDROGRAPHIC STAFF, 1904

An estimated nineteen engineers, surveyors, and assistants were transferred to the Department of Marine and Fisheries; from Public Works department, fifteen, and Railways and Canals, four. Personnel from Public Works were as follows: hydrographic engineers - Messrs S.J. Chapleau (assistant to chief hydrographer), P.E. Parent (i/c steamer *Delevis), A.* Amos, R. Bickerdike Jr., A.R. Decary, H.D. Parizeau, Chas McGreevy, Major J. Houliston and L.R. Voligny; surveyor or instrument man, Mr A.A. Gobeil; map draftsman, Mr C. Brousseau; survey sssistants (recorders, rodmen, chainmen, casual draftsmen) Messrs H. Melancon, J.O. Martineau, J.N. Mercure and E.O. Roy. Those from Railways and Canals were Mr E. Fusey (i/c Lake St Louis survey), R. LeSage and A.J. Pinet; surveyor or instrument man, Mr P. Jobin.

In the Marine and Fisheries department, five new assistants were added to the three regular assistants of the former Georgian Bay Survey, making a total of eight field officers. Their names were Messrs R. Rolland, A.O. Bourdonnais, A. Chatigny, M. Cinq-Mars and R. Charton (Chartrand?). Older officers were Messrs Wm J. Stewart, F. Anderson and R.E. Tyrwhitt. This year Mr Stewart had his first clerical assistant, or "secretary," in the person of Mr J.A. Simpson, who acted as ship-clerk on the *Bayfield* during the summer months, and returned to Ottawa in the fall. Early in 1905 Mr Simpson resigned, and was replaced by Mr W.R. McGee. Hydrographic officers of Marine and Fisheries now totalled nine (surveyors and assistants, eight, clerical assistant, one).

When added to the nineteen personnel from Public Works and Railways and Canals, the amalgamated hydrographic staff now numbered twenty-eight officers (technical 27, clerical 1). This figure was ninefold the staff prior to the amalgamation, and this was the organization Mr Stewart inherited in 1904 to plan the future growth and expansion of the

new hydrographic survey, and to carry out his plans efficiently. It was also the nucleus of the present Canadian Hydrographic Service, including the three regional offices now in the Marine Science Branch - the Pacific Region (first established), the Atlantic Coast, and the Great Lakes.

COLONIAL SURVEYS - ADMIRALTY REQUEST, JUNE 1904

By 1904, England was faced with a fast-growing naval fleet in Germany, and to match this growth action was taken to curtail colonial naval commitments. One of the decisions made was the withdrawal of hydrographic charting in Canada. Accordingly, in June of that year the British Admiralty issued a circular to the more self-governing colonies requesting them "to conduct hydrographic surveys along their own coasts." It was stated that Canada "had one party upon the Great Lakes and left the Atlantic and Pacific coasts for the Admiralty surveys for which they contributed half the coSt"[2] In 1904, another significant statement is attributed to Rear-Admiral Sir William J.L. Wharton, hydrographer of the Royal Navy: "the surveys of the shores of the Dominion, made as a rule by Imperial officers some years ago, are very inadequate to the vessels of modern navigation."[3]

APPOINTMENT OF CHIEF HYDROGRAPHIC SURVEYOR, OR CHIEF HYDROGRAPHER, AUGUST 1904

With the formation of the hydrographic survey, and in compliance with the Admiralty request for Canadian resurveys, it was now expedient to appoint an experienced hydrographic surveyor to head the amalgamated survey, and to get on with the recharting of the sea-coasts. A second order-in-council therefore became necessary (P.C. 1200), and this manuscript document over the signature of "R.J. Cartwright" was officially approved by the Earl of Minto, dated 4 August 1904. Here are a few recommendations submitted by the minister of Marine and Fisheries, one of which was for the appointment of an assistant to the chief hydrographer.

> On a report dated 11 June 1904 from the Minister of Marine and Fisheries stating that in consequence of the transfer of the Hydrographic Survey staffs of the Departments of Public Works and Railways and Canals to the Department of Marine and Fisheries, as authorized by Order-in-Council of the 11th March, last, it will be necessary to re-organize the Hydrographic Survey Branch of the last named Department, with a view of systematizing and facilitating the work, as well as to utilizing to the best advantage the services of the amalgamated staffs ...
>
> The Minister is of the opinion that all hydrographic work in the Dominion

[2] Report M & F 1904. Stewart, 96.
[3] Report M & F 1925. Capt. Anderson, 126.

> should be under the management and control of a Chief Hydrographic Surveyor having his headquarters permanently in Ottawa, who would be responsible to the Minister of Marine and Fisheries with regard to such work, and who would communicate with him on such matters through his Deputy Minister...
>
> It will therefore be seen that Mr Wm J. Stewart has a very large and long experience as a Hydrographic Surveyor upon the Great Lakes, and has also had some salt-water experience where currents were very strong and tides of great range. In addition to this he has the further advantage of being thoroughly conversant with all details of Departmental procedure, having spent all his winters at headquarters. The Minister therefore recommends that Mr Stewart be appointed Chief Hydrographic Surveyor of Canada.

The Minister further recommended, "Mr S.J. Chapleau, Hydrographic Engineer, be transferred from the Department of Public Works to that of Marine and Fisheries as Assistant to Mr Stewart with a salary, at a rate of $2,000.00 a year, from 1 st July, payable out of the vote for Hydrographic surveys."

CANADA'S FIRST CHIEF HYDROGRAPHIC SURVEYOR - MR WM J. STEWART, 1863-1925

William James Stewart was born in Ottawa 3 January 1863, and graduated as a gold medallist form the Ottawa Collegiate Institute in 1879. He was also a gold medallist, from the Royal Military College in Kingston, in 1883. In July of that year he was employed by the Department of Railways and Canals as a compass engineer, and worked on surveys in connection with the Gananoque and Devil's Lake water investigations. He transferred to Marine and Fisheries, and on 22 March 1884 was named assistant surveyor to Staff Commander J.G. Boulton, RN, officer-in-charge Georgian Bay Survey, in the Great Lakes. Under Staff Commander Boulton's tutelage Mr Stewart's progress was most rapid, and in the following year, (1885), he was placed in charge of the first hydrographic shore-party. After five years of hydrographic surveying the government was most anxious for him to take over this work, but he was not ready. In a letter he wrote two decades later to a senior officer, he reiterated those remarks, and added, "but the latter (meaning Commander Boulton) did not consider that I was qualified, and I know perfectly well now that he was right."

In May 1889, he became the first permanent employee in the hydrographic service, and two years later made the first survey on the sea-coast (Burrard Inlet, BC). Following a re-organization in the Department of Marine and Fisheries in 1892, Staff Commander Boulton returned to England. Early in April 1893, Mr Stewart succeeded him as officer-in-charge of the Georgian Bay Survey. To qualify himself better for the work under his charge, in April 1897 he successfully passed his master's examinations at Kingston, Ontario, and was granted Certificate No. 2123, effective April 27, 1897. Mr Stewart thus became the first Canadian hydrographer to hold Master's Papers (Inland Waters). For some unknown reason, however, he never called himself "Captain," as his successor, Capt. F. Anderson, did.

From 1893 to 1900, he completed the recharting of the Canadian shores of Lake Huron, including Georgian Bay and the North Channel, and Lake Erie. In 1901 he undertook the first hydrographic survey in Lake Winnipeg, and in the following year returned to the Great Lakes to commence the resurvey of Lake Superior. He was named chief hydrographer in August 1904, and that year ended his survey days on the Great Lakes. His last field season was 1905 when he began the first salt-water survey on the east coast (lower St Lawrence River). From then until his untimely death in the Ottawa Civic Hospital on 5 May 1925, he made Ottawa his headquarters where he was fully occupied with national and international hydrographic problems, and in planning the hydrographic survey of the future.

Mr Stewart had the reputation of being a good mathematician and worked closely with Dr W.F. King and Dr O.F. Klotz of the Dominion Observatory on survey problems pertaining to the sea-coast. In April 1907 he wrote, "on account of my experience on, and knowledge of the St Lawrence waterway I was selected by the government to succeed Dr King, as Commissioner on the International Waterways Commission" (renamed International Joint Commission, January 1909). Together with the American Commissioner Dr E.E. Haskell, Dean of Civil Engineering, Cornell University, Mr Stewart was appointed to a special committee and given part responsibility for formulating plans for, and the delineation of, the international boundary between Great Britain and the United States, according to Article IV of the Boundary Treaty, signed at Washington, D.C. on 11 April 1908. The care and maintenance of the boundary monuments erected on the Great Lakes and St Lawrence River, in accordance with the treaty's definition and delineation agreed upon, were then placed under the hydrographic survey until the International Boundary Commission was formed in 1925.

Mr Stewart also held the following important positions in connection with water-level regulations: Canadian representative on the International Boards of Control for Lake Superior, and St Croix River, N B; chairman, Board of Control, Lake of the Woods; member, Dominion Water Power Board. In October 1912, he was named consultant engineer to the prime minister and the Department of External Affairs on common problems relating to International Joint Commission matters between Canada and the United States.

Following the First World War, in 1919 he was named as advisor to the British government in the demarcation of the boundaries in Europe, as agreed by the Treaty of Versailles. When an International Committee was set up in Paris in 1920 to consider draft conventions on world communications and transportation, he was appointed a British Empire representative. At the first Conference on Communications in 1921, Canada was represented by the high commissioner in London, Sir George Perley, and Mr Wm J. Stewart, as consultant engineer to the Department of External Affairs. These international problems were to occupy most of Mr Stewart's time for the remainder of his career.

Back in 1910, Mr Stewart suffered a severe illness that crippled his right arm, from which he never fully recovered. Throughout his entire career he had a reputation of being tough, exacting, and most demanding. He would frequently criticize his own service but he would not tolerate any outside interference. Typical of Mr Stewart are two of his own statements. One was in connection with charts, and was directed to a senior hydrographer in January 1919: "I am responsible for the issue of charts by the Dominion of Canada, and

you are responsible for sending accurate charts to this office." Another was in connection with money matters, and sent to the same hydrographer May 1913: "I feel that all the vote for hydrographic surveys is under my control, and I do not allow anyone, not even the Deputy, to give orders for the expenditure of any part of it without a protest." From general hearsay, pecuniary restraints were characteristic of Mr Stewart during his term of office, and are reported having had an adverse effect on the progress of the survey and the general welfare of its staff. However, there were few who worked under, and with him, who did not admire his high sense of honour and judicial nature, and held him in high esteem.

At the time of his death, aged 62, Mr Stewart was an executive member of the Section of Oceanography, National Committee of Canada; International Union of Geodesy and Geophysics; member of the Engineering Institute of Canada; American Society of Civil Engineers; Institute of Civil Engineers, London, England; the Geographic Board of Canada; the Royal Astronomical Society of Canada. He was survived by a widow and two daughters.

To Canada's first chief hydrographer, Mr R.J. Fraser wrote this tribute in later years: "About 170 navigation charts of Canada are either the product of his own skilled hand or result from the responsible planning and production during the years of his personal administration of the service." A noble and parting tribute to a man who devoted forty-one years of his life in recharting Canada's inland and coastal waters, and to the heritage he left his successors.

THE CANADIAN HYDROGRAPHIC SURVEY UNDER MR WM J. STEWART, 1904-1925

1904-05

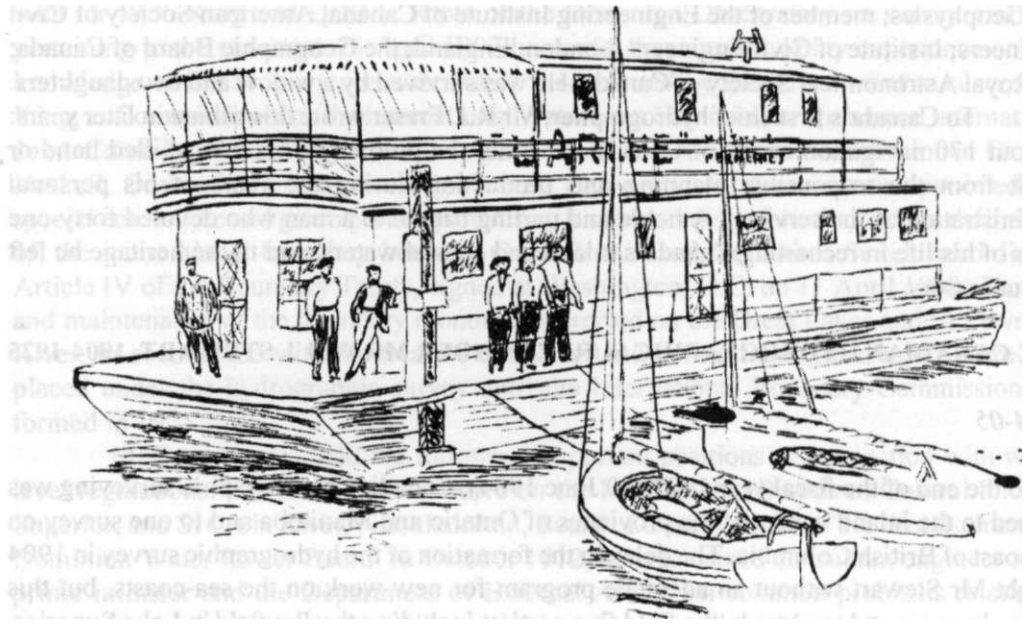
Up to the end of the fiscal year 1903 (30 June 1904), Canadian hydrographic surveying was limited to the inland waters of the provinces of Ontario and Manitoba and to one survey on the coast of British Columbia. The delay in the formation of the hydrographic survey in 1904 caught Mr Stewart without an adequate program for new work on the sea-coasts, but this season he managed to place in the field five parties, including the *Bayfield* in Lake Superior. Three of these parties were ship surveys, and two were shore-based. One ship and the two shore parties worked on the St Lawrence River between Quebec and Cornwall, including the Ottawa River - the first Canadian hydrographic surveys in the province of Quebec. The other two ship parties were in Lake Superior and Lake Winnipeg. A recapitulation of the first season of the amalgamated Hydrographic Survey is as follows:

FIRST CANADIAN HYDROGRAPHIC SURVEYS IN THE PROVINCE OF QUEBEC

St Lawrence River - above Quebec City

Quebec to Montreal. This sector of the St Lawrence River had been surveyed by the Public Works department since 1896, and in 1904 was continued in the steam tug *Delevis* on loan from the Sorel Shipyard. In charge of the *Delevis* was Mr P.E. Parent who had with him as assistants Messrs A. Amos, A.R. Decary, Chas McGreevy and Major John Houliston. Sailing

master was Capt. Thos. Frenette, and chief engineer, Mr Jos. Boisvert. With the sounding out of the Richelieu Rapids, the St Lawrence River had been recharted from Longue Pointe to Point Platon. Other field work consisted of tieing-in new lighthouses and buildings, etc. Later Mr Stewart reported, "the shore topography on both sides of the River has been completed as far northeast as Quebec. To complete the survey of the River there yet remains triangulation to connect the observatories at Montreal and Quebec.



L 'Arche by David Gray

Montreal to lake St Francis

Lake St Louis. The survey of this lake, begun in 1890 by the Department of Railways and Canals, was continued in 1904, with Mr E. Fusey in charge, and assistants Messrs R. LeSage, A. Pinet and P. Jobin. With the aid of the houseboat *L 'Arche* and the steam launch *Josephine,* a large section of Lake St Louis near the head of the Lachine Rapids was examined. Pilot of the *Josephine* was Capt. I. Lefebvre, and engineer of the launch was Mr H. Ritter.

Lake St Francis. In order to make a complete survey of the St Lawrence waterway, Mr Stewart remarked, "I thought it advisable to commence operations upon the whole unsurveyed link, viz. Lake St Francis." This work was placed under Mr S.J. Chapleau, assistant to Mr Stewart, who, prior to 1904, was in charge of the Public Works survey for

the Middle Channel of the St Lawrence River between Brockville and Kingston. Assistants with Mr Chapleau were Messrs R. Bickerdike Jr, H.D. Parizeau and A.A. Gobeil. Surveyor assistants were Messrs C. Brousseau, H. Melancon, J.O. Martineau, J.N. Mercure and E.O. Roy. For this survey, the yacht *Alma* was chartered from the Sorel Shipyards, and use was made of the houseboat *Lotbiniere* and the gasoline launches *Arrow* and *Viator* - transferred to the hydrographic survey at Prescott. These are the earliest known records of gasoline launches in the service. At the end of September, Mr Bickerdike replaced Mr Chapleau in charge of this survey, and in his annual report Mr Stewart stated, "I hope another season will complete it."[4]

Ottawa River. During the month of October, a minor investigation in the Ottawa River north of Way Shoal (below Ottawa) was carried out by Mr Stewart, "for the purpose of accurately locating the channel, and to place range lights in this area correctly." Some seven miles of this section of the river were examined, and as Mr Stewart wrote, "proved that the channel heretofore used, and the channel in which dredging was then being done, was not the best track for steamers. It also shows the necessity for accurate marine surveys before dredging is begun or range lights located."

OTHER SURVEYS

Great Lakes

In 1904, as chief hydrographer, Mr Stewart began the first resurveys of Thunder Bay and Pigeon Bay on the north shore of Lake Superior in the *Bayfield.* Assisting him were Messrs R.E. Tyrwhitt, R. Rolland and A.O. Bourdonnais. Sailing master of the *Bayfield* was Capt. W.O. Zealand, and chief engineer, Mr J. Nisbet. Offshore sounding was carried to Point Poryphyry, and when the *Bayfield* returned to Owen Sound that fall it was to be the last season for Mr Stewart on the Great Lakes.

In July 1904, the Department of Marine and Fisheries issued to the public the first Canadian chart of the Great Lakes - a preliminary, unnumbered photo-lithographic edition, entitled "Victoria Island to Fort William, Lake Superior."

Lake Winnipeg - Its Charting Completed, 1904

In July 1904, a companion chart for the northern portion of Lake Winnipeg was published, "Berens River to Nelson River." It too was an unnumbered photo-lithographic preliminary

[4] When the Georgian Bay Ship Canal Survey was formed in the Department of Public Works in August 1904, Mr S.J. Chapleau returned to this department, and on 1 October became engineer-in-charge of the Nipissing District, between DesJoachims (above Pembroke) and Georgian Bay. Before the year 1904 ended. Mr Chapleau had on his staff a young surveyor and a graduate from Royal Military College named Mr P.M. Peters, who was destined in 1936 to become surveyor general and chief, Hydrographic and Map Services - the third chief to head this service. During the winter of 1904. Mr Peters made a hydrographic survey across Lake Nipissing, and when he retired from the Department of Mines and Resources in 1948 he was chief, Surveys and Mapping Bureau (since renamed director. Surveys and Mapping Branch).

edition.

This season, the unfinished work in the northern portion of the lake was completed by Mr F. Anderson, assisted by Messrs H. Chatigny and M. Cinq-Mars. Sailing master of the *Frank Burton* was Capt. H. Barker, and chief engineer, Mr A. Vrooman of the *Bayfield.* In his annual report, Mr Stewart noted, "for ordinary purposes of navigation the lake can be considered charted, and the new chart should prove a great benefit." Thus the first charting of Lake Winnipeg, begun by Mr Stewart himself in 1901, was brought to a temporary close this year by his first assistant (since 1893), Mr F. Anderson.

HEADQUARTERS IN OTTAWA, 1904

Mr Stewart wrote, "as each party finished this season, the staff moved to Ottawa where the Headquarters will be for the future." Just where these headquarters were in 1904 is not too certain - probably in the West Block on Parliament Hill with rented offices nearby. However, by March 1906, Mr Stewart and his staff are recorded as being located in the J. A. Corry Building on Rideau Street (until the fall of 1966, beside the Union Station). A note of interest is listed in the annual report of the Department of Public Works for 1907: "J. A. Corry Building, Rideau Street, occupied by the Georgian Bay Ship Canal Survey, International Waterways Commission, Upper Ottawa River Works, Marine and Fisheries, and Public Works."

1905-06

Highlights of hydrographic activities in the fiscal year 1905-06 were the publication of the first Canadian chart east of the Great Lakes, the commencement of systematic charting in the St Lawrence River below Quebec City, the publication of the first volume of sailing directions for the Canadian shores of Lake Huron, and the commencement of the first long-term program of major ship construction. This year Mr Stewart reported, "the Pacific coast survey could not be started on account of the impossibility of procuring a steamer, and an officer to conduct the survey. Provision is being made to remedy this before the opening of the next season." Three ship and two shore-based parties were again sent into the field in 1905.

COMMENCEMENT OF SYSTEMATIC COAST CHARTING IN EASTERN CANADA

The charting of Canada's sea-coasts

In his reply to the Admiralty request of June 1904, Mr Stewart reported, "to answer the circular properly, it will be necessary to equip one party on each coast, and such work is rendered doubly important by the fact that ere long the Grand Trunk Railway will require a terminus at some, yet unnamed, portion of our Pacific coast. In the Gulf of St Lawrence a great deal of coast has not been surveyed, and more has had only superficial examination made. To carry out these surveys a couple of steamers similar to the *Bayfield* will be

necessary."[5]

Furthermore, in January 1905 Mr Stewart attended a committee meeting of the Royal Society of Canada in Montreal where the necessity of a resurvey of the Gulf of St Lawrence was discussed in detail. Later he reported to the deputy minister, "the Committee was particularly anxious that I should use my best endeavours to induce the Minister to place at least two vessels on this work to lessen the danger of striking more rocks that may be hidden, like the one accidentally discovered last summer off Murray Bay. I replied that I had no hesitation in saying that the Honourable the Minister was alive to the full importance of the suggested work and would do all in his power to obtain the necessary funds for it." Mr Stewart continued, "for the information of the Minister I might say that the existing charts of the north shore of the Gulf of St Lawrence and the mouth of the St Lawrence River are from hastily executed surveys, made for the purpose of marking the coastline. During the progress of the work, the officers naturally took a few soundings, and found some shoals, but no systematic search was made for dangers." Then again, in those days, "a bank with 20 feet of water above it was not considered dangerous, whilst now one with 30 feet is to be avoided."

In conclusion, Mr Stewart stated, "I have no hesitation in saying that if any proper survey had been made of the River below Pointe aux Orignaux, the shoal discovered last summer off Murray Bay would have been properly charted. If the money can be obtained, I certainly think the matter very urgent, and there still will be great disappointment and trouble if nothing is done this season." A first estimate by Mr Stewart was ten years to complete this survey with a well-equipped vessel. A second estimate indicated this was too short a time: "the distance along the north shore of the River and Gulf from Goose Cape to the Strait of Belle Isle is over 600 miles, along the south shore of the St Lawrence from Pointe aux Orignaux to Baie des Chaleurs is 300 miles, along the east coast of New Brunswick 100 miles ... if two vessels can be obtained, they can be worked with advantage. The committee was not much interested in work on the Pacific Coast (naturally)."

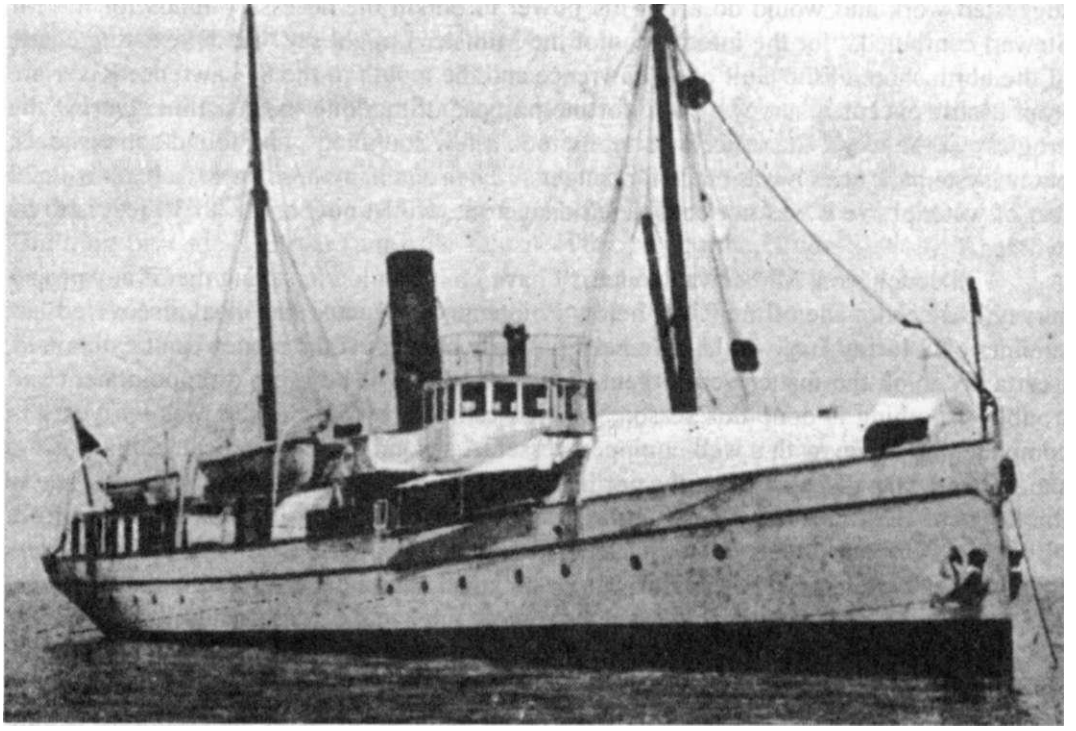
One further action in this regard was taken in January 1905 when the Canadian government concurred with the Admiralty's request to undertake marine surveys on her own coasts, but until such time when this work could be taken in hand, the Admiralty would permit their surveying vessels to continue work on the coasts. To this proposal the Admiralty agreed.

LOWER ST LAWRENCE RIVER- THE FIRST SALT-WATER SURVEY ON THE EAST COAST

Acting under instruction from the minister of Marine and Fisheries, Mr Stewart in the summer of 1905 began the resurvey of the St Lawrence River below Quebec City. For this work the Tidal and Current Survey steamer *Gulnare* was loaned to the hydrographic survey, and for assistants Mr Stewart had with him Messrs E. Girouard and Chas Savary. Sailing

[5] This statement was the first intimation of Mr Stewart's plans for an enlarged hydrographic fleet of survey vessels within the near future.

master was Capt. Thos. G. Taylor, and chief engineer, Mr Wm A. Robertson. In 1905 a gasoline launch was purchased for the *Gulnare* - the earliest known record of a hydrographic launch on the sea-coast. Whether it was used for surveying purposes is questionable.



Gulnare
photo courtesy CHS

In 1887 Capt. Wm F. Maxwell, RN, had surveyed the St Lawrence River between Quebec and River Ouelle, and made a plan of the channel opposite Hare Island. After some consideration, Mr Stewart decided, "for the present he would not resurvey any of this work, but rather take on where he (Maxwell) left off." Activities were then centred in the sector between River Ouelle and Cacouna, but not completed. A survey of Beaujeu Channel by Commander Maxwell and Lieut. Boulton in 1874 was resurveyed before returning to Quebec. These were the first known Canadian surveys on the east (Atlantic) coast. Later Mr

Stewart reported, "it is intended this survey will be in charge of Lieut. Irving B. Miles, RN, of HMS *Egeria* for the next five years."[6]

ST LAWRENCE RIVER, ABOVE QUEBEC CITY

Quebec to Montreal

Mr P.E. Parent resigned from the Survey early in 1905 to accept an appointment as Engineer of the Department at Quebec. His assistant, Mr Amos, was placed in charge of the *Delevis.* Assistants with Mr Amos this season were Messrs Chas McGreevy, E. Jodoin, R. Masson and A. Plamoden. Assistants to the surveyors were Messrs H. Melancon and O. Souliere. In February 1906, Mr F.J. Delaute was appointed to Mr Amos's field party in Ottawa. In the season of 1905, survey work was limited to the completion of omissions and additions along the ship channel route, and the taking of many magnetic and current observations.

Early in 1905, the first Canadian chart for the St Lawrence River was issued to the public "No. 2, Montreal Harbour, Longue Pointe to Varennes." This was a coloured photo-lithographic edition on a scale of 1000 feet to one inch - the first of a series of twenty others to be published within a few years between Montreal and Quebec City. Information pertaining to the ship channel was supplied by Mr F.W. Cowie, superintendent of the Sorel Shipyards.

Montreal to Lake St Francis

Lake St Louis. This season, work centred around Beauharnois in Lake St Louis, and was in the charge of Mr E. Fusey with assistants Messrs A.Pinet and G.B. St Pierre. For transportation, the steam launch *Josephine* was used, and the houseboat *L 'Arche.* Later Mr Stewart reported, "nothing can be ready for distribution this winter."

Lake St Francis. Work on this lake was carried out during the winter months of 1904-05 and in the summer season, Mr R. Bickerdike, officer-in-charge, with assistants Messrs H.D. Parizeau, A.A. Gobeil and P. Charton (Chartrand?). Again, the launch *Arrow,* the *Men's Scow* and the houseboat *Lotbiniere* were used. As in the case of the survey in Lake St Louis, nothing was ready for publication this year.

GREAT LAKES

On 1 January 1905, Mr F. Anderson became the second hydrographic officer to acquire a master's certificate (No. 4608) for inland waters, and this season was placed in charge of the *Bayfield* on Lake Superior. Survey work was centred on the north shore of the lake between Thunder Bay and Nipigon Strait. Assistants with Capt. Anderson were Messrs G. A. Bachand (drowned on North Shore of the Gulf, June 1931), A.O. Bourdonnais, R. Montgomery and

[6] This was Mr Stewart's last field season. It was also Lieut. Miles's as first assistant, HMS *Egeria* (Capt. J.F. Parry, in command) on the Pacific coast.

P. Jobin. Mr Jobin of the Lake St Louis survey replaced Mr R.E. Tyrwhitt, who died in May 1905, and of whom Mr Stewart wrote, "a thorough and conscientious assistant for ten years." In June 1905 the first volume of sailing directions for the Canadian shores of Lake Huron was written and issued to the public by the Department of Marine and Fisheries.

HYDROGRAPHIC SHIPS, 1905-06

In the fall of 1905, Mr Stewart urgently requested the department to undertake the construction of two new ships on the sea-coast - one for work in the Gulf of St Lawrence (Atlantic coast), and the other for the Pacific coast of British Columbia. At that time, consideration was being given by the Department to reconditioning the older steamer *La Canadienne,* as a replacement for the *Gulnare* on the lower St Lawrence River. This suggestion did not impress Mr Stewart, as he did not think it worthwhile "when her life was nearly run out ... and if the *La Canadienne* is placed on this service it will only be a few years until I am again clamouring for a new surveying vessel." Mr Stewart's adamant stand did bear fruit, and early in March 1906 Mr R.L. Newman, a naval architect from Montreal, was engaged to prepare plans and specifications for a new hydrographic steamer on the Pacific coast (the *Lillooet,* commissioned in 1908). Plans for a new steamer on the Atlantic coast were temporarily put aside, and alterations on the steamer *La Canadienne* began. This was the actual commencement of ship construction in the hydrographic service that continued throughout the years until 1962, when this responsibility was delegated to the Ships Division in the Marine Sciences Branch.

1906-07

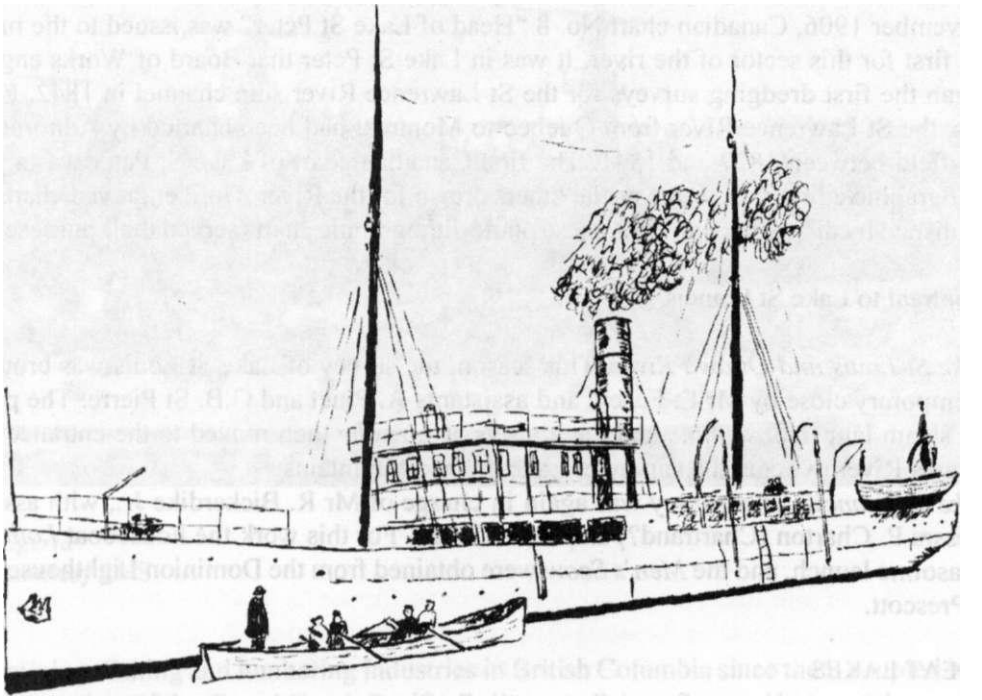
The season of 1906 was Mr Stewart's first full year in Ottawa, and it gave him more time to attend to matters pertaining to the Survey's future development. He began by placing six parties in the field: three ship, and three shore-based. In British Columbia the systematic recharting of this coast was started with the aid of gasoline launches. With the temporary close of the Lake St Louis survey, this party was transferred to the Ottawa River to begin the survey of Lake of Two Mountains. With the gradual transition from Admiralty to Canadian publications, coupled with an increased work load from current surveys, it soon became expedient for Mr Stewart to give this problem consideration. A small drafting office unit was therefore organized from surplus field officers and draftsmen formerly with the Public Works department. This unit then became a permanent unit of the hydrographic survey from this time onwards.

ST LAWRENCE RIVER

Lower St Lawrence

In 1906 the reconditioned departmental steamer La *Canadienne* replaced the *Gulnare* on the lower St Lawrence River survey. About 1 July Lieutenant Irving Brock Miles, RN, took

command of this survey, and had for assistants Messrs E. Girouard, Chas Savary and G.C. Venn (a former merchant marine officer). This survey, begun by Mr Stewart in 1905, was extended seawards to the approaches of the Saguenay River. Sailing master of *La*



La Canadienne
by David Gray

Canadienne this season was Capt. V. Belanger; and chief engineer, Mr J. Boisvert.[7]

[7] In a letter to the deputy minister dated 15 October, Mr Stewart had this to say about Lieut. Miles's appointment and other hydrographic applicants: "Men for hydrographic survey work are hard to get. A couple of years ago the department applied to the British Admiralty for the loan of a couple of officers to train young Canadians. We suggested various salaries which were declined until an offer of six hundred pounds (£600) was made when Mr Miles was appointed. Several older officers tendered their service, but all asked higher emoluments, and because of their ages and demands they were not considered. Messrs Miles, Anderson and Musgrave have had the necessary training for hydrographic surveys of exposed coasts and large bodies of water." At that time similar requests were sent to the US Navy, and US Corps of Engineers (US Lake Survey). The US Navy could not suggest a man, and one only from the US Corps of Engineers offered his services at $3,600 per annum. Needless to say, the Admiralty surveyor Lieut. Miles received the appointment.

St Lawrence River, above Quebec City

Quebec to Montreal. In 1906, Mr A. Amos was again in charge of the steamer *Delevis,* and had with him as regular assistants Messrs Chas McGreevy and A. Plamaden. Surveyor assistants and draftsmen were Messrs F. [H.?] Melancon, F. Delaute and O. Souliere. In November 1906, Canadian chart No. 8 "Head of Lake St Peter" was issued to the public - the first for this sector of the river. It was in Lake St Peter that Board of Works engineers began the first dredging surveys for the St Lawrence River ship channel in 1842. Prior to this, the St Lawrence River from Quebec to Montreal had been charted by Admiral H.W. Bayfield between 1827 and 1841. The first Canadian chart of Lake St Peter was a photo-lithographic edition, the same as the others drawn for the River. Until engraved charts were published by this service in 1909, these photo-lithographic charts served their purposes well.

Montreal to Lake St Francis

Lake St Louis and Ottawa River. This season, the survey of Lake St Louis was brought to a temporary close by Mr E. Fusey, and assistants A. Pinet and G.B. St Pierre. The party in the steam launch *Josephine* and the houseboat *L 'Arche* then moved to the entrance of the Ottawa River to begin the survey of Lake of Two Mountains.
Lake St Francis. This survey was again in charge of Mr R. Bickerdike Jr., with assistants Messrs P. Charton (Chartrand?) and A.A. Gobeil. For this work the houseboat *Lotbiniere,* a gasoline launch, and the *Men's Scow* were obtained from the Dominion Lighthouse Depot at Prescott.

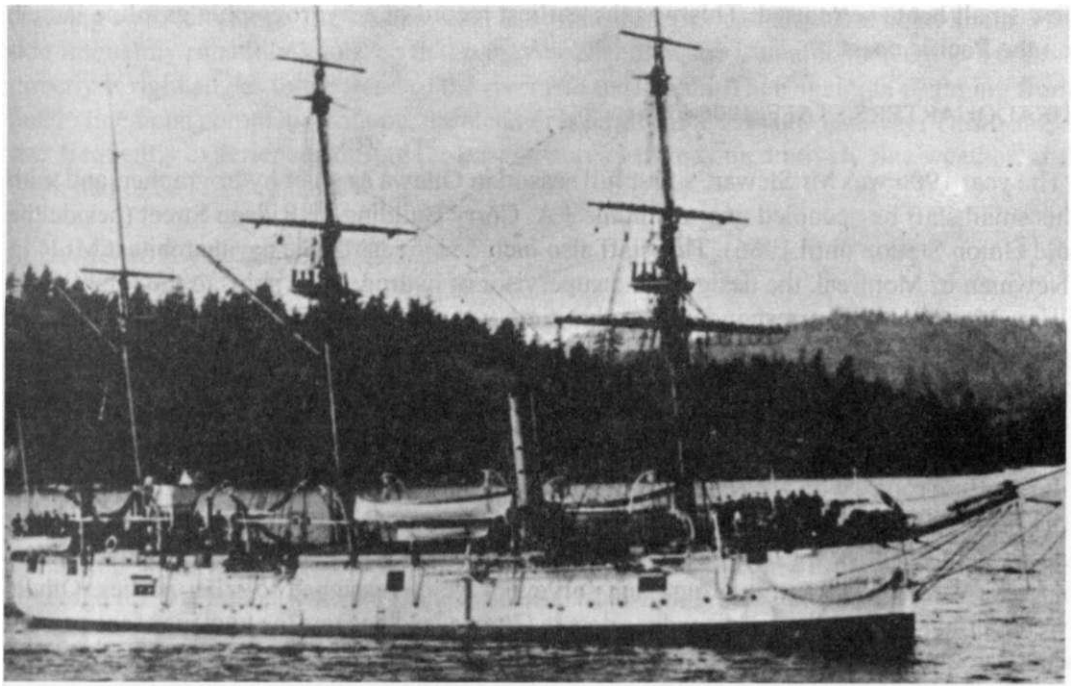
GREAT LAKES

In 1906, Capt. Anderson resumed work on the north shore of Lake Superior, extending the previous summer's work eastwards to Thunder Bay. With him as assistants were Messrs G.A. Bachand, P. Jobin, E. Longtin, and L.R. Davies. At the end of September, Mr Davies was transferred to the British Columbia party in Ottawa to assist Messrs G.B. Dodge and H.D. Parizeau with their season's work.

COMMENCEMENT OF SYSTEMATIC COAST CHARTING IN BRITISH COLUMBIA

British Columbia Survey, 1906

It was trade with the Orient that sent the first Canadian Hydrographic Survey party under Mr Wm J. Stewart to British Columbia in 1891. Here he spent the summer in resurveying Burrard Inlet and the Canadian Pacific Railway port terminus of Vancouver Harbour. The need for more accurate coast and harbour charts between the mainland and the offshore islands, to aid navigation and shipping in the days of the gold rush to the Klondike, did much to bring the Admiralty surveying ship *Egeria* to this coast in 1898. With the development



HMS *Egeria*
photo courtesy CHS

of the mining, fishing and lumbering industries in British Columbia since then, coupled with the construction of the Grand Trunk Pacific Railway to Prince Rupert Harbour, there soon arose a public demand for a more accurate resurvey of this coast, especially its northern waters. In compliance with these immediate needs, the hydrographic survey was officially instructed to undertake a survey in 1906 of the northern terminus of the Grand Trunk Pacific Railway at Prince Rupert Harbour. This was the authorization for the commencement of systematic recharting in British Columbia, a work that is still in hand.

Prince Rupert Harbour Survey. Unable to acquire the services of a qualified hydrographic surveyor with salt-water experience to undertake this survey, Mr Stewart was successful in obtaining from the surveyor general, Dr E. Deville, the temporary loan of Mr George Blanchard Dodge. At that time, Mr Dodge was articled to Dr. E. Deville as a dominion land surveyor, and for some years prior to 1904 had been a civilian assistant with the Admiralty Newfoundland survey. To assist Mr Dodge, Mr Henri Dalpe Parizeau was detached from the Lake St Francis survey on the St Lawrence, and sent west from Ottawa.

A campsite (Camp Fairview) was set up in the entrance of Prince Rupert Harbour from which much of the adjacent coastline was surveyed, but soundings were taken in the entrance of the harbour only. For water transportation a motor launch, a sailing gig, and a

few small boats were used. This was the earliest record of a hydrographic gasoline launch on the Pacific coast.

HEADQUARTERS STAFF, 1906-07

The year 1906 was Mr Stewart's first full season in Ottawa as chief hydrographer, and with his small staff he occupied quarters in the J. A. Corry Building on Rideau Street (beside the old Union Station until 1966). This staff also included the part-time naval architect Mr R.L. Newman of Montreal, the designer and supervisor of hydrographic ships to the First World War. Most routine correspondence at that time was hand-written by Mr Stewart, and his clerical assistant Mr W.R. McGee. Only when the hydrographic survey was transferred to the Department of the Naval Service in 1910 was the first full-time clerk-stenographer engaged (1911). Matters pertaining to chart distribution and routine messenger service were attended to by Mr A. Carbonneau. When not in the field, Mr Amos remained in charge of the drafting room, with Messrs Melancon, Souliere and Delaute fully occupied in compiling the first Canadian hydrographic charts for the St Lawrence River ship channel, and the river above Montreal to Kingston. From 1906 field work on this river became less active, and as surveys were closed out, hydrographic surveyors were reassigned to other parties. Others were permanently assigned to headquarters in Ottawa, and became the nucleus of the present chart production section in the hydrographic service.

1907-08

This field year was one of special significance to British Columbia. The first preliminary Canadian chart and sailing directions were printed for this coast, and for greater efficiency the first district office was established. Of greater interest, the first hydrographic wire-sweep survey of Canadian waters was organized, and carried out by the steamer *Bayfield* in Georgian Bay - the cradle of Canadian hydrography. Six parties were in the field this season: three ship- and three shore-based. At that time most office correspondence was still hand-written, and to assist with the increasing clerical work at headquarters Mr J.R. Dupuis was appointed a clerk to handle some of these matters.

ST LAWRENCE RIVER

Lower St Lawrence

During the summer of 1907, *La Canadienne* worked in the lower St Lawrence between the northwest end of Hare Island and the Saguenay River. Captain I.B. Miles was in charge with assistants Messrs Chas Savary, G.C. Venn, and W.R. McGee (from headquarters). At the end of the season, Capt. V. Belanger and Mr J. Boisvert, the chief engineer, resigned their positions. They were replaced by Capt. Henry J. McGough and Mr Alphonse Frenette. In his annual report, Mr Stewart wrote, "the steamer *La Canadienne* was very old and not very powerful. Any system of surveying a river forces the surveyor to sound in parallel lines,

crossing and recrossing. The steamer can, at best in smooth weather, steam eight knots. The tide frequently runs four knots, so that it may be seen that she is unable to keep on a course directly at right angles to the trend of the river and the stream. Then again, in changing from line to line upon completion of one, the steamer is hardly able to make headway. This trouble was frequently experienced during the past season, even in comparatively fine weather, and work had to be discontinued."

St Lawrence River, above Quebec City

Quebec to Montreal. Very little actual survey work was carried out by Messrs Amos, McGreevy and Jobin this season. The party was more concerned with astronomical and magnetic observations for seven localities between Montreal and Cornwall to tie in previous surveys, and in conducting similar work along the Saguenay River below Quebec. In the drafting office, Messrs Melancon, Delaute, Souliere and Jobin were occupied in preparing fair sheets for the St Lawrence River. In his annual report, Mr Stewart wrote, "this survey is almost completed." During this fiscal year, sixteen navigation charts for the St Lawrence River ship channel were issued to the public. This was about four-fifths of the total chart coverage for this inland waterway, and all were photo-lithographic editions.

Montreal to Lake St Francis.

Ottawa River. The survey of Lake of Two Mountains was resumed in 1907 by Mr Pinet using the *Josephine* and the houseboat *L 'Arche.* Assistants were Messrs G.B. St Pierre and H. Ortiz.
Lake St Francis. This survey, begun in 1904, was brought to a temporary close by Mr R. Bickerdike Jr. and P. Charton (Chartrand?) in 1907. Later Mr Stewart reported, "with the completion of this survey and that of Lake St Louis, charts of the St Lawrence River, Cornwall, or the international boundary line, to Montreal will soon be available."

GREAT LAKES & THE FIRST WIRE-SWEEP SURVEY

The steamer *Bayfield* resumed the survey of Lake Superior about 15 May and this season worked between Lamb Island and Jackfish Bay on the north shore. Capt. Anderson, in charge, had as assistants Messrs G.A. Bachand, A.E. Humphrey, H. Pope, and R.J. Fraser (dominion hydrographer 1948-52). On 1 October the *Bayfield* sailed from Lake Superior for Georgian Bay.
First Wire-Sweep Survey. Key Inlet on the northeast coast was reached without incident, and here the *Bayfield* completed the first wire-sweep survey in the service. This was in the approaches to Key Harbour, a potential lake terminus on the Canadian Northern Ontario Railway Company. This special work was carried out, "with a view to reporting upon a scheme for placing aids to navigation, to render the harbour safe for vessels, that are to carry

coal and iron ore."[8]

As to this wire-sweep survey, Mr R.J. Fraser wrote in 1962, "the first motorboats ... carried on the *Bayfield* ... in 1906 or 1907 [were] used solely for towing the sounding gigs or the dinghy. The only other service I saw the first launch put to use [sic] was in Georgian Bay when it handled one end of the first wire-sweep in the Service, planned and put together on board, and used in the channel survey of Key Harbour." A preliminary plan of this survey showed the main channel in Key Harbour "Swept to 21 feet, with aids to navigation marking it."

On 8 December 1907, the *Bayfield* laid up at Owen Sound, and in March 1908 her sailing master, Capt. W.O. Zealand resigned. He was replaced in April 1908 by Capt. Alex MacNab.[9]

BRITISH COLUMBIA, 1907

Prince Rupert Harbour

About the middle of February 1907, Capt. P.C. Musgrave officially took charge of the British Columbia survey from his former Admiralty shipmate, Mr G.B. Dodge. By 1 March, in company with Messrs H.D. Parizeau, and L.R. Davies, the survey of Prince Rupert Harbour was resumed from Camp Fairview. Until a new steamer was commissioned in 1908, Captain Musgrave and his party made use of gasoline launches for transportation, one of which was specially constructed this year for the survey. Its name is believed to be the *Budge,* but from many accounts of her performance a more appropriate name should have been *Never Budge.* Surveying in 1907 included the close sounding of Prince Rupert Harbour, with the leadline and the Lucas sounding machine (hand operated). The limits of this work were extended southward to Lawyer Island and to the entrance of the Skeena River. This is believed to be the last season for sailing gigs with the British Columbia Survey.

First District Office

When the party returned to Victoria in November, it took up permanent residence in a small office over the Canadian Pacific Railway Office on Government Street - the first District Office in the Service. In his annual report, Mr Stewart stated, "next season it is hoped that the new steamer will be in commission and that a distribution of the party will be possible so that Mr Parizeau will work with a separate outfit." During the first winter at Victoria, the party was fully occupied compiling for the engraver a fair copy of Prince Rupert Harbour

[8] M & F 1907

[9] Further to Mr Eraser's remarks on the use of a gasoline launch on the Great Lakes. It was not until June 1913 that Mr Parizeau was granted permission from Ottawa to charter a gasoline launch to sound the inshore waters only of Jackfish Bay, in Lake Superior. This was six or seven years after a launch on the Pacific coast had been used by Mr Parizeau for surveying purposes.

and approaches, and with matters pertaining to the new steamer scheduled for next season. Only in 1938, however, was the Victoria Office open all year round.

First Canadian Hydrographic Publications for British Columbia

The first significant hydrographic information from Canadian surveys in British Columbia is to be found in the Department of Marine and Fisheries Notice to Mariners No. 1 of 24 January 1907, paragraph 5. It was for Chatham Sound, Prince Rupert Harbour (Tuck Inlet) and gives the positions of two red spar buoys off Camp Fairview. Source of this information is a report by Mr G.B. Dodge, hydrographic surveyor.

The next information was contained in Notice to Mariners No. 51 of 1907, paragraph 142 dated 15 June. It too was for Chatham Sound to advertise the issuing of a "Chart of Prince Rupert Harbour... showing the results made in 1906 by Mr G. Blanchard Dodge of this Department." This chart was drawn on a scale of 1,225 feet to the inch, with soundings shown in the entrance of the harbour only. A further report by Mr Stewart indicated this chart to be a preliminary photo-lithographic edition, and to quote Mr Stewart, "during the past season some blue-prints of additional work had been issued."[10]

A third Notice to Mariners No. 72 of 1907 dated 9 August gives the first actual Canadian coast descriptions for British Columbia. They were for Prince Rupert Harbour, and written by "Mr P.C. Musgrave, Hydrographic Surveyor." So within two years of the commencement of work in British Columbia, the first Canadian provisional chart and sailing directions were issued to the public for Prince Rupert Harbour and approaches.

1908-09

FIRST RECLASSIFICATION OF THE CANADIAN HYDROGRAPHIC SERVICE (OTTAWA, ONLY)

In the year of Confederation, there were about 1,500 permanent civil servants in the newly formed Dominion government. These were the first enrollments of the various departmental Inside Services, or the Civil Government List at that time. For the most part, these employees were located at departmental headquarters in Ottawa, and with permanent status were eligible for benefits from subsequent amended civil service acts, such as superannuation and retirement plans.

Since Confederation, another class of government employees were employed to meet the exigencies of expanding growth and development. These employees from the very nature of their work were engaged by the department on the authority of the cabinet minister. Since they did not come under the civil government establishments, they were classified as temporary on the department's Outside Service. Most of this class were living beyond the restricted area of Ottawa. As a result of these adverse working conditions, many staff

" M&F 1907. 93.

anomalies and inequalities developed over the years, especially with yearly employees, and they were not actually resolved until the end of the First World War. The first practical move in this direction came from the amendment of the *Civil Service Act* (7-8 Edward VII, Chapt. 15) in 1908, and by this act the Civil Service Commission was established. Section 3 of this act defined the Outside and Inside Service, and with it most employees of the Outside Service in departments in Ottawa were transferred to the Inside Service of the civil government staff, and reclassified as permanent civil servants. One of the first undertakings of the new Civil Service Commission was the standardization of existing permanent classifications in Ottawa, depending on responsibility. Deputy ministers and senior civil servants were grouped under the category 1, 1 A, IB, etc.; professional and equally qualified personnel were grouped under the category 2, 2A, 2B, etc.; and administration personnel were grouped under category 3, 3A, 3B, etc.

When the amalgamation of the hydrographic survey was completed in 1904, its professional and technical staff comprised cfficers-in-charge, engineers-in-charge, engineers, assistant engineers, hydrographic surveyors, instrumentmen, assistants, draftsmen, etc. Salaries for the same work in some cases varied as much as $500 per annum, and in 1907 one officer-in-charge of a survey ship was less than $100 per annum from that of the chief hydrographer ($3,000). Following the new regrading of positions, Mr Stewart remained as chief hydrographer (1 A); hydrographers Capt. F. Anderson and A. Amos (in charge ship channel survey, and drafting room) (IB); junior hydrographers (2B); administration and clerical assistants (3, 3A, 3B, etc.). This was the new establishment of the hydrographic survey in 1908, with most employees in Ottawa now permanent. Since this act did not extend beyond the restricted area of Ottawa, the staff in Victoria, BC, remained on the Outside Service until the *Civil Service Act* was again amended in 1919.

ATLANTIC COAST SURVEYS -CUMBERLAND BASIN, NS

In a request for a survey of Amherst Basin by Mr Hans Logan, M.P. it was stated, "since the construction of Government piers and wharves, shipping has increased very rapidly." With a view to supplying navigation charts to ships trading at Amherst at high water, a survey of Cumberland Basin at the head of the Bay of Fundy was commenced in May 1908 by Mr Chas McGreevy with assistants Messrs P. Jobin and E. Jodoin. For this work a gasoline launch was shipped from the St Lawrence River. When the season ended the party returned to Ottawa for the winter. This Cumberland Basin survey was the first for both the provinces of Nova Scotia and New Brunswick by the Canadian Hydrographic Survey, and also the first for any area east of the St Lawrence River. Although one of the most detailed hydrographic surveys to this time, its extension was to be short-lived. In his annual report Mr Stewart stated, "this method of surveying such waters is not highly satisfactory, and it is hoped that when operations are extended a vessel may be available for a base." It must be kept in mind that the tides at Amherst are over forty feet in range, and with strong tidal streams to encounter, launch surveying in this harbour was a difficult task. Mr Stewart's remarks were probably the first intimation of what he had in mind for future hydrographic work on the Atlantic coast.

ST LAWRENCE RIVER

Lower St Lawrence

Work in the lower St Lawrence River was resumed by Capt. Miles in the steamer *La Canadienne,* with the assistance of Messrs Chas Savary, G.C. Venn and W.R. McGee. Sailing master was Capt. Henry J. McGough, and chief engineer, Mr A. Frenette. Surveying was resumed in the entrance of the Saguenay River and extended seawards to the Razade Islands, and to quote Mr Stewart, "it was very much delayed in this locality by the strong tides which *La Canadienne* is unable to stem." A large-scale plan for the mouth of the Saguenay River was finished that showed accurately the position of many critical shoal areas and banks in this vicinity of the river.

Montreal - Quebec

The season of 1907 practically ended the St Lawrence River survey of the ship channel. With the completion of a few revision surveys in 1908, to bring existing charts up to date, the Canadian Hydrographic Survey brought to a temporary close the St Lawrence River ship channel survey between Montreal and Quebec, a work begun by the Board of Works of Canada in 1841, and the Public Works department in 1896. Mr Stewart now had on hand sufficient data to seek the re-engagement of Capt. J.G. Boulton, RN, to write the first Canadian sailing directions for this portion of the river.

Ottawa River

Work in Lake of Two Mountains in the Ottawa River was in charge of Mr A. Pinet, who had for assistants Messrs G.B. St Pierre and H. Ortiz. For conveyance the steam launch *Josephine* was used, and the houseboat *L 'Arche* for accommodation of the staff. Pilot of the *Josephine* was Capt. A. Bertrand, and engineer was Mr A. LaFreniere."

GREAT LAKES

The steamer *Bayfield* left Owen Sound in charge of Capt. Anderson on 10 May, and until 1 August worked in the eastern approaches of Nipigon Bay in Lake Superior. The triangulation of this coast was also completed between Simmons Harbour and Isacor Point. Assistants this season were Messrs G.A. Bachand, A.E. Humphrey and R.J. Fraser. After a hectic field season the *Bayfield* reached Owen Sound on 23 November.

" It has been said that this party had all the comforts of home life aboard the ***L'Arche.*** or ***Ark,*** as she was sometimes called. It has also been said that aboard her was a pet canary named Petite, and that Petite and the chief manufacturing product of a nearby distillery (Melchiors) at Berthierville, occupied much time of one particular engineer.

Grounding in Nipigon Bay

On 23 June while working in the eastern entrance of Nipigon Bay the *Bayfield* "ran aground on a well-known rock," sustaining hull damage to the extent of $5,884.13. Following an investigation at Collingwood the blame was placed on Capt. A. McNab, who was replaced by Capt. J.F. Lunan as sailing master. Within a year the *Bayfield* now had three sailing masters, all of which indicated the difficulty in recharting the Canadian waters of Lake Superior at that time.

As to the Lake Superior survey, Mr Stewart wrote in 1908, "the north shore of Lake Superior from Pigeon River (the boundary between Canada and the United States) to the eastern entrance of Nipigon Bay, with the exception of Nipigon and Black Bays, has now been carefully and accurately surveyed and charted; that between Simmons Harbour and Isacor Point, a distance of fifty miles has been traversed and plotted in detail, but no soundings had been done off it. There still remains eighty miles between Wilson Island and Simmons Harbour, and fifty miles between Isacor Point and Cape Gargantua as well as Slate Islands, Michipicoten and Caribou Islands yet to be completed."

BRITISH COLUMBIA

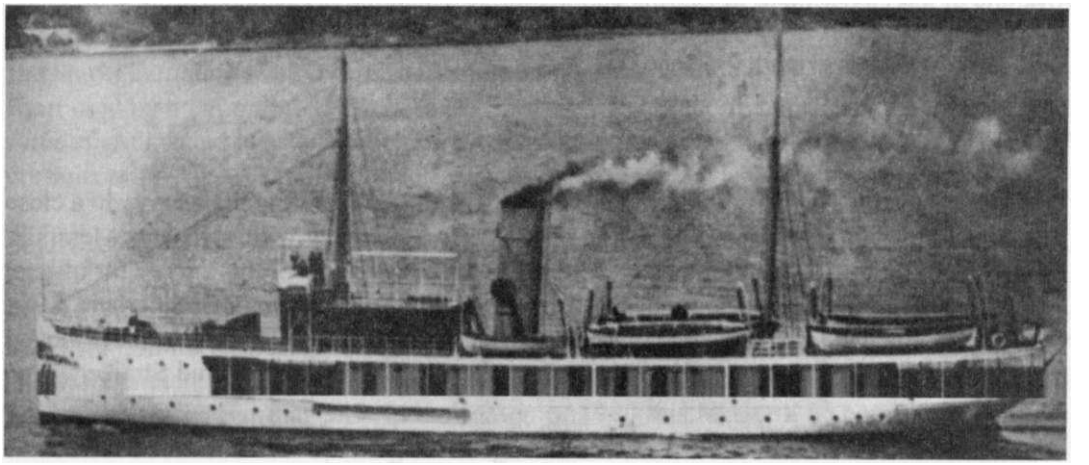
Early in April 1908, Capt. Musgrave with assistants Messrs Parizeau and Davies left Victoria by passenger steamer for the Skeena River. Here they established a campsite at Inverness, and proceeded to extend the survey beyond the entrance to this river. On 18 May Capt. Musgrave left Mr Parizeau in charge of the party to return to Victoria. Here he officially took command of the new hydrographic steamer *Lillooet* - the first officially designed and constructed vessel in the hydrographic fleet. The *Lillooet* was designed by R.L. Newman of Montreal, and built by the British Columbia Marine Railway Co. Ltd at Esquimalt at a cost of $150,000. Her first sailing master was Capt. F.H. Griffith, and first chief engineer, Mr T.W. Allen. After a few successful sea trials Mr F.P.V. Cowley was appointed to the hydrographic staff, and the vessel sailed for northern waters. The camp party was then taken aboard, and the ship left for Chatham Sound where she worked for the remainder of the season. The coast between Lucy and Rachel Islands and from Tree Bluff to Island Point was surveyed. An important discovery this season was the location of Alexandra Patch with eleven feet of water over it, where ten fathoms was supposed to exist.

British Columbia Publications, 1908

In a Notice to Mariners No. 77 of 1908, paragraph 195, and dated 24 August the Department of Marine and Fisheries advertised "a preliminary photo-lithographic chart of the southern approaches to Prince Rupert harbour and entrance to North Skeena passages, by Mr G. Blanchard Dodge and Mr P.C. Musgrave in 1907." White prints of this chart were issued to the public, and as Mr Stewart reported "these were preliminary to the regular charts, which take longer time to engrave."

This advertisement also included *Sailing Directions for Skeena River, Middle*

Passage, by Mr P.C. Musgrave. These descriptions, and those for the approaches to Prince Rupert harbour by Mr Musgrave (1907) were the first Canadian sailing directions for the coastal waters of British Columbia.[12]



CGS *Lillooet*
photo courtesy CHS

HEADQUARTERS, OTTAWA

At the close of the season of 1908, Mr Robert Bickerdike Jr., in charge of the Lake St Francis survey since 1907, and Mr A.E. Humphrey of the Lake Superior survey, resigned. Mr W.R. McGee, a former clerical assistant and secretary, also resigned, and was replaced by Mr T.L. Killeen early in 1909.

1909-1910

CAPTAIN J.G. BOULTON, RN

On the recommendation of his former first assistant, Mr Wm J. Stewart (now chief hydrographer), Capt. J.G. Boulton, RN (Ret'd), was temporarily engaged in February 1909 to write the first volume of sailing directions for the St Lawrence River between Quebec and Montreal. Assisting him with coast charts and field sheets compiled from former Public Works, Railways and Canals, and hydrographic surveys at this time, was Mr A. Amos. By

[12] About a quarter of a century, later the first Canadian volume of sailing directions for this coast were written by Mr H.D. Parizeau - the *Northern Portion,* Volume II, 1930. Two years later he wrote Volume I, *Southern Portion,* including Vancouver Islands.

now the drafting office had become permanently established in Ottawa, and had the necessary charts in readiness for Capt. Boulton's use. In addition to the writing of sailing directions Capt. Boulton acted as a consultant to the hydrographic survey, and to other officials in the Department of Marine and Fisheries, when the occasion arose.

ATLANTIC COAST SURVEYS, 1909

Cumberland Basin, NS

The Nova Scotia party in 1909 returned to Cumberland Basin to bring that survey to a close July 20th. This work was again in charge of Mr Chas McGreevy with assistants Messrs P. Jobin and E. Jodoin. Some blue-prints were made from the results of this survey for official purposes, but no standard navigation charts for either Amherst Harbour or Cumberland Basin were ever published from these two season's work. When this survey ended the party moved across the isthmus of Nova Scotia to Tatamagouche Bay in Northumberland Strait.

Tatamagouche Bay, NS

In reply to a request for a survey of Tatamagouche Bay by Mr A.R. Warburton, the member of parliament for Charlottetown, PEI, this work was carried out by Mr Stewart on instructions from the minister of Marine and Fisheries. Its survey was made in close detail by the Cumberland Basin party "with a view of selecting the best locality for wharves and piers."[13] With the aid of a gasoline launch the party worked in this area until 11 November when it returned to Ottawa for the winter. Some 200 miles of boat sounding, over an area of 11 square miles, and 32 miles of shoreline were surveyed. To quote Mr Stewart, "the small area in this case is accounted for by the fact that the sounding was of a much closer nature than is usual in hydrographic surveys." Like the Cumberland Basin survey, only a few blueprints for official use were printed from the results of the Tatamagouche survey, the first by this service in Northumberland Strait. This was the last hydrographic survey in Nova Scotia until the year 1915, when Capt. F. Anderson in the steamer *Acadia* began the systematic recharting of the Atlantic coast of this maritime province in the vicinity of Halifax Harbour.

ST LAWRENCE RIVER

Lower St Lawrence

The season of 1909 was to be the last one for the steamer *La Canadienne* on the lower St Lawrence River survey. Capt. Miles was again in charge of this work, with Messrs Chas Savary, Venn, and Ortiz, as assistants. The sector of the river between Green and Bic Islands

" M & F 1909.

was surveyed. Upon his return to Quebec in the fall, Capt. Miles was instructed to return to Matane just below Father Point, and examine the ground there for a danger reported by the Canadian Pacific Railway steamship *Empress of Ireland.*™ A very careful examination was made over quite a large area in the neighbourhood of the position given for the grounding. It indicated there was no shoal upon which this ship could have struck, except for Roix Shoal shown on the latest edition of Canadian chart No. 307. Roix Shoal was not shown on the chart used by the *Empress of Ireland.* Mr Stewart further reported that Capt. Miles observed some slight inaccuracies on that chart, all of which proved that "the survey of that and other portions of the river cannot be undertaken any too soon."[15]

St Lawrence River, above Montreal, 1909

Ottawa River. The survey of Lake of Two Mountains was resumed by Mr Pinet in 1909, who had with him for assistants Messrs G.B. St Pierre and E. Ghysens. Use was made again of the steam launch *Josephine* and the houseboat *L 'Arche* At the end of the season, Mr Stewart reported, "it is hoped that early in the season of 1910 this lake will be completed, and the chart issued for use at the opening of navigation in 1911."

FIRST CANADIAN ENGRAVED CHARTS, 1909

The first engraved chart from Canadian survey was published by the Admiralty Hydrographical Office in February 1886, and it was for the entrance to Georgian Bay from Lake Huron. About the year 1900 the US Lake Survey began publishing engraved charts, in colour, and in 1909 the Canadian Hydrographic Service began doing likewise. Until 1911 when the Printing Bureau established its own engraving section, most government lithographic charts were by contract with outside firms. Canadian engraved charts, in colour, were first advertised in Department of Marine and Fisheries Notices to Mariners as follows:
(i) No. 25, 15 April 1909:- The first coloured engraved Canadian chart was No. 201, "Lower St Lawrence River: White Island to Orignaux Point." It was drawn on a polyconic projection, to a natural scale of 1:72,611 (approximately one nautical mile to the inch), and sold for 15 cents per copy. It was compiled from surveys by Mr Stewart and Lieut. Miles, RN and assistants, 1905-07; and was obtainable from the Department of Marine and Fisheries, Ottawa, and its Agents at Quebec and Montreal.'[16]
(ii) No. 34 dated 8 May 1909:- The second coloured engraved chart was also drawn on a polyconic projection, No. 50 "Upper St Lawrence River, Lake St Louis." Its scale was 1:24,000 (approx. 2,000 feet to the inch), and it also sold for 15 cents per copy. It was

[14] This was the same *Empress of Ireland* that collided with the coal carrier *Storstat* below Father Point, PQ, 29 May 1913, and sank with a loss of some one thousand lives. During the summer of 1965 scuba divers from Ottawa located this wreck and positioned her more accurately. The nameplate of this ill-fated ship was also salvaged from the ship's bridge.

[15] M&F, 1910.

[16] No copy of this historic chart can be found for illustration purposes.

obtainable from the "Hydrographic Survey Office."[17]

(iii) The third coloured engraved chart in 1909 was for British Columbia and advertised in Notice to Mariners No. 110 dated 15 November 1909. It was Canadian chart No. 301, "Prince Rupert Harbour." Like the others, it too was drawn on a polyconic projection to a scale of 1:14,783 (approx. 1,250 feet to the inch). Its price was also 15 cents per copy, obtainable from the "Hydrographic Survey Office" ... and from agents of the department at Victoria.

(iv) The fourth and last engraved chart to be published in 1909 was listed in Notice to Mariners No. 112 of 1909 dated 17 November. It was Canadian chart No. 99 "Great Lakes: Georgian Bay - Key Harbour and Approaches," and drawn to a scale of 1:12,160 (approx. 1,000 feet to the inch). It too sold for 15 cents per copy, and was obtainable from the "Hydrographic Survey Office," the Collector of Customs at Port Arthur and Fort William, and the Superintendent of the Sault Ste Marie Canal.

Therefore, by 1903 the first Canadian preliminary chart from Canadian surveys was printed, and in 1909, the first engraved editions in colour.

GREAT LAKES

During the winter of 1908-09, it was decided by the minister of Marine and Fisheries to discontinue temporarily the work on Lake Superior and to undertake the resurvey of Canadian waters in Lake Ontario. The *Bayfield* accordingly left Owen Sound in under the of Capt. F. Anderson on 7 May 1909 and, en route to Lake Ontario, made harbour investigations at Goderich, Rondeau, Ports Stanley, Burwell and Colborne. While in the Detroit River a boulder spit was positioned near the car ferry at Windsor. The *Bayfield* reached Burlington, Ontario, on 10 June to begin the survey of Lake Ontario between False Ducks Islands and Presqu'ile Bay. Of this survey along the south shore of Prince Edward County, Mr Stewart makes reference to a "water-triangulation," i.e. positioning the ship offshore as apices of a network. On 3 November the *Bayfield* was laid up at the Dominion Lighthouse Depot at Prescott, the farthest east winter quarters to this time. Assistants to Capt. Anderson this season were Messrs G.A. Bachand, R.J. Fraser and A. Lighthall. Sailing master and pilot was Capt. J.F. Lunan, who was replaced in 1910 by Capt. Wm McQuade.

Gig-sounding on the Great Lakes, 1909

The following interesting account of the method of gig-sounding on the Great Lakes in 1909 has been submitted by Mr R.J. Fraser. It was typical of a day's work until gasoline launches were officially approved on the Lakes in 1913 for sounding purposes.

[17] This is the earliest known record of chart distribution in the Survey proper, and the authority for the present Chart Distribution Office. Canadian chart No. 50, "Lake St Louis" was most interesting from a historical viewpoint. It embodied the surveys of Railways and Canals from 1890 to 1904, and the Canadian Hydrographic Survey, 1904-06. On it appear the names of the following hydrographic engineers and surveyors: Messrs Alex Dufresne, C.E.; P. Jobin; Alex. J. Pinet, C.E.; and G.B. St Pierre, C.E.

> Handline sounding from a five-oared gig was, in shallow water, such as that of Lake Ontario, a day-long strain for the surveyor, and a strenuous physical exercise for the crew. There was one surveyor only in a boat. He stood in the stern sheets, where he had a sounding-board, sextant, notebook, glasses, and patent log-book. He steered the boat, grasping in one hand the notebook and pencil. He kept the boat on line, usually keeping in sight, ahead or astern, two lined-up natural objects on shore. When these were not visible, the boat's head was kept at a constant angle to the waves, if any. At specified log distances, he stopped the boat and a cast was made. At other longer spacings, a fix was taken. He also had a station-pointer, and the fix was plotted, the angles, log distance reading and the sounding recorded. He was also supposed to watch the leadman's line and check the sounding. On Lake Ontario, where in some places the shoal ran for miles offshore, only four lines of soundings were taken a day, two in the forenoon, and two in the afternoon. The lines sometimes ran for four or five miles out.[18]

BRITISH COLUMBIA

In 1909, the steamer *Lillooet* left Esquimalt for northern waters on 24 March and en route made a small survey of Boat Harbour on the east coast of Vancouver Island. Coal chutes were being built here at that time, and this is believed to be one of the earliest records of a Canadian survey on Vancouver Island. With Capt. Musgrave this season as assistants were Messrs Parizeau, Davies and Cowley. In northern waters the party was divided. Mr Parizeau and Mr Cowley were placed in a campsite at Claxton from where they surveyed Telegraph Passage, part of the entrance to the Skeena River, and Arthur Passage. This was the first season when two parties were engaged in charting the waters of British Columbia. The *Lillooet* under Capt. Musgrave sounded out a large area of Dixon Entrance between the northeast coast of Queen Charlotte Islands and the southeast extremity of Prince of Wales Island. This area was left unsurveyed by Capt. J.F. Parry, HMS *Egeria,* in 1908, and "this survey was asked to complete it." This was a highly significant request, and it marked the actual transition of hydrographic surveying in British Columbia from the Admiralty to the Canadian Hydrographic Survey. The *Lillooet* returned to Victoria on 8 November after a season of inclement weather that permitted about two days per week of work. However some 350 miles of ship sounding, and 350 miles by the boats were recorded in an area of 279 square miles.

OTTAWA, 1909

At headquarters Capt. Boulton was still busily occupied in writing the first sailing directions

[18] This description of gig-sounding differed by little from that introduced to the survey by Staff Commander Boulton in the Great Lakes a quarter of a century previously.

for the upper St Lawrence River, and acting as a consultant to the chief hydrographer, senior hydrographers, and other officials of the Department of Marine and Fisheries. In June 1909, Mr G.L. Crichton was appointed a draftsman with the hydrographic survey, and in September he was sent to Buffalo, N.Y., by Mr Stewart. Here within a short time he was named principal draftsman of the Canadian Section, and placed in charge of the compilation of boundary charts for Canadian waters by the International Joint Commission. About September of this year Mr Amos, who was in charge of the former St Lawrence River survey and the drafting staff since 1905, resigned from the hydrographic survey. Mr F.J. Delaute then acted in charge of the drafting office until Mr Crichton's return from Buffalo in 1915. Matters pertaining to the new ship *Carder* were well-advanced, and in charge of Mr R.L. Newman of Montreal.

1910-11

The fiscal year 1910-11 was perhaps the most active season in the history of the survey since its foundation. In addition to being transferred from one department to another, three ship- and one shore-parties were placed in the field. This was exclusive of the outfitting of the first northern expedition to Hudson Bay on the east coast. On the lower St Lawrence River, the new steamer *Carder* replaced the older department steamer *La Canadienne,* and the first investigations were made in Prince Edward Island. Above Montreal the Ottawa River survey was completed, and transferred to Lake St Francis.

TRANSFER OF THE HYDROGRAPHIC SURVEY, 1910

On 12 January 1910, a bill was introduced in the House of Commons entitled, *an Act Respecting the Naval Service of Canada.* This Act was passed and became law 4 May 1910. By it, the minister of Marine and Fisheries, the Honourable Mr L.P. Brodeur, became the first minister of the Naval Service. Mr G.J. Desbarats, the acting deputy minister of Marine and Fisheries at that time was named the first deputy minister of the Naval Service. By Order-in-Council P.C. 21-1453 dated 4 July 1910, the Canadian Hydrographic Survey was transferred from the Department of Marine and Fisheries to this newly formed Department of Naval Service. Other Marine and Fisheries branches to be similarly transferred were as follows: Naval, Fisheries Protection, Wireless Telegraph, and Tidal and Current Survey. Since 1904, Mr Wm J. Stewart had been responsible to the deputy minister of Marine and Fisheries for the conduct of the hydrographic survey. When named superintendent of the Tidal and Current Survey Division in 1908, Dr. W. Bell Dawson also attained this status. Of special concern to the hydrographic survey in British Columbia was the taking over from imperial authorities the dockyard at Esquimalt on 9 November 1910. With it ended the era of Royal Navy activities in British Columbia.

HUDSON BAY AND STRAIT

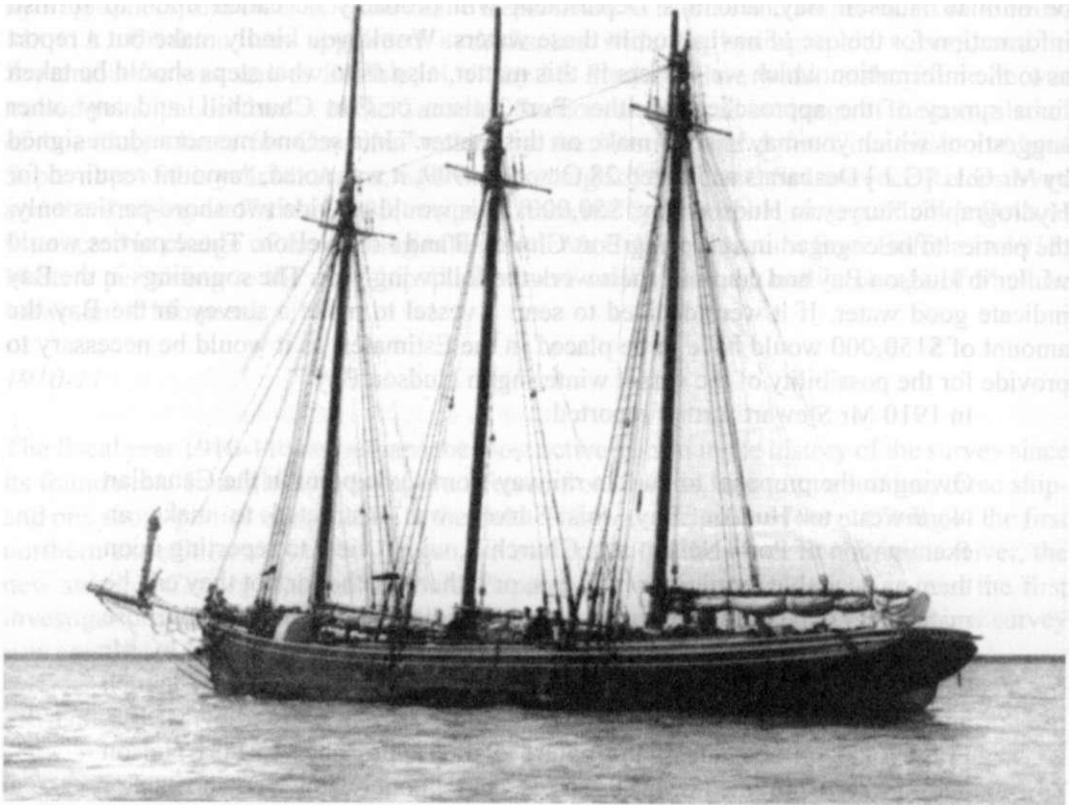
In a memorandum to the chief hydrographer from the acting deputy minister of Marine and

Fisheries dated 1 1 October 1909, it was stated, "it seems probable that a railway will soon be built to Hudson Bay, and this Department will probably be called upon to furnish information for the use of navigation in those waters. Would you kindly make out a report as to the information which we possess in this matter, also as to what steps should be taken for a survey of the approaches to either Port Nelson or Fort Churchill, and any other suggestions which you may wish to make on this matter." In a second memorandum signed by Mr G.L. [G.J.] Desbarats and dated 28 October 1909, it was noted, "amount required for Hydrographic Survey in Hudson Bay, $50,000. This would provide two shore-parties only, the parties to be engaged in surveying Fort Churchill and Port Nelson. These parties would winter in Hudson Bay and continue their work the following year. The soundings in the Bay indicate good water. If it were decided to send a vessel to make a survey in the Bay the amount of $150,000 would have to be placed in the Estimates, as it would be necessary to provide for the possibility of the vessel wintering in Hudson Bay."

In 1910 Mr Stewart further reported:

> Owing to the proposal to build a railway from some point in the Canadian Northwest to Hudson Bay, this Survey was instructed to make an examination of Ports Nelson and Churchill, with a view to reporting upon them as desirable termini for railways, or rather whether or not they can be made ports to be used with safety for ocean-going vessels. For this purpose two parties were organized: one under Mr G.A. Bachand assisted by Mr Chas Savary to go into camp at Fort Churchill, with the necessary launch and boats for work; the other under Mr H.D. Parizeau assisted by Mr R.J. Fraser, and on account of the nature of the approaches to Port Nelson Harbour were provided with a three-masted schooner, launch and boats. For transporting these parties to the localities the Department of Marine and Fisheries kindly loaned us the ice-breaking steamer *Stanley* which was placed in charge of Commander I.B. Miles. He had as Officers, Capt. Dalton of the *Stanley,* and Capt. S.W. Bartlett, one of the best known pilots for Hudson Strait.

The outfitting of the 1910 expedition was under the supervision of Capt. F. Anderson, officer-in-charge, Great Lakes survey. For the Nelson River survey, the three-masted schooner *Chrissie C. Thomey* was purchased in Newfoundland for the sum of $9,000 and proceeded to Halifax for reconditioning. The *Thomey* was a former molasses carrier in the West Indies trade, and was skippered by Capt. Thos. Gushue, or by his more familiar name "Black Tom o'Brigus." Also purchased for this expedition were two specially designed cabin-model gasoline launches. They were built at Collingwood in Georgian Bay by a man named Mr Watts (?), at an approximate cost of $4,170 each, hull and engine. One was named *Churchill* and the other *Nelson* after their first field assignments. Until 1924 the *Nelson* was used extensively in James Bay, the Atlantic coast, the Great Lakes, Northumberland Strait, Bay Chaleur, and Lake Melville, Labrador. Mr R.J. Fraser, who was one of the first hydrographers to use her in 1910 was also the last in Lunenburg Harbour, NS, in 1924,



Chrissie C. Thomey
photo credit NAC PA45204

wrote, "because one never knew next where it was going to turn up for a job of charting work ... it became more familiarly known as the *Sea Louse.* Not an elegant or refined name, but descriptive."

Port Burwell, NWT - The first Canadian Hydrographic Survey on the Hudson Bay Route

The steamer *Stanley* departed Halifax Harbour on 2 July with the following government officers: Commander Miles and Messrs Parizeau, Bachand, Savary, and Fraser of the hydrographic survey; Capt. "Bob" Bartlett, ice pilot; Dr. Marcellinus, M.D., Major Stearns of the RNWMP stationed at Fort Churchill, and a Mr L.V. King (later Dr. Louis Vescot King, professor of physics, McGill University) who assisted Commander Miles as a survey assistant when not engaged in taking other scientific observations during the voyage. The *Stanley* entered Port Burwell Harbour on 19 July and while waiting for the arrival of the schooner *Chrissie C. Thomey,* Commander Miles began the first hydrographic survey by this

service along the Hudson Bay route. Having disembarked the parties on the west coast of Hudson Bay, the *Stanley* re-entered Port Burwell on 4 August, and while awaiting the arrival of the government steamer *Earl Grey,* the survey of this harbour was resumed by Commander Miles and Mr King. A sketch plan of Port Burwell Harbour was drawn this year, and it was also the first Canadian harbour survey in the Northwest Territories (District of Franklin). However, it was not until April 1913 that this plan was issued to the public in chartlet form (Canadian chart 404, "Anchorages in Hudson Bay and Strait").

Churchill Harbour, Manitoba - The first Canadian Survey and Chart for Hudson Bay

The *Thomey* was taken in tow off Port Burwell on 19 July, and for obvious reasons few observations were taken from here to Churchill Harbour, which was entered on the 25 July. The following day the first Canadian hydrographic survey began in Hudson Bay from the shore-based campsite. This work was continued until 5 December when Messrs Bachand and Savary left Churchill by dog-sledge for Ottawa, which was reached in January 1911. The results of this survey with other observations in 1911, were compiled into the first Canadian hart for northern waters, No. 401, "Churchill Harbour," printed in Ottawa January 1912, and issued to the public November 1912 (Notice to Mariners No. 112 of 1912, paragraph 316). It was a photographic edition drawn on a scale of 1:12,425 (approximately 1,000 feet to the inch).[19]

Nelson River, Manitoba

On 27 July the *Thomey's* launch was taken aboard the *Stanley* and on the following day it was lowered in the water off the Nelson River estuary. The *Thomey* was already at anchor here, and for the next six weeks she was used as a ship-base for offshore hydrographic work. On 12 September the *Thomey* departed for Halifax. The survey party then went ashore to continue the inshore work from a campsite. When ice conditions made surveying hazardous the season ended, and on 20 January 1911 the party left for Ottawa in dog sledges, by way of the Nelson River and Lake Winnipeg. Ottawa was reached on 4 March.

Commander Miles reported to the chief hydrographer as follows, "whilst numerous bergs were met within the eastern part of Hudson Strait, none were seen in Hudson Bay itself. 1 would have endeavoured to run a line of soundings on the outward voyage, but

[19] Considerable surveying had been done by the Canadian government in Churchill Harbour prior to the arrival of the hydrographic party in 1910. First, there were the investigations by Lieut. A.R. Gordon, RN. and Capt. A.R. Markham, RN. when the first Canadian expeditions were sent to Hudson Bay, 1884-86 (see inset on British Admiralty Chart 863, "Hudson Bay and Strait," December 1910). Then there was a photolithographic map of this northern ocean terminus published by the surveyor general. Department of the Interior, in 1907, and compiled from a survey by Mr W. Thibaudeau, C.E. This map drawn, on a scale of 2,000 feet to the inch, included soundings by the Gordon expeditions at low water. Finally, between June 1908 and January 1909, Mr F.H. Peters (surveyor general and chief, Hydrographic and Map Services 1936-47) assisted Mr J.E. Morrier, D.L.S. with a detailed topographic survey for the Department of the Interior. From this plan the town site of Churchill was later delineated.

having a schooner in tow, and being so beset by ice, this was impossible. When able to do so on the return from Port Nelson to Cape Digges, 1 ran an almost continuous line, soundings being taken at intervals of 10 miles in deep water, and 5 miles in shoaler water." These recorded depths and a running sketch survey between the islands off the south coast of Hudson Strait were the first Canadian hydrographic observations across the entire Hudson Bay route between the Atlantic Ocean and Port Churchill. They were also coincidentally the first coastal observations in the Districts of Franklin and Keewatin. All are shown on the first Canadian chart No. 405 (now 5000), "Hudson Bay and Strait," published in Ottawa January 1913.

In addition to hydrography along the Hudson Bay route, ice, tidal, magnetic, meteorological and barometric observations were also recorded by this expedition. Hudson Strait was cleared by the *Thomey* on 21 September, and on 7 October Capt. Thomas Gushue sailed her into his home port of Brigus, Newfoundland. A month later, Halifax Harbour was entered to bring the 1910 season to a close.

ATLANTIC COAST - PRINCE EDWARD ISLAND

When the *Bayfield* was laid up this fall, Capt. Anderson was sent to Prince Edward Island for a few minor harbour investigations. One was in compliance with "a request of persons using Alberton Harbour," and the other was in Souris Harbour where an uncharted rock was checked. These investigations were conducted between December 1910 and January 1911 and are believed to be the first hydrographic work in the Garden of the Gulf.[20]

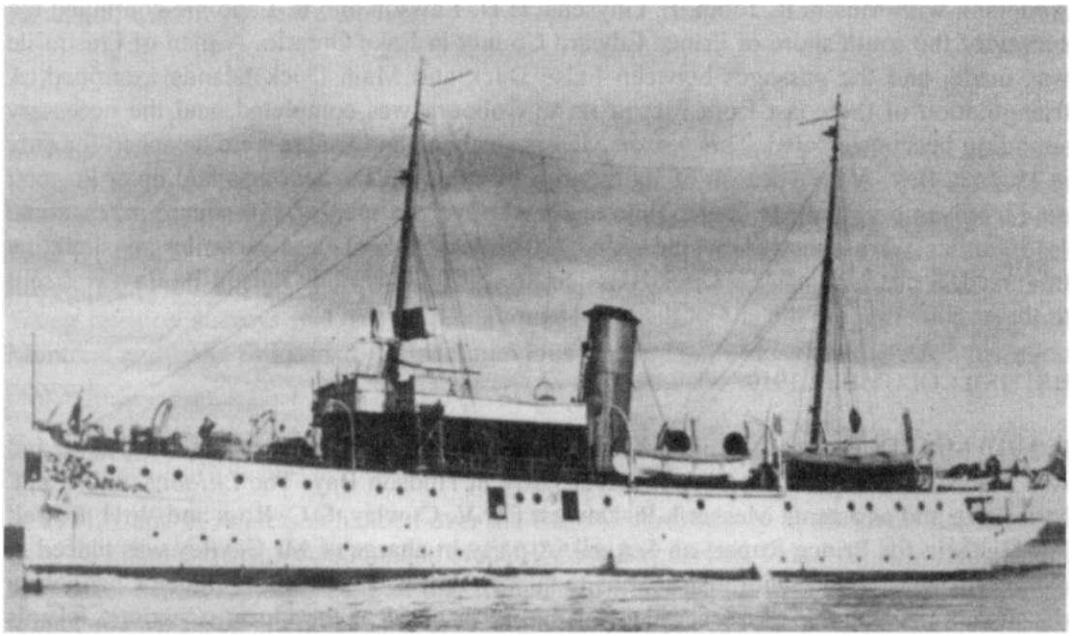
ST LAWRENCE RIVER

Lower St Lawrence.

May 6th, 1910 was one of both sorrow and joy for the hydrographic survey. On this day King Edward VII died in England, and the new steamer *Carder* arrived at Quebec from there. Designed by Mr R.L. Newman of Montreal and built at Newcastle-on-Tyne (England), the *Carder* was in many aspects a sister ship to the *Lillooet* in British Columbia, and cost $176,912. Following her arrival at Quebec, the officers and crew of *La Canadienne* were transferred to the new ship. Her first sailing master was Capt. Henry J. McGough. Her first chief engineer until 2 July was Mr D. Marcotte, when he was replaced by Mr S. Guenard. Early in July, Commander Miles and Mr Savary were detached for duty in Hudson Bay, and until the return of Commander Miles about mid-August, work on the lower St Lawrence was continued by assistants Messrs G.C. Venn and H. Ortiz. For the greater part of this time the party worked in the vicinity of Rimouski, and when the season ended the river had been surveyed to Bic Island. A new chart from White Island to Bic Island was planned for the

[20] Only in 1920 was the first standard harbour survey made on this island. This was in connection with the car ferry terminal between Cape Tormentine, NB, and Port Borden, PEI, in Northumberland Strait. It was completed by Capt. F. Anderson in the survey ship ***Acadia.***

fiscal year 1911. Regarding the steamer *Cartier* Mr Stewart reported, "she had given the greatest satisfaction, is economical of fuel, is a splendid sea-boat and furnishes comfortable quarters for men, and crew, and for the surveying work." In the meantime *La Canadienne* was laid up at Sorel until 1912, when she was recommissioned for hydrographic work in the Great Lakes.



CGS *Cartier*
photo courtesy CHS

St Lawrence River - Montreal to Lake St Francis

Ottawa River. With the completion of work between Ste Anne de Bellevue and Carillon on the Ottawa River, the Lake of Two Mountains Survey was brought to a close by Messrs A. Pinet and G.B. St Pierre. A chart of this lake was drawn, and was in the hands of the engraver for printing in 1911.

Lake St Francis. With the end of the Ottawa River Survey, the party in the steam launch *Josephine* and houseboat *L 'Arche* moved to Lake St Francis for further work at the head of this lake. Mr Pinet then returned to Ottawa, and Mr Chas McGreevy replaced him in charge. Assistants were Messrs G.B. St Pierre and E. Jodoin. On 24 November the boats were laid up in the Cornwall Canal for the winter, and the party returned to Ottawa. Mr Stewart reported, "there still remains some examination of suspicious soundings in the Lake to be

completed in 1911, when the publication of the charts will be placed in the hands of the engraver."

GREAT LAKES

In addition to supervising the outfitting of the Hudson Bay expedition in 1910, Capt. Anderson with Messrs R. Jobin, E. Ghysens, H.H. Lawson and E. Lapointe continued the survey of the south shore of Prince Edward County in Lake Ontario. A plan of Presqu'ile was made, and the passages between False Duck and Main Duck Islands examined. A triangulation of the coast from Presqu'ile to Cobourg was completed, and the necessary sounding beacons erected. This season Messrs Bachand and Fraser were detached for duty in Hudson Bay. After a season of six months duration the *Bayfield* was laid up at Prescott on 11 November, and Mr E. Lapointe resigned. Over an area of 350 square miles, some 1,150 miles were sounded by the ship, 720 miles by boat, and 60 miles of shoreline traversed. A chart from Main Duck Island to Presqu'ile, including Presqu'ile Bay, was sent to the engraver before the end of the fiscal year.

BRITISH COLUMBIA, 1910

In 1910 Mr H.D. Parizeau, senior assistant on this coast since 1906, returned to Ottawa and was placed in charge of the Nelson River party in Hudson Bay. The *Lillooet,* with Capt. Musgrave and assistants Messrs L.R. Davies, F.P.V. Cowley, C.C. Ross and W.H. Powell left Victoria for Prince Rupert on 5 April. A party in charge of Mr Cowley was placed in camp on Lewis Island, with instructions to survey Arthur Passage and Ogden Channel. In the meantime, the ship was occupied on the north coast of the Queen Charlotte Islands sounding out Masset Sound in the eastern entrance of Dixon Entrance between Rose Spit and Celestial Reef. This sector was left unsurveyed by Capt. J.F. Parry, RN, HMS *Egeria.* When the season ended, Messrs Cowley, Ross and Powell resigned.

New Quarters at Esquimalt, 1910

About September 1910 HM Dockyard at Esquimalt was gradually being vacated by the Royal Navy, and taken over by the Royal Canadian Navy and the Department of Marine and Fisheries. Before this year ended the hydrographic office, over the C.P.R. Office on Government Street since 1907, was moved to new quarters in the dockyard at Esquimalt. Here the survey remained until the end of the First World War.

Finish of Admiralty Surveys in British Columbia, 1910

On March 28th, 1910, Lieut. J.D. Nares, RN assumed command of HMS *Egeria* from Capt. J.F. Parry, RN (Hydrographer of the Royal Navy 1914-19), and two days later the ship departed Esquimalt for the last Admiralty surveying season on this coast. Work began in the northern waters of the Strait of Georgia and then extended southeastwards from Cape Mudge

to tie in with Commander Smyth's triangulation of 1899. At the end of the season, the crew of *Egeria* was paid off, and on 8 December she was recommissioned with a reduced ship complement to prepare her for disposal. With its sale in April 1911 an era of a century and a quarter of Admiralty surveying in British Columbia was brought to a close by the Royal Navy - an era that had its beginning in the last quarter of the eighteenth century by such eminent naval officers as Capt. James Cook, Master William (Breadfruit) Bligh of *Bounty* fame, and Capt. George Vancouver.

1911-12

In the season of 1911, the Department of the Naval Service sent three scientific parties to Hudson Bay: two hydrographic and one magnetic. The hydrographic parties were in charge of Capt. F. Anderson and Mr H.D. Parizeau, and the magnetic party was in charge of Mr W.E.W. Jackson of the Toronto Observatory. Regular ship surveys were again sent to the lower St Lawrence River, the Great Lakes, and survey work continued on the Pacific coast. When revision surveys in Lake St Francis ended, the party moved to Laprairie between Montreal and Lake St Louis to connect previous hydrographic surveys with a triangulation network.

HUDSON BAY AND STRAIT

In 1911, Capt. F. Anderson handed over the Lake Ontario survey in the Great Lakes to Mr G.A. Bachand and assumed command of the Hudson Bay survey. This season the department icebreaker *Minto* replaced the *Stanley*. Capt. John MacPherson was sailing master of the *Minto,* and Mr Joseph Ferguson the chief engineer. Ice pilot was again the famed North Pole explorer Capt. "Bob" Bartlett. In charge of the *Chrissie C. Thomey* was Mr H.D. Parizeau, and her skipper was again Capt. Thos. Gushue. Assistants with Capt. Anderson were Messrs Chas Savary and H.S. Windeler (RMC Graduate), and with Mr Parizeau of the Nelson River Survey, Messrs R.J. Fraser and H.H. Lawson.[21]

Magnetic Party, 1911

The magnetic party from the Toronto Observatory was in charge of Mr W.E.W. Jackson,

[21] Matters leading to Capt. Anderson's nomination to head this northern expedition are revealed in a letter by Mr Stewart to the Deputy Minister dated 18 December 1911. Here are a few extracts of interest: "When we decided to undertake this work, application was made to the Admiralty for the loan of an officer of high standing, as we did not consider it advisable to weaken the rest of our staffby detaching anyone from it. After considerable correspondence Commander W.O. Lyne was selected, but for some reason, after his engagement, he decided to withdraw and sooner than have the work abandoned we decided to sacrifice work in the older part of Canada and adopt strenuous measures to get the information at Port Nelson. You will remember that I selected Capt. Anderson for this work ... he has done so ... highly creditable to him ... last year Commander Lyne was engaged at a salary of £750 per annum for one year or more, depending upon conditions, to do the work that has been done without him."

who had an assistant Mr F. Ashbury, an honour graduate of the University of Toronto. For this work, the schooner *Burleigh* was purchased for the sum of $10,000, and for manoeuvring during observations at sea, a gasoline engine was installed. Skipper of the *Burleigh* was Capt. Thos. Butler of Halifax, NS. In tow of the *Minto,* the *Burleigh* entered Hudson Strait on 27 July, and was cast adrift the next day. She then stood over for Ashe Inlet and Lake Harbour to land supplies and missionaries. From the frequent buffetting of the ice endured to this time, and fearing for the safety of his vessel, Capt. Butler returned to Halifax for badly needed repairs, arriving there on 7 September. The season being too far advanced the *Burleigh* never returned to Hudson Strait. She was replaced in 1912 by the steamer *Arctic.*

Hydrographic Parties, 1911

Like the *Burleigh,* the schooner *Chrissie C. Thomey* also had to be towed into Hudson Strait through the heavy icefields, and was obliged to enter Wakeham Bay for temporary repairs to her forepeak. While in Wakeham Bay a minor reconnaissance survey was made, and in his diary for 2 August, Capt. Anderson wrote, "found Wakeham Bay good harbour with nice clean entrance ... we found Wakeham Bay 17 miles out in Latitude."

Nelson River Survey

With the *Thomey* in tow, the *Minto* departed Hudson Strait on 3 August and entered Churchill Harbour on the 7th. When entering this harbour the *Minto* "struck a submerged object." After close examination, this object could not be found. The gasoline launch of the Churchill Party (1910) was then picked up and taken to the Nelson River, and on the 11th both the *Thomey* and the *Minto* were anchored off the Nelson River estuary. Here the *Thomey* remained as a ship-base until 7 September when she was towed to Churchill for minor repairs before resuming her return voyage to Halifax.

On 11 September the *Minto* was again anchored off the Nelson River estuary, where she received coal from the *Erik* and made arrangements to return the "Nelson launch" to Halifax, and to tow the schooner *Thomey* to the Labrador Coast. Officer-in-charge of these matters on the *Erik* was Mr Chas McGreevy of Ottawa. The *Thomey* party then set up camp ashore where it worked until the remainder of the season, while the *Minto* party continued with the offshore surveying beyond the estuary. Red Bay was reached by the *Erik* with the *Thomey* in tow on 10 October. From here the *Thomey* proceeded to Halifax under her own power, arriving there 25 October.

While working off the Nelson River, on 26 September the *Minto* ran into a gale of 60 mph accompanied with heavy snow squalls. Two days later when this storm subsided, the *Minto* was minus a gig and dory. In his diary for the 26th, Capt. Anderson noted, "this has been a very disastrous day ... very lucky to get away with the launch." The *Minto* then weighed anchor and sailed for Hudson Strait. Sugluk Inlet was entered on 1 October where she remained until the 5th. During these four days, this inlet was surveyed and sounded. Cape Weggs was reported "many miles too far to the southeast, and the northern Button Island

appears some miles further to the westward than the position given on the chart." While in Port Burwell, from October 6 to 10, further survey work was carried out. The homeward voyage was by Gray Strait, and on the 11th, "Indian Harbour wireless station was picked up." Domino Harbour was entered on the 12th. Here the *Erik* was fuelled and the "Nelson Launch" taken aboard the *Minto* for transportation to Halifax, which they reached on 25 October.

As to Port Nelson, Mr Stewart reported, "it is difficult to approach and hard to pick up. This may be remedied by lightships and gas-buoys and the creation of a town, but can never rival the easy access of Churchill."[22] Mr Stewart further reported, "the survey of Port Nelson, a most difficult one, was accomplished, and the first chart of it given to the world." An unnumbered, photo-lithographic copy of the Canadian chart "Nelson Roads" is to be found in the Public Archives of Canada (V 1/510, 1911-Nelson). It is stamped "Litho Branch, April 2, 1912 Proof." Only in February 1913 was Canadian chart 402 "Nelson Roads" printed. It was issued to mariners in October of this year (Notice to Mariners No. 108 of 1913, paragraph 362). It was drawn on a scale of 1:57,052 (approximately 4,750 feet to the inch), and it was the second Canadian chart to be printed for Hudson Bay.

ST LAWRENCE RIVER

Lower St Lawrence

The *Cartier,* having been fitted out at the Marine Agency in Quebec, arrived on the surveying grounds of the lower St Lawrence River on 28 May. Owing to Commander Miles absence until 1 June, Mr Chas Savary was temporarily placed in charge of the party. He was then detached for duty in Hudson Bay with Capt. Anderson. Assistants this season on the *Cartier* were Messrs Pinet and Venn, and the main work was centred between Father Point and Bic Island. When the season ended, Mr G.C. Venn resigned to return to England. Of him Mr Stewart stated, "after such a period his retirement was a distinct loss to the survey." Mr Venn had been attached to the lower St Lawrence survey since 1906.

St Lawrence River, Montreal - Lake St Francis

The Lake St Francis party, with the aid of a gasoline launch, completed revision surveys in this lake and in Cedar Rapids. This work was nominally in charge of Mr Chas McGreevy with the assistance of Messrs St Pierre and Jodoin. About mid-season the party moved to Laprairie Basin to connect "our work in Lake St Louis with that in Montreal Harbour." The season ended with the laying up of the launch *Yinkin* at Cornwall on 27 November. In March 1912 after many years of service, Mr G.B. St Pierre resigned to accept a position with the City of Montreal.

M&F 1912, 49.

GREAT LAKES

With Capt. Anderson having taken over the Hudson Strait survey in 191 I, M r G . A . Bachand, his assistant since 1905, was placed in charge of the *Bayfield* in Lake Ontario. With the assistance of Mr E. Ghysens, he completed this season a water triangulation from Presqu'ile to Port Darlington, and the in-between section by shore traversing. Offshore ship sounding was carried out to a distance of 12 miles. Before returning in the *Bayfield* to Prescott for the winter, he also made plans for Cobourg and Port Hope Harbours.

BRITISH COLUMBIA, 1911

The Pacific coast party in 1911 consisted of Capt. P.C. Musgrave, officer-in-charge, and assistants Messrs L.R. Davies, O.R. Parker, and R.L. Fortier. Sailing master of the *Lillooet* was Capt. F.H. Griffith, and chief engineer, Mr A.R. Borrowman. Prior to his appointment to the surveying staff, Mr Parker was first officer in the *Lillooet,* and Mr Fortier was with the Fishery Protection Service of Marine and Fisheries on this coast.

Unfinished work in Arthur Passage was first completed before a camp party was established in Skidegate Inlet, Queen Charlotte Islands. A water triangulation of the shore from Rose Point to Copper Bay, and a coastline traverse were made of this section, (a distance of approximately 70 miles). Several days were also spent in Nepean Sound examining a reported rock, which the US steamer *Chicago* was said to have struck. No indication of this rock could be found. The season's work ended in Cousins Inlet, and upon the party's return to Esquimalt in late November, new quarters were occupied in HMC Dockyard. In July 1912, Mr Stewart reported, "the extent of work to be done in British Columbia is so great, that the Department should seriously consider the advisability of providing a second vessel, probably smaller, for service in the sheltered waters" (see schooner *Naderi).*

THE EXPANDING HYDROGRAPHIC SURVEY, 1911"

In 1911 the first female clerk, (also typist), was appointed, Miss K.M. Gamble (1911-13), and at the end of the fiscal year Mr Stewart reported, "the number of all ranks employed was 41, of whom 25 were surveyors. The men employed in the surveying parties numbered 152." Expenditure for the fiscal year 1911 was about double that for the first fiscal year 1904, and amounted to approximately $200,000. To this time the hydrographic fleet comprised three survey steamers, one three-masted schooner (ship-base, Hudson and James Bays), and several open cockpit and cabin
model gasoline launches.

[21] In the original manuscript, Meehan had made a note to delete this paragraph. [F.d.j

1912-13

The year 1912 marked the commencement of additional hydrographic duties in Ottawa: i.e. water-level investigations, and the installation of automatic water-gauges in inland waters. The steamer *Minto* was again sent north to Hudson Bay, and the schooner *Chrissie C. Thomey* to James Bay. Like other coastal surveys to this time, the James Bay party was sent north for the primary purpose of locating a suitable railway port terminus, and to gather ice and navigation information for that region of Canadian waters. A magnetic survey party was also sent to Hudson Bay by the Department of the Naval Service in the steamer *Arctic.* Its purpose was to conduct magnetic surveys along the Hudson Bay Route, and in certain localities, as planned for the schooner *Burleigh* in 1911.

In the Great Lakes, the steamer *Bayfield* continued its work in Lake Ontario; and in order to complete the charting of Lake Superior, the steamer *La Canadienne* was recommissioned and sent there. En route to the upper Great Lakes *La Canadienne* met with a major catastrophe while passing through the Welland Canal that resulted in the loss of two lives. The ending of survey work between Montreal and Lake St Louis this year brought to a close the resurvey of the St Lawrence River between Quebec and Cornwall.

On behalf of the International Joint Commission, the first Canadian hydrographic water-level investigations were carried out in the Detroit River, and between Montreal and Quebec the first hydrographic automatic water-gauges were installed. From these records, the first *Hydrographic Water-Level Bulletins for Inland Waters* were later published.

HUDSON BAY AND STRAIT

In 1912 the icebreaker *Minto* was again in Hudson Bay, with Capt. Anderson in charge, and assistants Lieut. J.H. Knight, RN (Ret'd), Messrs H.H. Lawson, A.M. Lacey, and E.B. MacColl. Sailing master was Capt. S. W. Bartlett (who replaced Capt. Murcheson) who acted as pilot officer as well. Chief engineer was Mr Joseph Ferguson of Halifax, and physician, Dr. Goodwin of Halifax.

With the *Thomey* in tow, the *Minto* entered Hudson Strait on 31 July and anchored in Port Burwell the following day. When about one hundred and twenty miles off Churchill Harbour, the *Thomey* was dropped to make her way to James Bay. By 6 August the *Minto* was off the Nelson River, "with a boat-party" away in the launch examining Nelson Shoal.

Much time was lost this season from inclement weather, but most important, surveying the offing of Nelson River was completed. On 28 September Captain Anderson wrote in his diary, "our coal is restricted to about 160 tons, and hope we can make Burwell on 60 tons in 5 days at 8 knots ... or about 12 tons per day." Across Hudson Bay to Mansel Island, a sounding every 1 *Vz* hours or 12 miles apart was taken. Erik Cove, Ashe Island and Port Burwell were visited, and on 5 October a survey of the Button Islands began. After a refuelling by the steamer *Beothic* at Port Burwell, the *Minto* returned to Sugluk Inlet, arriving there on 30 October. Until 3 November, this inlet was used as a base in cooperation with magnetic surveys in the strait under Mr W.E.W. Jackson. Later Capt. Anderson wrote, " really a wonderful fall ... no ice in sight." The *Minto* cleared Hudson Strait 6 November

and anchored in Halifax Harbour on the 1I .

Magnetic Surveys along the Hudson Bay Route, 1912

Unable to undertake this work in the schooner *Burleigh* in 1911, Mr W.E.W. Jackson returned to Hudson Strait in the steamer *Arctic,* chartered for this purpose. With him as assistant was a Mr W.B. Wiegan. Capt. Joseph Couillard was sailing master of the *Arctic,* and Mr John Koenig, the chief engineer. After a highly successful season, Mr Jackson was able to report on many magnetic observations at several land stations and along the Hudson Bay Route from the Atlantic Ocean to Churchill Harbour. These were the first significant observations along this route since those taken by the Gordon expeditions 1884-86, and from them isogonic charts (equal magnetic declination) were compiled for Hudson Bay and Strait. From 4 October to 6 November, the steamer *Arctic* worked in close cooperation with the steamer *Minto* in the charge of Capt. Anderson.

James Bay

With the inshore survey of Nelson Roads now ended, Mr H.D. Parizeau was sent in 1912 to James Bay, "to survey Rupert Bay, with a view to trying to locate a suitable harbour for a railway terminus, and also to gather as much information as possible regarding ice and weather conditions, and the natural resources of the district." For assistants Mr Parizeau had with him Messrs P. Jobin and F.R. Mortimer.

With eighteen men in four canoes the party left Cochrane, Ontario 6 May and arrived at the Reveillon Freres post (Hudson's Bay Company, 1936), on the Moose River, on the 11"[1]. While waiting for the ice to break up in Hannah Bay to the westward, a small hydrographic survey was undertaken in the Moose River, from half a mile above the trading post to the foot of Middleboro Island. This was the commencement of Canadian hydrographic surveying in James Bay. Soundings and fixes were taken with the aid of a forty-foot schooner, the only obtainable boat for this work. While at Moose Factory, Mr Parizeau had the good fortune of meeting Mr J.C. MacMillan, C.E., in charge of investigations for the Ontario Government Railway. Early that spring Mr MacMillan had taken soundings in the ice, and also had with him a blueprint showing the previous soundings in this river recorded by Mr S.C. Ells, C.E., of the Department of Mines. Mr Ells' plan indicated deeper water in the north channel, and it was here that Mr Parizeau decided to record the first hydrographic depths in James Bay.

Early Voyages and Ice Conditions, James Bay. In compliance with instructions, Mr Parizeau had Mr Mortimer copy many extracts from the journals of the Hudson's Bay Company at Moose and Rupert Rivers - dates of arrivals and departures of vessels from England between 1751 and 1911, and ice conditions for the Moose, Rupert and Hay Rivers from 1763.[24]

Rupert Bay, Ontario. On 10 June Messrs Jobin and Mortimer with eight men in three canoes

[1] For details see Report DNS 1912, 83-92.

left the Moose River for Rupert Bay, and the following day Mr Parizeau left the remainder of the party in "a small chartered sailboat." A campsite was set up on Mesakonan Point, and the next day survey work began to the eastward, the triangulation network being extended from Wood Island at the head of Rupert Bay to the foot of the last rapids of the Nottaway River. For inshore survey work the launch *Nelson {Sea Louse)* was shipped from Halifax to James Bay on a Hudson's Bay Company steamer. Tidal observations were also recorded at Rupert House and Stag Island, and this season some 80 miles of coastline were surveyed with 183 miles of sounding in the boats.[25]

This year the schooner *Chrissie C. Thomey* sailed north on what was to be her last voyage. She was dropped from the *Minto* in Hudson Bay on 5 August, but due to exceptional heavy icefields in the southern part of the bay and in the entrance of James Bay, she was unable to reach Stag Island until I October. She was then anchored for the winter in the entrance of the Rupert River opposite the Hudson's Bay Company trading post. Her late arrival caused a shortage of gasoline for the launch, and greatly hampered field operations. The party left Moose River by dog-sledge 6 January 1913, and arrived in Ottawa ten days later.

A Notice to Mariners No. 32 of 1913, paragraph 110 dated 22 April 1913, reads as follows: "A chart of Rupert Bay has been prepared by the Hydrographic Survey, Department of Naval Service. Copies may be obtained from the Hydrographic Office, Department of the Naval Service for fifteen cents per copy." Details of this chart are lacking. From further investigations in 1913, a provisional edition of this chart, No. 1506, was issued to mariners in 1914. It was a black-and-white copy, drawn to a scale of 1:73,000 (approx. one nautical mile to the inch), and it was the first Canadian chart for James Bay.

ST LAWRENCE RIVER

Lower St Lawrence

The field season of 1912 was to be the last for Commander LB. Miles, officer-in-charge of the lower St Lawrence River survey. Assistants this season with him were Lieut. J.H. Knight, RN, to July (transferred to Hudson Bay party), Messrs A.J. Pinet, L.B. Allen and F.R. Scandrett. Summer quarters again were at Rimouski, and this season the triangulation, traversing and sounding was carried east to a line joining Cape Columbia on the north shore with St Flavie on the south shore. Mr Stewart reported, "the resurvey of the Lower St Lawrence is now completed from the westward to this point." Over an area of some 580 square miles, 600 miles of boat and 750 miles of ship soundings were recorded. The *Cartier* returned to Quebec late in October, and on 20 March 1913, "Commander Miles resigned from this survey to accept a position with the Admiralty, after seven years of most efficient service."

[25] The launch *Sea Louse* was to remain with the James Bay survey until its finish in 1915, and in 1916 was transported back to Halifax by a steamer.

St Lawrence River above Montreal.

A small party under charge of Mr Chas McGreevy, working with the launch *Yinkin,* completed the main triangulation network connecting hydrographic surveys in Lake St Louis with that in Montreal Harbour. Topographic work was also conducted in the vicinity of Lachine and Caughnawaga to improve the chart of this area. This season brought to a close the hydrographic survey of the St Lawrence River between Quebec and Kingston, and below Quebec City, the river was recharted to Father Point (the pilot station for transatlantic ships).

THE INTERNATIONAL WATERWAYS (JOINT) COMMISSION AND THE CANADIAN HYDROGRAPHIC SURVEY 1907-25.

The International Waterways Commission was created by an United States act of Congress on 13 June 1902. It extended an invitation to Great Britain by the president of the United States to join in the formation of an international commission for the purposes "to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including the waters of the lakes and rivers whose natural outlet is the St Lawrence River to the Atlantic Ocean."[26]

The organization of the International Waterways Commission consisted of two main sections, American and Canadian with three members on each. The first American chairman was Col. O.H. Ernest, US Army, and the first Canadian chairman was Mr J.P. Mabee, who resigned in November 1905 to become a High Court Justice of the province of Ontario. In December 1905 Mr Mabee was succeeded by Mr Geo. C. Gibbons, a barrister of London, Ontario. Other members of the American Section were Professor G.S. Williams of Cornell University, Ithica, N.Y., and Mr Geo. Clinton, attorney-at-Law, Buffalo, N.Y. Headquarters of the American Section were located at Washington, D.C., and Buffalo, N.Y.

The first Canadian appointment to the International Waterways Commission was Dominion Astronomer Dr W.F. King, dated 3 December 1903. Other Canadian Members were the former chief engineer of the Public Works department, Mr Louis Coste from 7 January 1905, and Mr Thomas Cote of Montreal, secretary, dating from 20 February 1905. Headquarters of the Canadian Section were Ottawa and Toronto, with frequent meetings held at Buffalo, N.Y.

Following the death of the American consultant hydraulic engineer, Mr G.Y. Wiener, on 24 July 1906, Mr Eugene E. Haskell, patent holder of the famous "Haskell Type" automatic water gauges and Dean of Civil Engineering at Cornell University, was named his successor. With the resignation of Dr W.F. King in March 1907, Mr William James Stewart was named his successor on 6 April 1907, and took his seat on the Commission for the first time at Buffalo, N.Y., two days later. From that year up to the early years of the First World War, Mr Stewart and Dean Haskell worked in close harmony in compiling the first international boundary charts for the Great Lakes, and helping to solve many intricate water

[2.1] Reports 1WC, Printing Bureau, Ottawa, 1914.

level and navigation problems of common interest to Canada and the United States along the St Lawrence River and in the Great Lakes. Matters pertaining to the definition and demarcation of the Canada - United States boundary between St Regis N.Y., (near Cornwall), and Pigeon Bay in Lake Superior were by authorization of Article 14 of the Boundary Treaty dated 11 April 1908.

On 11 January 1909 the International Waterways Commission became the International Joint Commission. Problems of navigation and water levels in the Great Lakes practically ended with the final American report dated 20 June 1913. In it, a recommendation was made that the regulation of water levels in Lake Erie not be undertaken.

Regarding international boundary charts, in September 1909 Mr G.L. Crichton was sent to Buffalo, N.Y., by Mr Stewart to work on these special publications, and within a short time was placed in charge of all cartographic matters pertaining to Canadian waters in the Great Lakes. The final location and definition of the boundary line was fixed and adopted by the Commissioners at Buffalo, N.Y., on 15 August 1913. In March 1915 Mr Crichton returned to the hydrographic survey in Ottawa and was placed in charge of its drafting office. Here he began the compilation of a series of some thirty engraved boundary charts, that were printed in Ottawa by the Printing Bureau and issued to the public in 1918.

As to the maintenance of the boundary monuments on the Great Lakes, the Canadian Hydrographic Survey was responsible for these land-markers until the treaty of 1925. The care of the entire international boundary across Canada then came under the present International Boundary Commission in the Department of Energy, Mines and Resources.

COMMENCEMENT OF INLAND WATER-LEVEL INVESTIGATIONS BY THE HYDROGRAPHIC SURVEY, 1912

Formation of the Automatic Water Gauges Section

A flashback to 1886 brings to mind Staff Commander Boulton's request to the Public Works department to establish "a monumental block of stone" near the entrance to Little Current Harbour, on Manitoulin Island in the Great Lakes. In 1891 Commander Boulton further reiterated, "as long as we have to rely upon the fickle memory of the oldest inhabitant there will be an element of uncertainty as to whether the nature of the lakes are subject to temporary fluctuations, or are steadily lowering their levels."

About 1900 the first self-registering, or automatic water gauges, began to appear on the Great Lakes. These were the famous Haskell Gauges and were installed by engineers of the US Lake Survey. In 1906, three of these type of gauges were in operation by the Public Works department, in connection with the Georgian Bay ship canal survey. One was at the entrance of the French River in Georgian Bay, another at Collingwood in Georgian Bay, and the third was located at one of the Sault Ste Marie locks in the North Channel of Lake Huron. With moneys voted for this work now directed to the construction of the Welland ship canal in Lake Ontario, the Georgian Bay ship canal survey in 1909 was temporarily suspended. However, the Public Works department did manage to make practical use of their installed automatic water-gauges, until they were transferred to the hydrographic survey in

1912. The original installation of these gauges was for the purpose of obtaining bench marks at various points on the lakes by water transfers from nearby gauges on the United States shores of the same lakes.

Order-in-Council P.C. 60-1556 5 June 1912

In a letter by the deputy minister of the Naval Service dated April 31st [sic], 1912 it was stated that the "Hydrographic Survey is prepared to take over the complete service from the 1st of April, or as soon as Mr Burgess can be officially transferred, it being of course understood that the gauges and property connected wherewith in the possession of the Public Works Department become the property of the Department of Naval Service." In a reply letter dated 14 May by the Public Works department, the secretary wrote, "this is entirely satisfactory to the Department of Public Works. Mr Burgess will be duly notified accordingly, and instructed to report to your Department to which he will be attached in the future, and arrange for the transfer of the gauges in question." By Order-in-Council P.C. 60-1556 dated 5 June 1912, this transfer was duly carried out. Mr Burgess's salary on appointment to the hydrographic survey remained at $1,500 per annum. From 1912 until 1927, this unit was known as the Automatic Gauges, Hydrographic Survey.

In a further letter dated 28 September 1912, Mr Stewart requested the deputy minister to appoint "a new clerk ... for the purpose of assisting in the collection and compilation of data in connection with the automatic gauges upon the Great Lakes. I suggest that he be appointed to Class Sub-Division B of the 2nd Division *(C.S. Act 1908)* at a salary of $800 per annum."[27]

Great Lakes

During the season of 1912 nine automatic gauges were in operation on the Great Lakes: Port Arthur, Sault Ste Marie (2), Goderich, Isle aux Peches and Fighting Island, Detroit River, Port Colborne, Port Dalhousie and Kingston.

St Lawrence River

To assist the Department of Public Works in its investigation into the effect of withdrawals upon the level of the St Lawrence River below Montreal, "three gauges were installed, viz. at Longue Pointe, Sorel and Three Rivers. Data from these gauges were later referenced to the Geodetic Levelling for reduction to the common datum - mean sea level. Many valuable water-level readings were obtained at various locks of the Dominion canals since their construction, by reading staff gauges."

[27] This position was filled in the person of Mr Charles Alexander Price of Brockville, Ontario, 6 November 1912, who, in May 1913 following the resignation of Mr Burgess, became officer-in-charge. Automatic Gauges (renamed Precise Water Levels Division, 1928).

Lake Erie Water-level Investigations (I.J.C.) and the Hydrographic Survey, 1912

For the purpose of studying remedial works necessary to regulate the water levels in Lake Erie, a hydraulic survey was conducted in the Detroit River during the summer season of 1912 on behalf of the International Joint Commission. This current measurement survey was mainly to determine the flow from the upper lakes into Lake Erie. Related surveys by other joint officers were carried out in the Niagara River above the falls, with the possibility of damming the upper part of this river.

An authority for this Canadian investigation is contained in a letter from Mr Stewart to the acting deputy minister of the Naval Service, 24 July 1912, (File 404-5-1): "Just before the Honourable the Minister left for England he instructed me to make an examination in connection with Livingston Channel in the Detroit River. In conversation with him 1 explained that this would necessitate some field work, and for this purpose I found it necessary to engage the services of an outstanding man, Mr Douglas Ellis of the School of Mines, Kingston, for a couple of months at a salary of $150. This work is of a special character requiring special knowledge, and none of my assistants (even if they could be spared) are in a position to undertake it." Mr Stewart did, however, manage to spare one of his assistants to assist Mr Ellis with the first Canadian hydrographic inland water level investigation. This was Mr M. Cailloux, a junior assistant from Mr Bachand's Lake Ontario survey. From the summer headquarters at Amherstburg, current surveys were conducted with the aid of the chartered yacht *Cora* and a small boat. Automatic water gauges were also installed by Mr Burgess at Fighting Island, and Isle aux Peches on the Detroit River. From these records came the first Canadian hydrographic water level bulletins and computations for the Great Lakes.

GREAT LAKES SURVEYS, 1912

Lake Ontario

This season the *Bayfield* was again in the charge of Mr G.A. Bachand who had for assistants Mr E.A. Ghysens, and two recent graduates from Montreal Ecole Polytechnique, Messrs J.U. Beauchemin and M. Cailloux. Sailing master of the *Bayfield* was Capt. Wm McQuade, and chief engineer Mr John Nisbet. Summer quarters were at Port Whitby and surveys were completed from here westward to Toronto Harbour. This included, a water triangulation of the coastline from Port Darlington to Toronto. Soundings were carried to a distance fifteen to seventeen miles offshore and the 10-fathom contour was defined. No shoals of importance were discovered. From this survey a chart was compiled from Presqu'ile to Port Darlington, and three large-scale plans for Bond Head Harbour, Port Darlington and Port Whitby. Before wintering at Prescott, the *Bayfield* went into drydock at Port Dalhousie for general repairs.

Lake Superior

So as to expedite the recharting of Lake Superior (suspended in 1909), it was decided this

year to recommission the *La Canadienne,* (lower St Lawrence River, 1906-09), and send her to the upper Great Lakes. Little did departmental officials know at the time before this field season ended the *La Canadienne* would be the victim of one major, two minor, and one near accidents - a record yet to be exceeded by any hydrographic ship in the fleet. After a refit at Sorel and Montreal, she proceeded to Lake Superior in charge of Mr Chas Savary with assistants Messrs R.J. Fraser and E. Jodoin - all three hydrographers with salt-water experience in northern waters. Sailing master and pilot was Capt. Alex Brown, and chief engineer, Mr Joseph Coxford.

While upbound in Lake St Louis on 17 June the *La Canadienne* "nearly ran into a tug aft of us" (diary, Mr Savary), and the next day while coming out of the Upper Lock of the Cornwall Canal, "she collided with the steamer *Britannic."* Damage to the *La Canadienne* was superficial, and she resumed her voyage to Lake Ontario without further incident.

On 20 June she reached the west end of Lake Ontario, and while passing through the Wei land Canal was carried by a strong current flowing, and ran into the upper gate Lock No. 22, breaking the lower gate and puncturing a hole in her side, causing her to sink. This was the first major casualty in the hydrographic survey to this time. Two persons on the lock wall were carried away by the rush of water from the collision and were drowned. *La Canadienne* was refloated on 25 June and after repairs at Port Dalhousie, resumed her journey to Lake Superior on 28 July.

As if this were not enough for one season, the *La Canadienne* met with a third minor accident in the upper reaches of Lake Huron. While making an anchorage in the dark near Duck Island, she grounded for a few hours without serious damage. This time she was aided by a fishing tug that was rewarded with coal for this sea-rescue service.

Lake Superior was reached on 7 August, and the northeast coast the following day. In his diary for the 8th Mr Savary noted, "working outside with boat and launches." This season Caribou Island was traversed to a scale of 2,000 feet to the inch, and the new lighthouse on Michipicoten Island's east end was connected with the US Lake Survey triangulation network of Lake Superior. Owing to thick weather, much time was lost and many observations were incomplete. The ship then moved to finish the section from Copper Island to Lamb Island. In this area 24 miles of coastline were surveyed, 286 miles sounded by the boats, and 297 by the steamer. Lake Superior was departed on 15 October and for the remainder of the season the survey of Little Current Harbour in the North Channel of Lake Huron was taken in hand. The *La Canadienne* returned to Owen Sound for the winter on 18 November, after one of the most hectic seasons ever to be experienced by any survey vessel. Following the lay-up of the vessel, Capt. Alex Brown retired and he was replaced in the spring of 1913 by Capt. J.L. Baxter.

BRITISH COLUMBIA, 1912

The *Lillooet* in the charge of Capt. Musgrave, with assistants Messrs Davies, Parker and Fortier, left Esquimalt on 10 April and after coaling at Nanaimo proceeded to Ocean Falls in Cousins Inlet. Work in this inlet, and in Fisher Inlet begun the previous year was resumed,

and before the party returned to winter quarters on 10 December, the following areas had been charted and plans made: Granby Bay and Approaches, Pacific Harbour, Otard Bay, soundings in Dixon Entrance, Thurston Bay in Selwyn Inlet and Somass River. On 10 November, a party was sent to Alberni Inlet on Vancouver Island to make a survey of Stamp Harbour, and Somass River. This was one of the longest field seasons for the British Columbia party to this time, some eight months' duration.

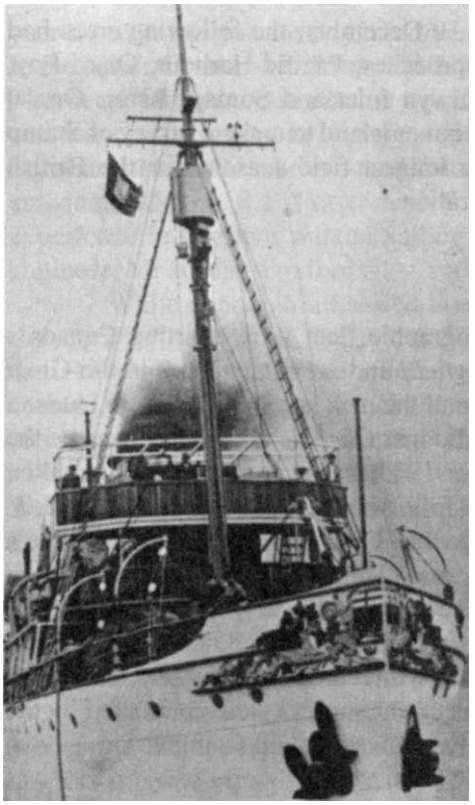
1913-14

In 1913 five major ship survey ships of the hydrographic fleet were charting Canada's coastline - the *Lillooet* in British Columbia, the *Bayfield* and *La Canadienne* in the Great Lakes, the *Cartier* in the lower St Lawrence River, and the new steamer *Acadia* in Hudson Bay and Strait. In the spring of 1913, the auxiliary schooner *Chrissie C. Thomey* became the first major ice casualty in James Bay, and in October 1913 the schooner *Naden* was taken over for survey work in British Columbia for the following year. In Ottawa Capt. J.G. Boulton, RN (Ret'd) returned to the capital from Quebec City for the last time, to write a new edition of his first Georgian Bay pilot with descriptions for the Canadian shores of Lake Huron. With the actual charting of the St Lawrence River above Quebec now ended, attention was given to current measurement surveys of the ship channel between Montreal and Three Rivers, to improve the navigation of the river with remedial works, and to regulate the water levels in Montreal Harbour. These special current surveys were conducted by the hydrographic survey on behalf of the St Lawrence River Investigation Commission.

ATLANTIC COAST SURVEYS, 1913

Hudson Bay and Strait

In the late summer of 1913, the new steamer *Acadia* made her maiden voyage to Hudson Bay from Halifax. Built at Newcastle-on-Tyne, England, by Swan, Hunter and Wigham Richards at an approximate cost of $330,000, she too, like the *Cartier,* made the transatlantic crossing on her own power. A modern vessel built to Canadian specifications, the chief hydrographer had this to say of this "flagship" of the hydrographic fleet: "On account of the service she was to be employed in, she is a radical departure from the style [of] the other surveying steamers of our Service, in that the sides are extended to the upper deck to give more and better accommodation on the main deck, and make her more comfortable in heavy weather. All the Survey vessels are twin-screw, but for this service it was deemed wiser to use a single screw. Because she was expected to encounter ice, the stem and plates likely to be exposed are double thickness, and the framing is not only heavier but the widths of the spaces between have been reduced and, in addition, extra fore and angles are supplied." The *Acadia* was the first hydrographic ship to be equipped with wireless, which incidentally was also the first piece of electronic equipment in the Service. All the metal within fifteen feet of the compass was "sceptre bronze to reduce as much as possible local attraction and weakening of the directive forces."



CGS *Acadia*
photo courtesy CHS

The *Acadia* arrived in Halifax Harbour from overseas on 8 July, and on 5 August, departed for Hudson Bay on her maiden voyage north. Port Burwell was entered the 13th and on the 20th the ship anchored off Port Nelson. Here surveying was resumed in the estuary eastwards to Cape Tatnam, with soundings taken from ten to seventeen miles offshore. Capt. F. Anderson was officer-in-charge, and had with him as assistants Messrs E.B. MacColl, R.L. Fortier, H.M. Teed, and L.C. Prittie. Prior to sailing from Halifax, Lieut. J.H. Knight, RN (Ret'd.), was transferred to the British Columbia survey and Mr H.H. Lawson to the Lake Superior Survey. First sailing master of the *Acadia* was Capt. S.W. Bartlett, and first chief engineer was Mr Geo. Robinson. First gasoline engineer was Mr Alfred Perkins.

A rendezvous was kept with the chartered supply steamer *Beothic* off Port Nelson where mail and a "large sounding launch" were delivered. A heavy gale of 60 mph was encountered with snow on 12 October. With both anchors out, the *Acadia* dragged 1 *Vi* miles before taking hold, and during the morning "our 34 foot sea-going launch broke adrift, the windlass pulling through the deck... completely encased in ice, and because of bad weather, nothing could be done to save her."[28]

With twenty-eight survivors, including fifteen Chinamen, of the ill-fated steamer *Alette,* the *Acadia* left Port Nelson on 19 October. This put the ship company on short rations on the return passage. Heavy ice was encountered in Hudson Bay that delayed her entry at Port Burwell until the 28th. On arrival in Halifax Harbour on 9 November, the Chinese seamen were handed over to the immigration authorities. This was the first known record of a sea-rescue operation on the Atlantic coast by any hydrographic ship to this time.

James Bay Survey and the First Major Ship Casualty in Northern Waters, 1913

Since the fall of 1912, the auxiliary schooner *Chrissie C. Thomey* had anchored inside the

* In January 1914, the Hudson's Bay Company post at Port Nelson reported that this launch was found by Indians in the ice off the south shore, apparently uninjured. This could have been the launch *Churchill,* reported by Mr Fraser in recent years having been lost in Hudson Bay.

entrance of the Rupert River, opposite the Hudson's Bay Company post. With the ice break-up early in June 1913, the vessel was lifted almost high and dry on her side, and filled with water. She was then righted and pumped out, but was later found to be too badly strained to sail to Halifax, and was abandoned on the beach - the first major casualty in northern waters, and the first major ice casualty in the fleet.

With the promotion of Mr H.D. Parizeau to officer-in-charge of the Lake Superior survey, Mr Paul Jobin was placed in charge of the James Bay survey and had for assistants in 1913 Messrs R.J. Fraser, and L.T. Bowes. An advance party under Mr Fraser was sent in the spring to Rupert River to build several main triangulation stations, to study and observe the ice break-up in this river, and to prepare the schooner *Chrissie C. Thomey* for use as a base ship (see above). About 21 June, Messrs Jobin and Bowes with the rest of the party arrived at Rupert River from Moose Factory. A campsite was set up on the mainland between Point Comfort and Stratton Island where the survey was resumed. Mr Jobin left for Ottawa on 16 October and about I January 1914, those left behind to see the *Thomey* safely frozen in, left Rupert River for Cochrane, Ontario.

ATLANTIC COAST - SABLE ISLAND, NS

Before returning to Halifax, the *Acadia* on 4 November 1913 spent some time off Sable Island, "making an examination of the east spit for an island reported to exist. Nothing new was discovered detached from the island bank; however a spot was found on the east spit awash at high water and probably 3 feet above at low water, lying East by North 10 miles from East Lighthouse. The chart shows 12 feet of water at this spot."[29] This was the first recorded account of Canadian hydrographic investigations for Sable Island - the Graveyard of the Atlantic.

ST LAWRENCE RIVER

Lower St Lawrence

On 20 March 1913, Commander I.B. Miles, RN, resigned his position and returned to the Admiralty office in London. He was succeeded by his former first assistant, and officer-in-charge of the Lake Superior survey, Mr Chas Savary. Assistants on the *Cartier* this season were Messrs A.J. Pinet, E. Ghysens, and M.A. MacKinnon. The party left Quebec on 12 May and worked in the lower St Lawrence River as far east as a line joining Manicouagan River on the north shore with Sandy Bay on the south shore. In an area of 670 square miles, some 975 miles of ship and 775 miles of boat soundings were taken, and about 95 miles of coastline traversed. Local surveys were made in the Bersimis River, and in the Lower Traverse. The *Cartier* returned to Quebec on 29 October.

[29] Mr Stewart. Report DNS 1913.

St Lawrence River Investigation Commission and the Hydrographic Survey, 1913-14

The first significant hydrographic investigations to regulate the water levels along the St Lawrence River ship channel below Montreal, began with a Commission organized by the Department of Marine and Fisheries in 1913. To this Commission were appointed Mr V.W. Forneret, chief engineer of the ship channel, and Mr Wm J. Stewart, chief hydrographer. Acting in a consultant capacity on hydraulic matters was Professor E.E. Haskell of the American Section, International Joint Commission, and Dean of Civil Engineering at Cornell University. In charge of field current surveys was Mr Douglas Ellis of Kingston, who conducted a similar survey in the Detroit River the year previously.

The installation and maintenance of automatic water gauges was in charge of Mr Frank R. Burgess of the hydrographic survey until his retirement at the end of May 1913. His assistant, Mr Chas Price was then placed temporarily in charge of this work. Assistants to Mr Ellis were a Mr L.M. McLean, and assistant engineer and hydrographers Messrs M. Cailloux (with Mr Ellis, 1912) and N. Wilson. Engaged on precise levelling work were Messrs R.A. Rogers (graduate, Queen's University) and A.R. Lee. In January 1914 Mr Price was appointed officer-in-charge of the Automatic Gauges Section (vice Mr F.R. Burgess), and Mr A.R. Lee officially transferred to his staff.

This season nine new automatic water-gauges were installed in the river below Montreal, and from anchored scows working between Lanorale - Sorel - Three Rivers, hydraulic surveys were made of the stream flow. From these and subsequent investigations much useful information was acquired that greatly assisted engineers with the planning and construction of a series of weirs above Sorel following the First World War.

GREAT LAKES SURVEYS, 1913

Lake Ontario

This season the *Bayfield,* with Mr Bachand in charge, worked between Port Darlington and Hamilton, with Toronto Harbour summer headquarters. Assistants were Messrs J.U. Beauchemin, M. Cailloux, E.B. MacColl and W.K. Willis. Mr Cailloux was assigned for part of the season to the current measurement survey staff working below Montreal, and Mr MacColl was assigned to duty in Hudson Bay. This season plans were made for Frenchman's Cove, Port Credit and Oakville. Toronto Harbour was carefully surveyed "and a proper chart of it will be issued." (Stewart). Over an area of about 400 square miles, 970 miles of ship and 595 miles of boat sounding were recorded. On 9 November the *Bayfield* returned to winter quarters at Prescott.

Lake Superior

With Mr Savary's transfer to the steamer *Carder,* Mr H.D. Parizeau of the James Bay survey was promoted as officer-in-charge of the Lake Superior survey steamer *La Canadienne,* effective 11 April 1913. With Capt. Alex Brown's retirement, Capt. J.L. Baxter was named

sailing master. With the season of 1913 ended, Mr J. Cosford, the chief engineer, was succeeded by Mr Norman Munro (promoted from second engineer's rank). Assistants on *La Canadienne* this season were Messrs H.H. Lawson (transferred from the Hudson Bay party), F.R. Mortimer, and H.L. Leadman. Peninsula Harbour on the north coast of Lake Superior was reached on 10 May, and from here the triangulation network was extended to connect this harbour with Schreiber Point and Slate Islands. A fair sheet of the lake between Schreiber Point and Pic Island was prepared, and a plan made of Jackfish Bay on a scale about 1,000 feet to the inch. Over an area of 650 square miles, 700 miles of ship and 550 miles of boat sounding were recorded, and 130 miles of shoreline traversed. This season was a trying one for Mr Parizeau with consistent crew difficulty, and to get on with the survey of Jackfish Bay he sought authority from Ottawa to use a gasoline launch for sounding purposes. With much reluctance this was granted to him, with a proviso, and for the records here are a few interesting extracts from the correspondence that led to this historic decision.

Mr Parizeau and Launch Sounding in the Great Lakes

A letter from Mr Parizeau dated 30 June 1913, to the chief hydrographer, reads in part as follows:

> I beg to be authorized to use the gasoline launch for shore and harbour sounding. As you are aware of the position in which I am in with regard to the crew on board *La Canadienne*. I beg to state that there has been no change since my last report, I haven't got enough men on hand to be able to start a gig to sound, and I am ready for 300 miles of boat sounding. I am aware of your objections to the use of the launch for sounding on the Lakes, and I had to make up my mind this year not to use our launch for this work, and it is only this unforeseen circumstance that forces me to ask for your authorization to use the launch for sounding. If you authorize the launch work will you kindly let me know by telegram on next Saturday.

This would indicate that up to the year 1913, approval for launch sounding in the Great Lakes had yet to be officially authorized.

A few days later approval was wired to Mr Parizeau over the signature of Capt. F. Anderson. This was followed by a letter to him from the chief hydrographer dated 7 July, that in part reads: "Yours of the 30th ultimo ... had been answered by Capt. Anderson by wire, but it must be understood that this authorization is only for the use of the launch in such localities as require sounding from boats, and are not shallow and dangerous. I do not think that any part of Jackfish Bay should be sounded from the launch, but there are portions of the outside shore that might be …."[30]

[111] In 1913 Mr Stewart had yet to be thoroughly convinced that sounding by gasoline launches was as proficient as by sailing gigs. This attitude is difficult to understand when the gasoline engine had by now proven a satisfactory means of transportation, both on land and water. In fact, gasoline launches had been in use in the

As to crew problems aboard *La Canadienne,* Mr Stewart in his annual report wrote, "the original crew deserted almost to a man after reaching Jackfish Bay - to take advantage of the high wages ruling at Port Arthur and Fort William. For a month the party was reduced to less than a boat's crew, and the Captain had to go to Collingwood to secure men."

The *La Canadienne* returned to her home port of Owen Sound on 7 November and upon examination was found to be in good condition, considering her age, and "being slow, of small beam and inclined to be cranky, she is hardly in the same class for surveying purposes as the other and newer vessels attached to the Survey. Owing to her lack of power the officers have to be careful to make good offing upon the slightest appearance of foul weather."

BRITISH COLUMBIA, 1913

Assistants with Capt. Musgrave on the *Lillooet* this season included Messrs L.R. Davies, O R. Parker and R.L. Fortier (until transferred to the Hudson Bay survey). About the middle of June, Lieut. J.H. Knight, RN (Ret'd), arrived from Ottawa, vice Mr R. Fortier, and in mid-August Mr J.A. Turner, a graduate from the Toronto School of Science, was appointed a junior assistant. The field season lasted from 10 April to 3 November. Until early in May, the ship completed the unfinished survey of HMS *Egeria* (1910) in Malaspina Strait. Here Mr Davies was placed in charge of a shore-based unit to survey Alberni Harbour. Survey work of 1912 in Hecate Strait was then resumed, and for the remainder of the season plans were made for Thurston Bay, Selwyn Inlet, Allford Bay, Pacofi, Otard Bay and Port Louis. Minor investigations were also conducted in the western entrance to Dixon Entrance. Off Cape Ball, large cribs were sunk in dune, and tidal comparisons were obtained between Port Simpson and Skidegate, another instance of early tidal investigations on the Pacific coast by the hydrographic survey. Of the 168 working days this season, 68 of them were lost to bad weather.

New Schooner *Naden*

In November 1913 the auxiliary schooner *Naden,* built at Esquimalt at a cost of $30,000, was taken over by the commandant in charge of HM Dockyard at Esquimalt. She was designed for hydrographic work in the more sheltered waters of the Gulf Islands and had provision for a gasoline engine in the future. With the commissioning of the *Naden* in 1914, the British Columbia fleet now comprised two survey vessels - the steamer *Lillooet* for offshore work in exposed waters, and the schooner *Naden* for work in less exposed coastal waters.

HEADQUARTERS, OTTAWA, 1913-14

Field Officers

Survey since 1904. and Mr Stewart himself had one with him on the *Gulnare* in 1905 - his last field season.

This spring Mr Stewart reported on the deaths of two field officers the same day, 1 April: Mr Edouard Jodoin from the typhoid epidemic in Ottawa, and Mr A. Lacey at his home at Sydenham, Ontario.

Automatic Gauges

On 31 May Mr Frank R. Burgess resigned as officer-in-charge, and was succeeded by his assistant, Mr Charles Price. In September 1913 the vacancy was filled by competition won by Mr Wm J. Miller, and in January 1914 Mr A.R. Lee was appointed to this staff. Nineteen gauges were now in operation: St Lawrence River ten, and Great Lakes nine. This year the first hydrographic water level bulletins for these Inland Waters were compiled by this staff, and issue to the public.

Sailing Directions

In January 1914 Capt. J.G. Boulton, RN, was recalled to Ottawa from Quebec by Mr Stewart, to rewrite a new edition of his first pilot for Georgian Bay and the North Channel, including the Canadian shores of Lake Huron. He also acted as a consultant on hydrographic matters when requested by departmental officials. When this employment ended in 1915 Capt. Boulton severed, for the last time, official connections with the Canadian Hydrographic Survey, a record that had its commencement some thirty years previously. He then returned to his home in Quebec City where he resided until his death in 1929, aged 87.

Charts

With the impending threat of a major European war in 1913, the Admiralty Hydrographic Office was fully occupied with more urgent chart requirements than the reproduction of its Canadian editions. Consequently, the Canadian Hydrographic Survey undertook the reprinting, by lithography, of former Admiralty charts for North Channel, Lake Huron, Great Lakes; Lower St Lawrence River; and Hudson Bay and Strait. This precedent is believed to be the commencement of Canadian reproduction of outdated Admiralty charts.

1914-15

The first period of growth and development of the Hydrographic Survey came to a slowdown with the outbreak of the First World War (1914-18). This season, seven ships were in commission: regular six, and one chartered. These were distributed as follows: British Columbia, two; Great Lakes, two; St Lawrence River (part season), one; Hudson Bay, one; and a chartered schooner in James Bay. In addition, a hydraulic survey party continued with water level investigations on the St Lawrence River below Montreal, and additional automatic gauges were installed by this hydrographic unit in this area, and in the Great Lakes. A resume of field and office activities in the year of the First World War follows.

ATLANTIC COAST SURVEYS, 1914

Hudson Bay and Strait, 1914.

The season of 1914 was to be the last for charting the Hudson Bay route until 1928. Capt. F. Anderson was again in charge of the *Acadia,* and had for assistants Lieut. C.B. Shaw, RN (Ret'd), and Messrs L.C. Prittie, J.L. Foreman and C.B. MacDonald. Sailing master was Capt. W.A. Robson; chief engineer, Mr J.C. Kelly. The *Acadia* left Halifax Harbour 11 July and encountered heavy ice off the entrance to Hudson Strait that impeded her voyage to the westward until 31 July. From 12 August to 10 September, she was engaged in surveying Lower Savage Island and local areas along the south coast of the strait. Hudson Bay was crossed and a running sketch survey of the southwest coast was completed between Port Nelson and Cape Henrietta Maria in the western entrance of James Bay.

The homeward voyage from Port Nelson began on 9 October and, on the 12[h] the southeast coast of Mansel Island was sketched. Many soundings were recorded along the devious routes traversed, and much of the south coast of Hudson Strait properly sketched. From 22 October until 2 November the party was fully occupied in connecting the survey of the Button Islands with Cape Chidley by triangulation. Cape Chidley was departed and Halifax Harbour entered the 10[h]. As a result of buffetting in the heavy ice fields this season, the *Acadia* sustained ice damage to her hull to the extent of $25,000.

Plans this season were also made for Charles Inlet, Savage Harbour and Acadia Cove (Resolution Island). They were not to be issued to the public until April 1916 when Chart 407, "Anchorages in Hudson Strait," was published in Ottawa. With the aid of the ship, the launch, the gigs, and on foot, the party traversed some 600 miles of coastline, and checked 300 miles more. Ten points were observed for latitude, longitude and azimuth, and 900 miles of northern waters sounded from the ship and gigs.[31]

James Bay

This party was again in the charge of Mr P. Jobin, with assistants Messrs R.J. Fraser and L.T. Bowes. The canoes left Cochrane on 24 May and reached Moose Factory the 29th. Here the survey launch and the chartered schooner *Annie Geele* were fitted out. The *Annie Geele* was owned by the Reveillon Freres Trading Company (purchased by Hudson's Bay Company in 1936), and was chartered at a cost of $1,500.00. She proved "to be no use except as a houseboat."[32]

The search for a suitable railway terminus continued and a harbour was eventually

[31] When the First World War, began the *Acadia* was working off Mansel Island in I ludson Bay. Two days later, on 6 August, Lieut. Shaw, RN, took passage on the steamer *Sheba* for Halifax, where he offered his services to the Admiralty. When the *Acadia* returned to Halifax in November, another assistant, Mr C.B.R. MacDonald was granted permission to accept a commission with the British Army, and never returned to the survey when this war ended.

[32] Stewart, Report DNS 1914.

located in the vicinity of Mount Sherrick, and concerning it Mr Stewart remarked, "1 am glad to say that it offers quite an excellent location." Surveys were made of the Charlton and Strutton island groups, and of Strutton Harbour. Triangulation along the coast was extended to the east end of Tredeley Island, and a more accurate determination of Lisbon Shoal was made. The party reached Moose River on 18 September, and here for a few weeks extended the previous surveys of this river as far north as North Bluff beacon. They left Moose Factory on 13 October and reached Cochrane on the 21st.

ST LAWRENCE RIVER

Lower St Lawrence

The survey of the lower St Lawrence River was resumed by Mr Savary in 1914 with the assistance of Messrs A.J. Pinet, E. Ghysens, M.A. MacKinnon and H.T. Bate. With the outbreak of the First World War early in August, Mr Bate left to join HMCS *Niobe* at Halifax, and on the 10th, the *Cartier* was ordered to proceed to Quebec for port examination duty, the first hydrographic ship to be commandeered for naval service. With the aid of small boats the party continued its work on the river. An assistant Mr M. A. MacKinnon returned to Ottawa, and was sent to Lake Superior as a replacement for Mr H.H. Lawson who was ill. So that the party might be kept busy during the winter months, the *Cartier* was loaned back to the survey for a brief period in the fall to complete special triangulation work in connection with the season's surveying. At the end of this fiscal year Mr Stewart reported that the survey of the lower St Lawrence River, begun in 1905, "has now been completed along the south shore as far east as Matane, and along the north shore as far as Pointe des Monts."[33]

St Lawrence River Water Level Investigations, 1914

The hydraulic study of the St Lawrence River ship channel, begun in 1912 by the Department of Public Works, was continued during the years 1913-17 by the St Lawrence River Investigation Commission. In 1914 hydrographic parties were again assigned to this study under the supervision of Mr Douglas Ellis, and Dean Haskell of Cornell University. Hydrographic assistants were Messrs M. Cailloux, N. Wilson, F.A. Clawson, and a seasonal employee Mr R.W. Bent (transferred to the hydrographic survey, September 1915). Mr R.A. Rogers, a graduate of Queen's University, was again employed in running precise level lines where needed, and during the winter months worked in Ottawa on this work and other contingent problems. Field work this season was centred chiefly between Montreal Harbour and Lake St Peter.

" In the winter oF 1914-15, the *Cartier* was again employed in the examination service in the entrance to the Bay of Fundy on the Atlantic coast.

GREAT LAKES SURVEYS, 1914

Lake Ontario

This season Mr Bachand with assistants Messrs Beauchemin, MacColl and Willis extended the survey of Lake Ontario westwards from Toronto Harbour to the Niagara River. Local surveys were also completed in the approaches of the Burlington Canal, and in Bronte and Port Credit Harbours. Over an area of 530 square miles, about 1,000 miles of ship and 830 miles of boat sounding were recorded, with 48 miles of shoreline traversed. The *Bayfield* returned to Prescott for the winter on 30 October.

Lake Superior

With Mr H.D. Parizeau on the *La Canadienne* this season were Messrs H.H. Lawson, F.R. Mortimer and H.L. Leadman. In Lake Superior Mr Lawson became ill, and in August was temporarily replaced by Mr M.A. MacKinnon of Mr Savary's staff. In the fall Mr Lawson joined the Second Contingent [of the army] and went overseas.

The party again worked on the north shore of the lake between Pic Island and Otter Head, and made plans for Peninsula and Port Munro Harbours. An attempt was made to connect the Canadian triangulation network with the US Lake Survey station "Tip-Top." In September the ship moved to Little Current in the North Channel Lake Huron, and then proceeded to Byng Inlet on the east coast of Georgian Bay (locale of the *Asia* incident, September 1882). A resurvey of this inlet and harbour was begun on a large scale, and on 8 November *La Canadienne* returned to winter quarters at Owen Sound. This season, 135 miles of shoreline were traversed and 500 miles of boat and 125 miles of ship sounding recorded. In his annual report for 1914, Mr Stewart noted, *"La Canadienne,* although a very old boat, had no heavy expenditure made upon her. She is in fairly good condition, but owing to her small power and poor speed she has to be carefully watched in heavy weather."

BRITISH COLUMBIA PARTIES, 1914

This season for the first time two Canadian hydrographic survey ships were engaged in recharting the coastal waters of British Columbia, the steamer *Lillooet,* and the schooner *Naden.* In charge of the *Lillooet* was Capt. Musgrave with assistants Lieut. John Knight, RN (Ret'd.), and Messrs L.R. Davies, J.A. Turner and O.R. Parker. Up to the outbreak of the First World War in August, Lieut. Knight was in charge of the *Naden,* and when he returned to Esquimalt to join HMCS *Rainbow,* Mr Davies took over. Another hydrographer to leave this survey in August was Mr J.A. Turner (a former graduate of RMC) who proceeded overseas with the first Canadian Expeditionary Force, and rose to the rank of Colonel [Lt-Col, 2nd Battalion, Royal Scots, awarded DSO and MC] before being killed in action (September 1918). Mr O.R. Parker also left to accept a commission with the Royal Navy, and for most of the duration was attached to the Admiralty Hydrographic Office in surveying critical coastal waters bordering the British Isles and Europe.

The first works undertaken this season were minor examinations in Alert Bay and Seaforth Channel. Upon arrival at Skeena River on 29 April, Lieut. Knight was detached from the *Lillooet* to take charge of the *Naden.* Here he worked in surveying this coast to the eastward of DeHorsey Island, and in Loredo and Surf Channels. The *Naden* then moved to Inverness to complete the inshore survey of the North Skeena Passage, and to connect it with the work of 1907. The *Lillooet* party proceeded first to Naas River and then to the following locales: Grandy Bay and Dixon Entrance around the Queen Charlotte Islands. Of a total of 169 working days, 60 were lost through bad weather and 33 from rain.

When the *Naden* tied up at the Esquimalt Dockyard in the fall, it was to be her first and only field season with the hydrographic survey. For the want of a crew she remained tied from 1915 to 1917, and in 1918 was taken over by the naval service of the department and commissioned as a training ship for officer-cadets. Since 1907 there had been a permanent staff of the survey located on this coast, with headquarters in 1914 located at HMC Dockyard, Esquimalt, BC.

HEADQUARTERS STAFF AT OTTAWA, FISCAL YEAR 1914-15

In 1914 the Department of the Naval Service was located in the Rea Building, (now the Daly Building), corner of Sussex and Rideau Streets. Before occupying quarters in this building the hydrographic staff were temporarily located in the West (or East?) Block on Parliament Hill. Early this year Miss K.M. Edmonds succeeded Miss K.M. Gamble as Mr Steward's clerk-stenographer. Routine administration matters were handled by Assistant Hydrographer Mr Chas McGreevy, with clerical matters such as accounts, etc., handled by Clerk Mr J.R. Dupuis. Since 1909 the Hydrographic Survey Office had been responsible for the distribution of Canadian charts and allied publications, and in 1914 chart distribution numbered 3,415 sheets. This and other routine office duties were handled for the most part by Mr A. Carbonneau, clerk-messenger.

With the survey ships *Acadia* and *Naden* now in commission, the naval architect Mr R.L. Newman of Montreal made less frequent visits to Ottawa. Until the spring of 1915, Capt. J.G. Boulton, RN, was fully occupied with writing a new edition of his *Georgian Bay and Lake Huron Pilot,* and in advising departmental officials on hydrographic matters.

Automatic Gauges

As already stated the hydrographic unit had been officially in charge of Mr Chas A. Price since January 1914, who was responsible for the installation and maintenance of all yearly and seasonal water gauges in inland waters. By 1914, thirteen new gauges had been installed on the St Lawrence River, and nine in the Great Lakes, a total of twenty-two. These were located between Quebec City and Port Arthur at the Lakehead.

Assistants with Mr Price in 1914 were Messrs Wm J. Miller and A.R. Lee. Following the outbreak of the First World War, Mr Miller was granted leave of absence to proceed overseas with the first Canadian Expeditionary Force. In September 1914 he was temporarily replaced by Mr F.C.G. Smith (dominion hydrographer 1952-57), and when Mr

Smith was reassigned to the lower St Lawrence River in 1915, Major C.F. Hannington was appointed to this section.

ADMIRALTY CHARTS AND THE DRAFTING OFFICE, 1914-15

Admiralty Charts

In a letter from the lord commissioners of the Admiralty to the governor general, (His Royal Highness the Duke of Connaught), dated June 18th, 1914, the Admiralty offered "to hand over to the Canadian government the chart plates of the Canadian Lakes and the St Lawrence River above Montreal." In late October a shipment of eleven cases of copper plates were sent from England, and by December they had been received by the Department of the Naval Service, and transferred to the King's Printer for retention and up-keep. In a letter to the King's Printer by the deputy minister dated 31 December, it was stated, "it will be necessary to make a considerable number of corrections and print an edition of these charts as rapidly as the Hydrographic Survey can advise you of changes." These copper plates were about fifty-six in number, and were transferred to the Department of Public Printing for engraving and printing, like other Canadian charts.

Drafting Office

Regular staff of the drafting office in 1914 were Messrs F.J. Delaute and H. Melancon. In January 1915 Mr P.E. Parent (former officer-in-charge of the St Lawrence River survey in 1904) rejoined the hydrographic survey as a map draftsman, and was assigned to keeping hydrographic corrections on the newly acquired Admiralty copper plates up-to-date for the King's Printer. Mr Gordon L. Crichton, on loan to the International Joint Commission at Buffalo, N.Y., since September 1909, returned to the Hydrographic Survey in March 1915, and was placed in charge of the Drafting Office as a principal map draftsman. With the departure of Mr F.J. Delaute overseas to join the Belgian Army in 1915, Mr A.J. Pinet (hydrographic surveyor since 1904) was temporarily transferred to the drafting office from the field. When not engaged on regular survey work other assistant hydrographers from time to time were assigned to temporary duty in this office.

RECAPITULATION, FISCAL YEARS, 1904-1914

When the hydrographic survey was formed in 1904 its total staff (field and office) comprised about twenty-eight personnel (Hydrographic Surveyors and technical support 27, clerical 1). In 1914 this staff tallied forty-one personnel (hydrographers 29, hydrographic recorders 3, draftsmen 4, administration and clerical 5). This was an increase of 50 per cent in staff during the period 1904-14. Ships' officers prior to the amalgamation numbered three, and in 1914 this figure was twenty-eight - or an increase by 1914 of nine times the 1904 figure. With the exception of Messrs Stewart and Anderson, all hydrographic and ships' officers in the department were on the Outside Service up to 1908, when most hydrographic officers

stationed in Ottawa were placed on the civil government list on the Inside Service. From 1908 to 1914 the hydrographic staff was increased with the addition of several junior hydrographers, and the establishment of an automatic gauges unit. Of this establishment less than one-third were permanent employees on the civil government list of the Inside Service, and with the exceptions of Messrs Stewart and Anderson, all came under the provisions of the *Retiring Act 1914.*

When the Georgian Bay and Great Lakes Survey ended in the fiscal year 1903, the hydrographic fleet comprised one 276-ton survey steamer *Bayfield,* a few sailing gigs, and other small craft. Gasoline launches had yet to be introduced to the survey. These came only with the amalgamation in 1904, and for some years were employed chiefly in towing sailing gigs to the survey grounds, one end of the sweeping apparatus, and for general transportation purposes. By 1914 they were in use on both coasts and inland waters as sounding launches and they totalled about a dozen open-cockpit and half-cabin models. When the First World War began there were seven ships in commission: Atlantic coast - *Acadia, Cartier* and chartered schooner *Annie Geele;* James Bay: Inland Waters - *Bayfield* and *La Canadienne,* and Pacific Coast: *Lillooet* and auxiliary schooner *Naden.*

In 1914, salaries for sailing masters varied from $ 1,320 *(Acadia)* to $ 1,620 *(Lillooet)* per annum; and chief engineers, from $1,200 *(Acadia)* to $ 1,560 *(Lillooet)* per annum. The chief hydrographer received $3,700 per annum; officers-in-charge of ships from $2,100 to $2,900; assistant hydrographers (senior ship assistants, or in charge of shore parties), from $1,700 to $2,050; junior hydrographers $1,300 to $1,600; principal map draftsman $2,100, and the officer-in-charge automatic gauges, $1,020 ($1,500 paid in 1912). In comparison the deputy minister of the Naval Service, M r G . B . [G.J.?] Desbarats, received $6,000 per annum; and Dr. W.Bell Dawson, superintendent of the Tidal and Current Survey Branch, $3,100.

The first Canadian chart from Canadian surveys was published for Lake Winnipeg in 1903. By 1914 new Canadian charts and reproductions totalled sixty-five general, coast and harbour charts: Hudson Bay and Strait (5), lower St Lawrence (7), St Lawrence River between Quebec and Great Lakes, including the Ottawa River (30), Great Lakes (12), Lake Winnipeg (2), and British Columbia (9). Five volumes of Canadian sailing directions and pilots had also been written since 1883: *Georgian Bay and North Channel* (1892, revised 1902), *Canadian Shores of Lake Erie* (1897), *Canadian Shores of Lake Huron* (1905), *St Lawrence River Pilot Quebec to Lake Ontario* (1912), and *St Lawrence River Pilot below Quebec* (1912). Price of Canadian charts was fifteen cents per copy, with sailing directions and water level bulletins of the automatic gauges section, free of charge. Since 1909 the hydrographic survey has maintained a chart distribution service in Ottawa, and in 1914 some 3,435 charts were issued to the public.

Annual hydrographic expenditure between 1901 and 1914 fluctuated from $84,435 (1908) to $309,390 (1913), with an approximate overall figure about $2,750,000. This amounted to an average yearly sum of $250,000. Of this total about $700,000, or one-quarter, was spent on the fleet alone.