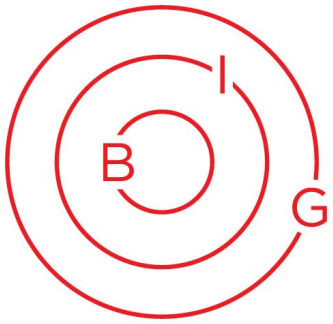
BORDERS IN GLOBALIZATION



Borders in Globalization Research Project 91

The International Joint Commission and the Great Lakes Borderlands Environment

Daniel Macfarlene
Western Michigan University

Introduction

It is difficult to exaggerate the magnitude of the Great Lakes freshwater system, comprised of lakes Superior, Michigan, Huron, Erie, and Ontario as well as connecting channels; it is likewise difficult to overstate the importance of these Great Lakes to northern North America. The lakes are surrounded by parts of eight U.S. states and two Canadian provinces, containing more than one-tenth of the population of the United States and one-quarter of the population of Canada. The region is one of the continent's most important industrial areas; nor is the economic significance limited to industry, for the tourism, recreation, and fisheries sectors contribute billions to their respective economies, to say nothing of the shipping industry. Governance of such an important and dispersed resource would be daunting even if it was located solely within one political unit, but the nature of the Great Lakes zone as a borderlands region – with all the attendant crossborder economic, transportation, and security connections – has made it a driver of the evolution of Canadian-American transnational governance and cooperation.

Since the early 20th century, environmental governance in the Great Lakes-St. Lawrence basin has revolved around the International Joint Commission (IJC), which was created by the Boundary Waters Treaty in 1909 to handle Canadian-American border matters. Although in terms of governance there are literally thousands of local, regional, and special-purpose governing bodies with jurisdiction for some management aspect of the basin or the lakes, the IJC is of particular importance in the Great Lakes (about one-third of the IJC's dockets have dealt with the Great Lakes basin). Primarily, the IJC's activities in the basin center on water quantity and levels, water quality, and air quality (fisheries and invasive species are also key governance issues in the basin, but not ones where the IJC is actively involved). IJC governance has been

most significant in the realm of water quantity issues – i.e., water levels as affected by diversions, canals and navigation improvements, hydro-electric developments, remedial works, consumptive uses, as well as natural causes and the related scientific understanding of these causes.

The goal of this paper is to chart the evolution of the IJC's binational approach and contribution to sustainability and management practices in the Great Lakes-St. Lawrence basin, primarily through – but not limited to – the lens of water quantity issues. Over the IJC's first 100 years of operation its behaviour, role, and function changed significantly, not only in general but in relation to governance of the Great Lakes-St. Lawrence basin. Though the Boundary Waters Treaty proved to be a pioneering piece of international environmental management legislation, including its pollution-anticipation and consensus-building features, for its initial decades this treaty and its instrument, the IJC, proved to be an elite form of water apportionment that favoured industrial and government interests at the expense of environmental, recreation, and local interests. Indeed, water quantity references that apportioned water resources and quantities were the overarching concern of the commission for its first five decades. Moreover, in its first half century of existence there were a surprising amount of cases where the IJC did not operate efficiently, splitting along national lines and failing to make timely or effective recommendations.

In the immediate post-Second World War period, certain members of the IJC became increasingly partisan as the commission pushed for water control megaprojects that entrenched unnatural water stage levels that have been ecologically detrimental. Into the 1960s, the IJC was dominated by prevailing societal mindsets about the need to engineer environmental resources for maximum production. The IJC, rather than dissuading hydraulic engineering megaprojects,

was in fact a chief proponent of them. Water quality and air quality issues attracted increasingly more attention after the Second World War, though these issues were sometimes the subject of "special agreements" that did not require the concurrence of the IJC, even though IJC frequently contributed. Nonetheless, during the 1960s the commission became a leader in addressing Great Lakes water quality and pollution issues, building consensus, legitimacy, and governmental will by incorporating scientific and public opinion. IJC engineers were at the forefront of the growing realization that cyclical natural causes, rather than anthropogenic modifications, have been more responsible for fluctuating Great Lakes water levels. Furthermore, the IJC began recommending against further large-scale engineering solutions.

Thus, the oft-heard refrain that the IJC has always been a global model for transborder environmental governance is, I will contend, based on a partial myth. The successes of the commission, and the concomitant high regard for it as an organization are, this study argues, more of a post-1950s development. The history of the IJC is characterized by an initial half century of mixed results, followed by a period from the 1940s to the 1960s of partisan politics resulting in large-scale endeavours with dubious environmental impacts, leading into a period of more noticeable success which continues to the present.

Pre-IJC Water Levels

Great Lakes water level variations, both annual and seasonal, are based mainly on precipitation and runoff and long-term trends have resulted in both high and low water periods over the last century of recorded data. Engineering works were built in the 20th century that impact water levels by regulating flows (to differing degrees) from Lake Superior into the St. Marys River, from Lake Erie into Lake Ontario via the Niagara River, and from Lake Ontario

into the St. Lawrence River, are the responsibility of the International Joint Commission. However, a number of diversions and alterations of water levels had taken place before the Boundary Waters Treaty of 1909, though they had next to no impact on the Great Lakes in terms of water levels. The Erie and Welland canals were built in the 1820s and 1830s to circumvent Niagara Falls, and subsequently improved numerous times over the 19th century. The Erie Canal connected the Niagara River with the Albany River, then to New York Harbour. The Welland, through its various iterations and routes, connected Lake Ontario with Lake Erie. Both were essentially intra-basin water transfers, which meant that the water stayed within the Great Lakes-St. Lawrence basin, as opposed to inter-basin transfers, which move water into a different water basin (the Erie did take a small amount of water out of the Great Lakes basin). Dredging for navigation in Great Lakes connecting channels (e.g., St. Clair, and St. Lawrence, and St. Mary's rivers) prior to the 20th century lowered lake levels slightly by expanding the volume of water these channels held, though without diverting water out of the basin. A great deal more dredging of channels was done in connecting channels for navigation over the course of the 20th century.

One of the first large-scale diversions from the Great Lakes began in the late 19th century and was completed in 1900: the Chicago Sanitary and Ship Canal. This stands as the first major work of the 20th century regarding Great Lakes water control. Moreover, it was a project that took water out of the Great Lakes basin on a large scale. It reversed the flow of the Chicago River *away* from Lake Michigan, and thus out of the Great Lakes watershed eventually to the Mississippi, in order to provide sewage disposal for the city of Chicago as well as navigation (and small-scale hydro production). However, plans to use this canal as a deep-draught navigation route from Chicago to the Gulf of Mexico using the Mississippi River never really materialized. Since the Chicago Drainage Canal lowered the water levels in the Great Lakes-St.

Lawrence system, it received opposition from Canada and other U.S. states bordering Lake Michigan. Ottawa protested many times in subsequent decades, as did other U.S. Great Lakes states, but this diversion was not subject to the Boundary Waters Treaty since it predated it and the diversion was entirely within the United States, being in Lake Michigan.

The Boundary Waters Treaty and the IJC

Border boundary water issues such as the Chicago diversion, sharing the waters of the St. Mary and Milk Rivers in the western prairies, and dividing the hydro-electric generating capacity of Niagara Falls and the St. Lawrence River, led to the creation of the International Waterways Commission (IWC) in 1903. In 1906 and 1907 the IWC made a series of recommendations that called on Canada and the U.S. to adopt principles of law governing uses of international waters along the boundary between and to create an international body with authority to study and regulate the use of these waters. In the ensuing negotiations, Canada wanted a powerful body, while U.S. sought a weaker one; the eventual result was a compromise. The Boundary Waters Treaty was signed on January 11, 1909 by James Bryce, the British Ambassador to the United States and by Elihu Root, the United States Secretary of State.

Amongst other features, the treaty settled the outstanding issues of the Niagara and the St. Mary and Milk Rivers and created the International Joint Commission which was duly formed and held its first meeting in Washington, D.C. on January 10, 1912 (BWT, 1909). Securing the agreement was a significant coup for Canada, since the much more powerful U.S. was agreeing to a commission within which the two countries were equal. Great Britain technically signed the treaty for Canada, though the Canadian government did much of the negotiating, and it was therefore an important nation-building step for Canada.

The Boundary Waters Treaty was a pioneering piece of environmental management legislation. The treaty was also an initial step in the rapprochement that characterized Canadian-American ecopolitics for most of the 20th century (Dorsey, 1998). The IJC is the key to the regime established by the 1909 treaty, and has often been portrayed as a model for bilateral cooperation. The IJC is a unique kind of international institution that combines interstate and supranational functions. As an adaptable governance form, it has evolved over time (as an organization and the way it has been used and approached) and increasingly incorporated transnational policy networks, public feedback, and scientific/engineering expertise. It has succeeded in providing a framework and ground rules that have, for the most part, prevented or resolved bilateral disputes over boundary and transboundary waters for over a century. It has been said that the philosophy of dispute-settlement and conflict-avoidance in the Boundary Waters Treaty was far more sophisticated than perhaps any comparable piece of bilateral machinery then existing in Western society. In the words of a former IJC Canadian chairman, its pioneering anti-pollution obligations fashioned a multiple-use instrument that went beyond experience elsewhere and perhaps even beyond the full appreciation of the draftsmen themselves; even the use of the word "pollution" was novel at the time (Cohen, 1981, p. 108). That said the focus on pollution really only evolved slowly, for at the time of its creation, and up until after the Second World War, the IJC was much more concerned about issues dealing with navigation and apportioning each country's share of boundary waters.

The treaty notably granted equal navigation access to the waters covered by the treaty, and regulations were adopted concerning water diversions and changes to water levels; essentially, any changes in the level of a border water needed agreement through the IJC (or a special agreement between the federal governments outside of the IJC). The treaty outlined an

order of precedence for how border waters could be used: 1. Uses for domestic and sanitary purposes; 2. Uses for navigation; 3. Uses for power. However, no reference was made to industrial, recreational, nor environmental uses, though these were incorporated over time. The treaty assigned the IJC four categories of function that the new body was expected to discharge, which can be summarized as *administrative* (Article VI): directing the measurement and division of the waters of the St. Mary and Milk Rivers; *quasi-judicial* (Articles III, IV, and VIII): passing upon applications for permission to use, divert, or obstruct treaty waters (commission approval with relevant conditions is typically given in an Order of Approval which the commission then monitors for compliance); investigative (Article IX): examining and making recommendations on any differences arising along the common boundary (these investigations are called "references" and recommendations are non-binding); and *arbitral* (Article X): making binding decisions with respect to any questions arising between the two countries – a function that has never been used (Willoughby, 1981).

The treaty established the commission as a six-member body in which there is parity between Canada and the United States. Three commissioners are appointed by Order-in-Council (in fact by the Prime Minister of Canada) to the Canadian section, and three by the President of the United States with confirmation required by the U.S. Senate. The IJC is not an arm of government and commissioners are technically independent from the government that appointed them. The IJC deliberates as a joint, collegial body that normally acts by consensus and seeks win-win solutions in the common interest of both countries. Commissioners are supported in their work by two section offices in Ottawa and Washington, D.C. (the Secretariat) and, since the signing of the Great Lakes Water Quality Agreement in 1972, by a Great Lakes Regional Office in Windsor, Ontario which supports the work of the commission's Great Lakes water quality and

science advisory boards. The staffs in Ottawa and Washington currently total about 30, and there are about the same number of permanent employees in Windsor.

Much of the commission's work, which takes place in the major transboundary watersheds from coast to coast, is performed by international boards or task forces. Boards of Control are appointed to report on compliance with Orders while study or advisory boards assist in References. Commissioners select and appoint Board members to serve in their personal and professional capacity, much like the commissioners themselves. Board members often are senior officials of state, provincial or federal agencies and are able to contribute financial and human resources to the work of the IJC (although this is less so in current times); however the departments are in no way bound by the opinion of a board member. This trust, which is crucial to the effective operation of the IJC, is arguably the most important aspect of the operation of the commission.

The treaty provided for public-input mechanisms, such as public hearing sessions that took place at the area concerned (rather than just in capitals), so that locals could have their voice heard, which was significant for the time. The treaty has been amended only once, namely in regard to the Niagara River Treaty of 1950 when hydropower expansion in the Niagara River affected flows over the Falls (discussed below). However, the IJC has historically been somewhat limited in its ability to go beyond the wishes of the two federal governments. The commission’s reports are advisory, not binding, and it is difficult for the IJC to initiate investigation or consideration of environmental issues not referred to it (though this is changing with the advent of watershed boards, which are discussed in more detail below). For various reasons, the Harmon Doctrine was included in the treaty: this doctrine essentially allows the upriver country to do what it wants with waters that cross the border. This meant that the treaty

effectively only applied to waters that formed the border, with the Great Lakes and St. Lawrence being the most prominent. To be fair, it is likely that the treaty and the IJC would have never have been achieved if the treaty-drafters had been more ambitious and included stronger enforcement capabilities.

The first few IJC cases (or dockets) did not involve the Great Lakes-St. Lawrence basin. In its third docket, the Canada and U.S. governments referred levels of Lake of the Woods (which is divided between Minnesota, Ontario, and Manitoba borders) to the IJC, later resulting in a treaty. The fourth docket, in 1912, was about the general pollution of boundary waters, mostly in the Great Lakes basin. In 1914 the IJC approved the building of the binational Compensating Works (16 gated structure with 8 gates on each side of the boundary) in the St. Mary's River (near Sault Ste Marie) and power plants are near the shore in each country. At the same time, the IJC established the first of its joint boards, the Lake Superior Board of Control, to regulate water levels and flows of Lake Superior.

Up to 1929, high-caliber people were not being appointed to the IJC; the members were largely selected on partisan grounds in the first two decades, usually former politicians. In addition, over its first half century of existence there were cases where the IJC did not operate as intended: e.g. the two national sides of the IJC split along national lines; the governments ignored the IJC's recommendations; the IJC failed to make a timely recommendation or made a flawed recommendation. The Trail Smelter air quality case (1927-1941) is a prime example of this mixed legacy: though the end result has been lauded as a landmark ruling that set a precedent for transboundary air pollution and the "polluter pays" principle, early on in the process, commissioners split along national lines, the U.S. government effectively rejected the IJC recommendations, and partisan politics were clearly at play (Wirth, 2000). Both the

originators and the first members of the IJC assumed that its quasi-judicial role would be much more important than its investigative role, and for three decades this assumption seemed correct (Willoughby, 1981). The IJC was initially reluctant to settle legal issues and establish precedents, but generally adopted pragmatic solutions. Of the 50 cases handled by the commission prior to 1944, 39 were applications for approval of specific works under the quasi-judicial power of article VIII, and only 11 were references under article IX, the investigative function.

During the second half of the 20th century, the story was reversed – between 1944 and 1979, for example, there were 35 references and 20 applications (Willoughby, 1981). Between 1979 and 2012 there were 12 references and 3 applications although the IJC was very busy between 2000 and 2012 reviewing its Orders of Approval for Lake Superior and Lake Ontario. During the immediate post-Second World War period, the IJC approved major border hydro-electric developments, namely the megaprojects on the St. Lawrence, Niagara, and Columbia rivers.

St. Lawrence Seaway and Power Project

Negotiations for the St. Lawrence deep waterway and hydro-electric project dated back to the 1890s – in fact, the deep waterway was a factor leading to the Boundary Waters Treaty – but it took over half a century for an agreement (this section is derived from Macfarlane 2014). This megaproject was both a hydro-electric project (power dams) and a navigation project (locks and canals), with the former submitted to the IJC by the governments for approval, while the latter was agreed to via a separate Canada-U.S. agreement. Since the St. Lawrence River is a border water, under the BWT the concurrence of both countries and the IJC is necessary to change water levels on the St. Lawrence River. There were failed Canada-U.S. St. Lawrence treaties in

1932 and 1941, as special interests in the U.S. – e.g. railways, coal, east coast port – helped stop congressional assent. The 1941 St. Lawrence accord was actually an executive agreement, and it was a comprehensive St. Lawrence-Great Lakes agreement that covered many transborder water bodies in the basin. In the immediate post-Second World War years a variety of economic and defence factors brought further pressure to bear on a St. Lawrence seaway and power project: in particular, the ability of a deep waterway to transport the recently-discovered iron ore deposits from the Ungava district in Labrador and northern Quebec to the steel mills of the Great Lakes.

Canada attempted to pursue an all-Canadian Seaway, but the U.S. blocked a solely Canadian waterway, which was deemed to be inimical to U.S. economic and security interests. In the early 1950s the IJC approved the plans for a transnational St. Lawrence power project and created the International St. Lawrence River Board of Control (this was not the first time that the IJC had formed a board or investigation on a St. Lawrence issues – e.g. a dam at Waddington, NY and the Massena Power Canal attracted the IJC's attention around the time of the First World War). Then, through a 1954 bilateral Canada-U.S. agreement (i.e. not through the IJC), Canada reluctantly acquiesced in the construction of a joint seaway with the United States.

The construction of the St. Lawrence seaway and power project had an enormous environmental and social impact on the St. Lawrence basin. It required a massive manipulation of the river and its environs. In excess of 210 million cubic yards of earth and rock – more than twice that of the Suez Canal – were moved through extensive digging, cutting, blasting, and drilling, using a litany of specialized equipment and enormous machines. The St. Lawrence power project required three dams in the international stretch of the St. Lawrence between Ontario and New York: the Moses-Saunders powerhouse, the Long Sault spillway dam, and the Iroquois control dam. These dams created Lake St. Lawrence, which inundated some 20,000

acres of land on the Canadian side, along with another 18,000 acres on the U.S. shore. On the much more heavily populated Canadian side, 225 farms, seven villages and three hamlets (often referred to as the Lost Villages), part of an eighth village, 18 cemeteries, around 1000 cottages, and over 100 kilometres of the main east-west highway and main line railway were relocated. So as not to create navigation and other difficulties in the new lake, *everything* had to be moved, razed, or flattened, including trees and cemeteries. Yet environmental issues were of virtually no concern to the various agencies and governments involved (at the time, no compulsory environmental impact legislation existed in either country and any potential side effects were generally considered necessary collateral damage).

The bill for the entire project was over $1 billion. Despite tolls revenue the Seaway never came close to paying for itself, as traffic on the Seaway never came anywhere close to predictions. On top of reconfiguring a river basin, the waterway allowed invasive species to come in via the ballast water of vessels, which Jeff Alexander has chronicled in his 2009 book *Pandora's Locks: The Opening of the Great Lakes-St. Lawrence Seaway*.

Measures to regulate Lake Ontario water levels had been part of the IJC's engineering plans for the St. Lawrence power project, but the Lake Ontario levels issue was turned into a separate IJC docket in the early 1950s after shoreowners complained about the effects of fluctuating water levels. Thus, as part of the St. Lawrence dual project engineers had to establish a "river profile" and develop a "method of regulation" for the St. Lawrence River and Lake Ontario. The "method of regulation" referred to the levels between which the water would be maintained by dams and control works in order to meet prescribed goals. The main future users of the St. Lawrence Seaway and Power Project at the time it was designed – power production, navigation, shoreline property, and downstream interests – wanted different minimum and

maximum water levels or varying ranges of stages (i.e. difference between high and low levels) and pleasing everyone seemed impossible. It is worth pointing out at this juncture that competition for Great Lakes water divides not only along national lines, but also along user type lines.

The engineering goal between 1954 and 1959 was to maintain the water levels at an average that equated to "natural levels" but also to improve on nature by removing the extremes of high and low and flows in order to create a predictable and orderly river and lake. "Natural" was defined as that which had existed in the 19th century before the first manmade alterations to water levels – i.e. what existed before Canada installed the Gut dam in the St. Lawrence River between Galops and Adams islands in the early 20th century. Yet establishing exactly what constituted a "state of nature" was problematic from the outset. Not only did representatives of the two countries disagree upon the historic impact of the Gut dam, and also for partisan reasons, but it was also difficult to find information regarding the natural levels to use as a baseline. For example, there was concern that past measurements were unreliable, exacerbated by the geological phenomenon of earth tilt, as well as a 1944 earthquake centered between Cornwall and Massena. Indeed, engineering studies were showing that natural factors must have played a much larger role in the recent rise in Lake Ontario water levels than had the man-made factors (i.e. diversions into the Great Lakes basin)

Along the way, there were many engineering miscalculations, assumptions, compromises, and partisan preferences Part of the problem stemmed from the faith that the engineers placed in their models, which were frequently wrong. The experts essentially admitted behind closed doors that they did not know what natural conditions were, and in many ways were guessing (Macfarlane 2014). However, in public they gave an impression of preciseness

and confidence. The engineers kept revising the method of regulation and debating whether the water levels should be kept at, for example, 248 feet or 248.3 feet. But such precise goals appear, in retrospect, somewhat strange given the uncertainty about the evidence and tests they used – engineers were trying to ascertain the historic conditions on which they based their arguments at the same time they were making their arguments – and the idea of 248 feet "as nearly as may be" prevailed.

In July 1956 the IJC issued a supplementary order directing that Lake Ontario levels be maintained between 244 and 248, again adding the "nearly as may be" rider. Yet soon after, method 12-A-9 was replaced by another method, 1958-A, then 1958-D (the method that has stood for over half a century). The precise technical differences between these methods are not important here – rather, it is the frequency of changes and the decision-making manner that are noteworthy because they betray how messy and reactive the process of regulating the river levels actually was. A new method of regulation, Bv7, that allows for more natural fluctuation cycles and greater variability was recently proposed following almost 15 years of study and review by the IJC and a team of experts. An updated version of Bv7, named Plan 2014, has since emerged which framers hope will better protect all interests through the use of trigger levels for adjusting Lake Ontario outflows during extreme water level fluctuations on the lake. At the time of writing this Article, the IJC is holding public hearings on a new approach to regulation including this new Plan 2014 and a revised Order of Approval which they hope to implement in 2014.

Ogoki-Long Lac Diversions

These two diversions are separate but they are often considered together because they both divert into Lake Superior water that originally drained north to James Bay. Together they are the largest manmade diversion into the Great Lakes basin, putting in almost as much water as the Chicago diversion takes out. In the 1930s and 1940s the governments of Canada and the U.S. had discussed the economic potential of diversions, such as Long Lac and Ogoki, into the Great Lakes. In 1940, after lengthy negotiations, the governments did conclude an arrangement through an exchange of notes for Ontario to use water diverted from the Albany basin into the Great Lakes for power generation at Niagara Falls.

The Long Lac diversion, completed in 1941, connects the headwaters of the Kenogami River with the Aguasabon River which naturally discharges into Lake Superior about 250 kilometres east of Thunder Bay, Ontario. The Ogoki diversion, completed in 1943, connects the upper portion of the Ogoki River to Lake Nipigon and from there flows into Lake Superior 96 kilometres east of Thunder Bay. These diversions were developed to generate hydro-electric power (in the case of the Long Lac diversion the transportation of the pulpwood logs southward was also a minor consideration).

Subsequently both governments ratified the Niagara Treaty of 1950 (see separate section below), Article III of which provides that waters diverted by Long Lac and Ogoki shall continue to be governed by the notes. The notes provide flexibility in operation because no diversion amounts are specified, but initial use at Niagara Falls was to be 5,000 (cubic feet per second) cfs. The actual diversion rates vary frequently (maximum and minimum annual combined diversions have been about 8,000 cfs and 2,500 cfs respectively) so the governments continue to use the constant figure of 5,000 cfs as a pragmatic way to calculate shares instead of actual diversion amounts as permitted by the notes. Although the diversions are controlled by Canada, examples

of mutual cooperation occurred in 1952, 1973, and 1985 when, in response to a request by the U.S., Canada reduced or stopped both diversions in an attempt to alleviate problems created by high lake levels. The amount of water diverted into Lake Superior by these diversions is reported by Ontario Power Generation (formerly Ontario Hydro) to the IJC through its International Lake Superior Board of Control.

These diversions increase the mean level of each of the Great Lakes - Lake Superior by 6.4 cm (0.21 feet); Lakes Michigan-Huron by 11.3 cm (0.37 feet); Lake Erie by 7.6 cm (0.25 feet); and Lake Ontario by 6.7 cm (0.22 feet) (IJC 1985). Together they have had significant local environmental effects on fish spawning areas and habitat as a result of the original construction and operation of diversion structures on the main stem rivers, the construction and alteration of diversion channels, the creation of reservoirs, the greatly altered flow regimes, and the use of waterways for log transportation. However no significant basin wide environmental effects have been documented.

Niagara Falls

As was previously mentioned, the Long Lac-Ogoki water continues to be utilized at Niagara Falls, itself another major water issue that had been included in the half-century of St. Lawrence Seaway discussions (information in this section is derived from Macfarlane, 2013a, 2013b). Large-scale hydro-electric production and distribution had its birth at Niagara Falls in the late 19th century. By the 1920s, there were multiple water power and hydro stations operating on both sides of Niagara. Water was diverted away from the Horseshoe and American Falls (the two main cataracts that make up Niagara Falls) in order to supply the various power houses. Before the end of the 19th century there had already been public concerns about the aesthetic

impact of decreased water levels on the Falls, as well as the industry that crowded the shoreline to take advantage of the water power.

Both the American Burton Act (1906) and the Boundary Waters Treaty put restrictions on the amount of water that could be diverted away from the Falls. The latter limits were lifted during the First World War, but then reinstituted afterward, though they were not always adhered to. In response to public worries about the scenic grandeur and diversions, Canada and the United States formed the International Niagara Board of Control in 1923, followed by a Special International Niagara Board in 1925. In an interim report that utilized photographs and aerial surveys, the Special International Niagara Board proposed the use of weirs – which are submerged barriers designed to strategically divert water from the middle part of the Falls to the edges. This would improve the appearance of the crestline, both in quantity and colour. Based on the Special International Niagara Board's interim report, the Niagara Convention and Protocol was signed in 1929 by both countries. However, this Niagara convention was not able to make it through the U.S. Senate.

In 1931 the Special Niagara Board released a report titled "Preservation and Improvement of the Scenic Beauty of the Niagara Falls and Rapids." The report examined whether it was the height, width, volume, colour, or lines that made Niagara such a spectacle. The report's sections on water colour were fascinating, and a special "telecolorimeter" was developed to test for the desired "greenish-blue" colour, which was considered superior to the whitish colour resulting from a thin flow over the precipice. The excessive mist and spray at Horseshoe Falls was considered a turn-off since it obscured the view and, unsurprisingly, got people wet. The denuded bare rock at the flanks of the Falls were labeled as one of the greatest detriments to the visual appeal, and erosion threatened to ruin the "symmetry" of the Falls. The

report concluded that a sufficiently distributed volume of flow, or at least the "impression of volume," which would create an unbroken crestline, was most important.

The board therefore recommended that the riverbed above the Falls, and the Falls themselves, be manipulated in order to apportion the necessary volume of water to achieve the desired effect. Remedial works, in the form of submerged weirs and excavations, would achieve that while allowing for increased power diversions. Such measures had been included in the failed 1932 Great Lakes Waterway Treaty and the 1941 St. Lawrence executive agreement. During the Second World War the two countries agreed that the limits on the amount of water diverted at Niagara Falls for war-time needs could be temporarily increased. Subsequently, further withdrawals were allowed during the war, rising to a total diversion of 54,000 cfs for Canada and 32,500 cfs for the United States. Canada and the U.S. agreed to split the cost of constructing a stone-filled weir – a submerged dam – above the Falls, which would raise the water level in order to facilitate greater diversions without an apparent loss of scenic beauty.

The wartime Niagara diversions continued on an indefinite – and technically illegal – basis after the end of the Second World War. The two countries separated the Niagara diversion issues from the repeatedly stalled St. Lawrence negotiations, and a Niagara Diversion Treaty was signed on 27 February 1950. This Canadian-American treaty accord called for further remedial works**,** to be approved by the IJC, and virtually equalized water diversions while restricting the flow of water over Niagara Falls to no less than 100,000 cfs during daylight hours of what was deemed the tourist season (8 A.M. to 10 P.M. from April to mid-September, and from 8.am. to 8p.m. during the Fall), and no less than 50,000 cfs during the remainder of the year. This worked out to Canada and the U.S. together taking about 3/4 of the total flow over the Falls outside of tourist hours.

In response to the reference from the two federal governments, the International Joint Commission created the International Niagara Falls Engineering Board. Studies by this board showed that, without remedial works, the diversions authorized in the 1950 Treaty would have a very negative impact on the scenic beauty of the area: the Chippawa-Grass Island Pool level would drop by as much as four feet, exposing areas of the river bed, turning the American Falls into an unsightly spectacle, and greatly reducing the appearance of the flanks of the Horseshoe Falls. In 1953 reports by the IJC and its International Niagara Falls Engineering Board, the objectives remained basically the same as they had been in the 1920s and 1930s: to ensure the appearance of an unbroken and satisfactory crestline while allowing for the diversion of water for power production. A "modern, graceful" 1,550 foot control dam was built from the Canadian shore, parallel to and about 225 feet downstream from the weir built in the 1940s, featuring 13 sluices (5 more were soon added) equipped with control gates. The purpose of this structure was to control water levels and spread out the water both for appearance and because flows concentrated in certain places caused more erosion damage. The diverted water went to the hydro-electric stations downstream. Currently, the IJC's International Niagara Board of Control monitors operation of the control works by the power entities, Ontario Power Generation and the New York Power Authority, under a Commission directive.

Excavation also took place along the flanks of Horseshoe Falls (64,000 cubic yards of rock on Canadian flank; 24,000 cubic yards on American flank) in order to create a better distribution of flow and an unbroken crestline at all times. To compensate for erosion, crest fills (100 feet on the Canadian shore and 300 feet on the American side) were undertaken, parts of which would be fenced and landscaped in order to provide prime public vantage points.[1] Indeed,

[1] LAC, vol. 6348, file 1268-D-40, pt. 25.2: St. Lawrence General Correspondence (November 25, 1953-January 29, 1954), Press Release: Niagara Falls Preservation Program Starts, January 15, 1954.

those standing in some of the best viewing spots would have found themselves going over the brink before the 1950s.

Chicago Redux

Because of its importance in the history of Great Lakes diversions, we now return to the issue of the Illinois Diversion through the Sanitary and Ship Canal at Chicago, which is not subject to the Boundary Waters Treaty since it predated it. This diversion to the Mississippi River is for water supply, sewage disposal, power generation and navigation The diversion consists of three components: (a) water supply withdrawn directly from Lake Michigan for domestic and industrial purposes and then discharged into the Illinois River as treated sewage; (b) runoff that once drained to Lake Michigan but is now diverted to the Illinois River; and (c) water diverted directly from Lake Michigan into the Illinois River and canal system for navigation and dilution purposes in the Chicago area.

The Chicago diversion was effectively limited by a 1930 U.S. Supreme Court decision to 3,200 cfs on an annual basis. The U.S. appealed for an extension due to worries that low water levels would threaten public health conditions in Chicago, as financial difficulties due to the Depression had caused work to cease on sewage disposal work. Capping the Chicago diversion had also figured prominently in St. Lawrence Seaway negotiations over the first half of the 20th century (in fact, the Chicago diversion may have indirectly killed U.S. legislative approval of the 1932 St. Lawrence treaty).

At several times in the 1950s, the Chicago diversion was allowed to be increased temporarily. In 1967, the U.S. Supreme Court ruling put the diversions back to 3,200 cfs. In the 1980s, the Corps of Engineers looked at tripling the volume of the diversion, and then the State

of Illinois requested the diversion be moved to its 10,000 cfs limit. In the 1990s, it turned out that Chicago was often exceeding the diversion limit, though sometimes by accident; that was apparently taken care of, and the diversion has of late been kept within its legislated bounds. According to the IJC, the diversion reduces the mean level of Lakes Michigan-Huron by 6.4 cm (0.21 feet), Lake Erie by 4.3 cm (0.14 feet) and Lake Ontario by 3.0 cm (0.10 feet) (IJC 1985). Although the average diversion rate remains constant, the potential for increases remains a concern for Canada and those living nearby in the U.S. who could be impacted by higher water levels or velocities. Current debate about the Chicago diversion tends to focus on it as a vector for invasive species – specifically, Asian carp.

Great Lakes Water Levels

Levels in the Great Lakes have always fluctuated under the influence of natural forces including the major ones of precipitation and evaporation and also winds, barometric pressure, ice jams, glacial rebound, aquatic weed growth and, to some extent, tides. There are of course long-term fluctuations, seasonal fluctuations, and short-term fluctuations due to storms, winds and pressure changes. Man has progressively intervened in the natural regime of the Great Lakes system including the regulation of Lakes Superior and Ontario, dredging in the connecting channels, diversions, and consumptive uses. Over this period, scientific understanding of "natural" lake levels have fluctuated themselves.

As was mentioned above, in 1914 the IJC approved a control structure to regulate Lake Superior, though this control structure has minimal impact because of the volume of water in Lake Superior. The regulation of Lake Ontario and the St Lawrence River, accomplished via the structures approved by the IJC is more pronounced.

The vast surface area of the Great Lakes combined with the natural restrictions of their connecting channels makes it possible for the system to cope with huge water supply variations while maintaining water level fluctuations of one to two feet in any one year. Depending on which lake one considers, the maximum range of water level fluctuations has only been about four to seven feet in the 150 years records have been kept. Older records may not be as accurate as current observations, since measurements were only taken at a single gauge per lake until 1918 and observations were not taken as frequently as they are today.

Long-term fluctuations occur over periods of consecutive years and have varied dramatically since water levels have been recorded for the Great Lakes. Continuous wet and cold years will cause water levels to rise. Conversely, consecutive warm and dry years will cause water levels to decline. The Great Lakes system experienced extremely low levels in the late 1920s, mid-1930s, again in the mid-1960s, and currently in the upper Great Lakes. Extremely high water levels were experienced in the 1870s, early 1950s, early 1970s, mid-1980s and mid-1990s. There does not appear to be any predictability to the various cycles of low and high water. Currently, Lakes Michigan and Huron are experiencing record lows. Within the last 1,000 years, evidence suggests that lake levels exceeded the range of levels recorded since 1865 by an additional five feet on lakes Michigan and Huron.

Over the last 50 years, the IJC has completed several reference studies on Great Lakes water level issues. In 1964, when water levels were very low, governments asked the IJC whether it would be feasible to maintain the waters of all the Great Lakes at a more constant level. This study was completed in 1973, when lake levels had risen to record highs. The IJC then advised the governments in its landmark 1976 report "Further Regulation of the Great Lakes" that the high costs (economic and environmental) of engineering further regulation of

Lakes Michigan and Huron could not be justified by the benefits. (IJC 1976) The same conclusion was reached during another IJC study in 1983 on regulating outflows specifically from Lake Erie.

In 1985, the IJC submitted their report under a reference on consumptive uses and diversions – especially the effects of existing diversions into and out of the Great Lakes system, as well as on the possibility of adjusting these diversions to help regulate water levels. Prior to this IJC study, consumptive use (e.g. agriculture, bottled water and pop) had not been considered significant because the volume of water in the system is so large. The study concluded that climate and weather changes affect levels of the lakes far more than existing man-made diversions and uses, recommending that governments not consider the manipulation of existing diversions to either raise low levels or decrease high levels. In 1986, during a period of record high water levels, governments asked the IJC to examine and report on methods to alleviate the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River basin. The IJC's final recommendations in its 1993 report (when the high levels had receded) included a range of actions such as promoting shoreline management measures; a recommendation that five as well as three lake regulation not be further considered; establishing a binational information center; and improving data gathering and analysis.

Primarily as a result of public outcry concerning a 1998 proposal by the Nova Group of Sault Ste. Marie to export Lake Superior water by tanker to Asia, the respective governments asked the IJC to examine and report on how the consumptive use and removal of water, diversions, and management and policies regarding water resources affect the levels, flows, and sustainability of water supplies in transboundary basins. Governments are using the findings, conclusions and recommendations of the IJC's landmark 2000 and 2004 reports as they address

the many issues related to water use in the Great Lakes basin. The governments asked the IJC to review its recommendations again at 10-year intervals unless conditions dictate a more frequent review. The governments have not responded to the IJC's recommendation that they consider adopting a plan of work for the IJC on the rest of the border beyond the Great Lakes.

Large Diversion Threats

As the ability to move water long distances expanded in the last half of the 20th century, so too did the threat of large scale transfers. As a result, a number of major diversions at several locations on the North American continent have been propounded over the past decades (IJC 1985). There is a perception in the Great Lakes basin of a need for water elsewhere, especially in the arid U.S. southwest. However no major diversion from the Great Lakes basin is under formal consideration at the present time and none of these concepts is currently proposed or endorsed by any government directly involved in the management of the water. Two schemes in particular have received some attention over the years and are noted briefly below.

The Great Recycling and Northern Development (GRAND) Canal Concept: the GRAND canal concept was first advocated in 1959 by Thomas Kierans. In this proposal, James Bay was to be diked, creating a freshwater lake, the waters of which could be diverted/recycled to the Great Lakes and on to the southwestern United States and even Mexico. Stepped pumping and flow control structures would be required in the transmission system. The distribution system from the Great Lakes would include new two-way channel and pump transfer arrangements connecting the major rivers that drain the mid-continent and the Canadian prairies. Reliable estimates of costs and benefits have never been available although Kierans estimated the costs would be $79 billion with a construction time of 8 years. While some assert that the proposal

would have multiple economic and other benefits (as did Premier Robert Bourassa while he was Premier of Quebec), most argue that the direct costs are astronomical and that the project is likely to have devastating and irreversible ecological effects.

The North American Water and Power Alliance (NAWAPA): this scheme was first presented in 1963 by Ralph M. Parsons and Co., a firm of engineering consultants. It involved diverting water from major rivers in Alaska, British Columbia, and Yukon to a reservoir in the Rocky Mountain Trench. From there it would be redirected for consumption in the western United States and Canada. In 1963 NAWAPA's total cost was estimated at about $100 billion with construction taking about 20 years. Hostile public reaction and the question of feasibility quashed the idea in its infancy and, as far as can be determined, is now not being considered by any government or possible proponent.

Great Lakes Water Quality

The issue of Great Lakes water quality has arguably received more sustained academic attention than has water quantity – this section draws on the standard book on the Great Lakes Water Quality Agreements (GLWQA), by Paul Muldoon and Lee Botts, as well as studies by Mark Sproule-Jones, Terrance Kehoe, Philip Scarpino, John Carroll, and various IJC sources. As was previously noted, one of the dockets the IJC handled in its first year of existence concerned the general pollution of boundary waters. In this case, the IJC was asked to study pollution in the Great Lakes basin and make specific recommendations for the connecting channels and waterborne diseases – the IJC identified human waste disposal and recommended sewage treatment and water purification (Sproule-Jones, 2003, 39). Though pollution factored into subsequent references, such as the many water control projects mentioned above, an IJC docket

did not explicitly address water pollution in the Great Lakes again until after the Second World War.

Beginning in the 1950s, American states urged the IJC to investigate pollution in the lower Great Lakes, but a comprehensive agreement was stalled for years by protracted discussions and disputes between Ontario and the Canadian federal government, various American states and the U.S. federal government, and the Canadian and American federal governments. From about 1954 to 1963 there was a stalemate between the Ontario government and the Canadian federal government, with the later in particular dragging its feet, over which level of government should pay for the works required to address the pollution. But a 1963 cost-sharing agreement cleared the way for a reference to the IJC, which had created joint investigative boards for Lake Erie, Lake Ontario, and the St. Lawrence River. The IJC issued three reports, in 1965, 1968, and 1970, identifying problems such as excessive levels of phosphorous, and made recommendations to address municipal and industrial pollution. Though aspects of these reports were ignored by the involved governments, Great Lakes pollution seized the public's imagination, fuelled by the eutrophication of Lake Erie and the 1969 Cuyahoga River fire (though there had reportedly been at least 13 fires in this grossly polluted river, including a larger one in 1952).

Building on the IJC's recommendations, Canada and Ontario finally signed an agreement in 1971, with Ontario agreeing to build municipal sewage treatment facilities and trunk sewers in the two lower Great Lakes and the international section of the St. Lawrence River. In the subsequent bilateral negotiations, there were a number of fundamental differences in approaches to pollution control between the United States and Canada: allocation of responsibility for pollution abatement; phosphate reduction in the lakes; and the effort to secure specific

commitments on pollution abatement (Carroll, 1983, 130). Canada argued for an "equal rights" approach, arguing that each country had the right to contribute pollution up to 50 percent of the "assimilative capacity" of the waters, irrespective of population and industrial capacity.

Though not all of these sticking points were conclusively solved, the Great Lakes Water Quality Agreement (GLWQA) was nonetheless signed in April 1972 between Canada and the United States. It established a non-binding framework for cooperative management of Great Lakes water quality. This, however, was limited to the two lower lakes, Ontario and Erie. Both nations were to develop common water quality objectives and regulatory standards for several types of pollutants, chiefly connected to excess nutrient loading, and implement programs to achieve these goals, such as through municipal sewage treatment (about $10 billion US was spent on improvement between 1972 and 1978). Under the agreement, Environment Canada and the American EPA were given primary responsibility for achieving the agreement's objectives, while the IJC's primary role was "to oversee the implementation process by the governments as an independent binational agency." (Botts and Muldoon, 18) The IJC was assigned responsibility for collecting, analyzing, and disseminating water quality data, monitoring water quality and related programs, and providing advice and recommendations to attain water quality objectives (http://www.ijc.org/en/activities/consultations/glwqa/guide_3.php) The GLWQA established the Great Lakes Water Quality Board and the Research Advisory Board. The IJC was tasked with examining the water quality impacts of land use activities and examining water quality specifically in Lakes Superior and Huron. To assist in these tasks, the agreement authorized the creation of a Great Lakes Regional Office, administered by the IJC.

The 1972 agreement was largely a success, as water quality soon showed a marked improvement, though the phosphorous loading reductions were not fully met within the five

years that the 1972 agreement set for its required renewal or termination. In 1978, the two countries arrived at a new agreement, building upon the 1972 version. It shifted the focus from conventional pollutants, such as phosphorus and bacteria, to toxic and hazardous polluting substances. In the 1978 Agreement, the two countries adopted a policy that the discharge of any or all persistent toxic substances be virtually eliminated in *all* the Great Lakes and international section of the St. Lawrence River, placing greater emphasis on nonpoint pollution and a broader ecosystem approach. The agreement updated the responsibilities assigned to the IJC, such as monitoring toxics and revised water quality standards. The 1978 agreement was subsequently amended in 1983, a protocol signed in 1987 (establishing Areas of Concern (AOCs) and Remedial Actions Plans (RAPs)), and further amendments in 2012. Overall, the various Great Lakes water quality accords have garnered praise because of the successful mobilization of scientific expertise, transborder cooperation, and ecological impact.

Air Quality

The International Joint Commission has had a less direct role in Great Lakes air pollution, and was a minor player in the 1991 Air Quality Agreement. The commission had been involved in early cases of transboundary air pollution, such as the Trail Smelter case in the Pacific Northwest, and in the decades after the Second World War, the IJC dealt with several air pollution references in the Detroit River-St. Clair River corridor (dockets 61, 85, 99), where its responsibility lay chiefly in identifying and monitoring the situation. In the words of Don Munton, who has written extensively on Canadian-American acid rain and air pollution issues, the 1991 bilateral Air Quality Agreement "gave the International Joint Commission (IJC) a modest public input role … In contrast to the Water Quality Agreement, the Air Quality

Agreement does not mandate the IJC to act as a watchdog over the implementation process." (Don Munton, in Stoett and La Prestre, 2006)

Recent Charters, Annexes and Agreements

Water management in the Great Lakes Basin is governed by a network of legal regimes, including international instruments and customs, federal laws and regulations in both Canada and the United States, the laws of the eight Great Lakes states and Ontario and Quebec, and the rights of Aboriginal Peoples and Indian tribes under Canadian and U.S. laws. (IJC Protection of the Great Lakes Report, February 2000). A number of diversion threats were mainly within U.S. borders, and resulting legal and legislative steps to prevent such diversions were thus internal U.S. matters that were not subject to IJC approval. In 1985, the eight states and two provinces bordering the Great Lakes-St. Lawrence basin adopted a new policy resolution: the Great Lakes Charter. The purpose of the Great Lakes Charter, which was a non-binding good faith agreement, was to provide the opportunity for basin-wide management. Any plan proposed in any Great Lake state or province that involves major consumptive use or diversion must give prior notice to, and seek approval of, all other states and provinces. However, the Charter was not binding, and holes soon appeared. For example, the possibility of bulk exports out of the Great Lakes basin surfaced, as did the transfer of water to smaller communities in the U.S. straddling or just outside of the Great Lakes basin (Annin, 2006).

The 2001 Annex to the charter commits the parties to develop binding regulations to ensure no net loss to the waters through diversion or consumption or through adverse impacts on water quality, with a commitment to ensuring public input. In 2005 the Charter was renamed as the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement (non-

binding) which was implemented in the U.S. by the binding Great Lakes-St. Lawrence River Basin Water Resources Compact in 2008. These new agreements ban new or increased water diversions out of the Great Lakes-St. Lawrence basin, with some strictly regulated exceptions (e.g. communities that straddle the water basin divide that will use the diverted water for public water supply purposes, potentially having to return it to the basin). The States and Provinces also pledged to use a consistent standard to review proposed uses of Basin water and a decision-support system to manage withdrawals. In addition, each State and Province is to develop and implement a water conservation and efficiency program. The Council of Great Lakes Governors serves as secretariat to the Great Lakes - St. Lawrence River Basin Water Resources Regional Body (Regional Body) and the Great Lakes - St. Lawrence River Basin Water Resources Council (Compact Council) both of which were created to coordinate implementation and follow-through of the Agreement and Compact.

Another legal issue that has been raised is whether international trade obligations, in particular the relevant World Trade Organization (WTO) agreements, including the General Agreement on Tariffs and Trade (GATT) as well as the Canada–United States Free Trade Agreement (FTA) and the Canada–United States–Mexico North American Free Trade Agreement (NAFTA), might affect water management in the Great Lakes basin and, in particular, commodify water. The IJC, in its 2000 and 2004 Reports, concluded that international trade agreements do not prevent the governments of the United States and Canada from protecting water as it resides in the Great Lakes and their tributary rivers and streams, if there is no discrimination against persons from other countries and undue expectations are not created. The governments of Canada and the U.S. supported this conclusion. However, because the IJC believed some concern still remained in the public's opinion, the commission recommended that

the governments need to make a greater effort to clarify this issue for the public, including continuing to demonstrate that future trade agreements will not affect the ability of governments to protect water resources like the Great Lakes.

Conclusion

Where the International Joint Commission has been successful in managing the Great Lakes, it has done so because of: equality; common vision and common objectives; different scales of action; strong scientific foundation; active community participation; good governance mechanisms: accountability and adaptability; partnerships; binationalism. (Valiante, 2008, pp. 258-60). However, while those attributes are valid for the period from the 1960s to the present, the first half century of the IJC's existence – when the IJC was finding its feet and evolving – do not warrant many of these positive assessments. Moreover, as others have pointed out, the scope and impact of both the Boundary Waters Treaty and the International Joint Commission have been limited: "its work has been relegated to noncontroversial areas where there was already diplomatic recognition that agreement could be achieved and most of its efforts, especially in recent years, have led to nonbinding recommendations that the two governments can (and often do) ignore." (Curtis and Carroll, 1983, pp. 27-28).

As this paper has shown, the IJC's behaviour, role, and function in terms of Great Lakes-St. Lawrence governance has changed significantly over time. Both the positive and negative aspects listed in the previous paragraph must be contextualized, for neither are fully applicable to the IJC over the course of its entire existence. Up to about the time of the Second World War, the IJC focused mainly on apportioning water resources. For much of this period the IJC did not operate efficiently, at least not compared to its later record, as on some occasions it split along

national lines or failed to make timely recommendations. A number of large-scale endeavours, during which the politicization of the IJC was apparent, characterized the two post-war decades. Furthermore, during these periods the commission supported or influenced activities that tended to be unsustainable and ecologically harmful, though much of that may only be obvious in hindsight. In turn, water quantity issues were, as this article had endeavoured to demonstrate, drivers of the evolution of the IJC – thus, its form of transborder governance cannot be properly understood apart from an understanding of water apportionment issues over its first half century. Thus, when evaluating and summarizing the IJC's role we have to separate these different thematic issues, and consider the first half of the IJC's existence.

During the 1960s the commission became a leader in addressing Great Lakes water quality and pollution issues, and it has since achieved success and public trust via its joint fact-finding, objectivity, independence, and role as a forum for public participation. Provided that the IJC receives the support of the Canadian and U.S. federal governments, it is well positioned to contribute to effective multilayered adaptive governance, a concept championed by Peter Stoett, as well as anticipate and resolve future transboundary disputes (Stoett, 2012). The IJC will need to continue its bipartisan method of building scientific consensus, based on public input and participation, and do so in an anticipatory manner – but for the IJC to be effective, the respective national governments need to be willing to invoke and heed the commission. Though water quantity issues have not been as prominent in recent years as water quality issues, the former remain remains a renewed but different challenge. Looking to the future, although the historical perspective provided in this study demonstrates the importance of utilizing scientific expertise through the IJC, we also should be cautious about the extent to which the two nations should even be attempting to "manage" extremely large and complex ecosystems such as the Great

Lakes. History, and the technological hubris of the 20th century, shows that there are always unintended consequences, and often these are as bad, or worse, than the original problem – this should give planners pause as they consider further engineered solutions, such as dealing with record low levels on lakes Huron and Michigan, particularly in the face of climate change.

Since the way the International Joint Commission operates has changed over the course of its institutional existence, flexibility has been one of its hallmarks and a characteristic that allowed it to eventually thrive. The IJC has displayed elements of both a capacity-building and regulatory institution: it solicits for public input, helps shape consensus, and collaborates widely, yet it has regulatory functions that involve a gatekeeper role in terms of approving project applications and handling references, and a role in implementation oversight. The IJC is an example of "fragmented bilateralism" (Mumme and Duncan, 1997) and the "rational-legal authority" approach to international relations. On the surface, in terms of the ways that the IJC actually operates (e.g., only the federal governments can ask the IJC to undertake a reference under the BWT) it would appear to counter the "sub-state actor hypothesis"; on the other hand, it is apparent that provinces and states, such as Ontario and New York, have played key roles in the evolution of major IJC issues and have membership on various engineering and scientific IJC boards. Moreover, subnational actors, such as activist organizations, have since the 1960s inspired or contributed to IJC investigations, such as the Great Lakes Water Quality Agreements. But the fact remains that without the consent of the Canadian and American federal governments, the IJC has little legal and regulatory capacity, as it has no enforcement mechanism, though it can use its reputation and symbolic authority to influence environmental issues (that said, in theory at least, once the IJC passes an Order of Approval it retains continuing

jurisdiction over it such that its provisions, once accepted by the Applicant, are not appealable even by governments).

As an organization the IJC is arguably as important symbolically and in the sense of "legitimacy building" as it is in policy terms, for it is commonly perceived as a pioneering model of bilateral environmental cooperation. Although this can be exaggerated, the IJC nonetheless currently wields symbolic and tangible power to frame issues, orient problems, and identity actors and solutions (often itself as the impartial repository of expertise). The IJC has wielded technocratic expertise and has been successful in framing scientific information with policy applicability; though that is a trend that, again, was less noticeable during the first half of its existence when it dealt largely with applications rather than references. The IJC continues to blend aspects of the Bureaucratic and Post-Bureaucratic Models, though it has increasingly moved toward the latter. Likewise, the IJC has displayed elements of both a capacity-building and regulatory institution. While the history of the IJC does not fully support the sub-state actor hypothesis, the future of Great Lakes governance (Great Lakes - St. Lawrence River Basin Water Resources Council) may well run in that direction.

Great Lakes-St. Lawrence water quantity issues not only shaped the evolution of the IJC, but also profoundly shaped the tenor of Canadian-American relations, at the national, subnational, local, and ecological levels. The history of the IJC's involvement in the Great Lakes basin points both to the ways that borders do and do not matter when it comes to sustainability concerns. Though the IJC's governance activities in the Great Lakes basin have primarily been aimed at water, atmospheric and terrestrial realms are also addressed, both directly and indirect. The initiation of an 'ecosystem' approach, and recognition that the ecological health of the three realms are intertwined, through the 1978 GLWQA is an obvious example of incorporating water,

land, and air. This is part of a basin-wide approach, which the IJC has of late augmented with its focus on watershed boards, and the IJC's successes can also be attributed in part to its attention to environmental concerns at various scales, be they individual watershed or the entire Great Lakes basin. Arguably, the IJC's successes have stemmed primarily from approaches that ameliorate the border to varying degrees, for this study shows that the border can substantially complicate the governance of bordered ecological zones, and it is probably that borderland rivers and lakes are more likely to suffer ecological degradation than those located wholly within one political unit. It is reasonable to speculate that the IJC's activities have helped foster a Great Lakes region consciousness and ethos that can serve to create transnational affinities and cooperation, even if this trend has been subsumed in recent decades into agreements and approaches that did not rely on the IJC.

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