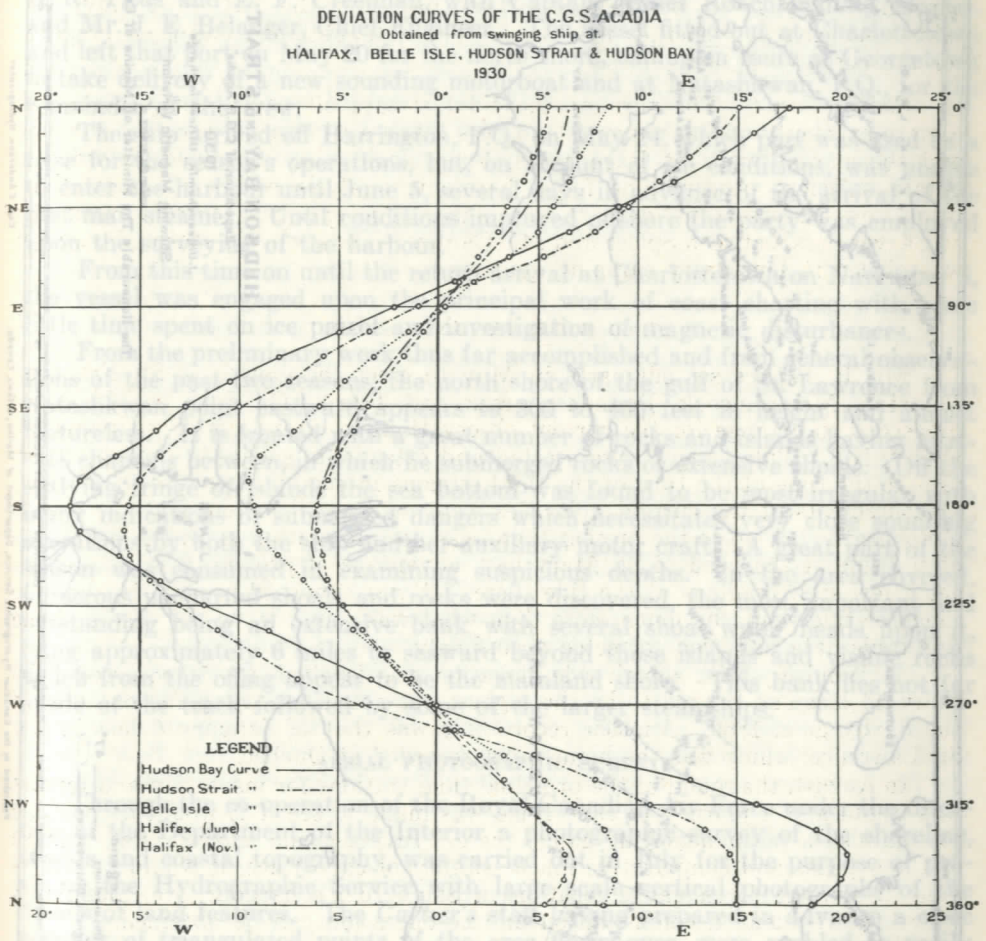
METEOROLOGICAL Observations taken on board the C.G.S. *Acadia* in 1930—*Conc.*

| Date | Barometer | | | Thermometer | | | Wind | | Locality | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean | Max. | Min. | Mean | Direction | Force | Lat. N. | Long. W. | |
| Oct. 26..... | 29·70 | 29·50 | 29·60 | 29·0 | 16·0 | 22·5 | ..... | Calm..... | Wakeham | bay..... | A.m. Calm, fine, clear, P.m. Fresh winds, snow. |
| " 27..... | 29·52 | 29·42 | 29·47 | 40·0 | 32·0 | 36·0 | East..... | Light..... | Wakeham | bay..... | Light winds, cloudy, snow. |
| " 28..... | 29·49 | 29·43 | 29·46 | 38·0 | 32·0 | 35·0 | SW..... | Light..... | Wakeham | bay..... | Light winds, cloudy, snow. |
| " 29..... | 29·62 | 29·54 | 29·58 | 30·0 | 30·0 | 30·0 | West..... | Light..... | 61–20 | 67–00 | Underway to Resolution. Mostly light winds, overcast, clear. |
| " 30..... | 29·51 | 29·22 | 29·36 | 33·0 | 30·0 | 31·5 | East..... | Fresh..... | 61–19 | 64–47 | Anchored Acadia cove 10.45 a.m. Fresh winds, fog and rain. |
| " 31..... | 29·30 | 29·19 | 29·24 | 47·0 | 36·0 | 41·5 | West..... | Fresh..... | 61–00 | 58–40 | Proceeding to Belle isle. Light to fresh winds, fog, snow. |
| Nov. 1..... | 29·74 | 29·36 | 29·55 | 42·0 | 36·0 | 39·0 | NW..... | Moderate. | 55–40 | 56–30 | Moderate winds, cloudy, snow flurries. |
| " 2..... | 29·97 | 29·81 | 29·89 | 35·0 | 34·0 | 34·5 | Variable.. | Moderate. | Off Belle | isle..... | Calibrating D.F. Station. Moderate winds, overcast, snow squalls. |
| " 3..... | 30·03 | 29·88 | 29·95 | 39·0 | 38·0 | 38·5 | SW..... | Fresh..... | Off Belle | isle..... | Moderate to fresh winds, overcast. |
| " 4..... | 30·10 | 30·05 | 30·07 | 45·0 | 41·0 | 43·0 | SW..... | Strong.... | 49–55 | 58–55 | Strong winds, heavy sea. |
| " 5..... | 30·10 | 29·28 | 29·69 | 46·0 | 43·0 | 44·5 | SE..... | Strong.... | Bay of Isl | ands..... | A.m. Light winds. P.m. Strong NE. wind. |
| " 6..... | 29·17 | 29·05 | 29·11 | 67·0 | 52·0 | 59·5 | WSW..... | Strong.... | Corner Br | ook..... | Strong wind, rain and fog. |
| " 7..... | 29·55 | 29·22 | 29·38 | 42·0 | 35·0 | 38·5 | SW..... | Moderate gale. | Corner Br | ook..... | Gales, snow squalls, rain. |
| " 8..... | 30·00 | 29·70 | 29·85 | 40·0 | 31·0 | 35·5 | West..... | Strong.... | 48–55 | 58–50 | Fresh to strong winds, snow. |
| " 9..... | 29·95 | 29·65 | 29·80 | 51·0 | 43·0 | 47·0 | SW..... | Fresh..... | Off St. Pa | ul's..... | Fresh wind, hazy. Calibrating D.F. Station. |
| " 10..... | 29·90 | 29·70 | 29·80 | 40·0 | 32·0 | 36·0 | NW..... | Strong.... | NorthSyd | ney ..... | Light to strong winds, overcast. Clear. |
| " 11..... | 30·20 | 30·05 | 30·12 | 35·0 | 33·0 | 34·0 | NW..... | Light..... | South Syd | ney..... | Cloudy, clear, light breeze. |
| " 12..... | 30·20 | 30·05 | 30·12 | 41·0 | 35·0 | 38·0 | South.... | Light..... | South Syd | ney..... | Cloudy, clear, light breeze. |
| " 13..... | 30·00 | 29·91 | 29·95 | 50·0 | 45·0 | 47·5 | West..... | Light..... | Off St. Pa | ul's..... | Hazy, overcast, light breeze. Calibrating D.F. Station. |
| " 14..... | 29·85 | 29·78 | 29·81 | 49·0 | 48·0 | 48·5 | SW..... | Light..... | Cansostra | it..... | Hazy, cloudy, light breeze. |
| " 15..... | 30·00 | 29·92 | 29·96 | ..... | ..... | ..... | North.... | Light..... | Halifax... | ..... | Moored at Dockyard. Light north winds, fine, clear. |


DEVIATION CURVES OF THE C.G.S. ACADIA
Obtained from swinging ship at
HALIFAX, BELLE ISLE, HUDSON STRAIT & HUDSON BAY
1930
W
E
20° 15° 10° 5° 0° 5° 10° 15° 20° 25°
N
NE
E
SE
S
SW
W
NW
N
0°
45°
90°
135°
180°
225°
270°
315°
360°
LEGEND
Hudson Bay Curve
Hudson Strait "
Belle Isle "
Halifax (June) "
Halifax (Nov.) "




FORM 11

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Capt. F. Anderson, Hydrographer

### Gulf of St. Lawrence, North Shore—C.G.S. "Cartier"

The charting of the north shore of the gulf of St. Lawrence along the Belle Isle steamship route, begun last year by the *Cartier* in the neighbourhood of cape Whittle, was continued in 1930 and extended westward from St. Mary island light to Wolf island, special attention being given to the offshore shoals and waters passed through by the transatlantic vessels which follow this route from Belle Isle to Montreal.

The *Cartier* was again under the command of Mr. G. A. Bachand, who had as senior assistant Mr. R. W. Bent, and junior assistants Messrs. W. F. Elliott, S. R. Titus and E. F. Creelman, with Captain James Roach, Sailing Master, and Mr. J. E. Belanger, Chief Engineer. The vessel fitted out at Charlottetown and left that port on May 20 for the north shore, calling en route at Georgetown to take delivery of a new sounding motorboat and at Natashkwan, P.Q., for the remainder of the crew.

The ship arrived off Harrington, P.Q., on May 24, which port was used as a base for the season's operations, but, on account of ice conditions, was unable to enter the harbour until June 5, several days in advance of the arrival of the first mail steamer. Until conditions improved offshore the party was employed upon the surveying of the harbour.

From this time on until the return arrival at Charlottetown on November 5, the vessel was engaged upon the principal work of coast charting with some little time spent on ice patrol and investigation of magnetic disturbances.

From the preliminary work thus far accomplished and from general observations of the past two seasons, the north shore of the gulf of St. Lawrence from Natashkwan point eastward appears to 300 to 400 feet in height and almost featureless. It is fronted with a great number of rocks and islands having intricate channels between, in which lie submerged rocks or extensive shoals. Off the outlying fringe of islands the sea bottom was found to be most irregular with many indications of submerged dangers which necessitates very close sounding operations by both the ship and her auxiliary motor craft. A great part of the season was consumed in examining suspicious depths. In the area covered, numerous uncharted shoals and rocks were discovered, the most important and outstanding being an extensive bank with several shoal water heads upon it, lying approximately 6 miles to seaward beyond those islands and visible rocks which from the offing appear to be the mainland shore. This bank lies not far inside of the track followed by some of the larger steamships.

### AERIAL PHOTOGRAPHIC SURVEYS

Through the co-operation of the Royal Canadian Air Force under the direction of the Department of the Interior a photographic survey of the shoreline, islands and coastal topography, was carried out in July for the purpose of providing the Hydrographic Service with large scale vertical photographs of the details of land features. The *Cartier's* staff having prepared in advance a close network of triangulated points of the area flown over, were enabled to easily and accurately plot upon the photographs the necessary control stations and to thus co-ordinate the product of observations. The result is a great saving of time and money in the surveying of the adjacent coastline and the more economical production of a chart. It is desired to record the appreciation of the work done by these aerial survey branches of the Government.

### ICE CONDITIONS

From the date of the arrival of the *Cartier* on the north shore on May 22 until June 15 considerable ice fields were met between Natashkwan point and Harrington. This unusual condition was reported to be due to continuous

easterly winds which had driven the ice inwards from the strait of Belle Isle. On June 5 the ship was able to enter Harrington harbour, which had cleared, and but little ice was sighted in all directions. The following day a southeast wind drove the fields inwards, partially filled the harbour and closed all entrances. By June 15 the ice had entirely disappeared from this locality.

On June 20 the *Cartier* proceeded to Belle Isle to investigate and report upon the ice conditions in the Atlantic approaches to the strait. On June 22 and 23 a number of concentric courses were run at distances of 18 miles, 35 miles, and 50 miles off Belle Isle and extending from the vicinity of Hare bay, Newfoundland, northward to the offing from Battle harbour and St. Michael bay, Labrador. No field ice was seen, but there were sighted over fifty icebergs within the strait and about the same number in the offing in the Atlantic. These were reported upon by radio for the benefit of shipping in the locality. A chart has been prepared showing all the bergs sighted, and it is estimated that fully twice the number that were recorded existed in this area at the time of the patrol, visibility due to fog and haze being poor and limited variously to 5 to 15 miles.

### MAGNETIC INVESTIGATIONS

Masters of vessels plying on the Belle Isle-St. Lawrence route having reported abnormal variations of the compass in the vicinity of Natashquan point, the *Cartier* on November 1 carried out certain investigations along the 50th parallel and found, in a distance of about 20 miles, a disturbance resulting in a variation from the normal value for that locality, ranging from 5 degrees westerly to 3 degrees easterly. This provided sufficient evidence to warrant further studies of this phenomenon at a later date when a survey vessel equipped with a gyroscopic compass can be detailed for the purpose.

Summarized the season's work included:—

| | | |
|---|---|---|
| Area charted | square miles | 450 |
| Number of miles of ship sounding | linear miles | 900 |
| Number of miles of boat sounding | linear miles | 800 |

Before laying up, the *Cartier* proceeded to the strait of Canso and examined a reported uncharted shoal in the vicinity of Mulgrave.

During the winter there were prepared at Ottawa a provisional chart of the north shore of the gulf of St. Lawrence from St. Mary island light to Wolf island, with soundings extending to latitude 50° North, or approximately the track usually followed by vessels plying the summer route from Belle Isle to the St. Lawrence river; a plan comprising Port Mulgrave and Port Hawkesbury in strait of Canso; and the completion of the chart of St. Peter bay, Cape Breton island, begun last year.

### MAGDALEN ISLANDS SURVEY—C.G.S. "BAYFIELD"

No other ship being available, the steamer *Bayfield* was detailed to investigate and locate a recently reported shoal lying in the track of deep-draft vessels in the uncharted deep-water central part of lake Superior, and, therefore, was unable to proceed with the continuation of the surveys about the Magdalen islands in the gulf of St. Lawrence.

After fitting out at Charlottetown, the *Bayfield* sailed for Pictou on May 1 for underwater repairs and the installation of an Admiralty echo sounding machine. The vessel was under the command of Mr. H. L. Leadman, with an assisting hydrographic staff composed of Messrs. R. E. Hanson, L. M. Clarke, and N. G. Gray. Sailing master and chief engineer were, respectively, Captain D. M. Snelgrove and S. A. Robson.

Returning to Charlottetown for completion of stores and repairs, the party set sail for lake Superior on May 24, calling en route at Georgetown for a new sounding gig and at Shippigan to land supplies for survey work to be performed in the autumn.

The echo sounder was successfully tested in the gulf, but later on in the river and lakes defects showed up due to faulty work at time of installation. Sault Ste. Marie was arrived at on June 5 and the work on lake Superior commenced on the 12th.

From the last-mentioned date until August 9 the deep-water area from Isle Royale to Caribou island on the Canadian side of the international boundary was sounded, and the reported danger, an extensive bank with a shoal-water summit having as little as 21 feet of water over it, was located, thoroughly examined and charted. In addition, in the 2,300 square miles of hitherto uncharted deep water of the lake there were discovered twenty new banks with least depths of from 36 to 50 fathoms.

The summit of the 21-foot spot, now known as Superior shoal, and lying directly in the path of shipping from Port Arthur to Sault Ste. Marie via the channel north of Michipicoten island, is quite small, about 100 feet in diameter, with a depth of 630 feet only 2 cables distant northeasterly from it. It lies in the main deep of the lake, 38½ statute miles from the nearest land of Slate islands. On earlier foreign charts there is shown, less than three miles from this position, a depth of 1,008 feet. It is not surprising, therefore, in the light of the foregoing data, that the existence of this isolated menace to lake navigation had never previously been reported and hydrographers had no cause to even suspect its existence, and no doubt it has been the cause of many marine disasters.

On the completion of the work, mariners were notified of the results of the survey and the current edition of the chart revised.

On August 9 the *Bayfield* left lake Superior. En route to the gulf, Goderich harbour was visited for the purpose of revising the harbour chart, and on lake Erie magnetic investigations were carried out in the vicinity of Tecumseh shoal where abnormal variation of the compass needle had been reported.

On the 21st of August, Shippigan was reached and last year's charting of Caraquet, Shippigan and Miscou harbours and vicinity was resumed and continued to the end of the season, with an interruption of ten days, spent in surveying the harbour of Dalhousie.

After an investigation of the Admiralty chart of Summerside harbour, the ship laid up at Charlottetown on November 1, the staff returning to Ottawa.

The summary of the field work is as follows:—

| | | |
|---|---|---|
| Area charted | square miles | 2,433 |
| Number of miles of ship sounding | linear miles | 1,263 |
| Number of miles of boat sounding | linear miles | 677 |
| Number of miles of shoreline surveyed | linear miles | 135 |
| Number of days lost through bad weather | | 26 |

As a result of the season's operations, there were prepared in the office during the winter a revision of the general chart of lake Superior, a preliminary chart of the Caraquet, Shippigan, Miscou district, a provisional first edition plan of Dalhousie harbour and revisions made to charts of other localities visited during the field season.

### Saint John River Survey

The charting of the Saint John river from the sea at Saint John harbour to Fredericton, an undertaking in the interests of the public who conduct shipping and transportation operations along that waterway, and in response to many qualified requests for adequate charts for the guidance of the growing yachting and tourist trade, had been under consideration for action at such

time as a trained staff and sufficient funds became available. This work was taken in hand on the opening of navigation in the spring of 1930, with a motor-boat party in charge of Mr. M. A. MacKinnon, assisted by Mr. G. E. Lowe.

On May 23, after fitting out at Saint John, the party was based for the season on East Riverside and Milledgeville, and active survey operations were commenced in the Kennebecasis arm of the river. The undertaking entailed the extension of a triangulation from a Geodetic survey base, traversing of shorelines and the detailed sounding of the area of bays and river from the head of navigable deep water at Perry's point to the main channel of the Saint John river.

Charting work was continued without interruption until November 24 with most satisfactory results and by the end of the season there had been accomplished a complete survey of the Kennebecasis bay between Perry's point and Sand point and the section of the Saint John river between Reversing falls and Lands End, with the exception of some soundings yet to be obtained in South bay.

With another similar season of successful work it is expected to complete the charting as far as Palmer point, the northerly limit of the first of three charts with which it is proposed to cover the river.

A summary of the work follows:—

| | | |
|---|---|---|
| Number of miles of boat sounding | linear miles | 317 |
| Number of miles of coastline surveyed | linear miles | 84 |
| Area charted | square miles | 24 |
| Number of triangulation stations erected | | 170 |
| Number of triangulations observed | | 126 |

### Upper St. Lawrence Survey—C.G.M.L. "Boulton"

The motor launch *Boulton*, an 18-ton day cruiser type, after having been laid up for a year at Belle River, lake St. Clair, was fitted out and commissioned for work on the upper St. Lawrence. Leaving Belle River on May 15, under the command of Mr. Edouard Ghysens, the *Boulton* proceeded down the lakes carrying out harbour chart revision work on the way. Brockville was reached on June 28 where two junior assistants, Messrs. P. Radakir and O. M. Meehan, joined the party.

On lake Erie the following Canadian ports and roadsteads were visited and examined, and changes and improvements noted for the necessary revision of current editions of the charts: Rondeau, Port Stanley, Port Burwell, Long Point bay, Port Dover, Port Maitland and Port Colborne.

On lake Ontario similar work was carried out at Port Weller, Hamilton harbour, Bronte, Oakville, Port Credit, Frenchman bay, Port Whitby, Port Darlington, Newcastle and Port Hope. At Port Weller, the lake Ontario terminus to the new Welland ship canal, soundings were taken off the entrance. Ten days were spent at Hamilton where considerable work was performed for the purpose of preparing a new edition of the chart of the harbour and Burlington bay.

In Presqu'ile bay and bay of Quinte all buoys were located and checked for revision and recommendations submitted for certain alterations in the buoyage scheme, due to changing conditions in the channels.

Trenton was visited in connection with requests for a survey in the vicinity of the new airport, and at Cataraqui bay, field information was obtained for the purpose of locating the new Kingston Elevator terminals on existing charts.

From June 28 until November 3, regular charting operations were conducted on the St. Lawrence river between a point six miles above Brockville to the western end of Grenadier island. An eight-mile stretch of the Canadian and United States main deepwater channel was triangulated, sounded and swept and shoals examined for least depth, in connection with the improved steamer route to the Prescott grain terminals.

Summarized, the season's work comprised:—

| | | |
|---|---|---|
| Harbours investigated for chart revision | | 20 |
| Boat sounding | linear miles | 250 |
| Number of shoals swept and examined | | 78 |
| Number of triangulation stations erected | | 14 |
| Number of triangulation points connected | | 29 |

As a result there were prepared during the winter, revisions of charts of harbours visited, a new edition of Hamilton harbour chart, and working plans showing existing conditions in the portions of the St. Lawrence river channels that were charted.

At the close of the season the *Boulton* and sounding craft were laid up for the winter at the Marine depot, Prescott.

## Lake Winnipeg Survey

The principal work begun last year in Playgreen lake at the northern end of lake Winnipeg was continued this past summer with a party in charge of Mr. J. L. Foreman, assisted by Mr. A. F. Wightman, operating with a sounding gig propelled by an outboard motor. Its object was the investigation of navigational possibilities of Playgreen lake from its head at Warren's Landing throughout the length of its west arm for some sixty-five miles to Whiskeyjack Portage.

Other undertakings on the season's program were a somewhat similar investigation of the steamboat route from Warren's Landing to Norway House and the establishment of magnetic range beacons at Gull harbour for the assistance of lake vessels in the adjustment of their compasses.

### PLAYGREEN LAKE CHANNEL

The camp party of eight men, including the hydrographic staff, left Selkirk on board the C.G.S. *Bradbury* in time to catch the first boat leaving Warren's Landing for Whiskeyjack Portage on June 20, from which date until August 27 hydrographic charting investigations were carried on in the waters of Playgreen lake.

In the course of the survey many navigational difficulties were revealed. Playgreen lake for its entire length is thickly strewn with rocks and small wooded islands, mostly of low elevation, and a rise of three feet in water level above that prevailing during July, 1930, would submerge about 50 per cent of the previously exposed rocks or unwooded islands and thus make additional aids for navigation necessary. Generally considered, deeper channels as well as more numerous rock outcrops are found on the east side of the lake. The west side revealed shoaler water and fewer rocks. In areas where the depth of water is six feet or less and bottom of mud, the weed growth by the latter part of August is sufficiently dense to prevent the continuous passage of a large 20-horsepower boat. In the many narrow and confined channels strong currents up to five miles per hour are encountered.

The limiting depth of water along courses known and used by the most reliable and experienced pilot, where to some extent natural range marks are observable, is only five and one-half feet at the stage of low water lake level prevailing during the summer season of 1930. After sounding out and definitely fixing over 300 miles of sounding lines, new channels and courses were determined wherein the limiting depth of water was increased to six and one-half feet, which may fairly conclusively be taken as about the best obtainable, but in order to make navigation possible over these new courses a very extensive system of buoying would be necessary, particularly as natural objects suitable for range marks are not discernible or are inconspicuous.

In connection with the preparation of a preliminary chart of the route through Playgreen lake, some assistance was had from aerial photographs taken some years ago in connection with a forestry survey, and for proposed continuation of the hydrographic work in this locality arrangements are being made with the aerial photographic services for a more complete vertical aerial survey at a low altitude of this entire area.

### WINNIPEG LAKE LEVELS

Partly as a result of the season's investigations and from research work in other sources respecting the elevation of lake Winnipeg as affecting navigation on that body and its outlet through Playgreen lake, the following observations on existing conditions are made: the average lake level for the 1930 season of navigation was (*a*) less than half a foot above the lowest lake level recorded during the past seventeen years; (*b*) about two feet lower than a normal year; (*c*) about 3½ to 4 feet lower than a year of average high water, or a condition as prevailed during surveys made in 1901 to 1904 and used as datum of soundings for the earlier charts.

Also, it is observed that storm conditions most prevalent during September may temporarily change lake levels by two or three feet, and consequently, with unfavourable winds, the approach to, or departure from Warren's Landing is made the more difficult and hazardous. The levels prevailing during the past season of navigation were barely sufficient to permit of average cargo draft, and at times such vessels as the ss. *Wolverine* experienced much difficulty in making port.

To provide for the safe and economical navigation of deeper draft craft than what are now able to use the route through Playgreen lake, it appears that certain remedial works may be necessary to raise and maintain the lake levels.

### GULL HARBOUR MAGNETIC RANGE BEACONS

On September 1 the hydrographic party left Playgreen lake and were transported to the southern part of lake Winnipeg to the vicinity of Gull harbour, where three weeks were spent in establishing two sets of magnetic range beacons for the assistance of mariners in adjusting their vessels' compasses. The work entailed a series of astronomical and magnetic observations, the clearing of considerable wooded territory, and the locating and erection of suitable range beacons.

The information resulting from this work will be issued to lake navigators in the form of a notice to mariners on the opening of navigation in the spring.

The party returned to Selkirk on September 22, where boats and equipment were stored, the crew paid off, and the staff returned to Ottawa, where for the winter they were engaged upon the reduction of the season's observations and the preparation of preliminary charts.

A summary of the work is as follows:—

| | | |
|---|---|---|
| Number of miles of sounding | linear miles | 350 |
| Area covered by triangulation | square miles | 95 |
| Number of triangulation stations erected | | 85 |
| Number of miles of shoreline traversed | linear miles | 15 |
| Number of islands and rocks located | | 990 |

## GREAT SLAVE LAKE SURVEY—C.G.S. "PILOT NO. 1"

Under the name of the above geographical division of the work the charting of the shores and waters of Great Slave lake had been carried on for two seasons. This last spring, however, it was found necessary to commission this establishment for exploratory work farther afield in the Northwest Territories and it was organized as an expedition to the Mackenzie river delta and the Western Arctic.

The object was to determine whether or not a navigable channel existed through the delta and out into the Arctic ocean that would permit sea-going Arctic vessels to enter sheltered waters, and so make contact with the steamers operating on the Mackenzie river. A channel with about 18 feet of water would be required for such a purpose.

ITINERARY

The expedition was in charge of Mr. Norman Wilson, with Mr. G. W. Baker as junior assistant, who left Ottawa, May 8, and travelled to Fort Smith, N.W.T., via Edmonton and Waterways, arriving on the 18th. The hydrographic auxiliary schooner *Pilot No. 1*, a 40-foot craft designed and built in 1928 for charting work in these waters, had wintered at this point and it was launched on May 22 and fitted out, and with a total complement of seven, and carrying a 16-foot dinghy fitted with outboard engine and a Peterborough canoe, left Fort Smith on the 27th for the 1,290-mile trip to Aklavik at the head of the Mackenzie delta. The route led down the Slave river for 190 miles to Fort Resolution on Great Slave lake, along the south shore of the latter body of water for 120 miles to the head of the Mackenzie; and thence down that river for 980 miles to Aklavik. Great Slave lake was reached on May 29 where a delay occurred on account of ice conditions at the mouth of the river and it was June 3 before the party arrived at Fort Resolution on the lake. A full week was spent at this point waiting for the ice to clear sufficiently and on the 10th the *Pilot* proceeded westward and northward again, arriving at Aklavik on June 20. A running schedule of 18 hours a day was maintained with a stopover of 36 hours at Fort Simpson for engine repairs and overnight rests at Norman and Good Hope.

Two days only were spent at Aklavik, situated at the head of the delta, the northernmost settlement on the Mackenzie and the last port of call for the river steamers from the south. On the 22nd of June, having engaged a pilot with a knowledge of the various channels of the delta leading to the sea, the party went on down to the Arctic, following the east channel for 125 miles to Tununuk, a small island that lies at the parting of three principal routes, one leading northeastward into the Arctic for Coronation gulf, a second westward through the outer part of the delta towards the open sea and along the coast on the way to Herschel island, and the third due northward to the outermost islands of the delta. Tununuk is a gathering ground of the Mackenzie river Eskimos and also the contemplated contact for seagoing and river vessels. It was here that the hydrographic party commenced exploration activities.

From Tununuk they proceeded northward down the Richards island channel to its mouth and thence variously amongst the outer islands, following their outer fringe in the open sea and westward and southward to the mainland shore at Tent island, arriving back upstream at Aklavik on July 16 to replace the local pilot and obtain medical attendance.

From here the Arctic and the numerous channels and islands were again visited and operations continued until August 27, on which date the party again arrived at Aklavik on its way south. The return trip upstream was accomplished by the *Pilot No. 1* under its own power, in 18½ days without incident, Fort Smith being reached on September 22. All survey gear was stored at this point and the schooner hauled out into winter quarters.

The party left Fort Smith by airplane transportation on the morning of the 26th, arriving at Edmonton the following day where the crew were paid off and the hydrographic staff returned to Ottawa.

CHARTING OPERATIONS

The territory under investigation, and which was partially covered in an exploratory manner in the two months' time available, extended from the prin-

cipal river entrance at Tununuk westward through various winding streams of the outer part of the delta and thence along the Arctic mainland coast for 60 miles to Shingle point, and northward for 40 miles to Hooper island, the outer extremity of the group. This territory embraced a triangular area representing an area of some 1,700 square miles.

The existing chart, or map, of this area is little better than a rough sketch compiled partly from obscure sources and was of little assistance to the hydrographic party, and often very misleading on account of the many intersecting channels and passages that wind in tortuous ways seaward, only to end in a wide spread area of uniformly shoal water. In places where large stretches of open sea were shown, islands were found to exist. Again, bodies of land originally charted as islands of considerable extent were discovered to be groups of small knolls connected by sandbars and inclosing large areas of tidal flats. This condition is not surprising when one considers that many of the outlying features on the map are from sketches and observations of the Franklin expeditions of 1825-27 and that 103 years later the members of the hydrographic expedition were the first white men known to set foot upon these outer islands of the delta. Indications point to extensive and rapid changes in the size and shape of these islands. They are of alluvial formation, composed almost entirely of fine river silt. In one instance it was noted that during a moderate storm lasting less than 36 hours, from 6 to 8 feet of the end of an island 8 feet in height was washed away. It may be assumed that changes in the directions and depths of channels and passages are correspondingly rapid.

The area under investigation was covered as fully as the short Arctic season permitted. Some 683 linear nautical miles of soundings were run off the mainland coast in the approaches to the various mouths of the delta, and in addition about 150 miles of soundings obtained in exploring unsurveyed and unmapped channels. Three large channels through the delta, that offered possible routes from the sea to the deeper water of the inside river channels, were explored and sounded throughout their length and many smaller ones were investigated and sounded in part.

The outer group of islands was triangulated and their coastline sketched and the waters between well sounded. Also, fifty miles of triangulation traverse was carried along narrow deep channels through unsurveyed territory, the results being checked by a tie-in with Topographical Survey monuments on the mainland.

### RESULT OF INVESTIGATIONS

Although the shortness of the Arctic season did not permit of a thorough and complete examination of the waterways of so great an area under investigation, the information obtained was comprehensive and conclusive enough to show that in the territory west of Richards island there are no indications of a deepwater channel leading all the way from the Mackenzie river to the Arctic ocean. During the past season it would have been utterly impossible to carry more than nine feet into the river, from the westward, under the most favourable conditions.

The existing conditions, in a general summarization, were found as follows: in the delta where the streams are narrow and the currents comparatively fast, the channel depths vary from 15 feet to 8 fathoms, in some places reaching depths of 10 and 12 fathoms. These depths continue generally until the outer islands are reached where the streams broaden out to many times their ordinary width, with a consequent loss of velocity and depth, and the channels proper become less sharply defined. Just beyond the mouths, where the protection of the islands ceases, and incoming tides and ocean swells have an uninterrupted sweep, the channels shoal very rapidly and extensive bars are encountered. The depths, in different channels, over these bars, vary from 2 to 8 feet. On a series of courses

reaching from Richards islands across the whole seaward approaches of the delta streams to the westward mainland at Tent island, the soundings obtained, well out of sight of land, showed a maximum depth of 12 feet, unreduced for tide. This affords some idea of the extent of the offshore shoal water area.

LIMIT OF NAVIGATION

Small craft drawing from three to four feet of water may go practically anywhere in the delta approaches and sheltered channels. In only a few localities is there need for local knowledge respecting the depths. For larger craft the channels are for the most part too narrow and crooked and the currents too erratic to permit of safe navigation, even with expert pilotage.

According to the best local information available to the hydrographic party, the largest craft operating between Aklavik at the head of the delta and Herschel island on the open coast draws 6 feet when fully loaded, and up to the time of the expedition's exploration this vessel had accomplished only one trip at full draught. The inference was that it was now operated with a part load only.

FUTURE CHARTING

As a result of the conditions found last season and as outlined in the foregoing summarization, further hydrographic charting and investigation in the delta by this Service would seem unwarranted, until such time as an aerial photographic survey of the outer delta has been completely made and reasonably accurate maps of the area are available, in order to allow the whole time of the short Arctic season to be spent entirely on sounding and delineation of channels.

The results of photographic flights conducted during the season and furnished to this service by the Aerial Surveys Branch of the Department of the Interior, were of material assistance in co-ordinating the hydrographic data obtained.

This service also desires to express its appreciation of the co-operation and assistance furnished by resident officials of the North West Territories Branch of the Department of the Interior and officers of the Canadian Corps of Signals in the MacKenzie district.

## Pacific Coast Survey—C.G.S. "Lillooet" and Houseboats "Pender" and "Somass"

The Pacific Coast survey, with district headquarters at Victoria, B.C., is in charge of Mr. H. D. Parizeau and this past season conducted charting and other hydrographic operations with a staff of eleven senior and junior assistants, and using the steamer *Lillooet* and surveying houseboats *Pender* and *Somass*.

The assisting staff comprised senior assistants Commander J. H. Knight and Messrs. L. R. Davies and W. K. Willis, and junior assistants Messrs. R. H. Ettershank, A. Stewardson, R. B. Young, H. N. McQuarrie, J. O. Johnson, John Rutley, Victor Wiebe, G. W. Turner and G. W. Lacroix, the last named employee replacing Mr. Turner who resigned in January. The sailing master of the *Lillooet* was Capt. J. J. Moore and the chief engineer, Mr. A. R. Borrowman. Five of the junior assistants, graduates of universities of applied science, entered the service at the beginning of the season, the increase in the staff having been authorized in order to provide a sufficient field force for all vessels, the new houseboat *Pender* having been constructed and commissioned as an additional unit of the Pacific charting fleet.

Extensive alterations made to the *Lillooet,* to prepare the ship for work in the more exposed waters of the west coast of Vancouver, delayed the commissioning and she sailed from Victoria on charting duty on June 20. The vessel laid up for the winter season on November 3.

The houseboat *Somass* was fitted out and commissioned on April 15 at Victoria and was laid up in winter quarters at Grappler creek, Barkley sound, on October 28.

The houseboat *Pender* left Victoria on June 16 and was laid up similarly with the *Somass* in Barkley sound on October 28.

### SEASON'S OPERATIONS

The *Lillooet*, after towing the houseboats on the 12th and 16th of June, respectively, from Victoria to the scene of their principal operations in Barkley sound, west coast of Vancouver island, a distance of 100 miles up the west coast of Vancouver island, and having carried out a series of tests of the Echo Sounding apparatus in deep water 150 miles off the coast, returned to Victoria for completion of repairs. From June 20 until July 15 the ship was variously employed as follows: sweeping in Vancouver harbour; sweeping at Squamish; investigation of a reported obstruction in Nanaimo harbour channel; sweeping for a reported uncharted shoal in Queen Charlotte sound; large scale survey in the vicinity of Kyuquot; locating an uncharted rock at Matilda creek.

The vessel arrived at Barkley sound on July 16 and until the 29th of October conducted coast charting operations both within the sound and along sixty miles of the outer coast where 30 large surveying beacons were erected in connection with an aerial photographic survey of the coast. During this period interruptions in the conduct of the season's principal work occurred when the vessel returned for three days to Victoria for repairs and also revisited Nanaimo to assist in the re-establishment of buoys.

On October 29 the *Lillooet* completed the transport of the two houseboat parties back to Victoria. Foul weather caused some further work at Vancouver to be abandoned and the ship laid up on November 3.

### "SOMASS" PARTY

In the early part of the season this party attached to the houseboat *Somass* in charge of Commander J. H. Knight, completed a resurvey of Victoria harbour between the 15th of April and the end of May when they were transferred to Squamish and the head of Howe sound was charted for the purpose of locating a suitable anchorage for deep sea vessels trading into those waters.

On June 12, Commander Knight having been transferred over to take charge of the new houseboat *Pender*, Mr. L. R. Davies was placed in charge of the *Somass* party with Mr. Turner as assistant and a crew of seven men, and the craft was towed by the *Lillooet* to the sheltered waters of Barkley sound, where for the remainder of the season this detachment was employed in charting the upper end of Middle channel, Effingham inlet, Junction channel, Useless arm and Rainy bay, and portions of the Broken Group islands.

The *Somass*, originally a wooden-hulled scow, was converted into a surveying houseboat in 1924 and its overall dimensions are: length 52 feet; beam 17 feet; and depth 5 feet. It has been in hydrographic service since that date and on the surveying grounds it is accompanied by the *Fraser*, a 100-ton water scow which, in addition to carrying the party's fresh water supply, provides additional housing and chartroom accommodations.

Summarized, the work accomplished by the *Somass* party included:—

| | | |
|---|---|---|
| Area charted | square miles | 47 |
| Coastline surveyed | linear miles | 110 |
| Number of mountain summits topographically surveyed | | 288 |

### "PENDER" PARTY

The advantages of a self-contained and mobile form of accommodation for detached parties as provided by a houseboat, over the older arrangement of hous-

ing survey parties under canvas on shore, were well demonstrated by the results obtained by parties using the *Somass* in the last six years. The system has worked economically and has assisted in expediting charting work on the British Columbia coast where so many minor surveys have to be undertaken in an effort to catch up with the requests of shipping and of canning and lumbering industries. In consequence, it was deemed expedient and necessary to procure an additional and larger craft of a somewhat similar type and during the past year there was designed, built and commissioned, the new houseboat *Pender*.

Her principal dimensions are: length over all, 100 feet; extreme breadth, 31 feet; and depth, 6 feet, with a displacement of 218 tons. The boat is of wood, strongly built and with metal fastenings, with a closed-in forecastle deck for protection in a seaway when in tow of a steamer. Though not self-propelled, the craft is fitted with bow and stern anchoring gear, towing device and hoisting davits for small boats. Accommodation is provided for a hydrographic staff of three officers with ample chartroom space, and for a crew of fourteen. It contains storage space for fresh water and for gasoline fuel for the attendant motorboats, and the houseboat is fitted with modern appliances, electric lighting, running water and refrigeration.

On June 16, the *Pender*, with Commander Knight in charge, assisted by Messrs. R. H. Ettershank and John Rutley, was towed by the *Lillooet* from Victoria to Barkley sound and on the 17th the party commenced the survey of Alberni canal. This work was completed on September 13 when the *Pender* was moved to the Broken Group islands in the outer part of the sound where, in conjunction with the *Somass* party, they charted the islands until the end of the season on October 28.

The two houseboats were laid up together at Grappler creek and the staffs and crews returned to Victoria, where the former were employed in the district offices and the latter paid off for the winter.

A summary of the *Pender's* party season's work includes:—

| | | |
|---|---|---|
| Area charted | square miles | 46 |
| Coastline surveyed | linear miles | 125 |
| Number of mountain summits topographically surveyed | | 247 |

With respect to the charting undertaken by the steamer *Lillooet* off the west coast of Vancouver island, and the work accomplished during the season, a tabulation or summary of the net results cannot adequately or clearly express the amount of detail involved, nor would such a report account comprehensively for the time expended. The peculiarities of local weather conditions and the nature of the submerged terrain to be sounded must be understood as these have a very pronounced effect upon the general methods employed and on the economical conduct of the work.

In the Alberni canal strong winds commence to blow about mid forenoon, preventing the carrying on of sounding work for the remainder of the day. In consequence, this phase of the work has to be undertaken between three and four o'clock in the morning and continued until such time as the weather becomes too unfavourable.

In the Barkley sound locality the extent of sounding work accomplished cannot be expressed in mileage because much of the time is consumed in minute examination of comparatively small areas where the depths change rapidly and unexpectedly from shoals of 2 or 3 fathoms to pockets and gullies of 18- and 20-fathom depths, and many pinnacle rocks are suspected to exist. Some of these were found to have as little as 4 and 5 feet of water over them.

## Division of Tides and Currents

### STAFF

The duties of this division of the Hydrographic Service were carried out by the customary staff of three permanent technical officers and twelve seasonal current observers and temporary tidal observers, six of the latter being on the Atlantic and six on the Pacific coast. The seasonal and temporary field observers are employed according to the work undertaken.

The subdivision of the work was conducted as follows:—

### ATLANTIC COAST DISTRICT

Mr. H. W. Jones, Senior Tidal and Current Surveyor and Officer in Charge, supervised, under the direction of the Hydrographer, the duties at headquarters, Ottawa, comprising the reduction of data, etc., the preparation of all "Tide Tables", attention to correspondence, and the work of both coasts generally. He was assisted by Mr. R. B. Lee, Junior Tidal and Current Surveyor, in field work and in the preparation of "Tide Tables", and by two stenographers who, in addition to general office assistance, are employed upon test checking of tidal records, tabulation of data and other related work.

### PACIFIC COAST DISTRICT

Mr. S. C. Haydon, Senior Tidal and Current Surveyor, with district headquarters at Vancouver, supervised the field work and inspected the permanent tidal stations on the Pacific coast, arranged for secondary stations, and assisted in the preparation of the Pacific coast "Tide Tables".

For some years additional technical assistance in preparing tidal and current data at headquarters was procured by detailing a junior hydrographic engineer from the Division of Hydrography to that of tidal work, but on account of the pressure of work in the hydrographic divisions this has not been possible for the past two years, and the compilation of tidal data and preparation of publications continue in arrears for lack of this necessary additional technical assistance. There is much work to be done in the reduction of tidal data to a form for ready reference, and at the same time it would be made available to transmit to the British Admiralty as improved information, or to other hydrographic offices.

The reference books "Tide Levels and Datum Planes in Eastern Canada", and the similar publication for the Pacific need to be brought up to date, which is a matter of considerable preparation.

Two reports are out of print, namely, "The Currents in Belle Isle Strait", and "The Currents on the Southeast Coast of Newfoundland", and before republishing these it is the intention to condense their contents somewhat, with the object of combining the two into one pamphlet.

In view of the proposed investigation of tidal currents in the lower St. Lawrence and along the route from the river to Belle Isle, further additional technical staff will be required for this division of the work.

More vessels bound for the St. Lawrence via Belle Isle strait now pass north of Anticosti through Mingan channel than formerly. This is becoming recognized as the best inward bound route, while outward bound they pass to the southward of Anticosti, thus taking advantage of the Gaspe current. More complete information on the tidal streams in the Mingan channel is, therefore, to be desired, while the currents off pointe des Monts which are reported as having a tendency to set vessels over to the south shore have never been examined to determine their extent and influence on navigation. Captains of vessels grounding on the south shore of the St. Lawrence estuary are being given the

benefit of doubt regarding these currents by the Wreck Commissioner and for this reason first attention should be given to this area. Investigation of the Gaspe current eastward from cape Magdalen in 1895, 1911 and 1912, was thorough but could be well continued to the westward to meet the survey in the vicinity of pointe des Monts, and even beyond to its beginning near the mouth of the Saguenay when appropriations and limited facilities of the Tidal division permit. Commencement of the work depends upon obtaining a steamer with deep sea anchorage equipment and additional technical staff of the Tidal and Current Division.

The work of Dr. Dawson in the northeastern corner of the gulf between Anticosti and Belle Isle, showed the currents to be extremely variable in direction and weak in velocity, so no predictions could be made or rules laid down for the direction of navigators and it is considered that investigations in this region might well be continued.

St. Lawrence River.—In preparing tidal information for the charts it was found that data for the time of the turn of tidal streams and velocities attained is lacking in many localities. To be complete the charts should show such information, and this can be obtained only by further tidal investigation.

Hudson Strait.—Investigation of the currents in this immense waterway is desirable but can be undertaken only when a much larger staff and a suitable vessel is available.

### SEASONAL TIDE GAUGES

*Atlantic Coast.*—It was thought advisable to establish beyond dispute the height that the tide may attain normally at points in the upper reaches of the bay of Fundy because of the possible effects of tidal power development in Passamaquoddy bay at the present time being promoted by power interests. This bay would be almost wholly cut off from tidal action which would be equivalent to an alteration in the configuration of the bay of Fundy with possible consequence to the dyked lands around the head of this bay through the agency of the tides. There are perhaps four hundred miles of dykes that might be affected. Information that may be used in future to support or refute damage claims, which might be made, requires a basis of several seasons of records to obtain the natural variations in the tide, and seasonal gauges were erected and operated through the summer, now for the third season, at the following points: In Nova Scotia near the head of tide in the Salmon river below Truro; in New Brunswick in the Memramcook river above College bridge; in the Petitcodiac river below Salisbury; and at Moncton. The records obtained should be sufficient for the purposes and it is not the intention to continue them another year, except possibly at Moncton.

Two other seasonal gauges, one at Westport, Grand passage, at the mouth of the bay and another at Tiverton, Petit passage, were installed in conjunction with the current investigations locally, and to obtain tidal information for the charts. Benchmarks were established at these places.

Besides the Bay of Fundy gauges and the one at Churchill, operated by arrangement with the Department of Railways and Canals, the gauge at St. François, Orleans island, was maintained another season to assist in the local dredging operations.

The comparison of water levels between Grosse Isle and St. François was very carefully reduced to show the datum for dredging in this channel in relation to true mean sea level and the datum planes of the other dredged channels.

*Pacific Coast.*—Gauges were operated at Humpback bay, Porcher island, near the mouth of the Skeena river, and another in Beaver passage (where a current observer was stationed), for the establishment of datum for hydrographic surveys and for tidal information to be published in the tide tables.

## INVESTIGATION OF CURRENTS

*Atlantic Coast.*—Observations of the turn of the tidal streams in Coudres channel were continued from the lightship stationed there during the past summer. Because the lightship is not in mid-channel the swing of the vessel at the turn of the tide showed considerable variation in the 1929 results, so this year daylight " slacks " as seen in mid-channel only were observed. The tidal streams here turn in unison with the tide at Father Point better than with the tide at Quebec.

The time of slack water in Grand passage and Petit passage, two channels through Digby neck, between St. Mary bay and the bay of Fundy, was taken and current velocities measured. The data obtained has been prepared for the charts and tide tables.

*Pacific Coast.*—The turn of the tidal stream off cape Scott, the north-eastern extremity of Vancouver island, was taken again during the past summer, and the similar work at Race rocks, Fuca strait, also continued in order to obtain sufficient observations for a harmonic analysis and predictions, there being now three seasons' data at this place. The only new current work was at Beaver pass, between Spicer and MacCaulay islands, when a seasonal observer was placed in temporary camping quarters.

## FIELD WORK (ATLANTIC COAST)

Mr. R. B. Lee set out early in May to erect the gauges at St. François, Moncton, Memramcook, Boundary creek and Truro. On June 5, Mr. Jones proceeded to arrange for the current observations in Grand and Petit passages, Digby, N.S. Tide gauges were erected and attendants engaged, also observers, to note the time of the turn of the tidal streams in each passage for the season. Measurements of the current velocities were made with meters and the use of motorboats. As up to the present there was no information as to the behaviour of the tide at the head of St. Mary bay, advantage of proximity was taken to get a few staff readings of the tide there. It was supposed previously that the range of tide would be much more than what was found to be the case and the tide table data has been corrected accordingly.

At Windsor, N.S., a high tide elevation was levelled in. It occurred February 14 last and proved to be the highest yet noted, excepting the one during the Saxby gale, 1869. Another record tide was that of January 6 last in the St. Lawrence, which was the highest yet recorded at Quebec.

In August, the round of the principal tidal stations for inspection and repairs was begun and a journey to cape Race was made to see if it would be possible to establish a permanent tide gauge there. Investigation showed that because of the expense and comparative inaccessibility of cape Race, it would be advisable to arrange for a gauge location in Saint John's harbour, Newfoundland, where the requisite accommodation and co-operation can be obtained.

Besides the need of additional permanent tidal stations for predictions, particularly at Saint John's or cape Race, Newfoundland, and somewhere in the locality of cape Whittle, on the north shore of the gulf of St. Lawrence, increasing scientific interest as to what is happening to the Atlantic seaboard, aroused by recent earthquakes, gives further reason for their establishment. They are the only means of determining whether there is a rising or subsidence of the northeastern part of the continent. As part of a plan to this end, the tidal stations at St. Paul island and Forteau bay, straits of Belle Isle, could be reopened and would be the first to give results because of the long periods of records previously obtained at these places. The former station was temporarily closed in 1927 and the latter in 1917.

REPORTS ON CURRENTS

Reports on tidal currents for assistance to shipping, as enumerated below, are available on request except the latter two which are temporarily out of stock.

"Currents in the Entrance to the St. Lawrence".
"Currents in the Gulf of St. Lawrence".
"Currents in the Bay of Fundy".
"Currents in Belle Isle Strait".
"Currents off the Southeast Coast of Newfoundland".

Besides the above, predictions of the turn of tidal streams in straits and passes are published with the tide tables.

TIDE TABLES

The annual tide tables were prepared and printed as usual. The 1931 distribution, except a reserve held for later demands, was sent out before the beginning of the new year and numbered 104,000 of the different editions combined. It is intended that the large complete edition shall serve the ocean steamships while the less expensive small books, abridged for different regions, are more convenient for fishermen and shore use generally. A reduction in the number of large books printed in future is thus made possible, and a wider service accomplished at a saving of expense.

ATLANTIC TIDE TABLES

"Eastern Coasts of Canada (unabridged)".
"Quebec and Father Point (abridged)".
"Charlottetown & Strait of Canso (abridged)".
"Halifax and Sydney".
"Saint John & Bay of Fundy".
"Port Churchill, Nelson and Hudson Bay" (leaflet).
"Moose Factory, James Bay" (leaflet).
"Rustico, P.E.I." (leaflet) for Canadian National Railway Hotel at Charlottetown.

PACIFIC TIDE TABLES

"Pacific Coast of Canada" (unabridged).
"Vancouver & Sand Heads" (unabridged).
"Prince Rupert (abridged)".

The tide tables printed by the St. Lawrence Ship Channel Branch were prepared as in past years by the Tidal Division of the Hydrographic Service.

PRECISE WATER LEVELS DIVISION

This division of the Hydrographic Service carries on the precise recording of the fluctuations of the water surface levels of the Great Lakes and St. Lawrence river, from Port Arthur on lake Superior through the system of lakes and waterways to within twenty miles of Quebec harbour, and throughout the past year was continuously employed upon the maintenance of automatic gauging stations at 44 locations (one less than in the previous year), the compilation of the records obtained and the circulation of the reduced data to navigation, engineering, scientific and other related interests. The staff employed comprise Mr. Charles A. Price, Officer in Charge of the division, and four assistants, Messrs. W. J. Miller, A. S. Matthewman, H. P. Williams and A. G. Tuttle. There were also employed forty river observers on part time duties at the observation stations.

## HISTORICAL OUTLINE OF SYSTEMATIC RECORDING OF WATER LEVELS OF THE GREAT LAKES AND ST. LAWRENCE

The earliest reference to variations in the water levels of the Great Lakes appears to be the mention in "Alexander Mackenzie's Voyages" of a sudden change of about five vertical feet in the water level, of lake Superior, at the "Grand Portage" about the year 1790. This sudden change in water level at the "Grand Portage," would appear to have been an outstanding barometric seiche, a number of which have been graphically registered during the past decade at other points on the same lake.

In connection with British hydrographic services and the charting of Canadian waters, observations to determine the relative elevations of the Great Lakes and St. Lawrence to mean sea level were made as early as the year 1823, by the Admiralty hydrographic surveyor Bayfield, using simultaneous barometric observations, a method which he later reported as unreliable and the resulting elevations as erroneous. Twenty-four years later, in 1847, Bayfield's notes record the following water elevations "by Americans and British agreeing within a foot" . . .

"Lake Superior is about 600 feet above Atlantic. Lake Huron is 13 feet above lake Erie. Falls of St. Mary 18½ feet by American engineers—Neebish and Sugar Id. rapids 4 feet by Major Long's estimate which I think is too little. Lake Erie determined to be 565 feet above Tide Waters of the Hudson by order of the Commissioners of the Great Western Canal of New York."

He gives the following figures under "Lakes above Tide Water at Three Rivers", and in comparison are shown the average water elevations above mean sea-level, during the period 1921 to 1930 inclusive, for the same lakes as adopted by the Canadian Hydrographic Service, and based on precise water level gaugings as reduced to the 1903 adjustment of the precise land level net.

| | Year 1847 | Period 1921 to 1930 |
|---|---|---|
| | Estimated elevation | Precise elevation |
| | feet | feet |
| Lake Superior | 600·00 | 601·82 |
| Lake Huron | 578·00 | 579·56 |
| Lake Erie | 565·00 | 561·80 |
| Lake Ontario | 234·00 | 245·67 |

Systematic recording of the Great Lakes water levels was not begun until 1860 and the records prior to that date are generally not continuous, and the planes of reference cannot be definitely established. From 1860 to 1900 the available records are those obtained from the reading of staff gauges at some six major locations, by the United States Lake Survey, and at three points on lake Ontario by Canadian authorities. At some of these locations the connections between the readings and permanent reference points were not at all times accurately maintained, and the resulting data cannot all be precisely co-ordinated with the present day reference planes.

Automatic or self-registering gauges, for the precise recording of both abnormal and minute fluctuations of the lake levels, were established first by the United States authorities at their major locations on the lakes and connecting rivers in the year 1900, and in 1930 they had in permanent operation some fifteen stations. In 1906 the Dominion government installed three self-registering graphic gauges which were maintained under the Department of Public Works, the number gradually increasing to nine by 1912, in which year

the investigation of the Great Lakes and St. Lawrence water levels and the maintenance and operation of the various gauging stations, was transferred to the Hydrographic Service and have since been under its direction. In the same year, 1912, similar operations were begun on the St. Lawrence river from Montreal to Quebec, and in 1915 on the upper St. Lawrence from Prescott to Montreal, a number of gauging stations being established in these sections.

Since 1920 the number of stations varied between 26 and 45 and this past year there were in operation 44, of which 38 were maintained all year, as located in the following sections: Lake Superior, 2; St. Mary river, 4; Georgian bay, 2; lake Huron, 1; St. Clair river, 2; Detroit river, 2; lake Erie, 2; lake Ontario, 4; St. Lawrence river, Prescott to Cornwall, 7; lake St. Francis, 2; St. Lawrence river, lake St. Francis to lake St. Louis, 3; Ottawa river (lake of Two Mountains), 1; lake St. Louis, 2; St. Lawrence river, Montreal to Quebec, 10.

At Port Weller, the lower entrance to the new Welland Ship Canal, a gauging station was established in August, 1929, and since the canal has opened for navigation, the continuous records show that when the contents of Lock No. 1 are released into the basin, formed by the approach piers, a seiche action is generated in which the water elevations rise and fall through a maximum range of over one and a half feet. The records also show that under average traffic conditions, three of these rapid fluctuations occur within any period of sixty minutes, with no appreciable horizontal movement, or current, of the water noticeable beyond a distance of about 1,000 feet from the lower gates of the lock.

A gauge well at the new Government elevator of the Prescott terminals, has been completed and it is proposed to install a self-registering gauge at this point to obtain a reliable value of the river slope, after which the older station at Prescott town will be discontinued.

A new location was adopted at Coteau Landing when the site previously occupied had to be abandoned, and at Montreal provision is being made for a permanent all year location at the outer end of the improved King Edward pier.

As a result of the year's operation, of these 44 stations, there were obtained 508 months of continuous records, an increase of 6 months over those secured in 1929, and 410 more months of records than in 1912 when operations were transferred to the Hydrographic Service. Well over 750,000 deductions were computed and compiled in 1930, entailing the use of approximately 1,500,000 sets of figures in the office activities under this division.

The regular inspections of all stations were carried out for the purpose of checking datums, maintenance, improvements and relocating of sites, or for co-relating associated hydrometric and levelling data obtained by other departments and by United States engineering services with whom co-operation is maintained, resulting in a more complete standardization of datums and reference planes than was possible in the earlier years of unrelated and non-continuous observations.

The importance and value of this continuity of recording the water levels of the whole system, from the head of the lakes to tidewater, cannot be too strongly stressed at this time when so many major national and international projects for the intensive utilization of navigational and power possibilities of the Great Lakes—St. Lawrence Waterways, are under consideration.

Special precise water level elevations were taken in Montreal harbour and vicinity on selected dates, between June and November of 1930, in connection with the improvement of the St. Lawrence Ship Channel.

In the office, in addition to the regular duties of this division, the staff prepared a revision of a graphical plan in connection with the department's registry of shipping, and during the field season the officer in charge on several occasions assisted the Division of Hydrography in procuring field survey data for the purpose of revising charts of the Great Lakes harbours.

During the year there were issued the regular twenty-three "Precise Water Level Bulletins," and the publication of profiles, graphs, etc., was increased to 100 in number or almost twice that of the preceding year. A total of 24,398 sheets of data being issued during the year.

Attached are the following tabulations:—

1. Monthly Mean Water Surface Elevations of the Great Lakes for the year 1930.
2. Monthly Mean Water Surface Elevations of the St. Lawrence River for the year 1930.
3. List of automatic gauging stations, their locations and periods of operation, during 1930.

## Division of Chart Construction

This division of the service, comprising sections engaged in compilation and construction of new charts and the revision of older editions, was continuously employed throughout the year in Cartographic drafting, engraving and calculations, and in the collection and filing of data relative to the preparation of mariners charts. The work is under the direction of Mr. G. L. Crichton, and the authorized establishment of the division is composed of a chief of division, assistant chief, 5 senior map draftsmen, 1 map draftsman, 2 student map draftsmen, 1 chief map engraver, 4 senior copperplate map engravers, 1 junior copperplate map engraver and 1 apprentice copperplate map engraver. At the end of the fiscal year the personnel was brought almost up to full strength by the transference of 2 senior map draftsmen from a mapping branch of the Department of the Interior and provision is being made for the completion of the staffing by the transfer of another cartographer from the same service.

During the year the principal work carried out by the division was as follows:—

| | |
|---|---|
| Number of 1st editions of newly engraved charts received, or in the lithographer's hands | 1 |
| Number of new editions of engraved charts carried over from previous year, completed during the present year, or now in the lithographer's hands | 20 |
| Number of 1st editions of new photo-lithographed charts received, or in the lithographer's hands | 14 |
| Number of 1st editions of new charts, process prints | 2 |
| Number of new editions of photo-lithographed charts carried over from previous year, completed during the present year, or now in the hands of the lithographer | 7 |
| Number of new index maps or diagrams printed | 6 |

In addition to the foregoing, the work in hand at the close of the fiscal year included:—

| | |
|---|---|
| Number of charts being revised for new editions | 10 |
| Number of charts awaiting revision for new editions | 6 |
| Number of new charts being engraved | 6 |
| Number of new charts being compiled | 4 |
| Number of new preliminary process prints in preparation | 4 |

As in past years all copies of charts issued to the public were corrected by hand up to the date of issue for small items such as changes in aids to navigation that had taken effect since the receipt of the charts from the printers. The total number of different publications thus amended for minor details was 72; the number of copies, 9,737; and the individual hand corrections made totalled 24,115. This was only 30 per cent of similar work performed in the preceding year for the reason that in 1929 efforts were concentrated on overtaking that phase of the work and for the further reason that through a reorganized distribution of chart revision work a much smaller reserve number of copies are now kept corrected for immediate issue whilst the time formerly required to be spent on these tasks by cartographers is now given to the compilation and preparation of new charts.

The result is the advancement of the production of new publications required for Canadian waters thus far not covered by charts of this service.

### ENGRAVING SECTION

In this section of the Chart Construction division the work of copperplate engraving carried out by the Chief Engraver, Mr. W. C. Cunningham, and the assisting staff of six, included:—

| | |
|---|---|
| Number of new charts engraved to completion (including two principal coast charts of Bay of Fundy and Pacific coast) | 3 |
| Number of new charts (from ten to ninety-five per cent completed) | 5 |
| Number of new charts formerly photo-lithographed (90 per cent engraved) | 1 |
| Number of small corrections and additions made to copperplates | 7,873 |

The filing section now has listed and on hand 7,874 items, including plans, tracings, reports, etc., of related data for use in the compilation and revision of charts.

### STANDARDIZATION OF CANADIAN CHARTS

With a few exceptions, the charts have been constructed on a conical projection and the scale based on the length of a nautical or geographical mile, i.e., a minute of latitude at the middle latitude of the chart. The scales vary considerably, their selection being regulated by the extent and nature of the area and the amount of detail therein that has been found desirable for insertion on a single chart as well as by the numbers, size and draught of vessels than can be reasonably expected to navigate in the particular waters which each chart represents.

These scales may, therefore, range from those of harbour and roadstead plans and charts, at 15 to 12 inches to a nautical mile, through those of river charts at 6 to 2·4 inches, coast charts at 1·2 to 0·4 inches, down to those of general charts at 0·2 to 0·1 inches to a nautical mile.

New charts and new editions of the present coastal charts are gradually being brought to a uniform basis and constructed on the Mercator projection; those on the Atlantic coast of Canada being based on a middle latitude of 48° North, those on the Pacific coast on middle latitude of 52° North.

The scales hereafter adopted for coast and general marine charts, in as far as is found to be practicable, will be standardized at 1 inch, 0·5 inches, 0·3 inches, and 0·1 inch to a nautical mile, in order to facilitate the use of a number of such consecutive charts in series.

### DIVISION OF CHART DISTRIBUTION

This division of the work, under Mr. Charles McGreevy, distributed on request during the past year 11,154 copies of the standard marine charts constructed and published by the Hydrographic Service. In addition there were many requests for provisional and process copies of plans of harbours and waterways in the more unsettled sections of the coasts, which requests were filled in so far as the existing limited facilities and data available would permit. The demand for these latter plans are not yet general enough in character to warrant their production in standard engraved or lithographed form, yet a certain limited stock must be kept on hand to meet the changing requirements of shipping. Especially is this true of British Columbia waters where some 35 different process prints of small harbours are kept in stock and distributed from the district hydrographic office in Victoria.

The exploitation of new water routes and the opening up of new centres of commercial activity create sudden demands for mariner's charts, both for navigation purposes and for comprehensive study of the territory. The development of the Hudson bay route and the attention drawn to the possibilities of the natural resources of northeastern Canada during the past four years was directly reflected in the sudden increase of requests for charts for Hudson bay

waters, and in that period there were circulated 1,125 copies, or nearly twice the total number applied for during the preceding eleven years. The Hydrographic Service now issues 17 separate charts, plans and prints of the coasts, roadsteads, harbours and anchorages, of the Hudson bay and strait and James bay territories.

During 1930, there were in circulation 330 Canadian charts as compared with 314 in 1929 and 308 in 1928. The distribution in 1930 decreased by 4,582 from that of the year 1929, and yet was greater by over one thousand copies than that of any season prior to 1926.

The number of copies of Coast Pilots and Sailing Directions distributed in 1930 was 211, more than in any previous year and many requests for publications under revision could not be filled on account of the lack of an assistant technical staff for the Coast Pilot and Sailing Directions section of the work.

### INCREASE IN PRICE OF CHARTS

Following a review of the nominal price being charged the public by the hydrographic services in other countries who in recent years have raised the prices of their charts, the Canadian service on or about the beginning of the calendar year increased the invoice price of all Canadian charts from that of twenty-five cents per copy to fifty cents per copy and the price of Coast Pilots and Sailing Directions from fifty cents per copy to one dollar per copy. The British Admiralty charts and the charts published by three different United States hydrographic services are priced, in the case of the former, from 72 cents to $1.80, and the latter from 20 cents to 75 cents. The Admiralty Coast Pilots are sold at the price of $2.40 per copy and the United States Hydrographic office publications at $1.80 per copy.

It was felt, therefore, that as the charts and publications issued by other countries, in so far as they deal with Canadian coasts and waters, contain information obtained from Canadian government sources, and are in part compiled from Canadian hydrographic original documents and surveys, the Canadian publications should be priced at figures somewhat in line with the valuations placed upon such products by foreign services.

Furthermore, it is pointed out that the revised charges do not cover half the cost of paper and printing owing to the small editions issued and the excellent quality of the paper furnished.

### CATALOGUE OF MARINE CHARTS

A new edition of "Catalogue of Marine Charts, Sailing Directions and Tidal Information" issued by the Canadian Hydrographic Service, corrected to April 1, 1931, was prepared and printed and is available to the public on application to the department. This 1931 edition replaces the catalogue of 1928 and has indexed in it 278 Canadian charts and 58 other Canadian government marine publications and also 309 British Admiralty charts of Canadian waters and 6 other Admiralty publications referring to Canadian coasts. The 1928 edition had originally indexed in it 221 Canadian charts, 45 other related Canadian publications and approximately the same number of Admiralty publications as in the new edition.

These Admiralty publications relating to Canadian waters are included in the catalogue for the additional benefit of mariners interested in those sections of the coast of which as yet no Canadian charts have been issued, but which are covered by those published by the Admiralty service from the results of their early surveys. The Canadian service has no facilities and assumes no responsibility for the sale or distribution of these, or of charts and publications of other governments, though a certain limited stock of specimen foreign charts received from foreign hydrographic offices are kept on hand for reference purposes.

## Monthly Mean Water Surface Elevations of the "Great Lakes", by Precise Water Level Division, during 1930

| — | — | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake Superior | Port Arthur | 602·11 | 602·02 | 601·91 | 601·85 | 602·18 | 602·53 | 602·86 | 602·78 | 602·62 | 602·63 | 602·42 | 602·18 | 602·34 |
| | Michipicoten Harbour | 602·26 | 602·04 | 602·01 | 601·89 | 602·22 | 602·56 | 602·90 | 602·90 | 602·82 | 602·78 | 602·55 | 602·34 | 602·44 |
| | Gros Cap | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| St. Mary river | Above lock | 601·73 | 601·41 | 601·43 | 601·38 | 601·77 | 602·06 | 602·35 | 602·30 | 602·24 | 602·27 | 602·01 | 601·89 | 601·90 |
| | Below dam (Canada) | 595·51 | 595·62 | 595·56 | 595·64 | 596·20 | 596·57 | 597·98 | 599·18 | 598·05 | 595·87 | 595·59 | 595·54 | 596·44 |
| | Below dam (U.S.) | 595·96 | 596·15 | 596·05 | 596·18 | 596·49 | 596·97 | 598·56 | 599·66 | 598·59 | 596·43 | 596·09 | 596·03 | 596·93 |
| | Below lock | 581·64 | 581·77 | 581·83 | 581·38 | 581·42 | 581·63 | 582·15 | 582·52 | 582·02 | 581·06 | 580·59 | 580·20 | 581·52 |
| Lake Huron | Goderich | 580·61 | 580·53 | 580·75 | 580·74 | 580·88 | 581·03 | 581·23 | 581·11 | 580·80 | 580·41 | 579·90 | 579·57 | 580·63 |
| | Collingwood | 580·56 | 580·44 | 580·58 | 580·62 | 580·84 | 580·96 | 581·18 | 581·05 | 580·80 | 580·33 | 579·80 | 579·46 | 580·55 |
| | Thessalon | 580·58 | 580·51 | 580·57 | 580·63 | 580·90 | 581·04 | 581·20 | 581·01 | 580·73 | 580·30 | 579·83 | 579·45 | 580·56 |
| St. Clair river | Point Edward | 580·06 | 579·97 | 579·84 | 579·86 | 579·95 | 580·04 | 580·26 | 580·15 | 579·77 | 579·40 | 578·87 | 578·59 | 579·73 |
| | Port Lambton | 577·61 | 577·24 | 576·92 | 576·99 | 577·00 | 577·04 | 577·15 | 577·02 | 576·74 | 576·33 | 575·85 | 575·63 | 576·79 |
| Detroit river | Tecumseh | 575·36 | 575·11 | 575·90 | 576·14 | 576·11 | 576·03 | 576·00 | 575·73 | 575·38 | 575·01 | 574·50 | 574·28 | 575·46 |
| | Lasalle | 574·71 | 574·45 | 574·95 | 575·29 | 575·32 | 575·23 | 575·22 | 574·93 | 574·54 | 574·13 | 573·63 | 573·43 | 574·65 |
| Lake Erie | Port Stanley | 573·25 | 573·07 | 573·38 | 573·71 | 573·74 | 573·57 | 573·25 | 572·79 | 572·47 | 572·05 | 571·74 | 571·53 | 572·88 |
| | Port Colborne | 573·36 | 573·04 | 573·50 | 573·77 | 573·80 | 573·64 | 573·33 | 572·84 | 572·63 | 572·22 | 572·01 | 571·82 | 573·00 |
| Lake Ontario | Kingston | 246·85 | 246·99 | 247·59 | 247·95 | 247·96 | 248·00 | 247·94 | 247·33 | 246·72 | 246·08 | 245·53 | 245·17 | 247·01 |
| | Toronto "A" | 246·83 | 247·07 | 247·58 | 247·95 | 248·01 | 248·07 | 247·97 | 247·39 | 246·76 | 246·15 | 245·59 | 245·20 | 247·05 |
| | Port Dalhousie | ..... | ..... | ..... | 247·94 | 248·00 | 248·04 | 247·97 | 247·38 | 246·75 | 246·13 | 245·56 | 245·23 | ..... |
| | Port Weller | 246·79 | 247·01 | 247·55 | 247·90 | 248·01 | 248·07 | 247·98 | 247·40 | 246·81 | 246·16 | 245·57 | 245·17 | 247·04 |

"A" Records taken by Toronto Harbour Commission, and referred to harbour datum as 244·79 feet above mean sea-level elevations are in feet above mean sea level and are referred to the U.S. Lake Survey datum of 1903 adjustment. Monthly means are deduced by hourly ordinates from continuous graphic records.

MONTHLY Mean Water Surface Elevations of the "St. Lawrence River", by Precise Water Level Division, During 1930

| — | — | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| St. Lawrence river..... | Prescott..... | 245·78 | 245·85 | 246·52 | 246·85 | 246·91 | 246·95 | 246·88 | 246·28 | 245·75 | 245·15 | 244·66 | 244·32 | 245·99 |
| | Upper lock 27..... | 244·27 | 244·38 | 245·07 | 245·47 | 245·55 | 245·62 | 245·56 | 244·92 | 244·40 | 243·76 | 243·31 | 242·97 | 244·61 |
| | Lower lock 25..... | 229·14 | 229·24 | 230·36 | 230·87 | 230·96 | 231·04 | 230·92 | 230·13 | 229·41 | 228·57 | 227·84 | 227·25 | 229·64 |
| | Upper lock 24..... | 225·57 | 225·60 | 226·63 | 227·10 | 227·22 | 227·31 | 227·22 | 226·55 | 225·93 | 225·16 | 224·47 | 223·95 | 226·06 |
| | Lower lock 23..... | 214·44 | 214·47 | 215·05 | 215·45 | 215·52 | 215·58 | 215·46 | 214·79 | 214·14 | 213·39 | 212·75 | 212·24 | 214·44 |
| | Upper lock 21..... | 201·80 | 202·01 | 202·35 | 202·74 | 202·71 | 202·76 | 202·70 | 202·12 | 201·60 | 200·94 | 200·40 | 200·02 | 201·85 |
| | Cornwall..... | 160·90 | 163·68 | 158·79 | 155·09 | 154·64 | 154·60 | 154·53 | 154·13 | 153·67 | 153·23 | 152·78 | 152·53 | 155·71 |
| Lake St. Francis..... | Summertown..... | 153·74 | 153·63 | 153·80 | 153·70 | 153·48 | 153·45 | 153·39 | 153·04 | 152·64 | 152·24 | 151·83 | 151·58 | 153·04 |
| | Coteau Landing..... | 152·93 | 152·79 | 152·74 | 153·03 | 152·93 | 152·89 | 152·75 | 152·35 | 151·94 | 151·63 | 151·35 | 151·11 | 152·37 |
| St. Lawrence river..... | Coteau du Lac..... | 135·14 | 135·12 | 135·32 | 135·84 | 135·64 | 135·60 | 135·45 | 134·99 | 134·54 | 134·16 | 133·86 | 133·55 | 134·94 |
| | Cedars (P.P.P.)..... | 96·32 | 96·25 | 96·46 | 96·78 | 96·66 | 96·63 | 96·57 | 96·20 | 95·90 | 95·59 | 95·28 | 95·08 | 96·14 |
| | Cascades Pointe..... | 71·29 | 72·83 | 71·93 | 71·26 | 71·06 | 70·93 | 70·90 | 69·68 | 68·99 | 68·52 | 68·00 | 67·85 | 70·27 |
| Lake of Two Mountains | Ste. Anne..... | 71·60 | 72·02 | 71·60 | 72·74 | 73·52 | 73·33 | 73·44 | 71·61 | 70·88 | 70·80 | 70·52 | 70·55 | 71·88 |
| Lake St. Louis..... | Pointe Claire..... | 70·25 | 70·20 | 70·01 | 70·79 | 70·83 | 70·68 | 70·58 | 69·31 | 68·66 | 68·27 | 67·80 | 67·63 | 69·58 |
| | Upper lock 5..... | 68·97 | 68·83 | 68·73 | 69·79 | 69·84 | 69·70 | 69·58 | 68·28 | 67·62 | 67·19 | 66·73 | 66·47 | 68·56 |
| St. Lawrence river..... | Montreal (lock 1)..... | 34·43 | 31·51 | 32·79 | 28·89 | 24·50 | 23·99 | 23·92 | 21·81 | 20·69 | 20·12 | 19·33 | 20·54 | 25·21 |
| | Longue Pointe..... | 28·27 | 26·54 | 27·19 | 24·79 | 23·06 | 22·44 | 22·35 | 20·24 | 19·09 | 18·56 | 17·86 | 19·29 | 22·47 |
| | Varennes..... | 26·23 | 24·44 | 24·74 | 23·03 | 21·70 | 21·05 | 20·93 | 18·73 | 17·50 | 16·99 | 16·27 | 18·23 | 20·82 |
| | Lanoraie..... | 21·31 | 20·00 | 20·63 | 19·45 | 19·00 | 18·19 | 17·92 | 15·84 | 14·67 | 14·24 | 13·58 | 16·11 | 17·58 |
| | Sorel..... | 19·00 | 17·90 | 18·65 | 18·76 | 18·42 | 17·61 | 17·27 | 15·32 | 14·22 | 13·82 | 13·14 | 14·78 | 16·57 |
| Lake St. Peter..... | Range light No. 2..... | ..... | ..... | ..... | ..... | ..... | 16·66 | 16·21 | 14·18 | 13·01 | 12·58 | 11·84 | | Till Nov. 12 |
| St. Lawrence river..... | Three Rivers..... | 14·72 | 13·69 | 14·67 | 16·41 | 16·54 | 15·55 | 15·07 | 13·06 | 11·91 | 11·47 | 10·93 | 10·85 | 13·74 |
| | Batiscan..... | ..... | ..... | ..... | ..... | 13·24 | 12·32 | 11·88 | 10·30 | 9·31 | 9·02 | 8·56 | | Till Nov. 20 |
| | Cap-à-la-Roche..... | ..... | ..... | ..... | ..... | 10·38 | 9·59 | 9·17 | 7·85 | 6·99 | 6·77 | 6·36 | | Till Nov. 21 |
| | Neuville..... | ..... | ..... | ..... | ..... | 4·25 | 3·80 | 3·48 | 2·89 | 2·37 | 2·40 | 1·99 | | Till Nov. 19 |

NOTE.—Prescott to Cornwall inclusive.—Elevations are in feet above mean sea-level and are referred to the U.S. Lake Survey datum of 1903 adjustment.
Summertown to lock 5 inclusive.—Elevations are in feet above mean sea-level and are referred to the Department of Public Works precise levels of instrumental value.
Montreal to Neuville inclusive.—Elevations are in feet above mean sea-level and are referred to the Department of Public Works precise levels of 1915 adjustment.

During 1930 continuous observations were maintained, on the Great Lakes and the St. Lawrence river, at 44 locations, and for the periods, as enumerated:—

| | | | |
|---|---|---|---|
| A—Port Arthur | Lake Superior | Jan. 1 | Dec. 31 |
| A—Michipicoten Harbour | " | " 1 | " 31 |
| A—Soo (above lock) | St. Marys river | " 1 | " 31 |
| A—Soo (below lock) | " | " 1 | " 31 |
| A—Soo (below dam, Canada) | " | " 1 | " 31 |
| A—Soo (below dam, Michigan) | " | " 1 | " 31 |
| A—Thessalon | Georgian bay | " 1 | " 31 |
| A—Collingwood | " | " 1 | " 31 |
| A—Goderich | Lake Huron | " 1 | " 31 |
| A—Point Edward | St. Clair river | " 1 | " 31 |
| A—Port Lambton | " | " 1 | " 31 |
| A—Tecumseh | Detroit river | " 1 | " 31 |
| A—LaSalle | " | " 1 | " 31 |
| A—Port Stanley | Lake Erie | " 1 | " 31 |
| A—Port Colborne | " | " 1 | " 31 |
| A—Port Dalhousie | Lake Ontario | April 1 | " 31 |
| A—Port Weller | " | Jan. 1 | " 31 |
| A—Toronto (by Harbour Com.) | " | " 1 | " 31 |
| A—Kingston | " | " 1 | " 31 |
| A—Prescott | St. Lawrence river | " 1 | " 31 |
| A—Lock 27 (above lock) | " | " 1 | " 31 |
| A—Lock 25 (below lock) | " | " 1 | " 31 |
| A—Lock 24 (below lock) | " | " 1 | " 31 |
| B—Lock 23 (below lock) | " | " 1 | " 31 |
| B—Lock 21 (above lock) | " | " 1 | " 31 |
| B—Cornwall | " | " 1 | " 31 |
| B—Summertown | Lake St. Francis | " 1 | " 31 |
| A—Coteau Landing | " | " 1 | " 31 |
| B—Coteau du Lac | St. Lawrence river | " 1 | " 31 |
| B—Cedars (P.P. Plant) | " | " 1 | " 31 |
| B—Cascades Pointe (below lock) | " | " 1 | " 31 |
| B—Ste. Anne (above lock) | Lake of Two Mountains | " 1 | " 31 |
| A—Pointe Claire | Lake St. Louis | " 1 | " 31 |
| A—Lock 5 (above lock) | " | " 1 | " 31 |
| A—Montreal (below lock No. 1) (Harbour Commission registering gauge used balance of year) | St. Lawrence river | April 25 | Nov. 26 |
| A—Longue Pointe | St. Lawrence river | Jan. 1 | Dec. 31 |
| A—Varennes (Staff gauge readings 9 a.m. and 3 p.m. daily for balance of year) | " | April 28 | Nov. 19 |
| A—Lanoraie (Staff gauge readings 9 a.m. and 3 p.m. daily for balance of year) | St. Lawrence river | April 25 | Nov. 25 |
| A—Sorel | St. Lawrence river | Jan. 1 | Dec. 31 |
| A—Range Light Curve No. 2 | Lake St. Peter | May 14 | Nov. 12 |
| C—Three Rivers | St. Lawrence river | Jan. 1 | Dec. 31 |
| C—Batiscan | " | April 19 | Nov. 20 |
| C—Cap-à-la-Roche | " | " 21 | " 21 |
| C—Neuville | " | " 17 | " 19 |

NOTE.—"A" denotes a Haskell self-registering graphic gauge; hourly readings, daily means, and monthly means compiled.

"B" denotes a Gurley printing register; half-hourly readings, daily means, and monthly means compiled.

"C" denotes a Haskell self-registering graphic gauge; half-hourly readings, daily means, monthly means, time and elevation of high and low water compiled.

# RADIO BRANCH

REPORT OF C. P. EDWARDS, O.B.E., F.I.R.E., A.M.E.I.C., DIRECTOR

## NUMBER OF RADIO STATIONS IN THE DOMINION

The total number of licensed stations in operation in the Dominion and on ships registered therein was, on March 31, 1931, as follows:—

| | |
|---|---|
| Coast stations | 29 |
| Land stations | 1 |
| Direction finding stations | 12 |
| Beacon stations | 19 |
| Radiophone stations | 4 |
| Government ship stations | 47 |
| Commercial ship stations | 272 |
| Limited coast stations | 4 |
| Aircraft stations | |
| Public commercial stations | 50 |
| Private commercial stations | 131 |
| Private commercial broadcasting stations | 80 |
| Amateur broadcasting stations | 8 |
| Radiotelegraph training schools | 6 |
| Experimental stations | 91 |
| Amateur experimental stations | 728 |
| Private receiving stations (including 677 licensed issued free to the blind) | 523,100 |
| Total | 524,582 |

## LICENCE FEES

The annual fees charged in respect of radio licences issued by the Minister of Marine are as follows:—

| | |
|---|---|
| 1. Limited coast stations | $ 50 00 |
| 2. Public commercial stations | 50 00 |
| 3. Private commercial stations | 10 00 |
| 4. Experimental stations | 5 00 |
| 5. Amateur experimental stations | 2 50 |
| 6. Broadcasting stations, private commercial | 50 00 |
| 7. Broadcasting stations, amateur | 10 00 |
| 8. Private receiving stations | 1 00 |
| 9. Technical or training school stations | 5 00 |
| 10. Ship stations | 10 00 |
| 11. Aircraft stations | 10 00 |

## GOVERNMENT COAST STATIONS

"Coast Station" is the term used to designate a radio station established on shore to communicate with ships at sea. Canada's extensive coast line demands a large number of stations to cover all its coasts and approaches thereto. The complete system consists of sixty-five stations located as follows:—

| | |
|---|---|
| East coast (includes 9 radio beacons) | 26 |
| Great Lakes (includes 5 radio beacons) | 13 |
| Pacific coast (includes 5 radio beacons) | 19 |
| Hudson bay and strait | 7 |
| Total | 65 |

The coast station system consists of three chains, one extending from Vancouver to Prince Rupert on the Pacific, another from Port Arthur to the Atlantic ocean in the East, and the third from Port Churchill to Resolution Island at the eastern entrance to the Hudson strait, and for the purpose of administration, is divided into three divisions, Pacific Coast, Great Lakes, and East Coast. The stations of the Great Lakes connect up with those of the East Coast division, which in turn connects with the Hudson Bay Route chain. There is no direct radio connection between the Great Lakes and the Pacific coast.

Of the above stations seventeen on the East coast and Great Lakes are operated by the Canadian Marconi Company under contract with the department, and the balance of forty-eight on the East and West coasts and Hudson bay and strait are operated directly by the department.

The primary aim of the coast station organization is to provide radio facilities whereby any ship within 500 miles of the Canadian coast can establish instant communication with the shore. Constant watch, 24 hours a day, 365 days a year, is maintained at practically all of the stations, which during the year handled a total of 8,534,982 words.

### *Closing of Cape Race, VCE, Station*

VCE, Canadian Coast Station located at Cape Race, Newfoundland, was closed at midnight July 31, 1930, and thereby passed into oblivion one of the historic landmarks of radio communication on the North Atlantic ocean.

This station was established in 1904 under the original contract with the Canadian Marconi Company, and at the height of its prosperity showed earnings of $82,000 per annum.

With the development of longer range transmitters since the war, whereby ships can now communicate directly with stations in the country of their destination, the Cape Race route is no longer attractive, and last year the revenue had dropped to $2,666. As a result it was decided to close VCE and amalgamate it with that of the Cape Race Direction Finding Station VAZ. The latter station will in future handle both the "Aid to Navigation" and "Commercial" services.

#### RADIOTELEGRAPH AIDS TO NAVIGATION BROADCAST

Twice daily, at advertised hours, ten stations on the East coast, seven on the Great Lakes and one on the West coast broadcast information to navigators covering weather forecasts, position and nature of dangers to navigation, etc. In addition, urgent information, such as hurricane warnings, etc., is broadcast immediately upon receipt. Two stations in the Hudson bay and strait also broadcast forecasts during the season of navigation.

Details of the times of transmissions, call signals, wavelengths, etc., are given in the current "Notice to Mariners" in this reference.

#### RADIOTELEPHONE AIDS TO NAVIGATION BROADCAST

A comprehensive radiotelephone service to fishermen is in operation on the East coast.

Three stations are used for this purpose: Louisburg (VAS), Halifax Lightship (VCX), and Saint John, N.B. (CFBO).

Louisburg using a 4,000 watt radiotelephone transmitter broadcasts on 438 metres (685 K/cs) at 3 a.m. and 12 noon, E.S.T., daily, a message to fishermen which includes weather forecasts, storm warnings and a synopsis of information in regard to the market price of fish, the amount of bait on hand at various points, and any other outstanding items of interest to fishermen generally. The range of this station enables fishermen to receive these messages as far east as the Grand Banks.

The Halifax lightship station broadcasts on 434·8 metres (690 K/cs) at 7 a.m. and 12.30 p.m., E.S.T., daily, and transmits the same message as Louisburg; it has a range of approximately 150 miles.

Station CFBO, Saint John, broadcasts weather forecasts and storm warnings to fishermen in the Bay of Fundy on 337·1 metres (890 K/cs) at 5 a.m. and 7 a.m., E.S.T., daily.

This service is augmented during the summer months by the C.G.S. *Arras* (CGFD), which accompanies the fishing fleet and broadcasts by radiotelephone on 434·8 metres (690 K/cs) storm warnings and weather forecasts at 6 a.m., E.S.T., daily, and a message to fishermen the same as that of Louisburg at 2 p.m., E.S.T., daily, with a range of approximately 150 miles.

The transmission from this network of stations provides reception at any point along the Atlantic seaboard as well as on the banks fished by Canadian vessels.

SPECIAL BROADCASTS IN SUB-ARCTIC REGIONS

In December, 1930, arrangements were made for the department's stations at Coppermine, Coronation Gulf; Chesterfield Inlet and Port Churchill, Hudson Bay; and the Royal Canadian Mounted Police schooner *St. Roch* to broadcast at scheduled hours for the benefit of trading posts, settlers, miners, missions, etc., within range. The broadcasts which consist of press, personal messages, etc., are transmitted by voice in accordance with the following schedule:—

| Station | Wavelength | Time (E.S.T.) and day |
|---|---|---|
| | metres | |
| Coppermine | 525 | 11.05 p.m. Wednesday and Saturday. |
| Chesterfield Inlet | 540·5 | 10.00 p.m. Tuesday and Friday. |
| Port Churchill | 540·5 | 11.00 p.m. Monday and Thursday. |
| *St. Roch* | 450·0 | 11.00 p.m. Wednesday and Saturday. |

TIME SIGNALS

Time Signals are transmitted as follows:—

*East Coast*

*Chebucto Head.*—Daily, except Sunday, at 2 p.m., G.M.T., on 600 metres (500 K/cs). The inclusion of the long distance radiotelegraph station at Louisburg in the time signal organization is contemplated.

*West Coast*

*Gonzales Hill.*—Twice daily, at 10 a.m. and 7 p.m., P.S.T., on 900 metres (333 K/cs).

*Estevan.*—Twice daily, at 10 a.m. and 7 p.m., P.S.T., on 600 metres (500 K/cs).

SPRING PATROL, CABOT STRAITS, GULF OF ST. LAWRENCE

The patrol service maintained in the Cabot straits at the opening of navigation was again undertaken this year by the icebreakers *Mikula* and *Montcalm.*

Observations of the ice conditions obtained by the patrol ships, while cruising in the vicinity of Cabot straits, as well as all detailed reports received by the senior ship from all incoming and outgoing ships and from all radio and signal stations, are compiled and analyzed and a message, containing a synopsis of location and drift of ice, together with recommendations as to the best route for ships to follow, is broadcast four times daily from the patrol ship, using call sign VCQP.

Ships can obtain copy of this message from the coast radio stations at Chebucto Head (VAV), North Sydney (VCO) and Grindstone (VCN). The stations at Louisburg (VAS) and Cape Race (VAZ) also broadcast a brief summary of the above-mentioned message twice daily.

The total number of words handled by the patrol this year was:—*Mikula*—24,399; *Montcalm*—8,386; total—32,785.

Commenced on April 9, the patrol was discontinued on May 15, 1930.

### RADIO DIRECTION FINDING

Twelve direction finding stations, 7 on the East coast, 4 on the Hudson bay and strait and 1 on the West coast are in operation. The East and West coast stations maintain " constant watch " throughout the year, and the Hudson bay and strait stations maintain a similar watch during the season of navigation only. These stations give bearings to any ships fitted with radio, free of charge.

The Canadian direction finding stations continue to enjoy a good reputation for efficiency and accuracy, many comments on the same having been received from navigators.

The number of bearings given by the stations varies from month to month, being dependent on weather conditions. The average number continues to increase, and has risen from 3,334 per month last year to 3,463 per month this year.

BEARINGS GIVEN 1930-31

| *Station*— | |
|---|---|
| Chebucto Head, N.S. | 7,783 |
| Canso, N.S. | 4,617 |
| Yarmouth, N.S. | 12,018 |
| St. Paul Island, N.S. | 3,209 |
| Cape Race, Nfld. | 8,468 |
| St. John, N.B. | 1,281 |
| Pachena Point, B.C. | 2,697 |
| Belle Isle, Nfld. | 1,487 |
| | 41,560 |

### RADIO BEACON SERVICE

There are now approximately 624 ships fitted with radio direction finding apparatus plying to and from Canadian ports.

The radio beacon system of the department comprises nineteen stations, located as follows:—

| *East Coast and Gulf of St. Lawrence* | *Great Lakes* | *Pacific Coast* |
|---|---|---|
| Cape Bauld, Nfld. | South East Shoal. | Race Rocks, Vancouver Island . |
| Cape Whittle, P.Q. | Main Duck. | Langara. |
| West Point, Anticosti Isl. | Long Point | Dead Tree Point. |
| Pointe-des-Monts, P.Q. | Michipicoten Island. | Quatsino (Kains Island). |
| Heath Point Lightship. | Cove Island. | Triple Island. |
| Cape Ray, Nfld. | | |
| Sambro Lightship. | | |
| Seal Island, N.S. | | |
| Lurcher Lightship. | | |

The new type of automatic radio beacon which was developed in 1929 and fully described in the 1929-30 annual report of the branch is now standard equipment at the above stations, and continues to give satisfaction.

Masters of ships equipped with direction finding apparatus were requested to complete a questionnaire in regard to these radio beacons, and resulting from their comment, a few minor changes in the transmission characteristics were made. Such ships may in addition to the above facilities obtain signals for the purpose of taking bearings from any of our coast stations free of charge, and during the past year, 4,986 requests for signals for direction finding purposes were handled.

### COMMERCIAL SHIP SERVICE

Each of the regular twenty-nine coast stations handles commercial traffic to and from ships and in addition all of the direction finding stations, Cape Race, Belle Isle, St. Paul, Canso, Yarmouth, Chebucto Head, Saint John, Port Churchill, Nottingham Island, Cape Hopes Advance, Resolution Island and Pachena, combine commercial service with their direction finding work.

Long distance service to ships on the Atlantic is provided by the licensed station at Louisburg, N.S., owned and operated by the Canadian Marconi Company, and on the Pacific by the departmental station at Estevan, Vancouver island. The traffic returns from these stations indicate that the route of commercial traffic continues to shift from the low power medium wave coast stations to the high power long and short wave stations.

### RADIOTELEPHONE SERVICE TO SMALL CRAFT ON THE PACIFIC COAST

The radiotelephone system has completed another year's work and is being used to a gratifying extent. The shore telephone stations are located at Vancouver (Merchants' Exchange), Merry Island, Alert Bay, and Cape Lazo.

In addition the four life-saving radio telephone stations on the West coast of Vancouver island at Banfield, Cape Beale, Pachena Point and Carmanah, are available for this service. Approximately fifty-eight tugs and other small craft are now equipped with radiophone apparatus. The sets in these boats are operated by the captain or engineer and most of them are installed by an operating company on a rental basis which includes service. The number of paid radio telephone calls handled numbered 15,169, an increase of 3,966 over the year 1929-30.

### SHIPS' EMERGENCY APPARATUS

The department has in effect an arrangement whereby its coast stations call upon Canadian and certain British ships to operate their emergency apparatus whilst at sea, in order to check their efficiency.

### NUMBER OF SHIPS EXERCISED, 1930-31

| | |
|---|---|
| Total | 276 |
| Failures | Nil |
| Average time taken to change over | 9·9 secs. |
| Time allowed | 30 secs. |

### AUTO ALARM DEVICES

There are now aproximately 146 ships fitted with auto alarm devices plying to and from Canadian ports, all of which were inspected during the year and found in efficient working order.

Certain of these devices have been approved by the British Board of Trade for use on ships at sea, and special regulations concerning them and the number of operators which their installation shall release are now in force.

This equipment consists of a valve receiver sharply tuned to 600 metres (500 K/cs) whose function it is to pick out the auto alarm signal—12 dashes, each of four seconds' duration, interspersed by a space of one second—from all other signals and pass it to a timed electro-mechanical device called the selector, which in turn actuates three bells installed at strategic points on board the receiving ship, indicating to those on board that a vessel in distress is in close proximity.

### INSPECTIONS

The administration of the Radiotelegraph Act has been carried on as usual and no evasions or attempted evasions of section 7 of the Act (Revised Statutes of Canada 1929, chapter 195), calling for compulsory equipment of radiotelegraph apparatus on board passenger steamers, have been reported.

Permanent inspection establishments are maintained at Victoria, Vancouver, Calgary, Edmonton, Regina, Moose Jaw, Saskatoon, Winnipeg, Toronto, Hamilton, London, Kitchener, Windsor, Ottawa, Montreal, Quebec, Saint John, and Halifax.

Inspectors, in addition to inspecting all ships and licensed stations in their district, also undertake the examination of operators for Certificates of Proficiency. All land stations are inspected at least once a year, and all ships when they visit Canadian ports. Supervision of broadcasting comes under their jurisdiction and now comprises a considerable part of their duties.

The policy of utilizing the services of qualified radio operators as "part time" inspectors to look after small localities or areas and to assist permanent inspectors in the large centres continues to prove satisfactory. These "part time" inspectors are paid a nominal salary of $15 to $30 per month, and are located at the following points:—

*Nova Scotia.*—Glace Bay, Sydney, and Sydney Mines.

*Prince Edward Island.*—Charlottetown and Summerside.

*New Brunswick.*—Saint John (vacant), Moncton, and Fredericton.

*Quebec.*—Montreal, St. Lambert, Sherbrooke (vacant), Three Rivers, and Rivière-du-Loup.

*Ontario.*—Brantford, Fort William, Port Arthur, Hamilton, Kingston, Peterborough, Sarnia, Toronto (2), Windsor, Chatham, North Bay, Sault Ste. Marie, Fort Frances, Kenora-Keewatin, Oshawa, St. Catharines, Niagara Falls, and Gananoque (vacant).

*Manitoba.*—Brandon and Winnipeg.

*Saskatchewan.*—Prince Albert.

*Alberta.*—Calgary, Lethbridge, and Medicine Hat.

*British Columbia.*—Vancouver (vacant), Kamloops, Nelson, and Prince Rupert.

*Yukon.*—Dawson.

The number of inspections carried out during the fiscal year was:—

| | |
|---|---|
| Coast and land stations | 171 |
| Ship stations | 2,208 |
| Amateur experimental and private receiving stations | 32,514 |
| Total | 34,893 |

EXAMINATIONS FOR CERTIFICATES OF PROFICIENCY IN RADIOTELEGRAPHY

The International Radiotelegraph Convention prescribes the qualifications of radio operators on mobile stations, and departmental regulations provide that all commercial and amateur operators must pass examination to satisfy the Minister as to their ability to operate the class of station on which they are engaged.

Competent operators on mobile stations are demanded in the interests of safety of life at sea, while interference problems necessitate similar requirements in the operation of amateur and land stations.

The more important services call for operators holding First, Second, or other prescribed class of Certificate of Proficiency, while in the case of services of lesser importance not likely to become a source of interference, operators are required to satisfy the department that they are fully qualified to operate and maintain the equipment upon which they are employed.

Three hundred and twenty-four operators were examined for Commercial Certificate of Proficiency in Radio during the year, including ninety-six re-examinations; one hundred and ninety-one candidates were successful and one hundred and thirty-three failed. Fourteen First Class Certificates issued under the Convention of 1912 were exchanged for Second Class Certificates issued under the Convention of 1927 without further examination.

Four Provisional Certificates of Proficiency in Radiotelephony were issued during the year, and one renewed.

One hundred and sixty-five candidates for Amateur Radio Certificates were also examined, of whom one hundred and sixty-two were successful and three failed.

Two thousand nine hundred and thirty-eight Certificates of Proficiency in Radio have been issued by the department up to the end of March, 1931.

FEES FOR EXAMINATIONS

| | |
|---|---|
| 1. Extra First Class Certificate | $ 5 00 |
| 2. First Class Certificate | 2 50 |
| 3. Second Class Certificate | 1 00 |
| 4. Third Class Certificate | 1 00 |
| 5. Experimental Certificate | 2 50 |
| 6. Amateur Certificate | 0 50 |
| 7. Emergency Certificate, any class | 5 00 |
| 8. Radiotelephone Certificate | 2 50 |

RADIO BROADCASTING

Radio broadcast reception on the whole showed a considerable improvement over the signal level which prevailed during the year 1929-30, especially during the winter months. Eighty-eight broadcasting licences were issued during the year, a decrease of three from the previous year:—

| | |
|---|---|
| Physical stations, active | 64 |
| Physical stations, inactive | 3 |
| Phantom stations, active | 18 |
| Phantom stations, inactive | 3 |
| | 88 |

(A phantom licence is one which authorizes the licensee to use the apparatus of an existing station under a special call sign.)

The following stations were authorized to make the changes indicated below:—

CHANGES IN LOCATION

CFJC—Kamloops—D. S. Dagleish & Sons, Ltd.—from centre of city to half mile outside.

CJGC—London—London Free Press and Ptg. Co.—from Hotel London, London, Ont., to Strathburn, Ont.

CHML—Hamilton—Maple Leaf Co. Ltd.—from Yale avenue to Thirteenth street, Hamilton, Ont.

CKOC—Hamilton—Wentworth Radio and Auto Supply Co. Ltd., Hamilton, Ont., to Barton street E. and Prospect avenue, Fordacres, Fruitland, Ont.

CFCO—Chatham—Western Ontario "Better Radio" Club.—from Community Trusts Building to William Pitt Hotel, Chatham, Ont.

CFBO—Saint John—C. A. Munro, Ltd., from Saint John to Fort Howe, N.B.

CHANGES IN FREQUENCY

CJOR—Vancouver—G. C. Chandler—from 1030 to 1210 kc/s.

CHWK—Chilliwack—Chilliwack Bcstg. Co.—from 1210 to 665 kc/s.

CKPR—Pt. Arthur—Dougall Motor Car Co.—from 930 to 890 kc/s.

CFCH—North Bay—Northern Supplies, Ltd.—from 600 to 1200 kc/s.

CKOC—Hamilton—Wentworth Radio Supply Co.—from 880 to 1010 kc/s.

CKCV—Quebec—G. A. Vandry—from 880 to 645 kc/s.

INCREASE IN POWER

CKPC—Preston—Cyrus Dolph—from 25 watts to 50 watts.
CHWK—Chilliwack— Chilliwack Bcstg Co.—from 50 watts to 100 watts.
CFJC—Kamloops—D. S. Dagleish & Sons—from 50 to 100 watts.
CHCK—Charlottetown—W. E. Burke & J. A. Gesner—from 30 to 100 watts.
CHGS—Summerside—R. T. Holman, Ltd.—from 25 to 100 watts.
CJOR—Vancouver—G. C. Chandler—from 100 to 500 watts.
CKOC—Hamilton—Wentworth Radio Co.—from 50 to 500 watts.
CFBO—Saint John—C. A. Munro, Ltd., from 50 to 500 watts.
CFNB—Fredericton—Jas. S. Neill & Sons, Ltd.—from 50 to 500 watts.
CFCY—Charlottetown—The Island Radio Co.—from 250 to 500 watts.

TRANSFERS OF LICENCES

CFCH—Iroquois Falls, Ont.—Abitibi Power and Paper Co., Ltd., *TO* Northern Supplies, Limited, North Bay, Ont.
CKPR—Midland, Ont.—Midland Broadcasting Co., Ltd., *TO* Dougall Motor Car Co., Port Arthur, Ont.

The total number of licences issued for receiving sets was 523,100 an increase of 98,954, and the net revenue from broadcasting licence fees, after deducting commissions to radio dealers, and to the Post Office Department for the sale of licences, and the subsidy of $18,375.50 to the Manitoba Government for Stations CKY, Winnipeg, and CKX, Brandon (50 cents in respect of each licence issued in Manitoba), amounted to $459,192.32.

PILOT BALLOON SERVICE

On behalf of the Meteorological Office, Toronto, pilot balloon ascents were made daily, weather permitting, at ten coast stations on the East coast.

The purpose of these flights is to obtain the direction and velocity of the wind in the upper air, and the height of the base of clouds when present. At the same time general observations on the visibility and weather conditions are also made.

TRANSATLANTIC RADIOTELEPHONE SERVICE

A radiotelephone service between Canada and Great Britain was made available to the Canadian public, through the medium of the Bell Telephone Company via the transatlantic radio circuit operated by the American Telegraph and Telephone Company from New York, in March, 1928. Negotiations are now proceeding between the British Post Office and the Canadian operating companies towards the conclusion of an agreement which will provide for a direct Anglo-Canadian circuit.

TRAFFIC SECTION

This section of the Radio Branch handles the preparation, rendering and collection of accounts for commercial ship to shore and inter-station messages, handled by the departmental ships and stations and the auditing, rendering and collection of international accounts to various operating companies and foreign administrations for radiotelegrams exchanged by foreign ships through Canadian coast stations and by Canadian ships through foreign coast stations.

The number of accounts handled by the branch was 133,000, representing $154,000 in tolls.

*Messages Handled by the Coast Station Services*

The total number of messages and words handled during the year ending March 31, 1931 (including retransmissions), was as follows:—

| | Messages | Words |
|---|---|---|
| East coast | 119,651 | 2,496,089 |
| Great Lakes | 27,782 | 431,019 |
| West coast | 223,574 | 4,680,209 |
| Hudson bay and strait | 25,720 | 927,665 |
| | 396,727 | 8,534,982 |

The business handled by the East Coast System (operated by the Canadian Marconi Company under contract and partly by the department) shows a decrease of 22,010 messages with a decrease of 297,511 words.

The Great Lakes System (operated by the Canadian Marconi Company under contract) shows a decrease of 8,436 messages with a decrease of 150,018 words.

The West Coast System (operated by the department) shows a decrease of 11,861 messages with a decrease of 121,750 words.

The Hudson Bay and Strait System (operated by the department) shows a decrease of 1,878 messages with a decrease of 63,041 words.

REVENUE

The net radio revenue accruing to the Radio Branch from all sources during the year amounted to $544,450.58, against $507,035.11 in 1929-30, an increase of $37,415.47.

| | | |
|---|---|---|
| *Traffic Revenue*— | | |
| East coast | $ 7,307 38 | |
| Great Lakes | 794 11 | |
| West coast | 62,175 67 | |
| Hudson bay and strait | 5,475 60 | |
| | | $ 75,752 76 |
| *Other Revenue*— | | |
| Licence fees | 468,092 32 | |
| Examination fees | 605 50 | |
| | | 468,697 82 |
| | | $ 544,450 58 |

The East Coast traffic revenue shows a decrease of $240.67, the Great Lakes a decrease of $39.22, the West Coast a decrease of $7,077.43, and the Hudson Bay and Strait a decrease of $7,617.83. Total traffic revenue decrease, $14,975.15.

The licence fees show an increase of $52,206.62, and the examination fees an increase of $184. Total "other revenue" increase $52,390.62.

TRANSATLANTIC

The Marconi Beam Service between Drummondville, P.Q., and Bodmin, England, which was inaugurated on October 25, 1926, continues in permanent operation. The rates in effect via this circuit are as follows:—

CANADA EASTERN ZONE TO GREAT BRITAIN AND IRELAND

| | |
|---|---|
| Fully paid messages | 18c. per word |
| Deferred messages | 8c. per word |
| Nightletter messages | $1.00 for 25 words or less and 4c. for each extra word |
| Week-end letter messages | 75c. for 25 words or less and 3c. for each extra word |
| Post letter messages | 60c. for 20 words or less and 3c. for each extra word |

### TRANSPACIFIC

The Marconi Beam Service between Drummondville, P.Q., and Ballan, Victoria, Australia, which was inaugurated on June 16, 1928, continues in permanent operation. The rates in effect via this circuit are as follows:—

CANADA TO AUSTRALIA

| | |
|---|---|
| Fully paid messages | 35c. per word |
| Deferred messages | 17½c. per word |
| Nightletter messages | $2.70 for 20 words or less and 13½c. for each extra word |
| Week-end letters | $2.10 for 20 words or less and 10½c. for each extra word |

### HUDSON BAY ROUTE

Detailed observations covering navigation conditions in the Hudson bay and strait during the season of navigation 1930 were made and have been compiled in pamphlet form, copies of which may be procured from the department.

### COMMUNICATION WITH ISOLATED POINTS

The importance of radio as a means of maintaining contact with isolated points beyond the reach of existing telegraph and telephone facilities is emphasized by the fact that forty-nine licences were issued to companies and private individuals for stations of this class.

Emergency communication in the case of interruption of normal telegraph and telephone communication has been provided for by the issuance of thirty-two licences to public utilities and power companies for the establishment of radio stations at their power plants and distribution centres.

### TRANSATLANTIC FLIGHTS OF AIRCRAFT

#### *R 100*

Working in conjunction with the Department of National Defence and the Meteorological Office at Toronto, preparation was made to cover the flight of the British dirigible "R 100".

The Coast D.F. stations at Belle Isle and Resolution Island were placed at the disposal of the airship for navigational purposes and gave several bearings on both the inward and outward voyages. The stations maintained constant watch on two waves.

The long range station at Louisburg, owned and operated by the Canadian Marconi Company, handled the commercial traffic from the airship.

Special weather observations were made by certain East coast and Hudson strait stations, in addition to the upper air reports from six Pilot Balloon stations on the East coast.

Ships at sea between Father Point and Longitude 35° W. also assisted in the collection of most detailed meteorological information.

The same organization remained in force to cover the return voyage of the *R 100*, and functioned to the satisfaction of all concerned.

#### *Southern Cross*

Radio played an important part in the transatlantic flight of the *Southern Cross*.

All radio stations in range of the route undertaken were organized to keep a special radio and visual lookout.

Unfortunately, dense fog prevented the proposed non-stop flight of the *Southern Cross*, and it was necessary for her to land at Harbour Grace, Newfoundland, for fuel.

Numerous bearings were given the plane by both the Coast D.F. stations at Belle Isle and Cape Race, which enabled her to make this forced landing in safety.

*German Flying Boat D 1422*

The Dornier flying boat *D 1422* arrived at Halifax, N.S., at 1.15 p.m., A.S.T., August 25, 1930, having crossed the Atlantic from Germany by easy stages.

A special visual and radio lookout was organized by all radio stations situated on the route taken by this aircraft, and from the time she left Greenland until arriving at Halifax, N.S., she was in communication with our various radio stations along the route and her position was known at all times.

WORK UNDERTAKEN ON BEHALF OF OTHER DEPARTMENTS OF THE GOVERNMENT

*Royal Canadian Mounted Police*

Prior to sailing on an extended cruise to the Western Arctic, the R.C.M.P. auxiliary schooner *St. Roch* was fitted with long and short wave transmitting and receiving apparatus in order to maintain contact with its headquarters.

An operator from this branch was detailed as special officer in charge of the radio equipment, and the ship was never out of communication with the outside world.

*Department of Railways and Canals*

The radio equipment of the steamer *Ocean Eagle* (supply ship), engaged in connection with the construction of Port Churchill harbour works, is maintained and operated by personnel of the Radio Branch.

*Department of Fisheries*

The radio installations of the fisheries patrol steamers *Givenchy* and *Malaspina* on the West coast and *Arras* and *Arleux* on the East coast are maintained and operated by this branch.

*Department of National Revenue*

This branch operates and maintains the radio equipment of the Customs cruisers *Baroff, Bayhound, Margaret, Vigilant, Conestoga, Fleur-de-lis, Preventor, Patrol Boat No. 4, Louisburg, Madawaska, Chaleur* and *Scatarie* on behalf of the Customs Preventive Service.

OTHER DEPARTMENTS OF CANADIAN GOVERNMENT OPERATING STATIONS

*Department of National Defence*

The Royal Canadian Corps of Signals of the above department operates, in addition to its purely military activities, stations on behalf of the following departments and civil activities of the Department of National Defence:—

*Interior Department (N.W.T. and Yukon Branch)*

Eight permanent stations and one summer station situated along the McKenzie river and in the Yukon Territory.

*National Defence Civil Government Air Operations*

Nine permanent and five summer stations in connection with its forestry and other air activities.

*National Defence Civil Aviation Branch*

Six permanent stations situated as follows: St. Hubert Airport, Montreal; Forrest, Man.; Regina, Sask.; Maple Creek, Sask.; Lethbridge, Alta.; Red Deer, Alta. The western stations are all of the directive beacon type, and are equipped to supply weather information to planes in flight by radiotelephone.

### THE ROYAL COMMISSION ON RADIO BROADCASTING

The Report of the Royal Commission on Radio Broadcasting has not yet been dealt with by Parliament. The question of jurisdiction over radio having been raised by the Government of the province of Quebec, the matter was made the subject of a reference to the Supreme Court, which gave a majority decision in favour of the Dominion Government on June 30, 1931.

### EMPIRE BROADCASTING

At the Imperial Conference 1930, a committee examined the question of establishing an Empire broadcasting service.

The British Broadcasting Corporation has for some time past conducted an experimental long distance service from the temporary station 5 SW at Chelmsford, England, and subject to certain conditions has offered to erect a more powerful station in the United Kingdom and to provide a permanent broadcasting service, including three news bulletins daily in addition to entertainment items and special events.

The scheme presents certain technical and financial difficulties, and the committee recommended that the British Broadcasting Corporation should communicate particulars of the scheme to the broadcasting organizations, and other appropriate authorities, throughout the Empire, and invite them to furnish their views as to the value of such a service and as to their readiness to make contribution towards its cost in return for the right to relay any part of the service they may require.

### RADIOTELEGRAPH CONFERENCE, MADRID

The next Radiotelegraph Conference will be held at Madrid in September, 1932.

A preliminary conference was held in the Department of Marine, Ottawa, on February 16 and 17, 1931, when proposals for the amendment of the International Radiotelegraph Convention of Washington, 1927, and the regulations annexed thereto were discussed and formulated.

Representatives from the Canadian Marconi Company, the Bell Telephone Company of Canada, the Canadian National Telegraphs, the Canadian Pacific Railway Telegraphs, the Shipping Federation of Canada, the Amateur Radio Relay League, the All Canada Congress of Labour, the Department of External Affairs, and the Department of National Defence attended.

### LEGISLATION

A Bill is being prepared to give effect to the provisions of the Safety of Life at Sea Convention held in London. It is anticipated that this Bill will be introduced to Parliament during the present session.

### INDUCTIVE INTERFERENCE SECTION, 1930-31

This section has been operated along the same general lines as in the past.

Twenty-four cars are equipped and in operation, investigating interference, with headquarters at Vancouver, Calgary, Edmonton, Regina, Saskatoon, Moose Jaw, Winnipeg, Windsor, London, Hamilton, Kitchener, Toronto, Ottawa, Montreal, Quebec, Saint John, N.B., and Halifax.

No new cars were purchased during the year.

In addition to the permanent establishments, thirty-two part-time inspectors located in other towns and cities throughout the country, are provided with limited equipment for the investigation of radio interference and conduct preliminary tests where radio interference is reported in their districts. If they are unable to arrange for the elimination of the same with the facilities at their command, an investigator is sent from the nearest divisional headquarters at the earliest convenient time.

The inspector in charge of each car, with his assistant, investigates interference in the city in which his headquarters are located, and, also, makes regular interference investigation tours throughout the sections of the surrounding country which are under the jurisdiction of the office to which he is attached.

The standard equipment for the investigation of interference remains the same as in the past year, except for minor changes to improve the sensitivity of the radio receivers.

The investigators, on their tours, interview broadcast listeners who have reported interference and determine the electrical system on which the trouble originates; they then assist the owners of the system to locate the exact source and recommend means of suppressing the interference. Many of the sources are found to be faults or abnormal conditions in electrical apparatus, which, if not attended to in the early stages, may result in hazardous conditions or service interruption.

Where interference is found to be caused by the normal operation of electrical equipment the investigator demonstrates the use of interference suppressors and recommends, in detail, what steps the owners should take to permanently cure the trouble.

Since practically every piece of electrical apparatus is a potential source of radio interference, Radio Branch investigators are daily confronted with new problems peculiar to the specific equipment under investigation. For many of these cases, no precedent exists. Detail records of the technical features covering location and suppression of interference from such sources are, therefore, made for future guidance.

Circulars are issued and revised from time to time as new methods are developed and these circulars are forwarded to all investigators and others interested in the suppression of interference. In this way all the investigators benefit by the experience of the individual.

A number of illustrated lectures have been delivered by the staff to radio clubs and technical societies with the object of encouraging all those interested to do their part in improving reception conditions by suppressing interference wherever possible. Considerable publicity has been given to a paper read by the Inductive Interference Engineer before the Association of Municipal Electrical Utilities at Toronto, January 9, 1931, which has been published in a number of radio and electrical trade periodicals.

There is at present no legislation compelling owners of interfering electrical apparatus to suppress interference, but it is found that rarely does any person desire to cause annoyance to his neighbours and in nearly all cases the owners of interfering apparatus agree either to cease using such apparatus during broadcast hours or, if the interference is preventable, instal suppression devices. In some cases, the local listeners affected subscribe the cost of these devices, which are usually inexpensive and can be easily installed by a qualified electrician.

An engineer of this branch is working on the Committee of the Canadian Engineering Standards Association, which is drawing up a code of principles and practices for outside wiring, and it has been suggested that the matter of suppressing radio interference be included in this code.

The number of sources of radio interference investigated during the past three years is shown in the following table. The staff has handled a large

volume of complaints incident to the twelve thousand individual sources since many broadcast listeners frequently request assistance from the Radio Branch relative to a single trouble originating on a distribution network.

| Sources investigated | 1928–29 | 1929–30 | 1930–31 |
|---|---|---|---|
| Electrical distribution systems and power lines | 4,271 | 6,405 | 7,719 |
| Domestic and commercial electrical apparatus | 1,650 | 2,123 | 3,763 |
| Defective receivers and radio apparatus | 356 | 723 | 1,346 |
| | 6,277 | 9,251 | 12,828 |

| Action taken | 1928–29 | 1929–30 | 1930–31 |
|---|---|---|---|
| Number of sources definitely reported cured | 5,273 | 8,301 | 10,709 |
| Number of sources not yet reported cured | 855 | 782 | 1,953 |
| Number of sources having no economic cure | 149 | 168 | 166 |
| | 6,277 | 9,251 | 12,828 |

Many of the 1,953 sources listed as "not yet reported cured" have been successfully dealt with by the owners of the apparatus following the advice given by the investigators, but definite reports of the permanent elimination have not yet been received.

The 166 sources reported as "having no economic cure" are principally high voltage power lines, electric railway systems, electro-medical apparatus and a few other types of commercial apparatus. Investigation of these problems continues in an endeavour to find a means of suppression.

Arrangements have been made with the Hydro-Electric Power Commission of Ontario for a joint investigation of interference from high voltage transmission lines and it is hoped that, as soon as research facilities are available, means may be found to materially reduce the interference from this source.

Investigations have also been commenced to find a means of reducing electric railway interference.

In addition to the sources listed above, a great number of cases have been dealt with by correspondence from Headquarters and district offices. Following the advice given, the interference has been successfully eliminated by the owners of the apparatus.

When the broadcast listener is able to describe the interference so that our inspector can associate it with some specific electrical apparatus without making a special investigation the case is referred to the owner of the interfering apparatus, to be dealt with by him, and is not included in the total of sources investigated.

Many special surge traps have been designed by the Department and surge traps not yet produced commercially are sold by the Department to owners who wish to suppress interference from domestic and commercial electrical apparatus.

Progress has been made in systematizing investigation work and the increase in sources of interference located and cured, as shown by the table, indicates that with no increase in staff improved methods have speeded up investigations, and the technique of applying tests for elimination of sources has advanced, so that arrangements for elimination can be made expeditiously.

Interference from a single source frequently travels many miles along the power wires and affects great numbers of broadcast listeners. An example of such a case occurred in March of the present year, when a locality in the Niagara

district was affected by a continuous type of interference of heavy intensity. A preliminary investigation showed that this was associated with the 12,000 volt power transmission network in that area, and, with the co-operation of the Ontario Hydro-Electric Power Commission, switching tests were conducted to determine the circuit on which the interference originated.

This circuit consisted of a 15-mile line and, after further arrangements had been made, sections of this line were isolated in turn until it was proven that the radio interference originated between an air-break switch and pothead near the generating plant.

Further investigation showed that the apparatus responsible for the interference was a disconnecting fuse on one line in which the fuse ribbon has become broken inside the porcelain tube, with the result that an arc took place between the ends of the fuse ribbon, and the operation of the line was not affected.

The radio interference from the arc in this fuse was severe along the 15 miles covered by the 12,000-volt circuit on which the fault occurred and also affected radio reception to some extent in the area covered by the network with which this circuit was linked.

In April, 1930, a heavy interference of an intermittent nature caused considerable trouble with radio reception in one city in which two public utilities were operating.

The Radio Branch investigators spent several days endeavouring to locate the source but owing to the intermittent character of this interference the location could only be narrowed down to within an area of several blocks.

The source was finally located by an investigator who, following up the case, patrolled this area during darkness and noted a spark where the primary lines of the two utilities crossed at an intersection.

Closer examination showed that the upper primaries had sagged and one line was intermittently contacting with a primary of the other utility crossing beneath it.

The services of a lineman were obtained immediately and the fault was cleared temporarily by tightening up the slack line.

Apart from the hazard involved both distribution networks were radiating the interference throughout the district and, also, carrying interference to some extent to other parts of the city.

Several manufacturers of electrical apparatus have been approached regarding certain features of their products which cause radio interference, and, by co-operation with the Radio Branch, the designs have been revised to minimize the possibility of radio interference from the operation of such equipment. Some dealers guarantee their products not to cause radio interference.

In view of the extreme sensitivity of the modern electric receiver and the general use of same, the number of reports of interference has considerably increased and types of interference which did not affect reception with less sensitive radio equipment are now of serious import to broadcast listeners.

In addition to the interference work, the investigators do other work required by the Radio Branch in the towns they visit. Such work includes the sale of licences, inspection of amateur stations, and the examination of candidates for operators' certificates.

## SUMMARY

The net result of the work of the Inductive Interference Section may be summarized as follows:—

(1) Most of the new cases of interference brought to the attention of the department have been successfully dealt with.

(2) Practically all of the public utilities are now giving serious consideration to the possibility of interference originating on their lines and equipment and are co-operating with the Government investigators to reduce existing cases of interference.
(3) Many public utilities are maintaining their lines and apparatus in a much better condition from the radio standpoint and are replacing obsolete equipment, which frequently caused interference, by modern non-interfering types of apparatus.
(4) The general public now realize that it is necessary for them to co-operate in order to reduce the interference in their districts, by avoiding, as far as possible during broadcast hours, the use of battery chargers, Violet Ray equipment and other spark-producing apparatus, or else having same fitted with interference suppression devices.
(5) Broadcast listeners realize also that wherever electricity is used there is bound to be a certain amount of noise heard on sensitive receivers and the extreme sensitivity of modern sets is intended for use only when reception conditions are favourable.
(6) The average noise level in many districts has been materially reduced owing to the elimination of many sources of long-standing interference caused by telephone, telegraph, and distribution systems and privately owned electrical apparatus, etc. The occurrence of intermittent cases of interference has also been considerably reduced due to improved maintenance and the use by public utilities of modern type of equipment.
(7) High-voltage power lines and electric railway systems continue to be the two greatest sources of interference for which no economic cure has yet been found. Investigation work now in hand is progressing favourably and it is hoped to find a practical means of reducing the interference noise level from these sources.

## NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS

### *West Coast*

*Bull Harbour.*—A 1,600-watt C.W. transmitter was installed at this station.

*Cape Lazo.*—A new motor-driven generator to operate off the 25-cycle local supply mains was installed to drive the radiophone transmitter. The necessary change-over switches were installed to enable operation from either A.C. or D.C., also a starting relay and motor starter with the necessary wiring.

*Dead Tree Point.*—A 17-foot by 7-foot lean-to addition has been built on to the operating house to accommodate the C.W. transmitter.

The interior of the operating room has been rearranged and operating tables and interior woodwork have been altered to suit the new arrangement.

An automatic radio beacon transmitter has been installed complete with all necessary engines, motor generator set, battery, time switch controls and wiring.

The 4-K.V.A., C.W., transmitter has been moved into the new addition and rewired in its new location with suitable controls.

A new angle steel mast has been erected to support the radio beacon aerial.

The station has been rewired for electric lighting.

*Estevan Point.*—A considerable amount of work was carried out on the Estevan-Hesquiat road, which consisted chiefly of putting down a split cedar corduroy on the soft parts of the road and repairing broken corduroy. The road was straightened and gravel graded in places.

The Hart Type E.C. 39-plate battery has been completely reconditioned.

*Gonzales Hill.*—All the fence enclosing the site has been repaired and about 250 feet of it has been replaced with new fencing. New gates were built and erected and the underbrush around the fences and grounds has been cleared.

*Merry Island.*—A new Coyle 120-ampere hour lead plate battery was installed, charged up and placed in commission.

*Vancouver Station.*—All the apparatus from the old Merchants' Exchange Building was dismantled and transferred over to the new Marine Building, and in addition a 100-watt radiophone transmitter was installed.

A spar for supporting the aerial was made up and fitted to project beyond the roof coping of the twentieth story of the building and a six-wire cage aerial 195 feet long was suspended from it.

The location appears better from every point of view. Receiving conditions have improved considerably, and distant stations report stronger signals.

*Radio Beacon Stations*

*Langara.*—A pitch roof building, 13 feet by 24 feet, was built to accommodate the radio beacon equipment and to provide a sleeping room for the operator in charge. Two automatic radio beacon transmitters, complete with engines, motor generators, change-over switches, battery and all necessary parts were installed.

Two steel angle masts were erected and the necessary aerial and ground wires were completed.

The beacon was put in commission on July 15, 1930.

*Quatsino.*—A suitable location in one end of the fog alarm building was selected and some alterations were made to accommodate the radio beacon transmitters.

Two automatic radio beacon transmitters, complete with engines, motor generators, change-over switches, battery and all necessary parts, were installed.

A tree was selected for a mast, properly stayed up and all the limbs trimmed off.

The station was put in commission on September 22, 1930.

*Race Rocks.*—An addition was built on to the fog alarm building at Race Rocks to provide accommodation for the operator and the beacon transmitters.

Two automatic radio beacon transmitters, complete with engines, motor generators, change-over switches, battery and all necessary parts, were installed.

The equipment was placed in commission on August 5, 1930.

*Triple Island.*—A suitable location in the basement of the Lighthouse Building was selected for the new radio beacon. Two automatic radio beacon transmitters, complete with engines, motor generators, change-over switches, battery and all necessary parts, were installed.

The station was put into commission on August 12, 1930.

One steel angle mast was erected and the necessary aerial and ground wires were completed.

*Ship Stations*

*R.C.M.P. Schooner St. Roch.*—A new wireless cabin was built on the upper deck and the wireless apparatus was installed in the same. A special gasoline electric unit was installed to supply light and power for the wireless equipment.

*East Coast*

*Red Head D.F. Station.*—The new type of aerial suspension gear was installed. New upper and lower stays were fitted on main mast, new stays on jury masts, all defective turnbuckles and insulators replaced.

*Cape Race D.F. Station.*—This station took over all duties carried out previously by the Marconi operated station VCE, August 1, 1930, and is now a double service station, the change taking place without any interference to the D.F. service.

*Radio Beacon Stations*

*Seal Island.*—Equipped with 2/type AB T 2-200 watt, beacon transmitters, 2 automatic generating units, each complete with starting batteries; the transmitter at this station was duplicated in January, 1931; and the height of both masts was increased 40 feet, and all rigging overhauled.

*Cape Ray.*—The spark beacon transmitter was replaced by one of the new type automatic beacons, type AB T 3-200 watt and 2 automatic generating units complete with batteries.

The ground system was improved by an additional 10,000 feet of copper wire.

*Cape Bauld.*—The spark transmitter at this station was replaced by a new type automatic beacon transmitter and automatic generating units in duplicate. Work was commenced on this installation July 18, and the new beacon went into commission August 7, 1930.

*Ship Stations....*

*Halifax Pilot Boats.*—The pilot boats, *Nauphila* and *Hebridean* operating off the port of Halifax were equipped with radiotelephony for communication with the shore.

General information relative to the movements of vessels received by the Chebucto Head Coast Station is communicated free of charge to the pilot boats by the department's Signal Station at the Citadel, Halifax, which is similarly equipped. Masters of vessels desiring to forward a special message to the pilot boat on duty may do so by means of a paid message sent via Chebucto Head.

GULF OF ST. LAWRENCE

*Grindstone Island.*—A 100 watt C.W.-I.C.W. radiotelephone transmitter, complete with 2 K.W. gasolene engine driven generator and starting battery, has been installed, which materially increased the effective range of the station. The old spark transmitter has been retained for emergency purposes. The installation of the new transmitter removes a long standing source of interference to broadcast reception on Prince Edward Island and vicinity.

GREAT LAKES

*Port Burwell, Ont.*—A remodelled 400 watt C.W.-I.C.W. transmitter, which had previously been used as a non-automatic radio beacon transmitter at south-east shoal, has been installed at this station, one spark transmitter being retained for emergency purposes. The efficiency of the station has been improved, and interference hitherto caused to broadcast reception by the spark transmitter has been eliminated.

HUDSON BAY AND STRAIT

The annual trip with supplies and relief staff for the isolated stations in Hudson strait was carried out by the new ice-breaker *N. B. McLean.*

*Resolution Island.*—The calibration of this station was rechecked.

*Cape Hope's Advance D.F. Station.*—Two new 60-foot masts were erected to support the short wave aerial used in communication with Ottawa. The calibration of the station was rechecked.

*Nottingham Island D.F. Station.*—A gasolene fire destroyed the operating house on the morning of December 26, 1930. Communication with the outside world was thereafter maintained by means of an emergency transmitter. Provision is being made to replace the building and equipment as early as possible after the opening of navigation.

The calibration of this station was rechecked.

*Port Churchill D.F. Station.*—The masts, aerials and rigging were overhauled and the buildings repainted. The calibration of the station was rechecked by the Hydrographic Survey ship *Acadia.*

*Chesterfield Inlet.*—A new station was erected on the south side of the entrance to the inlet. A combined dwelling and operating house was built and two 115-foot angle steel masts erected. The equipment of the station consists of duplicate 100 watt C.W., I.C.W., and phone transmitters with duplicate 2 K.W. gasolene engine driven generators together with long and short wave receivers.

COPPERMINE RIVER—CORONATION GULF

A new station was erected at the mouth of the Coppermine river to provide communication with the stations at Chesterfield and Churchill and to act as an observation post for the collection of meteorological data which is forwarded to the Meteorological Office, Toronto, to be used in the compilation of daily weather reports.

The equipment which consists of 500 watt long and short wave C.W. transmitters with telephone attachment and complementary receivers together with duplicate 5 K.W. generating sets, is installed in a combined operating house and dwelling. A 50-watt emergency transmitter and a 1,250-watt gasolene engine driven generator is housed in an adjacent store house. Two 115-foot angle steel masts support the long wave aerial and two 50-foot masts were erected for the short wave aerial.

Material was sent in by the Hudson bay steamer *Baychimo* and the crew were flown in by the Civil Aviation Branch of the Department of National Defence.

SPECIAL ASSISTANCE RENDERED TO SHIPS DURING THE YEAR BY GOVERNMENT RADIO STATIONS

*West Coast*

*Alert Bay*

SS. *Northland.*—At 1.30 a.m. on January 14, 1931, the ss. *Northland* requested assistance of the Alert Bay Station, advising grounded Helmicken rocks, Salmon river, 6.15 p.m. January 13. Alert Bay arranged for two large launches to stand by if required, as no vessel in immediate vicinity. The ss. Cardena took passengers off at 8 a.m. on 14th and landed them at Alert Bay. The *Northland* floated off at 9.30 a.m. on 16th, assisted by ss. *Salvage King,* and proceeded on voyage to Ketchikan. Vessel suffered slight damage to hull.

The West Coast stations were also of assistance to the ss. *Pacific Monarch, Princess Royal,* tug *Ivanhoe, H. W. Baxter* and *Northwestern.*

*Great Lakes*

The Great Lakes stations were of assistance to the ss. *Munising,* tug *Guardian,* barge *Sagamore, Anna C. Minch, Kingdoc,* yacht *Commodore, Valleycamp,* and *Collier No. 1.*

*East Coast*

*Cape Race, Nfld.*

SS. *Henri Jaspar.*—At 02.00 E.S.T. on July 7, 1930, the Cape Race Station received a message from the master of ss. *Henri Jaspar,* advising had struck submerged wreckage and lost propellor blade. The *Henri Jaspar* proceeded to destination at reduced speed.

SS. *Targis.*—At 02.15 G.M.T. on July 19, 1931, the Cape Race Station received a message broadcast from the ss. *Rangitata* as follows: " SS. *Rangitata* reports ss. *Targis* foundered 33·54 N. 50·45 W. at 01.45 G.M.T. 19th, all crew and passengers on board proceeding to Southampton ".

At 09.27 E.S.T. on July 27, 1930, the m.s. *Oljaren* advised the Cape Race Station of having picked up small fishing boat containing two men. The rescued men were taken to Liverpool.

*Belle Isle, Nfld., Direction Finding*

SS. *Dalryan.*—At 01.25 G.M.T. on July 18, 1930, the Belle Isle Station intercepted a distress message from the ss. *Dalryan* advising ship struck berg bow on in dense fog in approximately 51·53 N. 55·59 W. Several bearings on *Dalryan* given to ss. *Athenia* who proceeded to assistance, arriving at position about 04.40 G.M.T. At 14.55 G.MT. the *Dalryan* advised *Athenia* " now afloat and waiting to ascertain extent of damage." The *Dalryan* proceeded to Quebec under own power escorted by *Athenia.*

*Canso, N.S., Direction Finding*

SS. *Spica.*—At 15.20 G.M.T. on August 27, 1930, the ss. *Spica* informed the Canso Station had struck Cerberus Rock at 13.30 G.M.T. and asked if any tugs in Canso. The Canso Station assisted in getting tug and in the exchange of messages with the *Spica.* The *Spica* was, later, a total loss.

*Chebucto Head, N.S., Direction Finding*

Trawler *Tramontana.*—At 00.55 G.M.T. on April 5, 1930, the Chebucto Head Station received a distress message from the trawler *Tramontana.* Position not given—was obtained by the Chebucto and Canso D.F. Stations and broadcast. Two Spanish trawlers proceeded to assistance and ss. *Duchess of Bedford* stood by; other bearings and weather forecasts were furnished the *Tramontana,* who advised at 04.27 G.M.T. that trouble remedied.

*Cape Race, Nfld., Direction Finding*

SS. *Ovidia.*—At 05.53 G.M.T. on November 19, 1930, the Cape Race Station received a distress message from the ss. *Ovidia* advising position N. 42 Long. W. 50·55 bearing south 19 east from Cape Race 300 miles leaking and will soon be forced to take to boats. As the *Ovidia* could not get a reply from any ship for some time, Cape Race also broadcast the S.O.S. At 06.35 the ss. *Endicott* answered the *Ovidia.* " Captain says coming to you ". At 06.42 *Endicott* gave position noon 41·44 N. 52·19 W. bound Bremen speed 10 knots. At 06.47 *Endicott* advised *Ovidia:* " We are 75 miles to Eastward and now coming to your assistance." At 18.20 G.M.T. on 19th Lat. 42·35 No. Long. 50·45 W. *Ovidia* abandoned in sinking condition, crew taken off by ss. *Mauretania.*

Schooner *Vibert T. Shave.*—At 14.28 G.M.T. on September 28, 1930, the Cape Race Station was advised by the master of the ss. *Haugarland* as follows: " Schooner sunk midnight after collision off Ferryland magnetic SE. 3 miles off, one man saved and five missing, ships in vicinity please keep a good lookout ".

Cape Race broadcasts this message every twenty minutes from 15.30 to 18.50 G.M.T. and also in regular broadcast message.

The East Coast stations were also of assistance to the ss. *Aranda, Governor Dingley Caribou* and *Rosalind,* and schooners *Mary Patricia* and *James E. Newson.*

### EAST COAST VISUAL SIGNAL SERVICE

Twelve visual Signal Stations on the East coast are under the administration of the Radio Branch and under the direct jurisdiction of the Division Superintendent of Radio at Halifax. All radio stations report ships communicated with and this is supplemented by reports of ships sighted by the visual signal stations, which are organized to tie in with the East Coast radio service.

Details of these stations will be found on page 38 of this report.

## BOARD OF STEAMBOAT INSPECTION

REPORT OF CHAIRMAN, FRANK MCDONNELL, M.E.I.C.

### STAFF

Mr. L. M. Murphy was appointed Steamship Inspector (General) by Order in Council, dated September 30, 1930, to fill the vacancy at Montreal due to the death of Mr. S. Gruzelier.

### BOARD MEETINGS

Board meetings for the purpose of dealing with questions arising out of the administration of the regulations governing steamboat inspection, for considering the qualifications of candidates for the position of steamboat inspector, and for the approval of plans of hulls, machinery, boilers and equipment for use in ships coming under inspection, were held during the year.

### ENGINEER EXAMINATIONS

During the fiscal year 198 candidates for certificates of competency were granted certificates as marine engineers. In addition, 70 temporary engineer certificates were issued, also 22 certificates to motor engineers.

Appended will be found a list of the Steamboat Inspection staff during the fiscal year, also table showing the number of inspections made, fees collected, etc.

STEAMBOAT Inspection Staff for the Dominion of Canada during the Fiscal Year ended March 31, 1931

SENIOR STEAMSHIP INSPECTORS

| Name of Inspector | Headquarters | Division |
|---|---|---|
| N. A. Currie | Halifax, N.S. | Nova Scotia. |
| P. W. Lyon | Toronto, Ont. | Western Ontario—Toronto, Collingwood and Midland. |
| H. G. Robinson | Vancouver, B.C. | British Columbia. |

## INSPECTORS ACTING IN DUAL CAPACITY

| | | |
|---|---|---|
| A. I. Ross | Halifax, N.S. | Nova Scotia. |
| S. J. Hill | Halifax, N.S. | Nova Scotia. |
| C. E. Dalton | Saint John, N.B. | New Brunswick and Prince Edward Island. |
| J. A. Samson | Quebec, P.Q. | Quebec. |
| F. X. Hamelin | Sorel, P.Q. | Sorel. |
| J. H. Fontaine | Montreal, P.Q. | Montreal. |
| C. C. McVey | Montreal, P.Q. | Montreal. |
| *L. M. Murphy | Montreal, P.Q. | Montreal. |
| B. Mantrop | Kingston, Ont. | Kingston. |
| J. J. Moffat | Toronto, Ont. | Toronto. |
| A. K. Venables | Toronto, Ont. | Toronto. |
| W. P. Craig | Toronto, Ont. | Toronto. |
| W. L. MacKenzie | Midland, Ont. | Midland. |
| R. C. Blyth | Collingwood, Ont. | Collingwood. |
| W. J. Vigars | Port Arthur, Ont. | Port Arthur. |
| A. Farrow | Vancouver, B.C. | British Columbia. |
| T. M. Stephen | Vancouver, B.C. | British Columbia. |
| J. T. Mathews | Vancouver, B.C. | British Columbia. |
| J. Brydon | Vancouver, B.C. | British Columbia. |
| J. T. Edmond | Victoria, B.C. | British Columbia. |

*Vice Mr. S. Gruzelier, deceased.

## INSPECTORS OF BOILERS AND MACHINERY

| | | |
|---|---|---|
| D. J. Stevens | Halifax, N.S. | Nova Scotia. |
| J. T. Gardham | Montreal, P.Q. | Montreal. |

## INSPECTORS OF HULLS AND EQUIPMENT

| | | |
|---|---|---|
| D. K. O'Brien | Halifax, N.S. | Nova Scotia. |
| Capt. W. R. Bennett | Saint John, N.B. | New Brunswick and Prince Edward Island. |
| J. C. Beaudoin | Quebec, P.Q. | Quebec. |
| W. L. Robertson | Kingston, Ont. | Kingston. |
| A. A. Young | Toronto, Ont. | Toronto. |
| E. M. Sleigh | Vancouver, B.C. | British Columbia. |

## INSPECTORS OF SHIP'S TACKLE

| | | |
|---|---|---|
| D. K. O'Brien | Halifax, N.S. | |
| J. M. Martin | Saint John, N.B. | |
| A. Duval | Montreal, P.Q. | |

TABLE showing the Number of Inspections made, Fees collected, etc., during the Year ending March 31, 1931

| Division | Number of inspections made, with gross tonnage of vessels inspected | | | | Number of vessels not inspected, with gross tonnage | | Total number of vessels subject to inspection when in commission, with gross tonnage | | Number of vessels added to the Dominion, with gross tonnage | | Number of vessels lost, broken up or destroyed, with gross tonnage | | Fees collected by inspector(s) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vessels registered or owned in the Dominion | | Vessels registered or owned elsewhere | | | | | | | | | | | |
| | No. | Gross tonnage | No. | Gross tonnage | No. | Gross tonnage | No. | Gross tonnage | No. | Gross tonnage | No. | Gross tonnage | On account of inspections | On account of examinations of engineers |
| | | | | | | | | | | | | | $ cts. | $ cts. |
| Halifax | 133 | 119,785 | 16 | 64,250 | 9 | 20,719 | 158 | 204,754 | 2 | 3,847 | 2 | 4,803 | 16,436 26 | 237 00 |
| Saint John | 71 | 72,291 | 2 | 7,652 | 40 | 25,167 | 113 | 105,110 | 4 | 5,238 | 2 | 753 | 5,976 53 | 62 00 |
| Quebec | 73 | 35,210 | ..... | ..... | 8 | 2,241 | 81 | 37,451 | 7 | 4,173 | 4 | 623 | 5,606 66 | 119 00 |
| Sorel | 103 | 60,111 | ..... | ..... | 20 | 8,157 | 123 | 68,268 | 3 | 379 | 1 | 73 | 6,560 00 | 268 00 |
| Montreal | 109 | 175,422 | 15 | 48,279 | 105 | 10,749 | 229 | 234,450 | 10 | 19,315 | ..... | ..... | 17,453 40 | 335 00 |
| Kingston | 104 | 124,204 | 4 | 377 | 8 | 8,872 | 116 | 133,453 | 5 | 9,551 | ..... | ..... | 10,930 00 | 123 00 |
| Toronto | 203 | 290,979 | 53 | 79,106 | 25 | 41,727 | 281 | 411,812 | 1 | 149 | 4 | 1,555 | 25,342 10 | 100 00 |
| Midland | 73 | 83,527 | 3 | 65 | 20 | 8,473 | 96 | 92,065 | 3 | 12,928 | 5 | 138 | 6,233 90 | 103 00 |
| Collingwood | 90 | 34,944 | ..... | ..... | 21 | 10,739 | 111 | 45,733 | 6 | 6,557 | ..... | ..... | 3,910 00 | 44 00 |
| Port Arthur | 88 | 76,435 | ..... | ..... | 73 | 4,563 | 161 | 80,998 | 5 | 304 | 6 | 2,490 | 8,245 00 | 37 00 |
| Vancouver | 262 | 148,103 | 14 | 126,405 | 92 | 30,955 | 368 | 305,463 | 10 | 14,460 | 4 | 573 | 20,599 78 | 342 00 |
| Victoria | 74 | 78,794 | 14 | 32,644 | 16 | 13,077 | 104 | 124,515 | 3 | 11,093 | 2 | 100 | 7,425 50 | 96 00 |
| | 1,383 | 1,299,805 | 121 | 358,778 | 437 | 185,439 | 1,941 | 1,844,072 | 59 | 87,994 | 30 | 11,108 | 134,719 13 | 1,866 00 |

## REPORTS OF AGENCIES

### Halifax, N.S., Agency

During the fiscal year ended March 31, 1931, this agency maintained 151 lighthouses, 1 light in private dwelling, 9 unwatched lights, 22 pole lights, 9 electric lights, 2 lightships, 27 storm signals, 20 diaphones, 1 steam fog alarm, 1 explosive fog alarm, 3 mechanical fog bells, 84 wharves, 6 life-saving stations, 1 humane station on Sable island, 45 hand horns, 20 gas and whistle buoys, 19 gas and bell buoys, 7 gas only buoys, 24 whistle only buoys, 63 bell only buoys, 78 can buoys, 57 conical buoys, 1,012 spar buoys, 13 casks, 14 stakes, 16 bushes, 2 beacons, and 4 steamers—the *Aranmore, Stanley, Lady Laurier,* and *J. L. Nelson.*

#### CHANGES IN AIDS TO NAVIGATION

Pages island light was discontinued and a gas and bell buoy established in its stead.

Chester ironbound unwatched light changed to a fixed white light.

Two spar buoys to replace two barrels entrance to Glace bay harbour.

Green buoy marking wreck of schooner *Minto* in river Inhabitants was discontinued.

#### NEW AIDS ESTABLISHED

Two range lights in Otter Harbour—Bras d'Or lakes.

One unwatched light off breakwater in Canso harbour.

One unwatched light on Sheep island, in Dover bay.

One conical buoy off Hemlow island—Little Liscomb.

Four spar buoys, entrance Soldier's cove—St. Peters inlet.

One spar buoy—port L'Hébert.

Six spar buoys northern entrance Petit de Grat.

One spar buoy Dartmouth cove—Halifax harbour.

Erected new mast to replace old storm signal at L'Ardoise.

Erected new lighthouse, keeper's dwelling and assistant keeper's dwelling at Chebucto head.

Erected new combined lighthouse and dwelling at port Bickerton.

Erected new dwelling for keeper at east light Sable island.

All lights and fog alarms were maintained in proper order throughout the year and repairs made where necessary.

#### DOMINION STEAMERS

C.G.S. *Lady Laurier.*—April 1 to 24—under annual repairs. May 2 to June 3—on eastern program, loading buoys. June 4 to 28—placing and loading western buoys. July 4 to 26—on eastern supply trip, placing eastern buoys. July 28 to September 19—loading western buoys, to Devil's island, loading Cape Breton supplies, replacing and salvaging buoy at Sambro, supplying coal D.F. station Chebucto head, placing new buoy at Terence bay. September 20 to October 6, cleaning boilers, relighting Liscomb buoy. October 7 to 28—on eastern buoy and supply trip, replacing Little Hope buoy; at Chebucto head and Sambro. October 29 to November 24—replacing western buoys attending Sambro and harbour buoys; replacing Brazil rock buoy; on Sable island supply trip. November 28 to December 10—on western buoy program. December 13 to 24—on eastern buoy program. December 26 to January 3—on western buoy program; searching for schooner *Dorin.* January 5 to Feb-

ruary 1—on eastern buoy program; salvaged and replaced Egg island buoy February 4 to 13—on western buoy program; salvaging and replacing Little Hope buoy. February 16 to 27—on eastern buoy program. February 28 to March 19—on western supply and buoy trip. March 20 to 23—on eastern buoy program. March 24 to 31—blowing down for annual repairs.

C.G.S. *Aranmore.*—April 1 to 4—under repairs. April 5 to 10—bunkering, testing compasses, attending harbour buoys. April 11 to 23—placing and loading western buoys. April 24 to June 4—bunkering; placing and loading eastern buoys; with supplies to lightship and to Sable island; placed Shut-in-island buoy. June 5 to 27—loading and delivering western supplies. June 28—loading oil for Charlottetown agency. July 1 to 31—under Prince Edward Island agency. August 1 to 25—with supplies to Cape Race. August 27 to November 4—under Prince Edward Island agency. November 8 to 16—to St. Paul's island and eastern buoys. December 18—under Prince Edward Island agency. December 20 to March 31—under repairs.

C.G.S. *Stanley.*—April 1 to 4—to Sable island and Sambro lightship. April 5 to December 18—under repairs. December 19 to 26—recommissioning and testing compasses. December 27 to 29—searching for schooner *Dorin.* December 30 to January 1, 1931—to Canso. January 2 to 5—harbour program. January 9—with supplies to lightship. January 10 to 12—to Chebucto head. January 14 to 17—bunkering, and replacing harbour buoys. January 19 to February 18—on eastern program; breaking ice Bedford basin, also Sheet harbour; to Sambro lightship; loading for Sable island. February 19 to 23—bunkering and repairs at North Sydney. February 24 to March 13—on eastern buoy program; salvaged Isaac's harbour gas and whistling buoy; with supplies to lightship. March 14 to 31—inspecting western stations re damage; on western program.

C.G.S. *J. L. Nelson.*—April 1 to June 2—harbour duties; under small repairs; with supplies to Chebucto head; attending harbour buoys. June 4 to 30—with supplies to Mauger's beach; to Chebucto head; with supplies to Sambro fog alarm. July 2 to 10—harbour duties; under small repairs. July 11 to November 1—blown down for repairs; with supplies to near-by stations; with supplies to lightship; to Saul's unwatched light; with coal to Chebucto head. November 1 to January 20, 1931—with Sambro buoys; harbour duties; with supplies to Mauger's beach; to Chebucto head; to Ketch harbour. January 21 to February 3—inspecting harbour buoys; breaking ice Northwest arm; to Herring cove. February 4 to 26—harbour duties; breaking ice Northwest arm. February 27 to March 31—to Jeddore; harbour duties; to Chebucto head; to Neverfail buoy; to Herring cove and Terence bay; to Mauger's beach; to Devil's island and to Lawlor's island.

### Pictou, N.S., Subagency

Harbour and roadstead buoys were overhauled and painted. SS. *Brant* placed same in position May 7 and lifted same December 4.

Deep water channel from Abercrombie point to New Glasgow was bushed and marks maintained during season by contractor. Operation of East river range lights was supervised during season.

Steamers *Montcalm* and *Brant* were in port during season.

Lighthouse keepers were notified regarding lighting and extinguishing lights.

During early part of spring, daily reports re ice conditions in harbour and vicinity were made to Agent, Signal Service, Quebec.

Oil furnished lightkeepers when required.

### Sydney, N.S., Subagency

The last fiscal year was in many respects a repetition of former years, especially with regard to the safe navigation of the harbour and nearby coast line; this was due in a great measure to the care and attention shown by those in charge of the aids established by the department.

In view of the fact that there were neither groundings nor collisions, where this port is the headquarters and loading port of the fleet of ten thousand ton carriers, employed by the Steel and Coal Company, trading to and from Montreal and Quebec, is ample evidence of the protection given by the location of lighthouses and buoys, on headlands and shoals, and also the efficient pilotage service.

At the close of navigation last season, the C.G.S. *Montcalm* was assigned to the performance of winter service, here and at Louisburg, and was available at the same time to give assistance almost anywhere east of Halifax, but her work was specially intended for the assistance of vessels ice bound in Cabot strait, or on the west coast of Newfoundland, her efforts having been successful in relieving distress on shore, as well as vessels requiring assistance in ice fields.

The C.G.S. *Mikula* and the *McLean* came down the river and gulf after freeing the upper reaches of the river, and were available for convoying up river steamers, arriving from across, but fortunately very little interference was met with by drift ice this spring, and after a short period, both were withdrawn.

The C.G.S. *Lady Laurier*, *Arranmore*, together with the *Montcalm*, have given attention to all matters in connection with lighthouse and buoy service, in and around the island of Cape Breton, and their work has been satisfactorily done.

Matters of importance in which the Quebec and Charlottetown agencies were interested, have been arranged here.

The ship repair plants here as well as at North Sydney, have done quite considerable work for the Public Works Department, as well as other ship work in a general way.

The following tabulated statements will convey information regarding the extent of trade and commerce carried on in this harbour and adjoining ports. Together with St. Lawrence traffic, quite a number of European bound vessels arrived and cleared from time to time, some taking steel products, and others landing supplies for the Steel Company, such as brick and moulding sand.

SHIPPING RETURNS FOR THE PORTS OF SYDNEY, NORTH SYDNEY AND LOUISBURG

| | Number of ships | Tons |
|---|---|---|
| Port of Sydney:— | | |
| Foreign inwards | 191 | 40,627 |
| " outwards | 320 | 663,867 |
| Coastwise inwards | 1,026 | 1,297,128 |
| " outwards | 888 | 1,038,746 |
| Port of North Sydney:— | | |
| Foreign inwards | 828 | 324,634 |
| " outwards | 818 | 325,084 |
| Coastwise inwards | 761 | 262,531 |
| " outwards | 789 | 263,998 |
| Port of Louisburg:— | | |
| Foreign inwards | 31 | 18,083 |
| " outwards | 35 | 12,093 |
| Coastwise inwards | 169 | 44,463 |
| " outwards | 158 | 55,915 |

## Saint John, N.B., Agency

During the past year the usual annual repairs, cleaning and painting have been carried out at the various stations in this division.

There are under the supervision of this agency one hundred and seventy-four light, fog-alarm and fog-bell stations, classified as follows:—

7 unwatched lights, using A.G.A. acetylene.
4 fog-alarm stations only.
1 fog bomb station.
2 fog-bell stations operated by machinery.
7 electric lightstations, one of which is a combined light and fog-bell station.
1 station using a Banner burner.
1 station having a Mammoth No. 3 burner.
8 stations having Piper lanterns.
28 vapour lightstations, seventeen of which are light and fog-alarm stations combined.
113 stations using duplex lamps, six being combined light and fog-alarm stations.
2 stations with two range lights each.

At Peases island a Mammoth No. 3 lamp is maintained in addition to the 55 m/m diamond vapour light.

At Mitchener point, where there is a duplex lamp, a second light is maintained of the Mammoth No. 3 type.

Also the *Lurcher* lightship, a red, steel steamer with two masts, equipped with diaphone, submarine fog-bell and radio beacon, and manned by a crew of fifteen, is located on the Lurcher shoal, seventeen miles from Yarmouth, N.S.

### MAINTENANCE OF BUOYS AND BEACONS

All the buoys and beacons under the supervision of this agency, including those under contract, as well as attended by departmental steamers, have been well maintained during the past year.

The following is a list of those maintained under contract:—

| | |
|---|---|
| 3 barrels. | 6 cans. |
| 3 dropping buoys. | 15 bushed stakes. |
| 7 casks. | 7 miles bushing. |
| 3 spindles. | 532 bushes and stakes. |
| 8 conicals. | 362 spars. |

The departmental steamers have attended to the following:—

| | |
|---|---|
| 4 gas. | 57 cans. |
| 36 bell. | 56 conicals. |
| 7 whistles. | 113 spars. |
| 8 gas and bell. | 25 spindles. |
| 16 gas and whistle. | 20 stakes. |

At Reeds point, Saint John city, an electric beacon, showing a red and white light, is exhibited from a three branched lamp post.

### METEOROLOGICAL SERVICE

There are under the supervision of this agency ten signal stations, Kelly cove and Clarks harbour stations having been added during the past year.

LIFE-SAVING SERVICE

Two life-saving stations, Bay View, N.S., and Little Wood island, N.B., are under the supervision of this agency.

Repairs and renewals were made at Little Wood island, N.B.

CONSTRUCTION AND REPAIRS

*Boars Head light and alarm, N.S.*—As the road along the edge of the bank to Boars head lighthouse had caved in, a new right of way was bought around this part and a road built over it. The old lens was removed and replaced by a reflector. A new type "B" diaphone was also installed at Boars head.

*Cape Sharp, N.S.*—The old diaphone which was worn out was replaced by a new type "F" diaphone.

*Head Harbour fog alarm, N.B.*—A new type "B" diaphone was installed at Head Harbour fog alarm, N.B., to replace the old instrument which was worn out.

*Lord's Cove spindle, N.B.*—The spindle at Lord's cove, N.B., was rebuilt.

*Marine wharf repairs, West Saint John, N.B.*—Repairs were made to the face of the marine wharf which was badly eroded away.

*Marine depot, West Saint John, N.B.*—A new blacksmith shop was erected at the marine depot.

*Partridge Island, N.B.*—The assistant keeper's dwelling was repaired and put into good condition.

The old steam fog alarm plant at Partridge island was replaced by a new semi-diesel one and the building thoroughly overhauled and renovated.

*Point Prim light and alarm, N.S.*—The fog alarm plant and light at Point Prim was electrified. The light tower was repaired, the drainage system rebuilt and general renovations were made to the station.

*Splitting Knife Ledge spindle, N.B.*—Spindle rebuilt.

*Turpentine island, N.S.*—Eight dolphins were established on the Turpentine island channel.

MAINTENANCE OF WHARVES

There were under the supervision of this agency during the past fiscal year one hundred and thirty-four public wharves.

All of these wharves have been inspected and repairs made where found necessary.

SIGNAL SERVICE, SAINT JOHN, N.B.

Statement of vessels reported from Partridge island, giving total tonnage of same from April 1, 1930, to March 31, 1931:—

| | Tonnage |
|---|---|
| 158 steamers | 546,785 |
| 2 four-masted schooners | 1,154 |
| 1 gun-boat | — |
| 161 vessels | 547,939 |

DOMINION STEAMERS

C.G.S. *Dollard.*—This steamer was employed continuously during the fiscal year 1930-31 in buoy and lighthouse service work, landing supplies and oil at the various stations under the jurisdiction of the agency.

C.G.S. *Laurentian* was employed in lighthouse and buoy service work continuously under the New Brunswick agency during the last fiscal year.

## VICTORIA, B.C., AGENCY

### GENERAL

The general work of the service comprised the carrying out of repairs, maintenance and inspection of lightstations, government wharves, buoys, beacons, etc., the purchasing and delivery of supplies for same, as well as those necessary for the Radio and Hydrographic offices.

The past year, although in general a year of unusual depression, created no diminution in the number of vessels operating in British Columbia waters. On the contrary new services were opened and larger and faster coastal boats, being among the finest in the world, were put into coastal service here, for this reason the government, following their usual practice, continued to increase the aids to navigation in order to make the routes safer for this travel. A large number of unwatched lights, buoys, beacons, etc., were established; a large light and fog alarm station was built and put into operation at Albert head; a radio beacon was established at Quatsino lightstation. The lighthouse at First narrows was electrified, and a large diaphone fog alarm plant is now in course of construction at Pulteney point.

The life-boats at Banfield and Clayoquot have been in service all the year, except for the time required for annual overhaul, and their services were given in many instances in trips of rescue, as well as delivering mail and small supplies to nearby lightstations and attending to unwatched lights in their districts.

Patrol steamers were stationed at Banfield during the winter months and patrolmen were placed on the west coast trail from November 1, 1930, until March 31, 1931.

### LIGHTSTATIONS, FOG ALARMS, FOG BELLS, ETC., IN THE VICTORIA AGENCY

3 lightstations of the first order.
3 lightstations of the third order.
10 lightstations using catoptric reflectors.
10 lightstations of the fourth order.
7 lightstations of the fifth order.
8 lightstations of the seventh order.
25 fog alarms of the diaphone type.
2 fog alarms of the Strombos compressed air type.
4 fog alarms of the Reed type.
10 fog bells.

### BUOYS AND BEACONS MAINTAINED IN THE AGENCY

Lighted buoys—
1 type 11 gas and whistling buoy.
7 type 9½ gas and whistling buoys.
4 type 8½ gas and bell buoys.
8 type 8½ gas lighted buoys.
2 type 4½ gas lighted buoys.
3 wooden platform buoys with Aga equipment.
1 wooden platform buoy with oil lantern.

Unlighted buoys—
3 automatic whistling buoys.
5 surface bell buoys.
22 steel conical buoys.
34 steel can buoys.
3 small steel mine buoys.
130 wooden spar buoys.
16 wooden platform buoys.

Lighted beacons—
30 automatic acetylene gas beacons.
8 acetylene gas beacons using range lanterns and F.R. 20A flashers with ½ cubic foot burners.
10 Aga gas beacons using 200 m/m lanterns.
63 Aga gas beacons using 150 m/m lanterns.
21 electrical lighted beacons.
13 oil lighted beacons.

Unlighted day beacons, range marks, dolphins, etc., 73.

DOMINION STEAMERS

C.G.S. *Estevan.*—Landed coal at Porlier pass and Portlock point lightstations; lumber at First narrows lightstation; oil and supplies at West Coast lightstation and Ioco. Attended Fraser river buoys. Overhauled buoys on west coast. Built concrete base for an unwatched light at Blind channel, Kyuquot. Erected Aga light at White islet, Clayoquot sound. Replaced Sand heads lightship. On October 1 left for Prince Rupert agency and landed oil and supplies at lightstations en route and returned to port November 7, then overhauled gas buoys in strait of Georgia, and Fraser river, also mooring buoys for Naval Department at Esquimalt. Landed supplies on west coast of Vancouver island at all light and radio stations; material and machinery for new fog alarm at Pulteney point, at Active pass and at First narrows; landed also government stores at Cape Mudge lightstation.

C.G.M. *Berens.*—Landed building material for radio beacon accommodation at Race rocks; supplies at lightstations in strait of Georgia; gas engine and machinery at point Atkinson fog alarm station; oil and distillate at Pine island, Pulteney point and Scarlett point; stores at Porlier pass, Brockton point, Race rocks; fuel oil at Sand heads lightstation; oil at point Atkinson and material at Saturna island. Erected beacon on Discovery rock, Victoria harbour; day beacon at Grief point, Malaspina strait; derrick at Entrance island; light on Burial island; day beacon at Deep cove; and an Aga light at William head. Installed Aga lights at Nanoose bay, northeast point Texada island. Established day beacon at Pier island and two spar buoys off Knapp island. Repaired Norris rock beacon and Fiddle reef station. Rebuilt Sidney spit beacon. Replaced buoys in strait of Georgia; Grappler reef buoy; spar buoys at Maple spit and Kelp Bar crossing. Overhauled and replaced buoys between Nanaimo and Victoria; buoys in Haro strait; Pender island canal buoys; buoys in Sooke harbour; naval buoys in Esquimalt harbour; Brotchie ledge cable. Painted Prospect point station; range lights at Point Roberts. Recharged acetylene beacons in strait of Georgia; acetylene lights on Fraser river; beacons on Nelson rock and Escape reef; batteries at Robert Point international boundary beacons.

## PRINCE RUPERT, B.C., AGENCY

GENERAL

The general work of the agency comprised purchase and delivery of supplies for the lightstations, maintenance of aids to navigation, government steamers and of marine agency, supervising of construction, repairs to lightstations, and reporting on wharves, foreshores and wharfingers.

BUOYS AND BEACONS

This agency maintained fourteen lightstations, two automatic fog bells and the following buoys and beacons:—

Eight gas and whistling buoys, 9½ type; 2 gas and bell buoys, 8½ type; 1 gas buoy, 8½ type; 49 automatic and Aga acetylene gas beacon, 1 pole light, 6 can buoys, 6 conical buoys, 1 platform buoy, 28 day beacons, and 21 spar buoys.

MAINTENANCE AND CONSTRUCTION WORK

*Dryad Point.*—New dwelling and boathouse constructed and former one torn down and station improved in condition.

*Langara Island.*—New radio beacon building constructed and masts and machinery installed for operation of radio beacon.

*Triple Island.*—Machinery and mast was installed at this station for the operation of an automatic radio beacon.

*Venn Passage.*—Three 4-pile dolphins established to replace spar buoys.

*Prince Rupert Harbour.*—Sparbuoys established to mark shoal off Fishermen's floats.

*Southwest Point, Langara Island.*—Unwatched lighted beacon established on Iphigenia point.

*Naden Harbour.*—Unwatched lighted beacon established on George point.

*Deepwater Point.*—Daymark established.

*Kingui Island.*—Unwatched Aga light installed on beacon.

*Gull Rocks.*—Unwatched Aga light established.

DOMINION STEAMERS

C.G.S. *Newington.*—Delivered supplies to Langara island, Triple and Lucy islands; Ivory island, Holland rock, Lawyer island, Egg island, cape St. James, and Green island. Constructed Iphigenia and Naden harbour beacons also Gull rocks beacon. Established gas buoy on Tugwell reef. Changed position of Alford reef buoy. Replaced buoys at Port Simpson. Repaired Herbert reef beacon. Installed light on Kingui island beacon. Salvaged White rocks buoy. Overhauled Petrel rock, Alexander patch, Elinor rock, Kestral rock, and Port Simpson buoys, also Watson rock beacon. Recharged beacons off Queen Charlotte islands; in southern part of agency; at Serpent, Napier, Johnston channel, Casey, Barrett rock, and Camp point; and relit Kingui and Lowe island beacons.

C.G.M. *Birnie.*—Landed supplies at Holland rock, Lawyer island, Lucy island, Green island, Triple island and Barrett rock. Attended beacons at Venn passage, Dryad point, Ivory island, Triple island, Lawyer island, Pointers, Green, Lucy, Genn island, Barrett rock and Dundas point lightstations, also Kestral rock buoy and Alice rock buoy. Overhauled Richards point beacon, David point beacon; sparbuoys and beacons in northern part of agency; Inverness and Village island buoys; Mid rock, Bloxam shoal and Osland; also buoys in Skeena river. Recharged Casey point beacon and Grindstone reef beacon. Changed sparbuoys in Venn passage, repaired float at Port Simpson; worked on submarine cable, and moored ships in Casey bay; and relit Tugwell reef buoy.

C.G.S. *Estevan.*—Arrived in this agency October 14, returned to Victoria agency November 3. Overhauled Dall patch, Vancouver rock, Rose spit, Hodgson reef, Alford reef, Spire ledge, Georgia rock, Dead Tree, Lawn point buoys while in this vicinity. Established Oval bank buoy, replaced Browning entrance buoy, coaled up and returned to Victoria agency.

SS. *Salvage Princess.*—Was specially chartered from June 20 to July 2, to replace the C.G.M. *Birnie* (at drydock for annual overhaul). Charged Connis rock, marked Tree bluff, Herbert reef, Watson rock, Birnie island and Lizard point beacons, attended Holland rock, Lawyer, Lucy, Green, and Triple island lightstations.

*Ferry Service.*—The launch *Rhona,* under Captain H. Calderwood, was engaged through a portion of the year in the service between Prince Rupert and the agency, transferring passengers, mail and supplies both for this agency and the wireless station and the Fisheries Department, making from two to three trips every day and extra trips as required. In January, after a number of breakdowns it was decided to replace this launch by the *Katherine B* which was modified to suit this particular work. In the interval this service was maintained with the assistance of the fishery patrol boats and the C.G.M. *Birnie.*

### GOVERNMENT WHARVES

The following wharves are under the jurisdiction of this agency: Stewart, B.C., Alice Arm, B.C., Queen Charlotte city, Massett, Port Simpson, and Bella Coola, B.C.

Each wharf is inspected as opportunity offers and the condition and traffic reported thereon.

## Charlottetown, P.E.I., Agency

### GENERAL

During the fiscal year ended March 31, 1931, this agency maintained 16 light and fog alarm stations, 40 lights over fourth order, 150 small lights other than pole lights, 90 pole lights, 7 Aga lights, 7 electric lights, 10 hand fog horns, 1 electric fog horn, 3 life-saving stations, 1 direction finding station and 4 radio beacons, 2 signal stations, 3 meteorological stations, 15 storm signal stations, 1 tidal gauge, 2 Government steamers, and 59 wharves.

### BUOY SERVICE

All buoys under the supervision of this agency under contract, as well as those attended by Dominion steamers, were well maintained during the year.

The following buoys were maintained by Dominion steamers: 10 bells, 5 gas and bells, 5 whistles, 4 gas and whistles, 4 gas buoys, 33 conicals, 24 cans, 4 casks, 36 spars, and 6 beacons.

The following buoys were maintained under contract: 282 cans, conicals and casks, 592 spars, 791 stakes, 928 bushes, 6 beacons, and 21 winter spars.

### CHANGES IN AND ADDITIONS TO BUOY SERVICE

*Cape Tormentine, N.B.*—Black wood spar buoy established on western side of dredged basin inside Cape Tormentine R.R. pier.

*Malpeque Bay, P.E.I.*—Dredged boat channel south of Lennox island to Conway inlet marked by two black and eight red spars.

*Miramichi, N.B.*—Red conical buoy maintained in Sheldrake channel opposite Napan bay discontinued. Red wooden spar established in 18 feet of water on north side of channel 2 miles 5½ cables from front light of Oak point ranges. Black steel can buoy established in 20 feet water on south side of channel 2 miles and 7½ cables from front light of Oak point ranges.

Red steel conical buoy established on Horseshoe bar, on north side of channel in 21 feet water.

CHANGES IN AND ADDITIONS TO LIGHTHOUSE SERVICE

*Annandale Back Light, P.E.I.*—Light discontinued and temporary pole light established.

*Cape Anguille, Nfld.*—Old steam fog alarm equipment discontinued and replaced by new type having oil engines.

*Echourie, M.I.*—Colour of light changed from white to red.

*Entry Island, M.I.*—Colour of light changed from red to white. Apparatus changed from dioptric to catoptric.

*Hay Island, Miramichi Bay, N.B.*—New front range light erected on former site.

*Magdalen Islands, Amherst Harbour.*—Range lights established.

*Naufrage, P.E.I.*—Pole light moved to 20 feet from end of breakwater.

*North Rustico, P.E.I.*—Outer fixed white range lights re-established and inner range changed from white to red.

*Richibucto North Beach, N.B.*—Back range light changed from fixed white light visible from all points of approach to fixed white light visible in line of range only.

*Richibucto Harbour, Pile Sheet Range, N.B.*—Range established. Richibucto north beach front light used as front light.

*Richibucto Harbour, Fagan Point Range, N.B.*—Range established.

*Richibucto Harbour, Richibucto Town Range Light.*—Range established.

*Richibucto Harbour, N.B.*—Richibucto bar range lights moved southward to new position.

*St. Louis Gully, N.B.*—Range lights moved about half-mile southwestward.

*St. Peter's Harbour, P.E.I.*—Front range light moved 135 feet west; back light moved 159 feet west on account of changes in channel.

*Tracadie Harbour, P.E.I.*—Additional range established.

*Tracadie South Gully, N.B.*—Light moved 360 feet from former position.

*Treble Island, P.Q.*—Unwatched light established.

*Whale Island, off Bonnne Espérance, P.Q.*—Unwatched light established.

CONSTRUCTION

*Pictou Island east end, N.S.*—New lighthouse built on southeast point of island, 215 feet eastward of former light. White rectangular wooden dwelling surmounted by red octagonal iron lantern.

All other light stations and storm signal stations were inspected and repairs made where necessary.

DOMINION PIERS

Repairs were effected to the following wharves: China point, Charlottetown railway wharf, Georgetown railway wharf, Hickey's, Marine wharf, Charlottetown, McPherson's cove, Sturgeon, and Summerside.

RADIO TELEGRAPH SERVICE

New type of apparatus was installed at the following stations: Cape Bauld and Cape Ray, Nfld., and Grindstone, M.I.

LIFE-SAVING STATIONS

All the life-saving stations under the jurisdiction of this agency were inspected during the season, and repairs were effected to the boat slipway at Escuminac, N.B.

DOMINION STEAMERS

The C.G.S. *Bayfield* was repaired in the spring of 1930 and fitted out for the season at the Marine wharf, Charlottetown. Laid up for the winter at the Marine wharf in the fall of 1930 under the supervision of this agency.

The C.G.S. *Cartier* was fitted out for the season of 1930 at the Marine wharf, Charlottetown, and again laid up at the Marine wharf in the fall of 1930 under the supervision of this agency.

The C.G.S. *Montcalm* arrived at Charlottetown on May 3 to place the larger buoys of this agency. She was engaged in this work from May 6 to 15, when she proceeded to Quebec.

The C.G.S. *Aranmore* arrived at Charlottetown on June 29 to take aboard the supplies for northern light stations; taking aboard supplies until July 8, when she proceeded to deliver same. She was recalled after having supplied some of the stations and arrived Charlottetown July 24. Proceeded to Halifax on July 30. Returned to Charlottetown on August 27 and sailed on September 2 to deliver the remainder of the supplies for northern stations. Returned to Charlottetown on September 17. Boilers being blown down and cleaned and ship being cleaned and painted until October 2, when she commenced coaling and taking aboard supplies for northern stations. Sailed to deliver same on October 8; returned to Charlottetown October 29. Discharging empties, coaling, etc., until November 3, when she proceeded to come under the Halifax agency. Arrived at Charlottetown on November 21 with the Magdalen island and eastern strait buoys aboard. Weather unfavourable for further buoy work until November 28, when she proceeded to lift the north side Prince Edward Island buoys. Returned to Charlottetown on December 5 with the north side Prince Edward Island buoys, also West point, Richibucto and Miscouche buoys. Proceeded December 8 to lift the eastern Northumberland strait buoys; returned to Charlottetown December 10. Engaged in lifting Tormentine gas and bell buoy and Tryon shoal gas and bell buoy December 11 and 12. Lifted point Prim and Fitzroy rock buoys on December 16, and proceeded on December 17 to come under the Halifax agency.

The C.G.S. *Brant* went into commission on May 18, and from that date until May 20 she was placing buoys. From May 21 until August 14 she was engaged in delivering the lighthouse supplies to our Nova Scotia, New Brunswick, Prince Edward Island, and Magdalen island lights. At Marine wharf, Charlottetown, August 14 to 19, when she proceeded to inspect the gas buoys of this agency. At Marine wharf from August 26 to September 1, when she proceeded to Pictou to go on the slip. At Marine wharf, Charlottetown, from September 6 until September 16. Cleaning floor of potato warehouse at Georgetown and inspecting buoys until September 20. From September 20 to November 19 she was engaged in cleaning the potato warehouse at Charlottetown, sounding the Annandale, P.E.I., ranges, delivering supplies to light stations, etc., lifting buoys, etc., until December 20, when she commenced laying up for the season at the Marine wharf, Charlottetown. Finished laying up on January 12.

PARRY SOUND, ONT., AGENCY

All Parry Sound unwatched lights, also spar buoys in the inner channels between Parry Sound, Waubaushene, Fesserton, Coldwater, and the channel between Parry Sound and Shawanaga bay, were maintained by the staff with the launch *Duncan*.

During the winter 1930, thirty-nine Aga and forty-seven Pintsch, total eighty-six lanterns, were overhauled and tested in the agency, after which they were returned to their different sub-divisions for service.

DOMINION STEAMERS

C.G.S. *Grenville*.—April 21-May 27 landed all outlying keepers in Georgian bay, restored buoy service also unwatched lights in Georgian bay and upper section of lake Huron, adjusted compasses.

May 28-June 29.—Landed supplies at Western island, scraped and painted ship, life boat repaired, examined beacons at Minnicog, loaded supplies for supply trip.

Annual supply trip.—Commenced on June 30 and terminated on September 5. Lightstations and fog alarm stations, lightships, etc., within the division having been inspected and served as follows:—

July.—Cabot head, Flowerpot and Cove island, St. Clair river and lake, Detroit river, lake Erie; section between Amherstburg and Sarnia, lake Huron and south shore of Manitoulin island.

August.—Southwest and east shores of Georgian bay as far up as Parry Sound; north shore of Georgian bay, also north channel to Sault Ste. Marie.

September.—The whole of lake Superior; a number of lightstations in North Channel and buoys at north end of Georgian bay.

From September 6 on to the close of navigation the vessel was employed to the best advantage in connection with the buoy and lighthouse service of the Georgian bay.

Commenced withdrawing buoys in connection with the close of navigation on November 18 and completed this work, including the removal of lightkeepers on outlying stations, on December 15.

Ship laid up for the winter at Midland by direction of the department.

C.G.S. *Murray Stewart*.—April 28-May 18—landed all keepers and supplies in east end of lake Superior, restored Pancake shoal gas buoy and other buoys in Soo vicinity, installed new fog bell apparatus at Pointe-aux-Pins, commissioned unwatched lights along the North Channel, landed Cove island radio operator.

May 20 to June 7.—Delivered new Aga float at James Foote Patch, transported cargo of new spar buoys from Owen Sound to Parry Sound. Assisted *Grenville* in restoring spar buoys and re-commissioning beacons in Georgian bay, delivered steam coal to fog alarm stations.

June 8 to 16.—Scraped, chipped and painted ship, inspected anchor chains.

June 17 to 20.—Repaired Flowerpot derrick, delivered gasoline and oil at Cabot head and Cove island, also supplies at Meaford and Hope island, painted lighthouse tower at Waubaushene, also Iron rock beacon, Parry Sound; installed new fog bell apparatus at Owen Sound, painted beacons Parry Sound approach.

July 21 to 31.—Ship in drydock for underwater repairs.

August 4 to September 5.—Changed accumulators at Gordon rock and painted beacon slatwork; assisted in effecting extensive repairs at Hope island and Brebeuf ranges.

September 6 to 22.—Painted lightstations in Parry Sound channel; removed sunken crib at Parry Sound harbour, re-erected beacon on Woore rock and established unwatched lights on Newton rock, Red rock, and Minnicognashene ranges.

September 23 to October 10.—Installed new illuminating apparatus at Giants tomb; lifeboat repaired at Midland, painted ship, delivered supplies at several stations in Georgian bay, corrected defective whistle on Magnetawan ledges gas buoy; reshingled Flowerpot fog alarm building.

October 12 to November 8.—Scraped and painted inside of ship, attended to lighted beacons in Parry Sound channel, also at Meaford and Griffith island.

November 10 to 28.—Delivered supplies at Western island; searched for body of Dr. McClinton, drowned in Midland vicinity; discontinued lighted beacons Midland vicinity, departed for Sault Ste. Marie November 24 and arrived there on 28, doing odds and ends on the way.

December 3 to 13.—Removed all keepers also Pancake shoal gas buoy, lake Superior east end.

The ship laid up at Sault Ste. Marie for the winter by direction of the department.

The following is list of the number of various types of buoys and beacons maintained by both vessels in the immediate district during the season:—

| Iron other than gas | Gas buoys | Spars | Day beacons |
|---|---|---|---|
| 2 bell<br>1 conical<br>1 whistling | 21 | 289 | 56 |
| 4 | 21 | 289 | 56 |

making a grand total of 314 buoys and 56 beacons.

REPAIRS, IMPROVEMENTS AND GENERAL WORK DONE BY THE AGENCY STAFF DURING THE YEAR

*Footes Patch float.*—Constructed new Aga float.

*Providence Bay wharf light.*—Established red light on outer end of wharf.

*Mitchell's Bay shore range.*—Established by erection of iron masts in concrete blocks.

*Rosseau.*—Changed light to unwatched Aga.

*Iron rock beacon.*—Established unwatched flashing light on day beacon.

*Pointe-aux-Pins.*—Installed new bell mechanism.

*Boyd Island.*—Changed light to unwatched Aga.

*Flowerpot Island.*—Installed new lens in light.

*Thessalon wharf range.*—Established range and hand fog horn.

*Lake Temagami lights.*—Established three unwatched Aga lights.

*Hope Island.*—Shingled and painted fog alarm building.

*Western Island.*—Installed new diaphone and timer valve.

*Brebeuf.*—Repaired platform outside dwelling, painted buildings, repaired boathouse.

*Gordon Rock.*—Changed light to Aga flashing.

*Minnicognashene.*—Established two unwatched lights.

*Red rock beacon.*—Established Aga light.

*Newton rock.*—Established unwatched Aga light.

*Woore rock.*—Rebuilt day beacon.

*Strawberry Island.*—Made portable boatway.

*Point Pelee life-saving station.*—Extended launching ways.

## Fort William, Ont., Subagency

Tug *Whalen* started ice-breaking April 5, in Thunder bay, arrived at open water April 8 one mile NW. from Thunder cape.

The first vessel arrivals were from Duluth April 21, namely *F. E. Taplin* and *H. P. McIntosh* to load screenings at Fort William, for Duluth.

The most of the ice left Thunder bay with a strong NW. wind April 22.

Tug *Whalen* left Port Arthur April 22 with lightkeepers for the north shore of Lake Superior: Victoria, Welcome, Angus and Trowbridge islands, point Porphyry, Shaganash, Lamb, Battle and Slate islands, and returned April 24.

The first arrivals from eastern ports to Port Arthur and Fort William were the C.P.R. steamers *Assiniboin* and *Keewatin* April 28.

The first departures from the head of the lakes were the steamers *Kenora, Fernie, Beaverton, Selkirk, Grandby, Oakbay, Willowbay,* and *Poplarbay* April 28.

All spar buoys were placed in Port Arthur and Fort William harbours, also all shore lights were in commission by April 28.

May 3, all gas and bell and gas buoys placed in their respective places (5 in number).

During the month of July eight new spar buoys were manufactured and established in the Nipigon river channel.

August 28, the C.G.S. *Grenville* arrived at Port Arthur, after supplying all the lighthouses in this district; left for eastern ports August 29.

November 25, tug *Whalen* commenced ice-breaking in the West Fort William basin 1½ inches of ice.

December 8, the last departures were the steamers *Anna C. Minch* and *W. F. Fitch.*

December 11, the tugs *James Whalen* and *Strathmore* left to remove all lightkeepers from their stations namely: Victoria, Welcome, Angus, Trowbridge islands, point Porphyry, Shaganash, Lamb, Battle and Slate islands also Passage island U.S.A., and returned December 13.

All gas buoys were removed from their localities for the winter, and all shore lights were out of commission by the 15th of December.

December 20, five cases of buoy lanterns were shipped to Parry Sound for overhauling.

Fifty-seven spar buoys are maintained in this district including 3 at Victoria island channel also 8 new spar buoys established in the Nipigon river channel.

There are five gas buoys in commission and one spare in this district.

A storm signal mast is situated on the bank of the Kaministiquia river just east a few feet from the Ogilvies elevator wharf.

One hundred and five pounds of carbide were used for charging the gas buoys this spring.

A set of oil ranges with lamps on masts are situated on the wharf at Silver islet for the accommodation of small vessels passing up and down the north shore of lake Superior (allumation white).

There are six Aga beacon lights in this district and two electric lights.

A set of electric range lights are situated on the bank of the Mission river, about half way between the Searl terminal elevator and the Fort William coal dock, for guiding vessels in the Mission channel entrance (ranges N. 72 degrees west), allumation red.

The Sin-Mac lines of Port Arthur have a contract for the maintenance of the gas and spar buoys in Port Arthur and Fort William harbours, also a contract for ice-breaking and moving lightkeepers to and from their station spring and fall.

KENORA, ONT., SUBAGENCY

There are under the supervision of this agency the following aids to navigation:—

On the Lake of the Woods: 4 watched lights, 4 unwatched lights using A.A.G. acetylene, 2 unwatched lights, electric, and 417 cedar spar buoys.
On Rainy lake: 1 range light, electric, and 72 cedar spar buoys.
On Shoal lake: 24 spar buoys.
On the Winnipeg river: 34 spar buoys.
On Wabigoon lake: 26 spar buoys.

All aids to navigation in this district have been inspected, and the usual annual repairs, cleaning and painting have been carried out at the various stations.

The steamer *Redwing* was engaged on the lake of the Woods from May 22 until June 18, painting and replacing buoys and correcting the buoy service.

The launch *Mist* was used when necessary during the remainder of the season in maintaining the same.

On the Winnipeg river, the launch *Moose* was employed on June 16 and 17, painting and replacing buoys.

On Rainy lake the steamer *Laura A* was engaged from May 16 to the 28, replacing and painting buoys. Three replacements had to be made.

On Wabigoon lake the Dryden Paper Company launch was engaged for two days in May painting and replacing buoys.

QUEBEC, P.Q., AGENCY

This past year was eventful in so far as improvements were made in the new north channel, from the foot of the island of Orleans to Isle-aux-Coudres, in order to facilitate the passage of deep draught ocean vessels through this channel. These improvements consisted principally of the construction of two concrete piers at Brûlé bank from which electric lights will be exhibited. These piers and lights will serve to denote an alignment through the narrowest part of the channel aforesaid where dredging operations are now under way. Also may be mentioned the construction of a concrete pier at Isle-aux-Coudres, on which a lighthouse and fog alarm have been built.

An extension was made about 40 feet wide, along the face of a section of the King's wharf here. This will serve to increase the surface of the wharf and at the same time afford greater depth of water for vessels berthing at it. There is now a depth of 25 feet at low water, spring tides, whereas previous to the extension of the wharf there was only 12 feet at low water, spring tides, off certain sections of said wharf.

MAINTENANCE OF WHARVES

Ninety-five wharves are under the control of the Quebec agency; 7 new wharves have been added, viz.: Barachois de Malbaie, Cabano, Grande Anse, P.Q., Grande Anse, N.B., Middle Caraquet, Malbaie Gaspé, and Sacré-Coeur. All of these wharves have been inspected and repairs made where found necessary.

MAINTENANCE OF AIDS TO NAVIGATION

During the past fiscal year, the following aids to navigation were maintained under the control of this agency:—

5 lightships: Lower Traverse lightship No. 20, White island reef lightship No. 23, Red islet lightship No. 3, Isle-aux-Coudres lightship No. 5, Prince shoal lightship No. 7 (all self-propelling, except Prince shoal lightship No. 7).

342 lights.
56 mechanically operated fog alarms, hand fog horns, and fog-bells.
2 explosives (bomb signals).
298 buoys and stakes maintained by contractors.
81 gas buoys.
11 combined gas and bell buoys.
1 bell buoy.
40 unlighted buoys.
13 unwatched gas beacons.
63 day beacons.
33 storm signals.
91 wharves.

Aids to navigation established during 1930-31:—

St. Simon pole light.
Green point pole light.
Ruisseau LeBlanc pole light.
St. George-de-Malbaie two pole lights.
Escoumains pole light.
Pointe La Boule unwatched gas light.
Sacré-Coeur light on shelf on top of freight shed.
Brandy Pots aga gas light in operation after the closing of navigation.
Crane island north wharf pole light.
St. Jean temporary pole light.
Rivière-Nouvelle hand fog horn.
Bois-Brulé hand fog horn.
Ste. Anne-des-Monts hand fog horn.
Restigouche river and Chaleurs bay two black spars.
Natashkwan harbour black can buoy.
Bersimis river gas buoy 23-B, re-established.
Rivière-aux-Vases gas buoy 22½-B.
North channel gas buoy No. 114¼-B.

Repairs and alterations were made to lightstations where found necessary.

Aids to navigation discontinued:

Restigouche river and Chaleur bay, can buoy; Jacquet river, can buoy; Heron island, can buoy; Nash creek loading berth.
Bonaventure, red steel conical.
Bersimis river, gas buoy 23-B.
St. Fulgence light.
Crane island north, wharf, light on outer end of wharf.
St. Jean, light destroyed by fire.

The principal works carried out by the construction branch were:—

Bathurst.—Construction of a reinforced concrete pier.
Brûlé bank.—Construction of range lights on concrete pier.
Isle-aux-Coudres.—Construction of a fog alarm building and combined lighthouse and dwelling on concrete pier.
Quebec Agency.—Construction of new wharf of the crib type, completing the reconstruction of the King's wharf.
Sandy beach pier.—Refacing pier with concrete.
Upper Traverse pier.—Extensive repairs made to pier.

DOMINION STEAMERS

C.G.S. *Mikula*.—At the beginning of the fiscal year this icebreaker was occupied in the work of opening the channel in the St. Lawrence river, above

Quebec. April 2—undergoing repairs. Left Quebec April 10 for ice patrol duty in the gulf of St. Lawrence and Cabot strait, and returned May 18. Entered drydock on May 22 for annual survey and repair work preparatory to her being laid up for the summer months, and came back to Quebec on July 3, repair work being continued by the skeleton crew left aboard and also by contracting firms throughout the summer months and into the early fall, and also by departmental labour. At beginning of December was ready for any emergency service needed. Was from then on in active service, above and below Quebec, rendering assistance to ships in need, particularly to the ferry boats operating between Quebec and Levis and the ferry to the island of Orleans. She was also utilized in breaking ice for dealers off Beauport and off Wolfe's cove, in the vicinity of Quebec. At the end of January she again entered the drydock for the short period of five or six days for the purpose of carrying out underwater machinery repair work. Was then employed in ice-breaking operations; left Quebec on February 19; Three Rivers was reached without difficulty, and it is from that place and on that the arduous ice work had to be done. Finally Sorel was reached on February 22. Was then kept very busy in very hard ice work widening the channel between Three Rivers and Sorel. Left Sorel March 5, bucked through very heavy batture ice, and arrived in Montreal on March 14, this being, it is believed, the earliest date ever recorded in history for a ship to reach Montreal harbour. On March 15 the vessel left Montreal for Quebec, and on arrival entered dry dock for repairs.

C.G.S. *N. B. McLean.*—At the beginning of the fiscal year this ice-breaker was stationed at Halifax, N.S., under the jurisdiction of the Dartmouth agency of the department, and under the direction of that agency she left Halifax the latter part of July for Hudson bay on a northern expeditionary trip. Returned to Quebec, in the early part of November, on completion of her expeditionary work in Hudson straits, and was safely berthed in the St. Charles river, and her general administration was attended to by this agency. She was docked at Lévis on November 22 for examination of the propellers prior to her going into ice-breaking commission, and came out of dock on November 26 and was berthed again in the St. Charles river. In December she was utilized in connection with the removal of lightkeepers on stations off shore, and kept constantly in readiness to render assistance to ships caught in the ice or performing such other services as exacted annually by severe conditions prevailing at the closing of navigation. Throughout the winter the *N. B. McLean* was particularly useful in assisting the operation of the ferry boats plying between Quebec and Lévis, and also in breaking ice for dealers off Beauport and off Wolfe's cove, in the vicinity of Quebec. This ice-breaker left Quebec on March 8 with instructions to carry out ice-breaking operations in the Saguenay river, and on completion to proceed to the gulf of St. Lawrence and Cabot strait for ice patrol duties.

C.G.S. *Montcalm.*—At the beginning of the year this ice-breaker was stationed at North Sydney, C.B. Very shortly afterwards she was sent on ice patrol duty in the gulf of St. Lawrence and Cabot strait, after which she attended to the placing of buoys for the Charlottetown agency. On May 14 she made a short trip to the Magdalen islands. Returned to Quebec on May 18, and was prepared for entry in the dry dock; she was docked in the afternoon of May 22 and came back to Quebec from the dock on July 3, repair work being continued by the crew and contracting firms throughout the entire summer season, the vessel not being in commission during the whole of that time. Towards the end of November she was utilized for buoy service work and was in readiness to render assistance to ships out of the river, as also for the removal of other aids to navigation on completion of their utility. She was also of service in bringing

back to a safe port schooners adrift at the beginning of January. Left Quebec on January 6 for North Sydney, stopping on the way at Bird rocks (Magdalen islands), then Souris, P.E.I., to pick up mails and deliver them at the Magdalen islands, and then take mails, passengers, or cargo from Magdalen islands and destined for North Sydney. The vessel arrived at North Sydney, after having completed all of the above work, on January 15, and spent the whole winter in that vicinity, establishing her headquarters at North Sydney, C.B., Louisburg, N.S., according to the exigencies of her service from time to time.

C.G.S. *Saurel*.—At the beginning of the fiscal year this ice-breaker was engaged in ice-breaking operations on lake St. Peter, under the supervision of the river St. Lawrence Ship Channel branch of the department. During the latter part of April she proceeded to the Saguenay river to carry out ice-breaking work there, and besides she had the occasion of rendering assistance to three vessels that were stuck in the ice in that vicinity. She then continued her duties above Quebec as regards ice-breaking as far as Montreal and back to Sorel and Three Rivers. After this she was laid up in the harbour of Sorel throughout the summer and into the early fall, when she was again utilized for ice-breaking operations, returning here at the beginning of the second half of December. During the entire winter the *Saurel* made herself very useful in assisting on many occasions the ferry boats in maintaining their services between Quebec and Lévis, and also in rendering other services as they developed in the port of Quebec. In March she proceeded up river for the purpose of clearing the ship channel between Quebec and Three Rivers, and her operations brought her as far as Sorel.

C.G.S. *Mardep*.—The name of this vessel was changed from *Labrador* to *Mardep* by Marine Order No. 53 in 1930, dated June 28, 1930. At the beginning of the fiscal year this ship was purchased by the department and immediately handed over to the Quebec agency, when general work on her was carried out in order to adapt her to suit requirements. She was docked for the purpose of effecting necessary repairs. On July 11 she was loaded for the north shore as far as Seven islands, and stations on south shore from cap des Rosiers westward wherever a shortage of oil existed, in connection with lighthouse supply work, and she left Quebec on July 16, returning on July 26. During the trip she went down along the north shore to Magpie and Perroquet island, then proceeded to cape Gaspé, calling at Port Menier, and then worked westward along the Gaspé coast back to Quebec. She was then loaded with balance of supplies for the Gaspé coast and those destined for baie de Chaleur; and returned here on September 9, when all returned goods and empties from various lighthouses were discharged and her coal bunkers filled. On September 15 she left for the purpose of delivering coal to lightships and then proceeded up the Saguenay river for the inspection of all the buoys and lights. She again left Quebec on October 6 with coal and water for various lightships and supplies for some small light stations that had not been up to then visited; with oil for the fog alarm engine at Bicquette, and to deliver coal for pilotage and Marconi stations at Father point, and attended to some necessary work on the way back. On October 20 she left Quebec loaded with fall provisions for Anticosti island lights, calling at Pointe-des-Monts and Hâvre St. Pierre, north shore stations, and returned here on November 5. The *Mardep* ceased to be in commission on November 24, after having been in active service from July 14. During that time she made 432 stops, steamed 4,152 miles (occupying 527 hours and 35 minutes), and consumed 468 tons of coal. Shortly afterwards she was definitely laid up for the winter in safe quarters, and repairs carried out by departmental labour, and other necessary work performed by contracting firms.

C.G.S. *Loos*.—At the commencement of the fiscal year she was occupied in assisting the *Druid* on buoy service duties. Left on May 4 to place in position

*Prince Shoal* lightship, attend to requirements at Pointe Noire range light, and then proceeded up the Saguenay river, after which she supplied lightships with fresh water, and picked up grounded buoys. She then left on a trip to the lower Traverse pier and Sacré-Cœur. Then she made a trip in connection with buoy service and lightships. After this she proceeded to deliver provisions and lighthouse and fog alarm supplies to Pointe-des-Monts, Egg island, Cawee island, Isles-de-Mai, Seven islands, Perroquet island, Ile-au-Marteau, Cap-de-Rabast, Charleton point, Table head, Heath point, Bagot Bluff, South West (Anticosti) and West point (Anticosti). Returned to Quebec on June 25. From June 28 to the middle of August, was on lighthouse supplies trips to Anticosti island, part of north shore, and to the south shore of the St. Lawrence river. She was then placed on the marine railway slip of the Morton Engineering and Dry Dock Company for repairs. Then she was loaded with a full load of stone and cement for Sandy Beach pier, Gaspé basin, and also had on board the new skeleton steel tower and apparatus for the unwatched gas beacon at La Boule, Saguenay river, which was erected by the crew of the ship. Returned to Quebec on September 11. She was dispatched to Isle-aux-Coudres and Natashkwan for the purpose of transporting fog alarm machinery destined for these stations, and also calling at various lighthouses along the north shore where fall provisions and supplies were required. After all the above the vessel was utilized in connection with the removal of aids to navigation, thus assisting the *Druid*, and in placing spar buoys.

C.G.S. *Druid*.—From the very beginning of the fiscal year the *Druid* was kept on active service, and was regularly and constantly employed in the work of maintaining buoys of all kinds in their positions, examining and looking after the numerous gas and other buoys in the district, as well as maintaining quite a number of beacons and day marks. It is to be noted that this vessel is the regular buoy service tender, and that she was also engaged in the lighthouse service work from Platon (above Quebec) to Father point (below Quebec), covering a distance of 186 miles. The services of this lighthouse and buoy tender were also utilized in connection with the towage of lightships to their respective stations in the spring, and towing them back in the fall, as well as keeping them supplied with necessaries of all kinds during the navigable season. Also attended to the transportation of workmen and labourers effecting repairs to lighthouses, lights, beacons, etc., in this district. At all times the *Druid* is kept under steam, absolutely ready to leave at a moment's notice when reports reach the agency that gas or other buoys or lights are reported out of position, or are either defective or extinguished, or else for any other need pertaining to navigation arising in the St. Lawrence river between the points mentioned.

*Relief* lightship No. 25.—This vessel was engaged on lighthouse and buoy service work to lower Traverse, White island, Isle-aux-Coudres, Red islet, Prince shoal, and on supply trips to lightships. Replaced pilot-tender *Jalobert* at Father point. Made in all 40 trips; 61 stops; was occupied during 269 hours; covered 2,131 miles; was 168 days employed as a lightship on stations, and was for 17 days under repairs.

### Montreal, P.Q., Agency

Total expenditure for the fiscal year amounted to $540,350.30, an increase of $26,154.61 over the 1929-30 expenditure.

#### CONSTRUCTION AND REPAIRS

*Bloody Island*.—One wooden pier replaced by concrete one with steel tower.

*Beauharnois lights*.—Establishment of range lights leading to Beauharnois wharf.

*Bout de l'Ile traverse.*—Renewal of lighting apparatus.

*Charlemagne range.*—Renewal of lighting apparatus.

*Dowker's point.*—1-300m/m Pintsch lantern—Improvement in lighting apparatus.

*Graham front.*—Renewal of lighting apparatus.

*Ile-aux-Raisins range.*—Repairs to foundation and keeper's dwelling.

*Lavaltrie wharf lights.*—Renewal of lighting apparatus.

*Lachine and Caughnawaga range.*—Renewal of lighting apparatus.

*Leclercville range.*—Marking channel leading to wharf.

*Magog range.*—Construction of two day beacons to be attached to steel masts. Latter already established.

*Nicolet river beacon lights.*—Renewal of lighting apparatus.

*Pointe-du-Lac.*—Repairs to woodwork.

*Rivière des Prairies.*—Erection of two sets of beacons to mark new dredged channels.

*St. Ours locks back.*—Renewal of lighting apparatus.

*Thurso Islands.*—Construction of a concrete base and steel tank tower light.

*Vaudreuil.*—Renewal of lighting apparatus.

*Magog (Witch shoal).*—Installation of electric lights on new range leading into Magog.

*Witch shoal.*—Completion of construction work on two range lights marking channel leading to Magog.

MAINTENANCE AND REPAIRS TO WHARVES

All wharves were well maintained during the season and repairs made where necessary.

DOMINION STEAMERS

C.G.S. *Argenteuil.*—This vessel is used for buoy service, lighthouse construction, painting and other repair work on lake St. Louis, Ottawa and Richelieu rivers, delivery of supplies and was also used quite extensively for minor repairs to wharves in the above rivers.

C.G.S. *Emilia.*—This vessel is used in connection with buoy service such as recharging gas buoys, painting and repairing lighthouses as well as general construction work and is practically a floating workshop.

C.G.S. *Safeguarder.*—This vessel is used for lighthouse and buoy service work between Montreal and Portneuf, also the delivery of lighthouse and other supplies to the different lightstations in that section.

C.G.S. *Verchères.*—This vessel is used in such work as maintaining and painting of bank beacons and lighthouses, night and day patrol and inspection work. Recharging and maintaining in order all shore gas stations, towing of scows with construction and maintenance material, and in conjunction with the scow *Acetylene,* for buoy service work.

C.G.S. *Berthier, Frontenac,* Tugs *Bécancour, Contrecœur, Lavaltrie, Lac St. Pierre, Laviolette, Lanoraie* and *Varennes,* also Coal barges *No. 5* and *No. 7* were used in spring and fall for lighthouse and buoy service work.

# CITADEL SIGNAL STATION, HALIFAX, N.S.

## Record of Shipping as per Record Folio, from April 1, 1930, to March 31, 1931.

| — | Men-of-War — British | | | Men-of-War — Foreign | | | 1st class steamers | | | 2nd class steamers | | | Cable steamers | | | Ships and barquantines | | | Brigs and brigantines | | | 3-masted schooners | | | Monthly total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R. | A. | P. | R. | A. | P. | R. | A. | P. | R. | A. | P. | R. | A. | P. | R. | A. | P. | R. | A. | P. | R. | A. | P. | Reported | Arrived | Passed |
| 1930 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 1 | 1 | .... | 2 | 2 | .... | 124 | 124 | .... | 57 | 57 | .... | 5 | 5 | .... | .... | .... | .... | .... | .... | .... | 7 | 7 | .... | 196 | 196 | ..... |
| May | .... | .... | .... | 3 | 3 | .... | 80 | 80 | .... | 50 | 50 | .... | 7 | 7 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 140 | 140 | ..... |
| June | 1 | 1 | .... | 2 | 2 | .... | 83 | 83 | .... | 47 | 47 | .... | 6 | 6 | .... | .... | .... | .... | .... | .... | .... | 5 | 5 | .... | 144 | 144 | ..... |
| July | 4 | 4 | .... | 1 | 1 | .... | 82 | 82 | .... | 42 | 42 | .... | 2 | 2 | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | .... | 133 | 133 | ..... |
| August | 2 | 2 | .... | .... | .... | .... | 90 | 90 | .... | 42 | 42 | .... | 7 | 7 | .... | .... | .... | .... | .... | .... | .... | 3 | 3 | .... | 144 | 144 | ..... |
| September | 4 | 4 | .... | .... | .... | .... | 94 | 94 | .... | 48 | 48 | .... | 4 | 4 | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | .... | 151 | 151 | ..... |
| October | 2 | 2 | .... | 1 | 1 | .... | 84 | 84 | .... | 44 | 44 | .... | 4 | 4 | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | .... | 137 | 137 | ..... |
| November | .... | .... | .... | .... | .... | .... | 110 | 110 | .... | 40 | 40 | .... | 2 | 2 | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | .... | 154 | 154 | ..... |
| December | .... | .... | .... | .... | .... | .... | 118 | 118 | .... | 39 | 39 | .... | 4 | 4 | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | .... | 162 | 162 | ..... |
| 1931 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| January | .... | .... | .... | 3 | 3 | .... | 104 | 104 | .... | 31 | 31 | .... | 3 | 3 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 141 | 141 | ..... |
| February | .... | .... | .... | 1 | 1 | .... | 91 | 91 | .... | 23 | 23 | .... | 1 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 116 | 116 | ..... |
| March | .... | .... | .... | .... | .... | .... | 96 | 96 | .... | 31 | 31 | .... | 4 | 4 | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | .... | 132 | 132 | ..... |
| Totals | 14 | 14 | .... | 13 | 13 | .... | 1,156 | 1,156 | .... | 494 | 494 | .... | 49 | 49 | .... | .... | .... | .... | .... | .... | .... | 24 | 24 | .... | 1,750 | 1,750 | ..... |

## ANNUAL REPORT ON SABLE ISLAND

C. FAULKNER, ACTING SUPERINTENDENT

On March 19 steamer *Nils* grounded on north side two miles east of No. 3 station (now lying one mile west of No. 4 station) loaded with mixed lumber from 2 inches to 6 inches, and crew taken off. March 23 brought to Main station Captain and seven of his crew. Staff was sent to salvage 125 thousand feet of lumber that piled up, for safety for summer months.

On first inspection trip east, had boathouse repaired; roof shingled, tarred, and also had a concrete floor put in it. East light now in good condition.

Main station.—Part of roof of superintendent's house shingled and house painted. Necessary repairs were also effected to the horse barn and cow barn.

East light life-boat in good condition; also No. 3 station life-boat.

West light was painted and all buildings whitewashed.

No. 3 station.—Repairs were made to cow barn and horse barn.

Telephone lines from east to west end of island were repaired. Put in 16 new coils of wire.

All stations planted vegetables as usual. At Main station had 45 bushels potatoes, 22 bushels turnips, 27 bushels carrots, 7 bushels beets, 6 bushels parsnips, 25 bushels mangles. Had a good crop of cabbage but had a big storm and lake filled and destroyed cabbage. All other stations had good crops.

Cranberry bogs in good condition. Was able to ship 124 barrels to the Marine Department, Dartmouth.

There are 35 barn horses and 33 cattle on island; also 250 to 300 wild ponies.

The island has been patrolled forty times during the year on account of fog and snow.

Had six life-boat drills.

Visited all stations ten times during year.

The population of Sable Island now is:

| | |
|---|---|
| Main Station:— | |
| Acting Superintendent, C. Faulkner, wife and family | 6 |
| J. Perry, cook, | |
| T. Keating, coxswain, | |
| J. Bowes, acting carpenter, | |
| C. Topple, in charge horse barn, | |
| D. Grégoire, teamster, | |
| F. Savage, assistant | |
| R. McDow, in charge cow barn, | |
| C. Chisholm, assistant, | |
| L. Moon, pumping water at superintendent's house | 9 |
| No. 2 Station:— | |
| Keeper Grégoire, wife and family | 7 |
| No. 3 Station:— | |
| Keeper McDougall, wife and assistant Day | 3 |
| East Light:— | |
| Keeper McKenzie, wife and family, assistants Blackadar and Pye | 10 |
| West Light:— | |
| Keeper Mason, wife, and assistant Harbow | 3 |
| Wireless Station:— | |
| Chief operator G. Day, wife and family | 3 |
| Assistants A. Huzzey and E. Grégoire | 2 |
| | 43 |

## SALVAGE SERVICES RENDERED BY THE QUEBEC SALVAGE AND WRECKING COMPANY, LIMITED, FROM APRIL 1, 1930 TO MARCH 31, 1931

*1930*

May 17 to 19.—SS. *Lord Strathcona* left Quebec May 17 and with dredge *Steven D* and dumpscow in tow, proceeded toward Yamachiche where the dredge was delivered and the *Lord Strathcona* returned to Quebec May 19.

June 9.—British steamer *Canadian Winner*, with cargo of lumber was stranded near cape Chat. SS. *Lord Strathcona*, with wrecking barge *G T D* in tow, left Quebec and proceeded to the assistance of the *Canadian Winner*.

When the *Lord Strathcona* was about 45 miles from Quebec, wireless instructions were received to return to station as the steamer had floated without assistance. Returned the same day.

June 19 to 21.—British steamer *Adra*, with cargo of coal, was reported to have stranded at Matane.

SS. *Lord Strathcona* left Quebec and proceeded toward the reported position of the *Adra*. When in the vicinity of Bellechasse, word was received by wireless that Canadian steamer *Quebec* was ashore on White island reef. In the evening *Lord Strathcona* passed cape Goose; the weather was rainy, with easterly wind and fog. A dense fog prevailed during the rest of the night. About midnight, radio advices were received on board the *Lord Strathcona* that the *Adra* had been floated and was proceeding up the river.

As wireless instructions had been received from Canada Steamship Lines, Limited, to proceed to the assistance of steamer *Quebec* stranded on White island reef, ss. *Lord Strathcona* proceeded in that direction, but as a very dense fog continued to prevail and the exact situation of the *Quebec* could not be located, *Lord Strathcona* anchored off White Island reef, about 1.20 a.m. June 20. As the fog lifted slightly towards morning, the *Quebec* was sighted. A tow line was passed on board and the *Quebec* was floated during the evening, a continued fog having hampered the work all day. *Lord Strathcona* with the *Quebec* in tow, proceeded toward Quebec for a few hours. The tow line was then cast off and the *Quebec*, proceeding under her own power, followed the *Lord Strathcona;* the fog had lifted slightly allowing increased visibility. About midnight ss. *Lord Strathcona* and *Quebec* anchored owing to dense fog. The fog lifted somewhat towards morning and both vessels proceeded to Quebec. *Lord Strathcona* arrived on station in the afternoon.

July 12 and 13.—Norwegian steamer *Frank Seamans*, in ballast, was reported ashore at Natashkwan point, gulf of St. Lawrence.

*Lord Strathcona* left Quebec and proceeded to the assistance of the *Frank Seamans*. When about 125 miles below Quebec, the *Lord Strathcona* received wireless instructions to return to station as the steamer had floated unassisted. *Lord Strathcona* was back at home station, Quebec, in the middle of the night.

July 22 to 25.—British steamer *Dalryan*, with cargo of pea coal, was reported to have stranded on an iceberg in the straits of Belle Isle and, after floating, proceeded to Quebec with forehold and forepeak full of water.

On July 22, ss. *Lord Strathcona* was instructed to place portable 6 inch salvage pump on steamer *Dalryan* with engineers to operate it. This pump was set up with suction into No. 1 hold.

On July 23, instructions were received to place a second 6 inch pump, which also was installed with suction in No. 1 hold. Arrangements were concluded to tow the *Dalryan* to Montreal. About midnight *Lord Strathcona* made fast on port bow of *Dalryan* to help steer the steamer and both vessels left for Montreal,

arriving there next evening, and the *Dalryan* was berthed at Windmill point. *Lord Strathcona* left Montreal same evening, arriving at Quebec next morning July 25.

Salvage pumps left on board the *Dalryan* were returned to the *Lord Strathcona* on August 4.

August 4.—Italian steamer *Valfiorita,* with cargo of grain, was reported to have stranded on St. Valier point. SS. *Lord Strathcona* left Quebec about noon and arrived off the stranded steamer about 3 p.m. Our assistance was not accepted and the *Lord Strathcona* returned to her station.

August 11 and 12.—British steamer *Glenaster* was reported to have lost anchor and chain off Crane island. Motor vessel *Traverse* left Quebec in the morning of August 11, and, upon arrival off Crane island, started dragging for the lost equipment. The anchor and part of the chain were recovered and the *Traverse* arrived at Quebec in the evening of August 12.

August 12 to 19.—British steamer *Hochelaga,* with cargo of coal, was reported to have stranded on Magdalen islands, gulf of St. Lawrence, with Nos. 1 and 2 holds flooded and No. 1 hatch awash at low water.

SS. *Lord Strathcona,* with motor vessel *Traverse* in tow, left Quebec late in the evening August 12, and proceeded to the assistance of the *Hochelaga.* On August 15, both vessels arrived off the ship. The *Hochelega* was found stranded about 1½ miles southeast by south of East point, East island, Magdalen islands, with Nos. 1, 2, 3 and 4 hatches under water on the low water side at low water; fire room bulkhead bulged and leaking; and engine room leaking, with ballast pump in constant use keeping the water down in the engine room. Salvage operations were undertaken and cargo was jettisoned throughout the day. About 9 p.m. the *Lord Strathcona* was forced to leave from alongside due to increasing southeast wind and seas. An August 16, the *Traverse* was forced to leave from alongside. During the day the rising seas from southeast threatened to destroy the ship, and it became necessary to remove all men. Not until 10.45 p.m. was the last man removed from the ship. Southeast gale continued through August 17. August 18, the seas moderated sufficiently for the *Lord Strathcona* to proceed to the ship, which was found to be beyond recovery and operations were abandoned. In the morning of August 19, the *Lord Strathcona* and the *Traverse* arrived at Sydney, C.B., and landed crew from steamer *Hochelaga.* In the afternoon they left for Port aux Basques.

August 18 to 24.—British steamer *Caribou* was reported to have stranded near Port aux Basques, Newfoundland, on August 18.

SS. *Lord Strathcona,* with crew of abandoned steamer *Hochelaga* on board, and with motor vessel *Traverse* in tow, was proceeding toward Quebec, when instructions were received while in the vicinity of Magdalen islands, to transfer crew of the *Hochelaga* to the *Traverse* and for the *Lord Strathcona* to proceed to steamer *Caribou* to make an examination and report the conditions. The weather was too rough to operate the transfer of the men as instructed and both vessels proceeded toward Sydney, C.B., arriving there in the morning of August 19. The shipwrecked crew was landed and, about noon the *Lord Strathcona,* with the *Traverse* in tow, sailed for Port aux Basques and arrived off the *Caribou* August 20. The steamer was on Green island, southwest coast of Newfoundland and flooded throughout. During the day an examination was made by diver and the conditions, as found, were reported.

SS. *Lord Strathcona* with the *Traverse* in tow, left for Quebec August 21 and arrived about noon August 24.

September 6 and 7.—Tug *Storm King* and scow.—SS. *Lord Strathcona* was instructed to take 5 tons of coal on deck and proceed to Green island; there to

meet tug *Storm King*, deliver the coal to her, and assist in towing wrecked scow which was drifting up and down with the tide. *Lord Strathcona* arrived alongside the *Storm King* which was at anchor with scow in tow; she then proceeded with scow in tow and arrived in St. Charles river, Quebec, September 7, where scow was made fast to the wharf and *Lord Strathcona* proceeded to her station.

September 26 to 29.—British steamer *Lord Strathcona* was reported to have lost an anchor and 150 fathoms $2\frac{3}{8}$-inch chain about two miles above St. Lawrence, isle of Orleans. Thick fog prevailed at the time and shore marks were obscured. On September 26, we were instructed by the agents of the vessel to endeavour to recover the anchor and chain. The steamer was still at anchor near the spot where the equipment was lost and our motor boat was despatched from Quebec, proceeded to the steamer, and the local pilot indicated two possible places where the anchor might be found. These were close to the shore of the isle of Orleans. Early in the morning, September 27, the motor vessel *Traverse* left Quebec and, on arrival, started dragging at the indicated locations. The chain was grappled but heavy squalls suspended operations until the afternoon when about 30 fathoms of chain were recovered before falling tide and increasing southwest wind made it necessary to unshackle the chain, buoy the remainder and return to Quebec. Operations were suspended during Sunday, September 28. The *Traverse* recovered the anchor and remaining chain September 29, then returned to Quebec. On October 1, the *Traverse* placed the anchor and chain on board steamer *Lord Strathcona* then at anchor off Quebec.

November 22 to 28.—Norwegian steamer *Kings County*, with general cargo, stranded about $1\frac{1}{2}$ miles east of Quebec bridge. SS. *Lord Strathcona* left Quebec about noon, November 22, and arrived off the steamer, which was found stranded bow on the bank with No. 1 hold and forepeak flooded. Lighters were engaged and part of the cargo removed from Nos. 1 and 2 holds and steamer was floated during the evening of November 23, docked in St. Charles river, where additional cargo was discharged from Nos. 1 and 2 holds, temporary repairs made by diver and salvage pumps installed to control the leaks in No. 1 hold. In the evening of November 25, the steamer left Quebec for Montreal under convoy of ss. *Lord Strathcona*, arriving there in the early morning hours of November 27. Salvage pumps were left on board.

*Lord Strathcona* returned to Quebec arriving at her station in the afternoon of November 28. Salvage pumps were returned to the *Lord Strathcona* on December 9.

## REPORT OF SALVAGE SERVICES RENDERED BY THE PACIFIC SALVAGE COMPANY, LIMITED, DURING THE YEAR 1930

February 3.—SS. *Salvage King* salvaged small fishing boat *Spindrift* which had sunk in Victoria harbour.

February 16 to 21—March 10 to 12.—SS. *Salvage King* proceeded to the aid of the *Admiral Benson* ashore at Peacock spit, Columbia river. On arrival hope for saving the ship was abandoned, so shore crew was left to salvage cargo, etc., and the *Salvage King* returned to Victoria. She later returned to the wreck to recover gear and men.

February 28 to March 1.—SS. *Salvage King* proceeded to Barclay sound as H.M.C.S. *Thiepval* reported ashore. On arrival it was discovered that the vessel was submerged in sixty fathoms of water, so SS. *Salvage King* returned to Victoria.

May 27.—SS. *Oduna* struck a rock in Prince William sound. Vessel refloated on next tide.

June 6.—SS. *Burrard Chief* ashore in Sansum narrows, B.C. Tug *Hopkins* proceeded to scene with derrick scow and salvage gear and succeeded in refloating the vessel.

June 19.—SS. *San Diego* ashore on Danger reef. SS. *Burrard Chief* was chartered and proceeded to the scene with all necessary equipment. Succeeded in refloating the vessel.

August 18.—SS. *Culburra* reported ashore in Swanson bay. SS. *Salvage King* left port to proceed to her assistance, but was recalled later as the vessel had floated.

August 26 and 27.—SS. *Salvage King* proceeded to the Royal roads to fight a fire in the holds of the *Oregon Maru*. Efforts met with success and ss. *Salvage King* returned to port on August 27.

October 3.—SS. *Canadian Winner* ashore on Macauley point but refloated without assistance.

October 21 to 23.—SS. *Henry S. Grove* ashore on Patos island. SS. *Salvage King* proceeded to her assistance, floated the vessel and convoyed her to Seattle, Wash.

## PORT WARDENS' REPORTS FOR THE YEAR ENDED DECEMBER 31, 1930

Reports were received from twelve port wardens; six from Nova Scotia, two from Quebec, and four from British Columbia port wardens.

The total amount of fees collected at the port of Montreal for the year ended December 31, 1930, amounted to $20,285.31; at the port of Vancouver to $21,354.50; at the port of Halifax to $4,079; at the port of Quebec to $1,897; at the port of Victoria to $1,586; at the port of New Westminster to $1,121; and at the port of Sydney to $904.

### PORT OF MONTREAL

April 12.—Channel reported clear between Quebec and Montreal, this was two days later than last year.

April 15.—SS. *Miron L* arrived from Quebec, the first vessel to enter at this office, same date as last year. This vessel wintered at Quebec.

April 17.—SS. *Miron L*, first vessel to load and clear for lower ports.

April 21.—British ss. *Wentworth* was the first vessel from overseas, 1 day later than 1929.

April 24.—Italian ss. *Concordia* received first certificate of readiness to load full grain cargo, four days later than last year.

April 25.—R.M.S. *Duchess of Richmond* arrived Pier 8, the first passenger liner to dock, two days earlier than last year.

April 27.—R.M.S. *Andania* sailed; the first passenger vessel overseas; this was five days earlier than last year.

May 1.—SS. *Concordia* was the first vessel to sail overseas with full grain cargo, nine days later than 1929 season. No reports of any vessel having suffered damage from field ice this season.

November 28.—R.M.S. *Alaunia* sailed for Liverpool; the last of the passenger sailing for this season, one day earlier than 1929 season.

December 8.—*Michael L. Embiricos* arrived in ballast to load grain, the last overseas arrival for this season, three days later than last year.

December 9.—*Michael L. Embiricos* with full grain cargo sailed for Greece, the last sailing overseas, two days later than last season.

December 11.—SS. *Cabot Tower* arrived from lower ports, last arrival for this season, six days later than last year.

December 12.—SS. *Cabot Tower* sailed, general cargo, for lower ports; last vessel to leave port for this season and five days later than 1929.

OVERSEAS VESSELS REPORTED

Vessels, 815; aggregate tonnage 3,727,849 tons, a decrease of 70 vessels and 184,346 tons as compared with the 1929 figures.

Of the total overseas vessels 576 were British, 120 being registered in Canada. Vessels of other nationalities, 239.

LOWER PORT VESSELS REPORTED

Vessels, 360; aggregate tonnage 685,731 tons, a decrease of 5 vessels and 13,333 tons as compared with the 1929 figures.

EXPORTS OF GRAIN

Exports of grain for 1930 amounted to 69,083,800 bushels against 80,435,979 bushels for 1929, a decrease of 11,352,179 bushels for the year.

CASUALTIES REPORTED BETWEEN MONTREAL AND QUEBEC

June 24.—SS. *Canadian Traveller* stranded at Platon wharf, refloated, surveyed and proceeded, slight damage.

September 17.—SS. *Ravnedal* stranded near cap St. Michel, lightened, refloated and proceeded, slight damage.

September 26.—SS. *Hada County* stranded north side of channel near Sorel, undamaged and proceeded.

November 7.—SS. *Isleworth* grounded near buoy 172M Montreal harbour, refloated, lightened and drydocked for repairs, considerable bottom damage.

November 22.—SS. *Kings County* stranded below Quebec bridge, refloated and proceeded to Montreal, discharged cargo, drydocked at Quebec for considerable permanent repairs.

SHIP CHANNEL

The water in the Ship channel averaged lower than last season, but was above the average of the last five years. Experienced no difficulty in completing the heavy draft vessels avoiding any question of completing at Quebec.

## LIVE STOCK SHIPMENTS

List of live stock shipped to ports in Great Britain, Belgium and New Zealand during the year 1930

SAINT JOHN

| Month | Cattle | Horses |
|---|---|---|
| December | 580 | — |

MONTREAL

| | | |
|---|---|---|
| May | | 26 |
| July | 4 | — |
| August | 129 | — |
| September | 1,641 | 3 |
| October | 1,246 | 2 |
| November | 2,260 | 4 |
| | 5,280 | 35 |

## SOREL SHIPYARD

REPORT OF FRED BRIDGES, M. INST. N.A., M.E.I.C., SUPERINTENDENT

The operations of the Sorel Shipyard during the fiscal year ending March 31, 1931, consisted principally in maintaining the fleet of the St. Lawrence Ship Channel Branch in good order, carrying out the necessary winter repairs and operating repairs, and the building of new constructions.

Work was also done for the Dominion Steamers, the Maintenance of Lights Branch, the Maintenance of Buoys Branch, the Signal Service and the Public Works Department.

### NEW CONSTRUCTIONS

Work was completed on the new *Frontenac,* Construction No. 95 and the trial trip was made on June 2, 1930.

Work progressed on Constructions Nos. 98 and 99, two new dredges of the following dimensions: 192 feet by 40 feet by 14 feet.

Work also progressed on the construction of the two new 250-yards 100 feet by 29 feet by 10 feet 3 inches, steel dumping scows, Constructions No. 100-101. Construction No. 100 was launched during October, 1930.

Work was commenced on two other new 250-yards steel dumping scows, 104 feet by 29 feet by 10 feet 3 inches, Constructions Nos. 102-103.

A new steel sounding scow, 84 feet by 30 feet by 7 feet, Construction No. 104, was also commenced.

Work was commenced on a new flat wood scow 110 feet by 30 feet by 7 feet 10 inches, Construction No. 105.

The following are some of the outstanding repairs made on the various vessels:—

### DOMINION STEAMERS

The scow *Acetylene* was hauled up for inspection, hull under water-line was painted and other necessary repairs were made to the hull and machinery.

C.G.S. *Argenteuil* was hauled up and considerable repairs were made to her hull and machinery.

C.G.S. *Safeguarder* was hauled up and the hull under water-line was brushed and painted. The plating was faired at bows on water-line, the rudder area was increased; both propellers were removed and overhauled and the tail shafts were taken off and the lignum vitae was renewed; new gratings to main injection intakes were fitted.

Certain repairs were also made on the *Verchères* and *Lady Grey.* The icebreaker *Saurel* had her weather decks caulked and overhauled and made good, and sundry repairs were made to the hull and machinery.

### RAILWAYS AND CANALS DEPARTMENT

Certain repairs were made to their *Dumping Scow No. 19.*

### PUBLIC WORKS DEPARTMENT

Tug *Cliffside,* the vessel was hauled up on our ways, the tail shaft was drawn for examination; the broken rudder was removed and repaired and the stern shoe was taken off and straightened. Examination of the hull was also made.

### AIDS TO NAVIGATION

Certain repairs were made on the derrick scow *Quebec.*

SIGNAL SERVICE

The signal station at cap St. Michel (Varennes) was moved and extensive repairs made.

FLEET VESSELS

The *Contrecoeur* was hauled up, stern repaired, one propeller renewed and caulking was made around the sea-cocks.

Tug *Deschaillons*, a system of refrigeration to operate with steam was installed. Wood guard, port side forward, was repaired.

Tug *Laviolette* was hauled up, repairs were made to propeller shaft and also to hull plating. Three new brass liners for tail end shaft were fitted. Rubber liners were fitted to the outer bearing brackets as an experiment, from reports received a great saving in renewals is hoped for.

Tug *Lanoraie II* was hauled up, one new propeller was fitted and all sea-cocks examined, specially the main blow-off cocks. The back bearings were removed; the hull was painted.

Tug *Lac St. Pierre* was hauled up, all discharge pipes caulked, wood guards repaired, sheathing on hull repaired, rods of rudder chains renewed, propeller and bracket bearings retightened, reversing engine repaired and windlass repaired and rebolted to deck.

Tug *Varennes* was hauled up, considerable repairs to hull made, both propeller shafts were taken off, examined, straightened and refitted in place.

Tug *Frontenac* was hauled up and hull brushed and painted.

*Coal Barge No. 5*, the windlass was overhauled and the steering engine of the dismantled tug *Carmelia* was installed on her.

Artificial refrigeration by steam-driven units was installed on the following vessels:—*Hopper Barge No. 4, Dredge No. 8,* and Tug *Bécancour.*

*Dumping Scow No. 27* was hauled up and important repairs were made to the hull and machinery, after having been sunk.

*Dredge No. 3,* bow cable winch worm and gear repaired; upper and lower tumblers changed for new ones.

Tug *James Howden,* engines were removed and the hull demolished.

*Dredge No. 1,* which had capsized at wharf No. 3, was lifted by the Sin-Mac Salvage Limited, and the machinery was removed from her.

Wharf No. 4 (Cummins & Robinson's contract). This work in concrete and earth filling carried on piles was completed, also an extension beyond the Sheerlegs and the level of sheers by wharf was raised accordingly, when the railway siding is completed the whole will prove of very great service.

Building No. 3—steamfitters' shop, was extended 30 feet.

A new electric welding shop was built and a new welding machine installed.

The boiler and building of fire-hold at Sheerlegs were lifted on account of raise of level of wharf No. 4.

Important alterations were made to Building No. 9—the Store. A cement foundation being put in and the ground drained; a great improvement in the health of employees working on the ground floor was observed during last winter.

The spur line inside the Shipyard was repaired. A main drain from the back of yard and running alongside sawmill was built with the result that no water lay in that part of the yard at spring and the basement of sawmill was dry.

The shipyard buildings, wharves, fences, roads and sheerlegs were kept in good condition, and necessary repairs were made to the hauling ways.

The force employed at the Shipyard during the fiscal year 1930-31 varied from a minimum of 853 at August 18, 1930, and a maximum of 1,506 at March 30, 1931, with an average for the year of 1,046.

The total amount expended for Shipyard operations during the fiscal year 1930-31 was $3,382,868.04.

## REPORT OF A. R. TIBBITS, SUPERVISOR OF HARBOUR COMMISSIONS, PUBLIC HARBOURS, AND HARBOURMASTERS

There have been comparatively few changes in the personnel of the harbourmasters in charge of the different public harbours, during the years 1929 and 1930, and most of these have been due to vacancies caused by the decease of the incumbent of the position, or by resignations, and no new harbours have been proclaimed, although the new "prairie port" of Churchill, H.B.T., has been developed to the point where trial shipments of grain are being prepared for. Until the port is proclaimed a public harbour under Part XII of the Canada Shipping Act, it cannot be, officially, a public harbour.

Following are the changes made in the personnel of the officers in charge of public harbours, during the years 1929 and 1930, respectively:—

Vacancies in the position of Harbourmasters, which have occurred through death, resignation, etc., and new appointments to fill the vacancies, were as follows:—

### BRITISH COLUMBIA

Ladysmith.—James Delaney resigned January, 1930, and Mr. Andrew C. Walters appointed February 25, 1930.

Nanaimo and Departure Bay.—Captain A. F. Yates died; McGregor Chas. Ironside appointed March 3, 1930.

### NEW BRUNSWICK

Seal Cove.—Mr. William Russell died; Mr. Harvey Joy appointed April 2, 1930.

### NOVA SCOTIA

Liverpool.—John Seldon died; William Smith was appointed November 5, 1930, but resigned shortly afterwards, and Edgar J. Innes appointed December 12, 1930.

Parrsboro.—W. R. Huntly, resigned and H. MacAloney appointed May 23, 1930.

St. Mary River.—Captain S. E. Pride resigned May 12, 1930, and James Boutilier appointed May 23, 1930.

### ONTARIO

Meaford.—William Cook died in November, 1929, and Herbert Hall appointed June 14, 1930.

### QUEBEC

Amherst.—Eddy Reid appointed March 22, 1929, to supersede the former harbourmaster who resigned in the previous year.

Harbourmasters are paid solely from the fees collected by them from such vessels entering the harbour under their charge as may be liable for payment under the provisions of Part XII of the C.S.A., Chap. 186, R.S. 1927. Each ship is liable for payment according to her registered tonnage, the first and

second entries in any one calendar year. The harbourmaster is allowed to retain a certain portion of the fees collected by him each year, varying from $100 to $600, according to the importance of the harbour. If he collects more than the amount fixed for his remuneration in the Order in Council by which he is appointed, he retains this amount he is allowed and either deposits the balance to the credit of the Receiver General or remits it to the department's headquarters, and in either case it becomes a part of the Consolidated Revenue Fund. Should he not collect more than his allowance, he retains whatever he collects. The harbourmaster is required to submit a sworn report of his collections as at December 31 of each year, showing names of all vessels entering the port, and the date; name of the master in each case; the vessel's tonnage; amount of dues paid, if any, and last post of entry. Numbered receipts are given for each payment, in triplicate, two copies are given the master of the ship paying, one of which he is expected to deliver to the collector of customs at the port, and the collector of customs is required to forward it to the department for checking against the harbourmaster's return of dues at the end of the year. By this system the department keeps a check on the return of all collections. As will be seen from the tabulated statement following, showing the collections of harbour dues made by the different harbourmasters in each port from which the department receives returns, for the years 1929-30, the remuneration received by the harbourmasters is in many cases very small. This is due to the relative unimportance of the harbour and the small amount of shipping of any size which enters the port. Fishing boats also are exempt from payment of harbour dues, and this reduces in the Maritime Provinces particularly, the amount of collections that might ordinarily be made at many of the ports. It will be well to point out here that in harbours under commission administration, the harbourmaster is appointed by the Harbour Commissioners, and in these harbours the harbourmaster is paid a straight salary by the Harbour Commissioners, while the harbour dues collected go to the revenues of the Harbour Commissioners. A payment made in a harbour under the commission form of administration does not count on the two payments which every vessel (with the exception above-mentioned) is required to make twice in each calendar year at her first and second ports of entry.

SUMMARIZED Statement of Collections of Harbour Dues from Vessels by the Harbourmasters, showing in Detail the Collections at Each Port, and the Total Collections by Provinces, for the Years 1929 and 1930, Respectively.

HARBOUR DUES—SUMMARY FOR YEAR 1929

| Province | Amount collected | Remuneration | Amount remitted |
|---|---|---|---|
| | $ cts. | $ cts. | $ cts. |
| Ontario | 1,686 00 | 1,553 00 | 133 00 |
| Quebec | 1,598 00 | 1,410 50 | 187 50 |
| Nova Scotia | 3,267 75 | 3,033 75 | 234 00 |
| New Brunswick | 437 00 | 437 00 | |
| Prince Edward Island | 192 00 | 192 00 | |
| British Columbia | 4,820 50 | 3,660 50 | 1,160 00 |
| Total | 12,001 25 | 10,286 75 | 1,714 50 |

| | | |
|---|---|---|
| Amount credited to Receiver General for fiscal year 1929-30 | | $ 1,716 50 |
| Chemainus, B.C.—Amount of $1 included in Revenue of 1929-30 for year 1928 | $ 1 00 | |
| Nanaimo Departure Bay, B.C.—Amount of $1 included in revenue of 1929-30 for year 1928 | 1 00 | |
| | | 2 00 |
| | | $ 1,714 50 |

HARBOUR DUES, YEAR, 1929

| Name of Harbours | Amount collected | Remuneration | Amount remitted |
|---|---|---|---|
| *Ontario*— | | | |
| Collingwood | 90 50 | 90 50 | |
| Fort William | 536 00 | 536 00 | |
| Goderich | 14 00 | 14 00 | |
| Midland | 118 50 | 118 50 | |
| Oshawa | 53 00 | 53 00 | |
| Owen Sound | 37 50 | 37 50 | |
| Port Arthur | 406 00 | 300 00 | 106 00 |
| PortMcNicol | 42 00 | 42 00 | |
| Port Stanley | 53 00 | 53 00 | |
| Sault Ste. Marie | 327 00 | 300 00 | 27 00 |
| Whitby | 8 50 | 8 50 | |
| Total | 1,686 00 | 1,553 00 | 133 00 |
| *Quebec*— | | | |
| Chandler | 97 00 | 97 00 | |
| Gaspe | 114 50 | 114 50 | |
| Grand River | 22 50 | 22 50 | |
| Ha' Ha' Bay | 368 00 | 200 00 | 168 00 |
| Matane | 161 50 | 161 50 | |
| Montmagny | 34 50 | 34 50 | |
| Paspebiac | 23 00 | 23 00 | |
| Rimouski | 58 00 | 58 00 | |
| St. Johns | 199 50 | 199 50 | |
| Sorel | 519 50 | 500 00 | 19 50 |
| Total | 1,598 00 | 1,410 50 | 187 50 |
| *Nova Scotia*— | | | |
| Annapolis | 4 50 | 4 50 | |
| Apple River | 28 50 | 28 50 | |
| Arichat | 8 00 | 8 00 | |
| County Harbour | 14 00 | 14 00 | |
| Bridgewater | 14 00 | 14 00 | |
| Clarks Harbour | 17 00 | 17 00 | |
| Digby | 26 00 | 26 00 | |
| Guysboro | 52 00 | 52 00 | |
| Hantsport | 17 50 | 17 50 | |
| Hubbart Cove | 1 00 | 1 00 | |
| International Pier | 1,134 00 | 900 00 | 234 00 |
| Jeddore | 4 00 | 4 00 | |
| La Have | 29 00 | 29 00 | |
| Little Bras d'Or Harbour | 12 50 | 12 50 | |
| Liverpool | 64 50 | 64 50 | |
| Louisburg | 214 50 | 214 50 | |
| Lunenburg | 110 50 | 110 50 | |
| Margaretsville | 1 50 | 1 50 | |
| Marie Joseph | 1 00 | 1 00 | |
| Meteghan Harbour | 16 00 | 16 00 | |
| Musquodoboit | 0 50 | 0 50 | |
| Neil's Harbour | 5 00 | 5 00 | |
| North Sydney | 614 50 | 614 50 | |
| Parrsboro | 110 50 | 110 50 | |
| Petit de Grat | 10 50 | 10 50 | |
| Pictou | 92 50 | 92 50 | |
| Port Greville | 25 00 | 25 00 | |
| Pubnico | 14 50 | 14 50 | |
| Pugwash | ..... | ..... | |
| Ritcey's Cove | 19 00 | 19 00 | |
| St. Mary River | 73 50 | 73 50 | |
| Sambro | 0 50 | 0 50 | |
| Shelburne | 111 00 | 111 00 | |
| Ship Harbour | 28 50 | 28 50 | |
| Tidnish | 1 00 | 1 00 | |
| Tiverton | 6 75 | 6 75 | |
| Tusket Wedge | 2 50 | 2 50 | |
| Walton | 67 00 | 67 00 | |
| West Port | 28 00 | 28 00 | |
| Weymouth | 47 50 | 47 50 | |
| Whitehead | 2 00 | 2 00 | |
| Windsor | 100 00 | 100 00 | |
| Wolfville | 6 00 | 6 00 | |
| Wood's Harbour | 5 00 | 5 00 | |
| Yarmouth | 126 50 | 126 50 | |
| Total | 3,267 75 | 3,033 75 | 234 00 |

HARBOUR DUES, YEAR 1929—*Concluded*

| Name of Harbours | Amount collected | Remuneration | Amount remitted |
|---|---|---|---|
| *New Brunswick*— | | | |
| Alma | 32 00 | 32 00 | |
| Bathurst | 19 00 | 19 00 | |
| Campbellton | 72 00 | 72 00 | |
| Caraquet | 6 50 | 6 50 | |
| Chatham | 118 00 | 118 00 | |
| Dalhousie | 10 00 | 10 00 | |
| Letête | 11 50 | 11 50 | |
| Richibucto | 26 00 | 26 00 | |
| Seal Cove | 6 00 | 6 00 | |
| St. Andrews | 93 00 | 93 00 | |
| St. George | 2 00 | 2 00 | |
| St. Martin | 41 00 | 41 00 | |
| Total | 437 00 | 437 00 | |
| *Prince Edward Island*— | | | |
| Charlottetown | 118 50 | 118 50 | |
| Souris East and West | 23 00 | 23 00 | |
| Summerside | 50 50 | 50 50 | |
| Total | 192 00 | 192 00 | |
| *British Columbia*— | | | |
| Chemainus | 580 00 | 400 00 | 180 00 |
| Comox | 452 00 | 200 00 | 252 00 |
| Gibson's Landing | 3 00 | 3 00 | |
| Ladysmith | 177 50 | 177 50 | |
| Nanaimo Departure Bay | 547 50 | 500 00 | 47 50 |
| Ocean Falls | 236 50 | 200 00 | 36 50 |
| Port Alberni | 391 00 | 391 00 | |
| Powell River | 345 00 | 345 00 | |
| Prince Rupert | 244 00 | 244 00 | |
| Victoria and Esquimalt | 1,844 00 | 1,200 00 | 644 00 |
| Total | 4,820 50 | 3,660 50 | 1,160 00 |

HARBOUR DUES—SUMMARY FOR YEAR 1930

| Province | Amount collected | Remuneration | Amount remitted |
|---|---|---|---|
| | $ cts. | $ cts. | $ cts. |
| Ontario | 1,766 50 | 1,692 50 | 74 00 |
| Quebec | 1,574 50 | 1,199 00 | 375 50 |
| Nova Scotia | 1,825 50 | 1,825 50 | |
| New Brunswick | 335 00 | 335 00 | |
| Prince Edward Island | 102 50 | 102 50 | |
| British Columbia | 4,844 50 | 3,708 00 | 1,136 50 |
| Total | 10,448 50 | 8,862 50 | 1,586 00 |

HARBOUR DUES—YEAR 1930

| Name of Harbours | Amount collected | Remuneration | Amount remitted |
|---|---|---|---|
| | $ cts. | $ cts. | $ cts. |
| *Ontario*— | | | |
| Collingwood | 45 50 | 45 50 | |
| Fort William | 584 00 | 584 00 | |
| Goderich | 19 00 | 19 00 | |
| Midland | 106 50 | 106 50 | |
| Oshawa | 84 00 | 84 00 | |
| Owen Sound | 54 00 | 54 00 | |
| Port Arthur | 374 00 | 300 00 | 74 00 |
| Port Stanley | 65 00 | 65 00 | |
| Sarnia | 234 00 | 234 00 | |
| Sault Ste Marie | 189 00 | 189 00 | |
| Whitby | 11 50 | 11 50 | |
| Total | 1,766 50 | 1,692 50 | 74 00 |
| *Quebec*— | | | |
| Chandler | 87 00 | 87 00 | |
| Grand River | 39 50 | 39 50 | |
| Ha Ha Bay | 274 00 | 200 00 | 74 00 |
| Matane | 145 00 | 145 00 | |
| Montmagny | 13 00 | 13 00 | |
| Paspebiac | 31 50 | 31 50 | |
| St. Johns | 183 00 | 183 00 | |
| Sorel | 801 50 | 500 00 | 301 50 |
| Total | 1,574 50 | 1,199 00 | 375 50 |
| *Nova Scotia*— | | | |
| Country Harbour | 7 00 | 7 00 | |
| Bridgewater | 16 00 | 16 00 | |
| Glasgow and Cape Breton Pier | 53 00 | 53 00 | |
| Guysboro | 9 50 | 9 50 | |
| Hubbart Cove | 1 00 | 1 00 | |
| International Pier | 739 00 | 739 00 | |
| La Have or Getson's Cove | 30 50 | 30 50 | |
| Louisburg | 200 00 | 200 00 | |
| Lunenburg | 117 00 | 117 00 | |
| Mabou | 11 00 | 11 00 | |
| Neil's Harbour | 3 50 | 3 50 | |
| Parrsboro | 22 50 | 22 50 | |
| Petite de Grat | 4 50 | 4 50 | |
| Pictou | 59 50 | 59 50 | |
| Port Greville | 19 50 | 19 50 | |
| Pubnico | 17 50 | 17 50 | |
| Shelburne | 137 50 | 137 50 | |
| Ship Harbour | 7 00 | 7 00 | |
| Tidnish | 1 00 | 1 00 | |
| Tiverton | 6 50 | 6 50 | |
| Tusket Wedge | 2 50 | 2 50 | |
| Walton | 54 00 | 54 00 | |
| West Port | 30 00 | 30 00 | |
| Weymouth | 10 50 | 10 50 | |
| Windsor | 100 00 | 100 00 | |
| Woods Harbour | 2 50 | 2 50 | |
| Yarmouth | 163 00 | 163 00 | |
| Total | 1,825 50 | 1,825 50 | |
| *New Brunswick*— | | | |
| Alma | 11 00 | 11 00 | |
| Campbellton | 84 00 | 84 00 | |
| Caraquet | 7 00 | 7 00 | |
| Chatham | 93 50 | 93 50 | |
| Dalhousie | 21 00 | 21 00 | |
| Letete | 11 00 | 11 00 | |
| North Head | 9 50 | 9 50 | |
| Richibucto | 25 00 | 25 00 | |
| St. Andrews | 29 50 | 29 50 | |
| St. George | | | |
| St. Martin and Quaco | 43 50 | 43 50 | |
| Total | 335 00 | 335 00 | |

HARBOUR DUES—YEAR 1930—*Concluded*

| Name of Harbours | Amount collected | Remuneration | Amount remitted |
|---|---|---|---|
| | $ cts. | $ cts. | $ cts. |
| *Prince Edward Island—* | | | |
| Georgetown | 39 00 | 39 00 | |
| Souris East and West | 12 00 | 12 00 | |
| Summerside | 51 50 | 51 50 | |
| Total | 102 50 | 102 50 | |
| *British Columbia—* | | | |
| Chemainus | 585 00 | 400 00 | 185 00 |
| Comox | 398 50 | 200 00 | 198 50 |
| Ladysmith | 189 50 | 189 50 | |
| Nanaimo Departure Bay | 499 00 | 499 00 | |
| Ocean Falls | 255 00 | 200 00 | 55 00 |
| Port Alberni | 367 00 | 367 00 | |
| Powell River | 384 00 | 384 00 | |
| Prince Rupert | 268 50 | 268 50 | |
| Victoria and Esquimalt | 1,898 00 | 1,200 00 | 698 00 |
| Total | 4,844 50 | 3,708 00 | 1,136 50 |

## APPROPRIATION AND EXPENDITURE

The parliamentary appropriation for the Marine Department for the fiscal year 1930-31 was $15,273,474.72; the expenditure, $11,880,119.99, leaving an unexpended balance for the department of $3,393,354.73.

## CORRESPONDENCE

The number of letters received during the fiscal year 1930-31 was 176,955.

The number of letters sent out during the fiscal year 1930-31 was 120,341.

The above includes radio and hydrographic correspondence, which until recently, have been recorded in the Fisheries record branch.

## NEW LEGISLATION

During the parliamentary session of 1931, new legislation affecting the department was enacted as follows:—

21-22 George V, Chapter 21—An Act to amend the Canada Shipping Act (Masters and Mates' Certificates of Service), Section 87; assented to August 3, 1931.

21-22 George V, Chapter 25—An Act to provide for a further loan to the Chicoutimi Harbour Commissioners; assented to August 3, 1931.

21-22 George V, Chapter 34—An Act to provide for a further loan to the Halifax Harbour Commissioners; assented to August 3, 1931.

21-22 George V, Chapter 40—An Act to provide for a loan to the New Westminster Harbour Commissioners; assented to August 3, 1931.

21-22 George V, Chapter 41—An Act to amend the North Fraser Harbour Commissioners Act—(Harbour limits defined—Power to make by-laws—Tolls on logs, etc.—Regulations in re: obstructions—Confirming certain by-laws); assented to August 3, 1931.

21-22 George V, Chapter 49—An Act respecting the International Convention for the Safety of Life at Sea, signed in London on May 31, 1929, and the International Convention respecting Load Lines, signed in London on July 5, 1930; assented to August 3, 1931.

21-22 George V, Chapter 50—An Act to provide for a further loan to the Saint John Harbour Commissioners; assented to August 3, 1931.

21-22 George V, Chapter 56—An Act to provide for a further loan to the Three Rivers Harbour Commissioners; assented to August 3, 1931.

A. JOHNSTON,
*Deputy Minister of Marine.*

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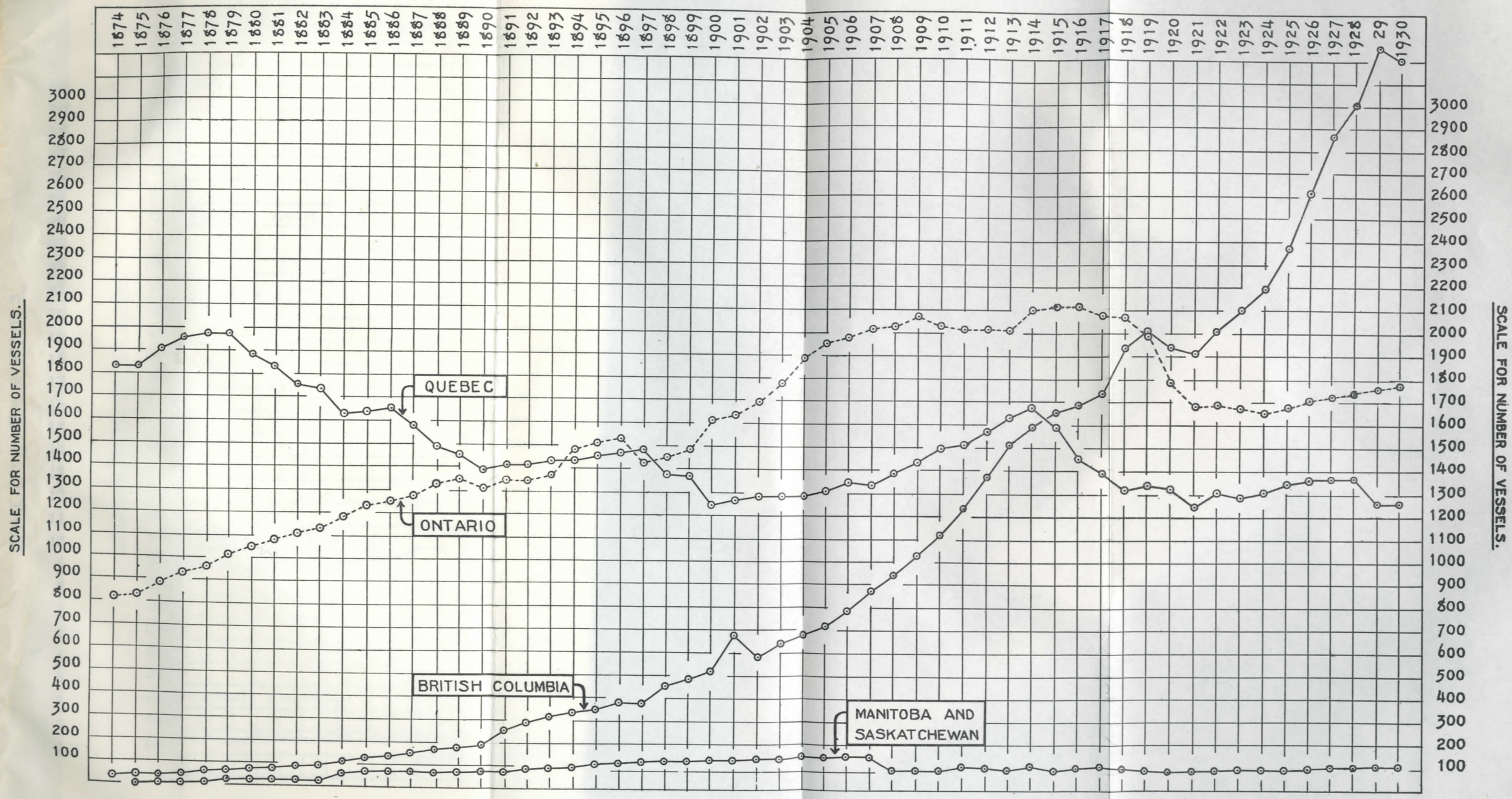
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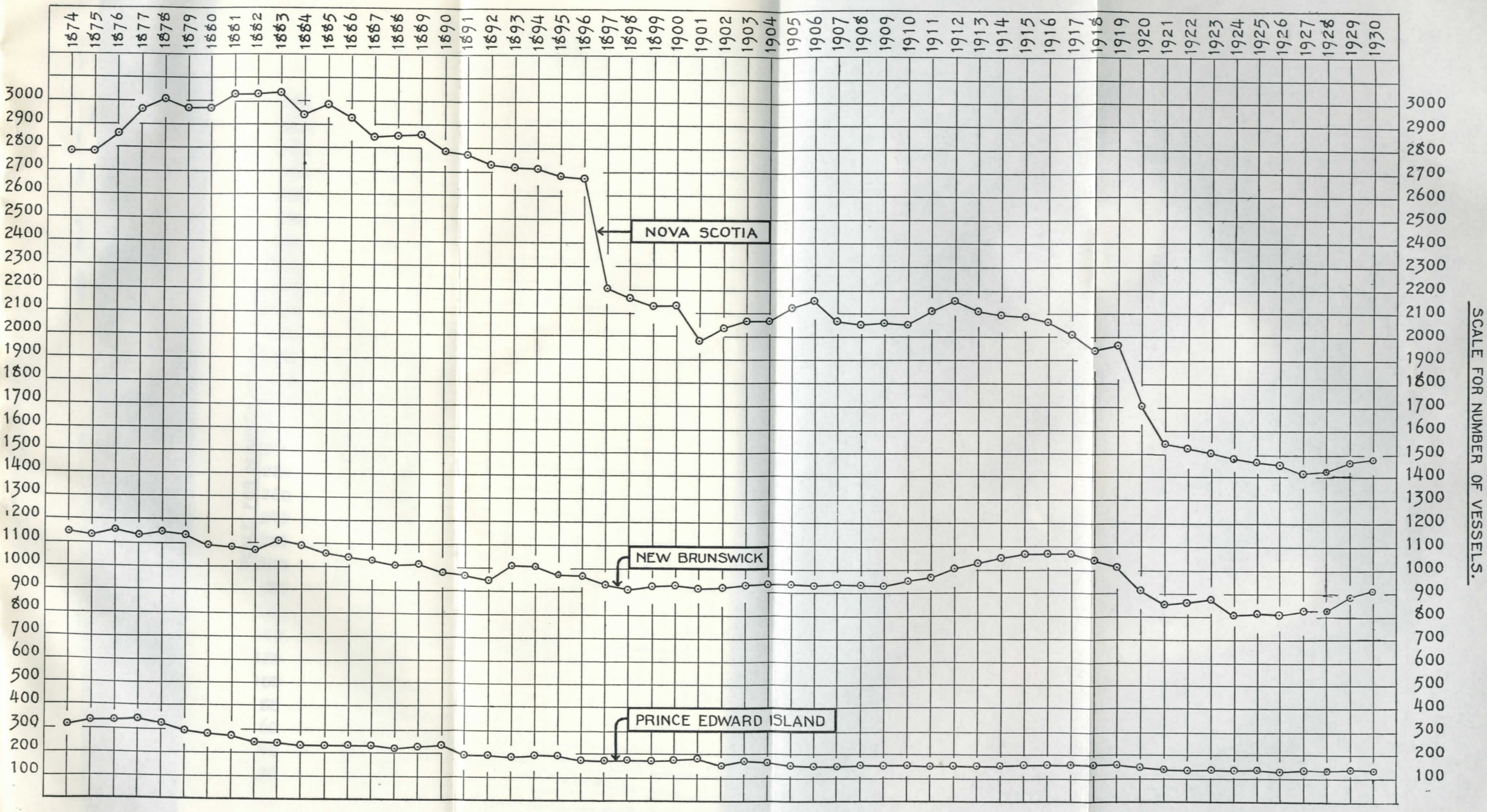
# Vessels

Comparative Curves Showing the Number of Vessels on the Registry Books of the Dominion of Canada, on December 31, in each Year from 1874 to 1930, both inclusive.



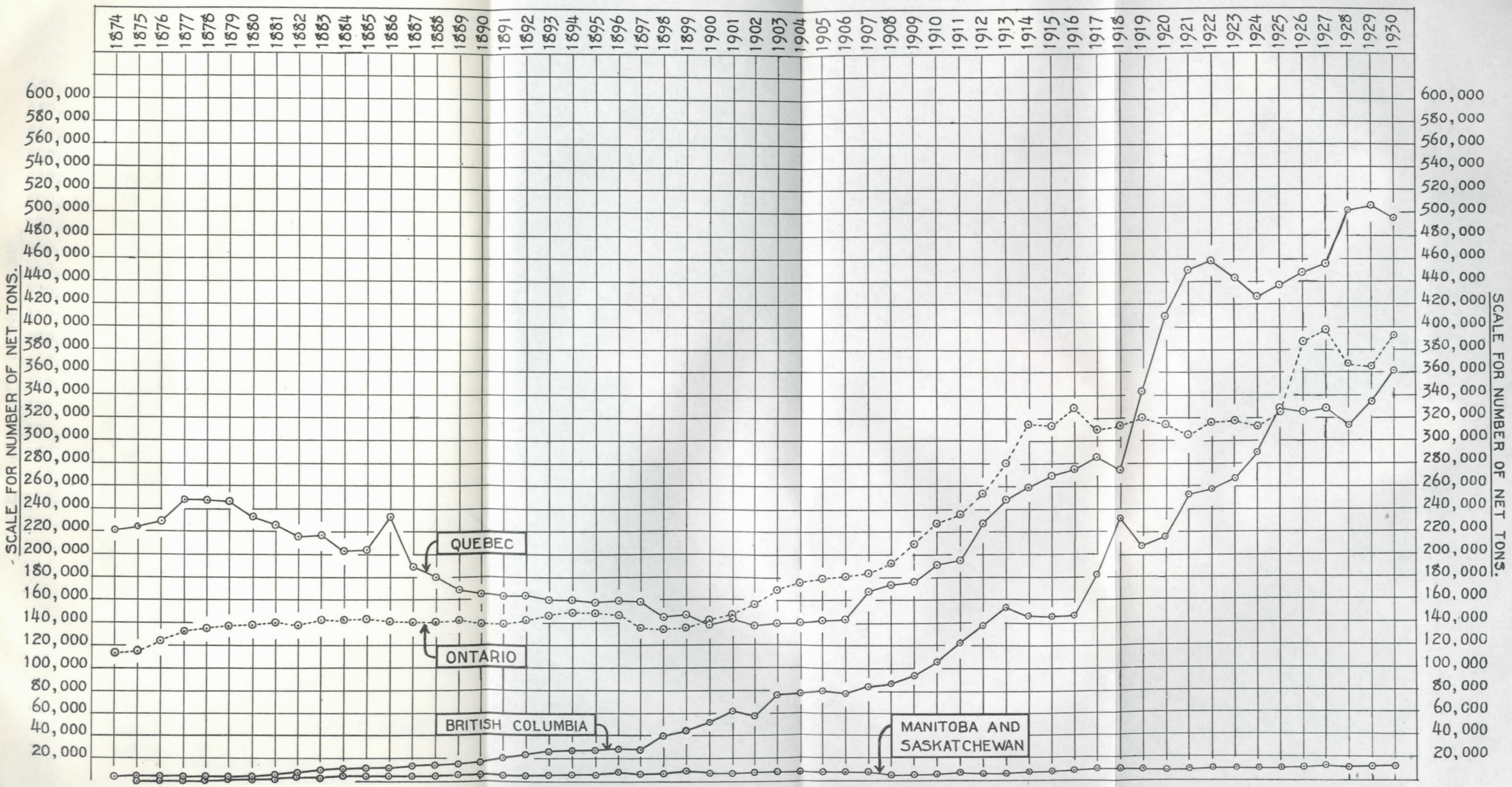
# Vessels

Comparative Curves Showing the Number of Vessels on the Registry Books of the Dominion of Canada, on December 31, in each Year from 1874 to 1930, both inclusive.



# Net Tons

Comparative Curves Showing the Number of Net Tons on the Registry Books of the Dominion of Canada, on December 31, in each Year from 1874 to 1930, both inclusive.



# Net Tons

Comparative Curves Showing the Number of Net Tons on the Registry Books of the Dominion of Canada, on December 31, in each Year from 1874 to 1930, both inclusive.

