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THE UPPER ST. LAWRENCE RIVER; ITS INTERNATIONAL
HISTORY, DEVELOPMENT OF NAVIGATION, AND
FUTURE POSSIBILITIES.

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(To be read on 19th March, 1911.)

The River St. Lawrence, or as it is called in the old treaties, the Iroquois or Cataraqui River, is a boundary river between the United States and Canada.

Under the treaty of peace signed at Paris in 1763, the boundary line is defined to a certain point on the 45° of north latitude in the middle of the River Iroquois or Cataraqui, and thence along the middle of the said river into Lake Ontario.

The next treaty taking cognizance of the River St. Lawrence as a boundary, was the Treaty of Ghent, 1814, where the boundary, as described in the previous treaty was confirmed, but there arose a question at this time regarding the location of the 45° of north latitude. This doubt, however, does not appear to have affected the point previously determined on, where it intersects the river, and the Treaty of Ghent having determined this point, it described the boundary up the river to Lake Ontario, as described in the Treaty of Paris, to be along the middle of the said Iroquois or Cataraqui River into Lake Ontario.

Certain doubts arose as to what was the middle of the river, and in order that these doubts might be finally decided it was provided that the matter should be referred to commissioners. This course was followed, and on the 18th June, 1822, the Commissioners gave their award, describing the boundary in the River St. Lawrence as being "From the point where the 45° of north latitude strikes the River Iroquois, beginning at a stone monument erected by Andrew Ellicott in the year 1817 on the south shore of the river, which

indicates the point where the 45° of north latitude strikes the river; thence running into the river, on a line at right angles to the southern shore, to a point 100 yards south of the opposite island, called Cornwall Island; thence turning westerly, and passing around the southern and western sides of said island, keeping 100 yards distance therefrom, and following the curvatures of its shores to a point opposite to the northwestern corner of said island; thence to and along the middle of the main river until it approaches the eastern extremity of Barnhart's Island; thence northerly along the channel which divides the last mentioned island from the Canada shore, keeping 100 yards distant from the island, until it approaches Sheik's Island; thence along the middle of the strait which divides Barnhart's Island and Sheik's Island, to the channel called the Long Sault, which separates the last two mentioned islands from the Lower Long Sault Island; thence westerly, crossing the centre of the last mentioned channel, until it approaches within 100 yards of the north shore of the Lower Sault Island; thence up the north branch of the river, keeping to the north of and near the Lower Long Sault Island, and also north of and near the Upper Sault Island and south of the two small islands, to the western extremity of the Upper Sault, etc." The boundary line is thus described in detail as far as Lake Ontario.

In the treaties, the St. Lawrence was stated to be free and open to navigation.

Generally speaking the boundary so described keeps to the middle of the river, dividing it fairly equally, but at Barnhart's Island the boundary is nearer the Canadian shore than that of the United States, so that over 90% of the water is in the United States and about 10% in Canada in this vicinity.

This was so noticeable that occasion was taken in drafting the treaty of 1842, the Ashburton Treaty, to insert the following clause (Article VIII.), "It is agreed that the channels of the River St. Lawrence on both sides of the Long Sault Islands and of Barnhart's Island shall be equally free and open to ships, vessels, and boats of both parties."

This was intended to emphasize the equal rights and ownership of the river by both countries, that all treaties endeavour to express.

By Article IV. of the reciprocity treaty of 1854, the right to navigate both the St. Lawrence above the point where it ceases to be the boundary, and the canals in Canada used as part of the water communication between the Great Lakes and the Atlantic Ocean was temporarily secured to the citizens and inhabitants of the United States. By Article XXVI of the Treaty of Washington, of May 8th, 1871, the same right as to the St. Lawrence is secured in perpetuity. By Article XXVII the British Government engaged to

urge upon the Government of the Dominion of Canada to secure to the citizens of the United States the use of the St. Lawrence, Welland, and other canals in the Dominion on terms of equality with its inhabitants; and the United States engaged to permit British subjects to use the St. Clair Flats Canals on terms of equality with the inhabitants of the United States, and also to urge upon the State Governments to secure to British subjects in the same manner the use of the several canals connected with the navigation of the lakes or rivers traversed by or contiguous to the boundary.

In the Treaty of 1871, and in Article XXVI navigation is especially referred to in this way: "Navigation of the River St. Lawrence, ascending and descending, from the 45 parallel of north latitude, where it ceases to form the boundary between the two countries from, to and into the sea, shall forever remain free and open for the purposes of commerce to the citizens of the United States, subject to any laws and regulations of Great Britain or the Dominion of Canada, not inconsistent with such privilege of free navigation."

The River and Harbour Act, passed by the United States Congress and approved June 13th, 1902, contained the following provision, viz.:

"The President of the United States is hereby requested to invite the Government of Great Britain to join in the formation of an International Commission, to be composed of three members from the United States, and three who shall represent the interests of the Dominion of Canada, whose duty it shall be to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all of the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic Ocean, also upon the maintenance and regulation of suitable levels, and also upon the effect upon the shores of these waters and the structures thereon, and upon the interests of navigation by reason of the diversion of these waters or changes in their natural flow; and, further, to report upon the necessary measures to regulate such diversion, and to make such recommendations for improvements and regulations as shall best subserve the interest of navigation in said waters. The said commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and if such structure is deemed advisable, shall make recommendations to their respective governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost thereof. The President, in selecting the three members of said Commission who shall represent the United States, is authorized to appoint one officer of the Corps of Engineers of the United States Army, one civil engineer well versed in the hydraulics

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of the Great Lakes, and one lawyer of experience in questions of international and riparian law, and said Commission shall be authorized to employ such persons as it may deem needful in the performance of the duties hereby imposed."

The invitation authorized by this section was duly communicated to the Government of Great Britain by Hon. Jos. H. Choate, then American Ambassador in London, July 15th, 1902.

On December 2nd, 1902, the invitation was transmitted by the Colonial Office in London to Lord Minto by a despatch, dated December 2nd, 1902, and by a subsequent letter, dated December 3rd, 1902.

The Canadian Government accepted the invitation of the United States Government under the recommendation of the Honourable the Minister of the Interior.

On June 6th, 1903, the Canadian Government was informed by the Secretary of State for the Colonies that His Majesty's Government had accepted the suggestion of the Canadian Ministers in regard to the appointment of the Canadian Commissioners.

The Commission was then formed.

The Canadian section held its first meetings in Ottawa, on March 6th and 7th, 1905. The scope of the investigations to be undertaken was defined in a letter addressed to each Commissioner by the Honourable the Secretary of State for Canada, dated January 16th, 1905.

The American section held its first meetings in Washington, D.C., on May 10th, 1905, and organized by the election of General Ernst as chairman. The scope of the investigations to be undertaken was defined in a letter from the Department of State, dated April 15th, 1905, from which the following is an extract:

"The wording of the law will be seen by reference to the enclosed copy. The Department's opinion is that the words 'including all of the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic Ocean,' are intended as a limitation on what precedes them, and that the investigation and report should cover only such waters, omitting the lower St. Lawrence itself."

The International Waterways Commission has carried on its work in an able and impartial manner, and has set at rest many important questions that had arisen in reference to boundary waters, and dealt with the St. Lawrence River at several points, including parts of the river below the 45th parallel where the river is wholly Canadian territory, thus treating the whole river above Montreal at least, as an international waterway.

In thus dealing with the river in Canadian territory—the true and intended effect has been given to the spirit of the various

treaties which recognize the St. Lawrence as an international waterway from the Great Lakes to the sea.

In the working out of many of the questions that came before the Commission it soon became evident that boundary waters should be more explicitly defined, and it was thought best to place this definition, and other matters relating to boundary waters, in the form of a treaty between Great Britain and the United States.

Accordingly, such a treaty was negotiated and the result was the signing of the Waterways Treaty, on January 11th, 1909.

This treaty was made with the desire to prevent disputes regarding the use of boundary waters, and to settle all questions now pending between the two countries involving the rights, obligations, or interests of either in relation to the other, or to the inhabitants of the other, along their common frontier.

This treaty in no way cancels or limits the application of the principles in the previous treaties, but was intended to more specifically define boundary waters. It agrees that the navigation of all navigable boundary water shall forever continue free and open for the purpose of commerce to both countries equally, subject, however, to any laws and regulations of either country within its own territory not inconsistent with such privilege of free navigation, and applying equally and without discrimination to both countries. These rights also extend to Lake Michigan and to all canals connecting boundary waters and now existing, or which may hereafter be constructed, on either side of the line. Articles 3 and 4 read as follows:

"It is agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdiction and with the approval, as hereinafter provided, of a joint commission, to be known as the International Waterways Commission.

"The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of the Dominion of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbours, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line, and do not materially affect the level or flow

of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes.

"The high contracting parties agree that, except in cases provided for by special agreement between them, they will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works, or any dam or other obstructions in waters flowing from boundary waters, or in waters at a lower level than the boundary in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary, unless the construction or maintenance thereof is approved by the aforesaid International Waterways Commission.

"It is further agreed that the waters herein defined as boundary waters, and waters flowing across the boundary, shall not be polluted on either side to the injury of health or property on the other."

This treaty established a Joint Commission which takes the place of the Commission formerly established, and this Commission has jurisdiction over matters under Articles 3 and 4 of the treaty governed by the following principles:

Each country shall have on its own side of the boundary equal and similar rights in the use of the waters hereinbefore defined as boundary water; and the following order of precedence shall be observed in the uses to which the water shall be put:

- 1st. Uses for domestic and sanitary purposes.
- 2nd. Uses for navigation, including the service of canals for the purposes of navigation.
- 3rd. Uses for power and for irrigation purposes.

The Joint Commission is a body to which all matters involving the rights, obligations, or interests of either country in relation to the other regarding boundary waters may be referred, the reference being made by the Senate of the United States, and the Governor-in-Council in Canada.

The powers of the commission are broad, and the spirit of the whole agreement is broad and common sense, and as it will, no doubt, be administered by capable men on both sides, there is very little chance of any serious disagreement arising as to the use of boundary waters.

This is a short history of the international phase of the Upper St. Lawrence.

We now come to its history as regards navigation.

First let us consider some of the physical features of the St. Lawrence River.

Among the great rivers of the world the position of the St. Lawrence is unique, the regulation of its flow is entirely natural,

it is the best regulated river that we know of, and this is due to the Great Lakes acting as enormous compensating reservoirs.

The drainage area of the Great Lakes is about 287,688 square miles, of which about 95,000 square miles is lake surface. The minimum flow of the river, above the Ottawa River, is 180,000 cubic feet of water per second, and the maximum flow has reached 330,000 cubic feet per second, the general average flow being about 255,000 cubic feet of water per second, or over 7,500 tons of water per second.

The regulation of the river is indicated by the ratio of minimum to maximum flow, which is 1 to 1.9, which shows remarkable regularity of flow, as compared with the Ottawa River, for instance, where the ratio is 1 to 15, varying as it does from 20,000 to 300,000 cubic feet per second.

No work of man has approached or ever will approach the perfection of the regulation of the St. Lawrence River.

The history of navigation on the St. Lawrence dates back to a very early period.

The first lock canals in Canada were built on the St. Lawrence around the upper and lower of the three rapids between Lake St. Francis and Lake St. Louis. They were built by the Royal Engineers, and finished in 1783. The locks were 40' long, 6' wide, with 30" of water on the sill.

In 1815, money was voted by Lower Canada for the construction of the Lachine Canal, and the work was completed in 1825. This canal was 48' wide at the water surface and 4½' deep. There were seven locks, each 100' long and 20' wide, built of masonry.

In 1818, a joint commission from Upper and Lower Canada reported in favor of a canal system for the St. Lawrence, with 4' depth of water, that being the depth of the Erie Canal.

The year after the Lachine Canal was completed, the Royal Engineers recommended longer and wider locks for the St. Lawrence, with 8' of water, and in 1832 a decision was come to that the depth of water should be 9'.

The Cornwall Canal was commenced in 1834, but the rebellion interfered with its completion, and it was not completed until 1843. Its locks were 200' long, 55' wide, and it had 9' of water on the sill.

The Beauharnois Canal was enlarged about the same time to similar dimensions, and was opened in 1848.

The canals at Farran's Point and Rapid Plat, and the Galops, now known at the Williamsburg Canals, were completed in 1847, upon the same scale as the Beauharnois Canal.

In 1871 a commission appointed by the Federal Government advised a uniform scale of navigation for the St. Lawrence Canals, with locks 270' by 45', and 12' of water on the sill. However, in 1875, the Dominion Parliament ordered that the enlarged canals

should be deepened so as to pass vessels drawing 14' of water, and this was done without regard to the other dimensions of the locks.

The canals were gradually enlarged to these dimensions, and vessels 260' long, 45' beam, can pass between Montreal and Lake Superior, loaded down to 14'. The locks were found to be too short before completion.

The extent of canal and river navigation from Montreal to Lake Ontario is shown in the following table:

	Miles.	Locks.	Rise.	Miles.
Lachine Canal.....	8.50	5	45	
Lake St. Louis.....				15.25
Soulanges Canal.....	14.00	4	84	
Lake St. Francis.....				31.00
Cornwall Canal.....	11.50	6	48	
River.....				4.70
Farran's Point Canal.....	.75	1	3½	
River.....				10.25
Morrisburg Canal.....	3.70	2	11½	
River.....				4.10
Galops Canal.....	7.60	3	15½	
River to Prescott.....				7.75
Totals.....	46.05	21	207½	73.05

From Montreal to Prescott is 119.10 miles—40% of which is through canals, but as the level of Lake Ontario is reached above Galops Rapids—111.35 miles from Montreal a little more than 40% of the distance to Lake Ontario level is through canals.

This distance of 119 miles is covered by the Richelieu and Ontario boats in 8 hours coming down, and in 19 hours going west.

The capital expenditure up to the end of the last fiscal year on the St. Lawrence canals was \$33,277,305, and in addition to this, large sums have been expended in renewals which were chargeable to income.

Further expenditures have been made in repairs and in operating, bringing the total amount expended in connection with St. Lawrence canals up to the end of the last fiscal year to \$52,676,298.

For the fiscal year ending March 31st, 1910, there was charged to the St. Lawrence canals:

Capital.....	\$370,871.00
Chargeable to income.....	145,682.00
Chargeable to revenue for staff.....	207,754.00
Repairs.....	202,511.00

Making the total cost for that year..... \$926,908.00

The principal facts in the statistics of traffic summarized, are as follows, for 1909.

The total traffic through the St. Lawrence Canals for the season of 1909 amounted to 2,410,629 tons, an increase of 400,000 tons compared with the previous year; 8,025 vessels passed through in 1908, and 9,271 in 1909 season.

The following features of the principal canal traffic during the season of 1909 will be of interest:

On the Welland Canal, 2,025,951 tons of freight were moved, an increase of 322,498 tons. Of the total, 921,866 tons were agricultural products and 186,614 tons produce of the forest; of coal, 377,681 tons were carried; 1,976,040 tons were through freight, of which 1,325,023 tons passed eastward.

Of the through freight, Canadian vessels carried 1,247,694, an increase of 326,373 tons, and United States vessels 728,346 tons, a decrease of 45,762.

The total through freight passed eastward and westward through this canal to United States ports was 445,419 tons, a decrease of 3,235 tons compared with the year 1908.

The quantity of grain passed down the Welland and St. Lawrence canals to Montreal, was 652,742 tons, a decrease of 103,399 tons as compared with the previous year; no transshipments have been made at Ogdensburg since 1903.

On the St. Lawrence canals, 2,410,629 tons of freight were moved, an increase of 123,652 tons, of which 1,564,584 tons were eastbound freight, and 846,045 tons westbound freight; 773,730 tons were agricultural products, 639,767 tons coal, and 509,157 tons forest products.

No tolls are charged on the St. Lawrence canals or on any other of the Canadian canals.

From the earliest times in the history of Canada the improvement of navigation of the St. Lawrence has received attention in an endeavor to meet the growing trade requirements; the work of improvement has been carried out by Canada, and for the reason that this route was of more importance to Canada than it was to the United States; this feature still exists, and the importance of this water highway must grow with the general development of Canada.

Various large schemes of inland transportation by water are now being considered, as for instance the Georgian Bay Canal, and the enlargement of the Welland Canal. In the case of the former, the terminus will be the Port of Montreal, and with the enlargement of the Welland Canal, the larger lake vessels will be able to reach Prescott where the cargoes will be transhipped, and move eastward by rail, or by smaller vessels through the canals to Montreal.

Trade must follow the line of least resistance, and it is a question

which has not yet been answered in a satisfactory way, will not the enlargement of the canal system on the St. Lawrence to the Port of Montreal, or a scheme of dams and locks with an improved river channel, be justifiable in the economic working out of our transportation problems, so that upper lake vessels may bring their cargoes to Montreal.

The route via the proposed Georgian Bay Canal will be 282 miles shorter than the existing water route, but the element of time must be considered, and the following is an extract from the report on the Georgian Bay Canal scheme, as submitted to the Government:

"Time of transit is affected by the length of restricted channels on the route, where speed has to be reduced, and by the number of lockages, and consequent delays. A close computation of the speed allowable in the different stretches, with about three-quarters of an hour delay for passage at each lock, gives about 70 hours, as time of transit from Georgian Bay to Montreal.

"With the advantage of shorter distance between terminal harbours, it is computed that the route will be from 1 to 1½ days faster than any other existing water route, under present conditions, from the head of the Great Lakes to an open ocean port, apart from also having an enormous superiority as to carrying capacity. But as compared with a possible improved system of St. Lawrence canals to a depth of 22 feet, assuming that the number of locks would be greatly reduced, and some of the channels widened, probably no practical benefit in time of transit could be claimed, the saving in distance being nearly offset by the longer stretches of lake and wide river navigation which exist through the Lake Erie and Lake Ontario route, where higher speeds would be permissible."

So that in so far as time is concerned, an improved St. Lawrence route would be equal and, perhaps, superior to the Georgian Bay or Ottawa River route. For many years the improvement of the St. Lawrence canal system has been discussed, but not in such a way as to produce definite conclusions. No comprehensive surveys and estimates have been made so as to determine the practicability of increasing the capacity of this route to Montreal on such a scale as contemplated for the Georgian Bay Canal, with locks 650' long, 75' wide, and a minimum of 22' of water on the sill, or of greater dimensions.

The dimensions of the canal and locks is a question demanding careful enquiry and foresight. There are boats on the lakes now 605 feet long, and the proposed new United States lock at Sault Ste. Marie will have 24' 6" of water on the sill.

I think the time has come when such a study of the St. Lawrence should be made, and this, before we should commit ourselves to heavy expenditures on competitive routes.

The idea of canalizing the river by maintaining the navigation

channel in the river and erecting dams below the various rapids, locking at each dam, has been the dream of engineers for many years, and this has of late been prominently brought forward by the proposal of a power company to treat the Long Sault Rapids in this way.

By treating the river in this way speed will be greatly increased, the number of locks might be reduced from 21 to 6, and the long stretches of river will be made use of to great advantage.

Primarily any such work, as erecting dams across the river, must be for the improvement of navigation, and Canada is more interested in the improvement of navigation of the St. Lawrence than is the United States, and Canadian interests in this matter focus in Montreal.

The development of power can only be held to be incidental, the real motive must be the improvement of navigation.

Mr. John Kennedy, our best authority on such matters, and whose judgment I would not question, has concluded that works such as are proposed at the Long Sault can be wisely and safely built and maintained, and I think that the same may be said of similar works if constructed at the other rapids.

In the report of the United States Deep Waterways Commission of 1900, it is shown that a deep channel may be obtained from Lake Ontario as far as the head of the Long Sault Rapids, which was as far as that investigation dealt with the St. Lawrence River.

I am not now stating that this is the best way of improving navigation so as to create the greatest benefit. The question is a very great one, and of vast importance, and we have not the evidence before us to form a correct opinion. The question is a national one, and I think that it should be carefully studied, so that the future policy of inland navigation may be carried out on more definite lines than the present knowledge warrants.

If Canada is to incur a very large expenditure on the improvement of inland transportation by water it would be business-like to make the expenditure in the direction from which the greatest benefit would result—so as to obtain the greatest efficiency, and first of all to ascertain all facts which would lead to a correct decision.

The work of improving canal transportation must be a national work, and all canals must be owned and operated by the Federal Government; no private ownership or exploitation of national waterways would be practicable in this country, and may be looked upon as impossible.

The development of power, though an important thing in itself, must under the terms of the treaty of 1909, in the case of the St. Lawrence River, be considered as secondary to the improvement of navigation. No development of power is desired unless by so doing we improve the conditions of navigation, and obtain from such

development commercial equivalent for the power produced.

The question before us now is not the maintenance of present conditions of navigation, but how can these conditions be improved, and they must be improved if we are to secure to the Port of Montreal what nature has given us.

The minimum amount of power that may be developed on the St. Lawrence River between Lake Ontario and Montreal, is the vast amount of 3,500,000 horse power. The absorption of this amount of power will be very gradual. It is not now commercially possible to utilize this amount of power, but we do not know what the future demands will be.

Is it not common-sense to think about this, and to provide for the future as broadly as we can? What I would urge is that a careful study of this whole subject be made now, so that a definite policy may be adopted in order to get the greatest efficiency out of what nature has given us. This study devolves primarily upon the Government of Canada, and I would urge that such a study of the river's possibilities should be made, and a comprehensive report be submitted before any commitments be made by Canada for the damming of the St. Lawrence River at any points on it, or the carrying out of any other great scheme of canal transportation.

Let us first decide by logical deduction from definite data what scheme is better than the other, and then carry out that scheme in the most efficient way possible.