Canada. Dept. of Naval Service
Report
1910/11

REPORT

OF THE

DEPARTMENT OF THE NAVAL SERVICE

FOR THE

FISCAL YEAR ENDING MARCH 31, 1911

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY C. H. PARMELEE, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1911

[No. 38—1912] *Price, 10 cents.*

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To His Excellency the Right Honourable Sir Albert Henry George, Earl Grey, Viscount Howick, Baron Grey of Howick, a Baronet, G.C.M.G., &c., &c., &c., &c., Governor General of Canada.

MAY IT PLEASE YOUR EXCELLENCY,

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the First Annual Report of the Department of the Naval Service, being for the year ended March 31, 1911.

I have the honour to be,

Your Excellency's most obedient servant,

LOUIS PHILIPPE BRODEUR,
Minister of the Naval Service.

DEPARTMENT OF THE NAVAL SERVICE,
OTTAWA, June, 1911.

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REPORT

OF THE

DEPARTMENT OF THE NAVAL SERVICE

FOR THE

FISCAL YEAR ENDED MARCH 31.

1911

OTTAWA, June 1, 1911.

SIR,—I have the honour to report on the Department of the Naval Service for the year ending March 31, 1911.

The Naval Service Act was passed on May 4, 1910, and steps were immediately taken to organize the Department of the Naval Service.

The Department is divided into the following branches:—

1. Naval.
2. Fishery Protection.
3. Tidal and Current Survey.
4. Hydrographic Survey.
5. Wireless Telegraph.

1. NAVAL BRANCH.

Rear Admiral C. E. Kingsmill was appointed Director of the Naval Service, and the services of four Naval Officers were obtained on loan from the Imperial Government to assist in the organization of the Department.

Orders in Council were passed appointing rates of pay and allowances for the Officers and men of the Naval Service, and regulations for the entry of Officers and men.

In October the department was transferred from the temporary offices on Slater street to offices which had been prepared in Sussex street.

Negotiations, which had been in progress to purchase cruisers from the Admiralty to serve as training ships, were completed after the passing of the Naval Service Act, and the first-class cruiser *Niobe* and second-class cruiser *Rainbow* were acquired, and, having undergone necessary alterations, the ships left England for their respective stations.

These ships were manned by a nucleus crew consisting of Active Service Ratings lent by the Imperial Government, and a proportion of Imperial Pensioners and Royal Fleet Reserve Men.

The *Niobe* sailed on October 10, and arrived at Halifax on October 21, where she remained during the winter in order to obtain recruits, and to assist in the organization of the dockyard.

On arrival at Halifax, six midshipmen, who had been under training in C.G.S. *Canada,* together with their Naval Instructor, were transferred to *Niobe.*

The *Rainbow* sailed on August 18, and arrived at Esquimalt on November 7, after an uneventual but successful voyage, and had no defects to make good after her voyage of 15,000 miles. During the winter she cruised round Vancouver Island and along the coasts of British Columbia on Fishery Protection Service, and effected the capture of an American schooner for fishing inside territorial waters.

On the arrival of the ships at Halifax and Esquimalt, respectively, recruiting was started. By arrangement with the Post Office Department, postmasters were appointed Recruiting Officers in seventy-five (75) cities and towns in the Dominion; posters were exhibited throughout the Dominion and a recruiting pamphlet was widely distributed. As a result recruiting has been satisfactory, and the complement of the *Niobe* is practically complete whilst there are still a few vacancies in the *Rainbow.* As the advantages of the Service become more widely known, it is anticipated that there will be no difficulty in obtaining recruits.

In November, a competitive examination was held for the entry of Medical Officers to fill three vacancies; the results were quite satisfactory and the Officers were duly appointed.

In November a competitive examination was also held for the entry of Naval Cadets, at which twenty-one (21) qualified for entry; the hospital building in Halifax Dockyard having been altered and adapted for use as a College, the Royal Naval College was opened on January 19, 1911, when the first term cadets joined. Considerable progress has been made with their education, although naturally many difficulties had to be contended with at the start.

The Accountant and Stores Branches are being organized with the assistance of officers lent from the Imperial Service; contracts have been entered into for the supply of provisions and clothing in Canada.

The dockyards at Halifax and Esquimalt, having been transferred by Imperial Order in Council, were taken over by the Department in November, and are now administered by officials of the Department. It is not proposed to open up Esquimalt Dockyard at present since there is not sufficient work to employ a permanent staff; at Halifax, however, the work on the vessels connected with this Department and those under the control of the Department of Marine and Fisheries, will be sufficient to employ a permanent staff, and the dockyard staff has been organized accordingly.

The government programme for the construction of vessels comprises four (4) cruisers of the Improved *Bristol* Class and six (6) destroyers of an Improved River Class; tenders have been invited for the construction of these vessels, and are due on May 1, 1911.

The report of the Director of the Naval Service on the Naval Branch is appended at page 15.

2. FISHERY PROTECTION.

The following ships were employed on Fishery Protection Service in the districts named during the year.

Canada.—East coast of Nova Scotia and Gulf of St. Lawrence.
Petrel, Constance.—East coast of Nova Scotia.
Curlew.—Bay of Fundy.
Vigilant.—Great Lakes.
Kestrel, Restless, Falcon.—Pacific coast.

These vessels were continually cruising during the fishing season watching the various fishing fleets.

On the east coast the Officers of the Fishery Protection Service report that the mackerel season was a bad one, whilst the lobster fisheries were good on the west coast of Nova Scotia, but only fair on the east coast.

On the Great Lakes comparatively little fishing took place.

On the Pacific coast considerable poaching has been reported, and in February, 1911, two whaling steamers, the *Grant* and *Sebastian,* were chartered and manned to assist in its suppression, on which duty they are still engaged.

The report of Rear Admiral C. E. Kingsmill on the Fishery Protection Service is appended at page 20.

3. TIDAL SURVEY.

The work of the Tidal and Current Survey was continued during the year.

An investigation of the tides was carried out for a length of 500 miles on the north shore of the Gulf of St. Lawrence. This work was hindered owing to the absence of wharfs on which to place the gauges; communication was also interrupted owing to an accident to the C.G.S. *Gulnare,* which ran ashore and had to be taken to Quebec for repairs. The results of the work were, however, satisfactory and will prove most valuable in determining more definitely the character of the tide throughout the gulf, as well as for the benefit of the local harbours along the coast.

The principal work in connection with the currents was done in connection with two of the important passes in British Columbia, Seymour Narrows and the Yuculta. Valuable data was obtained which will be of inestimable benefit to the large amount of traffic passing through these passes.

Valuable records of the set of the current were also obtained from the Light Ship off Heath Point, Anticosti Island.

The principal Tidal Stations on both coasts were continued in operation throughout the year, and the data obtained therefrom form the basis of the Tide Tables issued by the Department.

The report from Dr. Bell Dawson, Superintendent of the Tidal and Current Survey is appended at page 26.

4. HYDROGRAPHIC SURVEY.

The Hydrographic survey work is in charge of Mr. W. J. Stewart, Chief Hydrographer, and has made satisfactory progress during the year.

The survey work has been carried on under the following divisions:—

1. Great Lakes.
2. Atlantic Coast.
3. Pacific Coast.
4. Lake of Two Mountains.
5. Lake St. Francis.
6. Nelson River.
7. Fort Churchill.

The work in the Great Lakes was in charge of Captain Frederick Anderson, who conducted the survey from the steamer *Bayfield*. Much useful work was done including the location of dangerous shoals off Point Peter, Wicked Point and Scotch Bonnet Island and Presqu'ile, which have now been, for the first time, accurately charted.

The survey on the Atlantic coast is in charge of Commander I. B. Miles. The new steamer *Cartier* was commissioned for this service, this ship having arrived at Quebec on May 6, from Newcastle-on-Tyne, England, where she was constructed by Messrs. Swan, Hunter and Wigham Richardson at a cost of $176,912. She is a twin screw steamer of 522 tons register, 163 feet long between perpendiculars, 29 feet beam and 15½ feet deep, and has a speed of about 12 knots; she is especially fitted for the surveying service and is an excellent sea boat. The season was spent in surveying in the vicinity of Rimouski, and as a result of this and previous years survey arrangements have been made for the issue during 1911 of a chart embracing the water from White Island to Bic Island.

On July 1, Mr. Venn took over the charge of the survey to enable Commander Miles to take charge of an expedition to Hudson bay.

The survey on the Pacific coast is in charge of Captain P. C. Musgrave, using the steamer *Lillooet* as a base. Surveying was carried out around Prince Rupert, the north side of Queen Charlotte islands, Masset Inlet and the eastern end of Dixon Entrance. There is still much work to be done in this direction, but it is expected that the survey will be completed before the traffic to Prince Rupert becomes extensive.

The survey of Lake of Two Mountains was completed and the surveying outfit was then transferred to Lake St. Francis for the purpose of completing the survey of the upper end of that lake. This work was well advanced before the season closed on November 24.

Owing to the proposal to build a railway from the Canadian Northwest to Hudson Bay, an expedition was fitted out to examine Ports Nelson and Churchill with a view to reporting on their suitability or otherwise as termini for railways, and as ports for ocean going vessels.

Two parties were organized for this service and the ice-breaking steamer *Minto* was loaned to the Department for the purpose of conveying these parties to Hudson Bay, being under the command of Commander Miles.

Commander Miles furnishes an interesting and instructive report particularly with regard to the ice conditions.

A party under Mr. Bachand made a survey at Port Churchill which tends to show that it possesses advantages which render it suitable as a harbour for mercantile vessels, and capable of improvement at no great expense. The harbour is well sheltered, and there is good accommodation for the construction of wharfs sufficient to provide for large traffic.

Owing to the difficulties encountered it was not possible for the party at Port Nelson to do much surveying that can be put on paper, but much useful information was obtained which will be of great benefit in carrying out the future survey.

During the year the following new charts have been issued:—

Copper Island to Lamb Island.
Goderich Harbour.
Razado Island to White Island.
Approaches to Saguenay River.
Tree Bluff to Kinahan Island.
Quebec Harbour.

A second edition of the following charts was issued during the year:—

Montreal to Longue Point.
Three Rivers to Becancour.
Cape Levrard to St. Emelie.
St. Emelie to Deschambault
Head of Thunder Bay to Pigeon River.
Lamb Island to Thunder Cape.
Prince Rupert Harbour.
Lake St. Louis.

The report of the Chief Hydrographer, which includes Commander Miles' report on the Hudson Bay expedition, is appended at page 32.

5. WIRELESS TELEGRAPH.

The government owns and operates nine wireless stations on the Pacific Coast forming a complete chain from Victoria to Prince Rupert, the range of the stations varying from 150 to 350 miles.

Stations were completed at Triangle Island and Prince Rupert, and a complete new station was installed at Dead Tree Point at a cost of $17,233.

Improvements were also made at the following stations, viz:—Victoria, Point Grey, Cape Lazo, Pachena, Estevan Point and Ikeda Head, at a total cost of $29,461.

The power of the station at Victoria has been increased to enable communication to be established with Pachena.

The number of messages handled by the west coast stations was 48,074, containing 647,461 words, this showing a substantial increase over the previous year.

The total cost of maintenance of these nine (9) stations was $30,864.53, and the revenue derived therefrom $3,108.63.

On June 1, 1910, a commercial service was inaugurated in connection with the wireless stations on the west coast.

On the east coast the government owns thirteen (13) stations which are operated by the Marconi Company under contract, the range of action varying from 150 to 400 miles.

These stations handled 49,339 messages during the year, containing 699,151 words. The cost of maintenance was $44,524.21.

Stations at North Sydney and Pictou, range 100 miles, are owned and operated by the Marconi Company under contract with the government and handled 1,847 messages, containing 43,864 words. The cost of maintenance was $3,499.98.

Land stations are owned by the government at Quebec and Grosse Isle, range 100 miles, and during the year a new station was installed on Magdalen Island, P.Q., range 150 miles, the Marconi Company constructing the same at a contract price of $7,000. These stations are operated by the Marconi Company under contract and during the year handled 5,088 messages containing 108,623 words.

The Marconi Company own and operate land stations at Montreal, 200 miles; Three Rivers, 150 miles; Camperdown 250 miles; Sable Island, 300 miles; and handled at these stations 15,320 messages, containing 237,796 words.

During the year the wireless service has on several occasions proved of inestimable benefit to vessels in distress, communication by means of wireless having been instrumental in obtaining assistance.

The Government Steamers equipped with wireless are:—The *Quadra,* range 100 miles; *Minto,* 150 miles; *Stanley,* 150 miles; *Lady Laurier,* 150 miles;*Aberdeen,* 100 miles; *Druid,* 100 miles; *Earl Grey,* 200 miles; *Montcalm,* 150 miles; *Montmagny,* 200 miles; *Lady Grey,* 100 miles:

Licenses have been issued for the installation and operation of wireless stations in twenty-one steamers and three barges, and also for one experimental station at St. John, N.B.

No commercial licenses have been issued during the year.

A station has been erected by the Marconi Company at Port Arthur, Ontario, under an arrangement by which the government may take over the same should they wish to do so.

Arrangements are in progress for the establishment of a chain of wireless stations on the Great Lakes, from Port Arthur to Kingston, with a station at Kingston of sufficient range to communicate with Montreal. The scheme includes stations at, or in the neighbourhood of, the following points:—Kingston, Toronto, Port Colborne, Port Stanley, Sarnia, Tobermory, Midland, Sault Ste. Marie, Port Arthur.

The Trans-Atlantic station at Glace Bay, C.B., is owned and operated by the Marconi Company: this station is in communication with Clifden Station (Ireland). Messages are received for transmission to Great Britain at a cost of 10 cents per word for private messages and 5 cents per word for press messages. The business handled by the company averages 7,195 messages, containing 106,480 words monthly.

The report of the Superintendent of the Radio-telegraphic Service is appended at page 42.

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

G. J. DESBARATS.
Deputy Minister.

STATEMENT of Revenue of Department of the Naval Service for Fiscal Year ended March 31, 1911.

Royal Naval College—		
College fees for 21 cadets	$2,100 00	
Trust Funds	4,200 00	
		$6,300 00
Wireless Apparatus Licenses		2 00
Casual Revenue		739 40
Wireless Revenue—		
Victoria Station	988 16	
Point Grey Station	498 76	
Cape Lazo Station	29 67	
Pachena Station	1,081 75	
Triangle Island Station	2 25	
Ikeda Station	164 97	
Prince Rupert	329 88	
Dead Tree Point	13 69	
		3,109 13
Total		$10,150 53

THE DEPARTMENT OF THE NAVAL SERVICE.

Financial Statement for the fiscal year 1910–11.

Naval Service—		
Appropriation		$3,000,000 00
Expenditure		1,790,017 16
Expenditure less than appropriation		$1,209,982 84
Fisheries Protection Service—		
Appropriation		$301,500 00
Expenditure, Naval Service	$166,743 10	
do Marine and Fisheries	105,477 52	
		272,220 62
Expenditure less than appropriation		29,279 38
Hydrographic Surveys—		
Appropriation		$320,000 00
Expenditure		163,118 21
Expenditure less than appropriation		$156,881 79
Wireless Stations—		
Appropriation		$150,000 00
Expenditure		150,000 00

Tidal Service—		
Appropriation		$ 42,500 00
Expenditure		32,538 64
Expenditure less than appropriation		$ 9,961 36
New steamer to replace 'La Canadienne'—		
Appropriation		$ 75,000 00
Expenditure		31,353 14
Expenditure less than appropriation		$ 43,646 86
Civil Government—		
Appropriation	$ 29,650 00	
do from M & F	30,916 56	
		$ 60,566 56
Expenditure		41,577 07
Expenditure less than appropriation		$ 18,989 49
Contingencies—		
Appropriation		$ 20,000 00
Expenditure		11,987 51
Expenditure less than appropriation		$ 8,012 49

SUMMARY.

Grand total appropriation	$3,969,566 56
Grand total expenditure	2,492,812 35
Grand total expenditure less than appropriation	$1,476,754 21

REPORT OF THE MILITARY BRANCH.

OTTAWA, May 4, 1911.

The Deputy Minister,
Department of the Naval Service,
Ottawa.

SIR,—I have the honour to forward herewith the annual report of the Military Branch of the Department of the Naval Service for the year ending March 31, 1911.

The outcome of the Imperial Conference of 1909 was the determination of the Government to establish a Naval Service, and preliminary steps to this end were taken towards the latter part of 1909.

NAVAL SERVICE ACT.

On January 12, 1910, a Bill was introduced into the House of Commons intituled 'An Act Respecting the Naval Service of Canada.' After prolonged debate, it was finally passed and became law on May 4, 1910.

This Act provides for the establishment of a Department of the Naval Service and transfers from the Department of Marine and Fisheries, the Wireless Telegraph, Fisheries Protection, Hydrographic and Tidal Survey Branches.

The Act gives the Minister control of all naval affairs with a Deputy Minister as Officer called the Director of the Naval Service.

It empowers the Governor in Council to appoint a Naval Board to advise the Minister and to organize and maintain Permanent, Reserve and Volunteer forces. The Governor in Council is also empowered to place at the disposal of His Majesty, for general service in the Royal Navy, ships or men of the Naval Service.

It also provides for the establishment of a Naval College; and the adoption of the Naval Discipline Act, and the King's Regulations and Admiralty Instructions in use in the Royal Navy.

ORGANIZATION.

Consequent upon the passing of the Naval Service Act, Mr. G. J. Desbarats was appointed Deputy Minister, and Rear Admiral C. E. Kingsmill, Director of the Naval Service. Four officers from the Royal Navy have been 'lent' by the Admiralty for duty at Headquarters, to assist in the organization and administration of the technical departments, whilst officers were appointed by the Civil Service Commission to organize the non-technical departments. A civil officer from both the Accountant and Stores Departments at the Admiralty has been 'lent' for a period of six months to advise on the organization of these branches.

The principal work effected in the new Department has been drawing up regulations for the government of the Naval Service, and for the entry of Officers and men and recruiting generally; the purchase and equipment of *Niobe* and *Rainbow* and the preparation of specifications for the ships of the government programme.

SHIPBUILDING PROGRAMME.

During the debate on the Naval Service Bill, Sir Wilfrid Laurier announced that it was the intention of the government to construct four cruisers of the improved *Bristol* class and six destroyers of the improved River class. These ships would all be constructed in Canada, if possible.

In July, 1910, advertisements appeared in the press announcing that the government intended to call for tenders for the construction of the ships. Consequently, firms desiring to tender were informed of the conditions of the contract and in February, 1911, those firms British and Canadian, who were willing to accept the terms of the contract, were invited to tender. These tenders have not yet been received as they are not due until May 1, 1911.

'NIOBE' AND 'RAINBOW.'

Negotiations were opened with the Admiralty in the latter part of 1909, for the acquisition of two training ships. These were considered necessary in order to commence training the personnel for the ships of the government programme so as to have as many trained men as possible ready when the ships are completed.

The Admiralty had, at the Imperial Conference of 1909, recommended two ships of the *Rainbow* class for the purpose, and one was purchased for use on the Pacific coast, but it was felt that this would provide insufficient accommodation for recruits on the Atlantic coast; consequently after Parliament had approved of the proposal, *Niobe* was purchased.

These two ships are manned by nucleus crews, who are intended for the instruction of recruits, drawn from the Imperial Service, and lent by the Admiralty to the Canadian government, those on the active list for two years, reserve men and pensioners for three and five years, respectively.

In July, 1910, the Director of the Naval Service proceeded to England to attend the trials of these ships and take them over from the Imperial government. Certain alterations were found necessary in order to fit them as training ships; these being completed *Rainbow* commissioned on August 4, and sailed for Esquimalt on August 18, 1910, whilst *Niobe* commissioned on September 6, and sailed for Halifax on October 10, 1910.

Niobe was welcomed at Halifax on October 21, by the Minister of the Naval Service on behalf of the government, and *Rainbow*, at Esquimalt, by the Honourable Mr. Templeman on November 7.

The following are the principal details of the two ships:—

——	"Niobe."	"Rainbow."
Length	435 feet.	300 feet.
Breadth	69 "	43½ "
Draught	26 "	17½ "
Displacement	11,000 tons.	3,600 tons.
Horsepower	16,500.	9,681.
Armament	16–6" Q.F.	2–6" Q.F.
	12–12 pdr. Q.F.	8–6 pdr. Q.F.
	3–3 pdr. Q.F.	1–3 pdr. Q.F.
	2 – Maxims.	4 – Maxims.
	2–12 pdr. Field guns.	1–12 pdr. Field gun.
Torpedo Tubes	2 submerged.	2 above water.
Coal Storage	1000 tons.	400 tons.
Speed	20·5 knots.	19·7 knots.
Complement	705.	273.

DOCKYARDS.

Halifax Dockyard was taken over from the Imperial Authorities on January 1, 1906, and utilized, to a certain extent, by the Marine and Fisheries Department. It has now been reorganized, Commander E. H. Martin, R.N., having been appointed in charge and other necessary officers appointed to deal with the increased work.

Esquimalt Dockyard was taken over from the Imperial Authorities on November 9, 1910. It is not intended to re-open it at present to any large extent, but machinery is available for use when required by ships.

ROYAL NAVAL COLLEGE.

As it was necessary to utilize some building as a temporary college until the proposed new building was ready, it was decided to convert the old Naval hospital in Halifax dockyard to the purpose.

Certain alterations were found necessary but these were completed by January 19, 1911, on which day the college opened. The building has accommodation for 45 cadets, and is divided into dormitories, studies, recreation and mess rooms, and there are also rooms for three Officers who are in charge of the cadets.

In the dockyard attached to the college are workshops for the instruction of cadets in machine work. A store house, originally intended for storing oil drums, has been converted into and makes a suitable gymnasium. Boats have been provided, both for the instruction of the cadets in handling and sailing them, and also for use during recreation hours. A small schooner has been purchased and will be attached to the college to enable short sailing trips to be made, for the instruction of the cadets in sailing. There are also a recreation ground and tennis courts in the Admiralty house grounds. A house in the dockyard has been fitted up as a sick quarters, where any cadet suffering from temporary indisposition can be accommodated.

The Commander in Charge of the dockyard has been appointed in Command of the college, and Mr. B. S. Hartley, R.N., Naval Instructor, has been appointed Director of Studies on the recommendation of the Admiralty.

The instructional staff consists of two Lieutenants and one Engineer Lieutenant from the Imperial Service, and three masters for Mathematics, Science and Languages, who were appointed on the recommendation of the Civil Service Commissioners.

NAVAL CADETS.

An examination for entrance to the Royal Naval College was held in November, 1910, by the Civil Service Commissioners. There were 30 vacancies, and 34 boys sat for examination, but only 21 were successful.

Candidates must be between 14 and 16 years of age, but in this, the first year, the limit was extended to 17 years of age, owing to the shortness of notice announcing that the examination would be held.

According to present arrangements there will be an entrance examination each year, which will be held in the early part of November, the successful candidates at this examination being required to join college about the middle of January following. The year is divided into two terms, with six weeks vacation at Christmas and midsummer.

The instruction of the cadets at college is modelled as nearly as possible on the system adopted in the naval training establishments in England, the consequence being that the benefit of the result of years of experience is derived.

The course of instruction given assumes a thoroughly sound education, in nearly all subjects of modern requirements, the result being that a cadet who, through any mischance, does not ultimately adopt a sea life as his profession, is not, in any way, handicapped by having been at the college, but has benefitted by having received a really good education, and has also learnt the rudiments of discipline.

Each cadet spends two years at college at the expiration of which he has to pass an examination, from the results of which his seniority as a midshipman is awarded.

MEDICAL OFFICERS.

An examination was held in October, 1910, for three vacancies for Surgeons in the Medical Branch; the three successful candidates being appointed to *Niobe*, and

Rainbow. It is not the intention of the government to institute a permanent medical corps, but qualified surgeons will be eligible, after examination, for a three years appointment which may be extended to five years, when they will withdraw with a gratuity.

MIDSHIPMEN.

Six Naval Cadets who had previously been borne in *Canada* for training, were transferred to *Niobe* on her arrival and given the rank of Midshipmen.

These young officers will undergo a period of training aboard the *Niobe*, at the expiration of which they will be required to pass for the rank of Lieutenant, and their seniority in the Service will be awarded from the results of this examination.

ENGINEER SUB-LIEUTENANT.

Three Engineer Cadets who had been through the four years course at the Royal Naval Engineering College, Keyham, England, and had passed the qualifying examination, have been admitted into the Naval Service and given the rank of Engineer Sub-Lieutenant. This course was considered advisable in order to train a number of Engineer Officers for the new ships, as, in all probobility, the Imperial Service will be unable to lend a sufficient number of Engineer Officers for these ships owing to shortage of numbers. Three other Engineer Officers have been similarly entered.

RECRUITING.

At the beginning of February, posters were exhibited in all the principal towns of the Dominion calling for recruits for the Naval Service. Previous to this, recruits had been offering themselves on board *Niobe* and *Rainbow* and such as came up to the physical and educational standards were accepted.

The principal vacancies are for seamen and stokers, but there are also a small number of artisans, wireless operators, writers, &c., required.

Seamen are entered betwen the ages of 15 and 17 years and must agree to serve for seven years from the age of 18; a limited number of men are entered up to the age of 23.

Stokers are entered between the ages of 18 and 23, and they and all other ratings must agree to serve for seven years.

All recruits must pass the physical and educational standard required.

The numbers of recruits received up to March 31, 1911, and the provinces from which they come are as follows:—

——	"Niobe."	"Rainbow."	Total.
Nova Scotia	97	..	97
New Brunswick	3	..	3
Prince Edward Island	11	..	11
Quebec	28	..	28
Ontario	45	2	47
Manitoba	..	..	..
Saskatchewan	..	..	..
Alberta	..	1	1
British Columbia	1	35	36
	185	38	223

TRAINING OF RECRUITS.

Recruits for the Seaman Class, on joining, at once commence a two years' course in seamanship, gunnery, torpedo, mechanical work and school subjects. This course is divided into three periods of six, nine and nine months, respectively.

At the end of each course the classes are examined and then re-classed; so that the dull boys shall not cause the bright boys to lag behind; the latter being in classes by themselves are thus able to undergo a considerably advanced course.

At the end of two years the boys are ready to be drafted to sea as Ordinary Seamen and shortly after are eligible for rating as Able Seamen.

Able Seamen undergo further more advanced courses in gunnery and torpedo to enable them to qualify for seamen gunners, seamen torpedomen and gunlayers.

The recruits entering as stokers are first given a short course in drill, &c., to give them an insight into Naval discipline, after which they at once begin their training in the engine room and stokehold.

MOVEMENTS OF SHIPS.

Rainbow left Portsmouth, England, for Esquimalt on August 18, 1910; calling, en route at the following ports:—Las Palmas, St. Vincent, Rio de Janiero, Monte Video, Sandy Point, Coquimbo, Callao and Acpulco, arriving at Esquimalt on November 7.

Early in February she proceeded on a cruise on the west coast of Vancouver Island and on February 21, when off Cape Scott seized the United States schooner *Edrie*, of Seattle, for fishing within the three mile limit.

The schooner was turned over to the authorities at New Westminster, but the case has not yet been dealt with by the courts.

Rainbow proceeded on a similar cruise in March, upon which she is still engaged.

Niobe left Plymouth on October 10, 1910, arriving at Halifax October 21. It was not considered advisable to send her for a cruise during the winter months as it was desired that she should obtain her full complement of recruits first; also that her officers might be available to assist in the organization of Halifax Dockyard.

I have the honour to be, sir,

Your obedient servant,

C. E. KINGSMILL.
Rear Admiral, Director of the Naval Service of Canada.

REPORT RESPECTING FISHERIES PROTECTION SERVICE OF CANADA.

OTTAWA, April 15, 1911.

The Deputy Minister,
Department of the Naval Service,
Ottawa.

SIR,—I have the honour to report with reference to the Fisheries Protection Service last season as to the number of men and vessels engaged, and as to where each vessel was employed, with the names of the commanding officers, and a brief description of each vessel. I also append extracts from the annual reports of the various commanding officers giving details of the work carried out during the season 1910-11.

Eight vessels comprised the Fisheries Protection Service for last season, under the direct supervision of the Department of the Naval Service.

Names of vessels and their Commanding Officers:—

Canada.—Lieut. C. J. Stuart, N.R.N.
Curlew.—W. J. Milne.
Constance.—Thos. J. Kyffin.
Petrel.—Clement Barkhouse.
Vigilant.—P. C. Robinson.
Kestrel.—Holmes Newcomb.
Restless.—Charles Moore.
Falcon.—Alfred Copp.

'CANADA.'

Is a twin screw small third-class steamer, 200 ft. long; 25 ft. beam; 10′ 6″ draught; has a gross tonnage of 580 tons and her speed is 17 knots. She is armed with four 1½ lb. quick firing automatic mark III (1904) guns, two forward and two aft. She is electrically lighted throughout and fitted with a powerful searchlight, and carries a crew of 58 officers and men all told.

She was built by Vickers, Sons & Maxim, Ltd., England, in 1904, and is under the command of Lieutenant C. J. Stuart, R.N.R.

After a thorough overhaul during the winter at Halifax, the *Canada* commissioned on April 16, and was employed cruising during the season as requisite on the east coast, but principally on the Nova Scotia coast.

Before leaving Halifax, Lieutenant R. M. Stephens, R.N., Director of Naval Gunnery, visited the ship and examined the cadets in seamanship, company drill and signals.

On May 21, H.M.S. *Cornwall* arrived at Halifax, and the cadets on board *Canada* joined up with the cadets on board *Cornwall* in order to get an insight in experience in Naval routine, &c., and took part in sailing and pulling races with them.

On May 29, *Canada* proceeded to sea, cruising along the western shore to meet the United States mackerel fleet.

On May 31, anchored in Lunenburg Harbour in order to attend law case in connection with the seizure of nets in St. Margaret's Bay.

Continued cruising on June 2 with the United States mackerel fleet. Port Dufferin, White Head, Port Hawkesbury and North Sydney, C.B., were visited, the latter place being arrived at on June 12.

Continued cruising to Louisburg on June 16, watching the mackerel fleet, who were dispersing after a poor season.

On June 18, returned to Halifax and from thence proceeded on June 23 to Montreal to take on board Rear Admiral Kingsmill, who embarked on June 30. The ship then

proceeded to Quebec, the Admiral inspecting the ship and disembarking there the following day.

On July 4, took Commander Roper, R.N., Chief of Staff, Colonel Pelletier, Officer Commanding Quebec District, and Major Houliston to Crane Island, where they landed on departmental business, returning with them to Quebec the same evening.

On July 5, proceeded to Pictou, arriving there on July 7, where several minor repairs were taken in hand and the ship was coaled.

Continued cruising on July 13, visiting Georgetown and Charlottetown and arriving at Quebec July 21, to give leave to cadets.

Left Quebec on July 29, and cruised in the Gulf of St. Lawrence, visiting Gaspé, Port Dalhousie, New Richmond and Paspebiac, returning to Quebec August 10.

On August 12, left for Halifax, from whence, on August 26, took Commander Thompson, R.N., Officer Commanding Marine Service; and Mr. Campbell, Superintendent of Life-Saving stations, to inspect life-saving station at Sable Island, but owing to heavy weather and thick fog were unable to effect a landing. Returned to Halifax on August 29, took these officers to inspect the stations at Devil's Island, Duncan Cove and Herring Cove and returned to Halifax same day.

On September 7, cruised along the western shore visiting Lunenburg, Lockeport, Shelburne, Chester, Mahone Bay and Hubbard's Cove, destroying many lobster traps at the last-named place.

On October 8, visited Liverpool and took on board Mr. Bain, Fishery Officer and settled disputes between local fishermen, also settled dispute between fishermen at Peggy's Cove and Northwest Cove on St. Margarets Bay.

Returned to Halifax on October 13; on October 21 the Director of the Naval Service and Staff embarked and proceeded to the mouth of the harbour, to escort H.M.C.S. *Niobe* up the harbour.

On October 22, the Cadets with the Naval Instructor were transferred to H.M.C.S. *Niobe*.

On October 29, cruised eastward calling at Isaac's Harbour, White Head and North Sydney: at the latter place endeavoured to assist the schooner *Cora* off the Petrie's Ledges, but owing to heavy weather, were unable to render any assistance. The *Cora* eventually became a total wreck.

On November 8, left North Sydney, calling at Louisburg and Canso, and arriving at Halifax on November 9.

On November 21, cruised westward from Halifax, visited Mahone bay, Lunenburg and Liverpool, and on November 30, returned to Halifax and went into winter quarters.

The mackerel fishermen reported a poor season, but the shore fishermen have, on the whole, done fairly well.

The Bank fleet had a large catch and reported excellent prices for fish.

'PETREL.'

Is a steel screw steamer 116 ft. long; 22 ft. beam; 10′ 3″ draught, gross tonnage 192 tons Her speed is 10 knots and her complement 23 officers and men. She is commanded by Captain Clement Barkhouse.

The *Petrel* was employed on the east coast of Nova Scotia, including Cape Breton Island.

The *Petrel* commissioned at Liverpool on April 15 and proceeded to Halifax on April 30, for adjustment of compasses; from thence proceeded to Liverpool to take up the United States seining fleet and accompany them until they passed east of Canso.

The first fishing fleet arrived on May 18, and by May 29 the fleet numbered 51. The first haul of fish was made off Sambro, then the fish scattered and the fleet left for

home on June 25, the mackerel catch being a complete failure. Continued cruising from Cape Sable to Canso watching out for illegal fishing.

On August 14 proceeded to Chester to assist fishery officer in settling dispute at Northwest Cove, returning to Halifax afterwards.

Left Halifax on August 18, for Seal Island to watch the lobster fisheries, returning to Halifax again where ship was inspected, after which cruising was continued on the station.

On October 8, proceeded westward to Seal Island in search of the United States lobster smack *Atwood;* not finding this vessel there, continued cruising on station until November 6 when ship proceeded to Liverpool and went into winter quarters, crew being paid off on December 8.

The lobster fisheries during the above season were above the average on the western coast, but were only fair on the east coast owing to the heavy storms and the amount of gear lost. The Bank cod fishing had a most successful year, some of the Lunenburg vessels taking as high as 4,500 quintals. The in-shore fishing was fairly successful but the mackerel fishing was a complete failure.

During the season 155 American fishing vessels were boarded and the *Petrel* steamed 5,020 miles.

'CONSTANCE.'

Is a twin screw iron steamer; 116 ft. long; 19′ 8″ beam; 11′ 2″ draught, with a gross tonnage of 185 tons. The complement is 23 officers and men and her Captain Thomas Kyffin.

During the winter the ship was laid up at Halifax and commissioned for the season on April 15, 1910, but did not leave until May 12, when she proceeded to Pictou to fit out Patrol Boat No. 1.

Left for Canso on May 23, returning from thence to Pictou the following day to take Mr. Brownell to Georgetown. While under way picked up large disabled gasoline boat with five persons on board, and towed her into Pictou, where Mr Brownell disembarked.

Constance then proceeded to Halifax arriving on May 28.

On June 3, *Constance* left Halifax and continued cruising on her station as requisite, keeping company with the American fishing fleet.

On June 10, passed throgh Bras D'Or and anchored in Louisburg. Hearing that the fishing fleet had returned westward *Constance* proceeded to Canso and from thence to her station at Prince Edward Island, carrying on cruising and watching for illegal fishing.

On August 15 joined the mackerel fleet and on August 19 attended the Guysborough regatta, after which she returned to her station at Prince Edward Island.

On August 27, took Mr. G. J. Desbarats, Deputy Minister of the Naval Service, from Pictou to Charlottetown; returning again to Pictou and proceeding from thence to Canso for the fishermen's regatta.

On September 7, carried on cruising as requisite on her station until October 15; then, the last of the American seiners having left for Sydney, *Constance* followed them and arrived in Sydney on October 17.

On October 24, proceeded to Canso, remaining there until October 29.

On October 31, continued cruising off Prince Edward Island until December 25, when ship was paid off and put into winter quarters.

On the whole during the season the catch of line fish was up to the average, but owing to the frequent rough and stormy weather, trawlers were not so successful. The catch of lobsters was about the average and the catch of mackerel very poor.

'CURLEW.'

Is a twin screw iron steamer 116 ft. long; 19′ 8″ beam; 11′ 3″ draught, with gross tonnage of 158 tons, speed ten knots, complement of 20 officers and men, and is commanded by Captain W. J. Milne.

Curlew commissioned at St. John on April 25, and proceeded to her station off the coast of New Brunswick.

On May 30, took Commander Thompson, Officer in Command of the Marine Service, and resident engineer to inspect the life-saving station under construction on Wood Island, returning again to St. John.

Carried on cruising as requisite, watching the lobster fisheries until September 1, when *Curlew* took Commander Thompson and Mr. Campbell, Superintendent of life-saving stations, to inspect the stations in the neighbourhood of Digby and Grand Manan Island, afterwards proceeding to St. John where these officers disembarked.

On September 16, assisted Inspector Calder in preventing a large number of boats from torching for herring.

Carried on cruising as requisite until November 8, when report was received that the United States schooner *Eva May* had been driven ashore on the rocks at Hardwood Cove, when *Curlew* proceeded to render assistance and succeeded in towing her off and mooring her in a place of security at Seal Cove.

On November 22, left St. John for Halifax, where ship was laid up for winter and the crew paid off.

Patrol boat attached to the *Curlew* was commissioned on April 15, and proceeded to the International boundary line where she worked under the orders of Inspector Calder.

'VIGILANT.'

Is a steel twin screw steamer 175 feet long; 22 feet beam; 10 feet draught. She is electrically lighted throughout and fitted with a powerful search-light. Her complement is 30 officers and men and she is commanded by Captain P. C. Robinson.

The ship was given a thorough overhaul during the winter at Polson's shipyard and was commissioned on April 18, proceeding to her cruising ground in Lake Erie on April 20.

On May 4 the American fishing tug *Sprudel* was taken in Canadian waters and towed to Port Stanley.

Very little fishing was carried out during the summer months, but in the latter part of August the Americans again became active off Long Point and in September one hundred and forty gill nets were taken.

Owing to the stormy weather during the latter part of the season, very little fishing was done and the *Vigilant* left Lake Erie on November 21 for Toronto.

During the season the ship was inspected by Rear Admiral Kingsmill, Director of the Naval Service; Commander C. D. Roper, R.N., Chief of Staff and Engineer Commander P. C. Howe, Consulting Naval Engineer, also visited the ship, the former to hold an investigation into the conduct of Chief Engineer, the latter to examine engines, &c. Commander H. Thompson, R.N., Officer Commanding Marine Service, was taken from Port Dover to visit life-saving stations at Point Pelée and Long Point.

While in commission, Grubb's Reef and Port Burwell harbour were examined and reported on.

While *Vigilant* was employed on Lake Erie, poaching was not attempted on an extensive scale.

During the season the ship steamed 6,319 miles.

'KESTREL.'

Is a wooden screw steamer, 126 feet long; 24 feet beam; 12′ 12″ draught, with a gross tonnage of 311 tons; speed ten knots. She was built in Vancouver, B.C., in 1903, and carries twenty-three officers and men and is commanded by Captain Holmes Newcomb.

The *Kestrel* was employed in keeping the United States vessels outside the forbidden limits on the west coast and keeping the harbours clear, and was assisted by the small cruisers *Falcon* and *Restless*.

On April 2, *Kestrel* left Vancouver cruising as requisite between Cape Cook and Hope Island until May 11, when she proceeded to Hecate Straits remaining there until May 18, after which ship returned to the west coast until June 2. Cruised around north end of Vancouver Island and Hecate Straits until June 29, when she arrived at Vancouver and underwent repairs until July 22, when she proceeded to Union and carried on cruising as requisite until October 9, when ship returned to Vancouver.

Left Vancouver on October 18, to cruise as requisite off the west coast and in Hecate Straits, and arrived at Esquimalt on November 6.

Proceeded to Vancouver on the 18th and thence returned to Hecate Straits, cruising as requisite until the end of the fiscal year.

In February the services of two whaling steamers were chartered, the *Grant*, Captain J. T. Walbran, and the *Sebastian*, Captain Miller.

These boats left Victoria about the middle of February and proceeded to Sechart examining the harbours to the northward from there and keeping the United States vessels out of them. They were under the orders of the *Kestrel* and the Commanding Officer H.M.C.S. *Rainbow*.

The foreign fishing fleet was increased this year by fifty motor craft, and poaching for halibut bait has been carried on to a great extent.

'RESTLESS.'

Captain Charles Moore, was working in Hecate Straits under the orders of Captain Newcomb of the *Kestrel* until May 19, 1910, when she proceeded to New Westminster and placed herself at the disposal of Mr. C. B. Sword, Inspector of Fisheries.

On May 31, took Mr. Cunningham, Commissioner of Hatcheries, Mr. E. G. Taylor, Inspector of Fisheries, and Mr. T. Blain, to the west coast of Vancouver, visiting the hatchery sites at Anderson Lake and Kennedy River, returning to Alberni where these officials disembarked, *Restless* returning to New Westminster on June 9.

On June 20, towed C.G.S. *Alcedo* from North Saanich to Victoria, returning to New Westminster on June 23.

Ship was undergoing overhauling until July 25, and carried on cruising on the Fraser River and the Gulf of Georgia until October 3, when the fishing season closed.

On October 10, took Mr. Cunningham and Mr. Taylor again to the west coast of Vancouver Island to visit the hatcheries on Barkley and Clayoquot Sounds, and returning to New Westminster having experienced heavy weather on the trip.

On November 14, left New Westminster for Hecate Straits via Bull Harbour, arriving at Butler Cove on November 28, and being employed under instructions from *Kestrel* until February 1, 1911, when ship proceeded to Bull Harbour and patrolled that vicinity until the end of the fiscal year.

On February 2, Captain Charles Moore having been seriously injured by falling accidentally from a ladder was taken to hospital for medical treatment, Captain Ledwell of the C.G.S. *Kestrel* being placed in charge until March 17, when Captain Moore rejoined.

During the year *Restless* steamed 5,558 miles and was under way 745 hours.

'FALCON.'

Captain Alfred Copp, was employed under the orders of Captain Newcomb of the *Kestrel*. Left Vancouver on November 14, for Union, proceeding thence to Prince Rupert calling at Hardy Bay, Safety Cove, Ocean Falls, Swanson Bay.

On December 2, left for Hecate Straits to watch the harbours there, and keep the United States fishermen on the move.

Until the middle of February the weather was very stormy and very few United States vessels were sighted. During the latter part of that month, and the whole of March the weather improved and fishing became better.

Returned to Prince Rupert on March 24, and sailed from there for Vancouver on the following day, arriving April 1, and reported for duty to Inspector Williams.

I have the honour to be, sir,

Your obedient servant,

C. E. KINGSMILL,
Rear Admiral, Director of the Naval Service.

REPORT ON SURVEYS OF TIDES AND CURRENTS.

OTTAWA, March 31, 1911.

The Deputy Minister,
Department of the Naval Service,
Ottawa.

SIR—I have the honour to submit the following report of the work done in the Survey of Tides and Currents during the twelve months ending March 31, 1911. The work comprises, in general, the maintenance of the principal tide stations in eastern Canada and on the Pacific Coast; further investigation of the tides and currents during the summer season; the reduction of the observations to bring the results into practical shape; and the publication of the Tide Tables and other information. The surveying steamer C.G.S. *Gulnare* was utilized in tidal investigation last season up to the date of the unfortunate accident. There was not much accomplished in the investigation of the currents in consequence, except in British Columbia. where an important advance was made.

TIDAL OBSERVATIONS.

The six principal tidal stations in eastern Canada and five on the Pacific coast have been maintained in continuous operation with little interruption during the year. These stations are equipped with registering tide gauges and other appliances to secure a continuous record of the tide, day and night, in the form of a tide curve. Special arrangements have also to be made to obtain correct time, which is also essential; and in some localities it has to be obtained direct from the sun by a meridian instrument.

It will not be necessary to give details regarding the inspection, maintenance and repairs of the various tidal stations; although it is not always an easy matter, especially during the winter season when some of them are cut off from communication, except by telegraph.

The reduction of the tidal record thus obtained, affords a basis for the calculation of tide tables for future years, by the modern method of harmonic analysis. To utilize it in this way, it is necessary that it should be unbroken throughout the year; and if any interruption takes place, it has to be made good. The height of the tide at every hour during the year is then read off with reference to low-water datum, which is maintained at a constant level from year to year. An additional year of record from the new gauge at Charlottetown has thus been reduced; also, one more year from Port Simpson, B.C., and three continuous years from St. John, N.B. In this way the accuracy of our tide tables is being improved from year to year; and this also benefits other harbours which are referred to the principal stations for which the tide tables are published.

FURTHER INVESTIGATION OF TIDES AND CURRENTS.

During last season, the region to which tidal investigation was extended was the north shore of the Gulf of St. Lawrence; from Point de Monts, which is properly the mouth of the St. Lawrence estuary, to Belle Isle Strait, a stretch of 510 miles. Tide gauges were erected at Seven Islands; Ellis Bay Anticosti; Mingan; Eskimo Point; Natashkwan; Harrington; Bonne Esperance and Port Saunders, in Newfoundland. These tide gauges were all in operation simultaneously, for comparison with the per-

manent tidal stations at the three angles of the Gulf which are situated in Cabot Strait, in Belle Isle Strait and in the St. Lawrence estuary.

In carrying out this work, the C.G.S. *Gulnare* was made use of, as communication by the ordinary coasting steamers was at best only weekly or fortnightly, and often quite irregular. By the early part of July, all the above tide gauges were in operation, with the exception of Harrington. The Superintendent, with the assistance of Mr. S. C. Hayden, had established the tidal stations in the western end of the region; and Mr. H. W. Jones was entrusted independently with those in the eastern end, towards Belle Isle Strait. Observations of the set of the current, at the light-ship off East Cape, Anticosti, had also been arranged for.

In proceeding from Anticosti to Harrington, the steamer had the misfortune to run on an uncharted rock in Aylmer Sound off Little Meccatina Island, on July 13, It was the intention to anchor there before approaching Harrington Islands, as these were known to be rocky and dangerous. The depth on the rock which the vessel struck was little less than its own draught; and it was thus so firmly aground, that it was unable to haul off with its own winches and kedges, though every effort was made day and night for three successive tides. It was therefore necessary to await assistance from Quebec; during the delay, the hull of the vessel was considerably damaged during rough weather which ensued. A high tribute is due to Captain C. T. Knowlton, and to the First and Second Officers, for the way in which they rose to this emergency, and met the difficulties in a situation of so much isolation. The Engineer, Mr. Robertson, and his staff also gave invaluable assistance in the floating of the vessel.

When the *Gulnare* proceeded to Quebec for repairs, the Superintendent took charge of the work on the Coast; and by residing in the village of Eskimo Point, was able to keep in touch with the stations by telegraph. The want of communication which the surveying vessel would have afforded, was much felt, however. The tide gauges had been placed at partly-built wharfs or fishing stages; as this survey cannot afford to build special cribwork for the temporary stations. At most of these, construction work or repairs were going on; and when this disturbed the gauges, they could not readily be visited. The difficulty of obtaining good work with observers who had just begun, without previous experience, was also considerable; and this was increased by the trouble in obtaining correct time, which is of so much importance in a simultaneous series of observations. The subsequent reduction of the observations in the office has been unusually difficult; but with perseverance good results have been obtained.

RESULTS.

The North Shore of the Gulf of St. Lawrence is of more importance than may be usually supposed; as the number and amount of water-powers along it may, at any time, cause harbours to develop. In the choice of stations along this stretch of coast, care was taken to select points at which the establishment was already known; as there are a number of intermediate places where it has also been determined. By this method, the time of high water at these places can be computed without the expense of further observations. The tidal information for this coast will thus become very complete. Figures to enable the time of the tide to be known at all the important localities will be published in the next Tide Tables.

Much more definite knowledge of the general movement of the tide throughout the Gulf of St. Lawrence has resulted from the investigation. It appears that the rising tide and High Water are in accord with the entering tide in Cabot Strait, while the falling tide and Low Water are in accord with the St. Lawrence estuary. It is thus necessary to distinguish the High Water and Low Water, and to refer them separately to St. Paul Island and Father Point, which are the two principal stations that command those regions.

The behaviour of the current off the east end of Anticosti, resulting from the observations on the Light-ship, will be valuable; as this is one of the main turning points on the steamship route, where wrecks have often occurred. A good deal of information regarding the general movements of the water along the North Shore was also obtained from the Captains of the Coasting Steamers.

TIDAL OBSERVERS

The observations at the permanent tidal stations are taken by observers who are resident in the localities, and are paid a monthly allowance. The observations are continuous, summer and winter; and one of their duties in Eastern Canada is to attend the heating apparatus in winter, to prevent freezing.

During the summer season, a number of temporary men are instructed in the care of the smaller registering instruments, under the supervision of one of the Survey Staff. As the tidal investigations are carried on in a different region each year, the location and number of these summer observers changes from year to year. During last season (1910), there were eight observers of this character along the North Shore of the Gulf of St. Lawrence, from Seven Islands to Belle Isle Strait, a distance of 460 miles.

The tidal observers in all, are as follows:—

1. Eastern Canada, observers at the principal Tidal Stations:—St. John N.B., D. L. Hutchinson of the Observatory; St. Paul Island in Cabot Strait, J. M. Campbell; Charlottetown, L. W. Watson; Forteau Bay, Belle Isle Strait, A. Hart; Father Point, J. McWilliams; Quebec, W. McDougall at Levis Dry Dock.

2. Pacific Coast, observers at the principal tidal stations:—Captain B. L. Johnson of the SS. *Prince Rupert,* who carries time with a chronometer to the stations on the coast. Victoria, F. N. Denison of the Meteorological office; Vancouver, T. A. Blythe of the C.P.R. Engineering Office; Clayoquet, West Coast of Vancouver Island, John Grice; Wadham, in Rivers Inlet, Charles Kirkbride; Port Essington, Skeena River, J. B. Baillie; Prince Rupert, H. O. Crew; Port Simpson, George Rudge. Observations for a short time are also being taken at Sooke, in Fuca Strait by B. Dale.

3. Summer observers in 1910:—Seven Islands, D. A. Vignault; Ellis Bay, Anticosti, W. J. Hallimond; Mingan, J. A. Wilson and W. R. Foster of the Hudson Bay Company; Eskimo Point, F. Boudreau; Natashkwan, A. W. Legrand and F. Jandron, of the Jersey Fishing Firm; Harrington, Dr. H. M. Hare; Bonne Esperance, R. B. Robertson; Port Saunders, Newfoundland, L. E. Goff. Also E. Menard on the Light-ship off East Cape, Anticosti.

PACIFIC COAST.

On the coast of British Columbia, the time of slack water in the navigable passes is a matter of much importance, as the strength of the current is from 8 to 10 miles per hour; so that navigation is only possible at slack water, and vessels have to time their trips accordingly. Several of the more important industries of the province are dependent upon towing, as in the transportation of lumber and coal; and a knowledge of the time of slack water is therefore essential, as the most powerful tugs cannot handle a coal barge, a raft, or a scow-load of freight cars when the current is running.

Tables of slack water are published annually for Porlier Pass and Active Pass, through which the ocean steamers reach Vancouver. The more northern passes are quite as important. Through Seymour Narrows there is not only the Canadian traffic, but the whole traffic from the United States to Alaska. A good series of simultaneous observations in two of these passes was arranged for last spring; and Mr. S. C. Hayden went out in the spring and again in the autumn to supervise this work.

The two passes selected were Seymour Narrows and the Yuculta. Although the traffic through these is so heavy, the shores are uninhabited; and it was necessary to

arrange with two observers to camp out during the season, and to use chronometers for correct time in observing the turn of the current. Seymour Narrows and the Yuculta are the two extreme passes next Vancouver Island and the next Mainland. A number of intermediate passes are utilized, especially in the lumber industry. Information regarding these was obtained from captains having long experience in the region; and in this way the difference of time with the two extreme passes has been carefully ascertained. When the results are published as a table of slack water for Seymour Narrows, the turn of the current in all the passes and rapids of this region will be known. A 'Notice to Mariners' has been issued to give this information in advance of the publication of next year's tide tables.

OBSERVERS OF CURRENTS IN BRITISH COLUMBIA.

The observations at Seymour Narrows and the Yuculta were taken by D. P. Collis and Hans Kroeger, during the period of seven months. In Fuca Strait, observations of the current were taken at a lobster factory on the open coast near Sooke, to obtain preliminary information on the behaviour of the current in that strait.

ARCTIC OCEAN.

An important series of tidal observations was secured by the expedition in the C.G.S. *Arctic* under Captain Bernier. They extended over four months in 1908-9, at Winter Harbour on Melville Island; and they are of special interest in being the first for the Arctic Ocean. The work is creditable, as it was continued day and night without the help of a recording instrument. The notes obtained were handed over to this Survey for reduction; and a concise summary was prepared for Captain Bernier's report, which showed the range of the tide and explained its leading characteristics.

When Captain Bernier was leaving last spring, he was furnished with a recording tide gauge, with which better results will no doubt be secured. Complete instructions were also furnished regarding its establishment. No record can be received, however, until his return.

GREAT LAKES.

Observations in the Great Lakes have been continued during last season under the supervision of Professor Loudon. A record of the water level was taken at the mouth of Go-Home River on Georgian Bay; and an assistant obtained observations at Rondeau on Lake Erie. The special instruments required are provided by this Survey, and a small grant for expenses is made out of its appropriation. These observations are chiefly valuable to show the amount by which the depth of water may be decreased in the lake harbours during storms. They will also be of interest for comparisons with observations taken on the opposite shore by the United States Lake Survey.

The water level in Lake Ontario is observed at Toronto by the harbour master; and the record is forwarded regularly to the office of this Survey.

CO-OPERATION WITH OTHER SURVEYS.

ften possible to obtain tidal information of value to this Survey, and at the same time to give help to others in their work. Last season two recording instruments, tide scales, and complete outfit, were supplied to the Public Works Department to obtain data required for geodetic levels. These were placed at selected points on the lower St. Lawrence. The Hydrographic Survey was supplied with four recording gauges and similar outfits, to obtain the tide for the reduction of soundings. Two of these were placed at Bic and Escoumains on the lower St. Lawrence, and the two others at the mouth and head of Masset Inlet in the Queen Charlotte Islands, which is now a rapidly developing region.

The tidal information obtained at these various localities, though primarily for the benefit of the surveys referred to, will prove a valuable addition to the information published in the tide tables.

ACCESSORY ADVANTAGES.

The work of this survey frequently proves an advantage in other directions than its direct service to navigation. This is especially true of the tide levels, which are of service in the construction of wharfs, and also for sewerage work in our coast cities. The low-water datum is constantly referred to in dredging operations, and those engaged in this work have the tide tables in their hands. A number of industries, both in Eastern Canada and on the Pacific Coast, are more or less dependent upon the tide for their operations. Even a whaling station has to take the tide into consideration in landing a catch at their factory. In other directions, where greater accuracy is required, the determination of a mean sea level is an essential basis for levelling operations. The survey is thus in touch with several of the government departments, such as the Public Works, the Interior Department and the Geological Survey. Frequent applications for information are received from these departments, as well as from industries all over the country; and these examples serve to show the way in which an investigation of this character which the government may undertake, becomes of far-reaching benefit to the country at large.

PUBLICATIONS.

The tidal information for Canada is now published in two sets of Tide Tables, one for the Eastern Coasts and the other for the Pacific. This division facilitates their distribution. These tables are revised and extended from year to year, chiefly by the introduction of new information which is obtained as the investigations of the Survey are extended. It will not be necessary to detail these improvements; as the results of last season, already mentioned, will serve as an example.

Owing to the rapidly growing demand for tidal information on the Pacific Coast, the number of tide tables issued has now reached a higher figure than for Eastern Canada. In making this comparison it should be stated that the eastern tide tables are supplemented by two pocket editions, one for Quebec and the St. Lawrence, and the other for St. John, N.B. and the Bay of Fundy. The circulation of these abridged editions has steadily increased; and with the help of Harbour Masters and Custom Officers, they reach all classes of mariners down to the fishermen on the Coasts, by whom they are much appreciated. The number of tide tables published is shown below; and a 'Notice to Mariners' was issued, containing the advance information already referred to. The tide tables are widely distributed, and all the steamship companies are fully supplied. A large portion are addressed individually from the office.

Four thousand tide tables for the Eastern coasts of Canada.

Five thousand tide tables for the Pacific coast of Canada.

Two thousand abridged edition for Quebec, Father Point and the St. Lawrence.

Four thousand abridged edition for St. John, N.B., and the Bay of Fundy.

Some of the more important tide tables are republished in the *Canadian Almanac,* and in *Belcher's Almanac* for the Maritime Provinces. In British Columbia, some of the tide tables are reprinted by private enterprise, and published in the daily papers as news for the day.

The reports regarding the currents on the coast of Canada, in the form of pamphlets, continue in demand. They are well advertised, by an anouncement in the tide tables and a notice in the list of British Admiralty publications. Numbers have been supplied recently to new steamship captains in response to a 'Notice to Mariners'

drawing attention to them. A large number of reports on the currents around Newfoundland and in the Gulf of St. Lawrence have lately been circulated amongst the fishermen who fit out at Lunenburg for the Grand Banks.

In addition to the information published in the Tide Tables, the tide for one of the bars on the St. Lawrence above Quebec is computed for a publication issued by the Ship Channel Survey. This is required until the dredging of the channel is completed. Tide tables are also prepared for Summerside, P.E.I., which are published in the local papers. The time of the tide, during the tourist season on the lower St. Lawrence, is prepared for Little Metis and Tadoussac; and posted in the hotels and Post office for the information of summer visitors. Another item that is appreciated by tourists, is the time of arrival of the bore at Moncton at the head of the Bay of Fundy, which is included with the pocket edition of the St. John tide tables. These accessory Tide Tables are prepared by a little extra work in the office, and usually without even the expense of printing.

The Admiralty, in recent extension of the British Tide Tables, have requested information from all the Overseas Dominions; and it is gratifying to note that the tidal information now available for Canada is greater in amount than for all the rest of the empire, with the exception of India.

The new information obtained by this Survey, and the progress made, is frequently reviewed in nautical publications; especially in Germany where all new information is republished in full.

STAFF.

The whole personnel of this Survey consists of the office and field staff, the officers and crew of the surveying vessel, and the outside observers of tides and currents as already mentioned. The four permanent assistants, in addition to the superintendent, are Mr. S. C. Hayden, Mr. H. W. Jones, B.Sc., Mr. P. M. H. LeBlanc, C.E., and Miss M. A. Ramsay, stenographer. This staff undertakes the outside work during the summer season; and, in the winter, the reduction of the observations and the calculations of tide tables, as well as the ordinary office work.

Respectfully submitted,

W. BELL DAWSON.
Superintendent of Tidal Surveys.

REPORT ON HYDROGRAPHIC SURVEYS.

OTTAWA, August 8, 1911.

The Deputy Minister,
Department of the Naval Service,
Ottawa.

SIR,—I have the honour to present the following report upon the work of the Hydrographic Survey during the fiscal year, 1910-11.

The work has been carried on under the following divisions:—

1. Great Lakes.
2. Atlantic Coast.
3. Pacific Coast.
4. Lake of Two Mountains
5. Lake St. Francis.
6. Nelson River.
7. Fort Churchill

GREAT LAKES.

The work of this survey was as usual conducted from the steamer *Bayfield,* in charge of Captain Frederick Anderson, who was assisted by Messrs. Paul Jobin, E. Ghysens, H. H. Lawson and E. Lapointe. Mr. Bachand was detached for duty in connection with survey work at Fort Churchill, Hudson Bay, and Mr. R. Fraser for work at Nelson River, Hudson Bay.

For the first month the survey was temporarily in charge of Mr. A. G. Bachand, and for the second month under Mr. Jobin, as Captain Anderson was detached for duty of superintending the fitting out of the parties for Hudson Bay.

The steamer fitted out at Prescott, and on May 11, left for the scene of her labours off the south shore of Prince Edward County, Lake Ontario. The shallow inshore water was carefully and systematically examined to a depth of ten fathoms and soundings carried out beyond that to a distance of ten nautical miles or as far out as could be fixed from the shore.

The dangerous shoals off Point Peter, Wicked Point and Scotch Bonnet Island and Presqu'isle have been for the first time accurately charted. A plan of Presqu'isle, the western entrance to Murray canal has been made, and should prove valuable to mariners and yachtsmen. The examination of the passages about False Duck and Main Duck islands shows considerable less water than is shown on the existing United States Lake Survey charts and the soundings taken in the approach to Kingston Harbour also show discrepancies with these charts. It looks therefore as if it will be necessary to re-survey this water in the very near future.

The work from Main Duck Island to Presqu'isle including Presqu'isle Bay, has been concluded and the chart containing the information sent to the engraver for publication. In addition to this the triangulation of the shore from Presqu'isle to Cobourg was completed and the beacons necessary for sounding erected for work this season.

Captain Anderson reports that during the season the party traversed 60 miles of shore line, sounded 720 miles from boats, and 1,150 miles from the steamer, covering an area of 380 square miles.

On November 7, the steamer was dry docked at Kingston and painted, and on the 11th was laid up at Prescott. Upon the termination of the season Mr. Lapointe resigned.

I am pleased to be again able to report very favourably of the conduct and ability of the sailing master, Wm. McQuade, and the engineers John Nesbit and Wm. Baker, of this steamer.

After laying up the steamer and at the request of the persons using Alberton Harbour, P.E.I., Capt. Anderson was detailed to make examination of the entrance of that harbour. This he did and reported on December 5

After this he was sent to report upon a rock in Souris Harbour, P.E.I., which he did on January 28, upon his return to Ottawa.

ATLANTIC COAST.

This survey is in charge of Commander I. B. Miles, who was assisted by Messrs. G. C. Venn, and Henry Ortiz. Mr. Savary was detached for survey of Fort Churchill, Hudson Bay. Upon the opening of navigation the survey was transferred from the old steamer *La Canadienne* to the new steamer *Cartier,* which arrived at Quebec from the builders Messrs. Swan, Hunter and Wigham Richardson of Newcastle-on-Tyne on May 6. She is a twin screw steamer of 522 tons register, 163 feet long between perpendiculars, 29 feet moulded breadth and 15½ feet deep. She is steel double bottom throughout, has two Scotch boilers with Howden's forced draught and has a speed of about 12 knots. She is equipped with electric light, carbonic dioxide cold storage for meats and vegetables, has gasolene launches and latest style of surveying gigs. So far she has given the greatest satisfaction, is economical of fuel, is a splendid sea boat and furnishes comfortable quarters for officers and crew and for the surveying work. She cost $176,912.

After docking and the usual cleaning up and painting after the trans-Atlantic trip, the vessel, with party on board, left Quebec on May 31, and spent the season surveying in the vicinity of Rimouski, working out from the point at which work stopped in the autumn of 1910. The river is now charted as far as Bic Island and a new chart embracing the water from White Island to Bic Island will be issued during the season of 1911. The officers and crew of *La Canadienne* were transferred to the *Cartier* and the former laid up for the season at Sorel.

On July 1, Commander Miles left the *Cartier* in charge of Mr. Venn to assume Command of the expedition to Hudson Bay and returned August 17, having successfully placed the parties at Fort Churchill and Port Nelson (report on the trip is appended).

The *Cartier* returned to Quebec on November 1, and went immediately into winter quarters. She required very little work upon her. The ship's officers, Capt. McGough and Chief Engineer D. Marcotte, have again shown their usual zeal.

PACIFIC COAST.

This survey is under the command of Captain P. C. Musgrave, who was assisted by Messrs. F. P. V. Cowley, L. H. Davies, C. C. Ross and W. H. Powell, using the steamer *Lillooet* as a base. Mr. Parizeau was detached for survey work at Nelson River, Hudson Bay. The party left Victoria on April 5, and reached Prince Rupert on April 10.

A party under Mr. Cowley was immediately placed in camp on Lewis Island for the purpose of surveying Arthur Passage and Ogden Channel, as these waters are well sheltered and the work can be more economically carried out in this way than from a steamer.

Captain Musgrave and the balance of the party were engaged about the north side of Queen Charlotte Islands, during the spring and autumn in Masset Inlet, and during the fine weather of summer, sounding the eastern end of Dixon Entrance, between Rose Spit and Celestial Reef, or the large area which Captain Parry of the Admiralty Surveying Service was unable to complete in 1908. This was completed, but the western approach to the entrance outside the fringe about three miles wide off North Island, still remains to be done. Whilst this is supposed to be all deep, there is a reported danger well out and it will be necessary to use up a lot of time in an

examination of the locality. For this, it is proposed to take the heart of the fine weather of several seasons and have the work done before the trade to Prince Rupert becomes very extensive.

The examination of Masset Inlet, Queen Charlotte Islands, shows it to be a large lake of about sixty square miles area, connected with Dixon Entrance by a narrow channel twenty miles long, but deep enough for any vessel that can cross the bar at the mouth. The lake has many islands and shoals in it, but it can be made very useful. A chart of the inlet is now in the engraver's hands. At the end of the season Messrs. Cowley, Ross and Powell resigned, and were replaced by Messrs. O. Parker and R. L. Fortier.

The officers of the ship, Capt. Griffith, and Messrs. Allen and Borrowman, Engineers, gave the work their usual keen attention, thus aiding the surveying staff very materially, and without which progress would not have been very rapid. I regret to add that Mr. Allen, after three years service, accepted better employment and left us in April, 1911.

LAKE OF TWO MOUNTAINS.

This survey was continued and concluded under Mr. A. J. Pinet, assisted by Mr. St. Pierre. For the purpose he was provided with a house-boat and steam launch, and completed the work between St. Anne de Bellevue and Carillon early in August. The chart has been drawn and is now in the hands of the printer for engraving.

LAKE ST. FRANCIS.

Upon the completion of the work in Lake of Two Mountains, the house boat, steam launch and party were transferred to Lake St. Francis at Cornwall, and placed in charge of Mr. C. McGreevy, assisted by Messrs. St. Pierre and Ed. Jodoin, for the purpose of completing the work of surveying the upper end of that lake. This was continued until the end of the season, November 24, when the fleet was laid up in the Cornwall canal. 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.

HUDSON BAY.

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 by ocean-going vessels.

For this purpose two parties were organized, one under Mr. A. G. Bachand assisted by Mr. Chas. Savary, both assistants of several years standing and experience on this survey, to go into camp at Fort Churchill and were provided with the necessary launch and boats for work. The other was under Mr. H. D. Parizeau, assisted by Mr. Robt. Fraser, also assistants of several years standing and experience on this survey. These officers, on account of the nature of the approach to the 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, Captain Dalton, of the *Stanley* and Captain S. W. Bartlett, one of the best known pilots for Hudson Strait.

He furnishes the following interesting report on the trip, particularly on the ice conditions met with:—

'Ice conditions. Great numbers of icebergs were met with along the Labrador coast. These bergs are reported by fishermen to be much more numerous from the coast to 20 or 30 miles off than farther out. Probably the best course for a vessel, making from Newfoundland to Cape Chidley, would be about 50 miles off the land.

Cape Chidley was rounded and Gray Strait entered at noon on July 18, the ship anchoring in Port Burwell at 3 p.m. the same day.

Port Burwell and the bays along the coast were found to be quite clear of ice, but in Ungava Bay, as far as could be seen from aloft, the ice appeared solid. From information obtained from the Mission at Port Burwell, this field has been held in Ungava Bay by a long period of light northerly winds. It also appears that this year the ice in Burwell and adjacent bays had broken exceptionally early (about July 10), but as a rule it may be taken that it is impossible to enter these harbours till the last few days of July. In 1909, on the day corresponding to that on which I entered Port Burwell, dog teams were still crossing the harbour on the ice.

On leaving Port Burwell, July 19, heavy field ice was encountered at a distance of about 30 miles. This had apparently set out from Ungava Bay and drove the ship a considerable distance north toward Resolution Island. The extent of this field was about 60 miles, after which a sheet of comparatively clear water was passed through until 10 p.m. of July 20, when very heavy ice was met with. This kept the ship to the southward and made it necessary to abandon any idea of making Ashe Inlet.

In the opinion of Captain Bartlett this was Arctic ice, being much heavier and dirtier than that from Ungava Bay.

This pack appeared to be continuous from the northward to within a couple of miles of the southern shore of Hudson Strait (Cape Prince of Wales to Digges Island), a narrow passage along the shore being apparently kept fairly clear by tidal streams.

After a short spell of clear water off Cape Digges, about 40 miles of heavy ice drove the vessel toward Nottingham Island.

Mansel Island having been passed, the southern point of Coats Island was steered for and course set for Churchill.

Towards evening on July 22, the ship struck the outer edge of the largest ice field met with on the whole voyage. This, for a distance of about 200 miles, was continuous. This ice was not very heavy for a vessel specially constructed, but called for considerable skill on the part of Capt. Bartlett, the ice pilot, in finding leads.

There being no indication of clear water on either side it was resolved to make as direct a course as possible. The ship was seldom stopped, but was heavily shaken by the continuous pounding necessary to force her way through.

This field was suddenly cleared on the morning of July 24, and Churchill was reached the same night without further delay.

Churchill and Nelson having been visited, the vessel left the latter place on the evening of July 30, on the homeward voyage. Within a few hours of leaving Nelson the heaviest ice yet met was encountered, and for about 90 miles very slow headway was made. This having been cleared, nothing but light ice was met, either in the Bay or Strait, until after leaving Port Burwell. Whilst at anchor at Port Burwell awaiting the arrival of the *Earl Grey*, the ice set out of Ungava Bay before a moderate southerly breeze, and Burwell Harbour was completely filled. The ice was, of course, loose but made boat work impossible at times.

Port Burwell was left upon August 9, and within an hour the ship for the first time encountered ice that stopped her. This had evidently been heavily packed in slack water, the flood carrying its own ice to meet that returning through Gray Straits on the ebb. When the strength of the tide made itself felt, the ice holding the ship was loosened and by keeping close along the southern shore of Gray Strait, Cape Chidley was rounded and course set for southward. The pack was apparently very heavy up to the Button Islands.

Very few bergs were seen on the return along the Labrador coast.

Whilst numerous bergs were met with in the eastern part of Hudson Strait, none were seen in Hudson Bay itself, and Capt. Bartlett informed me they are practically unknown there.

It would appear from the above remarks that vessels may expect to meet ice from Cape Chidley to Churchill, but Capt. Bartlett's opinion was to the effect that our experience was exceptional, and that a long spell of light winds had contributed to the packing of the ice. Personally, I cannot see why this should be so, as the ice forms and breaks away year by year, some years (as the present, 1910) exceptionally early, no doubt, but it must be met some time during the navigation season. Long spells of wind in one direction might hold it in the bays and inlets for some time, but it is not likely that these winds would be so continuous as to keep it there until frozen in again. Therefore, any vessel navigating the Bay must be prepared to meet ice. Whilst none of that met with on this voyage could have been dangerous to the *Stanley*, or sealers and other specially constructed vessels now trading in the district, I am of the opinion it might be dangerous to a ship not so built. I certainly do not think any cargo vessel of ordinary construction would have been able to find or force her way through the large field met before Churchill, but would have been obliged to remain in the ice until it was loosened by winds or currents.

Under the weather conditions which prevailed whilst the *Stanley* was in the Bay, a ship might wait an indefinite period for the ice to open up again. In the event of a strong breeze which would eventually disperse it, the preliminary would be a heavy packing to leeward, which might jeopardise the vessel.

Throughout the above remarks 'ice' is to be taken to mean ice fields and not bergs.

WEATHER CONDITIONS.

The *Stanley* was exceptionally fortunate in weather while in Hudson Bay and Strait, nothing more than a moderate breeze being experienced. But, as a general rule, in the Strait and Bay proper, no lasting heavy weather need be anticipated during July and August, although in the vicinity of Nelson River, heavy 'northers' in August are reported by the Hudson Bay vessels, sometimes lasting from 36 to 48 hours.

A considerable amount of fog was met with, which would be expected with the light winds prevailing during the voyage. This fog was usually in the vicinity of ice, but not necessarily so.

Temperatures in the Bay and Strait were not low, the air averaging between 31° and 40° F., sea water between 30° and 40° F.

Owing to the uniform temperature of the water, little can be judged from this as to the vicinity of ice. This was also noticed after clearing the Straits of Belle Isle, that is to say, that the colder currents having been entered, the proximity of even large bergs made little difference to the temperature of the water.

GENERAL NAVIGATION.

Apart from the ice question which it will be seen is by no means insurmountable, the dangers and difficulties of the navigation of Hudson Strait and Bay arise chiefly from the inaccuracies of the charted positions of the salient points, and from the proximity of the magnetic pole, with the consequent effect on compasses.

As the whole of the Hudson Bay chart appears to be more or less in the nature of a sketch or running survey, great caution would naturally be exercised by the ship masters in making land.

From my experience on this voyage, the land and islands are in some cases 15 to 20 miles out of longitude. This may be modified when I have reworked the many observations taken, but in any case it would be unwise to attempt to make any land except in daylight and clear weather.

The Button Islands, southern shore of Gray Strait, and the land between Cape Prince of Wales and Digges Island, as shown on chart, bear little resemblance to the actual coast. King and Joy Islands do not exist, and Charles Island lies much closer to the mainland than the chart shows.

I would have endeavoured to run a line of soundings on the outward voyage, but 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, I ran an almost continuous line, soundings being taken at intervals of 10 miles in deep water, and 5 miles in shoaler water.

COMPASSES.

As regards the great 'bugbear' of Hudson Bay navigation, the reported local attraction and inaccuracy of the compass, I found nothing to justify this evil reputation. In one or two places only, and when in close proximity to the high land (Cape Chidley and Cape Digges, for instance) I found a deviation of two or three degrees from the normal. Whilst in southern waters, Halifax and Strait of Belle Isle, I had very carefully adjusted the compass of the *Stanley*, which was excellently placed as far as the ship's magnetism was concerned, and had reduced the error due to ship to such small amounts that almost the whole of the compass 'error' found by observation in the Bay could be accepted as due to variation, as opposed to deviation.

Being exceptionally fortunate in having clear sun and stars, my observations for error were almost hourly, and showed that the change of variation, though rapid, was normal, but the lines of variation will not quite agree with those shown on Admiralty charts. For instance, the line of 'no variation' lies about 30 miles east of that shown on chart. As stated above the proximity of the magnetic pole (and consequent small value of horizontal force) renders the needle sluggish and an alteration of a few degrees in direction of the ship's course is not immediately shown by the compass.

As the chart stands at present, continuous observations for compass errors are necessary. This is only in accordance with the ordinary practice of seamen, and I think that when the lines of equal variation have been correctly charted (and positions rectified) no more difficulty will be found in the navigation by account than is experienced in the approaches to the Gulf of St. Lawrence, where the rapid change of variation necessitates hourly alterations of the course.

It may be remarked that a liquid compass was found to be almost useless, especially in the western portion of the Bay.

TIDES AND CURRENTS.

As far as could be observed from the high water marks along the coasts passed, the H. W. F. & C., was much as shown on chart. The many deviations from the course, made necessary to avoid ice, prevented any reliable data being obtained as to the set of the currents, except that, as would be expected, a strong tidal set was felt in and out of the bays and indentations of the coast. In Gray Strait the Spring tides are so strong that it is advisable to time the approach to pick up a favouring stream.

PORTS NELSON AND CHURCHILL.

Until the results of the detailed surveys are in, it is difficult to give an unprejudiced opinion as to the relative values of Fort Churchill and Port Nelson as ports, and I can only take the point of view of a master of a vessel making these places for the first time without local knowledge or pilot's assistance.

When making Port Churchill, having obtained good sights for latitude and longitude at 5 p.m. and later picking up soundings, I proceeded until 11 p.m. when the distance being run down, I hauled to the southward for the port. Fog came down and I anchored for the night. When the weather cleared about 10 a.m. the following day, the beacon at the entrance to Churchill Harbour was seen, the harbour easily entered and a comfortable anchorage picked up.

I give this detail to show the facility with which the port can be made.

Churchill Harbour, although of not very great extent as it at present stands, appears to me to be adapted to easy enlargement, the eastern shore having good water close to. The entrance is narrow and I do not imagine any sea could get up that would inconvenience loading operations alongside wharfs, but the heavy tide and current from the Churchill River running against a strong breeze makes boat work difficult at times.

The land in the vicinity of Cape Churchill is rocky with stunted trees, the highest part of this land being about 100 feet above H. W.

The dangers shown on Admiralty chart No. 863 as being off Cape Churchill are locally stated to be much nearer the land.

Having left Churchill on July 27, I proceeded to Nelson Roads.

The land in the vicinity of Cape Tatnam and the western shore is very low, the summit of the trees being certainly not more than fifty feet above H. W. The ground on the approach to Port Nelson or York Roads was found to be very foul.

Four fathoms of water was picked up with no land in sight, and eventually anchored in nine fathoms in a position where the trees were only visible from aloft, and a beacon which is situated near the entrance to Hayes River and the summit of which is 80 feet above H. W., was just visible from the ship at a height of 40 feet above the water. Although only 80 feet high this beacon can be seen some time before any other sign of land is visible.

The day following my arrival, I ran with a launch to Hayes River and found that a drying flat of sand and boulders extends about three miles from the shore, less than 18 feet of water for a further four miles, and less than 30 feet for an additional three or four miles.

The current from the Nelson and Hayes Rivers is very swift, a great volume of water being discharged into Nelson Roads. When this current combines with an ebb tide and sets against the heavy northerly gales which prevail here in August and September, a very bad sea is raised, especially, as may be imagined, inside the five fathom line of sounding. The Hudson Bay vessels have found much difficulty in making, and holding, their positions in Nelson Roads and on more than one occasion have been obliged, after waiting some days for favourable conditions, to abandon all idea of discharging. They have then carried their cargoes on to Churchill, from whence it had to be drawn by dog teams during the winter. The usual procedure for the Hudson Bay vessels is to close the land as much as possible on the rising tide, and on their signals being observed by officials ashore, to steam out and anchor at a distance of about 18 miles and await the boats.

In August, 1909, one of these vessels experienced a northerly gale of 48 hours duration, during part of which time she was steaming full speed with both anchors down, with a heavy sea breaking on board. After remaining in the vicinity for ten days, and being unable to work, she proceeded to Churchill and there discharged her Nelson cargo.

After leaving Port Nelson anchorage I sounded my way out to the northeast and carried good water for some miles until, at an estimated distance of from 12 to 15 miles from Cape Tatnam, I suddenly picked up 10 fathoms and thought it advisable to haul due north. The ground in the vicinity of Cape Tatnam is reported locally to be as foul as that on the western side of Port Nelson.'

As a result of Mr. Bachand's survey at Port Churchill, I beg to offer the following report:—

'Churchill Harbour is situated in latitude 48-56-10 N. and longitude 94-10 W. and about the middle of the west shore of Hudson Bay.

The approach to Churchill Harbour is very well marked and comparatively easily picked up. The first landfall (approaching from Hudson Strait) is Cape Churchill, which stands well out from the low west shore and contrast to the shore south of it, may be approached to within a comparatively short distance. From this Cape to the

Harbour is a distance of 35 miles and a vessel may keep close enough to have the shore in full view until Eskimo Point and beacon at the entrance are made out.

This clear approach is important and in marked contrast to the approach to the whole shore from near Cape Churchill to James bay, which is fronted by a shallow band many miles wide.

The entrance to Churchill between the 18 foot contours is 1,100 feet wide and has as much as 90 feet of water in it with not less than 6 fathoms outside.

The harbour itself is in two parts, outer and inner, but the latter is so shallow as to be useless and injurious to the former, in that it furnishes a large area in which water is stored during flood tide to cause strong currents through the entrance at ebb tide.

The outer harbour or harbour proper is about 3,000 yards long north and south with an average width of 2,000 yards giving an area of one and a half square miles most of which, however, is very shallow. The area of water over 18 feet deep inside the entrance is about 1,600,000 square yards or about half of a square mile. The anchorage space is therefore not suitable for more than three or four vessels.

The East shore of the harbour is a long narrow point not over 40 feet high tapering from 3,000 feet at the inner and to a small rock at the entrance. For a distance of 6,000 feet from the entrance this point is fronted by a shallow band and a lane of water 700 feet wide over eighteen feet deep. If this harbour should be selected this would give an excellent site for sufficient slips and piers for a large traffic.

The west shore of the harbour is another point about 8,000 feet wide and terminating in a small island and the remains of old Fort Prince of Wales. This point is not considered so suitable for wharfs, piers and ships or railway yards.

Not being provided with the necessary apparatus, no borings of the bottom were taken, but as far as observed it is silt from the river.

TIDES.

The range of the spring tides is about 15 feet and the water rushes through this entrance with a velocity of 6 miles per hour on the ebb tide and 2½ miles per hour on the flood. As remarked in the beginning of this report the inner harbour is very large and allows a large volume of water to be impounded furnishing a supply that must escape during the ebb and cause heavy currents. The harbours might be separated by a dyke and thus provide a wet basin above and cut off the supply for the strong currents at ebb tide.

SHELTER.

The entrance being narrow, no sea of any consequence can come in, but when northerly to northeasterly gales blow, some sea strikes the west shore for a short distance inside the entrance and creates an uncomfortable condition for vessels anchoring off the R.N.W.M.P. post, particularly with the ebb tide. A vessel anchoring closer under the eastern shore experiences little inconvenience from sea or tide, and in the situation suggested for the wharfs and piers a vessel would suffer none. The high winds will, of course, be felt as the shores are comparatively low and void of trees.

ICE.

In 1910 floating ice first appeared from the river on October 15, and the harbour was closed on December 5. The survey party reached Churchill on July 25, and no ice was seen afterwards; first snow appeared on September 9, but the season was reported to be an unusualy short one.'

As a result of Mr. Parizeau's survey at Nelson River I beg to offer the following report:—

'Port Nelson is situated approximately in latitude 57-03 north and longitude 92-35 west, or about 120 miles south of Port Churchill.

The work on the survey of Port Nelson was carried on during the season of 1910 from the three-masted schooner *Chrissie G. Thomey,* purchased in Newfoundland especially for the work. It was in command of Mr. H. D. Parizeau, who was assisted by Mr. R. F. Fraser. The crew consisted of Captain Thos. Gushue of Brigus, Newfoundland, and nine men.

Mr. Parizeau and party left Halifax on June 27, under orders to meet the steamer *Stanley* at Port Burwell and be towed to destination. The meeting took place on July 19, and the two vessels reached the outer anchorage off Port Nelson on July 28.

On the trip heavy ice was encountered and the vessels were unable to call at Ashe Inlet for magnetic observations as intended. A track was, however, discovered along the south side of Hudson Strait close to land and the Bay entered on the 22nd. Acros the Bay heavy ice was found until within 70 miles of Port Churchill, after which no trouble was experienced.

At the present time anchorage is taken up at a great distance from shore. The Hudson Bay Company ships run in as close as possible on the high water to signal the post at York Factory and when seen they leave and anchor about 18 miles from Point Marsh.

Last season when approaching Nelson River to put the schooner on the station for her work, the steamer *Stanley,* with her in tow, ran into shallow water (4 fathoms) then moved out to 9 fathoms and fixed her position as 10 miles from land where nothing could be seen from the deck and only a few trees and the beacon on Marsh Point from the Crow's Nest.

After becoming acquainted with the locality and procuring a pilot the schooner was piloted at high water to an anchorage just off the position selected for the outer railway wharf.

Owing to the great difficulties encountered very little surveying that can be placed on paper was done. The greatest labour was necessary to get ashore with material for signals and owing to the low beach these had to be large and high that they might be seen a few miles off. The winds and seas were very heavy and in the exposed situation working from even a large well covered-in launch was impossible.

If very little of a definite nature was ascertained, a good deal of information that will be of material assistance next season was obtained.

At a point 15 miles from the beacon on Marsh Point and the same distance from Sam's Creek, there is a depth of only ten fathoms. The water towards the river gradually shoals and the river channel develops until at a point midway between Marsh Point and Sam's Creek, a bar is reached over which not more than 21 feet can be carried. Here the channel at low water is about 600 yards wide, the banks on either side drying at low water. Inside, the channel deepens again and continues for seven miles to the position selected for the outer wharf, where only 17 feet water can be found and the channel is about 600 yards wide.

Observations for tides show that springs rise 16 feet and neap 10 feet, and the tides flow and ebb at from 2 to 3 knots.

Of course, this information is all gathered from cruising about in bad weather, when circumstances made it impossible to fix one's position for transfer to paper and when the survey work is completed it may have a different appearance.

There is one thing certain that the survey is no child's play, the roadstead is exposed to every wind that blows and every sea that runs, the currents and cross currents are strong, the shores so low that nothing can be seen from boats and all locations must be determined from the previously ascertained position of the ship.

Ice began to form, coming down the river on one tide and up on the next, on October 31, and gradually became worse, each day making navigation more hazardous.

Until further and proper definite information is obtained, no opinion can be expressed as to the suitability of this port for a terminus.

On September 12, it was decided to send the schooner to Halifax and continue the work from camp until the ice would render moving about dangerous.

The schooner therefore sailed, arrived at the western entrance to Hudson Strait on the 15th, and at the eastern entrance on the 21st, having experienced strong gales and snow storms and thick weather, almost all the way. Twelve icebergs were seen off Ungava Bay. The vessel reached Brigus, Newfoundland, on October 7.

The survey party including Mr. Parizeau and Mr. Fraser remained at camp until January 20, when they left for Winnipeg by dog train and arrived in Ottawa on March 4.'

During the year the following new charts have been issued:—

No. 103.—Copper Island to Lamb Island.
" 98.—Goderich Harbour.
" 202.—Razada Island to White Island.
" 203.—Approaches to Saguenay River.
" 303.—Tree Bluff to Kinahan Island.
" 21.—Quebec Harbour.

A second edition of the following charts was also issued during the year.

No. 1.—Montreal to Longue Point.
" 11.—Three Rivers to Becancour.
" 15.—Cape Levrard to St. Emelie.
" 16.—St. Emelie to Deschambault.
" 101.—Head of Thunder Bay to Pigeon River.
" 102.—Lamb Island to Thunder Cape.
" 301.—Prince Rupert Harbour.
" 50.—Lake St. Louis.

I have the honour to be, sir,

Your obedient servant,

WILLIAM J. STEWART,
Hydrographer, Department of the Naval Service.

REPORT ON RADIO-TELEGRAPHIC SERVICE.

OTTAWA, April 1, 1911.

SIR,—I have the honour to submit herewith, annual report on the Radio-telegraphic Service for the fiscal year ended March 31, 1911.

The total number of commercial radio-telegraphic coast stations now in operation in Canada is thirty-two, an increase of three during the year; of the above stations, twenty-seven are owned by this Department and five by private enterprise.

WEST COAST.

The following coast stations owned and operated by the Department on the Pacific Coast, handled business during the year, as follows:—

COAST STATIONS ON THE PACIFIC COAST.

Name of Stations.	Private business to and from ships.		Private business between stations.		Business to and from government ships.		Government business between stations.		Service messages.		Re-transmitted messages.		Range in nautical miles
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	
Victoria	2,284	23,112	672	16,008	.....	.....	744	5,844	13,164	176,136	2,832	34,464	250
Point Grey	960	12,336	72	1,680	12	288	16	144	1,344	12,876	1,068	15,060	150
Cape Lazo	88	1,074	60	592	29	1,046	178	2,687	1,444	18,411	160	3,360	250
Pachena	60	444	120	1,092	.....	.....	48	972	1,596	21,588	3,300	48,288	300
Estevan	240	1,428	36	340	.....	.....	.....	.....	2,760	21,876	3,540	57,084	150
Triangle Island	1,176	14,256	7	56	15	155	552	10,152	960	14,892	2,820	45,840	350
Ikeda Head	48	420	162	1,458	12	148	.....	.....	1,428	17,376	1,524	30,492	250
Dead Tree Point	.....	.....	48	580	.....	.....	.....	.....	164	1,224	.....	.....	150*a*
Prince Rupert	171	2,784	675	11,497	.....	.....	234	4,464	945	9,297	306	4,140	250*b*
Total	5,027	55,854	1,852	33,303	68	1,637	1,772	24,263	23,805	293,676	15,550	238,728	.....

Total number of messages handled 48,074
" words " 647,461

a 2 months. *b* 9 months.

Name of Stations.	Revenue.	Cost of Maintenance.
Victoria	$ 988 16	$3,103 03
Point Grey	498 76	2,176 84
Cape Lazo	29 67	3,321 83
Pachena	1,081 25	2,880 56
Estevan	Nil.	2,060 28
Triangle Island	2 25	2,906 10
Ikeda Head	164 97	2,260 28
Dead Tree Point	13 69	1,079 99
Prince Rupert	329 88	2,207 19
	$3,108 63	21,996 19
Upkeep local office at Victoria, B.C.		3,576 77
General account charter of steamers, freight, travelling expenses, &c.		5,291 66
Total cost of maintenance for fiscal year, 1910-11		$30,864 53

The business handled by the above stations during the preceding fiscal year 1909-10 was 18,469 messages, containing 265,414 words. The present year shows an increase of 43,919 messages and 527,588 words over last year's business.

The west coast stations continue to handle the weather reports for the Meteorological Branch of the Marine and Fisheries Department, and the service given has proved very satisfactory.

During the year special attention has been given to the Signal Service reports provided by the stations, and every effort has been made to perfect the organization in this connection. Each station prepares three times daily at 8 a.m., noon and 6 p.m., a report containing the following information:—

Barometer reading.
Temperature.
Strength and direction of wind.
General weather conditions.
Shipping sighted and time of same.
Shipping spoken by wireless, location and time of same.

This report is forwarded by wireless to the Prince Rupert, Victoria, and Point Grey (Vancouver) stations, and is kept on file at these offices. Ships equipped with wireless telegraph apparatus are practically always in touch with one or other of the stations, and we are thus enabled to keep a constant record of their movements. The three stations mentioned above are connected with the local telephone exchanges and all information contained in the signal service report is given to the public free of charge upon request.

It is of much value to ship owners and agents who are thus enabled to keep informed of the positions of their vessels.

Advantage is also taken of the same by several western newspapers, who publish the reports in full in connection with their shipping intelligence.

On June 1, 1911, a commercial service was inaugurated in connection with the stations on the Pacific coast. The stations will now handle all business offering to and from the ships, also local business between stations. The rates charged are $1.20 for the first ten words of text, 12 cents for each additional word of text on all messages to and from ships with the exception of messages to and from ships on the ship's business, on which a reduced rate of 50 cents and 3 cents is given, and on messages to and from ships on the ferry run between Vancouver, Victoria and Seattle, on which a rate of 25 cents and 1 cent is given.

A twenty-four hour watch is kept on all the above stations with the exception of Ikeda Head (8 a.m. to 12 p.m.) and Dead Tree Point (8 a.m. to 6 p.m.) and the stations are instantly available in case of casualties to steamers.

The wireless service has proved its usefulness in several of the latter which have occurred on the coast during the past year, of which the following are among the most important:—

December 2, 1910, the SS. *Northwestern,* Capt. Croskey, owned by the Alaska Steamship Co., ran ashore on Pile Point, San Juan Island, Washington. She sent out wireless distress calls, which were responded to by our Victoria station and the C.P.R. steamer *Tees;* the B.C. Salvage Company was communicated with and the wrecking steamer *Salvor* sent to her assistance.

January 27, 1911, the steamer *Cottage City,* owned by the Pacific Coast Steamship Co., ran ashore on Cape Madge in a blinding snowstorm. She sent out distress signals and her owners were communicated with by our Cape Lazo Station. The vessel was abandoned half an hour after striking.

January 27, 1911, the steamer *Tees,* Capt. Gillan, owned by the C.P.R. Co., grounded in Berkley Sound. Communication was established with Pachena and twenty minutes after the stranding the owners were notified and assistance was despatched from Victoria and the United States life-saving station at Tatoosh. The vessel was floated next morning.

February 2, 1911, the steamer *Princess Adelaide,* Capt. ————, owned by the C.P.R. Co., grounded on Apple Cove Point. Communication was immediately established with the Victoria station; the vessel was floated the next morning.

February 3, 1911, the steamer *Victoria,* owned by the Alaska Steamship Co., ran ashore on Cape Mudge. Communication was immediately established with Cape Lazo station. The vessel was floated without damage and no assistance was required.

February 3, 1911, the steamer *Titania,* Capt. Kreeger, ran ashore on Stuart Island. This steamer was not equipped with wireless, but sent a boat to the nearest wireless station, which conveyed the news to Victoria, and the desired assistance was obtained.

The scheme laid down to duplicate the apparatus on all stations and to keep the standard of the same up to date, with all new developments of the art, has been steadily adhered to, and the following construction work has been undertaken during the year.

VICTORIA.

The power of the station has been increased to enable communication to be established direct with Pachena. One and a half acres of land adjoining the present site have been purchased, and a second two hundred foot mast erected on the same to provide support for an aerial large enough to work the desired distance.

A gasolene engine driven emergency set (6 horsepower) was installed in case of accident to the local power company's transmission lines. Also a complete duplicate set of transmitting and receiving apparatus.

This work has been carried to completion and satisfactory communication was established with Pachena.

The total cost of the above work was $8,940.28 (including cost of land).

POINT GREY.

A type No. 1 operating house 35′ x 16′ complete with concrete engine beds was erected at this point, and the apparatus transferred to the same from the dwelling house. The old 3 h.p. set at Cape Lazo was dismantled and re-erected at Point Grey, for a duplicate plant.

The 300 ft. tree which is used to support the aerial wires was provided with steel wire guys and 50 ft. of the top of the same was cut off.

A 4,000 gallon concrete water tank was installed in the basement of the dwelling house for water storage.

Some small alterations were made to the interior of the dwelling house which was painted.

A telephone line to the city limits was erected and the station connected to the Vancouver exchange.

The above work was carried to completion at a total cost of $3,556.21.

CAPE LAZO.

Three acres of land adjoining the present site were purchased at Cape Lazo and a topmast was erected on the top of a tree located on the same to provide a support for an aerial large enough to establish communication between Cape Lazo and Pachena. The total height of the improvised mast is 180 feet, and the same has been provided with the necessary guys.

A type No. 2 operating house 40′ x 18′ complete, with concrete engine beds was also installed on the new land, together with a complete new 6 h.p. plant.

The old 3 h.p. plant, which was installed in the dwelling house was dismantled and shipped to Point Grey.

Some small alterations were made in the interior of the dwelling house which was painted.

A small store and wash house was erected in connection with the dwelling house and a porch was placed on the rear door of the latter.

The whole of the new land was cleared and a proper fence erected around the same. Some repairs were also made to the trails.

The above work was carried to completion at a total cost of $5,729.85.

PACHENA.

A gasolene and coal storehouse 24′ x 12′ was erected at this point. A concrete water tank, 3,000 gallons, was installed under the dwelling house, and the latter was overhauled, repaired and painted. Two trees were trimmed and fitted to support the long aerial necessary to establish communication between Pachena and Victoria-Cape Lazo.

Some small repairs were made to the operating house and a new receiving equipment was installed.

The above work was carried to completion at a total cost of $3,503.12 (including charter of steamer).

ESTEVAN POINT.

The old 3 h.p. set at Victoria was dismantled and re-erected at Estevan point. Some small structural alterations were made in the operating house to accommodate the above, and concrete engine beds were installed.

A tree was trimmed to make a support for the aerial and the mast and all buildings were painted.

The above work was carried to completion at a total cost of $1,519.71.

TRIANGLE ISLAND.

The work on the erection of this station which was commenced during the preceding year was carried to completion, including the installation of a complete duplicate plant, comprising a 6 h.p. engine, machines and the necessary apparatus.

The mast, which was damaged in a hurricane, was repaired.

The above work was carried to completion at a total cost of $6,697.77.

IKEDA HEAD.

A concrete foundation was installed under the dwelling house at this point, and the necessary concrete engine beds for a duplicate plant; the latter, comprising a 6 h.p. engine, necessary apparatus and machines was installed.

The trees supporting the aerial extensions were trimmed and provided with guys.

Some work was done on the trail and telephone line between the station and Ikeda Bay.

The above work was carried to completion at a total cost of $6,211.80 (including charter of steamer).

PRINCE RUPERT.

The work on the erection of this station, which was commenced during the preceding year was carried to completion. The cable to the mainland was laid and a land line erected along the Grand Trunk poles to the City of Prince Rupert.

A complete duplicate plant consisting of a 6 h.p. engine, machines and the necessary apparatus was installed.

The above work was carried to completion at a total cost of $9,179.37.

DEAD TREE POINT.

A complete new station was erected at Dead Tree Point, Queen Charlotte Islands, consisting of one dwelling house and outbuildings, one operating house and one storehouse.

A single 6 h.p. 2 k.w. complete plant was installed, and two trees were trimmed, guyed and fitted for the support of the aerial.

Fourteen miles of telephone line to connect the station with the oil works, Skidegate and Queen Charlotte City were installed, including the necessary telephones.

The above work was carried to completion at a total cost of $17,233.70, (including charter of steamer).

NIGHT WORKING ON THE WEST COAST.

The peculiar phenomena affecting the range of wireless telegraph stations on the west coast has been very marked during the past year. It has been observed that between sunset and sunrise during the fall, winter and spring months, the range of the stations, both for transmitting and receiving, is increased from 300 to 500 per cent. The phenomena is somewhat erratic. On some nights it is continuous and constant communication can be maintained with another station within the zone, but on other nights it is intermittent and communication may be excellent for an hour, when the signals will suddenly fade away and then after a short period come on again. This may occur several times during the transmission of one message.

The greatest distance over which communication has been established under these conditions is between Triangle Island and Honolulu, a distance of approximately 2,500 miles. The daylight range of the Triangle equipment is 400 miles.

Another peculiar feature in connection with the above is that while the Victoria station is in communication practically every night with Ikeda Head, 400 miles north, 250 of which are over high land, and with the stations along the west coast of the United States as far down as San Diego, 1,000 miles south of Victoria, all of which is over high land, including the Cascade Range and the Sierra Nevada, rising to a height of 15,000 feet, no improvement has ever been noticed in the commnication between Pachena Point, B.C., and Victoria, B.C., 75 miles apart.

No reasonable explanation for the same has yet been discovered. A systematic observance of the phenomena is being made and when more precise information is available there is no doubt some satisfactory explanation will be forthcoming.

STATIONS.

The following stations on the east coast are owned by this department and operated by the Marconi Wireless Telegraph Company of Canada, under contract. ,

The business handled by them, cost of maintenance, &c., for the fiscal year was as follows:—

STATIONS ON THE EAST COAST.

Name of Stations.	Private business to and from ships.		Private business between stations.		Business to and from Government ships.		Government business between stations.		Service messages.		Re-transmitted messages.		Cost of maintenance.	Range in nautical miles.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	$ cts.	
Cape Sable, N.S....	2,006	20,191	1	8	225	4,179	22	303	995	20,682	.....	.....	3,519 98	250
St. John, N.B	30	542	.....	.....	134	2,650	4	39	503	13,138	.....	.....	3,499 98	250
Cape Bear, P.E.I. ..	96	3,704	265	13,565	803	13,872	236	3,592	88	2,818	.....	.....	2,500 02	150
Cape Race, Nfld. ..	4,612	46,442	....	.....	141	2,494	..... .	.....	1,789	22,568	.....	.....	3,499 98	400
Cape Ray, Nfld.....	472	6,137	1,222	16,661	61	620	492	2,410	1,439	15,887	192	3,608	3,499 98	350
Fame Point, P.Q. ..	764	15,225	235	5,206	231	4,544	2,071	25,068	3,699	62,453	.....	.....	3,499 98	250
Clarke City.....	2	22	769	18,472	18	414	26	356	895	7,064	....	....	3,504 33	250
Father Point, P.Q..	777	11,168	682	17,214	213	3,900	153	1,915	1,872	34,809	..... .	....	3,499 98	250
Heath Point, P.Q...	7	101	11	176	128	1,612	415	4,269	337	4,501	4,715	70,269	3,499 98	250
Belle Isle, Nfld.	592	7,596	78	1,658	74	1,638	1,004	12,738	1,318	24,699	2,401	36,368	4,499 98	250
Point Amour, Nfld.	89	1,024	339	4,914	28	542	796	10,680	1,527	18,313	3,785	59,049	3,500 02	150
Point Rich, Nfld....	328	1,173	92	946	11	466	23	661	889	9,991	3,019	49,230	3,499 98	250
Harrington, P.Q....	64	979	154	2,123	9	191	40	1,140	515	4,231	105	2,141	2,500 02	150
Total.....	9,839	114,307	3,845	80,943	2,079	37,122	5,282	63,171	15,866	241,154	14,217	220,665	44,524 21	

Total cost of maintenance..... $44,524 21
Total number of messages handled..... 49,339
" " of words handled..... 789,151

The following coast stations, owned by the Marconi Wireless Telegraph Company of Canada and operated by them, under contract, with this department, handled business, &c., as follows during the past year:—

Name of Stations.	Private business to and from ships.		Private business between stations.		Business to and from Government ships.		Government business between stations.		Service messages.		Re-transmitted messages.		Cost of maintenance.	Range in nautical miles.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	$ cts.	
North Sydney	10	99			71	1,667	63	513	209	3,911	6	123	1,749 99	100
Pictou	96	3,704	265	13,565	803	13,872	236	3,592	88	2,818			1,749 99	100
Total	106	3,803	265	13,565	874	15,539	299	4,105	297	6,729	6	123	3,499 98	

Total cost of maintenance $3,499 98
Total number of messages handled 1,847
" words " 43,864

The following land stations erected by the Public Works Department have been transferred by them to the Naval Service Department and are operated by the Marconi Wireless Telegraph Company, under contract; they handled business as follows:—

Quebec	332	5,260	61	722	482	8,756	1,021	21,300	868	13,191	96	1,402		100
Grosse Isle	24	466	47	597	241	3,823	966	21,493	225	4,841	264	5,021		100
Total	356	5,726	108	1,319	723	12,579	1,987	42,793	1,093	18,032	360	6,423		

Total number of messages handled 4,627
" words " 86,872

The following land stations owned and operated by the Marconi Wireless Telegraph Company of Canada, handled business as follows:—

Name of Stations.	Private business to and from ships.		Private business between stations.		Business to and from Governmentships.		Government business between stations.		Service messages.		Re-transmitted messages.		Cost of maintenance.	Range in nautical miles.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	$ cts.	
Montreal	260	2,821	14	135	7	111	4	56	731	9,907	2	12		200
Three Rivers	11	181	1	7	240	4,614			298	2,663	759	13,579		150
Camperdown	3,858	60,036	3,191	52,946	225	3,569	1,050	11,172	3,983	66,271				250
Sable Island	104	1,140			175	2,589			407	5,987				300
Total	4,233	64,178	3,206	53,088	647	10,883	1,054	11,228	5,419	84,828	761	13,591		

Total number of messages handled 15,320
" words " 237,796

The above stations continue to handle the signal service reports for the Marine and Fisheries Department, and are giving a very satisfactory service in that connection. Considerable business is also handled for the Meteorological Branch of the same department.

GLACE BAY TRANS-ATLANTIC STATION.

On January 4, 1911, in company with the Deputy Minister, a visit was paid to the Trans-Atlantic station at Glace Bay, C.B. This station is owned and operated by the Marconi Wireless Telegraph Company. The same was subsidized by the government to the extent of $80,000 in 1902, and an agreement was entered into between the Government and the company whereby they agreed to charge not more than ten cents per word for private messages, and five cents per word for press messages, transmitted between Glace Bay station and a similar station on the coast of Great Britain.

The signals from the Clifden station (Ireland), came in about as strong as those received from the average ship when 150 miles distant from the coast station, and were easily readable.

A message was sent to Mr. Marconi in London, to which a reply was received an hour later.

The methods by which the high power is handled, and the numerous automatic devices for safeguarding the operators, &c., reflect much credit on the designers of the station.

The weak spells at dawn and sunset which were encountered when the old apparatus was in operation have been overcome, and the signals with the new apparatus are found to maintain their strength throughout the twenty-four hours.

The trouble encountered with the atmospherics has also been very much reduced.

The company has opened a receiving office in Montreal where messages are accepted for transmission to England at 15 cents per word.

The business handled by the station averages 7,195 messages containing 106,480 words per month, which is about half the capacity of the station.

CONSTRUCTION WORK.

Magdalen island, P.Q., a complete new 1½ K. W. station, including living accommodation for operators; 185′ mast; 4 h.p. gasoline engine and plant was erected on Grindstone Island during the year. The Marconi Wireless Telegraph Company of Canada were the contractors and the contract price was $7,000.

Communication is now established between the Magdalen Islands and Cape Ray, Nfld.; Cape Bear, P.E.I.; Heath Point; Anticosti and Pictou, N.S., stations, thus giving the island an alternate method of communicating with the mainland in the case of a breakdown on the cable.

Since its inauguration the Magdalen island station has handled business as follows:—

MAGDALEN ISLANDS STATION.

Name of Stations.	Private business to and from ships.		Private business between stations.		Business to and from Government ships.		Government business between stations.		Service messages.		Re-transmitted messages.		Cost of maintenance.	Range in nautical miles.
	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	Messages.	Words.	$ cts.	
Magdalen Islands...	25	641	325	16,798	83	3,277	5	152	53	893	.....	.....	....	150

Total number of messages handled 461
" words " 21,751

The wireless service proved of considerable value in connection with several casualties which occurred on the St. Lawrence route during the year. The most important was the stranding of the *Prinz Oskar.*

'The S.S. *Prinz Oskar,* a vessel of approximately 7,000 tons, with a large and valuable cargo sailed from Montreal on Saturday, June 18, 1910, bound for Rotterdam, Bremen and Hamburg. At 8.40 p.m. on Monday, June 20, the vessel went ashore to the southwest of Flower Ledges, Newfoundland, near the western entrance to the Straits of Belle Isle.

At 8.45 p.m. the Captain authorized the wireless C.Q.D. call which was immediately answered by the Belle Isle station and the SS. *Sicilian.* The Belle Isle station informed the *Prinz Adalbert,* which was 140 miles east of Belle Isle, of the accident to her sister ship and the Captain of the *Prinz Oscar* was at once informed that the Belle Isle station was in communication with the *Prinz Adalbert.* At 11.28 p.m. the *Corinthian* exchanged calls with the *Prinz Oskar* and asked if she should proceed to the assistance of that vessel. The Captain, however, replied that he did not require any assistance. Continuous communication was held during the night of June 20, and the morning of June 21, with the Belle Isle, Point Amour and Point Rich stations, and also with the *Sicilian* and the *Montcalm,* while messages were continuously exchanged between the Captains of the *Prinz Oskar* and *Prinz Adalbert.*

In the meantime the news had been communicated to the owners, and the wrecking steamer *Strathcona* was despatched from Quebec. The people along the shore also received the news and in consequence the Newfoundland steamer *Diana* left Blanc Sablon for Flower Ledges, anchoring near the *Prinz Oskar* at two o'clock in the afternoon of June 21. While the position was extremely dangerous there were no passengers on board and the Captain naturally preferred to receive any assistance necessary from the *Prinz Adalbert* of the same line. The latter vessel was in constant wireless communication with the *Prinz Oskar* during Tuesday, arriving alongside of the *Prinz Oskar* at 6 a.m. Wednesday, June 22, and immediately attempting to refloat the latter steamer. At 9.05 p.m. on Wednesday, she succeeded in refloating the stern of the *Prinz Oskar,* the fore part of the ship, however, still remaining on the rocks.

Further attempts to refloat the steamer were made during Thursday, June 23, until 6.30 p.m., when the position of the steamer becoming very dangerous, the Captain ordered the crew to keep boats and life preservers in readiness as the ship might have to be abandoned at any time. On Friday at 10.30 a.m. the *Prinz Adalbert* succeeded in refloating the *Prinz Oskar* which immediately anchored, awaiting the arrival of the wrecking tug. As the position of the *Prinz Oskar* was now comparatively safe the *Prinz Adalbert* proceeded on her way to Quebec. On Saturday afternoon, June 25, the wrecking steamer *Strathcona* arrived from Quebec, and at 8.15 p.m., the steamer left her anchorage in company with the *Strathcona.* Despite the fact that the trip up the Gulf was a rough one, continuous head winds and heavy seas being met with, the vessel was safely escorted to Quebec, entering the dry dock where repairs were effected.

It is worthy of notice that the moment the steamer went aground she was in communication not only with the stations at Belle Isle and Point Rich, but also with the steamer *Sicilian;* and that during the time she was aground she was in constant communication, not only with the shore stations at Point Rich, Point Armour and Belle Isle, but had within radius of communication at all times, a minimum number of three steamers, any one of which would have proceeded to her assistance had it become necessary.

There is little doubt that had the steamer remained another twenty-four hours on Flower Ledges she would have been a total wreck. The saving of the ship was, therefore, due to the fact that she was able to receive almost immediate assistance from another vessel (fortunately a ship of the same line) which succeeded in refloating the

stranded vessel within a comparatively short time, and also to the fact that prompt notice of the mishap was given to the owners, enabling them to despatch immediately a wrecking steamer to the assistance of the stranded vessel.'

Another interesting case in which wireless telegraphy proved of great value, and in which the government wireless service played an important part, was in the rescue of the men of the steamer *West Point* which foundered at sea. The facts of the case are as follows:—

On Friday morning, August 21, 1910, a boat was sighted off the port bow of the *Devonian;* the ship was kept away towards her and she proved to be a lifeboat from the steamer *West Point* of Liverpool; the ship was stopped at 8:53 a.m. and sixteen men taken out of the boat. Their names were C. D. Meckle, Chief Officer; H. W. Barker, Third Officer; J. Roche, W. Aspetas, J. Lloyd, A. Bs.; W. Westlake, Second Engineer; Mason, Fourth Engineer; A. Murphy, T. Stewart, Edid and Lukin, Firemen; C. Levis, Mess Room Steward.

The boat was pulled up in the davits, stimulants supplied to the men and they were taken care of. Chief Officer Meckle reports that the steamer had foundered on Sunday, August 28, at 6 p.m. in lat. 45·43 north 40·41 west, catching fire at 6 a.m. on the 27th. They last saw the Captain's boat containing the remainder of the crew, in all sixteen men, on Thursday at 6 a.m. in about 47·8 N., 42·23 W. The Captain let them know he intended keeping to the east bound track. Thinking the boat might be in the vicinity and the weather coming thick the ship was stopped two hours, firing distress bombs at intervals to attract attention. The weather clearing somewhat at 11 a.m. they stood to S.S.E. and to southward, finally hauling on to course again. At 2.30 p.m. the weather was misty at times, and as the distance of observation was not great they failed to see anything of the missing boat. From the time of getting the mates report they have been in *constant communication with passing homeward bound ships by wireless telegraphy,* asking them to keep a good look out for the boat, also passed word through to Cape Race to report the matter. Received replies by wireless from *Kronprinz Wilhelm, Haverford, Mauretania, Pretoria, New Amsterdam, Pollanza, Ivernia, Teutonic, Lalorraine,* a Wilson liner and the *Pennsylvania,* all promising to keep a good look out. This morning they received word from the *Mauretania* via Cape Race and the *Deutchland* that she had picked up the captain's boat from the *West Point* and that all was well. The men had a very trying time during the five days in the small boat.

The first two days were moderate, after that, they met with tremendous sea in heavy gale with continual rain. They were pulling for seven hours in heavy seas in order to keep the boat's head on, and during this time they were all wet through. On Thursday the weather moderated and they got into the westward track about 2 on Friday morning. At this time they were feeling in a very exhausted condition. They sighted the *Devonian* about 8 a.m. on the Friday morning. Great excitement was caused amongst the passengers, who had taken up a collection for the shipwrecked men.

GREAT LAKES.

A scheme has been drawn up for the establishment of a wireless telegraph system on the Great Lakes, which will include a chain of stations, approximately 180 miles apart, from Port Arthur to Kingston, with a station at Kingston of sufficient range to communicate with Montreal, thus linking up the proposed system with the east coast system and giving through communication between Belle Isle or Cape Race and Port Arthur. The scheme as draughted out will include stations at or in the neighbourhood of the following points:—

Kingston, Ont.
Toronto, Ont.
Port Colborne, Ont.
Port Stanley, Ont.
Sarnia, Ont.
Tobermory, Ont.
Midland, Ont.
Sault Ste. Marie, Ont.
Port Arthur, Ont.

A preliminary survey of the points has been made and sites have been secured at Port Arthur, Sault Ste. Marie, Tobermory, Midland and Point Edward (Sarnia).

CONSTRUCTION WORK.

A station was erected by the Marconi Wireless Telegraph Company of Canada at Port Arthur, Ontario, in November, 1910. The company erected this station at their own expense, but under an arrangement with this Department whereby the Department may take over the same should they wish to do so. The Port Arthur station proved its value immediately after being placed in commission. The steamer *Dunedin* of the Inland Lines ran ashore on Isle Royale on December 7, 1910.

She was not equipped with Radio-telegraph apparatus, but a freighter equipped with the same, sighted her distress rockets and reported the casualty to the Port Arthur Radio-telegraph station. The tug *James Whalen,* with a wrecking equipment was sent to the assistance of the stranded steamer. Constant communication was maintained between the wrecking outfit and Port Arthur, and the boats were warned of the approaching storms, enabling them to take shelter in neighbouring bays during operations.

SHIPS.

The following Canadian Government Steamers are equipped with wireless apparatus and are operated by the Department of Marine and Fisheries.

	Range.
C.G.S. *Quadra*	100 miles.
C.G.S. *Minto*	150 "
C.G.S. *Stanley*	150 "
C.G.S. *Lady Laurier*	150 "
C.G.S. *Aberdeen*	100 "
C.G.S. *Druid*	100 "
C.G.S. *Earl Grey*	200 "
C.G.S. *Montcalm*	150 "
C.G.S. *Montmagny*	200 "
C.G.S. *Lady Grey*	100 "

LICENSES, SHIP.

In accordance with part IV. of the Telegraphs Act whereby no person may operate a Radio-telegraph station except under license from the Minister of the Naval Service, licenses have been granted for the installation and operation of Radio-telegraph stations on the following ships:—

SS. *Princess May.*
SS. *Princess Charlotte*
SS. *Princess Victoria.*
SS. *Princess Royal.*
SS. *Princess Beatrice.*
SS. *Athabasca.*
SS. *Alberta.*
SS. *Manitoba.*
SS. *Harmonic.*
SS. *Saronic.*
SS. *Assiniboia.*
SS. *Keewatin.*
SS. *Boston.*
SS. *Huronic.*
SS. *Majestic.*
SS. Germanic.
SS. *City of Midland.*
SS. *Prince Albert.*
SS. *Prince Rupert.*
SS. *Prince George.*
SS. *James Whalen.*
Barge *Luddington.*
Barge *Imperial.*
Barge *Empire.*

LICENSES, EXPERIMENTAL.

One experimental license was granted during the year to Mr. Frank Vaughan, St. John, N.B., for the erection and operation of an experimental wireless station.

LICENSES, COMMERCIAL.

No commercial licenses for the operation of commercial wireless telegraph stations were granted during the year.

I have the honour to be, Sir,

Your obedient servant,

C. P. EDWARDS,
General Superintendent Government Wireless.

H.M.C.S. "NIOBE."

H.M.C.S. "RAINBOW."

PLATE III.

A Tidal Station. Shelter-house and Tide Scale at Port Simpson, B.C.

PLATE IV.

A summer Tide Gauge. On a fishing stage at Mingan.

PLATE V.

A principal Tidal Station. A Tide gauge on St. Paul Island, Cabot Strait.

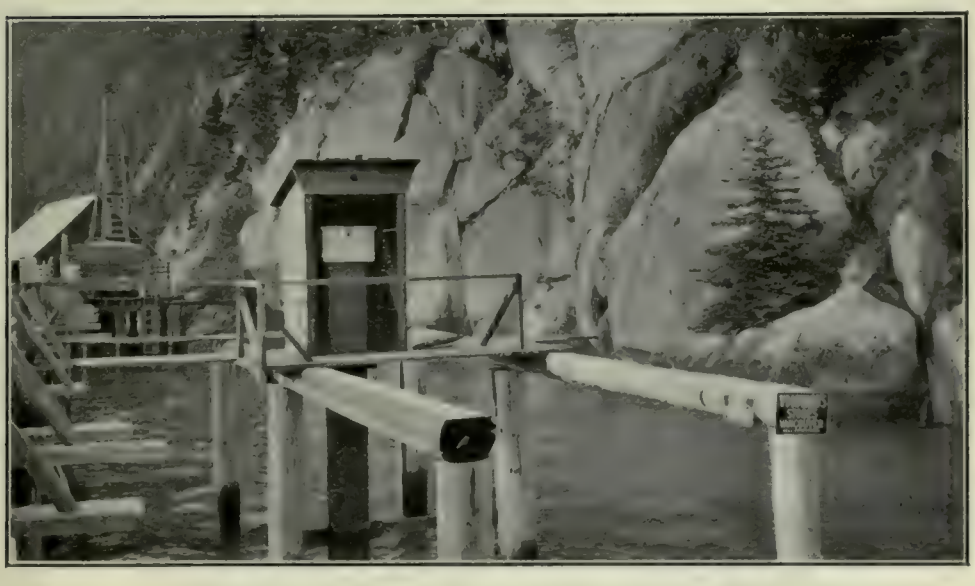
PLATE VI.

A principal Tidal Station. The Tidehouse at Forteau Bay, in Belle Isle Strait.

PLATE VII.

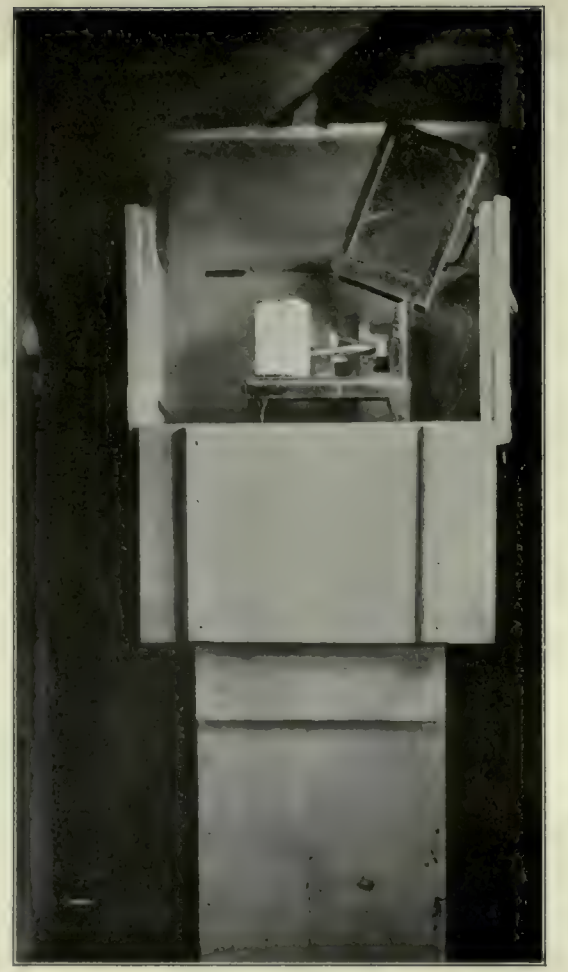
C.G.S. "GULNARE." Headquarters of the Tidal and Current Survey Staff.

PLATE VIII.



Installation of a summer Tide Gauge. At Bella Coola, B.C.

PLATE IX.



A recording Tide Gauge.

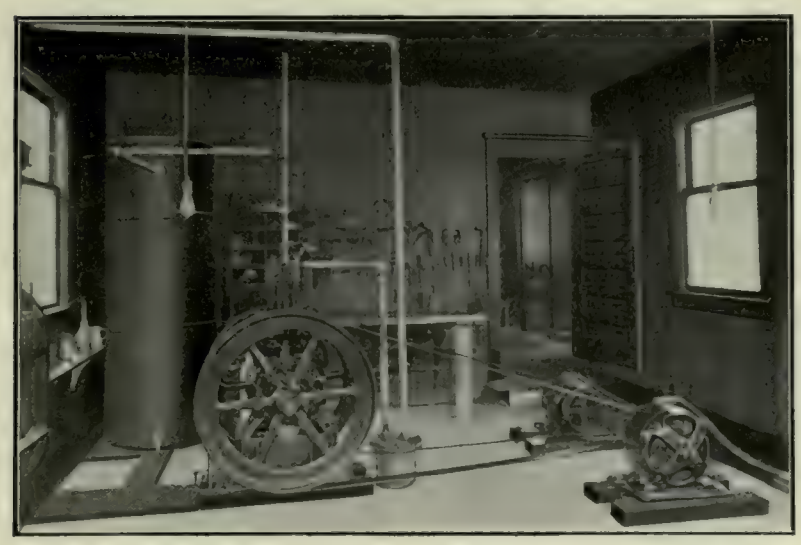
PLATE X.

At a Tidal Station. The tide-scale by which a recording scale is correctly set for height.

PLATE XI.

Operating room at Government Radiotelegraph Station, Prince Rupert, B.C.

PLATE XII.



No. 1 Engine and Generators at Government Radiotelegraph Station, Ikeda Head, Q.C.I.

High Tension Room and Transmitting apparatus at Government Radiotelegraph Station, Victoria, B.C.

Type No. 1. Operating House at Government Radiotelegraph Station, Cape Lazo, B.C.

Exterior view Government Radiotelegraph Station, Prince Rupert, B.C.