



**Lake Ontario and St. Lawrence River -
Changes in the Institutional Structure and
Their Impact on Water Levels, 1950-2001**

**Report to International Lake Ontario-St. Lawrence River
Study Board**

University of Ottawa, Institute of the Environment

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Cover Photo

NASA Photo ID: STS039-83-059 File Name: 10064194.jpg

Film Type: 70mm Date Taken: 05/06/91

Title: St. Lawrence Seaway, Quebec, Canada

This high oblique view of the St. Lawrence Seaway, Quebec, Canada (47.5N, 69.5W) was taken over southeastern Quebec, looking southwest down the estuary of the St. Lawrence River towards the city of Quebec. The light snow cover enhances the area of forests (dark) and nonforests (light). Most of the large irregular open areas on the Canadian side of the river were previously forested and were burned over during forest fires in 1989.

GLOSSARY

Commission	International Joint Commission
Governments	Governments of the United States and Canada
IJC	International Joint Commission
ISLRBC	International St. Lawrence River Board of Control
LOSLR	Lake Ontario - St. Lawrence River
NYPA	New York Power Authority
OAG	Operations Advisory Group
Study Board	International Lake Ontario - St. Lawrence River Study Board

1 SUMMARY

The document reports on changes in the institutional structure for the control of water levels in Lake Ontario and the St. Lawrence River over the past 50 years. Plans for constructing the St. Lawrence Seaway and International Rapids power generation project were announced in 1951. Since then, a four-tier integrated institutional structure for controlling levels and flows has evolved: The tiers are: the Governments of Canada and the United States; the International Joint Commission (IJC or the Commission); the International St. Lawrence River Board of Control (ISLRBC or 'the Board'); and, the Operations Advisory Group (OAG).

The investigation was conceived in 2001 by the International Lake Ontario-St. Lawrence River Study Board (Study Board), a board created by the Commission in 2000. This Summary is supplemented by copies of transparencies used at a presentation of the report to the Study Board on January 22nd, 2002, as provided in Appendix 1.

The focus of the investigation is an assessment of the institutional structures and arrangements with a view to changes in the levels decision-making process. In order to arrive at recommendations, the investigation studied:

- a. Significant responses of decision-makers to Lake levels;
- b. The decision-making process;
- c. The decision support infrastructure, and, pertaining to this, it looked at:
 1. climate and hydrology inputs;
 2. knowledge of ecosystem sustainability and levels control;
 3. accessibility of stakeholders , and, where pertinent;
 4. Current initiatives which could, or should, influence the levels decision-making process.

Overview of observations and recommended options for changes to the institutional structures

An assessment has been made of the institutional structures and arrangements integral to making decisions about Lake Ontario and St. Lawrence River levels and flows. The Boundary Waters Treaty lists sanitary and domestic, navigation and power as three uses recognized as important in 1909, leaving the accommodation of other uses somewhat vague. Since the time of the Treaty preparation, the entire ecosystem, human and natural has evolved. There has been:

- Exponential population growth in the Basin;
- Exponential increase in: understanding the value of the ecosystem; a recognition of the need to treat it holistically; how it works; and, concerns for what we do not know;
- Changing uses and intensities of use of the waters;
- Changing governance – participation, recognition of rights of minority groups.

The Study Board's initiatives are a much-needed institutional response.

The overall observation is that the institutional structure is effective, as have been the members and officials who have populated it over the years. The control system has been operated to satisfy many interests, within the envelope of hydrology knowledge available to decision makers. Since 1958, when the control structures were commissioned, the demands on the boundary waters and the scientific and cultural understanding of ecosystem have changed. In tandem, needs and the opportunities have also changed, providing in part the basis for the following observations and recommendations for changes to the structure and the decision-making process. Following each observation and recommendation is a summary of the comments made at a presentation to the Study Board with IJC staff in attendance on January 22nd, 2002.

The report's recommendations extracted from Chapter 7 are:

7.1 An option that the IJC should consider is the early definition, to the extent possible, of the decision-making process it intends to apply to the Study Board's outputs.

7.2 IJC should commission, at an early stage, an investigation of the flexibility inherent in the Treaty and the Orders of Approval to accommodate new plans of regulation and/or more discretionary authority to accommodate emerging and growing interests. It should be integral with developing the decision-making process referenced in 7.1 above.

7.3 The Commission should consider initiating investigations of the hydrology envelope in which the existing control structures are effective, if such information is not already available. It should take into account: Article VIII of the Boundary Waters Treaty, conditions and criteria in the Orders of Approval and the dependent Plan 1958-D; and, discretionary authority given to the ISLRBC.

7.4 Consideration should be given by the IJC to a study of the benefits and dis-benefits of consensus decision-making at all levels of the institutional structure, taking into account that not all stakeholders are equally represented in the decision making process.

Maintaining the current institutional management policy, an option would be to consider broader membership on decision-making bodies.

7.5 Consideration should be given by all levels of the institutional structure to timelier decision-making. In the event that protracted schedules are essential, the reasons and the schedule should be disseminated.

7.6 A review of the OAG responsibilities and membership base to match present and future needs is recommended.

7.7 Consideration should be given to reviewing Orders of Approval and dependent regulation plans with a view to including inputs from currently

lesser-represented stakeholder interests into the levels decision-making process, and, making that knowledge publicly available.

7.8 Consideration should be given to the preparation an authoritative, reader-friendly description of the cardinal features of the process.

7.9 National and bi-national organizations need to involve Aboriginal peoples in decision-making processes dealing with water levels. The IJC should consider adding to the levels decision-making process a mechanism that would involve Aboriginal peoples.

Consideration should be given to more research about the impacts of the damming of the River on the culture, economics and health of Akwesasne. This research should also document and utilize the specific knowledge of Aboriginal peoples about water levels.

7.10 Recognizing that the Study Board is undertaking some work in hydrology and hydrologic modeling, an option would be to open up discussions with technical and research institutions in the United States and Canada for the purpose of convincing them to give this field of science and engineering a high priority for funding.

2 INTRODUCTION

2.1 Overview

In 1895, Canada and the United States began discussions on a plan to improve the St. Lawrence River for shipping. The project included deepening the river and the canals so that any ship could travel between the Atlantic and the Great Lakes¹. The International Waterways Commission was established in December 1903 by the Governments to set out guiding principles and resolve disputes in boundary waters^{2,39}. This led directly to the Boundary Waters Treaty of 1909 between the U.S. and Great Britain, to settle all questions which were then pending regarding the boundary waters. The Treaty established precedence for the uses of the boundary waters and it was the genesis of what is today a tiered decision-making process for controlling water levels and flows in Lake Ontario and the St. Lawrence River. The International Joint Commission (IJC), a nationally neutral institution was created and assigned the jurisdiction to implement policies that would give effect to the provisions of the Treaty, and, with regard to levels, to assure the protection and indemnity of all interests on the other side of the line which may be injured thereby.

In 1951, plans to build the St. Lawrence Seaway and to construct a hydroelectric project were announced, incorporating works that would change levels and flows in Lake Ontario and the St. Lawrence River. Application for the project was made by Governments to the IJC in 1952, which approved the project in the same year and issued an Order of Approval that furnished the IJC's legal directives for execution of the project. This 1952 Order of Approval also established an executive arm of the IJC, the International St. Lawrence River Board of Control (ISLRBC), to ensure that conditions and criteria for construction and operation of the project works were met. During construction, in 1956, the IJC amended its Orders of Approval, with the concurrence of the Governments. The 1956 amendments added requirements to reduce the range of Lake Ontario water levels, and to provide dependable flow for hydropower, adequate navigation depths and protection for shoreline and other interests downstream in the Province of Quebec, when the control structures would be operational.

In 1958, with the completion of the power generation facilities in the International Rapids Section of the St. Lawrence River³⁹, the ability to significantly influence water levels and flows downstream of the Niagara River became a reality. It was understood that extremes of levels and flows could be beyond the control capabilities of the structures.

The impacts of regulating levels and flows with the consequent deviation from the naturally evolving ecosystem are many, they are significant, they are complex and they are not well understood. The impacts are felt on riparians, Aboriginal peoples³, shoreline property, ecosystem components and all users of the boundary waters. However, consistent with the wording of the Treaty, institutional decision-making to-date has given priority to only a limited number of uses, namely, sanitary and domestic uses, navigation and power generation, while considering other benefits such as flood control downstream as circumstances have permitted.

The situations that existed at the times of signing the Treaty and the issuance of the Commission's Order of Approval of 1952 as amended in 1956, have changed in many respects: evolving concepts of governance; changing priorities, interests and values in society; and, a rapidly increasing understanding of the science of the ecosystem. Population growth and associated urban expansion, demands for additional uses, frequently in direct conflict both with each other as well as with the historically established order of precedence, have occurred. Throughout the same period, a number of extreme climate events have resulted in significant disruptions of life and activity within the basin, bringing demands for additional controls to mitigate the severity of their consequences.

In consideration of such changes since the Orders of Approval were issued, and likely future trends, IJC has approved a Study Plan⁴ to provide it with the information it needs to evaluate options for regulating levels and flows in the Lake Ontario-St. Lawrence River system. The options will address benefits to affected interests and the system as a whole, in a manner that conforms to the requirements of the Treaty. As part of that Study Plan the following needs/interests/uses have been identified as sufficiently important to warrant significant study: environment/wetlands interests (ecosystem approach); coastal zone interests—riparian/shore property; recreational boating interests; municipal, domestic and industrial water interests; commercial navigation interests; and, hydroelectric power interests.

2.2 Purpose of this Investigation

The purpose of the investigation, of which the following report is the result, is to describe the operation of the existing institutions relative to the decision-making process and to suggest where improvements may be possible. In dealing solely with Lake Ontario and the St. Lawrence River, the investigation recognizes that levels and flows are very much influenced by the supplies upstream. For example, Lake Erie, which is not regulated, provides about 85% of Lake Ontario's supply.

The investigation also recognizes that the IJC is almost 100 years old and the ISLRBC is over 40 years old. Over this time, competent officials working within society's norms of the moment have striven to fulfill the intent of governments relative to boundary waters.

Terms of Reference for the investigation are attached as Appendix 2.

2.3 Report Outline

Following a *Summary* and an *Introduction*, a brief description is provided in Section 3 of the physical facilities that control levels and flows. In Section 4. *Chronology of Events*, hydrologic events are linked with levels and flows control responses of institutions. Section 5. *Institutions and the Decision Making Process* provides an overview of the institutional structure, the policy base of its principal components, a description of their operation and a selection of decisions they have made in the past 50 years. Section 6. *Stakeholder Access and Current Initiatives* deals with selected community sectors interested in levels and flows regulation within the Lake Ontario-St. Lawrence River Basin. It gives particular attention to Aboriginal peoples needs. Also in this section is a

description of the status of initiatives to improve inputs to the decision making process. Section 7 summarizes observations made during the investigation and recommends options that may lead to improved management of levels and flows. The final section, Section 8. *Bibliography*, identifies the reference material that has been used in arriving at the observations providing brief discourses where deemed to be helpful. Several appendices accompany the report. They provide convenient access to highly relevant documents, tabular material and supporting information.

3 LEVELS AND FLOWS CONTROL STRUCTURES

Since 1958, the water levels and flows in Lake Ontario and the St. Lawrence River have been regulated to a significant extent by the structures built during the development of the St. Lawrence power generation project. Regulation plans governing the operation of the works moderate the natural variation in magnitude and frequency of occurrence of levels and flows. These plans give effect to the directives embodied in the Orders of Approval when they are able. Extremes of levels and flows still occur according to the hydrology of the system and long term morphological change. In addition, weather phenomena such as wind set-up, ice, storm surge and seiche also create short-term effects in levels and flows beyond the control capability of the structures.

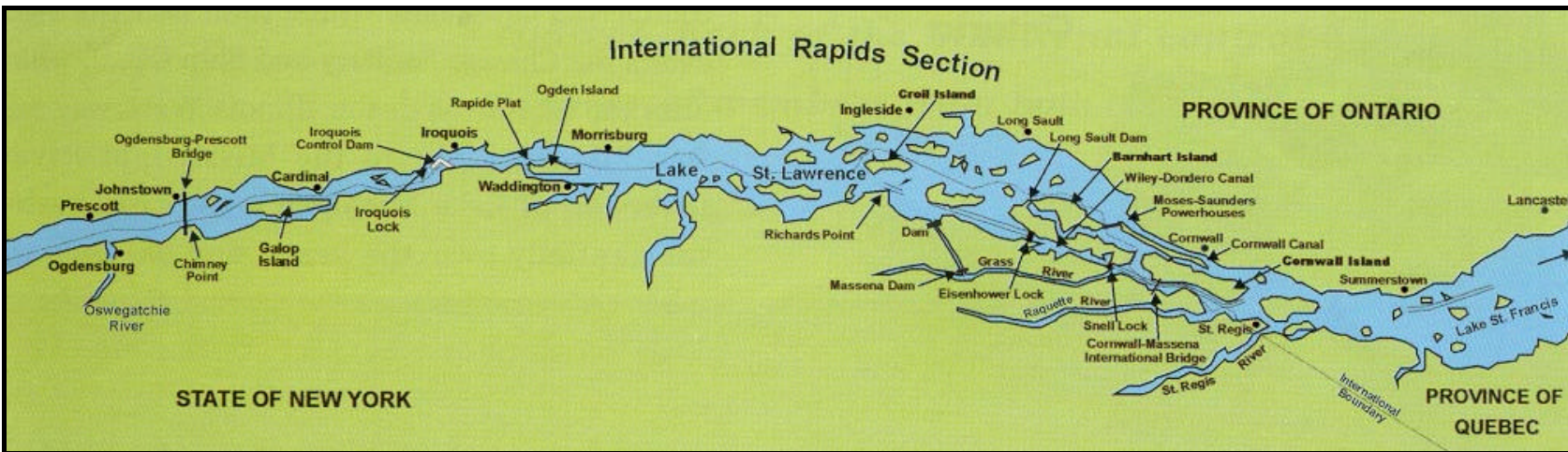
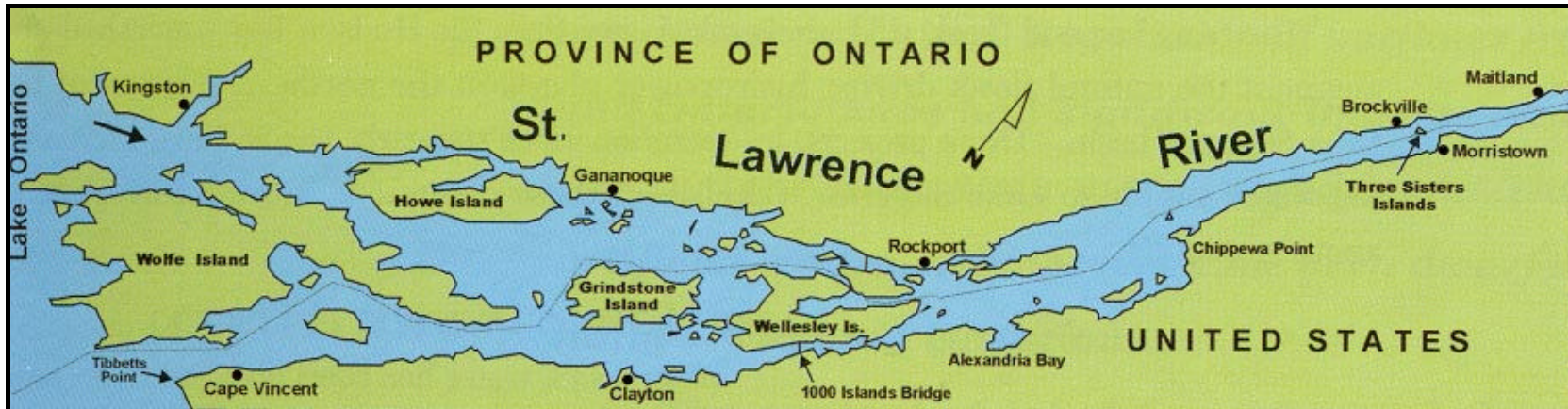
Outflow regulation is primarily accomplished by regulating the flow through the Moses-Saunders Powerhouse, located at Massena, New York and Cornwall, Ontario. The nearby Long Sault Dam has no generating capability. It acts as a spillway when outflows from Lake Ontario are greater than those which power dam structures can handle².

A third dam at Iroquois, Ontario, is part of the Seaway project although its operation is under the supervision of the Board. Located upstream of Cornwall it usually operates without flow control being applied. It can be operated to control levels in Lake St. Lawrence when the Moses-Saunders dam is being operated to assist flood control during the Ottawa River freshet. It is primarily intended to assist in the formation of a stable ice cover in the early winter as well as to ensure water levels do not rise too high in Lake St. Francis, downstream of the Moses-Saunders Power Dam.

Three navigation locks in the international section of the St. Lawrence River, two at Massena and one at Iroquois, Ontario, do not function to control levels and flows. They are not managed by IJC, but the Commission specifies the water supplies they are allowed to operate with.

Hydropower and navigation facilities in the Province of Quebec, downstream of the Massena and Cornwall control structures, are impacted by levels and flow regulation process.

The geography of the area is illustrated in Exhibit 1.



Scale: 1 inch = 6.5 miles (approximately)

Exhibit 1. St. Lawrence River (Courtesy USACE Detroit District)

4 CHRONOLOGY OF EVENTS

The water levels of the Great Lakes fluctuate both seasonally and annually⁵. Levels on most lakes tend to be lower in midwinter and higher in midsummer. These seasonal fluctuations are typically in the range of 30 to 50 centimetres, while fluctuations over several years have been 1.2 to 1.8 metres. There are also longer term fluctuations with sustained high then low levels over periods of several years. The prime driver behind lakes level fluctuation is precipitation, either directly into the lakes themselves or through runoff from the drainage basin. Lake levels can remain high for a few years, particularly in the lower Great Lakes, as the higher Great Lakes pass along their overburden. Other factors influencing lake levels are wind, evaporation, and control structures. Less influence is exerted by ice jams, dredging, and diversion. Crustal movement, or the rebounding of land depressed by the last ice age, causes very long-term water level changes. Lake Ontario is still undergoing isostatic rebound with the net "tipping" result producing higher levels on the south side of the Lake⁶.

Long-term flooding occurs when lakes reach record high levels and may persist for many months. Short-term flooding is caused by storms. Severe storms generate large waves and storm surges, which may overtop banks and cause temporary flooding. Storms and seiches may also tilt the lake surface, causing sudden changes in lake levels. Factors influencing the extent of short-term fluctuations include lake depth, orientation of shoreline with respect to prevailing winds, and the length of open water (fetch). Flooding in the St. Lawrence River, while certainly influenced by lake levels, is more often a result of significant events such as the spring freshet of the Ottawa River, major local storm events or ice jams.

The table presented in Appendix 3 of this report summarizes significant events associated with and/or related to water levels in the Great Lakes Basin with emphasis on the Lake Ontario-St. Lawrence River system⁷. It correlates these with the impacts of these responses and the institutional responses by regulatory authorities. It includes events deemed relevant to changes in institutional response in terms of assessing progress in this regard with respect to changing stakeholder values and influence. The information base available from 1993 to the present is far more comprehensive and detailed than that from previous years.

As can be seen from the table of chronology where selected events have been included for purposes of illustration, the Board has exercised considerable discretion within the constraints of the Regulation Plan in an attempt to accommodate expressed interests and concerns. The events and selected responses are depicted graphically in Exhibit 2. The Commission and the Board have also gone to considerable lengths to identify and classify concerns not specifically referenced in the Order of Precedence for use as defined in the Boundary Waters Treaty, Article VIII⁸. Significant funding has been provided in support of a five year program of detailed, focused study³⁰. This has been designed to assist with developing a plan of regulation that will both maximize the capacity of the Board to achieve an acceptable compromise for all interests, consistent

with the provisions of the Treaty as well as help forecast possible challenges to the regulatory process such as impacts of climate change.

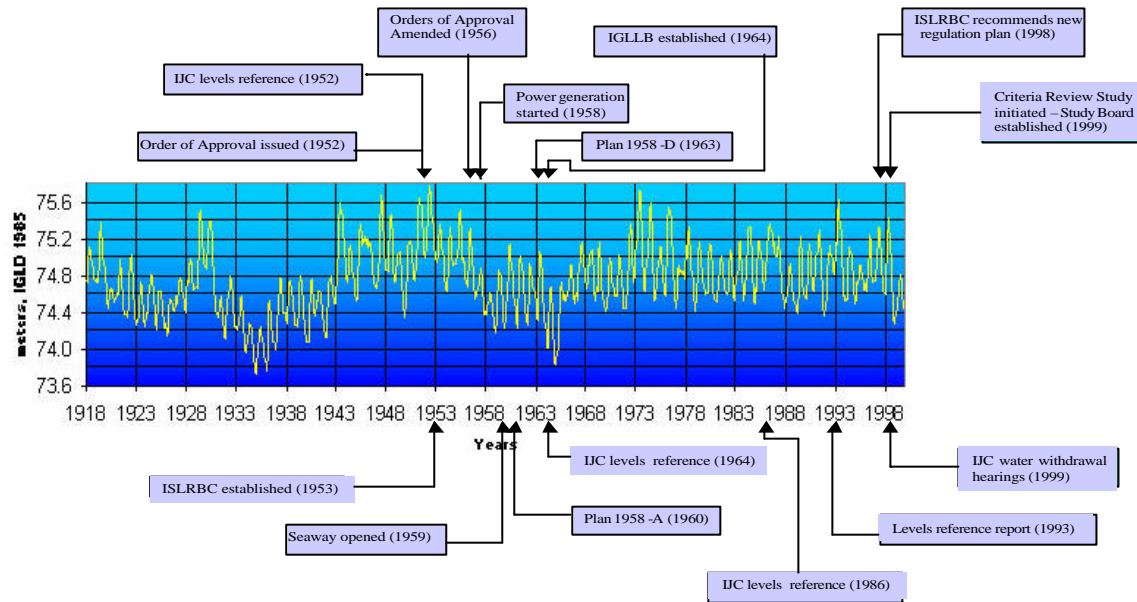
Bilateral discussions between Canada and the U.S. on a plan to improve shipping in the St. Lawrence River began towards the end of the 19th century resulted in the Boundary Waters Treaty of 1909 and the concomitant establishment of the IJC. The Commission worked for several decades to set out projects for navigation and power development and although agreements were tentatively reached, no real progress was realized until 1951. Prior to this attempts were made to regulate stage extremes using the instrument known as Method of Regulation 5, prepared by the Department of Transport, Canada based on a method first proposed by the Joint Board of Engineers in 1926. The latter culminated in the implementation of Plan 1958-D for the levels and flow regulation by the power generation control structures. This, along with some discretionary authority, remains the current basis for levels regulation today.

Record keeping tracking the levels in the Great Lakes began around 1900⁹. In 1929, levels peaked (record recorded highs) and then declined into the 1930's – the dry years. In 1952 they rebounded to the highs of 1929 resulting in severe flooding and erosion. A clear and unequivocal institutional response was the 1952 Reference by the Governments to the IJC with regard to regulating the levels of Lake Ontario. The ISLRBC was established in 1953 and levels regulation criteria were made an integral component of Orders of Approval for construction and operation of new control structures for development of power generation capacity. Plan of Regulation 12-A-9 was approved in 1955 and was subsequently updated with Plan 1958-A, recommended by the ISLRBC in 1958 and put into operation in 1960.

In the early 1960's, lake levels dropped to previous lows, despite ongoing operation of Plan 1958-A, resulting in unacceptably low water levels in Montreal Harbour with adverse impacts on commercial navigation. The institutional response took the form of Plan 1958-C which was put into operation in 1961 and then subsequently upgraded to Plan 1958-D in 1962, taking into account the operating experiences to date. In 1964, widespread public concern about the low levels, across all the Great Lakes, prompted the Governments to once again refer the issue to the IJC for study and recommendations.

In 1965, a massive ice jam resulted in severe flooding in Montreal¹⁰ causing considerable damage and blamed for loss of life (20 deaths attributed). Levels peaked again in 1972-73 with flooding and erosion causing damage estimated at twenty five million dollars. Similarly, in 1985-87, flooding and erosion damage estimated to top one hundred million dollars took place. These high levels combined with a period of intense rainfall brought on a flash flood in Montreal in 1987. In response to the extremes of the mid-1980's, again across all the Great Lakes, and attendant damage and economic losses, the Governments referred the issue to the Commission in 1986, requesting it study methods of alleviating the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River Basin.

Report: Lake Ontario and St. Lawrence River
 Changes in the Institutional Structure and Their Impact on Water Levels, 1950- 2001



(Courtesy of the U.S. Army Corps of Engineers' website
 (<http://huron.lre.usacemil/levelsfilevont.html>))

Exhibit 2. Correlation of Lake Levels with Institutional Responses

The reference resulted in a comprehensive suite of recommendations together with Guiding Principles delivered to the Commission in 1993³⁸. In addition to the research and technical elements of the outcome, there was clear guidance with respect to the need for public consultation and participation in the management process. This was a prominent element throughout the study.

Throughout the 1990's¹¹, the ISLRBC adopted an increasingly consultative approach to improve both its capacity for communicating its decisions and actions to the public, particularly the stakeholders and its responsiveness to their concerns (see Appendix 3). Part of their institutional response included increased discretionary interventions in the operation of controls, taking due account of the governing plan, criteria and order of precedence but reacting to mitigate identified stresses on stakeholders, where feasible. The Board also established a Working Committee charged with reviewing the existing Plan and preparing recommendations for improvements. The public outreach program instituted also served to provide advance information on levels, to recommend alternative strategies for mitigation, where feasible and to report on events, consequences and responses in a timely and useful (to stakeholders) manner.

Finally, in response to the changing demographic and economic climate in the Basin and growing government concern that existing control strategies may prove inadequate in the future, given the shadow of such threats as impacts of climate change, the Commission prepared a detailed Plan of Study to review all aspects the regulation of water levels and flows in Lake Ontario and the St. Lawrence River, beginning with the Orders of Approval³⁰.

In addition to tracking noteworthy events and regulatory responses, the table identifies milestones in the history of the Great Lakes-St. Lawrence River system as it developed in concert with economic growth in the region. Considerable thought was given to harvesting the navigation and hydro-power potential in the system as far back as the early 1800's. The problems derived, from time to time, from extremes of stage, also came under consideration as efforts began to be made to harness the system for economic benefit.

5 INSTITUTIONS AND DECISION-MAKING PROCESS

The genesis of the institutional structure accountable for regulating levels and flows in Lake Ontario and the St. Lawrence River is in the Boundary Waters Treaty of 1909 and its Article VII dealing with the establishment of the IJC. From the beginning, the IJC found it necessary to establish, as well as call upon, other institutions for executive, scientific and technical support in order to exercise its mandate.

The plans for constructing the St. Lawrence Seaway and International Rapids power generation project were announced in 1951. Since then, a four-level, integrated institutional structure for controlling levels in the levels and flows has evolved: The levels are: the Governments of Canada and the United States; the IJC; the International St. Lawrence River Board of Control (ISLRBC or, 'the Board'); and, the Operations Advisory Group (OAG)¹². This structure is depicted in Exhibit 3.

5.1 The Governments of Canada and the United States of America

Governments have expressed their common objectives in the 1909 Boundary Waters Treaty, through References to undertake investigations, and, upon request from the IJC, have made known their concurrence with strategies through approvals of various regulatory requirements and Plans of Regulation, study initiatives and study plans.

5.1.1 Policy Base

On the 11th January 1909, the United States of America and Great Britain signed what is commonly known as 'the Boundary Waters Treaty' in order to prevent disputes regarding the use of boundary waters and to settle questions that were pending between the United States and the Dominion of Canada. Copies of Articles VII, VIII and IX are attached for reference as Appendix 4.

In Article VIII, the Treaty establishes an order of precedence to be observed among the various uses for the waters:

- (1) Uses for domestic and sanitary purposes;
- (2) Uses for navigation, including the service of canals for the purposes of navigation;
- (3) Uses for power and for irrigation purposes.

The Article deals with inter-relationships between the designated uses as well as the charge that all interests be protected and indemnified. There appears to be a difference of opinion between knowledgeable officials about whether the three stated uses take priority over other interests.

Article VII of the Treaty established the IJC of the United States and Canada, to have jurisdiction over the use or obstruction or diversion of boundary waters. The Treaty also requires that the Commission give all interested parties a "*convenient opportunity to be heard*" on matters under consideration.

5.1.2 Operation

Governments relate to the IJC through the Canada Department of Foreign Affairs and International Trade (DFAIT) and the U.S. State Department respectively. In Canada, DFAIT obtains input directly from affected provinces. Input from federal departments is obtained through an interdepartmental committee chaired by DFAIT¹³. In the United States, the State Department relies upon 5 to 6 federal agencies, particularly the U.S. Army Corps of Engineers. Individual states that have interest in matters relating to the boundary waters interact directly with the State Department. These are the formal arrangements. It is understood that there is also access by all levels of government, private and public entities to the IJC and its subsidiary boards through a wide spectrum of informal arrangements. How the informal access influences decision-making is not readily evident.

5.1.3 Decision-Making

Particularly relevant decision-making actions by the governments relative to the regulation of levels and flows since the beginning of the 1950's include¹⁴:

- **1952.** Reference to IJC to determine whether measures can be taken to regulate levels of Lake Ontario for benefit of property owners having regard to all other interests. Asked to study factors affecting fluctuations of water levels.

As a result of its studies under this Reference, it is desired that the Commission shall determine' 'whether, in its judgment, changes in regard to existing works or other measures would be practicable and in the public interest from the points of view of the two Governments, having in mind the order of precedence to be observed in the uses of boundary waters as provided in Article VIII of the Boundary Waters Treaty of 1909.

- **1952.** Application to the IJC for approval of the St. Lawrence Power Project
- **1952.** IJC Order of Approval to proceed with construction of the power project approved.

The Orders provide that "consistent with other requirements, the levels of Lake Ontario are to be regulated for the benefit of property owners on the shores of Lake Ontario so as to reduce the extremes of stage which have been experienced. When water supplies to Lake Ontario are in excess of the supplies of the past as adjusted, the works are to be operated so as to provide all possible relief to riparian owners upstream and downstream; and when supplies are less than the supplies of the past as adjusted, the works are to be operated to provide all possible relief to navigation and power interests".

- **1955.** IJC Plan of Regulation (12-A-9) approved.
- **1961.** Response of IJC to 1952 Reference received.

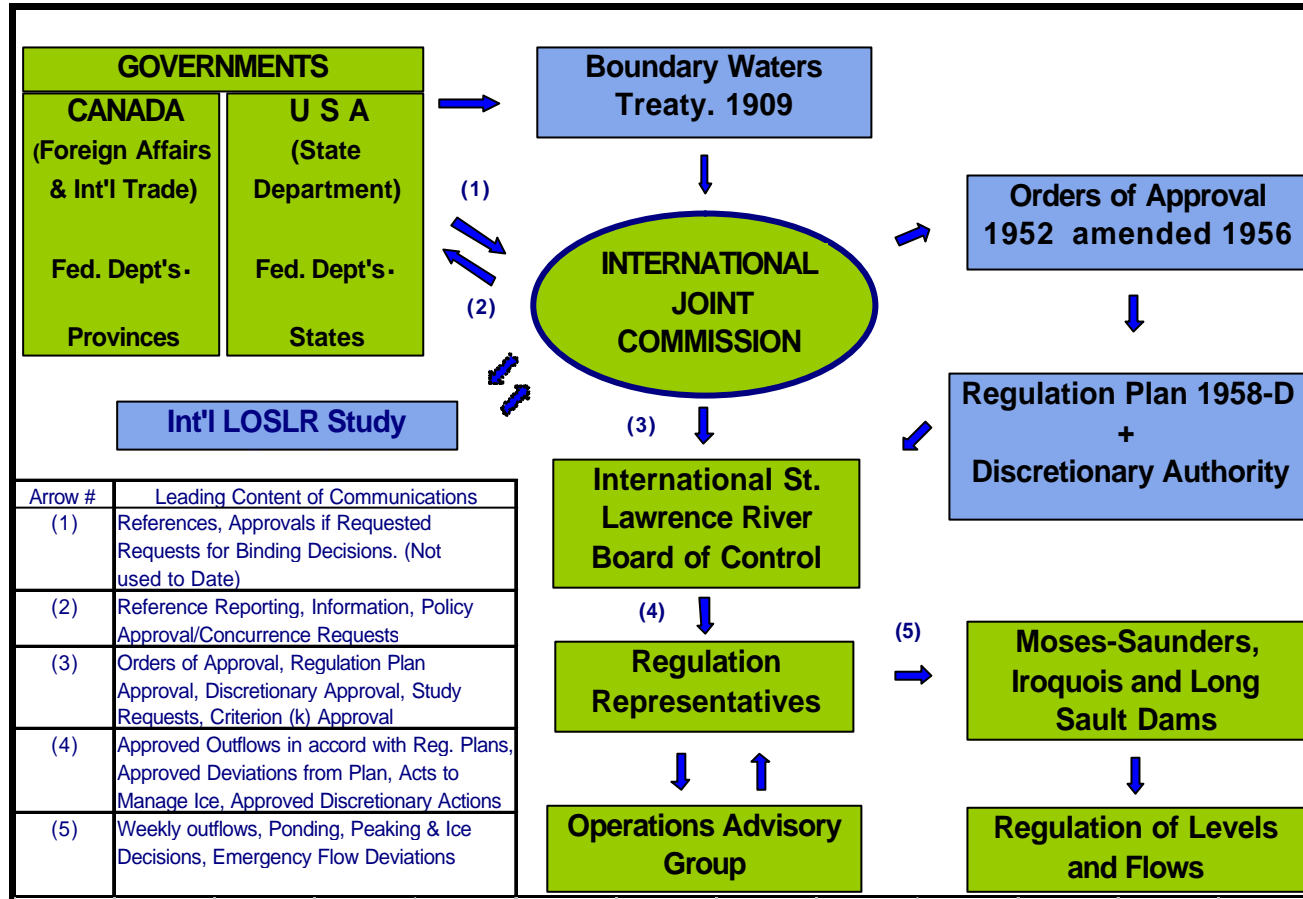


Exhibit 3. Levels Regulation Institutional Structure for Lake Ontario and the St. Lawrence River

“Furthermore, the Commission considers that the measures taken in connection with the St Lawrence project have sufficient flexibility to permit adjustments found necessary or desirable in the future to meet changing conditions or to provide further improvements considered practicable or in the public interest. The order of precedence to be observed in the uses of boundary waters, as prescribed in Article VIII of the Boundary Waters Treaty, has been followed in the Order of Approval of the St Lawrence project dated 29 October 1952 (Appendix B). This Order requires that the works shall be planned, located, constructed, maintained and operated so as not to conflict with or restrain uses of the waters of the St Lawrence River for purposes given preference by the treaty over uses for power purposes, namely uses for domestic and sanitary purposes and uses for navigation”

- **1964.** Lake Levels Reference to IJC concerning further regulation of Great Lakes water levels as a result of wide-spread public concern over the extremely low water levels experienced in the mid-1960's.
- **1973.** With regard to high water conditions in Lake Ontario, Governments are unable to offer assurances of indemnity for downstream riparian interests on the St. Lawrence River beyond those obligations assumed under the IJC's 1952 Order of Approval as amended in 1956.
- **1975.** Governments not prepared to authorize additional funding and manpower resources for an IJC request to conduct more studies of what measures would be required in the International Section of the St. Lawrence River to accommodate increased flows, until results of the 1964 Reference are provided. The Board's final report was submitted to IJC in 1973.
- **1986.** Reference from the Governments to examine and report upon methods of alleviating adverse consequences of fluctuating water levels in the Great Lakes–St. Lawrence River Basin.
- **1993.** IJC Report pursuant to 1986 Reference
- **1999.** Governments receive from IJC a Plan of Study for Criteria Review in the Orders of Approval for Regulation of Lake Ontario-St Lawrence River Levels and Flows.

5.2 The International Joint Commission

5.2.1 Policy Basis

The IJC is a bi-national organization authorized by the Boundary Waters Treaty of 1909⁸. The Commission is assigned jurisdiction by governments to govern the use, obstruction or diversion of waters that flow along, and in certain cases across, the boundary if such uses affect the natural water levels or flows on the other side. The Commission undertakes investigation of specific issues, or monitors situations, when requested by Governments. Implementation of Commission recommendations made under such

References is at the discretion of the two Governments. The Treaty also provides for Governments to refer matters to the Commission for binding decision, but to date this provision has not been used.

In the case of levels and flows regulation in Lake Ontario and the St. Lawrence River, the IJC directs the ISLRBC and others through Orders of Approval that reflect the intent of the Treaty. The Commission also directs through approval of Plans of Regulation (see section on ISLRBC), requests for study and investigation; permissions to employ discretionary authority; and, approvals of requests to invoke and revoke Criterion (k).

Orders of Approval

The 1952 Order of Approval for the hydro power generation works in the International Rapids Section of the St. Lawrence River stated the IJC's right to make such further Orders as judged to be necessary by the IJC and authorized the creation of the Joint Board of Engineers and the ISLRBC. It also addressed conditions relating to: adequate protection and indemnity of affected interests; precedence of uses of the boundary waters; and, safeguarding the rights of others affected by levels.

During construction, the IJC amended its Orders of Approval, with the concurrence of the Governments by adding requirements to reduce the range of Lake Ontario water levels, and to provide dependable flow for hydropower, adequate navigation depths, and protection for shoreline and other interests downstream in the Province of Quebec. The project must also be operated to provide no less protection for navigation and shoreline interests downstream than would exist without the project. Another provision in the Orders, known as Criterion (k), was included because water supplies would inevitably be more extreme sometime in the future than in the past (1860-1954). When supplies exceed those of the past, shoreline property owners upstream and downstream are to be given all possible relief. When water supplies are less than those of the past are, all possible relief is to be provided to navigation and power interests. A copy of the 1952 Order of Approval amended in 1956 is attached as Appendix 5 for reference purposes.

5.2.2 Operation

The Commission has six members. Three are appointed by the President of the United States, with the advice and approval of the Senate, and three are appointed by the Governor in Council of Canada, on the advice of the Prime Minister. The Commissioners must follow the Treaty as they try to prevent or resolve disputes. They must act impartially, in reviewing problems and deciding on issues, rather than representing the views of their respective governments. A group of advisers and other staff assist the Commission in fulfilling its Treaty responsibilities.

From the beginning, the IJC has found it necessary to establish, as well as call upon, other institutions for executive, scientific and technical support in order to exercise its mandate. Experts from both countries serve on technical boards for the Commission and carry out the required studies and field work. Boards of Control are appointed by the Commission to report on compliance with Orders of Approval, while study or advisory boards assist in References.

The Commission invites public participation and advice when it undertakes studies under References, when it deals with Orders of Approval and when it prepares reports to Governments. In many instances, citizens, both specialists and non-specialists, also serve on Commission boards and task forces.

The Joint Board of Engineers was established to act technically on behalf of governments during the project construction phase. The ISLRBC was established to give effect to the instructions of the Commission during construction and operation phases of the project.

Several other support mechanisms have been utilized as identified in the following section. The most relevant at this time is the International Lake Ontario - St Lawrence River Study Board established in year 2000^{4, 15}, *"to undertake the studies required to provide the Commission with the information it needs to evaluate options for regulating levels and flows in the Lake Ontario-St. Lawrence River system in order to benefit affected interests and the system as a whole in a manner that conforms to the requirements of the Treaty"*. It is understood, that for the decision-making process of IJC, the balancing of water use rights is the purpose of seeking information through the ILOSLR Study.

The studies are to include:

- a. reviewing the operation of the structures controlling the levels and flows of the Lake Ontario-St. Lawrence River system in the light of the impacts of those operations on affected interests, including the environment;
- b. assessing whether changes to the Order or regulation plan are warranted to meet contemporary and emerging needs, interests and preferences for managing the system in a sustainable manner; and
- c. Evaluating any options identified to improve the operating rules and criteria governing the system.

The Study Board is to provide options and recommendations for the Commission's consideration. New flow and level control structural alternatives are not to be investigated. The studies are expected to take five years to complete. When the study is finished, IJC will hold hearings, deliberate on all of the information, determine if there are deficiencies and seek consensus on rendering a decision. IJC will undertake the task of integrating individual sectors of investigation. Governments will be asked to approve any recommendations that are to be implemented.

5.2.3 Decision-Making

Although in practice, the IJC operates by consensus, the majority of the Commissioners have power to render a decision. Members do not represent their parent organizations at the table. In case the Commission is evenly divided upon any question separate reports are to be made by the Commissioners on each side to their own governments for resolution. Subsidiary organizations of the Commission also operate by consensus.

IJC has the authority to change its own Orders of Approval and request and approve

Plans of Regulation. It also creates policy for deviation from the plans. Since the 1952 Order of Approval for power generation works and ancillary works was a result of an application from governments to the IJC it was submitted to governments for their approval.

Selected IJC decisions particularly relevant to this investigation include¹⁴:

- **1952.** Orders of Approval as amended in **1956**
- **1953.** IJC directive created the ISLRBC.
- **1958.** Approval of ISLRBC Plan of Regulation 1958-A.
- **1961.** IJC gives discretionary authority to the ISLRBC to depart temporarily from the regulation plan flow when a deviation would provide relief from adverse impacts to any interest without appreciable adverse effects to any of the other interests. At various times, this authority is used to assist shoreline property owners, navigation, hydropower and other interests, as well as recreational boating.
- **1963.** Approval of ISLRBC Plan of Regulation 1958-D, the plan currently in effect, provided for an improvement of low water levels in Montreal harbour without reduction of the minimum winter flows
- **1964.** International Great Lakes Levels Board established because of extremely low water levels in the mid-1960's. Board's final report was submitted in 1973.
- **1978.** Request to ISLRBC to update 1975 Working Committee report that investigated alternative plans to Plan 1958-D. In 1980 ISLRBC reported that Plan 1958-D with discretionary authority was still preferable.
- **1998.** The Commission decides not to adopt Plan 1998 recommended in ISLRBC 1997 report because *"... it does not have sufficient information on the environmental impacts associated with the proposed plan and that the plan would not constitute sufficient improvement over the existing situation."* The Commission also noted that it would *"---continue to pursue support and funding for the development and execution of the more comprehensive studies outlined in a Scope of Work prepared by the ISLRBC in 1996."*
- **2000.** Established International Lake Ontario - St Lawrence River Study Board

5.3 The International St. Lawrence River Board of Control (ISLRBC)^{16, 17}

The Board, authorized by the IJC in its 1952 Order of Approval and established by directive in 1953, is the line organization concerned with controlling water levels and flows in Lake Ontario and downstream in the St. Lawrence River.

5.3.1 Policy Basis

In its 1952 Orders of Approval, the IJC authorized an International St. Lawrence River Board of Control. This Board's main duty is to ensure that outflows from Lake Ontario meet the requirements of the IJC's Orders as approved in the current approved Plan of Regulation (Plan 1958-D). The Board develops such regulation plans for approval by the IJC and conducts special studies, as requested by the IJC. It is to make representations to the IJC in regard to any matter affecting or arising out of the terms of the Orders with respect to water levels and the regulation of the discharge and flow.

Plan 1958-D is the regulation plan presently used to determine outflows in accordance with criteria specified in the 1952 and 1956 Orders of Approval. It has been in use since 1963. The objectives are: to provide adequate depths for navigation in the St. Lawrence River, including downstream at Montreal Harbour; to restrict flows so as to guard against excessively high velocities in the River, as well as low levels on Lake St. Lawrence, both of which could halt Seaway navigation; to provide adequate water for hydropower generation, and to reduce the range of levels on Lake Ontario and in the River. The plan specifies weekly Lake Ontario outflows based on current Lake Ontario water levels and trends in water supplies to Lake Ontario. Downstream (Montreal region) flow conditions and St. Lawrence River ice conditions are also taken into consideration and may, at times, govern decisions made on Lake Ontario outflows.

The criteria are only one component of the Plan. There are numerous other "requirements" and the Plan is implemented in full consideration of the entire contents of the Orders of Approval and how they attempt to convey the intent of the BWT. Plan 1958-D has never actually been finalized.

5.3.2 Decision Making

The Board issues directives to the control structure operators on a weekly basis and, in the judgement of the Board, at other times as the situation demands. The decision making process of the ISLRBC consists of continuous monitoring and evaluation of the hydrologic conditions of the Great Lakes and the St. Lawrence River, and application of the regulation Plan 1958-D, originally developed in 1960-1961, or directing deviations from the regulation plan when preferable or the situation warrants it. Decisions are reached by consensus based on what is in the best interest of both countries taking into account all stakeholder interests, rather than by negotiating from national positions or positions of particular interests.

The Board sets outflows under the current regulation plan or under Criterion (k) once it has been invoked by the IJC. It has been given discretionary authority to deviate from plan flows in order to deal expeditiously with unusual circumstances such as unprecedented water supplies or winter operations. The IJC is informed of any decisions to deviate from the plan and a press release is issued on the matter by the Board.

The Board monitors the installation of several ice booms in the river during the late fall-early winter each year. The Board assures that the needs of navigation to clear vessels through the system and the need to form a stable ice cover are both met. Deviations from the plan may occur at this time to assist in forming the ice cover.

It may also use its limited discretionary authority when a change from plan flow can be made to provide benefits or relief to one or more interests without appreciably harming others, and without breaching the requirements of the Orders. Deviations can also occur during the late spring in response to the Ottawa River freshet. Outflows from the control structures are reduced in order to lower flood levels at Montreal. When high or low water supplies occur, deviations from plan 1958-D may also occur. In extreme wet conditions all possible relief is provided to riparians. In extreme dry conditions, all possible relief is provided to hydropower and navigation.

Selected ISLRBC decisions particularly relevant to this investigation include:

- **1973.** ISLRBC initiated Working Committee to review operation since regulation began. The Board concluded in **1975** that Plan 1958-D, along with discretionary authority was superior to other regulation proposals at the time.

The Board stated:

“. . . waiving specific limits, at the discretion of the Board, when the consequences of such action are more clearly known or understood, provides for more flexible operation and more reasonable results than permanently waived limits based on rigid rules.”

The Board recommended:

“Should the Commission desire further study of all possible changes in regulation beyond the scope of responsibilities assigned the Board in the Commission’s letter of 5 October 1960, including physical capacity of the St. Lawrence River, improved forecasting techniques, shoreline management, and the redistribution of benefits which may result, it is believed that such a study should not be conducted by this Control Board, but rather by a Study Board operating under an appropriate reference and fully resourced.”

- **1979.** An economic evaluation of four alternative regulation plans for Lake Ontario compared to Plan 1958-D with discretionary authority, carried out through a request to the International Lake Erie Regulation Study Board by the ISLRBC, showed that all were inferior.
- **1996.** Scope of Work for investigations of criteria in the Orders of Approval submitted to IJC for approval.
- **1997.** Primarily to formalize many of the actions that it has to take in practice but also to provide some additional benefits to stakeholders over Plan 1958 D, the Board recommended to IJC that its updated Plan 1998 replace existing regulation Plan 1958-D.

5.3.3 Operation

The Board has ten members, five each from the U.S. and Canada. They are appointed by the IJC based on their technical background, technical support from their home institutions, and their knowledge of the Lake Ontario-St. Lawrence River system. Each nation has a secretary to the Board. Day-to-day Board functions are carried out by one U.S. and one Canadian Regulation Representative who provide technical support to the Board.

Members serve in their personal and professional capacities, not as representatives of particular interests or geographic regions. Being a part of the IJC institutional structure, the Board reaches its decisions by consensus. As a result, ISLRBC meetings, agendas and minutes are not presently accessible to the public. The reasoning provided is that opening the meetings of the Board and its OAG would inhibit the free discussion among members needed to reach consensus, force them into inflexible positions, and impair their ability to take timely action on sensitive international issues. However, in the case that members cannot agree, the matter would be referred to the IJC for decision. The IJC is considering making the minutes of Board meetings publicly available.

The Board normally meets 4 times per year; twice for regular board activities and twice for semi-annual reporting to the IJC. It also reports to the Commission when the Commission so determines. Regular board meetings alternate between the U.S. and Canada. In addition, there are 2-5 conference calls held per year on an ad hoc basis. Technical experts are invited to Board meetings to answer operational questions.

The Board has established an Operations Advisory Group (OAG) to advise on day-to-day operations consisting of the Regulation Representatives, navigation and hydropower interests. The OAG recommends weekly outflows for approval by the Board.

Innovative ways to seek public input have been developed by the Board: Annual Public Meetings, toll-free telephone numbers, an Internet site, various newsletters that are issued throughout the area, agencies in both countries, and smaller meetings in the basin that have been linked together by teleconference.

5.3.4 Implementing the Regulation Plan

Stage gauging

To measure the mean water level of Lake Ontario, the ISLRBC uses the average of water surface elevations taken at 6 gauges on L. Ontario operated by the U.S. National Oceanographic Services and Canada's Department of Fisheries and Oceans - Canadian Hydrographic Service . These two agencies also operate a number of water level gauges in the St. Lawrence River. The ISLRBC also uses water level data from other gauges operated by New York Power Authority and Ontario Power Generation. Other gauges used by the Board are operated by the U.S. and Canadian Seaway entities, Hydro Quebec, and Environment Canada. The Board's gauging committee periodically reviews this network of gauges to ensure they are sufficient to monitor the hydrologic and hydraulic conditions in system. The committee also oversees the operation and maintenance of these gauges to ensure accuracy in reporting of water levels and flows. Membership of the gauging committee is comprised of USACE, Environment Canada

and power entity representatives.

The *Canada–U.S. Coordinating Committee for Great Lakes Basic Hydraulic and Hydrologic Data* develops and promotes use of coordinated methods of determining Great Lakes data, and coordinated Great Lakes regulation and hydraulic models for joint regulation operations and studies.

Hydrologic and Hydraulic Projections of Levels and Flows

The Lake Ontario and St. Lawrence River water level and flow data feeds into the regulation plan. The plan specifies the volume of water to be released from Lake Ontario each week. Built into the regulation plan are rule curves, maximum and minimum allowable outflows that were designed taking into consideration the needs of the shore property (upstream and downstream), hydropower and navigation interests, and for ice management purposes. This regulation plan was tested, using historical water supplies to Lake Ontario for the period 1860-1954 to determine to what degree it meets the criteria specified in the IJC's 1952 Order of Approval as amended in 1956.

The regulation plan routes water supplies through the system and stage-flow relationships are available that estimate the resultant water levels on the St. Lawrence River. The present version of the regulation plan does not use weather forecasts. However, it has been programmed to project water levels and flows in the system assuming various sequences of water supplies, for example, very wet, average or very dry. Precipitation data is monitored but is not used. The LOSLR system reacts to atmospheric events on a time-scale measured in months rather than weeks or days. Long term weather forecasting is considered to be essential, but the science of weather prediction does not permit this. The model users believe that refining the hydraulic model to make it more hydrologic in nature is a very high priority. *"A huge leap in science is required"*. The Great Lakes Environmental Research Laboratory is working in this direction.

For the Board's operational purposes, the Plan 1958 D computation predicts water levels and outflows at exceedance probabilities of 5, 50 and 95 percent up to eight months ahead. It can be programmed for a longer period if desired. The effectiveness of the computerized mathematical model/tool used to project levels and flows, is being looked at by comparing predictions made in the past with levels and flows that actually transpired. It is understood that recent work has concluded that the present tool is probably the best that is available.

Also available are computerized models simulating Plan 1958-D and used to test deviations from the regulation plans. They can generate long series of water levels and flows given different sequences of water supplies as might be experienced under different meteorological and climatic conditions.

The Regulation Representatives

The Board's Regulation Representatives, one U.S. and one Canadian, are the Board's on-site representatives overseeing the operation of the IJC approved power generation project. The U.S. designate is the Buffalo District Commander of USACE and the

Canadian designate is the manager of the Environment Canada, Great Lakes-St. Lawrence Regulation Office in Cornwall, Ontario. Guidance and directions from the Board to the Regulation Representatives are given at Board meetings and Board teleconferences. The two officials work with the Board's OAG in implementing Board instructions.

The Representatives continuously monitor the Great Lakes – St. Lawrence River system, and advise the Board on regulation. They also recommend to the Board, when preferable or the situation warrants, deviations from the regulation plan. Recommendations that the Board receives from the Representatives lead to the Board defining a time bound deviation strategy that must be implemented by the OAG within an envelope of water volume. The deviations could be to accommodate, say, boaters on Lakes St. Lawrence and St. Louis at the end of the season, or shipping in Montréal Harbor, or, to store water for future considerations.

The Representatives report to the Board monthly, and more often when required, with assumptions of supplies and, projected levels and flows for the upcoming eight months. Recommendations are made to the Board for strategic actions that would store water on Lake Ontario or that would draw down levels, so that the considerations in the Orders of Approval are optimized. It is understood that the Representatives also would make recommendations to the Board on matters such as applying to IJC for invoking and revoking Criterion (k) and short term deviations from Regulation Plan 1958-D in order to accommodate power generation, navigation needs, flood control during the Ottawa River freshet and other actions that would have net beneficial effects.

The weekly Plan 1958-D computations are carried out by the Representatives. Every Thursday morning, information on water levels and conditions downstream of the control structures is applied to the computerized model that represents the Plan and a volume of water that should be released during the following week is specified. The distribution of the flow discharge over the week, to accommodate ponding, peaking and short term operational situations such as power generation works maintenance or safe navigation for a ship with large draft, is left up to the OAG.

The two officials have authority to direct emergency flow changes to deal with situations such as ship grounding. They also approve flow changes for ice management purposes. Instructions will be issued to control structure operators that will control ice formation within a winter operation that results in a zero net volume deviation from the plan.

5.4 Operations Advisory Group (OAG)^{16, 17}

5.4.1 Policy

The OAG, originally established by the Board to advise on peaking and ponding operations and winter operational needs, has now taken on a year-around function to advise on day-to-day operations. Its policy is to seek consensus decisions from OAG members and the regulation representatives on weekly flow discharges and their time-related distribution.

5.4.2 Operation

The OAG consists of members from the Canadian Coast Guard, Hydro Quebec, Ontario Power Generation, U. S. St. Lawrence Seaway Development Corporation and New York Power Authority.

Once a week, typically Thursday, the Representatives hold a teleconference with the OAG to review the conditions of the previous week and anticipated conditions and requirements for the coming week that would meet the parameter values of the current regulation plan. Any applicable and approved Board instructions or regulation strategy would be complied with. If there are no Board instructions to do otherwise, the calculated planned flow for the next seven days would be recommended to the Regulation representatives. Once the decision is made, instructions would be sent to the operators at the Moses-Saunders hydropower plants. It is considered desirable for every peaking and ponding flow discharge decision to have the concurrence of all of the OAG members.

Special conditions such as risk of flooding downstream due to the Ottawa River freshet, in respect to which the OAG and Hydro-Québec monitor very closely the conditions in the Ottawa River and in the Port of Montreal and Lac St-Louis, may lead to recommendations to the Board by the Representatives for discharge and flow control adjustments.

The hydropower plant operators may, given prior approval from the Representatives, and with the agreement of all the OAG members, vary their flow within the day and within the week to make most efficient use of water for hydropower purposes. The flow may also vary to accommodate ship transit and minimize transit delays caused by water level or flow conditions. An important thing to note is that these variations should result in the weekly average outflow specified by the regulation plan, or in accordance with the strategy of the Board.

6 STAKEHOLDER ACCESS AND CURRENT INITIATIVES

In recent years the IJC and its administrative and operational arms have instituted a significant communications and outreach program, greatly improving the transmission of information to system users. An important aspect of the communications effort is regular information as to why decisions to alter outflows are made. Another is provision of up to date information on levels and levels forecasts to help affected stakeholders prepare for extremes and potentially damaging impacts. The outreach program makes the ISLRBC more accessible to stakeholders through regular public meetings.

6.1 Access of System Stakeholders

Direct access of navigation and power interests to the levels and flows regulation decision making process is integral to the institutional structure. To a lesser extent, so is the access of municipal domestic and sanitary interests. Control actions reflecting these interests are well documented. Also, integral to the process are decisions made to implement measures that will moderate flooding due to the Ottawa River freshet.

The following sections are focused on other stakeholders that do not have such direct access at the present time. The uses made of the boundary waters by these other stakeholders, generally classified as "other uses" have, under the present demographic and economic climate of the Lake Ontario-St. Lawrence River system, become much clearer and their needs and expectations have been much better defined. The working premise is that the process of managing levels and flows for the benefit of the three uses specified in Article VIII of the Boundary Waters Treaty is such that representatives of these stakeholders have ready and adequate access to decision making within that process.

The other stakeholder groups or Basin interests whose discreet sets of concerns are crystallizing into well defined sets of needs include (in no order of precedence) Aboriginal peoples, shoreline dwellers (cottage owners), recreational boaters and the supporting industry, tourism and ecosystem sustainability.

These groups are becoming well organized and are mounting strong lobbies in support of their concerns. They are enjoying ever increasing opportunities for expressing viewpoints, as a result both of their organizations as well as of the aggressive public outreach provisions of the IJC and its various operating arms in the Basin. Members of these Basin interests are also serving on advisory groups to the Study Board. In these ways, they bring information, questions and concerns of the people they represent to the attention of decision makers. A short discussion of the evolution of stakeholder involvement in water level management is attached as Appendix 6.

Great Lakes United (GLU)

A lack of coordination and common communication channels seemed the most important problem NGO's were facing in 1960's and 1970's. This challenge was dealt with, to a great degree, with formation of Great Lakes United in 1982. By 1985, Great Lakes United had opened its central offices in Buffalo, advocating a coordinated

approach to preserving and enhancing the quality of the Great Lakes ecosystem. At the present time GLU is a coalition of 170 organizations from Canada and United States. Several member organizations are based in Aboriginal communities. Great Lakes United continues to serve as a significant focal point for the consolidation of environmental, science, boating, tourism and hydrological interests and it supports research and public awareness in the area of the ecosystem sustainability. In 1999, GLU put forward a motion requesting an IJC-supported science-based investigation and impact analysis of the current and future water regulation plans which should be open to the public for discussion.

Their key water levels and flows-related issue is the question of potential water diversions and exports. GLU opposes all forms of water diversions or bulk water exports. GLU is also involved in: water levels and flows issues involving biodiversity and habitat issues; and, an initiative involving five Great lakes environmental and community groups that developed a plan, called Water Use and Ecosystem Restoration: An Agenda for the Great Lakes and St. Lawrence River Basin. The plan deals with water levels and water flows both directly and as a part of a larger water transfer and bulk water export issue.

St.-Lawrence Franklin D. Roosevelt Power Project Re-licensing

A regulated access process in existence is the re-licensing of the New York Power Authority's St.-Lawrence Franklin D. Roosevelt Power Project which began in 1996¹⁸. This process is seen as recognizing the important role of the public. Scope was also given to the historical grievances of local communities regarding the impacts of the construction of the FDR dam on their environmental, cultural, economic and spiritual resources. In particular, the Mohawk communities affected by the FDR project were accorded access to the consultative process. Apart from the participation of some members of the Mohawk Council in the IJC Boards, the NYPA re-licensing appears to have been the first significant attempt by U.S. or Canadian authorities to include their input into the decision-making process in managing public infrastructure. This has assumed increasing importance as the social, economic, political and ecological risks associated with water level management in the Great Lakes-St. Lawrence River grow. Issues identified in the re-licensing process were recreational boating, flooding, erosion, power generation, and fish and botanical resources.

6.1.1 Aboriginal Peoples

If one looks for public involvement during the period of study, 1950 - 2000, it is remarkably absent. Although the Mohawks of Akwesasne and St. Regis are represented at the signing of the plans to build the Seaway in 1953¹⁹, they disappeared thereafter until the 1970s and 1980s. Dozens of islands, two whole communities and 275 farms were flooded above Cornwall without public input. Individual residents were able to negotiate (to some degree) the conditions of their departure, but without the benefit of a public process, the outcome was ultimately determined by the "public interest" of constructing the Seaway.

The same is true further downstream at Beauharnois, where dikes were constructed and currents redirected in order to ensure shipping and power generation. Indeed, between 1954 and 1959, dams, canal locks, dredged navigable channels, dikes and flooded areas radically changed the face of the St. Lawrence River and Great Lakes hydrology regime. When research was conducted in the late 1950s to determine upon what criteria water levels were to be managed, the following were identified:

- Water levels in Montreal harbour for navigation
- Summer and winter power generation
- Spring breakup – managing for flooding along the Ottawa River and in Montreal
- Dependable water flows for power generation
- The desire to keep channel excavations to a minimum
- Navigation
- And so long as they were consistent with the above criteria, the needs of riparian owners along the Seaway

It was clear then, in Plan 1958-D that the rights of the local public were to be subject to the national interests of the United States and Canada. It is important to underline the fact that Plan 1958-D, in place since 1963, continues to serve as the framework by which water level decisions are made.

In Community

It is widely recognized that Aboriginal people have a fundamentally important link with their natural environments. Their cultures, languages, primal economies and spirituality rely on this symbiotic relationship to the degree that where this relationship is altered or broken, Aboriginal communities suffer greatly. Of particular concern is the effect of environmental change and degradation on the resource-based economics of Aboriginal peoples.

The practices surrounding resource-based economics are critical to the survival of Akwesasne and many other Aboriginal peoples. Also referred to as subsistence activities, these primal industries at Akwesasne (as an example) serve to establish the basis for a healthy national economy. For the Mohawks, these primal industries are fishing, agriculture, hunting and gathering (for example: berry picking). These activities are crucial because they provide a link between person and land - keeping the environment whole. It is impossible to practice these primal industries without knowledge, respect, contact and responsibility between the land and the individual.

Participation by the community in fishing, agriculture, hunting and gathering not only assures the physical survival of the people at Akwesasne. It also teaches critical skills and language that would disappear in the absence of their practice. Fishing, for example, might invoke certain rites and rituals of thanks, preparation and net laying. As they are repeated on each fishing expedition, the communities' or Nations' rituals

become a part of the individuals' experience of the activity. Participation in spirituality and identity maintenance become one with the activity of fishing.

The preservation of language, too, is a by-product of participation in the primal economy. The best of example of this from Akwesasne might be beaver trapping. Due to the virtual elimination of the beaver from the rivers and streams around Akwesasne, the practice of trapping was discontinued. As a result, the language used in relation to the rites, rituals and practices of beaver trapping was lost by the community. In order to resume beaver trapping, the community has been forced to re-acquire the skills and language from other Aboriginal people. This example illustrates the fundamental link between subsistence activities, spirituality and language - all fundamentals of community identity.

Anything that challenges these activities threatens to rupture the relationship between a community and its environment. Over time, these threats force the separation of environment and lifestyle. This disrupts the practices, rituals and language that are the basis of and support for the identity of the Mohawks of Akwesasne. Of particular concern here are the waters upon which Aboriginal people rely for food, transportation and ceremony. Water is the "first environment" – the womb of the woman – where the future of Aboriginal communities receives its first exposure to the outside world, through the mother. As the waters have been impacted by the construction of dams, like those at Cornwall – Massena, so to has the "first environment" been affected due to increased levels of contaminants in fish.

Changes to the hydrology of the area because of damming have been intensified by climate change and variability. For example, Aboriginal people along the St. Lawrence River welcome the spring rains that cleanse the earth and replenish aquifers. The flooding from these spring rains fills marshes and creates critical spawning grounds for local fish populations. The construction of the dams and the earlier/more intense rains has forever changed these vital functions of the river. This will be elaborated below.

Regionally/Nationally

Just as Canadian and American nations have a complex set of institutions and interest groups that seek a role in the management of water levels in Lake Ontario – St. Lawrence River, so too do Aboriginal people have organizations and assemblies that represent their concerns about water in Ontario.

In particular, four organizations serve to represent and advocate on behalf of Aboriginal people in the corridor examined here. The Chiefs of Ontario²¹, for example, is organized to present a common voice for Aboriginal people in Ontario to the Assembly of First Nations²². Another of these organizations, the Association of Iroquois and Allied Indians²³ was established as a political organization in 1969 to represent its member nations in any negotiation or consultation with any level of government. The Union of Ontario Indians also serves an important representative and advocacy role for its members.

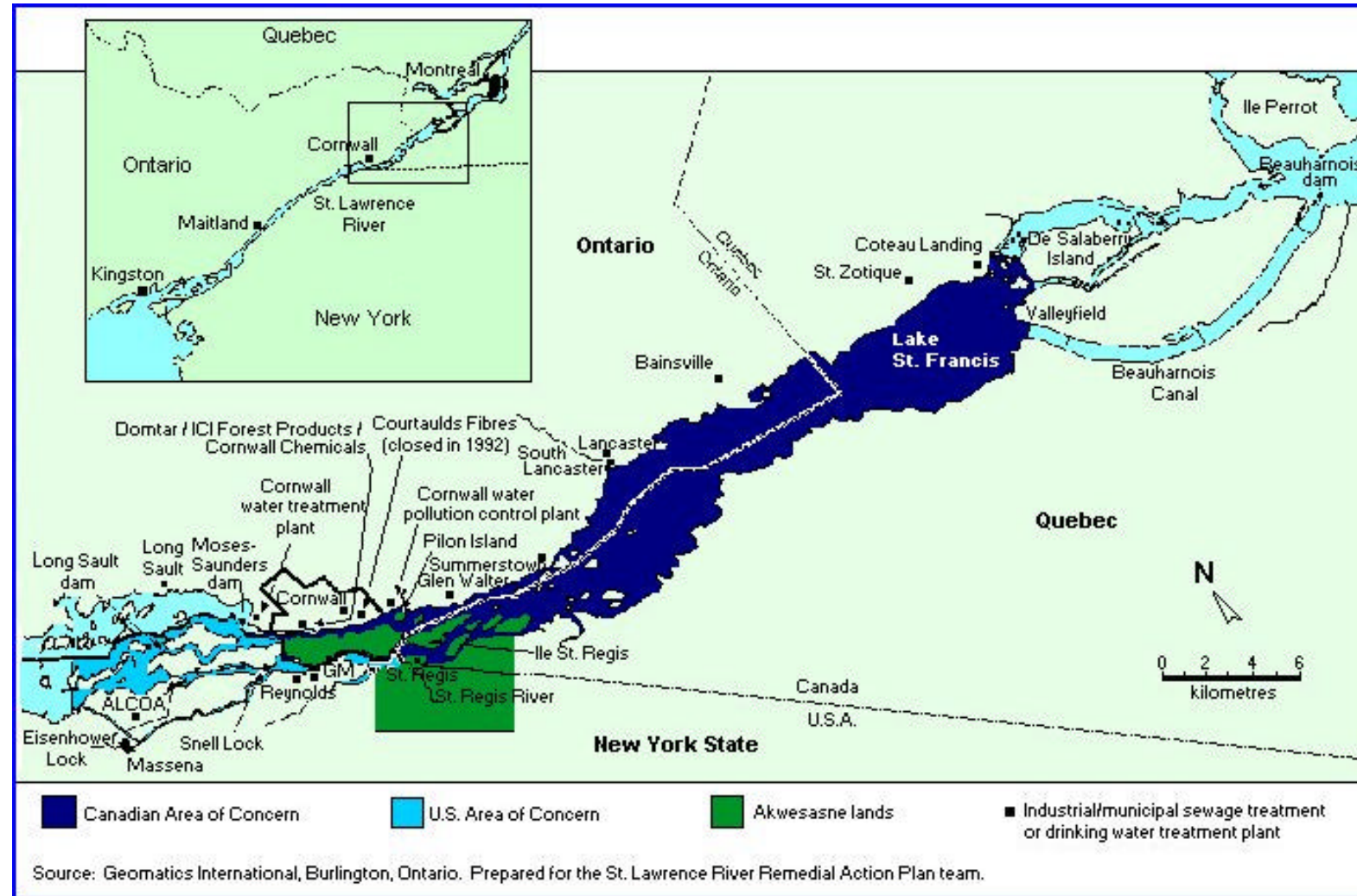


EXHIBIT 4. AKWESASNE LANDS

The Assembly of First Nations is the national institution representing the voices of First Nation peoples to the Government of Canada, and other Nations around the world. It provides significant political and social resources to its member nations, and grapples with issues of importance to all First Nations in Canada. For example, the Assembly of First Nations develops policy positions on issues like bulk water export to the United States, clean water supplies in First Nation communities, and contaminants in water. The Assembly of First Nations serves as an important focal point for addressing grievances with other national governments, such as those of Canada and the United States.

As this illustrates, the number of organizations representing Aboriginal concerns in the Lake Ontario – St. Lawrence River corridor has increased in number since the 1950s. The range of interests and concerns represented by these organizations reflects a complex web of policy networks that often approach the same issues from different perspectives. It is important, then, to note that as much diversity exists within the Aboriginal “community” as within the environmental, Canadian or American “communities”.

Akwesasne

Akwesasne stands as a good example of how the construction of the dams and seaway near Cornwall/Massena has had an impact on the health of the community. It is important to note that despite several large studies of the environment in the area around Akwesasne, little or no research has been conducted in areas/issues of critical importance to Akwesasne. This underlines both the need for more research about the impacts of the damming of the River on the culture, economics and health of Akwesasne, and signals the lack of equity and empowerment provided to Akwesasne from any of these studies.

Information drawn from a preliminary environmental assessment of the downstream impacts of the Moses-Saunders dam presented to Ontario Hydro by the Mohawk Council of Akwesasne and from comments provided to the New York Power Authority by the Akwesasne Task Force on the Environment¹⁸ regarding the environmental studies conducted during the re-licensing process, indicated the impacts of the dams on the communities of Akwesasne and St. Regis. Among the concern were:

- a. The flooding of farm land, and the loss of farm land due to erosion – this is caused by an increase in the speed of the river and a change in the flow regime;
- b. The erosion of the shoreline in the St. Regis Village;
- c. The loss of fisheries due to increased contaminant loads in the fish;
- d. The increase in contaminants in fish populations – this is as a result of the release of methyl mercury during the flooding of islands by the dam construction;
- e. The destruction of fish spawning beds, leading to critical loss in Sturgeon and Yellow Perch populations;

- f. A dramatic increase in the diabetes rate at Akwesasne due to loss of fish from the traditional diet;
- g. A decrease in the traditionally useable ice bridges in winter, resulting from changed currents – this has resulted in lost economic and transportation opportunities;
- h. An increase in density of industry in the local area due to cheap electricity, resulting in greater pressure on the environment; and
- i. Increases in community strife as local populations fight over increasingly scarce traditional resources, and struggle to maintain the viability of their traditions.

As noted above, insufficient research exists as to the full significance of the impacts of the FDR and Moses-Saunders dams on the cultural, economic and spiritual aspects of life at Akwesasne. However, due a long time series of traditional observations about the environment, and a long residency in the area, the Mohawk people living at Akwesasne *know that the dams have brought significant impacts to their way of life and environment*. Because of their privileged relationship with the environment, Aboriginal people require a voice in the management of resources which are significant to their survival, such as water.

Concerns of Aboriginal Communities

Any actions taken to enhance the ability of aboriginal peoples to coordinate a response to complex issues like water levels management will augment the ability of the IJC to involve them directly in decision-making processes. The knowledge of water levels impacts possessed by Aboriginal peoples could be very useful in evaluating the effects of water level management decisions on their communities. Evaluation and documentation of their knowledge about the water levels could be a first step in the process of their becoming directly involved.

Discussions and consultations have revealed that there are many barriers preventing or significantly hampering the direct involvement of Aboriginal people. Many Aboriginal communities still do not have qualified personnel skilled in environmental, engineering and water management. Even in communities where skilled people are available, none of the time and capabilities of these specialists and community representatives is allocated to the task of communication and interaction with IJC. Sometimes limitations are even more “trivial”: community specialists have free time capacity to participate but their organizations cannot cover the cost of travel.

At the regional and national levels, Aboriginal organizations often lack the professional capacity required for meaningful participation. Further, there is often lack of co-ordination between and within individual regional and national institutions and, there are no clearly defined objectives for the management of water levels to the benefit of Aboriginal peoples.

The Legal Context

Aboriginal people in Canada and the United States have increasing support from their respective legal systems for a role in natural resource management. In the United States, for example, the *Winters Doctrine* protects the right of Aboriginal Nations to have a say in the management of water resources that flow through their territories²⁴. Furthermore, U.S. Presidential Executive Orders secure these rights of Aboriginal nations in the United States. In Canada, cases like *Gérin*, *Sioui*, *Adams*, the “*VanderPeet* trilogy”, *Blueberry River Band*, *Maldvik*, *Delgum’uukw*, and *Marshall* expand the rights and responsibilities that Aboriginal people have for natural resource management²⁵. While this trend continues, Aboriginal people will continue to see their rights to have a say in natural resource management increase.

Canadian and American institutions have an increasing legal responsibility to take into consideration the impacts on Aboriginal peoples of resource management decisions. This implies that national and bi-national organizations in Canada and the United States will need to expand the involvement of Aboriginal people in decision-making processes about water levels in the St. Lawrence River and Lake Ontario if they are to remain within the legal frameworks provided by the courts of both countries. As the New York Power Authority re-licensing process demonstrates, public participation should be sensitive to the cultural, spiritual, economic and political needs of the three major nations in the St. Lawrence River- Lake Ontario corridor: American, Canadian and Mohawk.

6.1.2 Shoreline Dwellers

Those living on the shores of the Basin are affected by levels in a number of ways. Shorefront properties are subject to flooding and erosion; the successful operation of their water supply and waste disposal systems is reliant on water levels. Personal boating is also vulnerable, both in terms of associated structures (e.g. piers) as well as in available draft and the condition of the surrounding environment. Their interests are represented by municipal officials and cottagers associations. Examples of these groups include the South Shore County Collaborative on Lake Levels and the Private Landowners Committee of the Ontario Dune Coalition. Over the past few years, they have been successful in exercising some influence over the levels regulation decision making process. For example, Regulation Representatives have responded to concerns about getting boats into and out of the water at the beginning and end of the boating season by controlling levels for a short but defined period of time through the discretionary provisions of the ISLRBC.

6.1.3 Recreational Boating Industry

This has become a multi-million dollar industry on both sides of the Basin. It includes marina and tourism operators. The former frequently have significant investment in their operating facilities and extremes of fluctuation can have a considerable effect on their capacity to operate economically, if at all. Low water levels limit the size of boats that can be handled by the marina operators as well as the flexibility they have for launching or removing boats from the water. Some operators have absorbed considerable financial burdens by having their facilities dredged to improve capacity. Boats become damaged by running aground or having their propellers impact on submerged obstacles

that would, under less extreme conditions, be adequately submerged. Groups that represent these interests include the International Water Levels Coalition and operators such as the Point Claire Yacht Club. Again, the regulation system has responded in a limited way to the expressed concerns as was described above. However, the expressed needs of this group include asking that consideration be given to much more aggressive responses such as additional control structures.

International Water Levels Coalition (IWLC) ²⁶

The IWLC was formed to lobby all water level control agencies in order to maintain adequate levels in Lake Ontario and the St. Lawrence River. Its goals are:

- a. To have the International Joint Commissions (IJC) Orders of Approval amended to include recreational boating and the environment.
- b. To become better educated on all factors which influence water levels.
- c. To work closely with the ISLRBC to construct a candid, straight forward, two way communication highway and work cooperatively together.
- d. To develop a strong, active, well informed Advisory Board to the ISLRBC composed of independently selected representatives of all interest groups.
- e. To modify the Board of Control's consensus voting to a simple majority vote on water levels issue.

Informative extracts from its web newsletter indicate both the Coalition's approach and interests:

"The IWLC recognizes that it (The Study Board) will be impossible to satisfy all interests all of the time. Nevertheless, we hope for an improved plan of control in which the St. Lawrence River becomes one of the players, and recreational boating and tourism, as well as the environment are part of the plan. The Coalition believes that it is very important that all interests look to the overall health of the Lake Ontario/St. Lawrence River system first and their own individual concerns secondly.

In addition to the Study Board, a Public Interest Advisory Group (PIAG) has been established. Paul Webb, our Coalition president, and Bea Schermerhorn, secretary of IWLC are also members of this board.

The Coalition will play a very important role in the process. As we bring information to you, we need your input and ideas to take back to the study process.

Following a plan started a year ago, the Coalition has been meeting on an individual basis with each of the St. Lawrence River Board of Control members. Dr. Sciremammano is # 4 to have been invited to our meetings. Previous guests have been Dr. Theodore Huller, Doug Cuthbert and Peter Yeomans.

Your Coalition asked the St. Lawrence River Board of Control to keep about the same amount (10cm/4in) of water on the Lake as last summer. Due in part to our constant contact and reasoning with the Board, this request was adopted

Environment Canada asked the Coalition to participate in sending out a survey seeking information on optimum water levels at various areas along the River and the Lake.

The International Water Levels Coalition (IWLC) has been monitoring water levels and has continued communicating with the Board of Control as promised.

Spring 2000 News

International Water Levels Coalition is celebrating its 1st birthday!! There has been a lot of activity over these 12 months. We have established ourselves as a responsible organization. We have almost 500 members. We have participated in two tele-conferences put on by the International Board of Control; we have met with both a Canadian member of the control board as well as the newest American member.

1. *IWLC requested that the board maintain restricted outflows AFTER the Ottawa River freshet to raise Lake Ontario to long term average (putting approximately 3 to 4 inches up on Lake Ontario. The usual scenario is to go back to plan outflows after the freshet. And guess what! The day after their Massena meeting the St. Lawrence River Board issued a press release announcing that they are planning on trying to put some water on the Lake!!!*

2. *We ask the Board to consider using the resource of Universities and the private sector to get the study process going while waiting for government funding*

3. *We ask that the Board begin addressing the problem of changing the long term levels of Lake Ontario which have been occurring for many years, an unpleasant side bar of plan 1958-D that no one has really known about or maybe didn't care to address.*

4. *Finally, we ask for the IJC & the Board to carefully review past studies like the Levels Reference & Scope of Work studies as well as other relevant studies within the scientific community. This would avoid duplication of study effort and it would begin some early, remediation in water level regulation prior to the projected timetable for the new Plan of Study "*

6.2 Ecosystem Sustainability

A most significant aspect of ecosystem quality in relation to Lake levels is the fact that the natural variations over time are the conditions that created the habitat and for sustaining species life cycles and diversity. It is somewhat modified now by man's activities. Consequently, those stakeholders that are strong proponents of preserving the Great Lakes from an ecosystem perspective are not positively disposed towards a levels regulation regime that diminishes these historical levels fluctuations. In point of fact, the present process employed to regulate levels and flows in the Lake Ontario-St. Lawrence River system tends, except in the event of significant extremes of water input, to restrict levels variations to a considerably smaller range than would occur naturally.

Throughout the basin, on both sides of the border, there are numerous groups representing interests that focus on various aspects of the Great Lakes-St. Lawrence River ecosystem. Most of these provide information describing changes, usually

classified as detrimental, to various aspects of the Basin ecosystem that have resulted from man's intervention with the system.

For example, a recent discussion paper²⁷ prepared on fish habitat changes in the St. Lawrence River identified seven categories of alterations within the river system that have impacted fish habitat and fish. One of these categories is water regulation but others associated include dam construction and dredging and filling. In particular, water regulation has reduced and degraded wetlands and resulted in unstable and unproductive habitats.

A numerical model of the St. Lawrence River has been developed by Environment Canada²⁸ in cooperation with the National Institute for Scientific Research and other partners. The model, which concentrates on the region from Cornwall to Trois Rivières, can be used to assess the impacts of different water-level scenarios in which the river physics and chemistry change. In essence, it uses physical aspects of the habitat, such as water depth, currents, waves and sediment, to predict the potential impact on the flora and fauna.

The Commission's Levels Study Board concluded in 1993²⁹ that the reduction in the range of water level fluctuations resulting from regulation has adversely affected the extent and diversity of Lake Ontario's wetlands. Also in 1993, the Commission recommended that "Governments continue to use, and promote the use of, the ecosystem approach in managing water levels and flows in the Great Lakes-St. Lawrence River basin". Up until 1993, information presented in terms of levels impacts on wetlands was largely qualitative, based on the best professional judgment of acknowledged experts in the field. The paucity of quantitative data precluded an opportunity to advance system modeling concepts to incorporate ecosystem inputs. In order to participate constructively in a water levels and flows management environment where conflicting interests of stakeholders are the rule rather than the exception when it comes to influencing decision making, this collective stakeholder group requires a considerable amount scientific information in order to gauge the consequences of various regulatory processes. As a result, a very considerable amount of research has been and continues to be funded by the Governments in support of the generally accepted view that wetlands represent a practical indicator of how changes in levels and flows affect the ecosystem as a whole.

6.3 Current Initiatives³⁰

As the collective Great Lakes-St. Lawrence River Basin community has grown and evolved, so have suspicions and concerns among users of the system as to the dominance of navigation and power issues in the decisions taken by those in authority over levels and flows regulation. The Commission felt that there needed to be increased public understanding of the causes of water levels problems in order to develop a broader appreciation within the community at large of the impacts of proposed solutions to levels and flows management. To this end, the Commission has taken steps to significantly expand its process of communication, consultation and involvement.

The five year study recently inaugurated under the auspices of the International Lake Ontario-St. Lawrence River Study Board plan, and funded by the Governments, represents a serious response to the present concerns over the impacts of the fluctuation of levels and flows and the effects of controls. Clearly, if the Governments are to be successful in revisiting the Orders of Approval for flow regulation in terms of accommodating in a balanced manner, the concerns of riparians and system users need to be systematically taken into account in managing the regime. The study stems from recognition that there exist significant data and information shortfalls for effective and balanced decision making.

The present status with respect to the level of knowledge and planned research has been adequately described³⁰ together with an outline of a five year plan of study developed to fill in the identified data and information gaps³¹. The tasks and objectives pertinent to making up this study are:

Ecosystem Sustainability

1. Wetland vegetation studies and mapping to provide recommendations on the regulation scenarios to maintain dynamic cycles and processes
2. Faunal studies (native species) to ensure that faunal species that need to have access to the tributaries and floodplain for spawning have that access at the required times of year; and, to develop a general version for species that do not use the floodplain—ensure that faunal species have access to all the types of habitats they require to complete their life cycle
3. GIS, modeling and integration of data to determine the outcome of water level scenarios on habitat and fauna

Coastal Zone

Objectives include: improving understanding of the natural, modified, and future physical system for lake, river (upper and lower), and bay shorelines; prediction of flooding and erosion through development and application of state-of-the-art data acquisition, management, and modeling; coordinating and promoting wide dissemination of information with other groups/public (cross-pollination); evaluating potential water level and flow scenarios

Recreational Boating

Objectives include developing new criteria for recreational boating through assessment of the relationship of water levels and impacts to recreational boating and related tourism, and local and regional economy; soliciting concerns and obtaining buy-in to study; defining how the model will accomplish water impact relationships; identifying user patterns and values

Municipal, Domestic and Industrial Water

Objectives include identification and characterization of potential problems with water intakes (quality and physical levels) related to water level fluctuations, by taking into account variations in hydrodynamics in regard to biological processes (e.g., algae blooms) and the microbiology of pathogens effects in low levels compared to normal levels; developing a database containing the above information by basin (ON, QC, NY); developing a listing of municipal intakes (representative) with above problems to improve characterization; listing of sites with characterizations; recommendation report; survey result and analysis; recommendation report

Commercial Navigation

Objectives include assessment of the effects of levels and flows on commercial navigation from Lake Ontario (Port Weller) to Bécancour (just downstream of Trois-Rivières); development/establishment of a common understanding of facts and issues through the system; evaluation of the economic impact of fluctuating water levels and flows; evaluation of the impact of flow changes on levels and velocities (maximize vessel loading on an operational basis; determination underkeel clearance required for safe navigation in confined areas; maintenance of channel discharge capacity and prevention of ice jams; establishment of parity with upstream equivalent existing "H", "I" and "J" criteria; optimizing of loading capacity of vessels (tons carried per trip), economic viability of marine transportation system, and provision of a method to rank/evaluate various regulation scenarios; measure the increase/decrease of environmental effects from shipping due to changes in water levels (i.e., impacts of modal shifts on fuel consumption and resulting greenhouse gas emissions)

Hydroelectric Power

Objective is a review of the proposed change in the regulation plan on hydroelectric operation and participation in the information exchange among the involved groups

Hydrologic and Hydraulic Evaluation Models

Objective is provision of hydrology and hydraulic modeling (and regulation plan) to allow evaluation by various interests

Common Data Needs

Objective include acquisition of detailed bathymetric and topographic data of the nearshore zone to develop a detailed Digital Elevation Model of the shoreline to support the modeling of impacts of water levels; identify effects of fluctuations on various interests groups; establish standards for developing and working with spatial data (e.g. platform, projections, file formats, data exchange, metadata, etc.)

6.4 Hydrology and Climate Change -Related Considerations

The possible impacts of climate change on weather events and the hydrology of the Great Lakes-St. Lawrence River are an increasingly important factor in modeling for water level management.

6.4.1 Climate Change

Climate change and its likely impacts on levels in the Great Lakes-St. Lawrence River system are the focus of considerable research by a number of agencies on both sides on the international border. According to researchers, the average temperature in the Great Lakes basin could go up by about 4.5 °C by 2055, with slightly larger increases in winter than in summer. Higher rates of evaporation and drier soils would reduce runoff, and water levels in the Great Lakes could fall by an average of between 0.5m and 1.0 m, according to typical scenarios. The St. Lawrence River outflow could be reduced by 20 percent. While not undisputed, preliminary modeling suggests a decrease in outflow from the lakes of between 23 % and 51 % as a result of climate change³². Clearly, the potential changes increase the demands on the capability of current water level management modeling and emphasizes the demands for better predictive weather models.

Reduced levels and flows would have significant impact on shipping and the industries it supports throughout the basin as well as on power generation capacity. These might well be counteracted by longer shipping seasons as a result of milder winters as well as decreased energy requirements for the same reason. The recreational boating industry stands to be considerably affected. Other considerations include physical measures that might be taken to offset impacts such as dredging to compensate for loss of draught and the problems this might have for water quality. There will be significant habitat changes resulting in species responses. Dilution capacity will likely be reduced. As water levels drop across North America, particularly in the United States, there will likely be increased demands for diversion/export.

At this juncture, much of this is speculation and as stated, is the subject of comprehensive research activities. In summary, consultations can be summarized as climate change seems to be real and has to be taken seriously and should be incorporated into the planning, decision-making, and management processes. A partly diverging opinion is provided by Klemes³³:

"While it is recognized that the possibility of climate change increases the uncertainty inherent in the planning and design of water resources projects, ... both the past experience and the present standards of practice indicate that the potential impacts can be coped with if and when changes become manifest. The following general guidelines for the planning and design practice are considered sufficient for the foreseeable future:

- *Adherence to high professional standards in proposing solutions to existing water resource problems.*
- *Commitment to measures limiting water waste and pollution.*
- *Striving for robust and resilient designs and operational flexibility of projects.*
- *Documenting and taking into account known uncertainties in water supply and demand.*
- *Documenting the ranges of feasible operation of projects, rather than providing only nominal design parameters.*

- *Providing a general outline of feasible contingency measures for extreme conditions not accommodated by the project under normal operation"*

6.4.2 Hydrology

The Great Lakes water management system is operated essentially as a hydraulic routing system, with little consideration given to hydrology and climatology of the system and of its various and largely heterogeneous sub-systems.

Consultations indicate that justification for this simplification of the system is the long-term response of the system. Impacts of significant hydrology events and possible climate shifts cannot be recognized within hours or days. They can be identified only with delays measured in months, sometimes in years. However, a sound knowledge of the system's hydrology and hydrological parameters (rainfall, liquid and total precipitation, evaporation and evapotranspiration, runoff, ground water storage) is essential for any considerations involving impacts of climate change.

Hydrology and climate change-related considerations are divided into several sections: hydrology modeling, hydrology extremes, and climate change and impact. The issue was discussed with researchers in the field, however, the key source of information were selected papers by Klemes³³, summarizing the results of over 40 years of work of this eminent hydrologist, and extensively quoted in this section.

Hydrology Modeling

Satisfactory hydrology knowledge of the system does not exist at the present time. Mathematical models of the system do exist, but a hydrology model based on rigorous understanding of fundamental physical processes does not.

Fundamental hydrology research does not receive sufficient attention and support – for example, the role of the National Hydrology Research Institute, the key Canadian institution focusing on hydrology research, was officially defined in 1986 as "developing, applying and advising on the technology required by clients managing Canadian waters". The following three quotes from the report of the Canadian Associate Committee on Hydrology, entitled *Canadian Hydrological Science* [Associate Committee on Hydrology, 1991, quoted in Klemes, 2000] summarize the situation: "Hydrology research expertise is by and large focused on applied, not fundamental science"; "the research priorities of most Canadian hydrology establishments address technology"; and "Should funding become available, scientists currently conducting research in applied hydrology, water management and allied sciences would likely be enticed to shift into basic research".

Hydrology Extremes

Control of levels and flows in the Lake Ontario-St. Lawrence River system is used to reduce the impact of extreme floods and droughts. These issues have also been discussed with several specialists. They all have confirmed need for more basic research in areas of water balance, rainfall-runoff, evaporation and evapotranspiration, and groundwater storage. Results of the discussion seem to be aptly summarized,

however, in the Introduction to Chapter 3.3 in Klemes, 2000 (The Improbable Probabilities of Extreme Floods and Droughts)³³:

"The current approach to the estimation of probabilities of extreme floods and droughts is based on analysis of extremes in historic stream flow or precipitation records. The main weakness of the analysis is that it takes no account of the actual climatic, hydrological and other geophysical mechanisms that produced the observed extremes.

This attitude reflects confusion between the requirements of current decision-making and the need for improving the scientific basis for future decision-making. In the case of hydrologic extremes, the latter has been entirely sacrificed to the former – the above mentioned excuse has been repeated for at least 50 years during which time much progress on the real difficult issues could have been made but has not, so that the present-day planners are no better off than their grandfathers were".

7 OBSERVATIONS AND RECOMMENDATIONS

An assessment has been made of the institutional structures and arrangements integral to making decisions about Lake Ontario and St. Lawrence River levels and flows.

The Boundary Waters Treaty lists the uses: recognized as important in 1909: sanitary and domestic, navigation and power. The accommodation of other uses is left somewhat vague. Since that time the entire ecosystem, human and natural has evolved. There has been:

- Significant population growth in the Basin;
- Exponential increase in: understanding the value of the ecosystem; a recognition of the need to treat it holistically; how it works; and, concerns for what we do not know;
- Changing uses and intensities of use of the waters;
- Changing governance – participation, recognition of rights of minority groups.

The Study Board's initiatives are a much needed institutional response to accommodate the evolution.

The overall observation from this investigation is that the institutional structure is effective, as have been the members and officials who have populated it over the years. Within the envelope of hydrology knowledge available to decision makers, the control system has been operated to satisfy many interests. However, since 1958 when the control structures were commissioned, demands on the boundary waters and knowledge and understanding have changed, giving rise to new needs and the opportunities. The changes provide, in part, the basis for the following observations and recommendations about the decision-making process for levels and flows regulation. Following each observation and recommendation, there is a summary of the comments made by participants in a presentation to the Study Board and IJC officials on January 22nd, 2002.

7.1 The ISLRBC proposal to the IJC to modernize levels and flows regulation with Regulation Plan 1998 was not accepted. The Commission concluded that the improvements were insufficient and that there was insufficient environmental impact information. With a view to further considering a new Regulation Plan, IJC commissioned the Lake Ontario-St. Lawrence River Study Board in 2000 to provide IJC with options for improving operating rules and criteria. The Study Board has a 5-year time frame and a budget exceeding \$30 million Canadian. This is the most significant levels management initiative currently underway.

Although an options formulation and assessment process is described in the Board's study plan, no open reference has been found to the decision-making process IJC intends apply to the Board's outputs. An understanding of the IJC process, to the extent that it can be defined, if available to the Board, would provide guidance and would assist the Board in ensuring that its outputs are effective and that they are produced efficiently.

It would also support wise, reproducible, transparent and readily understandable decisions.

In the early 1990's, the USEPA was faced with a comparable situation for which the cost of obtaining environmental information was great and in which the potential costs of making wrong decisions because of a deficient information base could be extremely serious. The Agency commissioned the development of a logical approach to defensible decision-making relating to environmental matters, which is widely applicable.

An option that the IJC should consider is the early definition, to the extent possible, of the decision-making process it intends to apply to the Study Board's outputs.

Presentation comments

- A decision making process is followed by the IJC. It is not a clearly defined entity, depending upon the circumstances and the wishes of the Commissioners at the time;
- The process is likely to be an iterative process involving the Study Board and public hearings ;
- The recommendation is understood to be one that would promote the engagement of IJC staff and others early in the decision making process, looking at assumptions and future directions;
- No reference has been found to a study programme evaluation framework for assessing Study Plan progress. It was suggested that an evaluation programme would provide the Board with the knowledge for making in-course corrections to their programme while funds and time remaining allow taking such actions.

7.2 In the past 45 years there have been many changes in need, knowledge and governance related to uses of the boundary waters. The levels and flows decision-making process has only changed over this time by the provision of discretionary authority to the ISLRBC and improved outreach to stakeholders. It is not clear how much the limited change is due to the constraints imposed by the interpretation placed on the provisions of Article VIII of the Boundary Waters Treaty by decision makers.

Interpretation of the Treaty will be a fundamental consideration to the Study Board's evaluation of options to accommodate interests other than those traditionally accommodated.

IJC should commission, at an early stage, an investigation of the flexibility inherent in the Treaty and the Orders of Approval to accommodate new plans of regulation and/or more discretionary authority to accommodate emerging and growing interests. It should be integral with developing a decision-making process (7.1 above).

Presentation comments

- It would not be practical to explore the limits of Article VIII in the abstract.

7.3 For the assessment of regulation options, it will be important for the Study Board to understand the capability of the flow control structures to accommodate a variety of uses and the consequences of future changes in the system hydrology, including climate change. A description of the envelope of operating capability of the flow control structures was not found in this investigation.

The Commission should consider initiating investigations of the hydrology envelope in which the existing control structures are effective, if such information is not already available. It should take into account: Article VIII of the Boundary Waters Treaty, conditions and criteria in the Orders of Approval and the dependent Plan 1958-D; and, discretionary authority given to the ISLRBC.

Presentation comments

- It would not be onerous to obtain the information.
- The information could be used to point out to IJC where structural limitations to levels and flow control impact on regulation options;
- The information could be needed to consider the actions that would be required to deal with catastrophic events;
- There was a question as to whether the information is needed.

7.4 The Treaty explicitly allows for decision making by majority vote. The IJC's institutional management philosophy includes decision making by consensus, intended to avoid decisions being made along national, regional or agency lines. In the absence of some interests at the decision making table, this may be considered as majority decision-making.

In addition, the manner in which the institutional structures practice consensus seeking may lead to extended time for decision making as well as lack of transparency in the process.

Consideration should be given by the IJC to a study of the benefits and dis-benefits of consensus decision-making at all levels of the institutional structure, taking into account that not all stakeholders are equally represented in the decision making process.

Maintaining the current institutional management policy, an option would be to consider broader membership on decision-making bodies.

Presentation comments

- The IJC is considering making public the minutes of its subsidiary boards. An announcement could come as soon as February 2002.

7.5 The time required by the institutional structure to initiate actions that could lead to potential changes to the decision-making process, undertake the actions, report back to the eventual decision-maker, and arrive at a decision can be quite protracted (See the sections on decision-making in Chapter 5)

Consideration should be given by all levels of the institutional structure to timelier decision-making. In the event that protracted schedules are essential, the reasons and the schedule should be disseminated.

Presentation comments

- A list should be appended. (A selection is provided below).

1952. Reference to IJC to determine whether measures can be taken to regulate levels of Lake Ontario for benefit of property owners having regard to all other interests. 1961. Response of IJC to 1952 Reference received.

1964. Lake Levels Reference to IJC concerning further regulation of Great Lakes water levels as a result of wide-spread public concern over the extremely low water levels experienced in the mid-1960's

1986. Reference from the Governments to examine and report upon methods of alleviating adverse consequences of fluctuating water levels in the Great Lakes–St. Lawrence River Basin. 1993. IJC Report pursuant to 1986 Reference

1973. ISLRBC initiated Working Committee to review operation since regulation began. The Board concluded in 1975 that Plan 1958-D, along with discretionary authority was superior to other regulation proposals at the time.

The reasons were not investigated. They were not readily evident and no judgment was made.

7.6 The OAG has been in place for about 40 years. Originally instituted to provide advice on peaking, ponding and winter operational needs, its role has changed over the intervening period and it has developed into a day-to-day function. Only power and navigation interests are represented on the OAG.

A review of the OAG responsibilities and membership base to match present and future needs is recommended.

Presentation comments

- Recommendation strongly supported

7.7 The stakeholder interests that have direct representation in the decision-making process through membership on the ISLRBC and the OAG are governments, municipal, navigation and power. Other stakeholders are provided access through public meetings and smaller meetings in the basin, toll-free telephone numbers, internet sites, newsletters and announcements, and, agency offices in both countries. These stakeholders include shoreline property owners, including those that derive a living or their cultural structure from the boundary waters, such as Aboriginal peoples, fishermen, hunters, marina owners and tourism operators.

How the inputs for many of the 'other' stakeholders factor in decision-making is not public knowledge. This includes some of the stakeholders who rely on levels for domestic and sanitary purposes.

Consideration should be given to reviewing Orders of Approval and dependent regulation plans with a view to including inputs from currently lesser-represented stakeholder interests into the levels decision-making process, and, making that knowledge publicly available.

Presentation comments

- Domestic and sanitary uses in the River are covered by the provisions for riparian users upstream and downstream of the control structures;
- The recommendation is the goal of the Study Board.

7.8 The decision making process that begins with the interpretation of the provisions of the Boundary Waters Treaty and ends up with directions being given to the operators of the power generation control structures is difficult to understand, even by professionals. In places, lack of information, probably the absence of protocols and, differing opinions, serve only to make the situation more complicated. It must be even more difficult for the layperson that needs to understand because of a particular stake or interest in levels management. Some of the web sites of stakeholder groups and government agencies assist in transmitting parts of the process.

Consideration should be given to the preparation an authoritative, reader-friendly description of the cardinal features of the process.

Presentation comments

- The concise depiction of the decision-making structure, Exhibit 3 in Chapter 5, only represents the formal process. There is also multi-faceted informal access to decision makers.
- The Governments of Canada and the United States communicate with IJC through their respective departments responsible for external affairs. The depiction needs to show this. (Exhibit 3 incorporates the change)
- There was a question as to whether the IJC asked Governments for approval of some of its actions. A list was requested. (It has been provided to IJC ^{68, 69, 70}.)

7.9 Canadian and American institutions at all levels of government have a legal responsibility to take into consideration impacts of resource (levels) management decisions on Aboriginal Peoples. In this context, Aboriginal Peoples' knowledge about the water levels in relation to the system would be useful to understanding and addressing the impacts. Further, despite several large studies of the environment in the area around Akwesasne, little or no research has been conducted in areas and issues of critical importance to Akwesasne.

National and bi-national organizations need to involve Aboriginal peoples in decision-making processes dealing with water levels. The IJC should consider adding to the levels decision-making process a mechanism that would involve Aboriginal peoples.

Consideration should be given to more research about the impacts of the damming of the River on the culture, economics and health of Akwesasne. This research should also document and utilize the specific knowledge of Aboriginal peoples about water levels.

Presentation comments

- An explanation should be provided about where and how Aboriginal peoples should be included in the process.
- Add the need for more research with input from Aboriginal peoples

7.10 Hydrology and climate models are not used in the levels management decision-making process. It is understood that the state-of-the-science does not sustain the confidence of the decision makers in their use and likelihood of adding value. Given the significance of the Lake Ontario-St. Lawrence River system to the Basin's population, research into improving decision-making should be a very high priority.

Recognizing that the Study Board is undertaking some work in hydrology and hydrologic modeling, an option would be to open up discussions with technical and research institutions in the United States and Canada for the purpose of convincing them to give this field of science and engineering a high priority for funding .

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(<http://huron.lre.usace.army.mil/levels/hmpglv.html>)
Overview of current studies to improve regulation of outflows from Lakes superior and Ontario together with pertinent historical information. This website also provides access to numerous editions of Great Lakes Update containing much additional information on levels fluctuations and impacts.
3. Akwesasne Task Force on the Environment (ATFE).
(<http://www.slic.com/atfe/atfe.htm>)
4. International Joint Commission, Directive to the International Lake Ontario-St Lawrence River Study Board, December, 2000.
(<http://www.ijc.org/ijcweb-e.html>)
5. U.S. Army Corps of Engineers/Great Lakes Commission, *Living with the Lakes*, 1999.
(<http://www.glc.org/docs/lakelevels/lakelevels.html>)
A highly informative source of summary information on many aspects of the Great Lakes – St. Lawrence River system levels and flows.
6. Personal Communication, R.C.J. Sampson with Chairperson of PIAG, December 23, 2001
7. Canadian Hydrographic Service, Level News, a monthly levels bulletin
(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)
8. International Joint Commission (1998). The International Joint Commission and the Boundary Waters Treaty of 1909.
(<http://www.ijc.org/ijcweb-e.html>)
9. U.S. Army Corps of Engineers, B. D., Great Lake Water Levels and Hydrological Information (home page)
(<http://huron.lre.usace.army.mil/levels/hmpglv.html>)
This page provides useful links to historical, current and project water levels in the Great Lakes and St. Lawrence and information about the hydrology of these areas

10. Environment Canada: Fresh Water Flooding. Events in Canada-Quebec.
(http://www.ec.gc.ca/water/en/manage.floodgen/e_que.htm)

11. Canadian Hydrographic Service, Level News, a monthly levels bulletin
(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

12. Telephone discussions. C. J. Edmonds with representatives of the Lake Ontario-St. Lawrence River Study Board on June 7th and December 12th, 2001

13. Telephone conferences: C. J. Edmonds and R. C. J. Sampson, with officials of the International joint Commission, December 20 and 21, 2001

14. St. Lawrence River-Lake Ontario Plan of Study Team (1999). Plan of Study for Criteria Review in the Orders of Approval for Regulation of Lake Ontario - St. Lawrence River Levels and Flows. Annex 3. Prepared for the International Joint Commission.
(<http://www.ijc.org/ijcweb-e.html>)

Annex 3 provides an abbreviated history of regulation activities in Lake Ontario.

15. International Lake Ontario – St. Lawrence River Study Board. Public Meeting, October 18, 2001, Montreal, Quebec
(<http://www.ijc.org/ijcweb-e.html>)

Pictorial presentation on the contents of the study

16. Telephone discussion: C. J. Edmonds with ISLRBC U.S. Secretary on 11th December, 2001

17. Telephone conversation: C. J. Edmonds with ISLRBC Canadian Regulation Representatives on 20th December, 2001

18. New York Power Authority New York Power Authority Re-licensing.
(<http://www.stl.nypa.gov/relicensing.html>)

A web page dedicated to the documentation for the Re-licensing of the FDR dam. Of particular interest are the documents regarding the Cooperative Consultation Process (CPP)

- New York Power Authority Introduction to the Environmental Impact Assessment for the New York Power Authority - Project Information.
- New York Power Authority (2001). Appendix B, Compilation of Issues Identified by CCP Team Members and Observers.

This is a detailed listing of the socio-economic, environmental and cultural issues identified by the Cooperative Consultation Process with respect to the construction and operation of the FDR dam. Of particular interest are the specific issues raised by the Mohawk communities of Akwesasne and St. Regis.

19. Jenkins, P., *River Song - Sailing the History of the St. Lawrence* Penguin - Viking, Toronto, 2001.

The author presents stories about the St. Lawrence based on his experience of traveling down the river. The articles present a strong sense of the river and its place in the lives of the people that live along its shores. Of particular interest is a chapter about the removal of the lost villages prior to construction of the seaway.

20. Morin, J., Boudreau, P., and Leclerc, M., 1994. *Réhabilitation de l'Écosystème du Saint-Laurent - Lac Saint-François : Les Bases de la Modélisation Hydrodynamique*. Sainte-Foy, Québec, INRS - Eau.

The authors propose the development of a hydrodynamic model for the stretch of the St. Lawrence River between the Moses-Saunders dam and the Beauharnois Canal. They provide some information on the extent of modifications made to the river pre- and post- seaway construction – modifications that were made for hydro electric generation and navigation.

21. See www.chiefs-of-ontario.org/ for more information about this organization

22. See www.afn.ca for more information about the Assembly of First Nations

23. See www.aiai.on.ca/ for more information about AIAI.

24. Shurts, John, 2000. *Indian Reserved Water Rights: The Winters Doctrine in its Social and Legal Context, 1880s-1930s*, University of Oklahoma Press, Norman.

The author provides a historical study of the Winters case and the early use of the reserved water doctrine in the United States. This includes an examination of the social and legal contexts in which the Winters Doctrine was applied during its early years. This book is of particular interest to those interested in the rights of Aboriginal people to manage natural resources that impact on their way of living.

25. Isaac, T. F., *Aboriginal Law Cases, Materials and Commentary*, 2 ed., Purich Publishing, Saskatchewan, 1999.

A comprehensive compilation of legal cases treating aboriginal rights in Canada. The book is divided into sections (i.e.: resource use), each with an introduction and an analysis of the cumulative impacts of the cases on the specific area of law in question.

26. International Water Levels Coalition
(<http://www.iwlc.org/index.html>)

27. Grant R.E. & Associates, Brockville, Ontario, Fish Habitat Changes - Thousand Islands, Middle Corridor, and Lake St. Lawrence. St. Lawrence River Discussion Papers

28. Environment Canada. Science and the Environment Bulletin. St_ Lawrence has its Ups and Downs.

(<http://www.ec.gc.ca/>)

29. International Joint Commission (1993). Methods of Alleviating the Adverse Consequences of Fluctuating Water Levels in the Great Lakes - St. Lawrence River Basin.

(<http://www.ijc.org/comm/levelse.html>)

30. St. Lawrence River-Lake Ontario Plan of Study Team, 1999. Plan of Study for Criteria Review in the Orders of Approval for Regulation of Lake Ontario - St. Lawrence River Levels and Flows.

(<http://www.ijc.org/ijcweb-e.html>)

Basis for the terms of reference of this subsequent study examining the decision making process and institutional structures behind management of levels and flows in the Lake Ontario and St. Lawrence River system

31. International Lake Ontario-St. Lawrence River Study Board, Work Plans, Summary Report, in *Montreal Workshop*, Montreal, Quebec, 2001.

(<http://www.ijc.org/ijcweb-e.html>)

32. Slivitsky, M., Water Management: Water Supply and Demand - The St. Lawrence River, in *Great Lakes- St. Lawrence Basin Project*, pp. 32.

The author discusses basic reduced flow scenarios potentials in the St. Lawrence resulting from climate change.

33. Klemes, Vit, 2000. *Common Sense and Other Heresies. Selected Papers on Hydrology and Water Resources Engineering* (edited by C. David Sellars). Canadian Water Resources Association.

This compendium of selected papers deals with critical issues in the science of hydrology in general, hydrological modeling, hydrological extremes, considering the implications on design of risks, uncertainty and optimization, reservoir storage, as well as climate change impacts and water resources systems. The book summarizes results of more than forty years of work of this leading Canadian hydrologist.

34. Dorsey, A. H. J., Research for Water Resources Management: The Rise and Fall of Great Expectations, *Canadian Bulletin of Fisheries and Aquatic Sciences, Department of Fisheries and Oceans* 215, 1987.

This text focuses on the role of research on the management of water resources, examining the growing complexity of the growing and diversifying demands for use of water. The author stresses the need for innovations to re-invigorate the role of research in water resource management while bemoaning the decreased investment in the same.

35. Pross, A. P., *Group Politics and Public Policy*, 2 ed. Oxford University Press, 1992.
The author provides a detailed overview of the historical evolution of interest groups and their interaction with the public policy process. This is an essential introductory text to the evolution in the complexity of the relationships between the two. Of particular interest is the observation that public interest groups currently have not only greater access to the points in the policy process where they traditionally had had access, but also access to a greater number of points in the process as a whole.
36. Arnstein, Sherry, 1969. "A Ladder of Citizen Participation", *Journal of the American Institute of Planners*, 35, no. 4 (July), p. 218-224.
The author, former Chief Advisor on Public Participation in the Model Cities Administration of the United States Department of Housing and Urban Development, evaluated the differing degrees of "citizen power" given to participants in the first 75 model cities programs that the agency funded. She uses this evaluation to construct a typology of citizen participation, divided into eight rungs, starting at non participation, leading to tokenism, and achieving its highest levels with citizen power.
37. Stiles, Marit, 1998. *Lessons for Public Dialogue: an Assessment report on THE SOCIETY WE WANT Public Dialogue Project*, Canadian Policy Research Networks research paper F|02, Ottawa, Ontario.
The author provides a review of the climate for public consultation in Canada at the time of writing. She also provides several useful "pointers" for those interested in public consultation techniques in Canada.
38. Levels Reference Study Board, 1993. *Levels Reference Study - Great Lakes-St. Lawrence River Basin.*
Final report and appendices of the Great Lakes-St. Lawrence River Reference.
39. Bryce, J. B. *A Hydraulic Engineering History of the St. Lawrence Power Project with Special Reference to Regulation of Water Levels and Flows*. Prepared for Ontario Hydro, January 1982.
The purpose of the History is to record and discuss in summary form the significant events and recommendations relevant to the Hydraulic Engineering aspects of the Project, leading to the requirements of the Order of Approval and the basis of final design. Also, to record and discuss the development of plans for flow regulation and other operating criteria which have governed and continue to govern the hydraulic operation of the project.
40. International Joint Commission, *Great Lakes Regulation Issues Workshop - Agenda and Background Information for the June 9-10, 1998 Windsor Workshop*, 1998.

The materials should be listed and referenced separately as appropriate for the report as proceedings from the workshop were never prepared.

41. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1993 (Vol. 1, No. 9).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Lake St. Lawrence levels abnormally low

42. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1995 (Vol. 3, No. 1).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

ISLRBC considers options for improving Lake Ontario flow and level controls

43. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1995 (Vol. 3, No. 5).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Low Lake Ontario and St. Lawrence River levels following three months of below average supply from Lake Ontario

44. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1995 (Vol. 3, No. 6).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

ISLRBC public information meeting

45. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1995 (Vol. 3, No. 9).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

ISLRBC public information meeting

46. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1995 (Vol. 3, No. 11).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

FAQ from five recent public meetings prepared and distributed

47. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1996 (vol. 4, No. 6).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Levels rising rapidly due to snowmelt/freshet

48. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1996 (Vol. 4, No. 7).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

ISLRBC public information meeting

49. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1996 (Vol. 4, No. 11).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Extremely low Lake St. Lawrence levels

50. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1997 (Vol. 5, No. 2).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

IJC takes measures to deal with high Lake Ontario levels

51. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1997 (Vol. 5, No. 7).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Plan 1998 proposed

52. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1997 (Vol. 5, No. 8).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Lake Ontario level remains above average; ISLRBC public meeting brings complaints from Lake St. Lawrence boaters about low levels

53. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1997 (Vol. 5, No. 10,11,12).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Problems for Lake St. Lawrence boaters; IJC seeking comment on proposed Lake Ontario regulation plan

54. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1998 (Vol. 6, No. 3).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Potential for flooding prompts IJC to invoke Criterion "k"

55. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1998 (Vol. 6, No. 7).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

ISLRBC public meeting brings complaints about levels regulation

56. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1998 (Vol. 6, No. 11).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

57. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1999 (Vol. 7, No. 3).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Governments concerned about effectiveness of existing management principles and conservation measures

58. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1999 (Vol. 7, No. 4).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

IJC public hearings on consumption, diversion and removal (bulk export) of Basin waters

59. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1999 (Vol. 7, No. 7).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

ISLRBC public meeting, Cornwall, Ontario

60. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 1999 (Vol. 7, No. 11).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

Plan of Study for Criteria Review released by IJC

61. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2000 (Vol. 8, No. 3).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

Low levels; advisories issued

62. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2000 (Vol. 8, No. 4).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

ISLRBC holds multi-city teleconference

63. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2000 (Vol. 8, No. 6).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

ISLRBC public meeting

64. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2001 (Vol. 9, No. 1).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

International Lake Ontario-St. Lawrence River Study Board established

65. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2001 (Vol. 9, No. 4).

<http://www.on.ec.gc.ca/water/level-news/intro-e.html>

ISLRBC multi-city teleconference

66. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2001 (Vol. 9, No. 5).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

Low levels followed by rapid snowmelt, threat of flooding in Montreal

67. Canadian Hydrographic Service, Great Lakes - St. Lawrence River Water Levels, in *Level News*, 2001 (Vol. 9, No. 7).

(<http://www.on.ec.gc.ca/water/level-news/intro-e.html>)

ISLRBC annual meeting (public in attendance) in Kingston.

Minutes of proceedings and evidence of the Sub-Committee on the St. Lawrence Seaway of the Standing Committee on Transport, in *Sub-Committee on the St. Lawrence Seaway*, Queen's Printer for Canada, Ottawa, 1992.

This report deals with the issues facing the seaway at the time of the hearings in 1992. Included are issues regarding the levels of water, and the necessity for dredging to increase channel depths.

68. International Joint Commission. Letter to the Secretary of State for External Affairs, Ottawa, Ontario in early September, 1973., from Secretary, Canadian Section, IJC recommending that governments ensure acquiescence of Government of Quebec to the continued release of maximum practicable flows and response of Governments later in September 1973.

"With regard to high water conditions in Lake Ontario, Governments are unable to offer assurances of indemnity for downstream riparian interests on the St. Lawrence River beyond those obligations assumed under the IJC's 1952 Order of Approval as amended in 1956."

69. International Joint Commission. Letter to Honourable L. B. Pearson, Secretary of State of External Affairs, Ottawa. 17 March, 1955,

".....After consideration of the views of all concerned, and as soon as possible after these public hearings, the Commission will present an interim report recommending, for the approval of 'the two Governments, a range of lake levels and criteria for acceptable duration of high stages of Lake Ontario. If the two Governments approve the recommendations which 'will be contained in the interim report the Commission will put the recommendations into effect by issuing an appropriate supplement to its Order of Approval, dated 29 October, 1952. The Commission hopes to be able to issue this supplement on or about 1 May, 1955.

Yours sincerely,

A.G.L. McNaughton

Chairman, Canadian Section, International Joint Commission

70. International Joint Commission, Ottawa, Canada. Letter to Secretary of State for External Affairs, Ottawa. May, 1955

"Dear Sir,

In my letter of March 17, 1955, I transmitted to you on behalf of the Commission criteria for a plan of regulation of Lake Ontario in connection with the St Lawrence Power Project, having regard to all interests affected. In that letter., I also informed you that after public hearings and a consideration of the views of all concerned, the Commission would present an interim report recommending for the approval of the two Governments, a range of lake levels and criteria for acceptable duration of high stages of Lake Ontario."

Beck, G. G. and Litteljohn, B., *Voices for the Watershed: Environmental Issues in the Great Lakes - St Lawrence Drainage Basin* McGill-Queen's University Press, Montréal, 2000.

A collection of texts covering political, social, economic and environmental significance of the Great Lakes - St. Lawrence Ecosystem. The texts take a non-academic approach to the issues of key importance, and evaluate threats to the watershed and its inhabitants.

Burton, J. and St-Jacques, Y., Public Participation in Environmental Management of the St. Lawrence River: Zones of Primary Intervention, in *2nd Annual International Conference on the St. Lawrence Ecosystem*, Cornwall, Ontario, 1996.

The authors briefly document the ZIP programs along the St. Lawrence in Quebec. This text acknowledges the important difference between these parallel processes in Quebec and Ontario

Fay, D. and A. Eberhardt, Future Options for Lake Ontario - St. Lawrence River Outflow Regulation, in *2nd Annual International Conference on the St. Lawrence Ecosystem*, Cornwall, Ontario, 1996.

The authors discuss the history and alternatives to the management of water levels in the St. Lawrence and Great Lakes. In order to compare the effectiveness of the alternatives, they apply them to the management of water levels from 1900-1993. The resulting alternatives suggest several different engineering-based solutions to meet the demands of current stakeholders.

Great Lakes Commission (1999). Consumptive Use in the Great Lakes-St. Lawrence River Basin.

[\(http://www.great-lakes.net/lakes/\)](http://www.great-lakes.net/lakes/)

International Joint Commission (1976). Further Regulation of the Great Lakes.

International Joint Commission (1998). Unsafe Dams

An examination of existing procedures and institutions responsible for dam safety with an outline of proposals and recommendations for further action by governments

International Joint Commission (2000). Rapport final sur la protection des eaux des grands lacs.

International St. Lawrence River Board of Control, Frequently Asked Questions, Environment Canada, Level News, 1995.

(<http://www.on.ec.gc.ca/water/level-news/lvn95nov.html>)

Responses to a series of questions posed in relation to: Decision-Making, High Lake Ontario Water Levels, High Levels and Flows in the St. Lawrence River, Low Lake Ontario and St. Lawrence River Levels, Environmental Impacts, Other Interest

International St. Lawrence River Board of Control. Public Meeting, Holiday Inn, Kingston, Ontario. June 19, 2001 (www.islrbc.org/)

Presentations and a video provide a useful description of why flows are regulated and give some insight as to the organizations and procedures involved. Noticeably absent is how public input contributes to the decision-making process. Several stakeholder interests are identified. These stakeholders represent government (U.S. and Canada), private marina operators, Conservation Authorities, Shipping Associations etc. Although the issues of the stakeholders are presented, there is little or no feedback (or noticeable impact) observable.

International St. Lawrence River Board of Control, Multicity Teleconference, September 17, 2001 (www.islrbc.org/)

Commentary from stakeholders on lake levels covering recreational and commercial navigation, weed growth, municipal water supplies. Commentary about criticism of how input is or is not handled; used to identify specific stakeholder issues for water levels in the Great Lakes, St. Lawrence River. Although the issues of the stakeholders are presented, there is little or no feedback (or noticeable impact) observable; useful input from a variety of stakeholders in the St. Lawrence, Lake Ontario area. These stakeholders represent government (U.S. and Canada), private marina operators, Conservation Authorities, Shipping Associations etc. It is possible to tell whether the stakeholders feel that their input is being accepted or not

International Lake Ontario-St. Lawrence River Study Board. *First Progress Report to the International Joint Commission Covering the Period 12 December 2000 Through 22 March 2001*, 22 MARCH 2001 Buffalo, New York. Ottawa, Ontario.

The January meeting in Burlington, Ontario, was the first meeting fully attended by the twelve members Board. The Board outlined a schedule of activities to be conducted through July 2001, including the Montreal planning workshop, a fisheries workshop to be held in conjunction with the St. Lawrence Institute of Environmental Science Conference in Cornwall in May and future meetings at Akwesasne.

The Board endorsed the development of an historic/naturalized knowledge base of the Lake Ontario -St. Lawrence River system and a review of legislative/jurisdictional changes (1960-present).

On 22-25 January 2001, the Board held its Technical Experts Workshop. The first day included presentations about existing Lake Ontario regulation and recent studies regarding improvements, as well as, the new Study.

Mortsch, L., Koshida, G., and Tavares, D. e., Adapting to the Impacts of Climate Change and Variability, in *Environment Canada, Great Lakes - St. Lawrence Basin Project* Atmospheric Environment Service, Inland Waters Directorate, Burlington, Ontario, 1993.

The authors briefly document the ZIP programs along the St. Lawrence in Quebec. This text acknowledges the important difference between these parallel processes in Quebec and Ontario.

La Violette, N., A Comparison of Great Lakes Remedial Action Plans and St. Lawrence River Restoration Plans, *Journal of Great Lakes Research* 19(2), 389-399, 1992.

The author compares levels of public participation in the RAP, ZIP and PARE processes, drawing conclusions about the potential of each process to include the public.

Larson, J. W., 1983. History of Great Lakes Navigation, U.S. Army Engineer Water Resources Support Center, Institute for Water Resources.

The author purports to trace the history of navigation on the Great Lakes, starting in the 1700s. The book includes a timeline which traces this history, starting in 1763.

Leech, D. J., 2000. Public Consultation: A Review of Five Canadian Case Studies, Report Presented to Department of Justice (Canada).

The author presents an overview and assessment of five public consultation exercises conducted in Canada during the latter part of the twentieth century. The emphasis of this report is on providing guidance regarding the elements of a

successful public participation process. Of interest is that the document provides recommendations for public participation processes which are based on cultural concepts familiar to Aboriginal peoples.

Ottawa River Regulation Planning Board, Summary of Public Meeting, Hawkesbury, Ontario.

This is the summary of discussion held at the annual meeting of the ORRPB. The primary focus of the summary is to show the level of public interaction in the meeting, and the responses of the Board to public concerns and questions.

Pal, L., *Beyond Policy Analysis: Public Issue Management in Turbulent Times* ITP Nelson, Scarborough, Ontario, 1997.

This book provides a useful overview of the policy making and analysis process. It was the source of the model for understanding public impact in the water level consultation process.

Selznick, P., *Tennessee Valley Authority and the Grass Roots: A Case Study of Politics and Organization* University of California Press, 1984.

A fundamental text on the evolution of public participation in the management of complex watershed-based projects. This text could serve as a primer on how the public can become involved in managing the delicate balance between water levels (i.e.: for irrigation, flood control etc) and power generation.

St. Lawrence Vision 2000, in *Le Fleuve*.
(http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm)

Newsletter published by St. Lawrence Vision 2000. This issue has an article on the effects of water level fluctuations on the St. Lawrence ecosystem

St. Lawrence Vision 2000, in *Le Fleuve*.
(http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm)

Newsletter published by St. Lawrence Vision 2000. This issue has an article on sustainable marine navigation

St. Lawrence Vision 2000, in *Le Fleuve*.
(http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm)

Newsletter published by St. Lawrence Vision 2000. This issue has an article on the feasibility of the public's increased responsibility for the river

St. Lawrence Vision 2000, in *Le Fleuve*.
(http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm)

Newsletter published by St. Lawrence Vision 2000. This issue has an article on public consultation in the Lake St. Francis area

St. Lawrence Vision 2000, in *Le Fleuve*.
(http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm)

Newsletter published by St. Lawrence Vision 2000. This issue has an article on water level management and habitat productivity

St. Lawrence Vision 2000, in *Le Fleuve* 2001.
(http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm)

Newsletter published by St. Lawrence Vision 2000. This issue has an article on community involvement in rehabilitation of the ecosystem.

Stride, F. A. and Drier, S. I., St. Lawrence (Cornwall) Remedial Action Plan: An Overview of Actions 1986-1995, in *2nd Annual International Conference on the St. Lawrence Ecosystem*, Cornwall, Ontario, 1996.

The authors trace the history and experience of the St. Lawrence RAP, focusing on its greatest challenges for the future. They conclude that the RAP process has been a vehicle for increasing the implication of individuals dedicated to restoration of the environment.

Seaway History Milestones
(http://www.greatlakes-seaway.com/en/pdf/history_timeline.pdf)

Appendix 1

COPIES OF TRANSPARENCIES USED IN A JANUARY 22nd 2002

PRESENTATION TO THE STUDY BOARD

Appendix 2

ABBREVIATED TERMS OF REFERENCE

Task (1) Project Part 1:

A Bibliography of Institutional Structures and Arrangements (legal and regulatory) that impact on Lake Ontario - St. Lawrence River Water levels and flow regulation and a list of constraints thereby imposed on the issue.

Task (2) Project Part 2:

Based on an analysis of the bibliography, develop and present statements of option for changes in the decision-making process for controlling lake levels, and assess advantages and disadvantages of those options including:

- a) Dissemination of information, empowerment and access of stakeholders.
- b) Science priorities relating to improving ecosystem knowledge especially in light of emerging climate change considerations.
- c) Optional institutional structures to support an effective and efficient decision-making process.

Project Part 2 deliverables will be structured as follows:

Task (2a)

The Contractor will provide a written report on the on the above deliverables in electronic and hard (paper) copy format by no later than 31 December 2001.

Task (2b)

Following the delivery of the report, in January 2002 the Contractor will make an oral presentation and participate in a discussion of the deliverables with the Study Board at a time and location in the basin to be determined at a later date by the Board.

Task (3)

Period of interest is the past 50 years, but cognizance should be given to any prior agreements that impact on lake water levels and that could have influenced the development and form of the institutional structure. Task (3) has three main components:

Task (3 a)

Chronological analysis of actual lake water levels correlated with recorded decisions of regulatory authorities and actions of system users, e.g., flow control structures, flood control structures, and watershed development patterns.

Task (3b)

Identification and analysis of the institutional structures in place when level decisions have been made and the decision-making process employed. Influential factors such as qualifications of decision makers, resources available to them, committee structures, assignment of authorities, accessibility and consideration of stakeholders, information flows, etc., should be considered as a minimum.

Task (3c)

Identification of decision-support institutional infrastructure including government and non-government institutions, e.g., research institutes, universities, research funding agencies, public lobby groups, stakeholder interest groups and evaluation of the following factors:

Task (3c i)

Knowledge of climate and the hydrology of the system and research support to improve the level of understanding.

Task (3c ii)

Level of understanding of ecosystem quality and its response to lake water levels.

Task (3c iii)

Accessibility and influence of system stakeholders, e.g., hydro power generation, navigation, shoreline residents, small craft boating, municipal infrastructure, etc., to the decision makers,

Task (3d)

Evaluation of current initiatives and issues such as water supplies, water export, climate change, priority pollutant management.

Task (3 e)

Contact shall be made with a wide range of sources of institutional knowledge and records, i.e., legal advisors to the International Joint Commission in Ottawa and Washington, D.C. Offices, the Canadian Environmental Law Association, universities, etc.

Task (3f)

The scope of the work shall encompass institutional structures across all jurisdictions in the applicable Lake Ontario-St. Lawrence River Region downstream to Trois Rivières.

Estimated hours total: 150

Appendix 3

CHRONOLOGY OF HYDROLOGY EVENTS AND INSTITUTIONAL RESPONSES

DATE	EVENT	SIGNIFICANCE/IMPACT	RESPONSE	AUTHORITY
1825	Development of the Upper St. Lawrence River for navigation and power proposed ²			Governments
1895	First binational discussions on improving the St. Lawrence River for shipping			Governments
ca. 1900	Great Lakes levels record keeping initiated			
December, 1903	International Waterways Commission established ²	Guiding principles and dispute resolution		Governments
January 11, 1909	Boundary Water Treaty signed			Governments
January 11, 1909	IJC created			Governments
1921	IJC recommended a joint navigation-power project be undertaken in the upper St. Lawrence River			IJC
1929	Great Lakes levels reached highest historical recorded levels			
early 1930's	"Dry years" - Levels reached lowest historical recorded levels			
1952	Great Lakes levels reached 1929 highs	Flooding and erosion		
June 25, 1952	Reference to IJC to seek measures to regulate Lake Ontario to reduce extremes of stage to collective benefit of shore property owners			Governments
October 29, 1952	IJC issued Order of Approval for construction of regulatory works for development of power in the International Rapids Section	Regulation still based on Method of Regulation No. 5		IJC
November 16, 1953	IISLRBC established.			IJC
July 2, 1956	IJC Supplementary Order imposing regulation criteria for operation of the Cornwall-Massena power works issued - Plan 12-A-9			IJC

**Report: Lake Ontario and St. Lawrence River
Changes in the Institutional Structure and Their Impact on Water Levels, 1950-2001**

DATE	EVENT	SIGNIFICANCE/IMPACT	RESPONSE	AUTHORITY
1958	Power station operation initiated	Created Lake St. Lawrence Reservoir		
June 26, 1959	St. Lawrence Seaway officially opened	With power development, forced relocation of 6500 people and submersed villages and towns		
April 20, 1960	Lake Ontario Plan 1958-A put into operation			IJC
early 1960's	Great Lakes levels very low once again			
January 3, 1962	Lake Ontario Plan 1958-C put into operation			IJC
October 4, 1963	Lake Ontario Plan 1958-D put into operation	To improve levels in Montreal Harbour without reduction in minimum winter flows of 1958-C		IJC
1964	Continued record low supplies ⁴⁰	Power generation and navigation adversely affected; widespread public concern generally over levels	International Great Lakes Levels Board established; reference to the IJC concerning further regulation of Great Lakes Levels	IJC
1965	Flooding downstream from Montreal	Ice jam; death (20) and destruction		
1972-73	Great Lakes levels reached highs exceeding those prior to regulation	Flooding and erosion \$M 25 damage	Working Committee established to review operation since regulation began	ISLRBC
1985-87	Great Lakes levels reached highs exceeding those prior to regulation	Flooding and erosion \$M 100 damage	Reference (1986) from Governments to examine and report on methods for alleviating adverse consequences of fluctuating water levels	Governments
July, 1987	Flash flood in Montreal	Intense rainfall		
Late 1980's	Levels on decline	Recreational boating industry concerned about declining levels; concerns about negative environmental impacts of regulation	Working Committee (1989) to examine Plan 1958-D and identify possible improvements	ISLRBC
March, 1993	Report of the Levels Reference Study Board delivered to the IJC			
September, 1993	L. St. Lawrence levels abnormally low ⁴¹	Problems for boaters and wells in L. St. Lawrence area; low harbour levels in Montreal in August	Decreased LO outflows to aid Cornwall dam	ISLRBC
April, 1994	IJC Report: Methods of Alleviating the Adverse Consequences of Fluctuating Water Levels in the Great Lakes-St. Lawrence River Basin			
June 21, 1994	ISLRBC Public Information Meeting			ISLRBC

**Report: Lake Ontario and St. Lawrence River
Changes in the Institutional Structure and Their Impact on Water Levels, 1950-2001**

DATE	EVENT	SIGNIFICANCE/IMPACT	RESPONSE	AUTHORITY
January, 1995	ISLRBC considers options for improving Lake Ontario flow and level controls ⁴²	Plan 35-P from the 1993 Levels Reference IS-4 optimization technique to achieve compromise among competing interests		ISLRBC
May, 1995	Low Lake Ontario and St. Lawrence River levels following three months of below average supply from L.O. ⁴³	Recreational boating problems Cargo vessels forced to lighten loads	Decreased flows out of Lake Ontario authorized to conserve lake supplies	ISLRBC
May 15, 1995	ISLRBC Public Information Meeting ⁴⁴		Heavy turnout of varied interests	ISLRBC
August 9, 1995	ISLRBC Public Information Meeting ⁴⁵	Board outlined plans to review criteria for LO regulation	Large turnout with wide and often conflicting range of needs, expectations	ISLRBC
November, 1995	FAQ from five recent public meetings prepared and distributed ⁴⁶	Structured responses to key questions from the majority of participating stakeholders		ISLRBC
May, 1996	Lake levels rising rapidly due to snowmelt and Spring freshet ⁴⁷	Potential for serious flooding, esp. on Lac St. Louis	ISLRBC reduced the Lake Ontario outflows from late April until mid-May and maintained the flow sufficiently high order to provide adequate water levels for fish spawning on Lake St. Louis and downstream.	ISLRBC
June 3, 1996	ISLRBC public meeting drew large turnout of active participants, partly in response to the recent rapid rise in lake levels ⁴⁸	The Lake Ontario shore property owners and area elected officials expressed concern with high water levels and ongoing erosion problems. On the other hand, recreational boaters and marina operators in eastern Lake Ontario and the Thousand Islands area of the St. Lawrence River expressed a preference for higher levels. Representatives of environmental interests indicated a desire for somewhat more natural level and flow fluctuations.		ISLRBC
October, 1996	Extremely low levels in Lake St. Lawrence resulting from high flows through the Moses-Saunders power dam; situation aggravated by high winds ⁴⁹	Problems for recreational boaters, particularly as this is the season for lifting the boats out of the water	Regulation helped with elevated LO levels and ideal River and Harbour conditions but created LSL woes, especially for boaters	ISLRBC

**Report: Lake Ontario and St. Lawrence River
Changes in the Institutional Structure and Their Impact on Water Levels, 1950- 2001**

DATE	EVENT	SIGNIFICANCE/IMPACT	RESPONSE	AUTHORITY
January, 1997	IJC Takes Measures to Deal With High Lake Ontario Levels ⁵⁰	Concern over above average levels and continuing high supplies of water to Lake Ontario	The IJC to invoke Criterion (k) in the regulation of the outflows of Lake Ontario on January 17. By this measure, the IJC places a priority on providing relief to shoreline property owners on Lake Ontario and the St. Lawrence River as far downstream as Montreal. Under Criterion (k) operations, the IJC's ISLRBC will direct maximum possible outflows when appropriate without causing downstream flooding.	IJC
June , 1997	ISLRBC recommends alternative plan of regulation to IJC (Plan 35P alias Plan 1998) ⁵¹	Proposed plan would offer marginal improvements over documented performance of Plan 1958-D	Following public consultation, proposed plan was rejected (1998)	IJC
July, 1997	Lake Ontario level remains above average ⁵²	Very high flows from Lake Erie which are expected to continue	High Lake Ontario outflows directed by the ISLRBC have helped reduce the levels of Lake Ontario.	ISLRBC
July 2, 1997	ISLRBC Public Information Meeting in Brockville, Ontario ⁵²	Shore property owners on Lake Ontario were generally satisfied with actions taken by the Board in lowering lake levels this spring. Those who live and boat on Lake St. Lawrence, however, were not satisfied with the low water levels brought on by high flows at Cornwall/Massena.		ISLRBC
Oct., 1997	Lake St. Lawrence boaters experiencing difficulty getting their boats out of the water for the coming winter season ⁵³	The level of Lake St. Lawrence is about 45 centimetres below average	The ISLRBC has agreed to a request by the Ontario Marina Operators Association to have the Lake Ontario outflow set at 200 cubic metres per second below regulation plan flow on October 10-11, and again on October 17-18	ISLRBC
Fall, 1997	The IJC is seeking public comment on a proposed regulation plan for Lake Ontario outflows that would make minor adjustments to the regulation of water levels on the lake and St. Lawrence River as far downstream as Trois Rivières, Québec ⁵³	The proposed regulation plan builds on over 30 years of experience with the current regulation plan, Plan 1958-D, and includes many of the deviations from Plan 1958-D that are currently made to address various water supply conditions	Mixed reception at public meetings with increasing evidence of the extent of the competition for preferential responses, depending on the stakeholder interest.	IJC

**Report: Lake Ontario and St. Lawrence River
Changes in the Institutional Structure and Their Impact on Water Levels, 1950- 2001**

DATE	EVENT	SIGNIFICANCE/IMPACT	RESPONSE	AUTHORITY
February, 1998	Conditions are such that there is a high potential for flooding and shoreline damage during Spring breakup ⁵⁴		The IJC has invoked criterion (k) of its Orders of Approval for Lake Ontario-St. Lawrence River regulation. Criterion (k) gives precedence to shoreline property owners on Lake Ontario and the St. Lawrence River when setting the lake's outflow. In practice, this means that the outflow is being maximized without causing significant flood and erosion problems to property owners along the St. Lawrence River.	IJC
June 16, 1998	ISLRBC public meeting heavily attended and drew many complaints ⁵⁵	Different stakeholder groups voiced dichotomous views on handling of increases and decreases	ISLRBC explained that unusually large volumes of water had created the problems	ISLRBC
October, 1998	Low water level conditions at Montreal Harbour due to very low flows of the Ottawa River ⁵⁶	Difficulties for commercial navigation	ISLRBC authorized short-term increases in the Lake Ontario outflow on two occasions last month. The Board has also authorized further limited outflow increases should the need to maintain chart datum at Montreal arise.	ISLRBC
March, 1999	Both governments are concerned that existing management principles and conservation measures may be inadequate to ensure future sustainable use of shared waters ⁵⁷	Proposals to export water overseas from Canada, and litigation involving the export of water from Canada to the United States	IJC to examine and report on the consumption, diversion and removal of waters along the common border, including removals in bulk for export; public hearings	IJC
April, 1999	Public hearings around the Great Lakes - St. Lawrence basin as part of their investigation on the consumption, diversion and removal of waters, including removals in bulk for export ⁵⁸	Participants were overwhelmingly opposed to the diversion or export of water from the Great Lakes system. Concerns about the impacts such actions would have on the environment and about the setting of a precedence for larger exports in the future	Preliminary report due August, 1999	IJC
June 2, 1999	ISLRBC held a public meeting in Cornwall, Ontario ⁵⁹		The ISLRBC continued its regulation strategy during June to offset the over-discharge deviations, by releasing from Lake Ontario outflows less than specified by the regulation plan	ISLRBC

**Report: Lake Ontario and St. Lawrence River
Changes in the Institutional Structure and Their Impact on Water Levels, 1950- 2001**

DATE	EVENT	SIGNIFICANCE/IMPACT	RESPONSE	AUTHORITY
October, 1999	IJC released Plan of Study for Criteria Review in the Orders of Approval for the Regulation of Lake Ontario-St. Lawrence River Levels and Flows, describing in detail the work required ⁶⁰	Building on previous Scope of Work, the Plan of Study is extensive and encompasses detailed technical studies, impact assessment and development of alternatives. Ongoing public consultation will be an important component.		IJC
March, 2000	Low levels continue to plague system ⁶¹	Water levels advisories issued	The ISLRBC continues to maintain low Lake Ontario outflows. In order to conserve water on Lake Ontario, this Board has authorized that outflows from the lake be less than specified by its regulation plan during the spring if dry conditions on Lake Ontario continue	ISLRBC
April, 2000	ISLRBC holds multi-city teleconference ⁶²	120 members of the public participated and had the opportunity to express local views and concerns as well as also hear the views and concerns from other sites.		ISLRBC
May 30, 2000	ISLRBC public meeting ⁶³	130 attended and exchanged views		ISLRBC
December 18, 2000	IJC announces establishment of the Lake Ontario-St. Lawrence River study Board ⁶⁴			IJC
March 20, 2001	The ISLRBC held a multi-city teleconference on March 20 ⁶⁵	Public participation exceeded 80.		ISLRBC
May, 2001	Low levels followed by rapid snowmelt followed by declines resulted in rapid levels fluctuations at Montreal Harbour ⁶⁶	Threat of flooding in Lake St. Louis and around Montreal	The ISLRBC held the Lake Ontario outflow at an amount slightly less than specified by the regulation plan. While the flow of the Ottawa River remained high for several days as a result of snowmelt on the northern part of its basin, no further reductions in the Lake Ontario's outflow were needed during the rest of April	ISLRBC
June 19, 2001	40 people attended the ISLRBC annual public meeting held in Kingston, Ontario ⁶⁷	Participants, representing many user groups (riparian, recreational boating, hydropower generation, commercial navigation, etc.) came from Lake Ontario and from along the St. Lawrence River from Kingston to Montréal		ISLRBC

Appendix 4

BOUNDARY WATERS TREATY. ARTICLES VII, VIII AND IX

TREATY BETWEEN THE UNITED STATES AND GREAT BRITAIN RELATING TO BOUNDARY WATERS, AND QUESTIONS ARISING BETWEEN THE UNITED STATES AND CANADA

The United States of America and His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India, being equally desirous to prevent disputes regarding the use of boundary waters and to settle all questions which are now pending between the United States and the Dominion of Canada involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settlement of all such questions as may hereafter arise, have resolved to conclude a treaty in furtherance of these ends, and for that purpose have appointed as their respective plenipotentiaries:

The President of the United States of America, Elihu Root, Secretary of State of the United States; and

His Britannic Majesty, the Right Honourable James Bryce, O.M., his Ambassador Extraordinary and Plenipotentiary at Washington;

Who, after having communicated to one another their full powers, found in good and due form, have agreed upon the following articles:

PRELIMINARY ARTICLE

For the purposes of this treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes,- including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary.

ARTICLE VII

The High Contracting Parties agree to establish and maintain an International Joint Commission of the United States and Canada composed Of six commissioners, three on the part of the United States appointed by the President thereof, and three on the part of

the United Kingdom appointed by His Majesty on the recommendation of the Governor in Council of the Dominion of Canada.

ARTICLE VIII

This International Joint Commission, shall have jurisdiction over and shall pass upon all cases involving the use or obstruction or diversion of the waters with respect to which under Article III and IV of this treaty the approval of this Commission is required, and in passing upon such cases the Commission shall be governed by the following rules or principles which are adopted by the High Contracting Parties for this purpose:

The High Contracting Parties shall have, each on its own side of the boundary, equal and similar rights in the use of the waters hereinbefore defined as boundary waters.

The following order of precedence shall be observed among the various uses enumerated hereinafter for these waters, and no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence:

- (1) Uses for domestic and sanitary purposes;
- (2) Uses for navigation, including the service of canals for the purposes of navigation;
- (3) Uses for power and for irrigation purposes.

The foregoing provisions shall not apply to or disturb any existing uses of boundary waters on either side of the boundary.

The requirement for an equal division may in the discretion of the Commission be suspended in cases of temporary diversions along boundary waters at points where such equal division can not be made advantageously on account of local conditions, and where such diversion does not diminish elsewhere the amount available for use on the other side.

The Commission in its discretion may make its approval in any case conditional upon the construction of remedial or protective works to compensate so far as possible for the particular use or diversion proposed, and in such cases may require that suitable and adequate provision, approved by the Commission, be made for the protection and indemnity against injury of any interests on either side of the boundary.

In cases involving the elevation of the natural level of waters on either side of the line as a result of the construction or maintenance on the other side of remedial or protective works or dams or other obstructions in boundary waters or in waters flowing therefrom 'or in waters below the boundary in rivers flowing across the boundary, the Commission shall require, as a condition of its approval thereof, that suitable and adequate provision, approved by it, be made for the protection and indemnity of all interests on the other side of the line which may be injured thereby.

The majority of the Commissioners shall have power to render a decision. In case the Commission is evenly divided upon any question or matter presented to it for decision, separate reports shall be made by the Commissioners on each side to their own Government. The High Contracting Parties shall thereupon endeavour to agree upon an adjustment of the question or matter of difference, and if an agreement is reached between them, it shall be reduced to writing in the form of a protocol, and shall be communicated to the Commissioners, who shall take such further proceedings as may be necessary to carry out such agreement.

ARTICLE IX

The High Contracting Parties further agree that any other questions or matters of difference arising between them involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier between the United States and the Dominion of Canada, shall be referred from time to time to the International Joint Commission for examination and report, whenever either the Government of the United States or the Government of the Dominion of Canada shall request that such questions or matters of difference be so referred.

The International Joint Commission is authorized in each case so referred to examine into and report upon the facts and circumstances of the particular questions and matters referred, together with such conclusions and recommendations as may be appropriate, subject, however, to any restrictions or exceptions which may be imposed with respect thereto by the terms of the reference.

Such reports of the Commission shall not be regarded as decisions of the questions or matters so submitted either on the facts or the law, and shall in no way have the character of an arbitral award.

The Commission shall make a joint report to both Governments in all cases in which all or a majority of the Commissioners agree, and in case of disagreement the minority may make a joint report to both Governments, or separate reports to their respective Governments.

In case the Commission is evenly divided upon any question or matter referred to it for report, separate reports shall be made by the Commissioners on each side to their own Government.

Appendix 5

ORDERS OF APPROVAL FOR REGULATION OF LAKE ONTARIO. Office Consolidation.

IN THE MATTER OF THE APPLICATIONS OF THE GOVERNMENT OF CANADA AND THE GOVERNMENT OF THE UNITED STATES OF AMERICA FOR AN ORDER OF APPROVAL OF THE CONSTRUCTION OF CERTAIN' WORKS FOR DEVELOPMENT OF POWER IN THE INTERNATIONAL RAPIDS SECTION OF THE ST. LAWRENCE RIVER.

[Note:

1. *The amendments of July 2, 1956 are in Light Italic type.*
2. All elevations have been converted to International Great Lakes Datum (1985) and the metric system of measurement.

ORDERS OF APPROVAL

October 29, 1952, as amended by a supplementary Order dated July 2, 1956

WHEREAS the Government of Canada and the Government of the United States of America under date of 30 June, 1952, have submitted Applications to the International Joint Commission (hereinafter referred to as the "Commission") for its approval of the construction, jointly by entities to be designated by the respective Governments, of certain works for the development of power in the International Rapids Section of the St. Lawrence River, these being boundary waters within the meaning of the Preliminary Article of the Boundary Waters Treaty of 11 January, 1909 (hereinafter referred to as the "Treaty"), and of the construction, maintenance and operation of such works subject to and under conditions specified in the Applications, and have requested that the Applications be considered by the Commission as in the nature of a joint application: and

WHEREAS pursuant to the aforementioned request of the two Governments, the Commission is considering the two Applications as in the nature of a joint application: and

WHEREAS notices that the Applications had been filed were published in accordance with the Rules of Procedure of the Commission; and

WHEREAS Statements in Response to the Applications and Statements in Reply thereto by both Applicants were filed in accordance with the Rules of the Commission: and

WHEREAS pursuant to published notices, hearings were held, the Commission at Toronto, Ontario, on 23 July, 1952: at Ogdensburg, New York, on 24 July, 1952: at Cornwall, Ontario, on 25 July, 1952: at Albany, New York, on 3 September, 1952: at

Montreal, Quebec, on 8 September, 1952; and at Washington, D.C. on 20 October, 1952; and

WHEREAS by reason of the said notices of the said applications and hearings, all persons interested were afforded convenient opportunities of presenting evidence to and being heard before the Commission: and

WHEREAS pursuant to the said Applications, the hearings before, the evidence given, and material filed with the Commission, the Commission is satisfied that the proposed works and uses of the waters of the International Rapids Section comply with the principles by which the Commission is governed as adopted by the High Contracting Parties in Article VIII of the Treaty: and

WHEREAS the Commission has been informed that the Government of Canada has designated The Hydro-Electric Power Commission of Ontario as the entity to construct, maintain and operate the proposed works in Canada; and

WHEREAS the Commission has been informed that the President of the United States of America by Executive Order No. 10.500, dated 4 November 1953, designated the Power Authority of the State of New York as the United States entity to construct, maintain and operate the proposed works in the United States: and

WHEREAS the program of construction of the works. as proposed by the Applicants, includes the removal of Gut Dam from the International Rapids Section and the Government of Canada has informed the Commission that it is intention to take steps for the early removal of Gut Dam as soon as the construction of the proposed works is approved and as soon as river conditions and the protection of down river and other interests that *will* be affected during its removal will permit, thereby advancing the time of removal of Gut Dam: and

WHEREAS the Commission finds that suitable and adequate provision is made by the laws in Canada and by the Constitution and laws in the United States for the protection and indemnity of all interests on either side of the International Boundary which may be injured, by reason of the construction, maintenance and operation of the works; and

WHEREAS the Commission finds that it has jurisdiction to hear and dispose of the Applications by approval thereof in the manner and subject to the conditions hereinafter set out: and

WHEREAS the Commission, by Order dated 19 October 1952 [Docket 68], approved the construction, maintenance and operation of the works: and Appendix A to the said Order describes the features of the works so approved and provides that channel enlargements will be undertaken in specified areas; and

WHEREAS condition (i) of said Order provides that, upon completion of the works, the discharge of water from Lake Ontario and the flow of water through the International Rapids Section shall be regulated to meet the requirements of conditions (b), (c) and (d) thereof, and subject to possible modifications and changes to be recommended subsequently by the International St. Lawrence River Board of Control, in accordance with Method of Regulation No. 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September 1940; and

WHEREAS, by the said Order of 29 October 1952, the Commission specifically retained jurisdiction to make such further Order or Orders relating to the subject matter of the Applications of the United States of America and Canada (Docket 68) as may be necessary in the judgment of the Commission; and

WHEREAS the Commission, as a result of its investigations, under the Reference from the Governments of Canada and the United States of America, dated 25 June 1952, regarding the levels of Lake Ontario (Docket 67), has determined that it would not be practicable to base the regulation of flows from Lake Ontario on the said Method of Regulation No. 5; and

WHEREAS, pursuant to published notices hearings were held by the Commission at Detroit, Michigan, on 4 June 1953, Rochester, New York, on 17 November 1953 and 12 April 1955, Hamilton, Ontario, on 18 November 1953, and Toronto, Ontario, on 14 April 1955, at which all persons interested were afforded convenient opportunity of presenting evidence to and being heard before the Commission; and at the said hearings held at Toronto and Rochester in April 1955 all interested persons were given convenient opportunity to express their views upon the criteria and range of stage which had been tentatively proposed by the Commission; and

WHEREAS the Commission, on 9 May 1955, by letters addressed to the Secretary of State for External Affairs of Canada and the Secretary of State of the United States of America, respectively, recommended adoption by the two Governments of the following (i) A range of mean monthly elevations for Lake Ontario 74.15m (243.3 ft) (navigation season) to 75.37m (247.3 ft.) as nearly as may be; and

(ii) Criteria for a method of regulation of outflows and levels of Lake Ontario applicable to the works in the International Rapids Section of the St. Lawrence River; and

(iii) Plan of Regulation No. I2-A-9, subject to minor adjustments that may result from further detailed study and evaluation by the Commission; and

WHEREAS, by letters dated 3 December 1955, the Secretary of State for External Affairs of Canada and the Under Secretary of State of the United States of America advised the Commission that the Government of Canada and the Government of the United States of America, respectively, approved the range of mean monthly elevations for Lake Ontario and the criteria recommended in the Commission's said letters of 9

May, 1955; and also approved Plan of Regulation No. 12-A-9 for the purpose of calculating critical profiles and the design of channel excavations in the International Rapids Section of the St. Lawrence River; and

WHEREAS, in the said letters dated 3 December 1955. the two Governments urged the Commission to continue its studies with a view to perfecting a plan of regulation so as best to meet the requirements of all interests both upstream and downstream, within the range of elevations and criteria therein approved; and

WHEREBY, by letter dated 3 December 1955, the Secretary of State for External Affairs, on behalf of the Government of Canada. has informed the Commission of the arrangements that have been made for the redesign of a portion of the St. Lawrence Seaway Canal in the vicinity of Montreal, between Lake St. Louis and the Laprairie Basin; and

WHEREBY condition (i) of the said Order of Approval dated 29 October 1952 makes provision for adjustments and progressive improvements in the plan of regulation, subject to requirements and procedures specified therein;

NOW, THEREFORE, IT IS ORDERED that the construction, maintenance and operation jointly by The Hydro-Electric Power Commission of Ontario and the *Power Authority of the State of New York* of certain works (hereinafter called "the works") in accordance with the "Controlled Single Stage Project (238-242)", which was part of the joint report dated 3 January, 1941, of the Canadian Temporary Great Lakes-St. Lawrence Basin Committee and the United States St. Lawrence Advisory Committee, containing the features described in Appendix "A" to this Order and shown in Appendix "B" to this Order, be and the same are hereby approved subject to the conditions enumerated below, namely

(a) All interests on either side of the International Boundary which are injured by reason of the construction, maintenance and operation of the works shall be given suitable and adequate protection and indemnity in accordance with the laws in Canada or the Constitution and laws in the United States respectively, and in accordance with the requirements of Article VIII of the Treaty.

(b) The works shall be so planned, located, constructed, maintained and operated as not to conflict with or restrain uses of the waters of the St. Lawrence River for purposes given preference over uses of water for power purposes by the Treaty, namely, uses for domestic and sanitary purposes and uses for navigation, including the service of canals for the purpose of navigation, and. shall be so planned, located; constructed; maintained and operated as to give effect to the provisions of this Order.

(c) The works shall be constructed, maintained and operated in such manner as to safeguard the rights and lawful interests of others engaged or to be engaged in the development of power in the St. Lawrence River below the International Rapids Section.

(d) The works shall be so designed, constructed, maintained and operated as to safeguard so far as possible the rights of all interests affected by the levels of the St.

Lawrence River upstream from the Iroquois regulatory structure and by the levels of Lake Ontario and the lower Niagara River, and any change in levels resulting from the works which injuriously affects such rights shall be subject to the requirements of paragraph (a) relating to protection and indemnification.

(e) The hydro-electric plants approved by this Order shall not be subjected to operating rules and procedures more rigorous than are necessary to comply with the provisions of the foregoing paragraphs (b), (c) and (d).

(f) Before the Hydro-Electric Power Commission of Ontario commences the construction of any part of the works, it shall submit to the Government of Canada, and before the *Power Authority of the State of New York* commences the construction of any part of the works, it shall submit to the Government of the United States, for approval in writing, detailed plans and specifications of that part of the works located in their respective countries and details of the program of construction thereof or such details of such plans and specifications or programs of construction relating thereto as the respective Governments may require. If after any plan, specification or program has been so approved, The Hydro-Electric Power Commission of Ontario or the *Power Authority of the State of New York* wishes to make any change, therein, it shall before adopting such change, submit the changed plan, specification or program for approval in a like manner.

(g) In accordance with the Applications, the establishment by the Governments of Canada and the United States of a Joint Board of Engineers to be known as the St. Lawrence River Joint Board of Engineers (hereinafter referred to as the "Joint Board of Engineers") consisting of an equal number of representatives of Canada and the United States to be designated by the respective Governments, is approved. The duties of the Joint Board of Engineers shall be to review and coordinate, and, if both Governments so authorize, approve the plans and specifications of the works and the programs of construction thereof submitted for the approval of the respective Governments as specified above, and to assure the construction of the works in accordance therewith as approved. The Joint Board of Engineers shall consult with and keep the Board of Control, hereinafter referred to, currently informed on all matters pertaining to the water levels of Lake Ontario and the International Rapids Section and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section, and shall give full consideration to any advice or recommendations received from the Board of Control with respect thereto.

(h) A Board of Control to be known as the International St. Lawrence River Board of Control (herein referred to as the "Board of Control") consisting of an equal number of representatives of Canada and of the United States, shall be established by this Commission. The duties of the Board of Control shall be to give effect to the instructions of the Commission as issued from time to time with respect to this Order. During construction of the works the duties of the Board of Control shall be to keep itself currently informed of the plans of the Joint Board of Engineers insofar as these plans relate to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section, and to consult with and advise the Joint Board of Engineers thereon. Upon completion of the works, the duties of

the Board of Control shall be to ensure that the provisions of this Order relating to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section as herein set out are complied with, and the Hydro-Electric Power Commission of Ontario and the *Power Authority of the State of New York* shall duly observe any direction given them by the Board of Control for the purpose of ensuring such compliance. The Board of Control shall report to the Commission at such times as the Commission may determine. In the event of any disagreement amongst the members of the Board of Control which they are unable to resolve, the matter shall be referred by them to the Commission for decision. The Board of Control may, at any time, make representations to the Commission in regard to any matter affecting or arising out of the terms of this Order with respect to water levels and the regulation of the said discharge and flow.

(i) Upon the completion of the works, the discharge of water from Lake Ontario and the flow of water through the International Rapids Section shall be regulated to meet the requirements of conditions (b), (c) and (d) hereof, shall be regulated within a range of stage from 74.15m (243.3 ft) (navigation season) to elevation 75.37m (247.3 ft) as nearly as may be: and shall be regulated in accordance with the criteria set forth in the Commission's letters of 17 March 1955 to the Governments of Canada and the United States of America and approved by the said governments in their letters of 3 December 1955 and qualified, by the terms of separate letters from the Government of Canada and the Government of the United States of America dated 11 April 1956 and 1 May 1956, respectively, to the extent that these letters agree that the criteria are intended to establish standards which would be maintained with the minimum variation. The project works shall be operated in such a manner as to provide no less protection for navigation and riparian interests downstream than would have occurred under pre-project conditions and with supplies of the past as adjusted, as defined in criterion (a) herein. The Commission will indicate in an appropriate fashion, as the occasion may require, the inter-relationship of the criteria, the range of elevations and the other requirements.

The criteria are as follows:

(a) The regulated outflow from Lake Ontario from 1 April to 15 December shall be such as not to reduce the minimum level of Montreal Harbour below that which would have occurred in the past with the supplies to Lake Ontario since 1860 adjusted to a condition assuming a continuous-diversion out of the Great Lakes Basin of 3,100 cubic feet per second at Chicago and a continuous diversion into the Great Lakes Basin of 5,000 cubic feet per second from the Albany River Basin (hereinafter called the "supplies of the past as adjusted").

(b) The regulated winter outflows from Lake Ontario from 15 December to 31 March shall be as large as feasible and shall be maintained so that the difficulties of winter power operation are minimized.

(c) The regulated outflow from Lake Ontario during the annual spring break-up in Montreal Harbour and in the river downstream shall not be greater than would have occurred assuming supplies of the past as adjusted.

(d) *The regulated outflow from Lake Ontario during the annual flood discharge from the Ottawa River shall not be greater than would have occurred assuming supplies of the past as adjusted.*

(e) *Consistent with other requirements, the minimum regulated monthly outflow from Lake Ontario shall be such as to secure the maximum dependable flow for power.*

(f) *Consistent with other requirements, the maximum regulated outflow from Lake Ontario shall be maintained as low as possible to reduce channel excavations to a minimum.*

(g) *Consistent with other requirements, the levels of Lake Ontario shall be regulated for the benefit of property owners on the shores of Lake Ontario in the United States and Canada so as to reduce the extremes of stage which have been experienced.*

(h) *The regulated monthly mean level of Lake Ontario shall not exceed elevation 75.37m (247.3 ft) with the supplies of the past as adjusted.*

(i) *Under regulation, the frequency of occurrences of the monthly mean elevations of approximately 75.07m (246.3 ft) and higher on Lake Ontario shall be less than would have occurred in the past with the supplies of the past as adjusted and with present channel conditions in the Galops Rapids Section of the St. Lawrence River. ('present channel conditions' refers to conditions as of March 1955.)*

(j) *The regulated level of Lake Ontario on 1 April shall not be lower than elevation 74.15 m (243.3 ft) The regulated monthly mean level of the lake from 1 April to 30 November shall be maintained at or above elevation.*

(k) *In the event of supplies in excess of the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to the riparian owners upstream and downstream. In the event of supplies less than the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to navigation and power interests.*

The flow of water through the International Rapids Section in any period shall equal the discharge of water from Lake Ontario as determined for that period in accordance with a plan of regulation which, in the judgment of the Commission, satisfies the aforementioned requirements, range of stage and criteria and when applied to the channels as determined in accordance with Appendix A hereto produces no more critical governing velocities than those specified in that appendix, nor more critical governing water surface profiles than those established by Plan of Regulation I2-A-9, when applied to the channels as determined in accordance with Appendix A hereto, and shall be maintained as uniformly as possible throughout that period.

Subject to the requirements of conditions (b), (c) and (d) hereof, and of the range of stage, and criteria, above written, the Board Of Control, after obtaining the approval of the Commission, may temporarily modify or change the restrictions as to discharge of water from Lake Ontario and the flow of water through the International Rapids Section for the purpose of determining what modifications or changes in the plan of regulation may be advisable. The Board of Control shall report to the Commission the results of such experiments, together with its recommendations as to any changes or

modifications *in the plan of regulation. When the plan of regulation has been perfected so as best to meet the requirements of all interests, within the range of stage and criteria above defined. the Commission will recommend to the 'two Governments that it be made permanent and, if the two Governments thereafter agree, such plan of regulation shall be given effect as if contained in this order.*

(j) Subject as hereinafter provided, upon completion of the works; the works shall be operated initially for a test period of ten years, or such shorter period as may be approved by the Commission with the forebay water level at the power houses held at a maximum elevation of 72.36 m (237.4 ft). Subject to the requirements of paragraphs (b), (c) and (d) hereof: the Board of Control, after obtaining the approval of the Commission, may temporarily modify or change the said forebay water level in order to carry out experiments for the purpose of determining whether it is advisable to increase the forebay water level at the power houses to a maximum elevation exceeding 72.36 m (237.4 ft)

If the Board of Control, as a result of these experiments considers that operation during this test period at a maximum elevation exceeding 72.36 m (237.4 ft) t would be advisable, and so recommends, the Commission will consider authorizing operation during this test period at a maximum elevation exceeding 72.36 m (237.4 ft). At the end of this test period, the Commission will make such recommendations to the two Governments with respect to a permanent forebay water level as in deems advisable or it may recommend an extension of the test period. Such of these recommendations as the two Governments thereafter agree to adopt shall be given effect as if contained in this Order.

(k) The Hydro-Electric Power Commission of Ontario and the *Power Authority of the State of New York* shall maintain and supply for the information of the Board of Control accurate records relating to water levels and the discharge of water through the works and the regulation of the flow of water through the International Rapids Section, as the Board of Control may determine to be suitable and necessary, and shall install such gauges, carry out such measurements, and perform such other services as the Board may deem necessary for these purposes.

(l) The Board of Control shall report to the Commission as of 31 December each year on the effect, if any, of the operation of the ° down-stream hydro-electric 'power' plants and related structures on the tail-water elevations at the hydro-electric power plane approved by this Order.

(m)The Government of Canada shall proceed forthwith to carry out its expressed intention to remove Gut Dam.

AND IT IS FURTHER ORDERED that the allocation set out in Appendix "C" of the costs of constructing, maintaining and operating the works approved by this Order between The Hydro-Electric Power Commission of Ontario and the *Power Authority of the State of New York* be and the same is hereby approved but such approval shall not preclude the Applicants from submitting to the Commission for approval any variation in the said

allocation that may be agreed upon between them as being appropriate or advisable.

AND IT IS FURTHER ORDERED that the Commission retains jurisdiction over the subject matter of these Applications, and may, after-giving such notice and opportunity to all interested parties to make representations as the Commission deems appropriate, make such further Order or Orders relating there to as may be necessary in the judgment of the Commission.

APPENDIX A

FEATURES OF THE WORKS APPROVED BY THIS ORDER'

(a) Channel Enlargements

Channel enlargements *will* be undertaken from above Chimney Point to below Lotus Island, designed to give a maximum mean velocity in any cross-section of the channel which will be used for navigation not exceeding four feet per second at any time, also between Lotus Island and Iroquois Point and from above Point Three Points to below Ogden island designed to give a maximum mean velocity in any cross-section not exceeding two and one-quarter feet per second with the flow and at the stage to be permitted on the First of January of any year, under regulation of outflow and levels of Lake Ontario in accordance with *Plan of Regulation No 12-A-9, as prepared by the International Lake Ontario Board of Engineer, dated 5 May 1955*. Downstream from the power houses channel enlargements will be carried out for the purpose of reducing the tail water level at the power houses.

Final locations and cross-sections of these channel enlargements *will* be determined from further studies.

As approved by the Government of Canada and the Government of the United States of America in similar letters dated 3 December 1955, the said Plan of Regulation No 12-A-9 shall be the basis for calculating critical profiles and designing channel excavations.

(b) Control Facilities

Adequate control facilities will be constructed for the regulation of the outflow from Lake Ontario.

(c) Power House Structures -

The power house structures will be constructed in the forth channel extending from the lower end of Barnhart Island to the Canadian shore, and so located that one structure *will* be on each side of the international Boundary. Each power house structure will include the main generating units to utilize economically the river flows available to it, with provision for ice handling and discharge sluices.

(d) Dams and Associated Structures

A control dam will be constructed extending from Iroquois Point on the Canadian side of the river in an easterly direction to the United States mainland above Point Rockway.

A dam will be constructed in the Long Sault Rapids at the head of Barnhart Island.

Dykes and associated works will be provided as may be necessary in both the Province of Ontario and the State of New York.

All the works in the pool below the control dam will be designed to provide for full Lake Ontario level.

(e) Highway Modifications

In both the Province of Ontario and the State of New York provincial and state highways, and other roads, *will* be relocated in those portions subject to flooding, and reconstructed to standards at least equal to those now in existence.

(f) Railway Modifications

Such railway re locations as may be required as a result of the works herein described *will* be-made in the Province of Ontario and the State of New York to standards at least equal to those now in existence.

(g) Navigation Facilities

Provision will be made for the continuance of 14-foot navigation throughout the International Rapids Section during the construction period.

(h) Flooded Areas

Lands and buildings in both the Province of Ontario and. the State of New York *will* be acquired or rehabilitated as required. Inundated wooded areas will be cleared.

APPENDIX B

General Plan showing major works of the Great Lakes-St. Lawrence Basin Power Project are not' included in the consolidation.

APPENDIX C

1. The power development works under this Application are those specified in Section 3 of the Application.
2. Total costs of the works described in Section 8 shall be based on Canadian costs and United States costs and the total shall be equally divided between the two constructing entities.

3. The costs to be divided should be based on actually experienced and audited expenses.

4. In relation to the three principles above, the three following provisions apply:

(a) The amount to be paid to Canada, as specified in the Agreement of December 3, 1951, between Canada and Ontario, in lieu of the construction by the power developing entities of facilities required for the continuance of 14-foot navigation, shall be excluded from the total cost of the power project to be divided between the Canadian and United States power-developing entities, in consideration of the fact that actual replacement of 14-foot navigational facilities will be rendered unnecessary by reason of the concurrent construction of the deep waterway in Canada.

(b) The Authority to be established pursuant to the provisions of the St. Lawrence Seaway Authority Act, Chapter 24 of the Status of Canada, 1951 (Second Session), shall contribute an agreed sum of money towards the cost of the channel enlargement which the power developing entities must undertake in the St. Lawrence River, as set out in paragraph 4 of the Annex to the Canada-Ontario Agreement of December 3, 1951, and in section 3 of the Application to the International Joint Commission, in consideration of the benefits which will accrue to navigation from such channel enlargement.

(c) All costs for construction, maintenance and operation of the project except machinery and equipment in the respective power houses shall be borne equally by the two entities. All costs for construction, maintenance and operation of machinery and equipment in their respective power houses shall be paid by the respective entities and shall be deemed to satisfy the principle of an equal division between the two entities.

Appendix 6

EVOLUTION OF STAKEHOLDER INVOLVEMENT IN WATER LEVEL MANAGEMENT

The purpose of this appendix is to provide an overview of the nature of the evolution in stakeholder involvement in governance, with an emphasis on the environment, as it might apply to managing water levels in the Lake Ontario – St. Lawrence River corridor portion of the Great-Lakes Seaway system. In particular, the focus is on the period of time from 1950 to 2001.

This period of time witnessed great changes in the nature and level of involvement by ‘non-traditional’ stakeholders in public policy, project design and management decisions in both the United States and Canada. Indeed, the growth of public involvement in the management of economies, health systems and ecosystems has served both to add transparency and complexity to process of managing public infrastructure like the Seaway. It is essential to understand, then, both the specifics of water level management in the study area (Lake Ontario to Trois-Rivières) and the general backdrop of public involvement to get a clearer picture of stakeholder involvement trends. For the purposes of convenience, three periods will be covered here: 1950 to 1970, the 1970s to the 1980s, and the 1990s until the present. An additional emphasis has been placed on the specific concerns of Aboriginal peoples in the particular corridor in Section 6 of this report.

1950 – 1970: From Restriction to Openness

The 1950s was a period of growth along the St. Lawrence River and Lake Ontario. Still very much in the post-war building phase, the public interest was dominated by the needs to curb high levels of unemployment, to supply growing industry and the needs of consumers in the St. Lawrence Valley. These consumers demanded inexpensive power, the conveniences of modern life, and abundant drinking water. Beyond these demands, public authorities also concerned themselves with protecting their citizens from the ravages of nature – including spring flooding³⁴.

The construction of the St. Lawrence Seaway from 1953 to 1959 brought forward the first parties interested in the management of water levels. The primary reasons given for the construction of the Seaway, for example, was the transportation of iron ore, and the generation of electric power. Even though the construction of power generation facilities was more expensive than the construction of the navigation channels and locks³⁴, the emphasis of the public interest was primarily placed on the creation of a safe and reliable navigation channel from the ocean into the Great Lakes heartland. Navigation and power generation are the first two “interests” which emerge from the construction of the Seaway – interests which become the two primary determinants of water levels in the St. Lawrence River and Great Lakes.

The 1960s began to change the importance of citizen-based rights for “a say” in public affairs. Although the emphasis was still very much on economic development, and

project design limited to technical questions (such as flow rates), the public was “shocked into awareness” about their environment. In particular, the publication of *Fundamentals of Ecology* by Eugene P. Odum and Howard T. Odum alerted the public and the scientific community to the complexity and interrelatedness of environmental systems. Certainly, by the mid-1960s, the environmental and social consequences of water resource management began to attract greater research and government attention

³⁴

The 1960s were brought to a close with the implementation of the National Environmental Protection Act (NEPA) in the United States – an act that explicitly endorsed the role of public participation in public decision-making. Although this was a promising signal of greater openness to public participation by government organizations, the U.S. government waited until 1972 to create the USEPA, leaving the public questioning the intentions of the government. This was reinforced by the publication of Sherry Arnstein’s “Ladder of Citizen Participation” in the *Journal of the American Institute of Planners*³⁶. Arnstein’s provocative approach to defining citizen participation revolutionized our way of thinking about public participation and predisposed Americans (and later Canadians) to demand a greater role in public decision making.

1970s – 1980s – The era of Consciousness Raising

The 1970s and 1980s saw the expansion of non-traditional forms of participation in decision-making about water levels in the St. Lawrence River and Lake Ontario. In 1970, the U.S. Army Corps of Engineers was tasked to study the potential for winter navigation in the Seaway. They included, for the first time, an advisory group incorporating labour, industry and port authority representatives. This was followed in 1972 by the formation of the United States Environmental Protection Agency (USEPA); a full four years after enacting legislation had been put in place. Public participation in the U.S. was reinforced by the Water Pollution Control Act (1972), which like the NEPA included public participation by enabling citizen suits against water polluters. The growth in acceptance of public participation in large-scale infrastructure projects was manifest in the consultations regarding the Mackenzie Valley Pipeline.

Possibly as a response to greater demands to public participation, or as a reaction to the high water levels experienced in the mid-1970s, the U.S. and Canada signed the Great Lakes Water Quality Agreement (GLWQA). The 1970s, led, then, to the emergence of new players and an increase in the points of access to the public decision-making process³⁵. The 1970s also saw a growing involvement of the scientific community in environmental concerns, reinforcing the need for a broadening of the expertise required to understand ecosystem management. Although the enthusiasm for public participation was somewhat dampened by economic uncertainty, Canadians and Americans continued to increase their demands for a role in decision-making processes that had impacts on their lives.

In the 1980s, economic growth in both the U.S. and Canada allowed governments to return to environmental questions, including the concerns raised by citizens about the

impact of large-scale environmental engineering projects. This led, in 1982, to the formation of Great Lakes United, an organization focused on broadening the input of its member groups into the management and clean-up of the Great Lakes. In 1984, the Task Force of Water Diversion led to the U.S. / Canada Great Lakes Water Charter, and the creation of AOCs and SLAPs/ZIPs (in Quebec). In 1986, Great Lakes United held a series of public hearings about the quality of the Great Lakes, and to raise awareness about the GLWQA. As a result of these hearings, citizens were becoming increasingly impatient with the lack of public involvement opportunities with the IJC, evidenced in the public testimony at the IJC Biennial of 1989. There, in over 18 hours of public comment and discussion, the IJC was criticized for bad decision-making and lack of public involvement. The 1980s also witnessed the emergence of climate change as an issue for the public and public policy makers.

1990s – Present: from citizen involvement to citizen control

Public involvement in the remediation and monitoring of the St. Lawrence River, Lake Ontario corridor continued to grow in the 1990s. Increasing concerns about the effects of climate change on water levels in the Great Lakes and the St. Lawrence River drew greater attention to man-made structures and their impact on the local environment.

Conclusion

The current climate for consulting the public is best summed up by the experiences of The Society We Want process, an endeavour of the Canadian Policy Research Network, Inc.: “While they thirst for the opportunity to engage in meaningful dialogue, citizens feel frustrated with past attempts at consultation and deliberation”³⁷. Indeed, the experience of the consultation processes discussed in the above and within the literature, suggests that Canadians, Americans and Aboriginal peoples are more than willing to engage in meaningful dialogue with governments, where they feel their input will be considered and used in the formulation of public policy.

The literature³⁷ identifies several key reasons for an increase in interest in consultation by the public. The first is a decline in deference, where the willingness of the citizenry to trust elected representatives is on the decline. Secondly, the development of a “rights-based” culture means that a new generation of “Charter citizens” put their rights before their responsibilities; this trend is also reflected in the decrease in participation in traditional democratic activities, resulting in a search for new forms of empowerment. While traditional models of consultation have failed citizens, new forms of public consultation that empower citizens and provide a vehicle for community cohesion (in an era of fragmentation), offer a real potential to create new policy options. Finally, society is undergoing a massive transformation, a change in world views, institutions and structures leading a renewed search for new forms of democratic participation.

Citizens, stakeholders, and interest groups are increasingly unwilling to accept the devolution of public responsibilities to lower levels of government and/or individual citizens without the concomitant devolution of responsibility for defining and advancing public policy issues to those same levels.

The number of stakeholders directly impacted by the hydrology regime has increased in the second half of the 20th century, and the start of the 21st century. The public has demonstrated a willingness and capacity to engage in a broad range of consultation processes, from emotional to technical regardless of the issue. Organizations, like the IJC and NYPA should invest greater amounts of time and resources into public participation processes. The challenge remains to find a meaningful public consultation mechanism that meets both the needs of the public, the government, and the policy area in question.

Appendix 7

COMMENTS: *Dalton Foster*

Lake Ontario and St. Lawrence River - Changes in the Institutional Structure and Their Impact on Water Levels, 1950-2000

A Report to the Lake Ontario-St. Lawrence River Study Board January 2002

I thought the report provided an excellent external synopsis of some of the challenges facing study personnel over the duration of the study. It offered an outside viewpoint by which the study process can be examined by those of us involved in the daily conduct. I was pleased to see that it was an inclusive report, considering the roles of the IJC, Study Board, TWG's, technical support agencies as well as the aboriginal and general public populations. I offer my comments from my role of representing the general public's interest.

From the examination of PIAG's first year surveys, it is clear that much of the public *directly affected* by the Lake Ontario - St. Lawrence system has little understanding of the workings of the system. There are very obvious gaps between the public and the regulating agencies in terms of both knowledge and trust. The general public is often both ill-informed and misinformed on technical policy issues. While communication with the public has increased over the past 40 years, information coming from governing regulatory bodies is still perceived as somewhat incomplete and/or arrogant.

- "We'll tell you what you need to know - when you need to know it."
- "We're the experts here - why are **you** (the public) questioning **us**?"

The Knowledge Gap

Currently, no effective programs exist to educate the public on the workings of the Lake Ontario - St. Lawrence River system. Each geographic area and user-base views the system somewhat narrowly through "their eyes". They focus on "their trees", and fail to see or understand the system "forest". While this situation has long been recognized, no *effective* remedial action has ever been initiated.

Education does **not** occur in confrontational public meetings. Outreach programs need to truly *reach out* to the public in their normal daily lives on an on-going basis - not just at the obligatory, yearly, emotionally charged general public meetings. Neither does effective education occur solely on informational web-sites or in pamphlets that few ever read. Rather than to furtively blame the public for its "inability to understand" or its "selfish incorrigibility", we should focus on *our* inability to communicate effectively. If what we have been doing is ineffective (*and the current feedback indicates clearly that it is*), we need to make changes - to design alternative and creative methods of communication that *can* be effective.

In the absence of an effective educational program, the public has developed a number of *ad hoc* information distribution systems through special interest groups. Unfortunately, these systems often represent a mix of information and misinformation. They often focus on placing blame - on government agencies, on other user interests, or a combination thereof - for specific problems they encounter with the Lake Ontario - St. Lawrence River system. However, they are certainly more effective at communicating with the public than any current governmentally sanctioned program. These *ad hoc* information distribution systems often serve to exacerbate the knowledge gap between the public and government regulating agencies.

The Trust Gap

The "Trust Gap" appears to be two-sided. The public clearly harbors a great deal of skepticism about information provided by government agencies. Often when citizens are presented with completely valid information, they simply dismiss it as "just more propaganda". Government agencies, on the other hand, appear wont to share information with the public that might cast them in an unfavorable light. Agencies never claim infallibility, but seem to be unable to recall ever making any specific mistakes.

- *"If we can somehow rationalize that our action had some obscure, long term advantage - then it wasn't really a mistake."*
- *"If we admit to a mistake, we might invite liability issues and besides, they'd never let us live it down."*

Mutual distrust is earned, as is mutual trust. For years we've been earning and reinforcing our distrust for one another. We need to begin searching for constructive ways of reducing these knowledge and trust gaps. To quote the final sentence of the subject report: *"The challenge remains to find a meaningful public consultation mechanism that meets both the needs of the public, the government, and the policy area in question."*

This task will require some behavior modification on both sides of the "gaps" - but we need to begin this effort now. If we conduct the world's finest study ever - and reach the end without having gained the confidence of the public - this study will go down as just one more failed attempt at making meaningful changes to the Lake Ontario - St. Lawrence River regulation plan.