CHAPTER

3

Reasserting Traditional Knowledge across a fragmented governance landscape: The Mackenzie River Basin

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The Mackenzie River is the largest freshwater outlet to the Arctic Ocean from Turtle Island (North America), draining a basin that is the 10th largest in the world at 1.8 million square kilometers (Mackenzie River Basin Board, 2004). The basin includes six sizeable sub-basins, including the Athabasca, Peace, Liard, Peel, Great Slave, and Mackenzie-Great Bear (see Fig. 1). In its Canadian context, the Mackenzie's average rate of discharge puts it a close second to the St. Lawrence. Like the St. Lawrence system, the Mackenzie basin is a home to several large lakes: Great Slave Lake, Great Bear Lake, and Lake Athabasca. Where the Mackenzie River itself flows out of the western end of Great Slave Lake, it is aptly named in the Dene Zhatié language as the *Deh Cho* or "Big River."

The 2013 report of the Rosenberg International Forum's Workshop on Transboundary Relations in the Mackenzie River Basin (Rosenberg International Forum on Water Policy, 2013) highlighted the watershed's ecological fragility in the face of accelerating climate change and industrial development, noting that its jurisdictional fragmentation hinders efforts to respond to these threats. Within Canada's federal structure, provinces and territories manage natural resources, which means that governance of the Mackenzie basin is largely in the hands of three provinces (British Columbia, Alberta, and Saskatchewan) and two territories (Yukon and Northwest Territories).

The Mackenzie and its many tributaries have served as the lifeblood of Indigenous livelihoods and cultures for millennia. Maps of traditional place names for any of the First Nations, Métis, or Inuvialuit Peoples[a] who reside within the basin reveal a density of relationships

[a] In Canada, Indigenous peoples are defined as comprising three distinct groups: First Nations, Inuit (or in the case of the NWT, Inuvialuit), and Métis. The latter is a distinct people that emerged as a result of the unions between Indigenous and European peoples during the period of French and British colonization.

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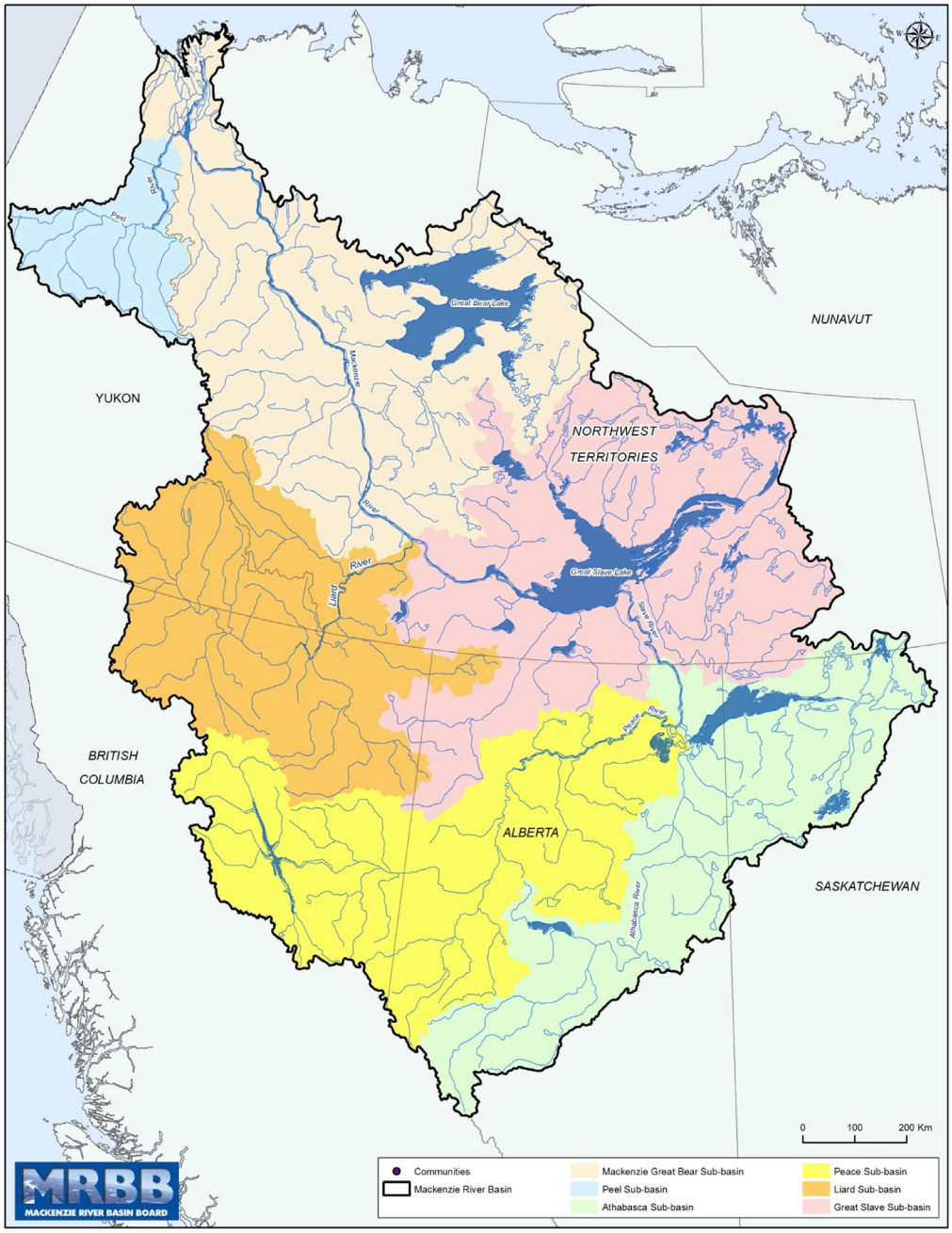

FIG. 1 The Mackenzie Basin and major sub-basins. *Reproduced from Mackenzie River Basin Board. (n.d.).* Mackenzie River Basin Map. *Available at https://www.mrbb.ca/resources/basin-maps.*

with the land that follows the waterways across their territories. Effectively, the Mackenzie basin is a latticework of human and non-human interconnections with water. For generations, Indigenous laws and governance systems guided the stewardship of these relationships. Now, after surviving two centuries of colonization, Indigenous peoples in the basin are reasserting their rightful roles in water governance.

This chapter considers the fraught landscapes of colonial relations, resistance, and Indigenous resurgence that construct barriers and possibilities for Traditional Knowledge (TK)[b] to shape water governance in the Mackenzie basin. I am a non-Indigenous settler-scholar working to reimagine my research practices in ways that center relationships and Indigenous knowledge (e.g., see Latulippe, 2015; Louis, 2007). For the past 5 years, I have been engaged with questions of water governance and stewardship in the Northwest Territories (NWT). I have explored the role of Indigenous governments in the NWT's Water Stewardship Strategy and transboundary water negotiations with upstream neighbors, documented Traditional Knowledge to help answer questions about interactions between transportation infrastructure and traditional fisheries, and collaborated with a regional tribal council and several member communities to support land and water stewardship through Indigenous Guardians programing.

In this chapter, I step back from primary research results in order to offer some broader observations and comparisons. As my own experience is limited to the NWT, I draw more heavily on secondary literature to pull two key upstream jurisdictions into consideration: Alberta and British Columbia.[c] There, dramatic levels of resource extraction arguably offer a counterpoint to more favorable conditions for TK in the NWT. Regardless of these differences, it is impossible to ignore the way that both the authority and the fragmentation deriving from Canadian federalism inhibit *all* Indigenous governments in the basin from responding to new environmental threats by scaling up traditional practices of water stewardship and governance.

The extent and complexity of the basin limit my ability to offer a systematic or definitive synthesis of regional water governance in this chapter. Instead, I offer a series of brief case reflections, with the aim of revealing both recurring challenges and avenues of change. The first section provides a brief background for those unfamiliar with the historical, political, and legal context for Indigenous contributions to water governance in the Mackenzie Basin. I then delve into basin-level governance efforts, examining the Mackenzie Valley Basin Board and transboundary water negotiations. Finally, I offer four snapshots of regional and local cases: fish and ferries in the lower Mackenzie, Indigenous Guardians in the Dehcho, and Industrial development in both British Columbia and Alberta. The conclusion draws together some of the key threads that emerge through these diverse sites of exploration and reflection: relationships between TK and Western science, Indigenous leadership in collaborations to shape stronger water stewardship, transboundary water agreements as new points of leverage for TK, the role of economic influence in resource policy, and the underlying implications of Canadian sovereignty and political fragmentation of the watershed.

[b]I prefer the term "Indigenous Knowledge" over "Traditional Knowledge," since the latter can be taken to suggest that Indigenous people's knowledge belongs to the past or is unchanging. Nevertheless, I use TK throughout this chapter since it is the term most often used in the literature and governance contexts I examine.

[c]While portions of the watershed in Saskatchewan and Yukon Territory also contain interesting learning, considerations of space lead me to focus on the three jurisdictions representing the largest share of the basin.

Indigenous rights context: Treaties, land claims, and consultation

The context for Indigenous peoples' involvement in Mackenzie Basin water governance is complex, with only a high-level overview possible here. Starting in the late 1800s, the imposition of Canadian sovereignty pushed aside Indigenous peoples for processes of economic development, nation building, and resource management. In the Mackenzie Basin, Treaties 8 (in 1899) and 11 (in 1921) were understood by Indigenous signatories as treaties of friendship and peace, but were treated by Canada as a surrender of territory, opening the way for settlement and resource extraction. While initially devastated by disease, loss of land, residential schooling, and other impacts of colonialism, by the mid-20th century, Indigenous peoples across Canada were reasserting their rights as First Peoples. The constitutional affirmation of "aboriginal and treaty rights" in the 1982 Constitution Act (Constitution Act, 1982) was one outcome of those mobilizations, and provided a key foothold for court challenges of natural resource regulations and development projects. Legal victories have strengthened standards around the duty to consult when decisions are made that affect the traditional land use that is protected by Aboriginal[d] and treaty rights (e.g., see Morellato, 2008; Schabus, 2014; Wright, 2018). Nevertheless, the courts have also upheld the supremacy of Canadian sovereignty, reserving the right of public government to authorize development in the absence of Indigenous consent (Hamilton & Nichols, 2019; Patzer, 2019). At the time of writing, the Canadian federal government has recently passed legislation to implement the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) but the implications of this remain unclear.

In addition to the evolving national legal framework, provincial and territorial contexts are crucial to water governance in the Mackenzie Basin. Provinces have constitutional responsibility for natural resources and similar responsibilities have been devolved from the federal government to Yukon Territory (2003) and NWT (2014). Of particular importance for much of the following discussion are developments in the NWT during the last 50 years. In the 1970s, dispute over interpretation of Treaty 11 led to legal challenges and a major commission of inquiry about pipeline development in the Mackenzie Valley (Berger, 1977). These events in turn set the stage for land-claim negotiations. Some of those are still underway, but settlements between Canada and the Inuvialuit (1984), Gwich'in (1992), Sahtu Dene and Métis (1993), and Tłı̨chǫ (2003) have recognized Indigenous Nations as partners in land and water stewardship, with shared representation in co-management boards. Established in 1998 through the federally legislated *Mackenzie Valley Resource Management Act* (1998), those boards regulate land and water use as well as carrying out environmental impact assessments.

South of the NWT, Indigenous territories within the Mackenzie Basin are almost entirely encompassed by Treaty 8 lands, and that treaty continues to stand as the basis for state-Indigenous relationships. This leaves much weaker openings for Indigenous involvement in natural resource decision-making. The provincial government in British Columbia passed legislation in 2019 to implement UNDRIP (Government of British Columbia, 2019), but it is too soon to evaluate its implications. Alberta has made no such movement to strengthen recognition of Indigenous rights.

[d]The Canadian constitution uses the language of "Aboriginal rights," and this usage still remains in many settings, even though it is also common today to use the term "Indigenous rights" in line with international usage.

Traditional Knowledge in basin and transboundary governance

Despite more than 40 years of efforts, watershed-level collaboration in the Mackenzie Basin is in many respects still a fledgling endeavor. The work of a shared basin-level institution and the more recent negotiation of transboundary water agreements are the two most defining features of that collaboration. This section explores each in turn to chart the evolving role of TK.

Traditional Knowledge and the Mackenzie Valley Basin Board

After more than 20 years of initial efforts at intra-basin collaboration, the *Mackenzie River Basin Transboundary Waters Master Agreement* was signed in 1997 (Mackenzie River Basin Board, 1997), promising to address jurisdictional fragmentation, advance sustainable water use across the basin, and conserve aquatic ecosystem integrity. It established the Mackenzie River Basin Board (MRBB) to provide an avenue for basin-level governance. Unfortunately, despite years of negotiations, little jurisdictional autonomy was yielded in the creation of the MRBB. Indeed, as highlighted by Morris and de Loë (2016), the organization was designed to facilitate and coordinate, not regulate. The 2012 Regional Workshop of the Rosenberg Forum on Water Policy took up the challenge of water governance in the Mackenzie Basin, with one of its key recommendations being that the MRBB "be reinvigorated as an independent body charged with managing and protecting the basin" (p. 6). The forum recommended that the MRBB be granted "overarching authority" for a holistic basin management approach (p. 9). As Morris and de Loë observed, over the past decade MRBB members have shown little appetite to move the board in this direction. Instead, the focus has been on negotiating bilateral water agreements. I explore those agreements in the following subsection, but first it is worth probing Indigenous participation in this forum for basin-level governance.

The 1997 *Master Agreement* stipulated that Indigenous organizations from each provincial and territorial jurisdiction would nominate a representative, to "be appointed by and serve at the pleasure of the Minister representing the jurisdiction from which the nominee was selected" (p. 4). The inclusion of Indigenous voices is notable, but so is their subordination as appointees of public government in their respective regions. Moreover, with only one representative per jurisdiction, input is hardly representative of the diverse Indigenous Nations within the watershed. With respect to TK, the duties of the MRBB outlined in the Master Agreement include, in item 2(c), "considering the needs and concerns of Aboriginal people through, (i) the provision of culturally appropriate communication, and (ii) the incorporation of their traditional knowledge and values" (p. 5). Morris and de Loë (2016) argued that the MVBB has underperformed in carrying out this duty, something the MVBB's own 2012 *State of the Aquatic Ecosystem Report* also acknowledged, stating that, "Traditional Knowledge is underrepresented in all areas of the Mackenzie River Basin" (Mackenzie River Basin Board, 2012, p. 10).

Addressing this weakness, the Indigenous representatives on the MVBB formed the Traditional Knowledge and Strengthening Partnerships Steering Committee, which has worked closely on the State of the Aquatic Ecosystem Report Steering Committee for development of the (still pending at time of writing) 2018 State of the Aquatic Ecosystem Report (Mackenzie River Basin Board, 2019, p. 8). In addition, collaboration with *Tracking Change*, a major

scholarly research project based at the University of Alberta, has presented the opportunity for multiple systematic reviews of TK studies in the Mackenzie basin (Tracking Change, n.d.), as well as community-based research around the role of TK in monitoring and governance (e.g., see Maloney, Howlette, & Parlee, 2020; Stenekes, Parlee, & Seixas, 2020). While the *Tracking Change* project represents the most comprehensive effort to bring together TK within the basin, each of the basin reviews includes a disclaimer such as the following: "This report strongly recommends that resources be made available for a more comprehensive and regional approach to documenting Traditional Knowledge" (Parlee & D'Souza, 2019, p. 1).

The MVBB provides a potentially powerful space to convene research and dialogue to develop tools and frameworks for TK to play a greater role in water governance. However, given the limited influence of the MVBB we need to look elsewhere to find opportunities for TK to have real policy leverage. Transboundary water agreements provide one such opportunity.

Transboundary water agreements as catalysts; NWT as policy innovator

The 1997 *Master Agreement* set out principles for the subsequent negotiation of bilateral water agreements, but with the exception of a 2002 agreement between NWT and Yukon, it took almost two decades for those negotiations to come to fruition. The NWT played a key role in moving this agenda forward, both in bringing upstream jurisdictions to the table and as a policy innovator. With roughly 50% of its population being Indigenous, NWT negotiators built on the commitment to TK in the Master Agreement, advocating strongly for an Indigenous role in transboundary water management. To understand how this came about, we need to look first to the NWT Water Stewardship Strategy, which provided the platform for the territorial government's negotiating position.

By the start of the 2000s, land-claim settlements across much of the NWT and the consolidation of co-management institutions helped shape the conditions for Indigenous organizations and governments in the territory to call for wider efforts to protect the waters of the Mackenzie basin. One consistent concern was the risk that upstream development posed to water quality, aquatic ecosystems, and traditional food sources. The Keepers of the Water, a network led by Indigenous Peoples but joined also by many non-Indigenous ally organizations, held annual gatherings between 2006 and 2016. The network raised the alarm about downstream effects of resource development, with a mandate, "to elevate decolonized traditional Indigenous water governance … emphasizing Indigenous land-based knowledge, language and culture" (*About us*, 2006). A 2008 water summit, hosted by Dene Nation,[e] especially highlighted the threat to downstream water quality posed by fossil fuel extraction from the Alberta oil sands, and called for the formation of an Indigenous Commission on Water (*Buffalo River Dene Nation: Water summit*, 2008).

These events were noted in the ministerial preface to the 2010 NWT Water Stewardship Strategy, *Northern voices, northern waters* (2010). The development of the Strategy reflected a clear attempt by public government to respond to such concerns, especially about the need

[e]The Dene Nation is an association of all regional Dene governments and organizations in the NWT, formed in 1975.

to bring Indigenous governments to the table to develop a new approach to water governance. The strategy development process included high-level discussions between public and Indigenous governments, establishing a basis for working together in new ways that built on shared interests (Latta, 2018). This included the creation of an Aboriginal Steering Committee, a forum that continues to shape the implementation and renewal of the Stewardship Strategy. As a result, the role of Traditional Knowledge has been central to the Strategy from the start (*Northern voices, northern waters: NWT Water Stewardship Strategy*, 2010, p. 18). One example of how this commitment has been implemented is through a community-based water monitoring program, which combines TK and Western science (Government of Northwest Territories, n.d.-b).

Transboundary water negotiations were one of the most important priorities identified in the initial phase of the NWT Water Stewardship Strategy, from 2010 to 2015. The working relationships built by the Strategy fed into strong levels of engagement between public and Indigenous governments to shape the negotiating position for the NWT, which was led by the Government of the NWT in anticipation of the 2014 devolution of powers over lands and resources from the federal government. Alberta and British Columbia were targeted as priorities for bilateral negotiations due to their large share of upstream industrial development.

The NWT insisted on the inclusion of an Indigenous representative at the negotiating table, setting a precedent that its counterparts in the negotiations followed. Furthermore, both through the Aboriginal Steering Committee and a robust consultation processes, Indigenous governments were engaged in an ongoing way as the negotiations proceeded. These relationships were not without challenges, deriving both from the ongoing capacity and resource imbalances between Indigenous and public governments, and from the deeper structural fact of public government's authority under Canadian federalism (Latta, 2018). Nevertheless, several analyses of the transboundary negotiations reported favorably on the degrees to which Indigenous People's voices shaped the outcomes (Beck, 2016; Ishkonigan Inc., The Phare Law Corporation, and North Raven, 2015; Latta, 2018). Significantly, obligations to Indigenous governments were also identified by NWT negotiators as something that strengthened their position at the bargaining table (Latta, 2018, p. 10).

The agreements that emerged from bilateral negotiations reflect the holistic and ecosystem-based perspective of water management found both in the Mackenzie Valley Basin Transboundary Waters Master Agreement and in the NWT Water Stewardship Strategy (e.g., see *Alberta-NWT transboundary water agreement*, 2015).[f] In this, they differ markedly from other transboundary agreements, which tend to focus on allotting shares of water consumption.[g] This ecosystem perspective is paired with a commitment that transboundary water quality objectives will "be intended to protect all uses, including traditional uses" (*Alberta-NWT transboundary water agreement*, 2015, item 7. b) iv.). Moreover, Traditional Knowledge is assigned a role in monitoring (item 10.2b) and dispute resolution (item 14.1b), including

[f]I cite the NWT-Alberta agreement, but this agreement became the template also for the NWT-British Columbia agreement, in which all these provisions are the same.

[g]Morris and de Loë (2016) highlight the 1969 Master Agreement on Apportionment, which established the Prairie Provinces Water Board, as one example of this contrast.

principles for the use of Traditional and Local Knowledge in Appendix C (C1) and a commitment to the development of a framework for its incorporation in decision-making (C2). Finally, each agreement sets out a role for an Indigenous representative from each jurisdiction on the agreement's Bilateral Management Committee (BMC), which is charged with overseeing implementation (item 13.1.1c).

Six years after the bilateral agreements were signed, work is still under way to complete the design of both scientific and Traditional Knowledge frameworks and indicators for transboundary monitoring. While effective implementation will depend on degrees of commitment in different jurisdictions, the agreements promise to mobilize TK for watershed governance in novel ways. At the same time, by becoming the focus of basin relationships they arguably maintain a marginal role for the MVBB, deferring deeper discussions about how TK can shape truly basin-level governance collaboration.

Traditional Knowledge in regional and local water governance

The character of water governance in the basin can only be partly understood through the role of the MVBB and the shape of transboundary agreements. Of equal importance is the way TK is being mobilized for water management and stewardship at the regional and local level. The following four subsections provide such perspectives, beginning with two cases from the NWT and followed by two brief snapshots of how TK is fairing in relation to major resource development in British Columbia and Alberta.

Fish and ferries in the Gwich'in settlement area

The Gwich'in peoples' traditional territory spans current-day Yukon Territory, Northwest Territories, and Alaska. In Canada, the 1992 Gwich'in Comprehensive Land Claim Agreement, which comprises lands in both the NWT and Yukon territories, established Gwich'in title over roughly 24,000 km^2, as well as rights to participate in resource management within a broader settlement area spanning 57,000 km^2 (Government of Northwest Territories, n.d.-a, see Fig. 2). It also provides for exclusive commercial hunting and fishing rights, an ongoing share in resource revenue, and the eventual negotiation of self-government. The Gwich'in Tribal Council oversees these lands and rights on the NWT side of the settlement area, representing four Gwich'in communities. Three co-management boards, comprised of 50% Gwich'in and 50% public government representatives, were also created through the settlement and the *Mackenzie Valley Resource Management Act* (1998): the Gwich'in Renewable Resources Board, the Gwich'in Land Use Planning Board, and the Gwich'in Land and Water Board.

Gwich'in harvesters have fished the waters of the Nagwichoonjik (Mackenzie River) and the Teetł'it Gwinjik (Peel River) for generations (Heine, Andre, Kritsch, & Cardinal, 2007; Thompson & Millar, 2007; Wishart, 2013). In 1979, the Dempster Highway opened, crossing both of these rivers to connect Inuvik with southern Canada. In the open-water season, ferries shuttle traffic across the rivers, using temporary landings built with locally sourced gravel (a mixture of stones, pebbles, and fine particles). Over time, the landings have altered the

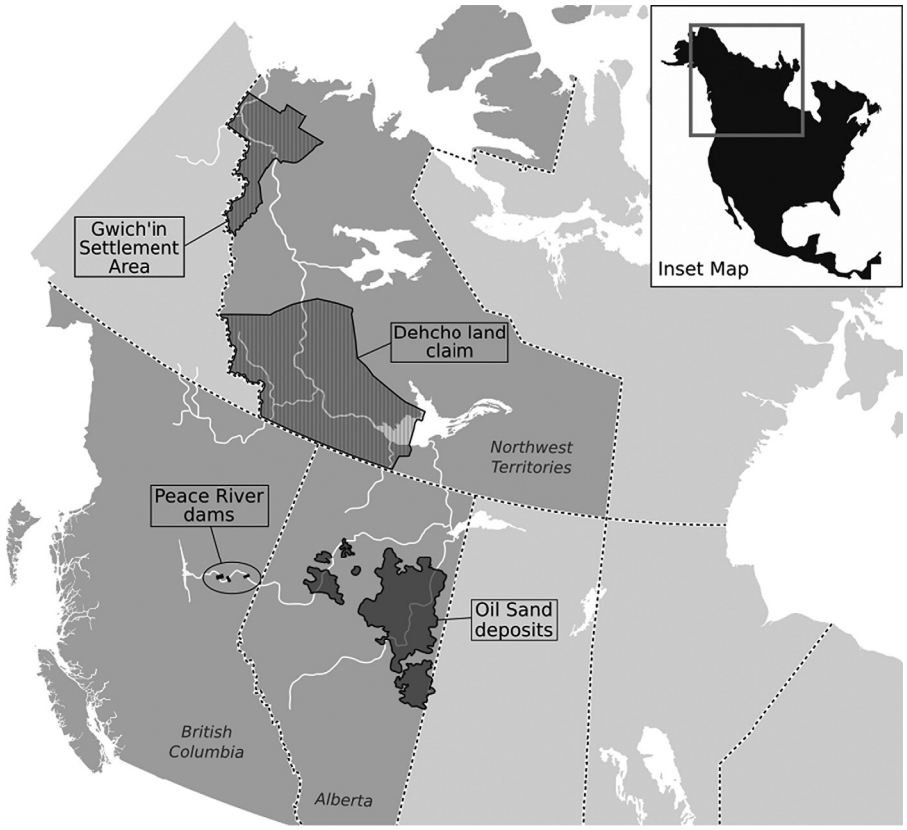

FIG. 2 Major geographic features discussed in the chapter.

shoreline to varying degrees, and the gravel is constantly being washed away and replaced as river levels fluctuate. Gwich'in land users in the communities of Fort McPherson and Tsiigehtchic have long expressed concerns that the ferry operations, especially the gravel landings, are having an impact on the traditional fishery. How these concerns have been taken up by co-management institutions and government departments reveals both new avenues for TK to influence decision-making and continued hurdles that stand in the way.

There was little traction for concerns about ferry operations prior to the settlement of the Gwich'in land claim, but after 1998 the territorial Department of Transportation (now the Department of Infrastructure) was required to apply to the Gwich'in Land and Water Board for water licenses for the ferry operations. As a requirement of the licensing process, an Aquatic Effects study was carried out in 2001 and 2002 to assess the impact of sediments from the ferry landings on water quality and fish health. That study (GeoNorth-Ross-AMEC, 2003) included Traditional Knowledge interviews in both Tsiigehtchic and Fort McPherson. While the scientific data collected in the study showed that the ferry landings were not having a significant impact on water quality and fish, some Traditional Knowledge holders identified concerns, including changes to deposition that could interfere with fishing. Several of them

recommended some kind of alternative permanent or semi-permanent structure for the landings (GeoNorth-Ross-AMEC, 2003). Continued study was recommended as ferry operations continued. Two subsequent studies presented alternatives to gravel crossings that were deemed unfeasible due high costs associated with building and maintaining docking structures in such a large and dynamic river (Department of Transportation, 2003; S.H.M. Marine International Inc, 2010).

Ongoing expressions of community concern made their way into the 2010 license renewal process, leading to the requirement for further monitoring of the impacts of the ferry landings. A Local Area Monitoring Plan (LAMP) was designed and carried out over 5 years by the Department of Infrastructure. While the communities were engaged periodically through the study process, data collection was limited to bathymetric (riverbed depth) mapping and a fish harvest survey; apart from numbers and location of fish catch, and a single open-ended question at the end of the fish survey, no TK was collected during this monitoring effort.

When the water license was renewed again in 2015, it came with a request for a summary of the LAMP study and a requirement that the LAMP methods be updated to include Traditional Knowledge (Gwich'in Land and Water Board, 2015). The LAMP Summary Report concluded that the bathymetric data showed no correlation between the ferry landings and river morphology (Department of Infrastructure, 2017). It argued that different approaches to scientific monitoring were needed to measure the sediment suspended in water, and it suggested that the fish survey should be continued but improved. In line with community concerns about the government studying its own operations, the LAMP Summary Report also recommended a university or other third party be brought in to update the LAMP approach.

An aquatic ecosystems biologist at Wilfrid Laurier University was approached by the Department of Infrastructure in 2016 to submit a proposal for a LAMP 2.0 study. It was only after an initial proposal received comments from Gwich'in organizations (a process again facilitated through the Land and Water Board) that it became clear a social scientist and significant further study design, in consultation with the communities, was required for TK to be adequately incorporated into the study. This is when I was invited to join the research.[h] The eventual study included TK interviews in each community and a revised approach to the fish harvest survey that incorporated more TK observations. However, these aspects of the study only took shape after an extensive consultation process, which happened while the scientific portion of the study was already underway due to tight time lines for multi-year data collection.

The outcomes of this new study (publication still pending at time of writing) are not what I want to focus on as I conclude this exploration of how TK has interacted with co-management institutions in this particular case. What I can say is that those outcomes will again—as with the original 2003 Aquatic Effects study—combine two sets of findings that to some degree talk past one another. The scientific findings respond to fairly narrow questions around sediment transport and riverbed invertebrate communities near the ferry landings, and find little evidence of impacts from the landings. The TK findings provide a degree of support for the scientific results, but also point to a wider array of issues, including

[h]In this work and my understanding of how TK fit into the way the study unfolded, I am indebted to my coresearchers, Derek Gray and Matthew Teillet, and owe special thanks to Roxanne McLeod, Gina Vaneltsi Neyando, Laura Nerysoo, Sharon Snowshoe, Bella Charlie, Geraldine Blake, and Kristi Benson.

implications for traditional fishing locations and concerns about potential spills and cumulative impacts. These issues continue to mark a space of friction between Indigenous land users and the Department of Infrastructure. While both Western science and TK are given their due in the study findings, a prioritization of TK in the initial request for the study proposal might have triggered a different study design process, with outcomes that better addressed community concerns.

The broader arc of this story illustrates two things. First, co-management institutions are working, in the sense that the water licensing process has provided concrete points of leverage for community concerns (rooted in TK) to be heard and to receive responses within the regulatory process. Second, and on a less positive note, TK tends to play a secondary role to scientific monitoring and research in relation to that process. We can see this (a) in the way scientific findings (rather than clear concerns of TK holders) seemed on balance to define the regulatory outcome of the original Aquatic Effects study, (b) in the absence of TK engagement during the LAMP study, and (c) in the belated addition of a TK dimension to the most recent study. It seems that hurdles remain for TK to become a routine dimension of water governance in this part of the Mackenzie basin, in spite of the well-established rights and institutional frameworks for that incorporation to take place. As one outcome of this, even when TK *is* incorporated, there is a missed opportunity here for it to more strongly shape approaches to environmental monitoring, including the questions addressed by Western science.

Dehcho Guardians: Improvising stewardship amidst uncertainty

The Dehcho is a 185,000 km^2 region spanning the southern portion of the Mackenzie River valley and the western portion of Great Slave Lake (see Fig. 2). Dehcho First Nations (DFN), a regional Indigenous governance organization, comprises seven of the ten First Nations in the Dehcho, as well as two Métis Councils. As of 2021, the governance of water and other resources in the region remains subject to provisional arrangements, since the regional land claim—the "Dehcho Process"—is still ongoing after more than 20 years of negotiations. An Interim Measures Agreement (Deh Cho First Nations, Government of Canada, & Government of Northwest Territories, 2001)() and an Interim Land Use Plan (Dehcho Land Use Planning Committee, n.d.) provide some degree of funding and a basis for relationships with public government, but DFN does not enjoy the same level of financial resources, nor the same role in regional resource co-management, as do the Gwich'in and other Indigenous peoples with settled claims in the NWT.

Despite this context of uncertainty and limited resources, DFN and its member communities have participated and partnered with both territorial and federal government agencies to pursue initiatives that intertwine TK and Western science to advance land and water stewardship. These efforts have been consolidated through DFN's Indigenous Guardians program, *Dehcho K'éhodi* ("caring for the Dehcho"). The *Dehcho K'éhodi* initiative emerged in 2014, after processes to develop protected areas were interrupted for several years during devolution of authority from federal to territorial government. *Dehcho K'éhodi* is a holistic concept linking land, way of life, and identity, as captured in the phrases that have guided development of the program: "being on the land in a Dene way protects the land" and "we need to be who we say we are" (Wiebe, 2019). This approach puts TK at the center

and links it to the culture, laws, language, and land-use skills that enable Dene practices of land and water stewardship. My own research engagement with DFN and member communities has been in support of *Dehcho K'éhodi* (Latta, 2020; Latta & McLeod, 2017), and my observations and reflections here are rooted partly in that work.[i]

One of the main areas of activity for *Dehcho K'éhodi* is aquatic ecosystem monitoring. Community-based Dehcho Guardians are hired with funding from the federal Department of Fisheries and Oceans Aboriginal Aquatic Resources and Ocean Management Program (AAROM). They complete various training and certification programs before carrying out AAROM activities focused on water quality and the health of subsistence, recreational, and commercial fisheries (Aboriginal Aquatic Resources and Ocean Management Program, n.d.). This involves monitoring fishing and fish stocks, as well as monitoring and remediation of mercury levels in fish. AAROM also coordinates community-based water monitoring for the Dehcho, as part of a broader program funded by the Government of the NWT.

While AAROM's roots are in Western science monitoring, in practice it has become a space where TK plays a significant role. TK is central in establishing sites for water monitoring. Moreover, because Dehcho Guardians are Dene land users, their evolving understanding of environmental change blends their TK observations with the scientific data they collect. This centrality of TK also includes an emphasis on their roles as mentors for youth, not only in environmental monitoring but also in transmission of language and culture, both of which are crucial for protecting the land and water as guided by Elders and land users. In on-the-land camps led by Guardians, youth learn Dene culture, language, and TK alongside Western science.

In the absence of a settled land claim, these efforts at land and water stewardship are fragile, but two significant achievements around infrastructure monitoring and protected areas have provided new tools cementing the role of Dehcho Guardians. In 2017, Enbridge filed an application to replace the segment of its Line 21 pipeline that crosses the Mackenzie River near Fort Simpson. DFN, together with member communities Łı́ ́dlı̨ı̨ Kų́ę́, Sambaa K'e, Pehdzeh Ki, and Tthets'éhk'edélı̨ First Nations, raised concerns about potential impacts of the project and Enbridge's level of engagement with the communities. They asserted their title and treaty rights, proposing that Dehcho Guardians play a role in monitoring the work. Since there is no regional land and water board for the Dehcho, Enbridge's application was handled by the Mackenzie Valley Land and Water Board. During the permitting process, DFN and two of the communities that also presented formal submissions noted their traditional role as stewards of the Dehcho and underlined the value of Dene knowledge to ensure effective monitoring of the pipeline (Mackenzie Valley Land and Water Board Public Registry, n.d.). The project license was only approved once Enbridge came to an agreement with DFN to fund training and expenses for Dehcho Guardians to act as environmental monitors, both during the pipeline replacement and along the entire path of the pipeline through DFN territory.

[i]I owe special thanks to Dahti Tsetso, Kristen Tanche, Mike Low, Jessica Jumbo, Melaine Simba, Margaret Leishman, and Chiefs Dolphus Jumbo and Lloyd Chicot for their generosity and sharing of knowledge during my research with the Dehcho K'éhodi program.

The second major advance cementing the role of Dehcho Guardians came as a result of DFN's work with the Canadian Wildlife Service to create a new Indigenous Protected Area in the region. Established in 2018, the Edéhzhíe Protected Area covers over 14,000 km^2 of crucial wildlife habitat that has helped sustain several DFN communities for generations (Environment and Climate Change Canada, 2018). The establishment agreement sets out the conditions for co-management between DFN and the Government of Canada, with a central role for Dehcho Guardians. The management plan for Edéhzhíe is not yet in place at the time of writing, but both parties in the co-management arrangement are committed to elevating TK as a basis for ongoing stewardship of this crucial part of DFN territory.

These developments are significant. Even without a settled land claim, we see again that co-management institutions can be a crucial factor in providing leverage for Indigenous governments to assert their roles as knowledge keepers and environmental managers. Also in evidence here is the potential for collaborative innovation based on new kinds of relationships between public and Indigenous governments: Edéhzhíe is a federal protected area but arguably has benefited from broader shifts in attitude around resource management in the NWT.

Alongside these hopeful developments, financial and capacity limitations constrain the ability of the *Dehcho K'éhodi* program to systematically bring TK into water governance. Also, as with the case of fish and ferries in Gwich'in territory, Western science has a head start over TK in the governance process. Water and pipeline monitoring have Western science at the core of sampling and reporting protocols, and protected area management that puts TK at the center is still an experiment in progress. At the same time, what *Dehcho K'éhodi* illustrates is the adaptive resilience of Indigenous land and water stewardship practices. While academic and government researchers meet in seminars to fuss about how to combine different knowledge systems, Indigenous peoples are taking up science alongside TK in ways that suit their own efforts to reclaim their rightful place as the guardians of land and water in their territories.

Traditional Knowledge extraction in Alberta's oil sands

British Columbia and Alberta offer less hopeful snapshots of TK in water governance. They are certainly not the only parts of the Mackenzie basin with significant natural resource extraction and related concerns for the integrity of aquatic ecosystems. As one notorious example, between 1949 and 1999 the Giant Mine and refractory, near Yellowknife, NWT, released arsenic into the surrounding environment with far-reaching impacts, especially on Yellowknives Dene First Nation (Sandlos & Keeling, 2016). Nevertheless, the region of oil sands extraction in northern Alberta and that of oil, gas, and hydroelectricity development in northeastern British Columbia (see Fig. 2) are the most significant zones of resource development in the basin today.

Alberta's oil sand deposits are located across more than 140,000 km^2, and the endeavors to extract them have been called "the world's largest industrial project" by environmentalists and the media (e.g., Leahy, 2019, see Fig. 2). The scale and time frame of development raise questions around cumulative and regional impacts. TK is uniquely positioned to grapple with those questions, but significant hurdles limit Indigenous peoples' meaningful

participation in decision-making. Some of these hurdles are practical challenges resulting from inadequate investment in practices and frameworks to bring forward TK. For example, Parlee and D'Souza (2019) note that there are challenges related to varying definitions and methods of documenting TK, and that TK documentation conducted for communities often contains confidential information. However, they also highlight that such technical challenges are only part of the picture, and that "… careful attention be paid to the socio-economic inequities that perpetuate the marginalization of Aboriginal voices in decision-making …" (Parlee & D'Souza, 2019, p. 1; see also, Parlee, 2016; Slowey & Stefanick, 2015).

Addressing that marginalization means more systematic documentation of TK, but also requires efforts to overcome bias in regulatory processes. Natcher, Brunet, Bogdan, and Tchir (2020) note that Indigenous observations regarding environmental impacts of oil sands development are often dismissed as merely anecdotal. Disregarding them on this basis not only risks missing impacts that scientific monitoring may be failing to detect, but also fails to appreciate the way perceptions of impact may themselves constitute "cultural truths" that have real implications for Indigenous relationships with their traditional territory. Along these lines, Westman and Joly (2019) argue for more community-engaged research to synthesize the connections between environmental, cultural, and social impacts of oil sands development. They observe that Traditional Knowledge studies and related documentation of the impacts of development in the region are produced mostly for environmental impact assessment and other regulatory processes, which may partly empower Indigenous communities to influence decisions but is equally likely to fulfill a box-ticking function for project proponents—what Baker and Westman (2018) label "extracting knowledge."

The case of the oil sands gives us a chance to probe a bit deeper into the kinds of assumptions and bias that stand in the way of moving beyond the *extraction* of TK as a formality within regulatory processes. In particular, researchers working in the region argue that TK is pushed to the margins not merely due to perceptions that it fails to meet the same evidentiary criteria as science (i.e., being seen as "anecdotal") but also due to a deep ontological divide between Western and Indigenous knowledge systems. As Wheatley and Westman (2019) assert, "much of the regional literature on environmental issues neglects the ontological character of water that is reflected in Cree, Métis, and Dene worldviews" (p. 174). As Baker (2020) underlines, Indigenous worldviews reject the objectification that is at the root of Western science, instead seeing plants, animals, and even rocks as sentient and as kin.

In her reflections on work with Fort McKay First Nation and Bigstone Cree Nation around the impacts of oil sands development on traditional berry picking, Baker (2020) notes how conventional practices for incorporating TK in environmental management neglect the deeper relations between people and berries. That knowledge is only incorporated into impact assessment and management to the extent that it fits within a scientific narrative (e.g., observations of wildlife abundance) or has been verified by science (e.g., by testing berries for contaminants) (see also, Baker & Westman, 2018). This kind of power relations in the politics of knowledge and environmental regulation are hardly unique to the oil sands (for other examples see, e.g., Dokis, 2015; Muller, 2014; Nadasdy, 2005; Sioui & McLeman, 2014). Nevertheless, they become graphically visible in the context of such spatially expansive industrial development, which leaves behind entire landscapes that are the products of human engineering through environmental mitigation measures—rendered alien to an Indigenous worldview (Wheatley & Westman, 2019).

Traditional Knowledge and cumulative impacts in British Columbia hydroelectricity

Dams are another form of resource development that brings radical landscape change to the Mackenzie Basin. In northeastern British Columbia, existing and future dams on the Peace river have been the object of significant contention, especially for their impacts on Indigenous lands and livelihoods. The WAC Bennett Dam was completed in 1967, named after the premier whose vision of converting British Columbia into a natural resource powerhouse gave birth both to this series of megaprojects and to BC Hydro, the public utility that has promoted them (Loo, 2007). Controversy over the dams has extended far downstream, where many blame the WAC Bennett Dam for changes in water levels and associated impacts on Indigenous livelihoods in the Peace-Athabasca Delta and the Slave River Delta (e.g., see Beltaos, 2014; Independent Environmental Consultants (IEC), 2018; *Our water, our life: Building partnerships to assess the health of the Slave River and Slave River Delta*, 2012; but the degree of these impacts relative to climate-related changes is debated, see Dagg, 2016; Wolfe, Hall, Edwards, & Johnston, 2012; Wolfe, Hall, Wiklund, & Kay, 2020). Concerns over those downstream impacts have also been part of an enduring controversy over the Site C Dam, under construction downstream from both the WAC Bennett Dam and the subsequent Peace Canyon Dam (completed in 1980). Initially shelved after significant public protest in the 1970s, the Site C dam was approved in 2014 after environmental assessment by a federal-provincial Joint Review Panel.

As with the oil sands, cumulative impacts are a major concern for Indigenous peoples affected by the Site C Dam, and yet BC Hydro negotiated terms of environmental assessment that significantly constrained the scope of cumulative impacts study. BC Hydro asserted that the effects of the existing dams could not be properly factored into cumulative impact considerations due to a lack of reliable information about environmental conditions prior to their construction. In its conclusions, the Joint Review Panel disagreed with this assertion and was critical of the weak cumulative impact measures in the assessment process. The panel identified various kinds of available information on prior environmental conditions that could have been employed in the study, notably including Traditional Knowledge (Report of the Joint Review Panel – Site C Clean Energy Project, 2014, p. 259). Indeed, despite lacking adequate information from the environmental impact statement submitted by BC Hydro, the Joint Review Panel concluded that Site C was likely to cause "significant adverse cumulative effects on current use of lands and resources for traditional purposes" (p. 120). Though it discarded the possibility of impacts on the Peace-Athabasca delta, the panel identified a series of impacts on wildlife and heritage that were of direct relevance to local First Nations' livelihood and cultural practices.

Site C was approved by the British Columbia Government in disregard of this finding that First Nations' treaty-protected rights would be impacted. A new provincial government came to power in 2017, among its election promises being an immediate reconsideration of Site C. The new government called on the provincial utilities regulator, the BC Utilities Commission, to conduct a review of the project, but the scope for that review was limited to analyzing costs around potentially delaying or canceling the project. In its public review process, the Commission again heard extensive submissions from First Nations about cumulative impacts, but these submissions were largely irrelevant to the question put before it by the government. The project approval was reaffirmed by government in the fall of 2017 without any further consideration of cumulative impacts.

Cumulative effects and impacts are part of the technical nomenclature within Western science and policy. Nevertheless, they arguably act as an epistemological bridge with TK because they represent an attempt by science to tell a longer story of landscape change, one which is closer in temporal scale to the long-term view of TK. A full cumulative impacts study would have brought scientific findings into greater dialogue with the knowledge of environmental degradation embedded in First Nations' intergenerational experiences of expanding resource extraction in the region. The fact that the Joint Review Panel nevertheless gave weight to these voices in its assessment demonstrates that regulatory processes can become spaces of contention over the legitimacy of different knowledge systems. Nevertheless, as Bakker and Hendriks (2019) argue in their analysis of the Site C approval, this is a case where "one dominant epistemic community successfully claimed legitimacy and authority" to advance a political and economic agenda.

That dominant epistemic community drew an indelible line between the mistakes of the WAC Bennett dam and BC Hydro's approach to the Site C project. Two years after Site C's initial approval, BC Hydro opened a new exhibit at the WAC Bennett Dam Visitor's Center, chronicling the impacts of the Bennett dam on First Nations (Fisher, 2016). In a discursive sleight of hand, the exhibit was titled "Our Story, Our Voice," at the same moment that the corporation's web site was erasing current Indigenous voices by touting the "rigorous and independent" scrutiny received by Site C, including "multiple opportunities for timely and meaningful participation by the public, Aboriginal groups, all levels of government, and other interested stakeholders" (BC Hydro, 2017). This *then and now* story about BC Hydro's approach to hydroelectric development is arguably part of a broader narrative across Canada's natural resource sector, one which locates colonial injustice in the past while effacing the play of political and economic power that underlies current practices of impact-benefit agreements and consultation.

Of course, it is a false dichotomy to suggest that resource development necessarily stands opposed to the interests of Indigenous peoples, and their governments regularly enter into benefit sharing agreements with development proponents—like the ones signed by four of the seven First Nations that originally opposed the Site C dam (Cox, 2020). We should be cautious, however, to interpret this as a sign of inclusive decision-making. Papillon and Rodon (2017a, 2017b) note that Impact-Benefit Agreements are frequently negotiated prior to completion of environmental assessment, and typically without significant community deliberation. Such agreements allow communities to glean economic benefits from resource development, but they also grease the wheels of decision-making processes that fail to grapple meaningfully with the Indigenous knowledge, worldviews, values, and governance practices that should be part of deliberations leading to decisions about consent (Mitchell, Arseneau, Thomas, & Smith, 2019). For communities that often have high poverty rates and deficits of public investment in infrastructure, education, and health, turning down benefit opportunities from projects they stand little chance of stopping is hardly an option. In the case of Site C, only one of the First Nations impacted by the dam has so far refused all offers of compensation; at the time of writing, West Moberly First Nation continues in a court action against the Government of British Columbia for infringement of their treaty rights.

Conclusions: Reclaiming space for Traditional Knowledge

Indigenous peoples across Turtle Island are engaged in processes of resurgence rooted in their long-standing relationships with the land (Alfred, 2015; Alfred & Corntassel, 2005; Artelle et al., 2019; Simpson, 2011). In doing so, they respond to the losses and displacements of several centuries of colonial history, but also to ongoing structures of political and economic power sustained by what Simpson calls "the original false claims of the settler: a right to territory and a right to govern" (Simpson, 2017, p. 19, see also Coulthard, 2014).

In the Mackenzie Basin, those claims of the settler state stand as roadblocks to Indigenous-led water governance. They do that not only by continuing to undermine Indigenous territorial and governance autonomy, but also by fragmenting the watershed into provincial and territorial allotments of Canadian sovereignty, jealously guarded by their respective governments. Theoretically, the Mackenzie Valley Basin Board could play the kind of strong basin-level governance role recommended in the 2013 Rosenberg International Forum on Water Policy. In practice, as Morris and de Loë (2016) observe, it was purposefully designed to play a much more limited role. Although the recent bilateral agreements could be an avenue to strengthen basin collaboration, they are more likely to simply reinforce the status quo. This ongoing political fragmentation hinders the incorporation of TK in basin governance, both because it blocks the development of concerted and common approaches to documenting and mobilizing TK in decision-making, and because it hampers Indigenous collaboration across the basin to challenge the system-level impacts of rapid and expansive resource development.

Within this fragmented landscape, Indigenous peoples have gained important footholds through ongoing assertion of their inherent rights. These footholds are unevenly distributed across the basin. I have singled out the NWT, where despite challenges to fully embrace TK in decision-making there is growing Indigenous influence in water regulation and policy. Those advances have been achieved both through the consolidation of co-management arrangements and with long-term relationship building between public and Indigenous governments. Even where unsettled land claims keep Indigenous governments in a vulnerable position, an overarching shift in the culture of land and water governance in the NWT generates spaces for experiments in cross-cultural collaboration, with encouraging outcomes for the involvement of Indigenous land users and knowledge holders in water monitoring and stewardship. Increased efforts are needed to strengthen the role of TK both in co-management and in monitoring and research practice; part of this involves supporting regional and community-level Indigenous governments in building their own capacity to bring TK forward into decision processes.

Jurisdictions like the NWT can also be catalysts for broader improvements across basin-level governance. The bilateral water agreements are one example of this, providing new and important sites of leverage for TK to play a role in challenging upstream development that puts water at risk. It remains to be seen how powerful that leverage will be, both of TK within bilateral management deliberations and of the agreements themselves in preventing impacts from upstream development. Outcomes will depend significantly on political will in British Columbia and Alberta. Notwithstanding its record with the Site C dam,

British Columbia's legislation to implement UNDRIP is a hopeful sign, but with rapidly accumulating investments in oil, gas, and mining in the northeastern part of the province, powerful economic interests stand in the way.

Taking TK seriously in water governance represents a challenge to Western institutions because it means allowing space—both figuratively and geographically—for other sovereignties, other ontologies, and other ways of being. In the Mackenzie Basin, some of that space is opening up. Certainly, we can see examples where TK is officially included in environmental management but continues to play a secondary role, or even where it is relegated to "tick-box" status rather than receiving serious consideration. Nevertheless, we can also see that Indigenous land users, communities, and governments are increasingly unwilling to have their knowledge and voices excluded. Using whatever legal and political tools at their disposal, they are busy reclaiming their rightful roles as guardians of the waters in this vast and interconnected landscape.

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