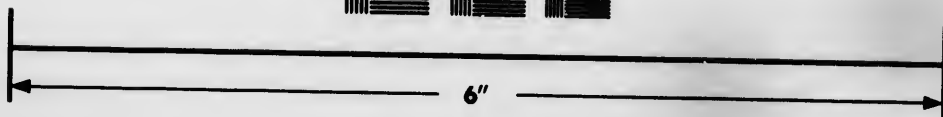
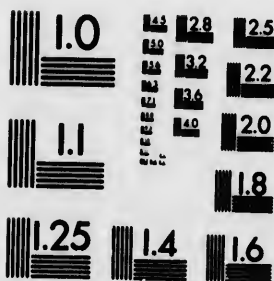


**IMAGE EVALUATION
TEST TARGET (MT-3)**



**Photographic
Sciences
Corporation**

23 WEST MAIN STREET
WEBSTER, N.Y. 14590
(716) 872-4503

**CIHM
Microfiche
Series
(Monographs)**

**ICMH
Collection de
microfiches
(monographies)**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1993

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured covers/
Couverture de couleur
- Covers damaged/
Couverture endommagée
- Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- Cover title missing/
Le titre de couverture manque
- Coloured maps/
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- Bound with other material/
Relié avec d'autres documents
- Tight binding may cause shadows or distortion along interior margin/
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- Additional comments: /
Commentaires supplémentaires:

- Coloured pages/
Pages de couleur
- Pages damaged/
Pages endommagées
- Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
- Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
- Pages detached/
Pages détachées
- Showthrough/
Transparence
- Quality of print varies/
Qualité inégale de l'impression
- Continuous pagination/
Pagination continue
- Includes index(es)/
Comprend un (des) index
- Title on header taken from: /
Le titre de l'en-tête provient:
- Title page of issue/
Page de titre de la livraison
- Caption of issue/
Titre de départ de la livraison
- Masthead/
Générique (périodiques) de la livraison

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The copy filmed here has been reproduced thanks to the generosity of:

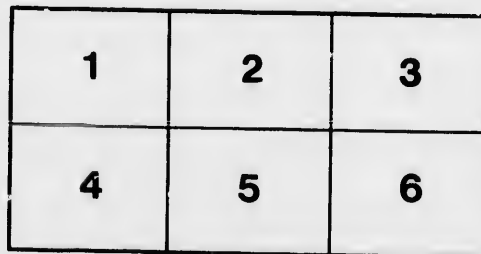
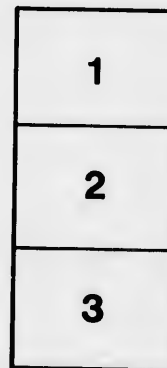
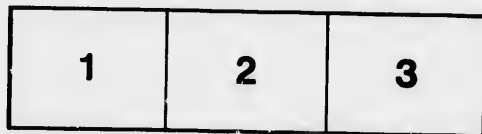
National Library of Canada

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol → (meaning "CONTINUED"), or the symbol ▼ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

Bibliothèque nationale du Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ▼ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

qu'il
cet
de vue
ge
ation
ués

9

THE
STRAITS OF BELLEISLE.

THE STRAITS OF BELLE ISLE.

Reprinted from the MONTREAL GAZETTE,

March 26th, 1877.

Sir,—The article of the *Liverpool Post*, of the 23th January last, headed, "A New Climate for Lower Canada," and which you reproduced in your issue of the 4th February last, has been read in this country with curiosity, if not with interest. The author purports to do no less than to change, for the better, the climate of at least the whole of Lower Canada and probably other portions of the Dominion, and in order to effect this great desideratum he suggests the blocking up of the Straits of Belle Isle, at its narrowest part. The author argues, under the impression that it is entirely owing to the presence of the streams of cold water which pour through this Strait from the North Sea, and to the ice which rushes in the same Strait from Baffin Bay and Davis Strait, that the climate of the north coast of the Gulf of St. Lawrence and of the Island of Anticosti is so cold.

On the other hand, he states that "at Anticosti Island and along the Quebec shores the Gulf Stream is not felt, as it rushes off in another direction, while, in the more southerly part of the St. Lawrence, Prince Edward Island comes under the genial influence of that stream, which, with its high temperature, is more than a match for the freezing influences of the colder streams which flow in from another direction."

Then, in another part of his article, the writer, who attributes the severity of our climate to the presence of icebergs in the Straits of Belle Isle, adds:

"Once get rid of all this accumulation of ice, and the result anticipated would be that the winter would be reduced by about three months, whilst the St. Lawrence would practically be navigated all the year round. The temperature of the gulf would be raised most considerably, whilst the influence of the Gulf stream would more probably penetrate further northwards, though perhaps not to a great extent."

While giving due credit for the attempt of the *Liverpool* writer, in a direction which is certainly most friendly and humanitarian, and which, if his plan could be carried out with its desired effect, would bring an immense and everlasting benefit to this country, I

can not let pass his assertions and speculations without offering a few remarks, and I hope that the readers of this article will not tax me with too much assumption when they bear in mind that I have cruised in the Gulf of St. Lawrence and Strait of Belle Isle during sixteen years, in command of an armed cutter, equipped for the protection of the fisheries of Canada.

But before arguing, I must establish my premises.

The principle agents which, besides the differences of latitude, affect in a positive or negative way, the climate of the parts of the eastern portion of America above mentioned, that is the north coast of the Gulf of St. Lawrence, the Island of Anticosti and Lower Canada in general, are the following: 1st, the Gulf stream; 2nd the Polar current; 3rd, the prevailing westerly winds; 4th, the ice. As it is requisite that we should well understand each other as to the effects of these agents, it is necessary that I should describe them, beginning by the Gulf stream, the most remarkable of them all.

I therefore give now a short description of the great marine river and its branches from the best authors, and I will quote largely from the celebrated Maury and from Elisee Beecher's interesting book entitled "The Or"

THE GULF STREAM.

The following is the beautiful description of the Gulf stream given by Maury:—

"There is a river in the ocean, in the severest draughts it never falls, and in the mightiest floods it never overflows; its banks and its bottom are of cold water, while its current is of warm; the Gulf of Mexico is its fountain, and its mouth is in the Arctic seas. It is the Gulf Stream. There is in the world no other such majestic flow of waters. Its current is more rapid than the Mississippi or the Amazon, and its volume more than a thousand times greater. Its waters, as far out from the Gulf as the Carolina coast, are of indigo blue. They are so distinctly marked that their line of junction with the common sea water may be traced by the eye. Often one-half of the vessel may be perceived floating in the Gulf stream wa-

ter, while the other half is in the common water of the sea, so sharp is the line, and such the want of affinity between those waters, and such, too, the reluctance, so to speak, on the part of those of the Gulf Stream to mingle with the littoral waters. Owing to the rotatory motion of the globe, and probably also to the general direction of the coasts, this current follows a constant direction to the north-east, and does not touch any of the advanced points of the Continent of America."

"The waters of the Gulf Stream, after they escape from the Gulf of Mexico, are bound for the British Islands, to the North Sea and Frozen Ocean, attaining even Spitzbergen. This current of warm water on emerging from the Strait of Bimini, is about 82 miles wide, and of a depth of 200 fathoms. Off Cape Hatteras it has acquired a width of about 75 miles, and its depth is lessened to 120 fathoms."

"It is roof-shaped in its middle, and on its axis it is computed to be nearly two feet higher than the contiguous waters of the Atlantic."

In the Strait of Bimini the temperature of the Gulf Stream is no less than 86° Fahr.; they lose their warmth but slowly, and during the winter they often have off Cape Hatteras and the banks of Newfoundland a temperature exceeding by 20° Fahr. those of the rest of the Atlantic under the same latitudes.

Between the 43rd and 47th degrees of north latitude in the neighbourhood of the banks of Newfoundland, the Gulf Stream, coming from the southwest, meets on the surface of the sea, the polar current, discovered by Cabot in the year 1497.

The line of demarcation between these two ocean rivers is never absolutely constant, but varies with the seasons.

In winter, that is to say from September to March, the cold current drives the Gulf stream towards the South; for during this season, the circulatory system of the Atlantic, winds, rains and currents, approach more nearly to the Southern hemisphere, above which the sun travels.

In summer, that is to say from March to September, the Gulf stream, in its turn, resumes its preponderance, and forces back the line of its conflict with the polar current more and more toward the north.

Thus the great river undulates here and there over the seas, and, according to the graceful expression of Maury, waves like a pennon in the breeze. But it is probable that the advance of the two opposite currents is often modified in consequence of the superficial expansion of cold and warm water.

The banks of Newfoundland, that enormous plateau surrounded, on all sides, by abysses five or six miles deep, is undoubtedly due, in great part, to the meeting of these two moving liquid masses.

On entering the tepid waters of the gulf stream, the icebergs gradually melt and let

fall the fragments of rock and loads of earth, which they bear into the sea. The bank, which rises gradually from the bottom of the ocean is a sort of common moraine for the glaciers of Greenland and the polar Archipelago.

After encountering the waters of the gulf stream, those of the Arctic current cease, in great part, to flow on the surface, and descend into the depths, in consequence of the greater weight which their temperature gives them.

The direction of this counter-current exactly opposite to that of the gulf stream, is demonstrated by icebergs which the warm breath of temperate latitudes has not yet melted, which travel towards the South-West directly against the superficial current, which they divide like the prow of a ship. More to the South we recognise the existence of this concealed current, only by means of sounding apparatus, the cold waters serving as a bed to the warm river; flowing from the Gulf of Mexico, it descends lower and lower as far as the Straits of Bimini, where the thermometer discovers it, at a depth of 220 fathoms.

Nevertheless, a part of the waters of the polar current remains at the surface of the sea; and gliding along the eastern coasts of the United States, as far as the point of Florida, gives to the gulf stream by contrast, very sharply defined limits. Generally the cold water crossing from the Arctic Sea possesses sufficient force to compel the current from the gulf to bend sensibly towards the south, and to oppose an insurmountable barrier to it in the other direction. The warmest and more rapid water of the gulf stream, which forms precisely the left or western side of the current, is found in immediate juxtaposition to a sheet of cold water, which spreads in an opposite direction between the gulf stream and the adjacent shores. This counter current which interposes the waters of the icy sea between the coast of Carolina and the warm river flowing from the Gulf of Mexico, bounds the gulf stream like a wall of ice.—Reclus, Franklin Bache, *United States Coast Survey*.

The following are the distances from the inner or western edge of the Gulf Stream from the Canadian and American shores:—

The inner edge of the Gulf Stream	
is distant from Cape Canaveral	85 miles.
From Cape St. Augustine	70 "
" Charleston	62 "
" Cape Hatteras	50 "
" Cape May	125 "
" Sandy Hook	270 "
" Nantucket	80 "
" Cape Sable	120 "
" Scattari	220 "
" Cape Race	200 "

The Gulf stream crosses the Atlantic with a mean speed of 24 miles a day, and it spreads over such an immense space of the ocean that it loses its depth, until it is nothing but a sheet of surface water when it reaches the British Islands and the North sea. In this stupendous circuit it is aided,

in its course, by the counter trade winds, which have a north-east direction.

It is rather difficult to lay down the precise route of the Gulf stream in the seas of western Europe, because of the enormous width of its moving expanse. One may say that in reality it stretches over the whole ocean from the Azores to Spitzbergen.

But I most allude to a branch of the said current, which is important, I quote from Reclus and Peterman. It is not only in the wide extent of the North Sea, from Nova Zembla to Iceland, that the Gulf stream takes a submarine course; the same is the case, it appears, in Baffin's Bay to the west of Greenland.

In fact, from Cape Farewell (south end of Greenland) to eight degrees further north the existence of a coast current has been ascertained, which carries the ice in an exactly contrary direction to that which it follows on the west, near the coast of Labrador, and which serves as a high road for the fragments of the ice-fields.

This current was formerly considered as the continuation of the one which flows along the eastern coast of Greenland from north to south, and which would thus have abruptly turned around Cape Farewell. But it is more natural to think that the polar current continues its route directly towards the great centre of the tropical seas.

In this case, the current of the western coast of Greenland would be simply a branch of the Gulf Stream. This is rendered almost certain by its water being comparatively warm. The sea seldom freezes on the shores which it bathes, and the climate there is on average nine degrees Fahr. warmer than on the coast looking towards the east. Towards the 78th degree this river-like current completely ceases, taking, undoubtedly, there a submarine course.—Reclus; Graah.

THE POLAR CURRENT.

We know at least in part the origin of that current.

Along the northern coasts of Siberia, as Wrangel and other explorers have told us, a current of cold water flows from east to west. Encountering on its way the large Island of Nova Zembla, it covers the strand and rocks with enormous quantities of ice, which render the Island quite uninhabitable, and close the straits to navigation.

Arrested by this barrier, the waters of the glacial current are forced to come to the north, and flow in a north-westerly direction towards Spitzbergen, round the northern archipelago, which they finally turn, in order to enter the seas around Greenland. It is there that they begin to take a direct road toward the equatorial seas.—Reclus.

One branch passes along the eastern coast line of Greenland, and joins the other branch which flows west of it, a good way south of Cape Farewell.

This last branch, which is commonly called

the Polar current, comes from the Arctic Sea, passes through Smith Sound, Baffin Bay and Davis Strait, descends parallel to the coast of Labrador to southward, and after having rounded the banks of Newfoundland, it bends towards the southwest in consequence of the movement which carries the earth in an easterly direction and causes a deviation from its course in everthing coming from the north. Besides, as I stated when speaking of the Gulf Stream, this current of icy water—which has been joined, as I have above stated, by a similar cold current from the east side of Greenland, when it meets the Gulf Stream—takes a submarine course, except towards the southwest, where it fills the space of the sea which lies between the inner edge of the Gulf Stream on one side and the coast of America on the other.

But this cold current not only flows southerly and south and westerly along the eastern shore of America, but a small branch of it enters the Straits of Belle Isle, and penetrates a short distance into the Gulf of St. Lawrence.

Having sailed many times in the Straits of Belle Isle, I am quite cognizant of this current. But perhaps it will be better to give here a description of it from Bayfield's work, entitled Pilot of the St. Lawrence, so that the authority cannot be disputed:—

CURRENT IN THE BELLE ISLE STRAIT.

"The reality of a current inwards, through the strait of Belle Isle, is confirmed by the presence of icebergs, which it transports into the Gulf every summer against the prevailing southwest winds, frequently carrying them as far as Mecatina, that is, 150 miles from the entrance of the strait, and 90 miles from its narrowest part, at Point Amour, and sometimes even to the neighborhood of the east point of Anticosti."

"It is probable, that it is a branch of the great current from Davis' strait, which is known to run along the coast of Labrador and to transport numerous icebergs to the southward every year."

"After entering the Gulf, it runs along the north or Labrador coast a distance of 2 or 3 miles from the outer islands, leaving a narrow space in shore, in which the streams of the tides, when, uninfluenced by winds, are tolerably regular. Passing outside of Mistanogue, the islands of great Mecatina and the South Maker's ledge, it pursues a direction given to it by the trending of the coast, till it is turned gradually to the southward by the weak current which is often found coming from the westward, between Anticosti and the North Shore, during westerly winds, and which is set off to the south coast from Natashquan point. The united streams continue their southern course, at a rate diminishing as they become more widely spread, and which seldom exceeds half a knot, and finally joining (to the east-

ward of the Island of Anticosti) the main downward current out of the River St. Lawrence, they all pursue a south-east direction towards the main entrance of the Gulf, between Cape Ray (on the south-west end of Newfoundland) and the Island of St. Paul-Bayfield." It will be seen, then, by the above description that the current inwards through the Strait of Belle Isle does not extend beyond the east point of Anticosti.

THE MAIN CURRENT OF THE RIVER ST. LAWRENCE.

The current of this mighty river which carries into the Gulf of St. Lawrence its immense body of water, sometimes in a precipitous way, generally at a majestic pace, is so well known that I need not describe it.

Suffice it to say that when it meets the flood tide at Quebec, and even at many miles above that port, it has still sufficient force to check it to such a degree that, while the flow is only felt, in the ordinary spring tides, during 4 hours and 48 minutes, the ebb lasts 7 hours and 48 minutes.

In the narrows of the south traverse the rate of the ebb tide is from 6 to 7 knots an hour, and that of the flood from 5 to 6 knots. The former lasting 6 hours and 50 seconds, while the latter is only felt during 5 hours and 35 minutes. From Father Point to Cape Chat this current runs from half a knot to 2 knots an hour. Below Point de Monts, and as far as Seven Islands, there is an eddy current that runs close inshore, as far as the first named point, by which it is diverted towards the south shore, and at some distance it merges itself in the more downward current.

Past Cape Gaspe this current, curving gradually to the south and south-east, continues its course towards the entrance of the Gulf, between Newfoundland and Cape Breton Island, with a rate very much lessened, in consequence of the great space over which it is now spread. Bayfield—This celebrated hydrographer adds:—"I have myself observed that a current sets out between Cape Bay and St. Paul Island during westerly winds and in calm weather.

I have already described the currents through two of the entrances of the Gulf of St. Lawrence, namely, 1st, the Strait of Belle Isle, and 2nd, the entrance between Newfoundland and Cape Breton Island.

Now it remains for me to speak of the third entrance, which is the Strait of Canso, or commonly called the Gut of Canso.

This strait, which separates Cape Breton Island from Nova Scotia, is 14½ miles in length, and its least breadth, between Batache Point and Cape Porcupine, is 450 fathoms, and depth from 15 to 32 fathoms, (Bayfield). There are no permanent currents running always one way or the other in this strait, but only the tide currents, which are increased or diminished in rapidity according to the winds.

WINDS OF THE NORTH ATLANTIC.

The winds of this ocean have been studied with that constancy and accuracy of method which distinguish the modern hydrographers, astronomers and natural philosophers. And we may say that very little is left to be learned concerning them, especially in reference to their general direction, at the surface of the sea, during the different seasons of the year.

Beginning at the equator, we have first the trade winds, which blow throughout the year from the north-east; and extend from about the fifth to the twenty-seventh degree of latitude north. I may state that in the south Atlantic, the trade winds which blow from the south-east occupy a space somewhat larger.

Beyond the trade winds in the North Atlantic are to be found the calms of the Cancer, over a belt of a breadth of five or six degrees.

Above that, that is, from the parallel of 35 N. to the 60 N. are met the so-called counter trade winds, because they blow generally from the south-west, in opposition to the regular trade winds of the north Atlantic, which, as it has been stated above, blow from the north-east.

But experience and observations have proved that, from the parallel 35 N. to the parallel 60 N., the winds have generally a westerly direction, the prevailing winds ranging from the south-west to the north-west.—Reclus.

This is a well-known fact to sailors navigating between Europe and America, in that belt comprised between the last mentioned parallels; and I am only repeating a truism, when I state that passages, by sailing ships, from Europe to America are longer than passages from America to Europe, principally on account of the prevalent westerly winds; I say principally, because the outward passages to Europe are also greatly aided by the currents of the gulf stream, if they sail within its compass.

But these prevailing winds from the westward, not only blow on the Atlantic, but they are also felt in the Gulf and river St. Lawrence, and over the countries which border them. Any one who has sailed in the Gulf, for several years, is well acquainted with the strong or continuous gales of westerly and north-westerly winds which prevail in it during the fall, and the difficulty often encountered by vessels bound-up the St. Lawrence in reaching their destination; while vessels bound down often succeed in clearing the Gulf in a couple of days. There is one fact also that should not be lost sight of—it is, the tendency of westerly winds to veer towards the north at night.

GROUND ICE.

The ice which forms along the coasts, in the bays, rivers, gulfs, and sometimes extend many miles in the sea, is called ground ice. It is

firm during the whole winter, but towards the spring, when the thaw comes, it is detached gradually from the shore and floats off to sea, propelled by the current and by the winds. It then mixes with the floating or floe ice, which has formed at sea and has drifted more or less, during the winter, from one shore to the other, according to the winds and currents.

FLOE ICE.

Ice is also formed in larger gulfs and in the open sea. When the temperature is low enough and the sea is calm, and especially in cold nights, the sea gets frozen on long extents, and sometimes the ice thus formed in one night is strong enough to bear a man. But at the first ripple of the sea, this sheet of ice breaks into fragments or cakes, which the long winter of our climate increases in breadth and in depth, until they fill whole gulfs and extend a great many miles into the sea.

Often these fragments unite together and form immense islands of ice, which sometimes block up, for awhile, large gulfs and bays.

Those are the kinds of ice which are formed along our shores and in our bays and gulfs; and during our long winters they, in great part, fill the river and gulf of St. Lawrence and disappear only when the action of the sun and water, in which they float, has melted them, in some places early in the spring, at others very late. I have seen myself large fields of floating ice remaining as late as the beginning of July, in the Strait of Belle Isle.

Observations have proved that salt water does not freeze in the same way as fresh water. While the latter has its greatest density at the temperature of 39.2 degrees Fahr., the former becomes heavier and heavier until it freezes. In fresh water crystals of ice at first appear over almost the entire surface, but in the sea, which have no great depth, it is generally from the bed itself that the liquid mass congeals.

The coldest strata of water being the heaviest, descend vertically towards the bottom of the sea and displace the warm strata which are lighter.

While the water which descends to the bottom of rivers, has a normal heat of seven degrees above freezing point, the sea water, which falls deeper, may have been chilled at 32 Fahr., or some several degrees below it. When the mass is not agitated it becomes liquid, but on the slightest disturbance it suddenly turns into ice.

Around the rocky shores of Greenland, Labrador and Spitzbergen these infloes often raise huge stones, which they have torn from the bed of the sea. [Poggendorf & Reclus.]

The fishermen settled along the shores of Labrador, in the Gulf of St. Lawrence, are well aware of the singular property of chilled salt water, and that to their great detriment; as it often happens that, in the month of December, when they are fishing for, I should say entrapping seals, which pass

along the shore from east to west, migrating from the north seas into the Gulf of St. Lawrence, their nets, which are very long, and form large pounds extending from the bottom to the surface of the sea, sometimes get all covered with ice to their very bottom, and in spite of heavy lead sinkers, float to the surface, and thus become useless. The poor fishermen are then forced to put them ashore, discontented, as perhaps they will see schools of seals passing incessantly, a week or two longer, in front of their fishing places.

ICEBERGS.

Icebergs do not form in rivers, gulfs or seas. They form on land and are the production of fresh water, rain, snow and halitones. They are parts detached from the immense glaciers which cover a great extent of land in the polar regions, both arctic and antarctic.

Many of these glaciers formed in immense valleys, on a plane inclining towards the sea, extend slowly over the cliffs and project far into the sea. During the long winter of those regions, the icebergs remain attached to the glaciers and increase in size. Besides, were they detached then, they could not flow out to sea, as they are barred by the ground ice of the coast. But when the thawing season has commenced, then immense blocks are detached from these glaciers, float in the waters adjacent, and one by one, caught by the polar currents, proceed on their descent towards the South, unless imprisoned for a time with the flow ice in some deep bays, where the current is not much felt, or unless they ground in shallow places. In the sea, the water of which are comparatively warm, like those of Spitzbergen and the western coast of Greenland, their base, which is immersed in the water, melts faster than the upper parts in the air; they then get top heavy and capsize, and in this overturn are often broken into many fragments, which in their turn pass through the same operation. While in the icy water of the Polar Sea, the icebergs, instead of diminishing, increase in size from the snow, hail and rain, while their base, not only is unaffected by the icy water which surrounds them, but on the contrary increase in size by the water that solidifies near them.

The northern seas are, as I have said, usually covered with ice during the winter season.

In the spring, that immense mass begins to move slowly and partly; by and by the whole mass sets on its way towards the south, and bringing with it or accompanied by the icebergs.

The floating ice melts on the way, as well as the small icebergs, but the large icebergs continue their majestic advance towards the equinoctial waters, until arrived at the banks of the Newfoundland, or invincible barriers meets them. It is the warm waters of the Gulf Stream, which soon melt them, as I

have explained in another part of this correspondence. While floating down along the shore of Labrador, on the Atlantic coast, some of the icebergs are caught by the current flowing from the Atlantic towards the Straits of Belle Isle, and aided by the north-east gales, which sometimes blow for a number of days, even weeks, in April and May, in those parts. They enter into the strait and float with the current westward. Some years they are numerous, while at other times, for several years in succession, few are seen.

Very few of these icebergs penetrate beyond Point Amour, the narrowest part of the strait, only some scattered ones being seen on the coast of Labrador, as far as Mecatina. Very rarely an odd one may reach as far as the east point of Anticosti.

I have sailed fifteen years through the strait of Belle-Isle, as far as Blanc Sablon, in the month of June, and seldom met icebergs to the westward of the place.

In 1861, I was on board the steamer *Napoleon III*, on a cruise for the protection of the fisheries. She had also to make a trip to the Island of Belle-Isle, to supply the lighthouse erected on the east end of the island. We arrived at the western end of the strait about the 15th of June, but we were prevented from passing through it by floating ice, which completely blocked it. It was only on the 29th June that we succeeded in making our way through an opening that had been made in the middle of the strait, by the wind and tides; but fields of floating ice still covered large spaces in the water, especially in the vicinity of Forteau. From Blanc Sablon to the Island of Belle Isle, we met about twenty large icebergs and some small ones, and we were able to ascertain their depth, as several of them were aground. One that we met, about the middle of the Strait, a good way to the eastward of Forteau, was aground (it had been there sometimes) in 40 fathoms of water (240 feet) and it rose 130 feet above the water; its total thickness was then no less than 370 feet. The base was large and the top slender and pointed. Near Belle Isle island there were few icebergs, but we saw from the lighthouse, at a height of 800 to 900 feet, immense icebergs floating in the Atlantic, one of them seemed to be more than a mile in length.

On our way back we stopped in Forteau Bay, and there I made the ascension, along with the late T. Tatu and three of my crew, of a square-shaped iceberg, which had been aground for some time, at the mouth of this bay, in 30 fathoms of water. The top of the iceberg was a plane inclined towards the sea, and while the outer edge was not more than 10 feet above the water, the inner side, looking towards the shore, was about 80 feet high. This iceberg was then 260 feet in thickness.

Now, having described the three kinds of ice which one meets with in the Gulf of St.

Lawrence and the Straits of Belle-Isle, I have only to add that these two arms of the sea are covered during the winter with ground and floe ice, sometimes to such extent, in severe winter, that hardly any clear water is to be seen anywhere, and there that ice remains until it is melted. In the Strait of Belle Isle it is sometimes so closely packed that I have heard that people have crossed on the ice from Newfoundland to Labrador. At the Magdalen Islands, I saw the floating ice for several years remain as late as the end of May, while in the Straits of Belle-Isle it remained as late as the latter end of June and sometimes the beginning of July. But no icebergs are seen during the winter in the Straits of Belle-Isle. The icebergs of the previous spring having been melted during the year, and it is known, as I have explained above, that the icebergs do not begin to descend from the Arctic sea until the spring, when the floe and ground ice break by the thawing process, and consequently the icebergs do not enter the straits of Belle-Isle before the month of May.

It seems to me apparent, by the above remarks and statements, that the conclusions which the Liverpool writer has arrived at are not borne out by facts.

1st. The Gulf stream, as it has been seen, does not penetrate into the Gulf of St. Lawrence at all, and, therefore, it cannot be influenced by the strait of Belle Isle current.

But even if it did penetrate into the Gulf, it would meet the main current of the St. Lawrence, which is carried right through the Gulf in a southeasterly direction, before meeting that of the strait of Belle Isle.

As the Island of Anticosti seems to be the principal objective point of the writer, I have prepared a table which will show at what distance from the east point of the said Island the inner or western edge of the Gulf stream runs.

Distances from the east point of the Island of Anticosti and several points of the inner edge of the Gulf stream:—

	Miles.
In an easterly direction	650
In a south-easterly "	470
In a southerly "	540

A similar statement for Prince Edward's Island will, perhaps, not be uninteresting to the reader.

Distances from Prince Edward's Island and several points of the inner edge of the Gulf Stream:—

	Miles.
In an easterly direction	400
In a south-easterly "	350
In a southerly "	430

2nd. Now with regard to the Strait of Belle Isle current, although its temperature is low, I do not see that it can have much influence on the climate of the Island of Anticosti, since it does not flow around it. Be-

sides, it is well known that the temperature of the waters of the Gulf of St. Lawrence, especially in the northern parts of it, are, even in summer, of a low temperature. Bayfield says that on the 9th of July, 1831, off St. Nicholas harbor, on the north shore of the River St. Lawrence, opposite Matane, about 200 miles from Quebec, and about the same distance to the westward of Anticosti, he found the temperature of the water to be on the surface, after a westerly wind, 39° Fah.

The next day, being off Point de Monte, he found the temperature at 37° Fah. Bayfield concludes his observations as to the temperature in the lower river and Gulf of St. Lawrence in the following words: "It also appears from the preceding any many other similar observations, that in fine weather the comparatively warm and fresh water of the St. Lawrence, and its numerous tributary streams, float on the surface, but that, when the waters are agitated by any cause, it becomes mingled with the constantly cold water beneath.

The temperature of the surface, therefore, depends less upon the warmth than the strength of the winds. Now, the blocking up of the Strait of Belle Isle would only stop a current of an axis of about 60 miles and less than two hundred miles in length and of a temperature very few degrees below the surrounding water. And really I do not see how it could affect the climate of Anticosti and the north coast, along which it runs at a distance.

The prevalent south-westerly winds in summer, and westerly and north-westerly in the fall, besides would drive away the cold air that it might bring it to those parts.

3rd. With regard to the ice, it seems to be proved that the icebergs which are met in the Strait of Belle Isle, however numerous they might be sometimes, cannot have any effect on the climate in any part except in their immediate vicinity. At all events they do not influence the climate of Anticosti.

Besides, there are no icebergs in the Strait of Belle Isle or in the Gulf of St. Lawrence during the winter.

And when they appear in the strait and until the end of May and sometimes of June, they form but a very inconsiderable part of the ice which, as I have said before, covers those arms of the sea.

After the floe and ground ice has been melted, icebergs no doubt remain in the strait, but they are scattered. Now a break-water across the strait of Belle Isle would certainly prevent the icebergs from appearing to the westward of it, but it would not, in the slightest way, prevent that part of the strait to the westward of the projected break-water and the Gulf from filling with ground and floe ice and obstructing it, during the winter and as late as the end of May, as it happens too often.

The conclusion I arrive at, is, that the bar-

ring of the Straits by a breakwater would have no effect on the climate of the north coasts of the Gulf of St. Lawrence or the Island of Anticosti, I need not add of Lower Canada. But one might ask, what makes those parts so cold and so bleak? I would not venture to enter upon this subject at length, but I might be allowed to offer a few remarks:

1. The difference of latitudes between the centre of Lower Canada and the above-named places is an element not to be lost sight of.

While the latitude of Montreal is 45° deg. $30'$ N., that of Quebec is 46° deg. $49'$ N.; the Island of Anticosti is 49° deg. $30'$ N., and the north coast ranging between 50° deg. $10'$ N. and 51° deg. $25'$ N.

The last latitude is that of Forteau, the one before that of Cape Whittle. It follows then that the Island of Anticosti is 276 statute miles further to the north than Montreal, and 200 miles more than Quebec, while Cape Whittle is 325 miles and Forteau 400 miles further north than Montreal. This would account in part for the colder climate of those parts.

On the other hand, Prince Edward Island is in latitude 46° $15'$ N., consequently it is 220 statute miles further to the south than Anticosti.

But it happens that in reality Anticosti is not so cold as Quebec, in winter, because it is surrounded by the sea, which, as every one knows, equalises the temperature. But the springs, summers and falls are much colder. How to account for this? First by the difference of latitude, then by the prevailing winds—westerly and north-westerly winds—which bring the cold breezes, not only from the land, but from Hudson's Bay, over which they have to travel, before they sweep over the Gulf, with their cold breaths. We must not forget first that the southernmost part of Hudson's Bay (James Bay) is only 430 miles, and the middle part of this great inland sea of about 31,000 square miles, and which is covered with ice during the whole year, or nearly so, is only 980 miles from Quebec. It is about the same distance from Anticosti. The wind, which during a gale, travels at the rate of 40 miles an hour, will bring us the icy air which has floated over Hudson Bay, in 12 hours from its nearest shore, and in 24 from its centre. And I have seen frequently, in the fall, northwest and north gales blowing for three or four days in those parts. Sometimes there were in the fall a prevalence of these winds for several weeks, and vessels, which have to sail during that season from Gaspé to Quebec, know this well.

It seems to me this is enough, in addition to the difference of latitude, to account for the cold and bleak climate of Anticosti and the north shore of the St. Lawrence. I offer those hastily written remarks as a feeble attempt to elucidate the subject in question.

One word more for those persons who might still believe that the blocking up of the Strait of Belle Isle would change the climate of this country.

PROJECTED BREAKWATER IN THE STRAIT OF BELLE ISLE.

The narrowest part of the Strait of Belle Isle is between Point Amour, in Forteau Bay, on the coast of Labrador, across to Newfoundland, at Savage Cove; it is only nine marine miles and a quarter wide (9 1/4 miles); Bayfield.

Reduced to statute miles, it makes ten miles and two-thirds (10 2/3 miles).

The depth of the strait, at the same place, varies between 20 and 37 fathoms near the Newfoundland shore, but near Labrador it is deeper. If we take the mean depth we have 35 fathoms, equal to 210 feet.

Now, as some writers on this subject have alluded to the Cherbourg breakwater in connection with the proposed mole or break water, perhaps it will not be unnecessary to make a comparison between the former and the projected one.

The Cherbourg breakwater is (2) two and a third statute miles in length at the base, but 520 feet less at the level of the water.

It measures 42 English feet and 9 inches between the bottom and the surface of the water at the low equinoctial spring tides, and 65 feet 8 inches at the highest tides.

It was begun in 1763, and only completed in 1853. It has cost 67 millions of francs, equal to twelve millions and three quarters of dollars.

The works of this celebrated breakwater, which I visited in 1868, consist, first, in what

we might call a sub-marine mountain of stones, as far as the low water mark, and the whole is covered by a masonry 32 feet in breadth and 27 feet high.

Every one knows that this breakwater is defended by three forts, armed with guns of the heaviest calibre, one in the middle, the others at each end.

I may add that the building of this breakwater was attended with the greatest difficulty and danger, the works having been destroyed several times by storms, and many workmen having been drowned during the progress of the work.

The projected breakwater at Belle Isle, of 10 2/3 miles in length, would have four times and a half (4 1/2) the length and three and one-fifth (3 1/5) the height of that of Cherbourg. The former would then be fourteen times larger than the latter, and would seemingly cost fourteen times more, that is, 940,000,000 francs, equal to 178 millions of dollars.

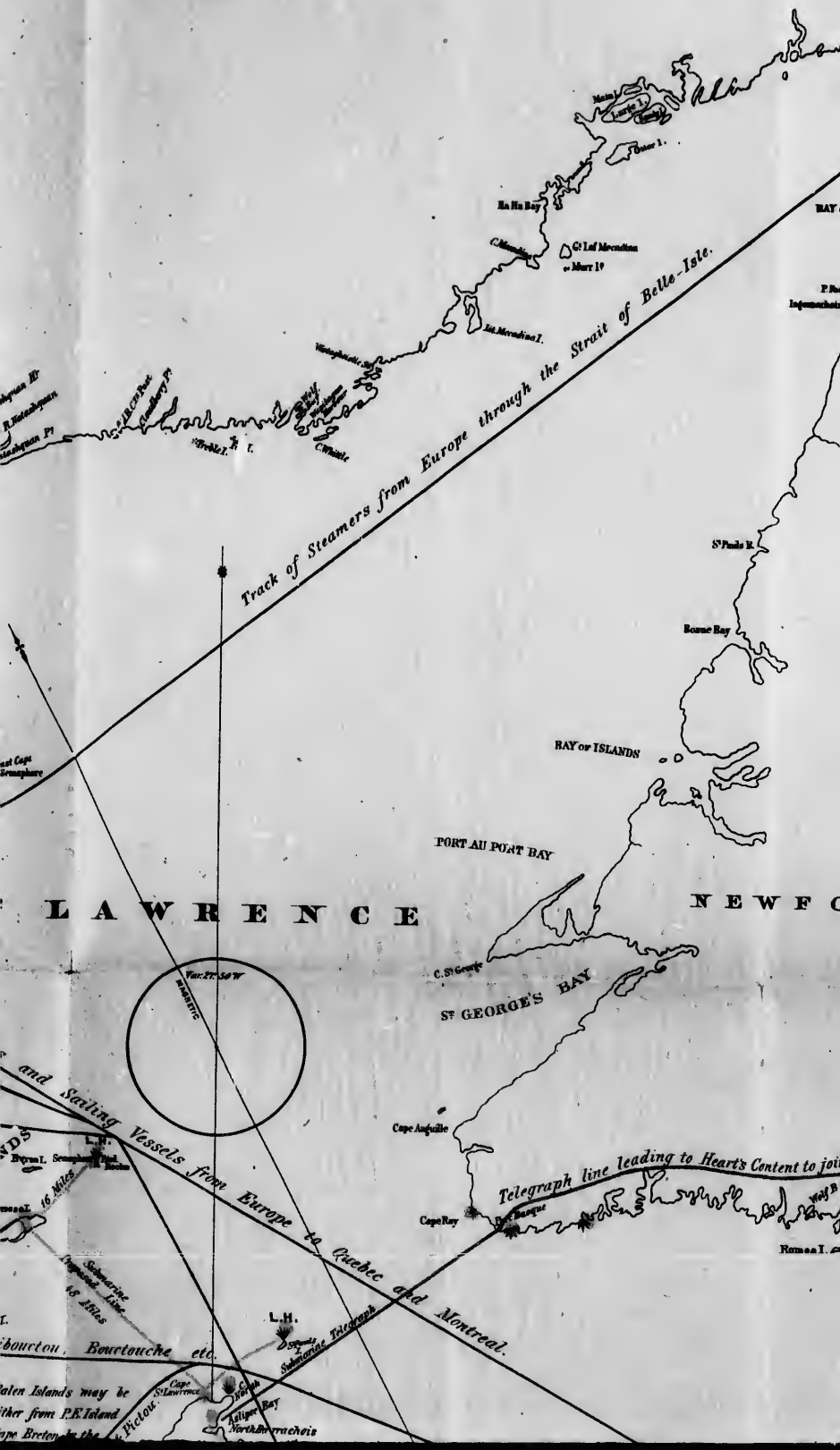
I said seemingly, because really the breakwater at Belle Isle would cost more than fourteen times that of Cherbourg, for the base of the work, in order to sustain the stones and prevent them from being loosened and carried away by the storms, would have to be immense, and besides, no work could be done on it during more than three months of the year, on account of the inclemency of the weather and frequent gales of wind in the spring and fall; and all the materials except stones would have to be carried there, as well as engineers and workmen.

Now, I would like to know where we would be able to procure one thousand millions of francs to build that breakwater.

P. FORTIN.

[Faint, illegible text, likely bleed-through from the reverse side of the page.]

[Faint, illegible text, likely bleed-through from the reverse side of the page.]



LAWRENCE

NEW F O

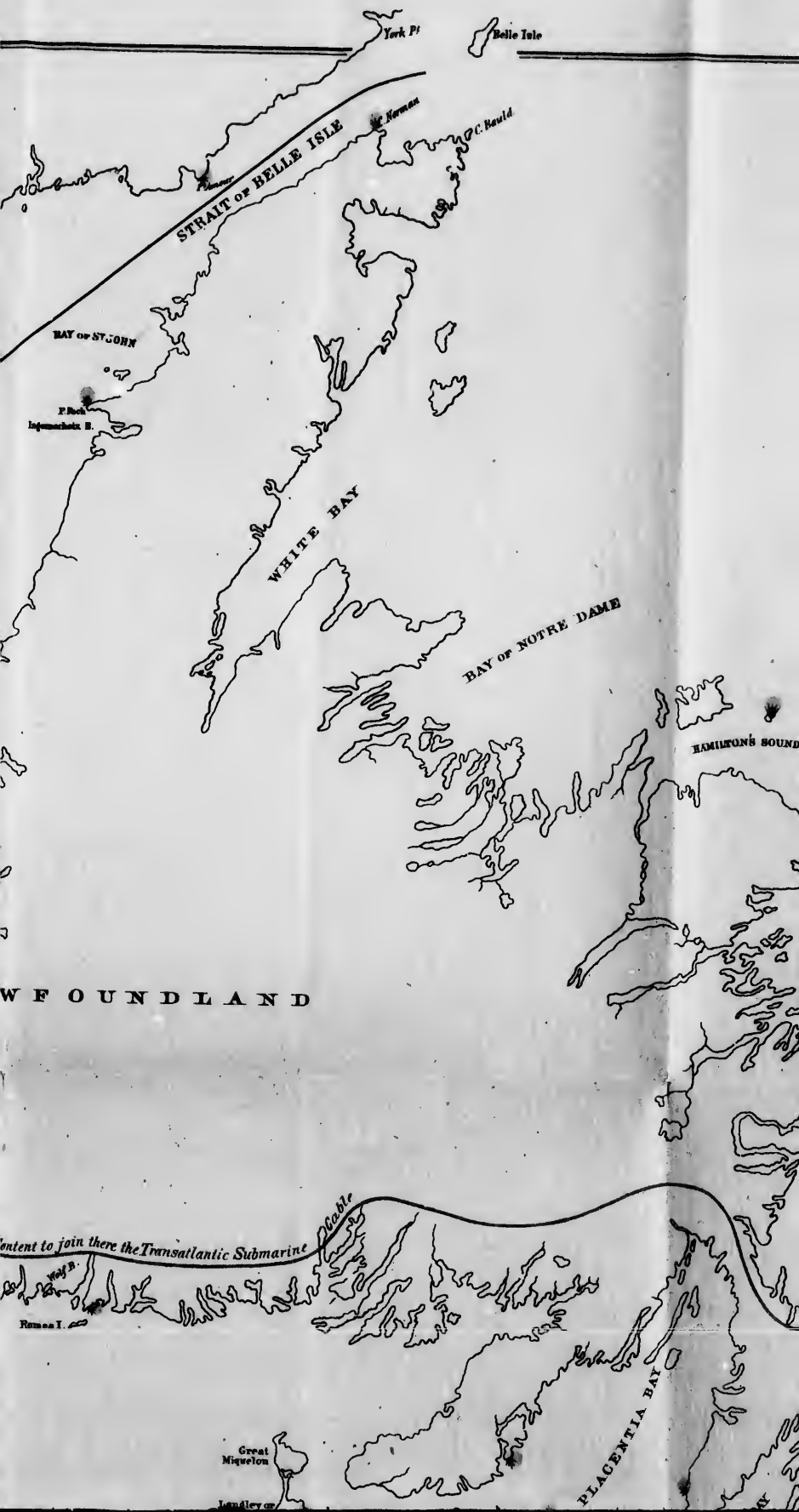
Track of Steamers from Europe through the Strait of Belle-Ile.

Var. 27° 50' W
18 miles

and Sailing Vessels from Europe to Quebec and Montreal.

Telegraph line leading to Heart's Content to join

Islands may be
from P.E. Island
Bretou in the



STRAIT OF BELLE ISLE

BAY OF ST. JOHN

WHITE BAY

BAY OF NOTRE DAME

HAMILTON'S SOUND

W FOUNDLAND

PLACENTIA BAY

Intent to join there the Transatlantic Submarine Cable

Great Niquelon

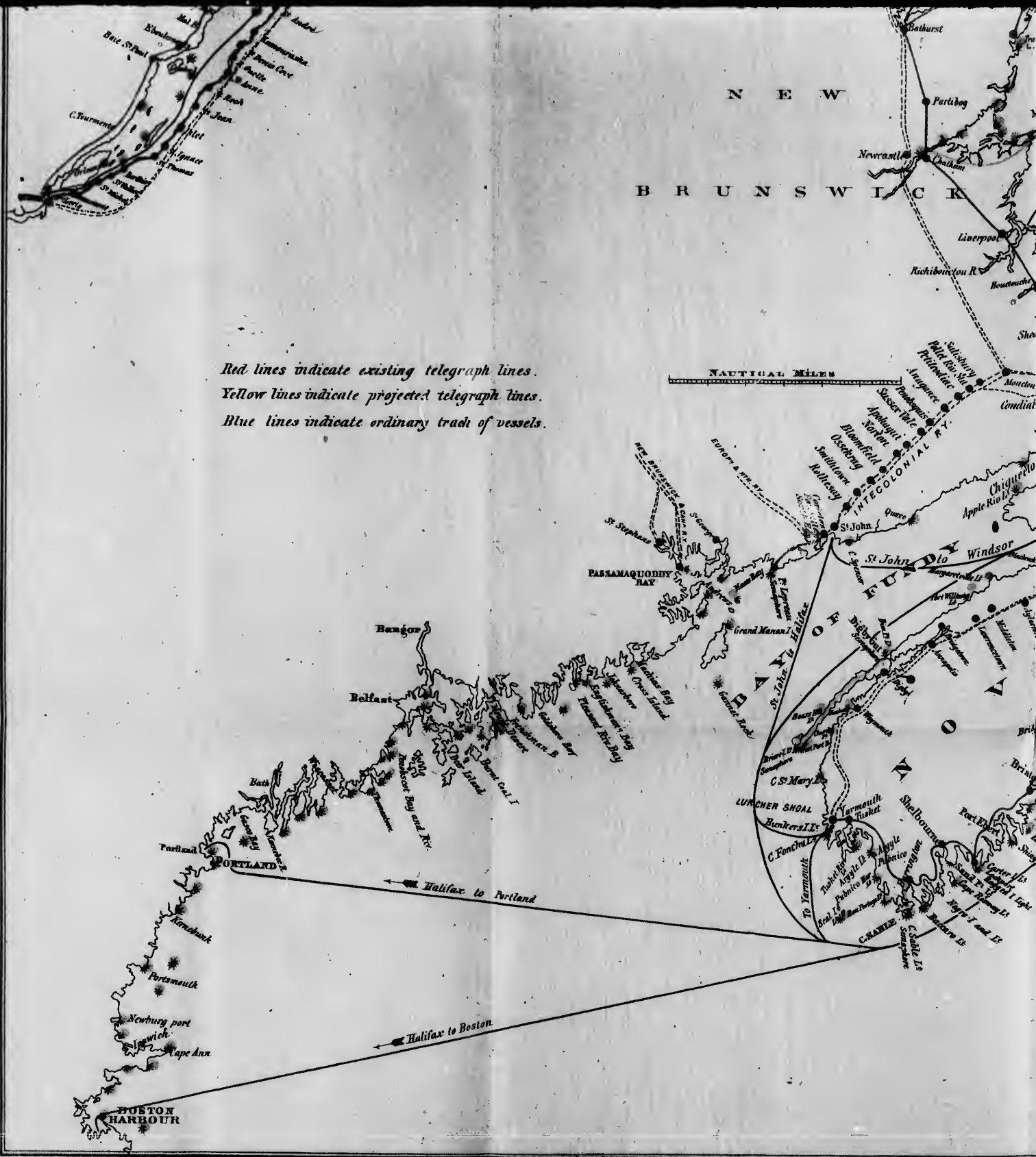
RE DAME



N E W
B R U N S W I C K

Red lines indicate existing telegraph lines.
Yellow lines indicate projected telegraph lines.
Blue lines indicate ordinary track of vessels.

NAUTICAL MILES



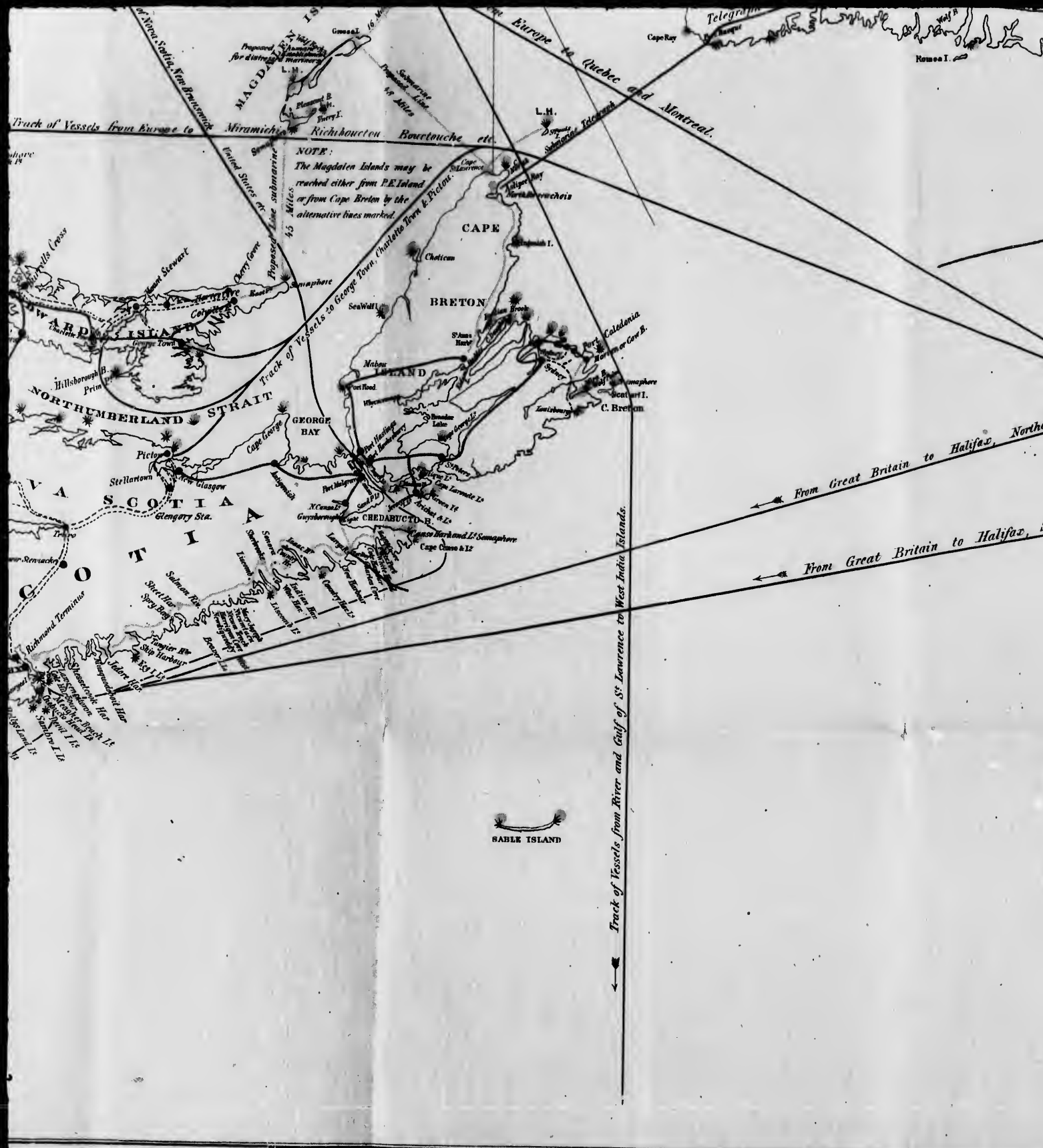


Track of Vessels from Europe to

NOTE:
The Magdalen Islands may be reached either from P.E. Island or from Cape Breton by the alternative lines marked.

Track of Vessels from River and Gulf of St. Lawrence to West India Islands.

SABLE ISLAND



NOTE:
 The Magdalen Islands may be reached either from P.E. Island or from Cape Breton by the alternative lines marked.

SABLE ISLAND

Track of Vessels from Europe to Quebec and Montreal.

Europe to Quebec and Montreal.

Track of Vessels to George Town, Charlotte Town & Pictou.

From Great Britain to Halifax, Northern

From Great Britain to Halifax, Southern

Track of Vessels from River and Gulf of St. Lawrence to West India Islands.

Telegraph

Romeo I.

GEORGE BAY

CAPE BRETON

SCOTIA

NOVA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA

SCOTIA



Great Britain to Halifax, Northern Route

Great Britain to Halifax, Southern Route

