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“A Completely Man-Made and Artificial Cataract”: The Transnational Manipulation of Niagara Falls

Abstract

Over the first half of the twentieth century, Canada and the United States considered engineering works that would simultaneously divert water around Niagara Falls for hydroelectric production while ostensibly maintaining and enhancing the appearance of the great cataract. Binational studies and environmental diplomacy resulted in the 1950 Niagara Diversion Treaty, which authorized the International Niagara Control Works. The construction of these remedial works in the 1950s physically reconfigured Niagara Falls and the Niagara River immediately above the falls in order to divert water while masking the scenic effect of lower flow volumes. As a result, depending on the time of day, up to three-quarters of the Niagara River’s water does not go over the falls but is sent via massive tunnels to hydroelectric generating stations downstream. During debates in the following decades about further remedial works, public opinion helped stop some modifications of Niagara Falls, signifying a shift in
attitudes. Using multiple archives from both countries, including the International Joint Commission, this study uncovers the conceptual and physical engineering of the Niagara landscape and waterscape in the middle decades of the twentieth century. The modern history of the manipulation of Niagara Falls highlights both shared and differing Canadian and American conceptions of the links between border waters, progress, technology, and nationalism.

**INTRODUCTION**

The American side has been enhanced with a greater flow of water, the flanks of the Horseshoe Falls have been re-clothed and the ugly scars removed, an unbroken crestline has been achieved, and the mist cloud, which so often hid much of the beauty of the Horseshoe Falls, has been lessened, new vantage points for sightseers have been provided and landscaped and the central concentration of flow which formed the threat to the future of the Falls has been tapped and dispersed. In the face of increased diversions of water for power there has resulted for posterity a scenic spectacle more captivating than that which we have known in the past. Surely this is conservation at its best.

—Alvin Hamilton, minister of natural resources, 1957

With these words, Alvin Hamilton, the minister of natural resources in the Canadian federal government, dedicated the completed remedial works at Niagara Falls in September 1957. Hamilton’s statement revealed the extent of the cataract’s artificiality and was broadly representative of the way government officials and engineers in North America viewed a manufactured waterfall. The various alterations to which Hamilton referred were part of the International Niagara Control Works (various weirs, dams, excavations, and fills) designed to increase hydroelectric production while increasing the beauty of the famous falls. These works were a joint undertaking of Canada and the United States, authorized by the 1950 Niagara Diversion Treaty, which was the result of several decades of binational attempts to plumb Niagara Falls for greater hydro production while enhancing the waterfall’s appearance. Indeed, it had to be a binational effort, given that the Niagara River is a border water and thus subject to the Boundary Waters Treaty and the International Joint Commission (IJC). Niagara Falls consists of the American Falls (and Bridal Veil Falls) in the State of New York, and the renowned Horseshoe Falls that used to bisect New York and the province of Ontario but, because of the 1950s remedial works, were shrunk to the point that they were entirely in Canadian territory.
As a result of these remedial works, the majority of the Niagara River’s water does not go over the falls. In fact, the Canadian and American hydro plants downstream regularly divert three-quarters of the water from the Niagara River around the falls through tunnels, canals, and conduits, and the intake capabilities of the plants are collectively able to shut off the waterfall completely. To government planners, Niagara Falls seemed little more than a dam for hydroelectric production. When other contemporary river systems were dammed for hydroelectricity, such as those connected to the Tennessee Valley Authority, St. Lawrence, or Columbia projects, their appearance underwent an obvious and radical transformation. But at Niagara Falls, the reverse prevailed: the goal was to retain the natural appearance as much as possible. By ostensibly preventing erosion, human expertise was turned to improving the falls by helping it look more like itself. The inherent contradictions, however, were not apparent from the perspective of high modernist North American states, which viewed hydroelectric production as the most effective use of Niagara’s waters.

The state handling of Niagara Falls reveals how Canadian and American federal and subfederal governments conceptualized the environment and their ability to master it through technology. Both governments, along with their respective bureaucracies and experts, displayed key characteristics of high modernism, a concept most prominently associated with the work of James C. Scott. High modernism can be defined as state-organized projects that privilege bureaucratic and technocratic expertise over local knowledge, without recognition of the limitations of this expertise and top-down approach, in large-scale attempts to simplify and order nature (particularly riverine environments) and legitimate and extend governmental control and ordering of society.

While high modernism is a very useful transnational concept, the Niagara case points to the need to contextualize and modify it for the North American early Cold War context. Several scholars have already pointed out ways of doing this in the Canadian context. It is apparent that the Canadian and American states did not fit the despotic and authoritarian mold usually associated with high modernism, and the relative success that the Niagara project achieved contrasts with Scott’s assertion that high modernist projects inevitably fail in liberal democracies. These considerations, combined with unique local and national factors (such as particular Canadian and American views of the connections between identity and nature), lead me to suggest that we can identify what can be termed negotiated high modernism. Lacking the ability to impose their schemes without planning errors and without some measure of consent from those they governed, the Canadian and American governments had to adapt, negotiate, and legitimize themselves in relation to both the specific natural environments and the societies they aimed to control.
A rich historiography is connected to Niagara Falls, in large part because of its purchase in the American national imaginary and its historical role as the nation’s cradle of hydroelectric development. In comparison, little has been written about the other parts of the...
Great Lakes-St. Lawrence basin, relative to their size and importance, and North American border waters in general have been ignored. A number of commentators have looked at the ways that developments at Niagara Falls represented shifting conceptions of beauty and the sublimity of nature, industrialization, and power. Niagra Falls has been explored as a subject by many cultural and social historians, such as Elizabeth McKinsey, Karen Dubinsky, and Patrick McGreevy. Others, such as Ginger Strand and Pierre Berton, have written excellent histories of Niagara Falls that include brief references to the changes to the hydrological and hydraulic regimes on which this study concentrates. William Irwin, H. V. Nelles, and John N. Jackson explore themes engaged here, such as technological, industrial, and water power developments in the Niagara region, but they primarily do so in the context of the nineteenth and early twentieth centuries. Other authors have examined aspects that typically concern environmental historians, but they have largely limited their analyses to the preservation movement and landscape and parkland developments in the period before World War I, such as Frederick Law Olmstead’s nineteenth-century creation of the Niagara Reservation.

Indeed, the many publications on Niagara Falls have tended to address everything around the cataract, ignoring the actual waterfall itself. This article differs because it considers how Canadian and American governments physically manipulated the waterscape of Niagara Falls for hydroelectric production, chiefly during the neglected middle decades of the twentieth century. Specifically, I concentrate on both federal governments, their representatives on bilateral engineering boards and commissions such as the IJC, the governments of New York and Ontario and their power utilities, and public opinion. This requires exploring various transborder engineering studies from the first half of the twentieth century, the binational Niagara agreements of 1929 and 1950, the remedial works constructed in the 1940s and 1950s (particularly the International Niagara Control Works), as well as further diversion attempts in subsequent decades. In contrast to previous studies, I combine an environmental, technological, and international history approach, relying on governmental, institutional, and engineering archival sources. As this is a state-centered and transnational study, it consciously situates itself within the subfield of environmental diplomacy, demonstrating the impact of cross-cutting government jurisdictions on border waters. Furthermore, this history highlights not only shared transborder conceptions of Niagara Falls, but also national differences in Canadian and American attitudes toward the great cataract, identity, technology, state-building, and the environment.
A number of industries utilizing mechanical water power were constructed on the American side of the Niagara gorge during the last half of the nineteenth century, drawing off water destined for the falls and thereby reducing its scenic appearance. Hydroelectricity had first been generated at Niagara in 1881, and the construction of hydroelectric facilities on both sides of the border near Niagara Falls only accelerated in the early twentieth century, along with concomitant industrialization. Public pressure led Congress to enact the 1906 Burton Act limiting Niagara diversions to 15,600 cubic feet per second (cfs), although the act had lapsed by 1913, and call for a treaty to preserve the scenic beauty of Niagara Falls.

The Boundary Waters Treaty of 1909, a landmark Canadian-American agreement that created the IJC to oversee border water and environmental issues, put further limits on diversions: water could be taken from above the falls at a rate of 36,000 cfs by Ontario and 20,000 cfs by New York. The IJC, a major diplomatic coup for Canada (although it was technically signed by Great Britain) and an organization that many—rightly or wrongly—point to as a model of bilateral environment regulation, played a key role in the future of the Niagara issue, which was intertwined with schemes for the creation of a Great Lakes-St. Lawrence deep waterway. However, given that much of the resulting Niagara power was contractually exported to the United States, the diversion ratio was not as beneficial to Canada as it would first appear. The diversion limits were endorsed by US power interests who anticipated that such laws would enshrine their existing water rights. During World War I, all the water that could be utilized was made available for power diversion. The 1920 Federal Power Water Act moved the US diversion limits to those set by the Boundary Waters Treaty, and these limits technically remained in effect until World War II. In the meantime, further expansion of hydro production facilities on both sides of the Niagara gorge was taking place, including the construction of lengthy diversion conduits.

However, public worries arose that the huge quantities of water diverted for such purposes, regularly exceeding the volume limits prescribed by the Boundary Waters Treaty, were harming the scenic beauty of the falls. Members of the public had concerns that natural erosion (over 7 feet per year for the Horseshoe Falls) and low water levels in the Great Lakes were doing the same. This led Canada and the United States to form the International Niagara Board of Control in 1923 to monitor the diversions. Representatives from the power industry argued that, since the falls were eroding themselves, the best way to preserve them was to reduce the amount of water flowing over the precipice. This would, not coincidently, open the door to further water diversions. Studies by the US Army Corps of Engineers...
confirmed the erosion patterns. After Canada suggested an increase in the amount of water that could be diverted from the river, in 1925 the United States proposed further joint governmental consideration. The following year the two countries established a Special International Niagara Board that would focus on how best to maintain the scenic beauty of the falls.

In a 1927 interim report, the board proposed the use of weirs—they were also termed artificial cascades—to divert water strategically from the middle part of the falls to the edges in order to improve the appearance of the crestline, both in quantity and color. The board also suggested that during the nontourist season (October 1 to April 1), power companies be permitted to divert 10,000 cfs from each side. In 1928, the Hydro-Electric Power Commission of Ontario (also known as HEPCO or Ontario Hydro) asked the Canadian federal government to open negotiations with the Americans on increased diversions at Niagara. A quasi-Crown corporation established in 1906 to distribute power in Ontario, over time HEPCO also began producing electricity and became the leading power utility in Canada. HEPCO also served as the basis for the Power Authority of the State of New York (PASNY), which was created in the early 1930s by Governor Franklin D. Roosevelt to handle that state’s hydroelectric resources.

Based on the Special International Niagara Board’s interim report, the Canada-US Niagara Convention and Protocol was signed in 1929. It called for remedial works that would disperse water to ensure an unbroken crestline in all seasons, and it permitted experimental diversions of 10,000 cfs for each country from the Niagara River above the falls for seven years from October 1 to March 31. The works would be paid for by HEPCO and the Niagara Falls Power Company, a private American firm. Although the Canadian Parliament assented to the 1929 convention, the US Senate did not ratify it because of concerns that it granted too much to private power interests. Indeed, the scenic aspect of the agreement had been included largely to curry public favor for increasing diversions.

In 1931, the Special Niagara Board released a report titled “Preservation and Improvement of the Scenic Beauty of the Niagara Falls and Rapids,” which was the final version of its interim report. The report analyzed every aspect of Niagara Falls aesthetics. Noting that the visual appeal of the falls stemmed from diverse factors and perspectives, the board gave consideration to what exactly constituted “scenic grandeur.” For example, was it the height, width, volume, color, or lines that made Niagara such a spectacle? The report’s sections on color are fascinating, and engineers developed a special “telecolorimeter” to test for the desired “greenish-blue” shade. This hue was considered superior to the whitish color resulting from a thin flow over the precipice, which resulted from different factors including the depth of the water above the falls. The board suggested that the American Falls were
more appealing than the Horseshoe Falls, in part because of the excessive mist and spray at the latter. In addition, the denuded bare rock at the flanks of the falls, which the report admitted at least partially resulted from diversions, were one of the greatest detriments to the visual appeal. Erosion at a rate of several feet per year, resulting from concentrated flow in the middle of the horseshoe, also threatened to ruin the “symmetry” of the falls.

All factors considered, 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 riverbed above the falls should be manipulated in order to apportion the necessary volume of water to achieve the desired effect.\textsuperscript{13} Remedial works, in the form of submerged weirs and excavations, would achieve the purpose while allowing for increased power diversions of 20,000 cfs, bringing the total allowable to 70,000 cfs. This report, along with the 1929 treaty, would serve as the conceptual basis for attempts in the following decades to control Niagara.

\section*{BACK TO NIAGARA}

Ongoing bilateral talks about a joint St. Lawrence navigation and power project produced the Great Lakes Waterway Treaty, signed on July 18, 1932, which outlined a 27-foot deep seaway as well as hydro development in the St. Lawrence River. The treaty also dealt with a range of boundary water issues in the Great Lakes-St. Lawrence basin, including Niagara Falls and other Great Lakes diversions, such as those from Chicago and the Albany River basin (the Long Lac and Ogoki diversions).\textsuperscript{14}

At Ontario’s urging, the Canadian government, led by Conservative prime minister R. B. Bennett, pursued the Niagara power issue. But President Roosevelt worried that further diversions at Niagara could diminish the grandeur of the falls, particularly as there were a spate of rock falls in the 1930s at the famous cataract. The US president approached Canada in 1935 with a draft treaty on Niagara remedial works only for the purpose of beautification. But Canada did not wish to proceed with an agreement that did not include power development.\textsuperscript{15} Despite the bilateral delays, the Niagara landscape was already undergoing dramatic changes. As the American shoreline developed into a leading site of electrochemical production, the Canadians had also modified their side. In 1931, Ontario Hydro brought the first turbine of a new power plant online, Sir Adam Beck No. 1. This hydroelectric generating station, which diverted water via a canal placed above the falls and required the reversal of the Welland River, was part of a line of successive Niagara area power plants that could lay claim to being the world’s largest hydro station.\textsuperscript{16} In addition, Canada had been
reconfiguring the western edge of the Horseshoe Falls by reducing the flank of the waterfall and blasting off much of the remainder of Table Rock.

Premier Hepburn renewed Ontario’s calls for diversions from the Hudson’s Bay watershed into the Great Lakes basin in order to increase power production at Niagara. Relations between Hepburn and the new prime minister, William Lyon Mackenzie King, became strained because disputes over water rights were tied into wider constitutional questions and federal-provincial issues. King, knowing that Roosevelt was unwilling to give the permission necessary for Ontario to develop more power at Niagara except as part of a broader St. Lawrence package, resisted Hepburn’s requests and subsequent diatribes. An informal board appointed by Roosevelt to examine the Niagara case suggested that private companies would impede a St. Lawrence development if their Niagara diversion desires were not satisfied. As a result, the Roosevelt administration decided, with Canadian concurrence, to withdraw the still-unratified 1929 Niagara treaty from Senate consideration and fold the Niagara issue into a wider agreement that would comprehensively deal with all Great Lakes-St. Lawrence basin navigation, power, and diversion issues. The Americans produced a draft treaty in 1938 that did just that, and it stipulated remedial work at Niagara to preserve the visual appeal of the falls while allowing for the increased power diversions. But with Hepburn resolutely opposed to a larger agreement, King, despite his admiration for Roosevelt, claimed that his hands were tied. The situation appeared intractable.

World War II, and the concomitant need for hydro power, changed the picture dramatically. Hepburn reversed his opposition to a St. Lawrence treaty. But Roosevelt was now the more reluctant partner because he had to face the electorate in 1940. To help compensate for this delay, the Roosevelt administration permitted Ontario to undertake the Albany River diversions into the Great Lakes watershed and utilize up to 5,000 cfs for hydro production at Niagara Falls. On March 19, 1941, a new federal-Ontario cost allocation was signed, and that same day Canada and the United States entered into the Great Lakes-St. Lawrence Basin Agreement, which was an executive agreement rather than a treaty. The agreement created the Great Lakes-St. Lawrence Basin Commission to oversee construction of a 27-foot seaway in conjunction with a single-stage hydro dam in the International Rapids section of the St. Lawrence River.

In addition to stipulating limits for the Chicago diversion and parameters for other diversions into the Great Lakes-St. Lawrence watershed, Article IX of the 1941 agreement provided for the construction of remedial works in the Niagara River, as well as the means of testing their utility and immediate diversions of 5,000 cfs per side. The Great Lakes-St. Lawrence Basin Commission was charged with preparing
plans for remedial works, which the two governments could then choose to build. However, this 1941 Canadian-American St. Lawrence agreement also failed to receive the assent of Congress, largely because of the entrance of the United States into World War II.

Nevertheless, the two countries agreed that the limits on the amount of water diverted at Niagara Falls for wartime needs could be temporarily increased outside of the agreement: 5,000 cfs for the United States and 3,000 cfs for Canada. Further withdrawals were subsequently allowed during the war, rising to a total diversion of 54,000 cfs for Canada and 32,500 cfs for the United States. In early January 1942, Canada and the United States agreed to split the cost of constructing remedial works above the falls, with Ontario Hydro the responsible Canadian entity and the US Army Corps of Engineers handling the US share. These works would primarily take the form of a stone-filled weir—a submerged dam—in the Chippawa-Grass Island Pool about a mile above the falls, which would raise the water level in order to facilitate greater diversions and maintain scenic beauty. By the end of 1942, 90 percent of the weir was completed, although it was not finished until 1947. It reportedly raised the water level in the Grass Island Pool about a foot and doubled the flow over the American Falls.21

The wartime diversions continued on an indefinite, and technically illegal, basis after the end of the war. They powered the tremendous growth in manufacturing in the Niagara region that had taken place during and after World War II, leading one optimistic commentator to dub the Niagara peninsula “the Ruhr of Canada.”22 Moreover, the economic growth of the region was joined by a tourist explosion. Canada in general, particularly central Canada, experienced a boom period after 1945, and more electricity was needed to feed the economic and industrial expansion. Ontario, the leading Canadian province in terms of production, was already experiencing power shortages, and if the capacity of the country’s most important industrial area was to develop to its full potential, new sources of power were required. In 1945, southern Ontario had consumed 9.9 billion kilowatts, would consume 11.8 billion kilowatts in 1949, and estimates put the 1951 requirement at 15.6 billion kilowatts. The larger US consumer and defense industries, particularly those along the Niagara River, required even greater supplies of electricity.

1950 NIAGARA DIVERSION TREATY

As World War II drew to a close and then gave way to the Cold War, the two countries explored the possibility of making the Niagara diversions permanent through a separate agreement. A HEPCO memorandum contended that, as of 1947, 86,000 cfs of water was being diverted without any detrimental effect on the Horseshoe
Falls. Further studies showed that additional remedial works would allow more water to be safely diverted, which coincided with plans to build a new, larger generating station that could more effectively utilize diverted water. In December 1948, Canada and the United States exchanged diplomatic notes endorsing a further 4,000 cfs diversion.

HEPCO had been in regular contact during the preceding months with the Federal Power Commission, PASNY, and the Niagara Hudson Company, and members from these three entities had been working on a plan for the Niagara River “embracing the preservation of the Falls diversions, and maximum power production.” Yet changing the Niagara diversions also presented some serious logistical and legal difficulties from the Canadian government’s perspective. Questions about the division of waters were also a bone of contention, as were the locations from which the countries would take their water.

These questions were eventually resolved, and on February 27, 1950, the Niagara River Water Diversion Treaty was signed between the United States and Canada. The US Senate passed the treaty in August 1950, although it did attach some reservations, which Ottawa agreed to in September. The treaty came into force on October 10, 1950. The finished form of the accord called for remedial works including the International Niagara Control 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 they deemed the tourist season: 8 a.m. to 10 p.m. from April to mid-September, and from 8 a.m. to 8 p.m. during the fall), and no less than 50,000 cfs during the remainder of the year. Since the average total flow was about 200,000 cfs, Canada and the United States were collectively allowed to take about three-quarters of the total flow over the falls.

The various governments spoke of the waterfall as if it were a water faucet to be turned on and off according to aesthetic whim. In the words of the Canadian secretary of state for external affairs, “In the evening the Falls are floodlighted and 50,000 c.f.s. may not be enough water to provide an adequate spectacle at that time. It may prove necessary to maintain a flow of 100,000 c.f.s. up to midnight in the tourist season. On the other hand, it is probably unnecessary to turn on the full flow at sunrise. It may be better to define ‘night-time’ as the period from midnight to 9:00 a.m. We shall have to discuss this problem with the authorities responsible for lighting the Falls.”

Despite such ambitious plans, according to a former Ontario Hydro public relations official, the potential public response made Ontario Hydro “leery” of making decisions that affected the falls. There was considerable public pressure on the American side for scenic works, and the Special International Niagara Board seemed genuinely
concerned about the scenic quality of the falls. Without going into detail, there were clearly vocal public elements in both countries, although they tended to be louder in the United States, opposed to manipulation of the waterfall. Nonetheless, most governmental elements in both countries exhibited a technological and environmental hubris about their ability to configure Niagara Falls since “[t]heir aim was the subjugation of the raw and wild, the domestication of elemental forces to man’s ordered plan.”

Studies by the newly constituted International Niagara Falls Engineering Board showed that, without remedial works, the diversions authorized in the treaty would have an overwhelming impact on the scenic beauty of the area. The Chippawa-Grass Island Pool level would drop by as much as 4 feet, exposing areas of the riverbed, turning the American Falls into an unsightly spectacle, and greatly reducing the appearance of the flanks of the Horseshoe Falls. Central to planning the form and location of the works were the elaborate scale models constructed by the Army Corps of Engineers in Vicksburg, Mississippi, and by Ontario Hydro at Islington, Ontario.

The IJC’s May 1953 “Report to the Governments of the United States of America and Canada on Remedial Works Necessary to Preserve and Enhance the Scenic Beauty of the Niagara Falls and River” was based on model readings and a March 1953 report by the International Niagara Falls Engineering Board. The objectives remained basically the same as they had been in the 1920s: to ensure the appearance of an unbroken and satisfactory crestline while allowing for the diversion of water for power production. The report recommended a Chippawa-Grass Island Pool control structure, and excavations and crest fills on the flanks of the Horseshoe cascades. It also called for the establishment of an International Niagara Board of Control (the previous board of the same name was effectively abrogated by the 1950 Niagara Treaty) to supervise the construction and operation of the proposed remedial works, formally called the International Niagara Control Works. These works were also designed to ensure that the levels of the Niagara River and Lake Erie were not adversely affected.

There was delay on the diversions because of issues about the balancing of costs between the two countries. A member of the US Section of the International Joint Commission argued that the main purpose of the 1950 treaty was for the protection of scenic beauty, and that no additional diversions should take place until the remedial works were completed. Since this was not stipulated in the treaty, the diversions went ahead. Moreover, this member’s view was decidedly in the minority, for there was considerable governmental pressure from both sides of the border, and Ontario in particular, to do just the opposite and begin diverting the additional water before the remedial works were installed.
CONSTRUCTING NIAGARA FALLS

The two governments accepted the Engineering Board’s recommendations later in 1953. In January 1954, the first remedial works...
construction contract was signed, and ceremonies to mark the commencement of construction took place in June. Under the treaty terms, Canada and the United States had a four-year time limit (from the date of agreement) in which to finish building the works. Later in the year, another major rockslide occurred. It was almost as if Niagara was resisting attempts to subdue or conquer it.

The total cost of the remedial works was estimated at about $17.5 million, but they ended up totaling around $12.5 million when finished in 1958. The “modern, graceful” 1,550-foot International Control Dam extended in a straight line from the Canadian shore, parallel to and about 225 feet downstream from the weir built in the 1940s, consisting of sluices equipped with control gates. The purpose of this structure was to control water levels in the Chippawa-Grass Island Pool above the falls in order to adequately supply the water intake works for both countries and spread out the water both for appearance and because flows concentrated in certain places caused more erosion damage. The flanks of Horseshoe Falls were designated for significant modification. Excavation took place along the flanks (64,000 cubic yards of rock on the Canadian flank; 24,000 cubic yards on the American flank) in order to create a better distribution of flow and an unbroken crestline. To compensate for past 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.

An Ontario Hydro news release crowed about the work being done to “conserve” Niagara Falls, stating that “[d]iversion of water above the Falls for power since 1900 has been responsible for reducing erosion considerably, and the remedial works to be constructed will make it negligible.” Government officials increasingly referred to the remedial works as not just simply for the preservation of the falls, but for their enhancement. This was largely rhetoric to help convince the public that their efforts were intended for the benefit of the falls, rather than for hydroelectricity, although many officials and experts seem to have started to believe their own words over time.

The overarching goal was to create an uninterrupted curtain of water over the precipice that displayed a pleasing consistency and color. The remedial works were also intended to reduce spray because excessive mist was scaring off visitors to the tunnels behind Table Rock. This speaks to the commodification of the Niagara experience, a process that was intertwined with the other tourist trappings prevalent at Niagara Falls: nature should be sanitized, made predictable and orderly, and packaged for easy consumption. It was a manufactured landscape, a hybrid of the real and artificial. Ginger Strand calls Niagara an “in-between” landscape, which is compatible with concepts such as Richard White’s “organic machine,” Liza Piper’s identification of the relationship between industrialization and nature as assimilative
and integrative, and Sarah B. Pritchard and Thomas Zeller's stress on “naturalizing industrialization.” The great cataract was reduced to cubic feet per second and feet of crestline, a schematic or blueprint where the beauty for the engineers lay in their precision and control over the waterfall. It was to be regulated and fine-tuned to produce the maximum beauty and maximum power. The water still flowed over a rock cliff, and thus was natural, but it did not go over the precipice in a natural way: it had been radically altered and modified to suit human tastes. In fact, the majority of the Niagara River’s water was not even going over the falls, but passing around. One could argue that the real waterfall was in the reservoirs and penstocks of the downstream generating stations.
As reports from the Niagara Falls Engineering Board indicate, the extensive scale models were the primary means by which the form and location of the remedial works were selected. Inherent to postwar high modernist water megaprojects, these models show the misplaced faith
in technological methods: slight model mistakes were common, and when extrapolated onto a larger scale, they could have significant ramifications. For example, an engineering report later concluded that “on the basis of tests which Hydro itself has run on models of its own design, Hydro Engineers have been led to conclude that the models being used by the Board, which were designed to a distorted scale, produce results which are quite different from those run on true scale models.”

**ATTEMPTING FURTHER DIVERSIONS**

By 1958, the remedial works had been completed. A 1960 report by the International Niagara Board of Control showed that, based on model tests, if the power entities diverted all the allowable water from the Niagara River, which was expected in the near future with the completion of the new American Robert Moses generating station near Lewiston, New York, the Chippawa-Grass Island pool could not be maintained at the authorized levels during nontourist times. Moreover, the final construction report on the remedial works concluded that “[t]he control structure as built is of insufficient length to hold the level prescribed by the Board of Control under all conditions.”

As a result, HEPCO and PASNY decided in 1961 to submit a supplementary application to the IJC asking for further remedial works in order to make greater use of their allotted water, as well as consideration of whether the flows over the falls would be negatively altered by further reductions beyond those specified in the 1950 treaty. A Canadian Department of External Affairs memorandum pointed out that these proposed works would do nothing for the beauty of the falls but were designed entirely to ensure that the entities were supplied with all the water they were entitled to divert. Nonetheless, the IJC quickly approved, stating that these enhancements were essentially the logical conclusion of the earlier remedial works. The commission recommended an extension with five sluices to the control structure, additional training walls (to keep ice away from the hydro intakes), and the removal of the old weir.

The IJC deigned it necessary to hold only one public hearing. But negative feedback came via other forums. According to the Canadian representative on the Niagara Board, faulty gauges had resulted in 20,000 cfs less than the minimum required quantity going over the falls at times, although he called these only “minor.” While the government may not have considered it significant, others thought differently; the resulting opposition was part of the burgeoning environmental movement sweeping the continent, but stemmed as much, if not more, from the unique historic affinity for Niagara Falls as the archetype of natural splendor. Locals stated in newspaper interviews that the existing remedial works had already been detrimental to the scenic beauty,
and the envisioned additional remedial works would only result in “a completely man-made and artificial cataract.” Moreover, one interviewee aptly continued, “[i]t is a far stretch of the imagination to call the works remedial: that is, enhancements of the natural assets of the Niagara. They quite obviously are for the diversion of water for electric-generating development in the Lewiston-Queenston area, and it is completely false to say anything to the contrary.”

Dissatisfaction with proposals to increase daytime diversions during the tourist season was even greater in the United States than in Canada. The public outcry led the governor of New York to compel the PASNY chairman, and virtual dictator within his fiefdom, Robert Moses, to withdraw the request in 1962. Ontario concurred, sensitive to the domestic pressure in Canada against the diversions. Nevertheless, some aspects of the proposed remedial works, such as the extension to the control structure, were eventually constructed. The US Army Corps of Engineers also undertook further remediation on the US side of Horseshoe Falls. The eastern end of Horseshoe Falls was technically in the United States, but by filling in the flank at Terrapin Point and thus reducing the width of the crestline, the water of Horseshoe Falls was restricted entirely to Canadian territory—the United States had lost its share of the great cataract. Other smaller modifications also took place including the removal of shoals, dredging, and the placement of an ice boom.

A campaign began in the mid-1960s to remove the “unsightly” rock talus that had formed at the base of the American Falls (with the result that the American Falls were half waterfall, half cascade) and prevent further erosion and rockslides. In 1967, Canada and the United States asked the IJC to investigate and report on measures necessary to preserve or enhance the beauty of the American Falls, specifically in regard to the talus. The US Army Corps of Engineers undertook a range of studies and tests, and in 1969, the American Falls were dewatered—a cofferdam diverted the water to the Horseshoe Falls—so that the US Corps of Engineers could perform tests and stabilize the rock face. The Corps of Engineers concluded that the removal of the 280,000 cubic yards of talus might weaken the rock face and that the talus was a “dynamic part of the natural condition of the Falls and the process of erosion should not be interrupted.” As a result of this recommendation, and likely in large part because of the estimated cost of approximately $26 million, the IJC in 1974 recommended against further artificial measures to prevent rock erosion at the American Falls. To the IJC, it seemed “wrong to make the Falls static and unnatural, like an artificial waterfall in a garden or a park,” and the fundamental conclusion of the report was that “man should not interfere with the natural process.”

Stating that humans should not interfere with the natural process was contradictory, even hypocritical, considering the means that had been
used to make the report, and the fact that elsewhere in the report there were recommendations for remedial works to stabilize the flanks of the falls. Opposition to further work seemed to be based as much on cost considerations and uncertainty that talus removal would, in the long term, unequivocally benefit the scenic spectacle. But the principle of not interfering with the natural process promulgated by the North American states and their various representatives (e.g., IJC members) was nonetheless noteworthy. The same was true of the acknowledgment that what accounted for scenic beauty or improvement was subjective and contested, and the report’s suggestion that Canada and the United States should pay attention to the “setting” of the falls (i.e., the built environment and developments around the waterfalls). This belied a greater awareness of the ecological implications of manipulating Niagara Falls, a point soon driven home by the unfolding of the Love Canal scandal mere miles away.

HYDRAULIC/HYDROLOGICAL NATIONALISM

The Niagara issue highlights the links between national identity, environment, and natural resources. Patrick McGreevy argues that the Niagara River, Falls, and region had resonated with Canadian nationalists for various reasons. These include Niagara’s proximity to the Canadian heartland, connection to the St. Lawrence-Great Lakes system, its

Figure 7: Contemporary view of Horseshoe Falls from the Canadian side, just upstream from the western flank. Credit: Daniel Macfarlane (2012).
sites of Canadian resistance to American encroachment in the War of 1812, and Canadian views of the environment. To borrow his effective metaphor, Niagara Falls was Canada’s front door and America’s back door. At the same time, these reasons apply to much of the Great Lakes-St. Lawrence basin. Moreover, up to the late nineteenth century, Niagara Falls was more strongly associated with the American sublime, be it natural or technological. The unique American associations with Niagara Falls were reflected by the fact that, in the decades leading to the 1950 Niagara treaty, the strongest voices for preservation of the scenic appeal of Niagara Falls came from the US side. Granted, many Americans, particularly in governmental positions, took a more imperialist view of the Niagara River and felt that the proper use and outgrowth of Niagara’s legacy was industrial production. Canadians did begin to take a possessive view of the more attractive Horseshoe Falls in the twentieth century but did not connect the Niagara waters to Canadian identity to near the same extent that they did with the St. Lawrence River. The willingness to alter such an iconic landmark in the twentieth century seems to further undermine McGreevy’s argument.

I would suggest that Niagara Falls does have a unique place in the Canadian (or central Canadian) national imagination. The factors McGreevy identifies did have nationalist resonance but became absorbed, and thus enhanced, by technological control of Niagara’s waters for hydroelectricity. Transforming the waters of Niagara into hydroelectricity represented the full use of the nation’s birthright and thus a uniquely Canadian hydraulic/hydrological nationalism.45

Figure 8: The Sir Adam Beck No. 1 and No. 2 (left) and Robert Moses (right) generating stations downstream on the Niagara River. Credit: Daniel Macfarlane (2012).
Although Canadian scholars have arrived at different interpretations of the impact of technology on nationalism, and vice versa, the two are inextricably linked. The argument that “technological nationalism has characterized the Canadian state’s rhetoric concerning identity” is persuasive—from the early Canadian staples trade to railroad building to the St. Lawrence seaway and power project. As R. Douglas Francis suggests, technology was historically the means by which the United States could dominate and control Canada. However, technology was a double-edged sword, for by the 1930s, Canadian access to modern technology held out the potential for the nation to evolve independently of the United States, rather than further integrating the two countries. Canadians had historically viewed nature in more antagonistic terms than did Americans, and technological advances offered Canada the opportunity to conquer the hostile environment and retain the primary benefits of extracting staple resources. Although the Niagara works were a joint undertaking with the United States, this was done as much out of necessity (i.e., the Niagara River forms the border) as a desire to cooperate.

CONCLUSION

While there had been considerable public pressure throughout the first half of the twentieth century to preserve the scenic beauty of Niagara Falls, the Canadian and American governments generally privileged hydroelectric development and only did what was necessary to appease appearance advocates. The governments were interested in conserving the water at the falls, but this was for increased power diversion and economic considerations. For some elements of public opinion, the sublime singularity of Niagara Falls warranted protection by virtue of its very existence. For many, however, the satisfactory appearance of Niagara Falls was as much a means to economic ends—tourist dollars, for example—as it was for the sake of the cataract and its environs. But by the early 1960s, a shift was perceptible, and efforts to leave Niagara natural achieved greater success. This may have been part of the growing environmental movement of the 1960s, but it arguably also stemmed from an ingrained societal view of Niagara as the epitome of the sublime. Yet there was still a transnational willingness to sacrifice Niagara Falls for the sake of power and industry.

The history of developments at Niagara Falls going back to the nineteenth century indicates a North American confidence in the ability of technology to control, tame, and exploit the natural environment, an impulse that took on even more urgency as the Cold War dawned after 1945. Niagara is a unique high modernist case because, rather than seeking to dominate the natural setting visually, as did other
comparable projects in the 1950s and 1960s, the control works at and above the actual cataract were hidden. Instead of making the technology (the remedial works) prevalent, they were designed to be unseen, although the downstream power projects, to be sure, were meant to invoke awe. This can be in large part explained pragmatically: public pressure to preserve the scenic appearance, and state interest in retaining the tourist appeal. But it also speaks to a different variant of high modernism in which the desire to dominate had to be negotiated by the state, both with the governed but also the natural environment.

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Notes
I would like to thank Serge Durflinger, Norman Hillmer, Lynne Heasley, Murray Clamen, Nancy Langston, members of the Network in Canadian History and Environment (NiCHE) New Scholars Reading Group, attendees of the Border Flows conference, and the anonymous reviewers. Institutional and financial support came from NiCHE, the Social Sciences and Humanities Research Council of Canada (SSHRC), the Fulbright Foundation, and the Eisenhower Foundation, as well as the University of Ottawa, Carleton University, St. Lawrence University, and Michigan State University.

1 Library and Archives Canada (LAC), RG 25, vol. 6780, File 1268-D-40, pt 52, St. Lawrence Project: General File, September 18, 1957, to April 21, 1958, 28: Address by Alvin Hamilton (Minister of Natural Resources) at Dedication Ceremony, Niagara Falls, September 28, 1957.

2 The fall of the Niagara River from Lake Erie to Lake Ontario is about 326 feet; Niagara Falls makes up 160 feet of that fall, and the rapids on either side of the falls also provide a significant drop. There are two cataracts at Niagara: the western Horseshoe Falls, with a crest of around 2,500 feet, and the American Falls featuring a crest of about 1,100 feet.

3 Ontario is on the verge of finishing a new tunnel.


5 Tina Loo with Meg Stanley, “An Environmental History of Progress: Damming the Peace and Columbia Rivers,” Canadian Historical Review 92, no. 3 (September 2011): 399–427; Tina Loo, “Disturbing the Peace: Environmental Change and


8 On the St. Lawrence seaway and power project, see Macfarlane, “To the Heart of the Continent” (forthcoming).


10 Strand, 173.


13 “Preservation and Improvement of the Scenic Beauty of the Niagara Falls and Rapids”; Strand, 175–76.
14 The Chicago diversion, which since its opening in 1900 took water from Lake Michigan through the Chicago Sanitary and Ship Canal into the Missouri River basin and eventually to the Gulf of Mexico, was a continual irritant in Canadian-American relations. The Long Lac/Kenogami and Ogoki River diversions both involved shifting water from the Hudson’s Bay drainage basin into Lake Superior.

15 Government of the United States, National Archives and Records Administration II (NARA II), RG 59, Box 4048, Memorandum, Department of State, 711.42157 SA 29/1375, February 4, 1936.

16 Sir Adam Beck No. 1 was located at Queenston-Chippawa, downriver from the falls, rather than just the height of the falls.

17 Kottmann, 317–18.

18 NARA II, RG 59, Box 4048, Memorandum to the Secretary of State, from Roosevelt, 711.42157 SA 29/1375—1/2, December 23, 1935.


20 Through an exchange of notes on October 14, October 31, and November 7, 1940, Canada was given the right to use the extra water at Niagara until such time as a Great Lakes-St. Lawrence basin agreement was put into effect. LAC, RG 25, 1268-A-40, pt. 1, St. Lawrence-Niagara River Treaty Proposals (Interprovincial Correspondence) (March 21, 1938, to March 21, 1942), vol. 4168, Letter from Skelton to Hogg, October 11, 1940; LAC, RG 2, Memorandum Re: Meeting of Cabinet War Committee, October 14, 1940.


22 Dubinsky, 181.


24 LAC, RG 25, file 1268-D-40C, St. Lawrence River-Niagara River Treaty Proposals—General Correspondence, part 9 (Jan 5/49 to Dec 30/49), vol. 3560, Canadian Ambassador to Secretary of State, June 1, 1949.

25 Aside of the temporary wartime increases, since 1909 Canada had enjoyed an extra 16,000 cfs diversion at Niagara, but it had been exporting the power produced by about 8,600 cfs to the United States. LAC, RG 25, file 1268-D-40C, St. Lawrence River-Niagara River Treaty Proposals—General Correspondence, part 9 (Jan 5/49 to Dec 30/49), vol. 3560, Memorandum for the Secretary to the Cabinet, Re: St. Lawrence Development and Niagara River Diversions, May 26, 1949.

26 Ibid.

27 The passage of the Niagara treaty also required an amendment to the Boundary Waters Treaty.

28 LAC, RG 25, file 1268-K-40C, St. Lawrence-Niagara River Treaty Between Canada and United States—Additional Diversion of Water at Niagara Falls, part 4 (Jan 1/48
to Nov 30/49), vol. 3561, secretary of state to Canadian ambassador, November 7, 1949.

29 Interview with Dennis Dack (former speechwriter to HEPCO chairman Robert Saunders), Toronto, Ontario, May 3, 2011.


31 For example, the Ontario model was 95 feet by 37 feet and depicted 5 miles of the river, including the falls, and Ontario Hydro estimated that its use saved about $5 million. Ontario Hydro, “Power From Niagara.”

32 IJC, “Report to the Governments of the United States of America and Canada on Remedial Works Necessary to Preserve and Enhance the Scenic Beauty of the Niagara Falls and River, May 3, 1953.”


36 IJC, Docket No. 64: Niagara Falls Reference, IJC Meeting, October 7, 1959.


June 1, 1961, to December 18, 1961; Niagara Falls Review—“Remedial Works a Detriment,” August 11, 1961.


42 Drescher, Engineers for the Public Good, 264.


45 Andrew Biro uses the term hydrological nationalism, but since I believe in the case of hydroelectric development this association is tied up in both the actual river/lake waters and the manipulation of these waters, it is both hydrological and hydraulic, for the former is generally accepted as referring to the water itself and the latter to the ways it is manipulated and modified, such as canal and hydroelectric works. Andrew Biro, “Half-Empty or Half-Full?: Water Politics and the Canadian National Imaginary,” in Eau Canada: The Future of Canada’s Water, ed. Karen Bakker (Vancouver: UBC Press, 2007), 323.

46 Adria, 45.

