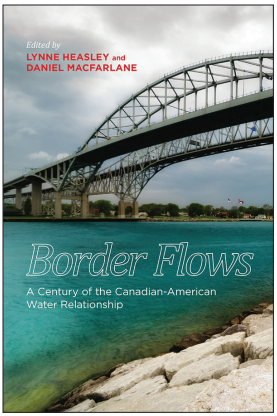

BORDER FLOWS: A Century of the Canadian-American Water Relationship

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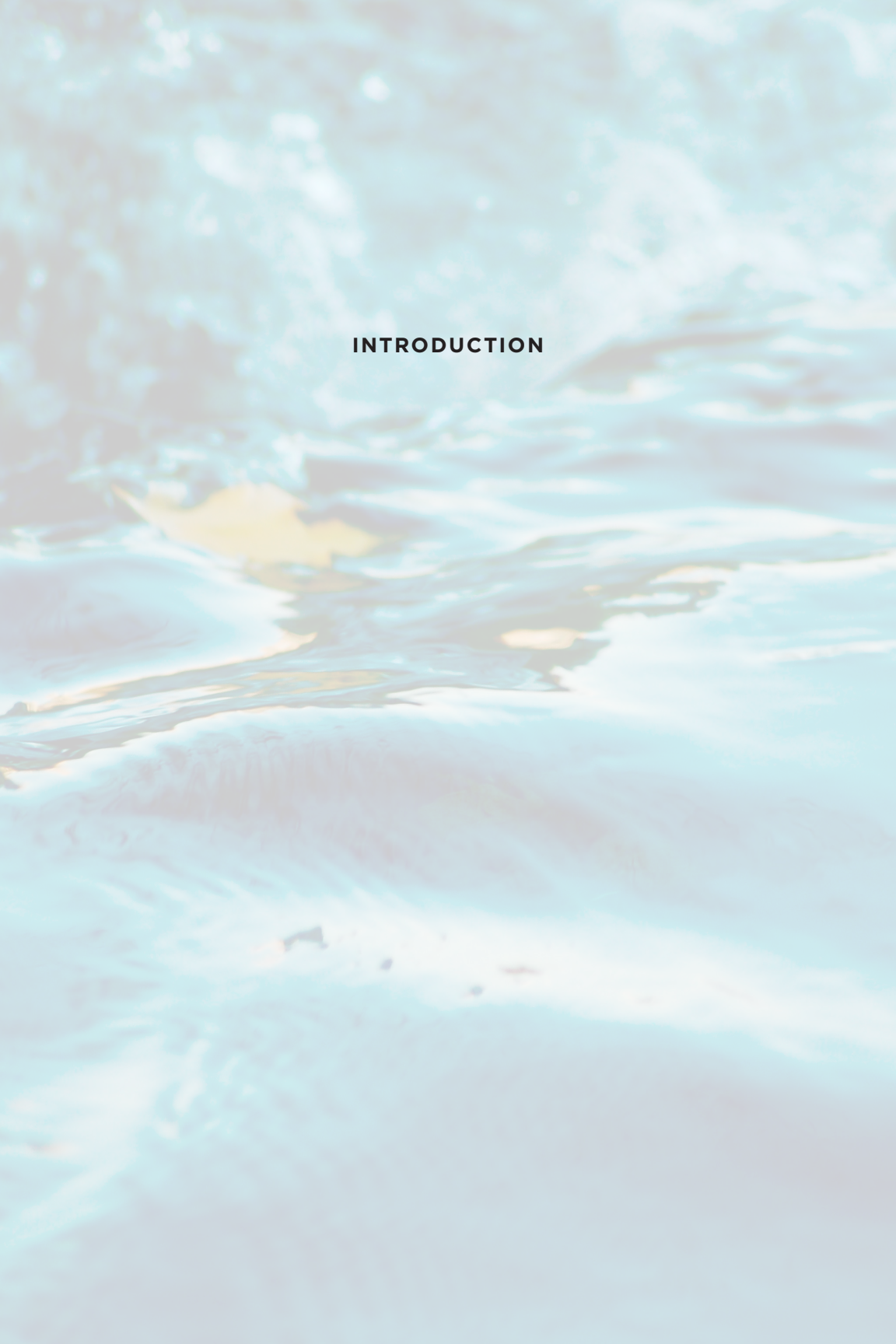
ISBN 978-1-55238-896-9

Acknowledgement: *We acknowledge the wording around open access used by Australian publisher,* **re.press**, *and thank them for giving us permission to adapt their wording to our policy* http://www.re-press.org



INTRODUCTION

Negotiating Abundance and Scarcity: Introduction to a Fluid Border

Lynne Heasley and Daniel Macfarlane

In 1982, a collective chill spread through the offices of two Canadian premiers and eight U.S. governors whose provinces and states encompassed the vast Great Lakes–St. Lawrence basin. In *Sporhase v. Nebraska*, the United States Supreme Court had just declared water an article of commerce subject to interstate trade under the commerce clause of the U.S. Constitution.[1] Henceforth states could not ban water diversions outside their borders, the question addressed in *Sporhase*. Imagine the implications from the perspective of policymakers and politicians in Great Lakes states. At six quadrillion gallons, 84 percent of North America's surface freshwater supply, the lakes were a kind of aquatic El Dorado, hypothetically open to those with the political or economic might to extract their water.

Such fears were not hyperbole to Great Lakes residents. The court decision came on the heels of a U.S. Army Corps of Engineers study on whether imported water, possibly from the Great Lakes, could restore a rapidly declining Ogallala Aquifer in the Great Plains. The corps provoked more paranoia by using uncharacteristically socialist language about fairness, or redistribution from "water rich" to "water poor" regions.[2] Proposing a national water policy became a kind of shorthand for water redistribution.[3]

The corps study followed the resurrection of an infamous proposal by Canadian engineer Tom Kierans. Kierans named his idea the Great Recycling and Northern Development Canal, or GRAND. GRAND would pump water to Lake Huron from James Bay, which lay far to the north on the southeast corner of Hudson Bay. According to the GRAND concept, Lake Superior would no longer be necessary to feed Huron. Therefore a channel could run Superior's "superfluous" water to the arid—i.e., water poor—American West. These and other epic ideas raised the hackles of whichever Great Lakes premiers or governors were in office.[4]

The *Sporhase* case galvanized an intense twenty-five-year saga of interstate, interprovincial, and binational negotiations with one goal: to find a constitutionally sound and mutually agreeable way to limit future diversions. Some of the twists and setbacks of this quest come later in the volume. Jumping ahead now, though: in December 2008, a binding Great Lakes–St. Lawrence River Basin Water Resources Compact took effect (hereafter the Great Lakes Compact). The compact and its companion Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement with Ontario and Quebec put limits on water use and diversions from the basin. This was a stunning environmental landmark of the twenty-first century.

With the compact in hand, stakeholders from local to federal levels seemed to escape what Lynne Heasley has called "the paradox of abundance."[5] Many environmental histories share an abundance narrative—i.e., that the intense concentration of a valuable resource practically assured the decimation of that resource. The historical reasons vary, but for the nineteenth and twentieth centuries reasons often involved time lags between market-driven extraction, increased scales of production, catch-up policy responses, and true care for the natural world. Such boom-and-bust histories along today's Canada-U.S border include (1) near-extinction of the beaver in New France and bison on the nineteenth-century Great Plains, and the actual extinction of the passenger pigeon; (2) liquidation of old-growth white pine forests; (3) fishery crashes from the Grand Banks to the Great Lakes to the Pacific Northwest; (4) mineral mines, including gold strikes along the Alaska–British Columbia border; and (5) Canadian oil and especially the infamous Alberta tar sands crude, much of it sent south across the border.[6] Abundance stories are Sisyphean: our economic and cultural inability to prevent the next example, to push the proverbial rock over the crest, to *sustain* both the people and the nature of our homes.

In North American environmental history, abundance is a powerful narrative indeed.[7] But in North American *water* history, scarcity is the dominant narrative.[8] The western half of the continent—the American southwest especially—has had an understandable but nonetheless disproportionate influence on national narratives of water and debates over policy. Think of "the border" itself. For many Americans, and certainly the media, the first border that comes to mind is the U.S.-Mexico border and its borderline through the desert, the Rio Grande. Historically, think of American John Wesley Powell's explorations of the Colorado River in the nineteenth century and his unheeded recommendation that climate-appropriate property boundaries should restrain settlement in arid regions.[9] A decade before Powell, geographer John Palliser made nearly the same argument about semiarid dry prairies in southern Saskatchewan and Alberta. Much later, irrigation transformed "Palliser's Triangle" (the area's common name) into Canada's breadbasket of wheat production.[10] While scholars, policymakers, and environmentalists still look to Powell's journals for insight, a legal system of water rights at odds with his approach prevailed in the arid American West. The system's bulwarks were the Colorado Doctrine, governing individual user rights, and the Colorado River Compact of 1922, an agreement among the river basin's seven states to allocate water rights to the river and its tributaries.[11]

Better known as the prior appropriation doctrine, or "first in time, first in right," the Colorado Doctrine separated water rights from riparian land ownership.[12] In simpler terms, prior appropriation means the first user has the superior claim to a water source. This claim holds even if later users own land adjacent to the water and the first user owns no adjacent (i.e., riparian) land. The key is that the first user's purpose be "beneficial," which historically meant for agriculture or industry. For instance, if the first user was a mine operator who diverted water from a stream to run the mine, a second user could not interfere with that first use. After the first user, the second user had the next highest claim, and then the third user, until, theoretically, there was no water left to use. Prior appropriation made water a quantifiable and transferable commodity; therefore, a user could divert water to another location and sell his user rights and legal place in line to someone else.

Today, both prior appropriation and the Colorado Compact are broken. In an era of global warming and megadroughts, there is not enough water

to share but still enough to fight over. "Colorado to California: Hands Off Our Water," shrills a Fox News headline.[13] "Rain Barrel Bill Dies on Calendar," runs a much blander headline in the *Colorado Statesman*, though this 2015 story is just as dramatic. "A bill that would have allowed Coloradans to collect rainwater died in the Senate late Tuesday night," begins the rain barrel story—and midway through is the crux:

> Opponents, including farmers and ranchers, believe that rainwater is covered under the state's prior appropriations law, since it runs off into groundwater and surface water, such as rivers. . . . There's a reason why rain barrels have been illegal in Colorado for the past 160 years, according to Chris Kraft of Fort Morgan, who operates one of the largest dairies in the state. "We're short of water. People keep moving here. This is a worse idea today than it was a long time ago." Kraft explained that farmers have to get a water court decree to get water, and some of those decrees date back to Colorado's earliest days as a state. Kraft said his decree dates back to the 1890s, and he has to pay a lot of money for that decree and the ditch that supplies his farm with irrigation water. "This would allow people to steal water from my appropriation," he told the Ag Committee.[14]

To someone who lives east of the 100th meridian, "rain barrels" don't sound like fighting words. That collecting rain from one's roof is illegal anywhere might be a stunning idea for, say, a Michigander or an Ontarian. In more general terms, however, popular culture has made conflict over scarce water a Pan-American narrative. In the famous 1953 western film *Shane*, ranchers and homesteaders warred over land with access to water. As they fought, the story goes, a moral code and rule of law emerged to civilize the American West and point the country toward greatness. No matter that the 1950s parable about the 1880s frontier was belied, even then, by the 1930s Dust Bowl. With its prominence in American politics, literature, and film lore, scarcity dominates how many of us see water. Iconic images of Dust Bowl suffering and a new iconography of water scarcity are bookends to more than a century of dryland visuals.[15] From *National Geographic* to local newspapers, twenty-first-century photos of cracked landscapes make water the focal point by its absence. Often a dark

line leads the eye through the parched scene—the S-curve of a bone-dry streambed.

All of this raises a question: If much of the history of the American and Canadian West is variations in the key of water, why is there no equivalent filmography or literature or iconography for the Great Lakes region?[16] Surely its history includes an awe-inspiring water narrative? Surely its immensity as the largest freshwater system in the world could rival the immensity of water scarcity out west? But we wager that the average Coloradan gets little exposure to the Great Lakes through education, political discourse, or the cultural imagination. Author Jerry Dennis once marvelled that the Great Lakes are so unknown beyond their shores that a funny online hoax about whale-watching in Lake Michigan made its way into a children's K–6 science magazine. A Michigan teacher had to alert the publisher's editorial staff in Utah that, no, whales and dolphins do not set forth each spring from Hudson Bay to breeding grounds in Lake Michigan.[17]

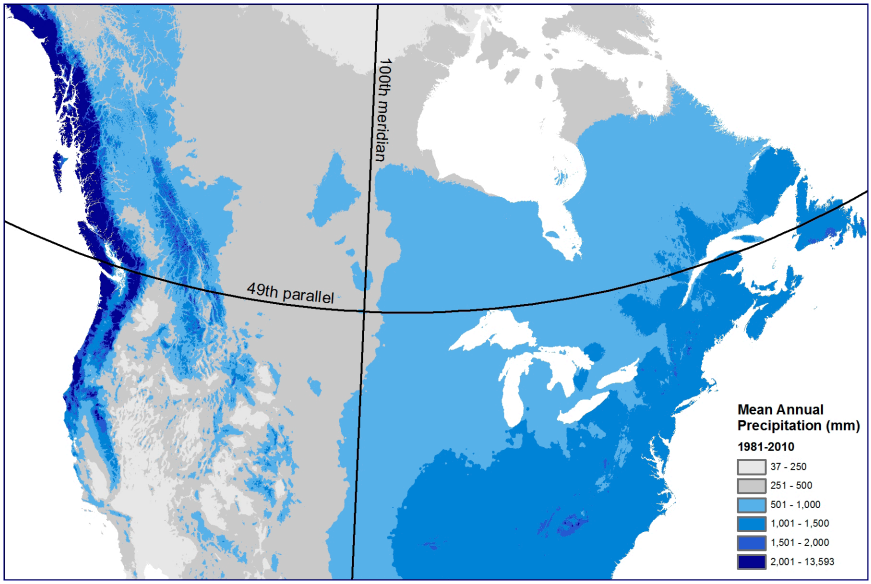
Dennis hypothesized that people do not "see" the Great Lakes because the lakes are too enormous and diverse to comprehend. Yet the West is enormous and diverse, too, on both sides of the border. So we'll add two other hypotheses. First, perhaps their low visibility in water discourse is because the Great Lakes make up the actual border between the United States and Canada. Their significance cannot wholly fit nationalist narratives of development and identity, and their governance is easily banished to the far-away realm of diplomatic niceties, rather than the knock-down, drag-out arena of the rain barrel. By contrast, the upper Colorado River is a wholly U.S. example. As such, even easterners might see a battle between rain barrel friend and foe in more familiar terms, as the latest local resource controversy to intersect with state or national politics.

For our second hypothesis, the Great Lakes might fade into another kind of distance—emotional and empathetic distance, or the degree to which people can imagine themselves in a distressing scene. A few ugly invasive species or an economic legacy of industrial water pollution in the Great Lakes might not trigger the same empathetic intensity or emotional visualization from outside the region as the apocalyptic specter of two countries' breadbaskets disintegrating into dust while scientists forecast the inexorable drain of ancient aquifers like the Ogallala. Perhaps water scarcity from arid conditions west of the continent's 100th meridian mapped a sharper, more dangerous geography in the public imagination

than do water regimes east of the 100th meridian, even someplace as physically distinct as the Great Lakes. Nonetheless, we might have reached a turning point. A North American geography of water abundance—one in which Utah textbook writers could picture make-believe Lake Michigan whales—now includes its own all-too-real, fully imaginable site of empathetic horror: the water crisis in Flint, Michigan. A conspiracy of negligence that lead-poisoned an entire population became, if possible, more terrible because Flint residents once had, were recklessly deprived of, and yet remained painfully close to abundant safe water.[18] Flint has generated a new emotional Great Lakes geography that transcends politics, occupation, class, and color. How easy to imagine yourself in a Flint home whose water tap holds invisible terrors and irreversible harm for your family. On this mental map, the home is only inches from Lake Huron, the fourth largest freshwater lake on Earth.[19]

We propose scarcity *and* abundance as the two faces of U.S. and Canadian water history. Alongside scarcity, abundance has been a different but powerful driver of water law, policy, economics, and culture in both countries.[20] To give one abundance example from the same frontier period when western states and provinces were experimenting with laws on prior appropriation: far to the (humid) east, the state of Michigan, surrounded by four of the five Great Lakes, established a matrix of laws and property rights to *drain* water from as much land as possible.[21] "Don't go to Michigan, that land of ills, the word means ague, fever, and chills," warned a nineteenth-century chant about the state's reputation as a swampy, disease-ridden hellscape for settler farmers.[22] The culmination of Michigan's exertions to deal with surfeit or "too much" water was the Michigan Office of Drain Commissioner, a county-level elected position that some political scientists uphold as a candidate for the most powerful local elected office in the United States or Canada—or, "the state's most powerful man," according to a belligerent Shiawassee County drain commissioner in 1979.[23]

We would encourage water scholars to shout across the great arid-humid divide of the 100th meridian whenever possible, or even to "[erase] the 100th meridian as a scholarly demarcation," as historian Donald Pisani advocated.[24] To the famous 100th meridian we add the less-examined 49th parallel between Canada and the United States as an important locus for a more unified water studies. North America's largest waterway (the Great Lakes–St. Lawrence system) makes up such a long stretch of this border



0.2 Canada-U.S. precipitation including 49th parallel and 100th meridian. Map by Jason Glatz.

that water history in either country would be incomplete without it. But the 49th parallel has importance beyond the Great Lakes. Whether scarce or seemingly abundant, whether west, mid-continent, or east, relationships between communities and water play out differently on the border and create their own spillovers to the north and south.[25]

The 2008 Great Lakes interstate compact and its companion binational agreement raise an important question. The compact marked a partial reprieve from boom-and-bust water exploitation. So far, at least, the basin is not on track to slake an insatiable dryland thirst, or become a liquid mine for twenty-first-century robber barons, or, scariest of all abundance nightmares, shrink into a poisonous salt barrens from economic hubris, like Russia's Aral Sea.[26] Why did the Great Lakes escape this paradox of abundance? With an international maritime corridor, with a withering industrial base (steel, chemical, paper, automotive), and with aquatic ecosystems compromised by toxic pollution, invasive species, shoreline development, and climate change, it seems remarkable that eight American states, two Canadian provinces, and two nations could come to an agreement on a

legal, economic, and environmental matter as contentious as controlling water.[27] Yet they did.

Note that the question is not *how* the region escaped the paradox of abundance. The how is part of a recent history of negotiations. But *why*?

Was it because the basin's state and provincial governments were somehow more evolved than their brethren to the north or south? Were they more virtuous, more altruistic, and a heck of a lot smarter than their counterparts along the Colorado River? Hardly. (However, far be it for us to assume Mark Twain's mantle of political "moralist in disguise.")

Was it because water itself was such an exceptional resource, fundamentally different than trees, fish, or ore? No again—at least not legally. To the contrary, many warned, the compact enshrined water as a commodity and carried unfortunate echoes of the prior appropriation model. Critics like Dave Dempsey argued that policymakers compromised away a strong constitutional case that Great Lakes water should be subject to a public trust doctrine instead.[28] The public trust doctrine traced its roots from ancient Roman civil law to English common law and ultimately to a robust body of law in the United States—both in the states and nationally with affirmative Supreme Court decisions.

Was it a higher moral imperative that outweighed other considerations? That water is so fundamental to human and nonhuman life in the region that their welfare demanded it be protected from outside claims? One might hope so, but again, no. In fact, the moral argument often went against protection. In a world where billions of people are without potable water, how can you win an argument against urgent care for your brothers and sisters? The short answer is, you cannot win that particular argument.

So, why the good outcome? Our explanation begins at the U.S.-Canada border.[29]

Borders embody dualisms: they divide yet potentially unify, they are barrier yet possible gateway, they are solid (on paper) yet porous, they can intensify competition or inspire cooperation, they can stir resentment or nurture understanding. Borders are complicated. International borders are even more complex. They are actual places, just as regions and provinces and states are places. International borders can loom large and brooding in a nation's political consciousness, as the Canada-U.S border does for

Canadians. Or, they can recede to the edge of a Rand McNally atlas, as the same U.S.-Canada border does for many Americans.

Border *waters* complicate things still more. For Canada and the United States, shared waters were more than a river delineating two countries, like the St. Lawrence River. They were more than a major river crossing two countries, like the Columbia. The 49th parallel between our two countries includes 2,200 miles (3,540 kilometres) of boundary waters, from the Bay of Fundy on the Atlantic to the Salish Sea on the Pacific, and to the north the border continues between Alaska and British Columbia.[30] List these border rivers and lakes, and you will find signposts to great swaths of North American history and geography: in the northern reaches, the Yukon, Chilkat, Stikine, Taku, Firth, Whiting, and Alsek Rivers; along the southern Canada-U.S. border, Columbia, Skagit, Kootenay, Pend D'Oreille, Flathead, St. Mary's-Milk, Souris, Red, Roseau, Rainy, St. Mary's, St. Clair, Detroit, Niagara, St. Lawrence, St. John, and St. Croix Rivers. Osoyoos Lake, Waterton Lakes, Lake of the Woods, Quetico-Boundary Waters, Lake St. Clair, Lake Champlain, and Lake Memphremagog. Plus, of course, four of the five Great Lakes—Superior, Huron, Erie, Ontario—that form North America's inland seas, the industrial epicentre of Canada and the United States from the mid-nineteenth to mid-twentieth centuries.[31] The Canada-U.S. border contains over 20 percent of the world's available fresh surface water. The longest border shared by any two countries in the world is also the most fluid.[32]

With water, Canada and the United States have long faced disputes and mutual interests on a scale far greater than most international waterways.[33] A century before the 2008 Great Lakes agreement, these border waters set in motion diplomatic processes that created a transnational tenure regime governing access to water and responses to shared problems at various levels of government and industry. The sheer abundance of water along the border catalyzed a legal framework that evolved differently than water law and policy in regions that lie entirely within Canada or the United States.

The heart of this framework was the Boundary Waters Treaty of 1909.[34] The Boundary Waters Treaty created the formal diplomatic relationship both countries needed to peacefully share their wealth in water. The treaty also established a binational International Joint Commission (IJC) to resolve conflicts and facilitate mutual interests.[35] Thus, the Boundary Waters Treaty symbolized a new era of peaceful coexistence, and a

diplomatic coup for Canada. Under the treaty, the fledgling nation—still under Mother Britain's wing in many regards (indeed, it was Britain that actually signed the treaty on Canada's behalf)—gained parity with its more powerful neighbour.[36] Because of their economic and geographic importance, border waters not only drove binational environmental diplomacy, they defined the Canadian-American relationship.

The Boundary Waters Treaty of 1909 and the IJC figure prominently in *Border Flows*. Contemporary scholarship rightfully problematizes the long history of both. Up to the 1960s, the IJC, like North American society writ large, facilitated industrial development that exploited border watersheds, with all the destructive environmental and social consequences thereof. At times, Canadian and American governments ignored or marginalized the IJC altogether. Still, these complicated, problematized cases can obscure one of the most important reasons that the long history of the Boundary Waters Treaty and its agent, the IJC, are worth sustained study.

Article IV of the treaty states that "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other." Beneath the assertive stance of "shall not" lay a remarkably ambitious principle to *anticipate* and resolve *future* environmental conflicts. Anticipation is the antithesis of the paradox of abundance, in which reacting after the fact is the norm. Along the Canada-U.S. border, from the western Fraser River to the eastern Maritimes and mid-continent at the Lake of the Woods and Great Lakes, the treaty provided a legal basis and the IJC provided a forum to anticipate, study, and negotiate alternative futures.[37] Preceding the environmental movement by fifty years, the IJC's pioneering efforts on water research and policy foreshadowed modern concepts like ecosystem management, anticipatory policy, and sustainability. A twenty-first-century world in water crisis has pitifully few enduring models at this scale with which to find successes and hope along with the undeniable failures. With close study, perhaps the treaty's many tests of time will illuminate avenues for better water governance elsewhere.

The 2008 Great Lakes–St. Lawrence compact and agreement built on a century-in-the-making legal framework. The Boundary Waters Treaty of 1909 was its scaffolding. From these heights of international diplomacy and shared governance we get a continental vantage of the border. At this scale, our conflicted relationship with water comes into focus. Abundance and scarcity were indeed its two faces. The legal framework was also under construction at the grassroots, and so we have to be explicit about issues of scale. At the grassroots, the International Joint Commission loses its centrality: federal, state, and provincial governments, First Nations and Native American tribes, agencies, municipalities, industries, universities, and nongovernmental organizations were all participants.[38] At this (general) scale, the border fragments into regions, watersheds, and geographically specific issues. At still other scales, the nonhuman world becomes visible. Invasive species, pollution, climate change—these transcended the border but still shaped it. Perturbations of aquatic ecosystems pushed water development in new directions.

One challenge for any burgeoning literature on border waters is to welcome works at different scales, even if thematically and methodologically they don't mesh perfectly. Take one example from this volume: the St. Lawrence River, North America's second largest river (and, bizarrely, a river often missing from maps of the rivers of America). International relations, grassroots dynamics, and ecological processes are all promising scales of analysis. From its first tiny canal in the eighteenth century, the river's hydrological regime underwent constant reengineering to an engineering apex in the 1950s. This was when Canada and the United States embarked on their largest joint project to date, the St. Lawrence Seaway and Power Project. One billion dollars spent, fifteen thousand workers deployed, 200 million cubic yards of earth excavated, many islands obliterated—at this scale, the seaway was an expression of twentieth-century hydro-nationalism. Hydropower and shipping were the seaway's economic goals, but Cold War defense and the discovery of huge iron ore deposits in Labrador were also part of a border story that was, intrinsically, about globalization.[39]

At the grassroots we gain different insight from the St. Lawrence saga. On the Canadian side alone, the seaway displaced nine communities, 225 farms, and 6,500 people.[40] From this vantage we get the lived experience of dislocation. As Joy Parr reveals in her intimate portraits, those who once knew the river lost everyday sights, sounds, and smells—all the "physical

reference points for the selves they had been. . . . benchmarks for the spatial practices of daily life, for the habits through which residents had embodied the place."[41]

Finally, at an ecological scale, the nonhuman world comes into view as a powerful agent of change.[42] In 1829, Canada's Welland Canal opened the upper Great Lakes to maritime traffic from the Atlantic.[43] Since then, the St. Lawrence has been an international vector for over two hundred non-native species.[44] The parasitic sea lamprey arrived early via the Welland Canal. Zebra and quagga mussels arrived 150 years later as biological stowaways on oceanic ships in the seaway. Wherever they colonized, mussels and other less-famous species hurt and then transformed indigenous food webs.[45] These ecological disturbances triggered new water management debates. At ecological scales, we not only perceive the natural world's changeability, we get a close-up view of nature's relationships with humanity.

The St. Lawrence River illustrates both the difficulties and the possibilities of a volume on U.S.-Canada border waters. To examine "waters" in the plural is to examine multiple places at some scale or scales, making each place its own universe of possible events, perspectives, stories, and insights. By pursuing a collection on border waters, with a multidisciplinary authorship, this volume necessarily becomes exploratory, and we necessarily forfeit perfect thematic consistency or exhaustive examination of either "the border" or "water." Yet heterogeneity can create its own organizational logic and insights, as we outline below.

No matter the locations, academic disciplines, or specific themes of its individual chapters, *Border Flows* advances five core insights:

- Canada-U.S. border waters are historically instrumental yet permeable.
- Canada-U.S. border waters at every scale (transnational to local) embody transformative *relationships*—between humans and the natural world, between Canada and the United States, and among different groups of residents, economic stakeholders, and policymakers.

- Canada-U.S. border waters are agents in a continuous process of place-making and place-remaking.
- Canada-U.S. border waters reveal a more unified framework for tracing water policy and governance in North America because scarcity and abundance so visibly make up a larger conceptual whole.
- Canada-U.S. border waters offer an early model of anticipatory environmental policymaking with contemporary (often cautionary) implications for sustainable water management in other parts of the world.

These shared insights emerged when our contributors met for a writers workshop in Kingston, Ontario, sponsored by the Network in Canadian History and Environment (NiCHE). At the workshop, we reviewed draft articles, explored their interconnections, and considered the overall flow of the volume. We embraced the puzzle and opportunity of our internal diversity—by country (we hail from both the United States and Canada), region, discipline, research focus, even writing genre. Regionally, our work spans the Pacific Northwest, Quebec, the Arctic North, and the Great Lakes–St. Lawrence. (We had hoped to fill in the border with scholarship from the eastern Maritimes and coast and more from the prairies, but we did not find willing contributors for those places.) Our authors—who come from law, history, geography, political science, environmental humanities, and creative nonfiction—all contribute distinct understandings of border dynamics and water studies to this single volume.

Despite our multidisciplinarity, intersecting scales and themes formed natural groupings. An unusual transdisciplinary experiment began to take shape, which became the fourth part of the volume. For a general roadmap, the four parts of *Border Flows* traverse, respectively, (1) international scales and interactions involving nation-states; (2) federalist scales (nations in relation to provinces and states) and binational interactions of corporate and state actors and regional communities; (3) bioregional and ecological scales and how nonhuman organisms interact with the border; and (4) intimate phenomenological scales wherein individuals relate on a personal level to vaster, often impersonal, histories of borders and water.

In some ways, part 1 of *Border Flows*, "Finding the Border: Political Ecologies of Water Governance and Tenure," is the volume's most challenging section. This is not because the individual case studies are more complicated than those in later sections; rather, subsequent parts of the volume depend on all our readers, layperson and academic alike, being comfortable with the shifting scales, overlays, and relationships that clarify or hide border processes. The burden therefore rests on the authors in part 1 to make sense of the Canada-U.S. border as an idea and a process, not as an actual thing, and Canada-U.S. border waters as locales for relationships, not as large glasses of H_2O on a table called North America. This section explores the basic problem of "finding the border," with guides from the realms of environmental policymaking (Dave Dempsey), water law (Noah Hall and Peter Starr), cultural geography (Emma S. Norman and Alice Cohen), and political science (Andrea Charron).

Dempsey opens part 1 by outlining tensions inherent in transboundary agreements such as those for the Great Lakes. These include differences between environmental law and policy, incompatible management from international to local levels, inconsistent decision making, fluctuating priorities, public expectations, and, unsurprisingly, the "media-unworthy messy business of implementation." Dempsey uses fish to illustrate the normality of such tensions. Fish cannot respect the boundaries that international diplomacy is meant to establish. As live beings, fish are not static; they move around, and they respond to pollution, habitat changes, predation, and climate change, all of which will undermine the original assumptions that guided any bilateral negotiation over their management. Dempsey thereby offers a key theme for the next three chapters of the section: border waters diplomacy is neither end point nor outcome; it is a succession of ambiguous outcomes and changing facts on the ground that cumulatively make for an open-ended process of negotiation. From here, "Finding the Border" examines the particularities of three famous U.S.-Canada border waters. Hall and Starr build on Dempsey's introduction to Great Lakes–St. Lawrence governance with a "citizen's primer" on Great Lakes water law. Consider this a crash course on the legal waterscape and its historical progress from resolving international and interstate water allocation and nuisance disputes toward governance more explicitly focused on environmental protection and sustainable water use. Norman and Cohen take readers to the Salish Sea (once called Puget Sound) at the

western end of the 49th parallel. They expose a problematic history—one in which the Canada-U.S. border was a moveable line of control, a form of nationalism that privileged some geographic and political boundaries while erasing others. Norman and Cohen also populate the border with actual people, Coast Salish indigenous communities, whose cultural identity proved as important as economics in new forms of water governance. Charron then moves north to the fabled Northwest Passage (NWP) of the Arctic North, which connects the Pacific Ocean to the northern Atlantic.[46] This is the contested water of sovereigns, whose definitional arguments—Is the NWP "internal (Canadian) waters" or an "international strait"?—entailed enormous transnational interests, defense and shipping issues, and also the environmental well-being of NWP waters.

On a surface level, part 2 of *Border Flows*, "Constructing the Border: Hydropolitics, Nationalism, and Megaprojects," makes Canada-U.S. border waters the aspirational domain and canvas of twentieth-century engineers—those state-sponsored "artists" of borderland waterscapes, commissioned to bring nationalistic imaginations to life in epic public works of the technological sublime. In other words, "Constructing the Border" addresses the subordination of natural waterways and watersheds to a large-scale border infrastructure of dams, locks, canals, harbors, and hydropower plants. Beneath the surface of audacious engineering blueprints for the Columbia River, the Chicago River, the St. Lawrence Seaway, Niagara Falls, and James Bay run confusing undercurrents of binational treaties, national or subnational identities, federalist systems of power, cultural ideas about nature, and competing questions about water itself—both its purposes and its distribution. Water historian Matthew Evenden helps readers navigate these currents. He opens with examples of the roles mega-water-projects have played in a fraught Canada-U.S. relationship. He surveys categories of water development along an east–west corridor: irrigation, urban water supplies, and hydropower. Most importantly, though, Evenden establishes a historical zeitgeist of technological optimism that denied natural and social limits and rationalized underperformance (economically speaking) or outright bad consequences. Subsequent case studies deconstruct historical border water projects so mega they still awe today: the bilateral St. Lawrence Seaway and Niagara Falls water control projects (Daniel Macfarlane), unfulfilled schemes for bulk water exports from Quebec to the United States (Frédéric Lasserre), and the Columbia River Treaty and consequent

reengineering of the Canadian side of that river (Jeremy Mouat). Each of these projects is geographically distinct and important to water and borderlands studies in its own right. Lasserre's chapter, for example, offers an archetypal abundance mindset: Quebec's water export proponents focused obsessively on how to exploit the province's wealth in water, the principle value of which, in their view, derived from its commodification and sale to water-scarce regions. But readers should also come away seeing the larger context for mega-water-projects on the Canada-U.S. border. As Macfarlane theorizes, these were nationalistic showpieces in a global era of high modernism, an era defined in large part by hubris.

In part 3, "Challenging the Border: Ecological Agents of Change," three of environmental history's most innovative thinkers bring their intense transdisciplinary engagement with hybrid ecologies to U.S.-Canada border waters. Taking the ecologically twinned but border-divided Boundary Waters Canoe Area (United States) and Quetico Provincial Park (Canada) as an accessible entry, James W. Feldman shows readers how cumulative differences in management and tourism did indeed demarcate two parks that look and feel different north and south of the border. Then Feldman introduces the natural forces of wind and fire, thus opening the hard work of this section: How do we understand causality and outcomes when the border is both water and land, when border waters are natural and human, when the scales of explanation are as broad as wind, as cellular as fish fat, as global as climate? In *Nature's Metropolis* (1992), William Cronon explicated the overlay of "second nature" on "first nature" in nineteenth-century Chicago. In this part of *Border Flows*, our authors take a deep dive into first and second ecology. It requires a humanist scholar both at ease and expert with scientific literature to analyze the natural cycling of wholly unnatural chemicals and heavy metals, as Joseph Taylor III does when he returns readers to the Salish Sea. Taylor traces the paths of persistent organic pollutants from industry through the marine ecosystem and beyond, to birds, mammals, and humans, and how these problems challenged a region that tried, but failed, to draw a line between sovereigns. Likewise, Nancy Langston interrogates the easy explanation that invasive sea lampreys decimated lake trout populations in Lake Superior (not only a crucial border water but the world's largest freshwater lake by surface). For one thing, the historical chronology does not support a simple cause and effect. Superior's aquatic ecosystems—powerful agents in their own right—interacted with the multiple stressors

of watershed change, industrial pollution, fisheries management, and, recently, climate change. In the past, binational policy did not adequately map and address these interrelationships. Lake Superior and the Salish Sea illustrate how historically grounded transdisciplinary analysis might help policymakers respond to complexity in time (the next time).

In part 4, "Reflections in the Water," acclaimed nature writer Jerry Dennis guides readers into the realm of environmental humanities and creative nonfiction. Here, several of our contributors offer more intimate takes on their scholarship and the places they study, to draw out the experiential aspects and to show how scholarly themes get traction in our daily lives. These short, reflective essays are also an experiment of sorts for translating academic scholarship into relatable scenes, where real people (not faceless researchers) participate in the cares and woes and flows of care-worthy places. The authors want readers to imagine themselves in such places and situations—or better yet, to draw parallels with their own experiences and perceptions. The personalization in the essays is contemporary in form and function. Consider TED Talks, for instance, those short public-scholarly hybrids whereby the presenter places himself or herself emotionally *within* the narrative trajectory of a complex subject. First-person narrative is entirely normal for nature writers like Dennis but less comfortable for many academics. And so, this part of *Border Flows* consciously stands apart from the first three sections and tries to welcome readers who might care more about their childhood on the lake than high modernism.

Finally, Graeme Wynn revisits our many border waters in his inimitable way, map-melding the case studies with metaphor and meaning in an afterword that is also a prologue and blessing for future travel along this and other important borders.

The impetus for the entire *Border Flows* project is water itself—water as a fundamental environmental and moral concern of the twenty-first century. More than half the planet's population confronts severe water shortages. The World Economic Forum warns that our world faces water bankruptcy.[47] We must put our insights about the past in service to the precarious future of Earth's fresh water. A century of water relations along the Canada-U.S. border—with the lessons and models therein—should be part of that urgent dialogue.

Notes

1 Sporhase v. Nebraska ex rel. Douglas, 458 U.S. 941 (1982).

2 U.S. Army Corps of Engineers, *Six-State High Plains Ogallala Aquifer Regional Resources Study: Summary Report* (Washington, DC: U.S. Army Corps of Engineers, Southwestern Division, 1982).

3 During his short-lived presidential campaign, New Mexico governor Bill Richardson (Democrat) proposed a national water policy and "dialogue between [western and eastern] states," asserting that "states like Wisconsin are awash in water." Dan Egan, "A Water Query from Out West: Hopeful's Interest in Great Lakes Renews Calls for Compact," *Milwaukee Wisconsin Journal Sentinel*, Oct. 6, 2007.

4 Peter Annin, *The Great Lakes Water Wars* (Washington, DC: Island, 2006); Dave Dempsey, *On the Brink: The Great Lakes in the 21st Century* (East Lansing: Michigan State University Press, 2004); Terence Kehoe, *Cleaning Up the Great Lakes: From Cooperation to Confrontation* (Dekalb: Northern Illinois University Press, 1997); Lee Botts and Paul Muldoon. *Evolution of the Great Lakes Water Quality Agreements* (East Lansing: Michigan State University Press, 2005).

5 Lynne Heasley, "Paradigms and Paradoxes of Abundance: The St. Lawrence River and the Great Lakes Basin" (paper presented at the First World Congress of Environmental History, Copenhagen, August 2009). Heasley's current book project—*The Paradox of Abundance: Essays on the Great Lakes*—grew out of this paper.

6 James W. Feldman and Lynne Heasley, "Re-centering North American Environmental History," *Environmental History* 10, no. 3 (2007): 951–58. These stories of abundance involve vast subgenres of popular literature and academic scholarship, each with its own landscape types, regional memories, and cultural touchstones. On fisheries alone, readers might begin with Stephen Bocking, "Fishing the Inland Seas: Great Lakes Research, Fisheries Management, and Environmental Policy in Ontario," *Environmental History* 2 (1997): 52–73; Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999); Margaret Beattie Bogue, *Fishing the Great Lakes: An Environmental History, 1783–1933* (Madison: University of Wisconsin Press, 2000); and Michael J. Chiarappa and Kristin M. Szylvian, *Fish for All: An Oral History of Multiple Claims and Divided Sentiment on Lake Michigan* (Lansing: Michigan State University Press, 2003).

7 See William Cronon, "Landscapes of Abundance and Scarcity," in *The Oxford History of the American West*, ed. Clyde A. Milner II, Carol A. O'Connor, and Martha A. Sandweiss (New York: Oxford University Press, 1994), 603–37; and Martin Melosi, *Coping with Abundance: Energy and Environment in Industrial America* (Philadelphia: Temple University Press, 1985).

8 The foundational work of North American water history on which historians and theorists continue

to build and elaborate is Donald Worster's *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Oxford University Press, 1992). For a contemporary theoretical overview of the social production of water scarcity and abundance in service to a modern hydraulic society, see Andrew Biro, "River-Adaptiveness in a Globalized World," in *Thinking with Water*, ed. Cecilia Chen, Janine MacLeod, and Astride Neimanis (Montreal: McGill-Queen's University Press, 2013), 166–84.

9 For a rich historiography of Powell in the arid American West, and especially his 1878 "Report on the Lands of the Arid Region of the United States," work backward from John Wesley Powell, *Seeing Things Whole: The Essential John Wesley Powell*, ed. William DeBuys (Washington, DC: Island, 2001); Donald Worster, *A River Running West: The Life of John Wesley Powell* (New York: Oxford University Press, 2000); and Wallace Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Opening of the West* (New York: Penguin, 1992).

10 Of the arid Canadian prairies, legal scholar David Percy says that "in a pattern that was familiar in the American West, the role played by water law in creating shortages became the subject of examination only after all efforts at augmenting the natural supply of water had been exhausted. In Canada, it became apparent only in the last two decades that *the basic model of prairie water law had never been designed to deal with water scarcity*." Percy, "Responding to Water Scarcity in Western Canada," *Texas Law Review* 83, no. 7 (2005): 2097; emphasis ours. See also Tristan M. Goodman, "The Development of Prairie Canada's Water Law, 1870–1940," in *Laws and Societies in the Canadian Prairie West, 1670–1940*, ed. Louis A. Knafla and Jonathan Swainger (Vancouver: UBC Press, 2005), 266–79. Jim Warren and Harry Diaz offer a sympathetic view of dryland farmers in *Defying Palliser: Stories of Resilience from the Driest Region of the Canadian Prairies* (Saskatchewan: University of Regina Press, 2012). Sterling Evans provides a terrific model for binational, transnational, and comparative scholarship on this border region in *Bound in Twine: The History and Ecology of the Henequen-Wheat Complex for Mexico and the American and Canadian Plains, 1880–1950* (College Station: Texas A&M Press, 2007). See also Christopher Armstrong, Matthew Evenden, and H.V. Nelles, *The River Returns: An Environmental History of the Bow* (Montreal: McGill-Queen's University Press, 2009); and Shannon Stunden Bower, *Wet Prairie: People, Land, and Water in Agricultural Manitoba* (Vancouver: UBC Press, 2011).

11 Norris Hundley, *Water in the West: The Colorado River Compact and the Politics of Water in the American West*, 2nd ed. (Berkeley: University of California Press, 2009).

12 Donald J. Pisani offers a sophisticated but manageable entry with *Water, Land, and Law in the West: The Limits of Public Policy, 1850–1920* (Lawrence: University Press of Kansas, 1996). Then, for an alternative economic and legal history of the prior appropriation

doctrine, tackle David Schorr, *The Colorado Doctrine: Water Rights, Corporations, and Distributive Justice on the American Frontier* (New Haven: Yale University Press, 2012). In Canada, the provinces of Alberta and British Columbia experimented with, but ultimately rejected, prior appropriation models.

13 Alicia Acuna and David Burke, "Colorado to California: Hands Off Our Water," *Fox News Politics*, January 28, 2015.

14 Marianne Goodland, "Rainbarrel Bill Dead for Session," *Colorado Statesman*, May 4, 2015.

15 A recent stunning example is Matt Black's portfolio in "The Dry Land," *New Yorker,* September 29, 2014, http://www.newyorker.com/project/portfolio/dry-land.

16 We use the Great Lakes as our juxtaposition with the Colorado River because it is the most physically prominent system of water east of the 100th meridian, even by comparison with the Mississippi River basin, and also because historically it is the most important diplomatic and economic boundary water system between the United States and Canada.

17 Jerry Dennis, *The Windward Shore: A Winter on the Great Lakes* (Ann Arbor: University of Michigan Press, 2012), 11–12.

18 Flint Water Advisory Task Force, *Final Report*, commissioned by the Office of Governor Rick Snyder, State of Michigan, March 21, 2016.

19 Or the third largest, if you exclude the Caspian Sea.

20 In a different region of the border itself, Paul Hirt explores the unequal social consequences and the unsustainable ecological consequences of a bilateral "politics of abundance" running through the history of the Columbia and Fraser Rivers of the Pacific Northwest. Hirt, "Developing a Plentiful Resource: Transboundary Rivers in the Pacific Northwest," in *Water, Place, and Equity: Tempering Efficiency with Justice*, ed. John M. Whiteley, Helen Ingram, and Richard Perry (Cambridge, MA: MIT Press, 2008), 147–88.

21 Donald J. Pisani, "Beyond the Hundredth Meridian: Nationalizing the History of Water in the United States," *Environmental History* 5, no. 4 (2000): 476. For a national environmental history of wetlands, and specifically wetland drainage, see Ann Vileisis, "Machines in the Wetland Gardens," in *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington, DC: Island, 1997), 111–41. For an important water history of settlement and development forces and governmental policies that transformed water-abundant landscapes of the American South, see Craig Colten, *Southern Waters: The Limits to Abundance* (Baton Rouge: Louisiana State University Press, 2014), esp. 41–115.

22 Willis F. Dunbar and George S. May, *Michigan: A History of the Wolverine State* (Grand Rapids: Wm. B. Eerdmans, 1995), 157.

23 Quoted in "Tisch: 'Drain Commissioner State's Most Powerful Man,'" *Argus Press,* May 17, 1979. Drain commissioners had and have the authority to condemn property, contract, assess all costs for drain work and projects to landowners in a designated drain, issue bonds, sue, and be sued—all unchecked

by any other official or agency, accountable only to the laws of the Michigan Drain Code and the voters at election time. For a timeline of drain-related Michigan law, see Appendix 2-D in Michigan Department of Transportation and Tetra Tech MPS, *Drainage Manual*, January 2006, https://www.michigan.gov/stormwater-mgt/0,1607,7-205--93193--,00.html (see also the Michigan Drain Code of 1956). For a midwestern context of state drainage district legislative history, see Mary R. McCorvie and Christopher L. Lant, "Drainage District Formation and the Loss of Midwestern Wetlands, 1850–1930," *Agricultural History* 67, no. 4 (1993): 13–39.

24 Pisani, "Beyond the Hundredth Meridian," 478.

25 The perception of abundance is key here, as opposed to the more objective reality of finite limits. Karen Bakker calls out Canadians' optimistic belief in their nation's (mythical) abundant supplies of water. Bakker, introduction to *Eau Canada: The Future of Canada's Water*, ed. Karen Bakker (Vancouver: UBC Press, 2006).

26 Philip Micklin, Nikolay Aladin, and Igor Plotnikov, eds., *The Aral Sea: The Devastation and Partial Rehabilitation of a Great Lake* (Berlin: Springer Earth System Sciences, 2013).

27 For an examination of the U.S. interstate framework during that intense period of negotiation, see Noah D. Hall, "Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Basin," *University of Colorado Law Review* 77 (2006): 405–56.

28 Dave Dempsey, *Great Lakes for Sale: From Whitecaps to Bottlecaps* (Ann Arbor: University of Michigan Press, 2008).

29 In the past decade, an important literature has emerged to rethink and theorize North American borderlands, with an emphasis on transnational and comparative history. See Benjamin Johnson and Andrew Graybill, eds., *Bridging National Borders in North America: Transnational and Comparative Histories* (Durham: Duke University Press, 2010); Michael Behiels and Reginald Stuart, eds., *Transnationalism: Canada–United States History into the Twenty-First Century* (Montreal: McGill-Queen's University Press, 2010); Matthew Evenden and Graeme Wynn, "Fifty-Four, Forty, or Fight? Writing within and across Boundaries in North American Environmental History," in *Nature's End: History and the Environment*, ed. Sverker Sörlin and Paul Warde (New York: Palgrave Macmillan, 2009); and Victor Konrad and Heather Nicol, *Beyond Walls: Re-inventing the Canada–United States Borderlands* (New York: Ashgate, 2008). The scholarship also examines regionality at the border: Sterling Evans, *The Borderlands of the American and Canadian Wests: Essays on Regional History of the Forty-Ninth Parallel* (Lincoln: University of Nebraska Press, 2006); Kyle Conway and Timothy Pasch, eds., *Beyond the Border: Tensions Across the 49th Parallel in the Great Plains and Prairies* (Montreal: McGill-Queen's University Press, 2013); John J. Bukowczyk *et al.*, *Permeable Border: The Great Lakes Basin as Transnational Region, 1650–1990* (Pittsburgh: University of Pittsburgh

Press, 2005); Ken Coates and John Findlay, eds., *Parallel Destinies: Canadian-American Relations West of the Rockies* (Seattle: University of Washington Press, 2002).

30 The Beaufort Sea is another binational marine zone in the Arctic North.

31 Feldman and Heasley, "Re-centering North American Environmental History." Steven C. High explores the economic decline of the region in *Industrial Sunset: The Making of the North American Rustbelt, 1969–1984* (Toronto: University of Toronto Press, 2003).

32 Note that the Uruguay River makes up the entire (though shorter) border between Argentina and Uruguay.

33 Emma S. Norman, Alice Cohen, and Karen Bakker, eds., *Water without Borders? Canada, the United States and Shared Waters* (Toronto: University of Toronto Press, 2013).

34 Boundary Waters Treaty, U.S.-Great Britain [for Canada], January 11, 1909, Temp. State Dept. No. 548, 36 Stat. 2448.

35 L.M. Bloomfield and Gerald F. Fitzgerald, *Boundary Waters Problems of Canada and the United States: The International Joint Commission, 1912–1958* (Toronto: Carswell, 1958); Murray Clamen and Daniel Macfarlane, "The International Joint Commission, Water Levels, and Transboundary Governance in the Great Lakes," *Review of Policy Research* 32, no. 1 (2015): 40–59.

36 Chirakaikaran Joseph Chacko, *The International Joint Commission between the United States of America and the Dominion of Canada* (New York: AMS Press, 1968); Robert Spencer, John Kirton, and Kim Richard Nossal, eds., *The International Joint Commission Seventy Years On* (Toronto: Centre for International Studies, University of Toronto, 1981).

37 On industrialized waters, the IJC offered seminal ideas on water policy, such as the "virtual elimination" of persistent toxic substances.

38 Bradley C. Karkkainen, "Post-Sovereign Environmental Governance," *Global Environmental Politics* 4, no. 4 (2004): 72–96.

39 Daniel Macfarlane, *Negotiating a River: Canada, the U.S., and the Creation of the St. Lawrence Seaway* (Vancouver: UBC Press, 2014); J.R. McNeill and Corinna R. Unger, *Environmental Histories of the Cold War* (New York: Cambridge University Press, 2010); Richard White, "The Nationalization of Nature," *Journal of American History* 86, no. 3 (1999): 976–86.

40 On the American side, dikes protected communities around Massena, while the town of Louisville lost about a third of its taxable land, including Louisville Landing, a historic port on the St. Lawrence. Work on the American side was not as dramatic as the displacement on the Canadian side, but with eighteen thousand acres flooded, it still displaced 225 farms, five hundred cottages, 12.5 miles of highway, and 1,100 people. Macfarlane, *Negotiating a River.*

41 Joy Parr, "Movement and Sound: A Walking Village Remade: Iroquois and the St. Lawrence Seaway," in *Sensing Changes: Technologies, Environments, and the Everyday, 1953–2003* (Vancouver: UBC Press,

2009). See also Tina Loo, "Disturbing the Peace: Environmental Change and the Scales of Justice on a Northern River," *Environmental History* 12, no. 4 (2007): 895–919; and Tina Loo with Meg Stanley, "An Environmental History of Progress: Damming the Peace and Columbia Rivers," *Canadian Historical Review* 92, no. 3 (2011): 399–427.

42 John Riley, *The Once and Future Great Lakes: An Ecological History* (Montreal: McGill-Queen's University Press, 2013).

43 John N. Jackson, with John Burtniak and Gregory P. Stein, *The Mighty Niagara: One River—Two Frontiers* (Amherst, NY: Prometheus, 2003); John N. Jackson, *The Welland Canals and Their Communities: Engineering, Industrial, and Urban Transformation* (Toronto: University of Toronto Press, 1997). The Welland Canal was a contemporary of and competitor to another invasion corridor, the Erie Canal. Carol Sheriff, *The Artificial River: The Erie Canal and the Paradox of Progress, 1817–1862* (New York: Hill & Wang, 1996).

44 Jeff Alexander, *Pandora's Locks: The Opening of the Great Lakes–St. Lawrence Seaway* (East Lansing: Michigan State University Press, 2009).

45 Invasive species became an overwhelming problem in all directions. From their deliberate introduction in southern U.S. fishponds, silver and bighead "Asian" carp have migrated up the Mississippi River and into the Chicago Ship and Sanitary Canal, the man-made water bridge linking the Mississippi and Great Lakes basins. On the prairies, invasive species travelled from the Missouri River basin to Hudson's Bay via the Devil's Lake diversion. Asian carp are travelling in the opposite direction along the same route. Pacific ports have struggled with non-native mollusks and crabs.

46 Graeme Wynn, *Canada and the Arctic North America: An Environmental History* (Santa Barbara, CA: ABC-CLIO, 2007).

47 World Economic Forum Water Initiative, "The Bubble Is Close to Bursting: A Forecast of the Main Economic and Geopolitical Water Issues Likely to Arise in the World during the Next Two Decades" (unpublished draft for discussion at the World Economic Forum Annual Meeting, Davos, Switzerland, 2009); Mesfin M. Mekonnen and Arjen Y. Hoekstra, "Four Billion People Facing Severe Water Scarcity," *Sciences Advances* 2, no. 2 (2016), doi:10.1126/sciadv.1500323.