Perspectives and experiences of fisheries professionals working for Indigenous fishery agencies on the Laurentian Great Lakes

by

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Abstract

The health of fish and water is of utmost importance for Indigenous Peoples yet Indigenous voice and wisdom continue to be marginalized in decision-making about water resources. This is problematic given that interconnected aquatic ecosystems require collaboration, alongside legal and ethical imperatives to involve Indigenous Peoples in decisions that uphold their rights. This thesis employs a case study of fisheries decision-making on the Laurentian Great Lakes where multijurisdictional collaboration emerged in response to widespread damages caused by the invasive sea lamprey *Petromyzon marinus*. Drawing on interviews with fisheries professionals working for Indigenous fishery agencies we provide insight into the challenges and opportunities of fisheries co-management. We find that collaboration can be impacted by individual to institutional to system levels. Overall, the equitable involvement of Indigenous voice and wisdom in decision-making can move us together and further along a pathway of reconciliation and commitment to healthy water resources.

Dedication and Acknowledgements

For my dad, from whom I have learned so much

This work would not have been possible without the incredible support of many people. First, to the participants in this research: I am deeply grateful to have had the opportunity to learn from your insights. Second, to my supervisors, Dr. Vivian Nguyen and Dr. Steven Cooke. Thank you for your mentorship and support. I am grateful also for the guidance received from Dr. Valerie Berseth. Third, to Andrea, Alex, Beth, and Bill: I am honoured to have had the opportunity to work with you. Many thanks for the wonderful conversation. To my committee members, Dr. John Dettmers, Dr. Nathan Young, Dr. Andrea Reid: thank you very much for your helpful feedback and continued support.

I am grateful to the Great Lakes Fishery Commission, who provided funding and support for this research. To my parents, Will and Rebecca, and to my brother, Aaron, for being with me through it all. Thank you for your encouragement, long walks, and unconditional love and support. The Takla Nation has played a central role in supporting me throughout my studies. I express my sincere gratitude to Takla leaders, community members and colleagues, and especially to Scott Emmons, Keith West, and Cory Williamson: thank you for your mentorship. To the whole of the Lands & Stewardship team, including Brandy Jarvis, Colin Teegee, Tessa Lewis, Mitch Macfarlane, Krista Sittler, and many others. Thank you so very much for your humour and inspiration.

Thesis Format and Contributions

This thesis consists of a general introduction (Chapter 1) and discussion (Chapter 4), and two co-authored manuscripts (Chapters 2 and 3) that are in preparation for submission to peer-reviewed journals. The repetition of definitions and details is at times necessary so that chapters can stand alone. All co-authors have provided significant guidance and foundation to this research, including comments/edits on draft and near final versions of manuscripts. To reflect the collaborative nature of this research, the use of the pronoun 'we' is used throughout Chapters 2 and 3. Co-authorship contribution details are as follows:

Chapter 2: Perspectives and experiences of fisheries professionals working for Indigenous fishery agencies on fisheries and sea lamprey decision-making in the Laurentian Great Lakes. Postma, H.G., Nyboer, E. A., Duncan, A. T, Reid, A. J., Mattes, W. P., Berseth, V. Young, N., Steeves, M., Pritchard, G., Barber, J., Gaden, M. and V. M. Nguyen & S. J. Cooke.

Chapter 3: Preparing current and future fisheries professionals to work with and for Indigenous fishery agencies. Postma, H.G., Reid, A. J., Duncan, A. T., Nyboer, E. A., Mattes, W. P., Young, N., Steeves, M., Pritchard, G., Barber, J., Gaden, M. and S. J. Cooke & V. M. Nguyen.

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Positionality Statement

I would like to acknowledge that this thesis was prepared from the unceded and unsurrendered territory of the Algonquin Anishinaabe Peoples (Ottawa, Ontario). The focus of this research is Nayaano-nibiimaang Gichigamiin, the five Laurentian Great Lakes. In a spirit of gratitude I recognize the many Indigenous communities who continue to care for these waters and surroundings lands. This research was guided by the larger collaborative project *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great Lakes.* Just as water systems are connected so too is this research, flowing into and carried on by others on the project team: the Centre for Indigenous Fisheries at the University of British Columbia, the University of Ottawa, and the Great Lakes Fishery Commission and its partners.

I am a third-generation settler with family roots in Scotland and Friesland, a province of the Netherlands. I acknowledge many privileges, including the opportunity for me to conduct this research. For most of my life I have lived on Treaty lands of the Mississaugas of the Credit First Nation, also the Traditional Territory of the Haudenosaunee, Huron-Wendat and Anishinabek. Processes of settler-colonialism disrupted (but did not extinguish) the relationships between Indigenous Peoples and their lands and waters. Opportunities to learn and live within these regions of Turtle Island encourages and inspires but also instills within me humility and a responsibility to listen to and be guided by the priorities of Indigenous Peoples.

Throughout this thesis I have drawn inspiration and guidance from important principles as stated in the United Nations Declaration on the Rights of Indigenous Peoples (the UNDRIP). Canada's Truth and Reconciliation Commission's Calls to Action – Actions 43 and 44 – call upon all levels of government to fully adopt and implement the UNDRIP as a framework for reconciliation.

I commit to contribute to healthy relationships and to deepen my understanding of Indigenous realities within a settler-colonial society where Indigenous Peoples continue to face multiple discriminations. I commit to actively work and stand alongside of Indigenous Peoples in seeking reconciliation and upholding their rights.

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Chapter 1: General Introduction

We approach this thesis through five contextual settings (Figure 1-1) within which we seek to learn how Indigenous voice and wisdom can be meaningfully supported in fisheries decision-making.[1] In the introduction, we first describe how water systems (and the fish that swim across them) are interconnected, providing impetus for ecosystem-wide collaboration (Interconnected and Symbiotic Water Systems). Second, Indigenous Peoples – for whom water is of the utmost importance – have largely been excluded from these decision-making processes (Indigenous Peoples are Rightsholders and Water Keepers). Third, collaborative management (co-management) has emerged as an approach which endeavours to include Indigenous voice and wisdom in natural resource decision-making (Towards Meaningful Collaborative Management). Fourth, we employ a case study of fisheries management on the Laurentian Great Lakes, wherein fishery collapses in the 1940s and 50s illustrated the need for whole-ecosystem, multijurisdictional collaboration (Multiscalar Governance and Management). Indigenous Peoples were not invited into these decision-making processes, even as the results were implemented within and across Indigenous lands and waters. Lastly, enabling inclusive and equitable collaboration among all who are committed to the health of fish and water invites collective success (System-Wide Collaboration is Key). This thesis argues that the equitable involvement of Indigenous voice and wisdom can move us further along and together on a pathway of reconciliation and commitment to healthy fish and waters.

[1] Throughout this thesis "voice" represents a diversity of Indigenous voices. It is inclusive of voices not always shared by Indigenous Peoples themselves, but by individuals representing Indigenous interests and communities.

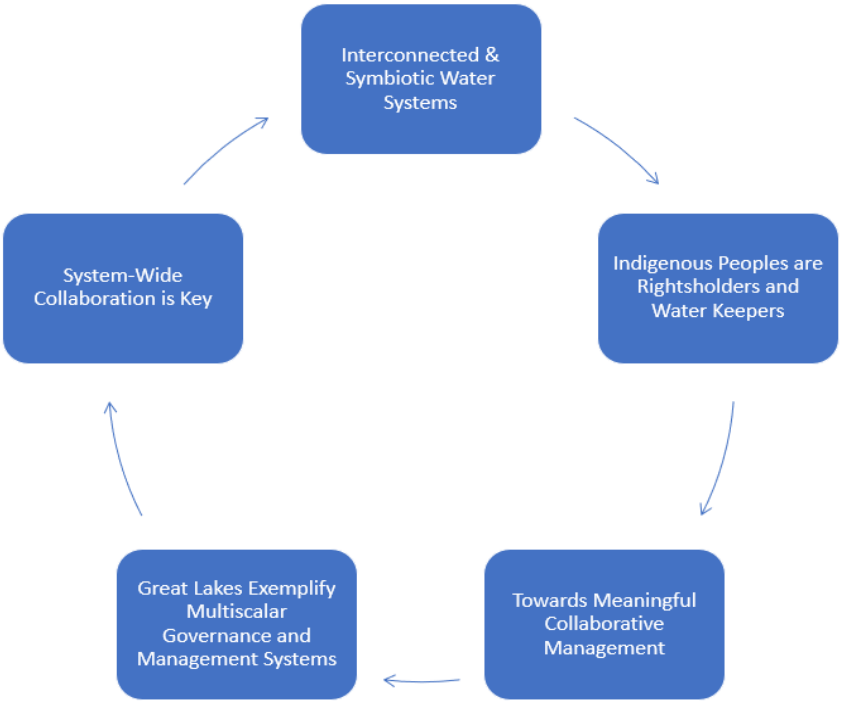


Figure 1-1. Each of the contextual **and interconnected** settings introduced in this thesis.

Interconnected and Symbiotic Water Systems

Water governance[2] and fisheries management are connected, complex and multijurisdictional (Arsenault, 2021; Bakker and Cook, 2011; Craft and King, 2021; Irvine et al. 2020; Chiblow, 2023). Water systems are inherently intertwined. What happens in one part of a waterbody or watershed has wide-reaching effects and implications (Nguyen et al. 2017; Lapointe et al. 2014). Aquatic organisms such as fish do not realize jurisdictional borders, traveling long distances across waters shared and cared for by many. Effective decision-making regarding fish and waters requires all relevant actors to come together to reach consensus and carry out decisions (Koontz & Newig, 2014). In addition to day-to-day requirements to work together, collaboration and decision-making need to also consider future human interactions.

Indigenous Peoples are Rightsholders and Water Keepers

[2] Throughout this thesis "governance" and "management" refer to decision-making processes. Governance can refer to a set of regulatory processes through which decisions and outcomes are influenced by policies and politics. Management often involves the practical implementation of such regulatory processes (Wilson, 2018; Kotaska, 2013).

In settler-colonial states[3] Indigenous Peoples, their voice and wisdom, have been (and in many cases continue to be) excluded from or unrecognized as rightsholders in decision-making processes (Simms et al. 2016; McGregor, 2023; Alcantara & Nelles, 2013; Hartwig et al. 2020; Chiblow, 2023). This is particularly true with regard to decision-making within Indigenous territories, where the resulting consequences of dispossession and marginalization threaten Indigenous rights to live in relation with their ancestral lands and waters.

The health of water (and the life within) is of utmost importance for Indigenous Peoples (Restoule et al. 2018). Indigenous women in particular carry an unbreakable relationship with water, instrumental in protecting water resources and safeguarding water laws (Dennis & Bell, 2020; Chiblow, 2019).[4] Indigenous-water relations are sacred and multifaceted, structured by worldviews upon which management decisions are based (Wilson, 2018; Fisher & Parsons, 2020). Legal frameworks of settler-colonial states focus on possession[5] of water resources whereas Indigenous worldviews and governance systems can place more emphasis on the role of humans in ensuring its continued care (McGregor, 2014; Yazzie & Baldy, 2018; Roy, 2017).[6]

Settler-colonial approaches to decision-making have historically been and continue to be a low-context system in which decision-making is separate from nature or the object of study (Cajete, 2000; Mazzochi, 2006). Natural resources are perceived and managed as a means to benefit humans (Busiahn, 1989; Cajete, 2000; Nakashima and Roue, 2000; Drake et al. 2022). In contrast, Indigenous interactions with the natural world flow from centuries of interdependent relationships with the broader environment, developing ways in which to sustainably manage and use natural resources. These ontological and epistemological

[3] Settler-colonial states are Canada, the United States, Australia, New Zealand and South Africa (of which Canada, the United States, Australia and New Zealand voted against the implementation of the United Nations Declaration on the Rights of Indigenous Peoples) (Sturm, 2017). Although both colonialism and settler-colonialism are based on domination by an external power, only settler-colonialism seeks to replace Indigenous Peoples with a settler society that over time develops a distinctive identity and sovereignty (Veracini, 2014).

[4] Indigenous women are water keepers (Hania & Graben, 2020). As Sarah Niman explains in an APTN National News outlet, "They carry water in their wombs, protect the water and share water laws with their communities" (APTN, 2021). Water laws are the laws Indigenous Peoples have developed to govern the relationship between humans and water.

[5] For example, the basis of fisheries management in the United States relies on ownership of the fishery resource. This is known as common property principle, where the fishery is owned by the entire populace. State governments are empowered to maintain open access to the fishery while ensuring the protection, sustainability and productivity (biological and economic) (Nielson, 1999; Henquinet & Dobson, 2006).

[6] Indigenous governance refers to the diverse ways through which Indigenous Peoples continue to govern themselves despite complex histories and realities of colonialism (Wilson, 2018). Indigenous governance includes Indigenous laws (e.g., water laws) and legal processes developed by Indigenous Peoples to govern their relationships, manage their lands and waters, and resolve conflicts within and across legal system (such as A Dish With One Spoon) (Gunn & O'Neil, 2021).

philosophies can contribute to divergent but perhaps also complementary systems of governance and decision-making (Wilson & Inkster, 2018; Parsons & Fisher, 2020). [7]

Decision-making processes that marginalize Indigenous ways of conceptualizing water "devalues those cultures which traditionally rely heavily on naturalistic observation and insight" (Kawagley et al. 1998, p. 134), potentially and significantly affecting Indigenous Peoples' cultural well-being and very identity. Not recognizing and undervaluing the rights and management approaches of Indigenous Peoples places a disproportionate amount of power in the hands of settler-colonial governments (Muller et al. 2019). Yet, as Berkes (2012) illustrates, "despite all of its power", a resource management paradigm which serves a "utilitarian, exploitative, dominion-over-nature worldview" has been "unable to halt the depletion of resources and the degradation of the environment" (p. 266).

Indigenous Peoples are challenging such decision-making processes which do not recognize Indigenous rights to self-determination, calling into question the very manner in which lands and waters are protected and managed (Wilson, 2019; Wilson & Inkster, 2018; Muller et al. 2019). In so doing, Indigenous Peoples are (re)claiming roles within natural resource governance and management processes. There are also growing movements in scholarship, and among legal, policy and advocacy communities, to shift away from insular, single authority approaches towards natural resource decision-making (Simms et al. 2016; Tsatsaros et al. 2018). Such shifts endeavour to embrace a more holistic and integrated approach, placing more value on different ways of knowing and centering Indigenous voice and wisdom more prominently in decision-making (Nyboer et al. 2022; Bottom et al. 2009; Thompson et al. 2019; Simms et al. 2016).

Part of the motivation behind this shift has been the recognition of the shortcomings of a solely settler-colonial-based approach to natural resource decision-making. Indeed, legal requirements (re)affirm Indigenous Peoples' inherent rights to participate equitably in decisions which affect them. As such there is increasing interest in natural resource management regimes

[7] Here, we define ontologies as ways of being and defining what something is, shaping how we see ourselves in relation to others. Epistemologies are understood as ways of knowing (Descola, 2013).

that feature collaborative research and management between Indigenous and non-Indigenous communities (Swerdfager & Armitage, 2023). This momentum illustrates the importance of transformative action at all levels, including from within existing systems and structures to the individuals involved in carrying out research and decisions.

Towards Meaningful Collaborative Management

Progress has been made in recent decades in achieving high-level recognition of Indigenous rights (UNDRIP; Schweitzer et al. 2023; Allard & Curran, 2021).[8] Efforts have emerged in settler-colonial states to implement approaches to natural resource decision-making that share responsibilities with Indigenous Peoples (Parsons & Fisher, 2020; Curran, 2019). Co-management – a term first used in court decisions providing U.S. Treaty fishing Tribes with the right to "concurrent management" – is a form of participatory decision-making which has evolved into an increasingly prominent approach to the management of shared resources between relevant and indeed essential actors (Pinkerton, 2003).

Participation is a key dimension of fisheries co-management and it is one which depends largely on power dynamics (Quimby, 2018; Curran, 2019; Natcher, 2005). As Etzioni (1968, p. 320) reminds us, "Power can be exercised only because – and to the extent that – power potentials are unevenly distributed among actors" (Etzioni, 1968, as cited in Jentoft, 2007). Empowered actors such as federal and state/provincial governments and research agencies are products structured by and evolved from the foundations of settler-colonialism.

Arnstein (1969) and other scholars such as Bruns (2003) conceive of participation as a "ladder", focusing on the different levels of power-sharing progressing from consultation and informing to independent self-management and agency. Berkes et al. (1991) describe the concept of the ladder as the extent of involvement and shared decision-making in resource

[8] The United Nations Declaration on the Rights of Indigenous Peoples (hereafter UNDRIP) provides for a right of self-determination which includes the free pursuit of economic, social, and cultural development, and for a right for Indigenous Peoples to make and exercise decisions about their lands and waters (Lalancette & Mulrennan, 2022). UNDRIP offers indication of the emergence of the recognition of Indigenous rights, evidenced by land settlements, reconciliation plans, partnerships and agreements. At local and institutional levels, momentum to reconcile and collaborate is contributing to strengthened approaches towards shared power and responsibility.

management. Wilson (2018) suggests a typology of governance arrangements involving Indigenous and colonial-based governments, informed by three possible types of jurisdiction: Indigenous, co-jurisdiction, and non-Indigenous. Indigenous jurisdiction and title are critical factors enabling Indigenous Peoples to make decisions about the land and waters within their territories.

Acknowledging a typology of participation suggests the importance of more authentic and inclusive collaboration, and the importance of intentionally enabling all members to participate equitably. Arnstein emphasizes the importance of deliberate inclusion in decision-making processes, with the goal to shift power more equitably among all involved participants. She states, "Participation without redistribution of power is an empty and frustrating process for the powerless" (Arnstein, 1969, p. 216).

More attention is now focused on justice for Indigenous Peoples. Participation cannot be tokenistic or passive, but intentionally sought after and valued. Nancy Fraser's model of social justice and participation parity can be helpful as Fraser defines justice as social arrangements that permit all members to interact on a par with one another. Fraser offers an approach combining three dimensions of justice that together ensure parity of participation: redistribution of resources, recognition (who is included and heard), and representation. This is particularly relevant in the context of Indigenous involvement in decision-making, where management processes are layered on top of colonial legacies of exclusion and inadequate financial resourcing (Diver, 2016; Blue et al. 2019).

Co-management initiatives are intended to improve the sustainable management of natural resources, leveraging diverse perspectives and fostering more equitable sharing of power. Much of the existing literature about co-management with Indigenous Peoples focuses on its established and proposed benefits. On the one hand, co-management is suggested as an essential step for advancing Indigenous inclusion and self-determination, improving multijurisdictional conservation and management outcomes (Pinkerton 1989; Skogen 2003; Kendrick and Manseau 2008; Berkes 2009; Njifonjou et al. 2006; Olsson et al. 2004). While it does not necessarily remove differing perspectives, it is premised on sharing knowledge and

redistributing power to increase participation and reduce conflict (Jentoft, 2007; Parsons et al. 2021).

On the other hand, there is growing debate in literature and practice as to the extent co-management actually achieves more equitable power sharing for Indigenous governments working to achieve self-determination over decisions that affect their rights (Snook, 2021; Snook et al. 2022; Swerdfager & Armitage, 2023). There is a risk that the (deeper) inclusion of Indigenous voice and wisdom in collaborative work can be tantamount to perceiving Indigenous Peoples as mere stakeholders or relevant actors, rather than as rightsholders and self-determining governments (von der Porten et al. 2015; von der Porten & Loë, 2013; Buschman, 2022). This can subsume Indigenous rights, interests, and knowledges into a settler-colonial framework within which established parameters dictate the participation and influence of Indigenous voice and wisdom in decision-making (Curran, 2019; Reo et al. 2017).

The fisheries discipline, in particular, has faced criticism for prioritizing their own interests and authority and for disregarding alternative management and knowledge systems (Jentoft, 2007; Hind, 2014; Soto, 2006). How individual researchers perceive the legitimacy of or embrace other approaches to science and decision-making is not alone reliant on their own expertise and biases, but reinforced by the fact that it is situated within and as a powerful institution (Jentoft, 2007; Parsons et al. 2021). For example, Finlayson (1994) and McGuire (1998) discuss the northern cod moratorium in Newfoundland where "a strong reluctance to listen to local knowledge" contributed to the fishery collapse and resultant loss of livelihood for thousands of fishers (McGuire, 1998, p. 14). Thus, powerful institutions are positioned to reinforce the status quo, or bring about change.

Indeed, co-management offers spaces within which people can come together, interact freely, and share knowledge. While co-management can be invitational, providing opportunities for all participants to grow knowledge with which more encompassing and holistic decisions can be made, it also carries with it many ambiguities if not risks of inequities being exacerbated and perceptions of exclusion being heightened (Nadasdy, 1999; Stevenson, 2004).

Multiscalar Governance and Management

The Case: Laurentian Great Lakes

The Laurentian Great Lakes (hereafter Great Lakes) are managed by a broad, multiscalar ecosystem of collaborative decision-making. This study region offers an opportunity to examine the implementation of co-management arrangements which involve diverse actors including Indigenous and non-Indigenous governments and agencies (the mandates, roles and responsibilities for which often overlap).

More than 185 Indigenous communities inhabit and hold ancestral lands within the Great Lakes basin, which spans the 17,000 km shoreline between Canada and the United States (Serville-Tertullien et al. 2023). [9] Since time immemorial Indigenous groups have entered into agreements to avoid conflict about shared lands and waters (Jacobs & Lytwyn, 2020; Reo et al. 2017). A Dish With One Spoon is one such example: an agreement between the Anishinaabe, Mississaugas and Haudenosaunee Peoples surrounding the Great Lakes region. A Dish With One Spoon describes how the natural world can be shared to the mutual benefit of all its inhabitants (Thomas, 2022), [10] while also assuring each group's distinct sovereignty. Wampum belts were exchanged to symbolize the making of an agreement or Treaty and commemorate a long-lasting relationship. Early European settlers also entered into agreements and Treaties with Indigenous groups. However the settlers believed in the concept of private property, the rolling out of which negatively impacted the intent of both A Dish With One Spoon and the wampum belts (see Lowitt et al. 2023). Whereas agreements and Treaties offered real hope for sustained collaboration, Indigenous Peoples around the Great Lakes have been excluded from decision-making and have seen their rights denied (see Lytwyn, 1997).

The governments of Canada and the United States enacted laws and regulations which prevented Indigenous Peoples from protecting and living in relation with their lands and waters (Lytwyn, 1997). Colonization has since made the Great Lakes ecosystem increasingly

[9] Indigenous communities include Tribes in the United States, and First Nations in Canada. We recognize that there may also be Métis communities.
[10] The *dish* represents lands that are to be shared peacefully, and the *spoon* represents the individuals living on and using the resources in a spirit of cooperation.

vulnerable. Throughout most of the nineteenth and twentieth centuries, commercial fishing, industrialization, and landscape and waterway alterations brought drastic changes. For example, the construction of shipping canals not only facilitated settlement and growth of people but inadvertently allowed for the entry of aquatic invasive species, a particularly significant one being the invasive sea lamprey *Petromyzon marinus* (Taylor et al. 2013). Sea lamprey have caused major ecological and economic damages over the past century (Brant, 2019), driving fishery collapses in the upper Great Lakes (Coble et al. 1990; Smith & Tibbles, 1980).

In response to calls for a coordinated response to the damage sea lamprey inflicted on commercial fishers the governments of Canada and the United States implemented the 1954 Convention on Great Lakes Fisheries (hereafter the Convention) (Taylor et al. 2013; Miehls et al. 2020). The following year the Convention established the Great Lakes Fishery Commission (hereafter the GLFC), followed by the implementation of the Great Lakes Water Quality Agreement.[11] With these agreements in place, *A Joint Strategic Plan for Management of Great Lakes Fisheries* (hereafter the JSP) was developed.

The JSP is a non-binding agreement through which signatory agencies commit to cooperation, consensus, strategic planning, and ecosystem-based management. Federal, provincial and state agencies with specific fishery management roles became signatories to the JSP in 1981. It was not until the mid-1980s that some Tribes in the United States gained formal representation on committees organized under the JSP. First Nations in Canada are currently represented by the Province of Ontario (Mattes & Kitson, 2021; Gaden et al. 2012).

The Great Lakes Fishery Commission

[11] The Convention on Great Lakes Fisheries was developed and signed by representatives of the governments of both Canada and the United States. The resultant Great Lakes Fishery Commission is not the only transboundary initiative (e.g., the Great Lakes Commission, 1955), but it is the one which focuses on coordinated fisheries research and management across the Great Lakes ecosystem. Other co-management arrangements between Indigenous and non-Indigenous partners (e.g., the 2000 Consent Decree; fishing agreements between the Province of Ontario and First Nations) focus specifically on waters federally recognized as within Indigenous jurisdiction.

The GLFC is a focal point for Great Lakes fisheries management, tasked with managing sea lamprey, conducting and coordinating research, and maintaining working relationships. When considering cooperative fishery management the GLFC plays a facilitative role in support of the five Lake Committees, each of which is composed of a senior level representative from each agency with specific fishery management authority on each lake. All represented agencies are signatory to the JSP. The current Lake Committees and their role in cooperative fishery management are a product of the JSP, which itself is a product of its member agencies.[12] The GLFC is tasked with facilitating Lake Committee meetings (Appendix A). While the Lake Committee decisions are not binding (compared to harvest allocation decisions arrived at through the 2000 Great Lakes Consent Decree which determines harvest allocation between the state of Michigan and the five fishing Tribes in the 1836 Treaty waters) they are guided by Fish Community Objectives (hereafter FCOs) which represent a collective vision of a fish community that can support various levels of harvest. Many interjurisdictional planning and organizing decisions are made per lake using FCOs. Sea lamprey wounding data is one metric used to inform objectives for a healthy fish community.

FCOs are developed by each Lake Committee as a foundation for pursuing cooperative fisheries and fisheries-related consensus-based management.[13] Each Lake Committee has at least one technical committee, and under these are sub-committees and specific working groups (e.g., Lake Michigan salmonid working group). Technical committees are charged with collecting data, producing and interpreting science, and making recommendations to Lake Committees. When addressing issues of concern to the Great Lakes as a whole, Lake Committee members meet as the Council of Lake Committees.

The GLFC, separately from the Lake Committee structure, operates a Sea Lamprey Control Board, where decisions and discussions about sea lamprey control programs are held

[12] Lake Committees were first formed by the GLFC in 1965 to provide a place for information sharing among agencies. When the Joint Strategic Plan was signed in 1981, the Lake Committees became "action arms" for the agencies to achieve their objectives (GLFC, 2023).
[13] Fish Community Objectives do not directly translate to decisions, but do guide decisions at a strategic level.

by officials from federal, state, provincial, and interTribal fishery agencies.[14] It sponsors a Sea Lamprey International Symposium (SLIS) every twenty years (1979, 2000, 2019) to provide recommendations (Mattes & Kitson, 2021).

Since the 1950s the GLFC has coordinated a bilateral, multijurisdictional approach to sea lamprey control. It has been operating for over 70 years with demonstrated success in reducing sea lamprey population size by 90-95% from peak population (Hrodey et al. 2021; Brant, 2019; Gaden et al. 2021b). However, various methods used to suppress sea lamprey are under continued and increasing review, particularly among Tribes and First Nations in the Great Lakes region (Nonkes et al. 2023; Gaden et al. 2021b; Mattes & Kitson, 2021).

While the GLFC serves as a long-standing collaborative entity, Tribes and First Nations were excluded from deliberations for the 1954 Convention on Great Lakes Fisheries and early sea lamprey control decision-making (Nonkes et al. 2023; Gaden et al. 2021a).[15] Sea lamprey continue to spawn in tributaries and affect fish populations across the Laurentian basin, including in and across Indigenous territories where Indigenous Peoples/governments have increasing authority over their lands and waters. This research discusses the extent to which Indigenous fishery agencies are presently involved in sea lamprey and fisheries decision-making, including within the Lake Committees.

System-Wide Collaboration is Key

> *"Just as rivers cannot be separated into components (river-stream-wetland) and instead must be viewed as ki uta ki tai (from the mountains to the sea), the impacts of colonization cannot be decoupled from local and global environmental changes which*

[14] An interTribal agency (such as the Great Lakes Indian Fish and Wildlife Commission, or *GLIFWC*; the Chippewa Ottawa Resource Authority, or *CORA*; or the 1854 Treaty Authority) is a natural resource management organization that protects and implements the rights of Tribes under its mantle, including at the interface with colonial-based governments. These agencies were formed by the actions of their member Tribes. For example, the 1836 Tribes formed a joint-management authority in 1981 for the purposes of establishing uniform regulations, enforcement, and biological capacity. The individual Tribes vested management authority to the joint body (CORA).

[15] It should be noted that interTribal biologists (e.g., CORA fisheries professionals) started attending Lake Committee meetings in 1982 (the JSP was adopted in 1981). By 1983, CORA were regular attendees and participated in technical committee meetings and activities. The path to full membership was hastened by the implementation of the 1985 Consent Order (preceding the 2000 Consent Decree).

contribute to past, present, and future social-environmental injustices" – Māori Proverb

Indigenous and non-Indigenous communities working in support of healthy water resources are committed to safeguarding the Great Lakes. These commitments are building momentum to rethink the practice of co-management and decision-making. In the Great Lakes, fishery and sea lamprey management has largely been informed by non-Indigenous approaches to science, to the exclusion of Indigenous ways of knowing, being and doing (McGregor, 2023; Almack et al. 2023; Castañeda et al. 2020). This exclusion may be a potential source of ecosystem vulnerability to an ever-evolving matrix of environmental threats that pose new and unpredictable challenges to fisheries managers.

The issues facing the Great Lakes basin are highly contextualized and wide-reaching, necessitating an approach which centers diverse ways of knowing and collaboration. Academia, government agencies and society as a whole increasingly recognize the interconnectedness within and across the natural world (Whyte et al. 2017; Reeder-Myers, 2022; Berkes, 2009). As the legal landscapes of rights and title continue to evolve, so do the imperatives for federal, state and provincial governments to work together meaningfully with Tribes and First Nations in decisions that impact their rights. On a shared pathway of reconciliation, there is opportunity to better understand how to support Indigenous voice and wisdom in decision-making processes.

With the importance of reconciliation in mind, this thesis seeks to learn from the perspectives and experiences of individuals involved directly within fisheries decision-making on the Great Lakes. This research employs a case study of fisheries co-management in the Laurentian Great Lakes basin, drawing from interviews with fisheries professionals working for Indigenous fishery agencies.[16] In learning from the insights and reflections shared by Indigenous and non-Indigenous fisheries professionals, this research emphasizes the importance and indeed

[16] Throughout this thesis, the term "agencies" (both Indigenous and non-Indigenous) is inclusive of organizations, government agencies, and departments embedded within government bodies.

opportunity of effective and reconciliatory fisheries decision-making between and among all who are committed to safeguarding Great Lakes water resources.

Objectives

The objective of this thesis is to begin to learn how Indigenous voice and wisdom can be better supported in fisheries decision-making on the Great Lakes. This objective is made even more important given the commitment from both Indigenous and non-Indigenous groups to the health of fish and waters, as well as reconciliation. Specifically, we share the perspectives and experiences of twenty-three Indigenous and non-Indigenous fisheries professionals working for Indigenous fishery agencies on the Great Lakes. This group is involved in fisheries decision-making including at the interface between Indigenous and non-Indigenous governments. This thesis presents these learnings insofar as they are applicable to co-management and the health and well-being of Great Lakes fisheries. Their voices are important, discerning, and I am grateful for their time and commitment to supporting this research.

This thesis is composed of two research chapters undertaken with the guidance of co-authors (Chapters 2 and 3), and a general discussion describing emerging considerations and areas for further reflection and potential research (Chapter 4). The research chapters, though separate manuscripts, are complementary, and draw from the same methodology. In Chapter 2, we seek to understand the depth of involvement of Indigenous fishery agencies in fisheries decision-making on the Great Lakes as well as perspectives towards engagement and collaboration. In Chapter 3, our analysis focuses on the learning backgrounds of participants who work for Indigenous fishery agencies to identify useful learning opportunities by which to prepare individuals to be effective in such roles and contexts. We present findings that can be applicable for fisheries professionals working for or in collaboration with Indigenous fishery agencies.

In its totality, this thesis demonstrates that the equitable involvement of Indigenous voice and wisdom can move us further along and together on the shared pathway of

reconciliation. Tangibly, this translates as more effective decision-making and action taking in collaborative research and management. Although this research was specific to the Great Lakes it has wider implications for other collaborative freshwater management contexts within which Indigenous Peoples are impacted and can inform positive outcomes. This research contributes to and is guided by the larger collaborative project, *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great Lakes.* It is supported by the Great Lakes Fishery Commission.

Research Questions

The research presented in Chapter 2 was guided by two main research questions:

1) What is the extent of involvement of Indigenous fishery agencies in fisheries and sea lamprey decision-making on the Great Lakes?
2) What are the perspectives of and lived experiences within collaborative work between Indigenous and non-Indigenous groups working in support of healthy fisheries?

The research presented in Chapter 3 was guided by two main research questions:

1) What is the extent of preparedness to work in roles that involve representing Indigenous interests and perspectives in fisheries decision-making?
2) What are useful learning opportunities that can help prepare fisheries professionals to work for or in collaboration with Indigenous fishery agencies?

Chapter 2: Perspectives and experiences of fisheries professionals working for Indigenous fishery agencies on fisheries and sea lamprey decision-making on the Laurentian Great Lakes

Abstract

There is growing interest and movement in scholarship, and among legal, policy and advocacy communities to involve Indigenous voice and wisdom more prominently in natural resource management. Such momentum is contributing to efforts to reconcile and work meaningfully together with Indigenous groups in fisheries decision-making on the Laurentian Great Lakes. Co-management suggests an opportunity to advance Indigenous agency and improve multijurisdictional management outcomes. The extent to which co-management achieves these objectives is a growing debate. There is relatively little research that examines the practical realities of how Indigenous and non-Indigenous groups make and implement decisions together. This chapter draws on interviews with Indigenous and non-Indigenous fisheries professionals working for Indigenous fishery agencies to learn about their perspectives and experiences in fisheries decision-making on the Great Lakes. This chapter reveals that while some positive steps have been taken to include Indigenous voice and wisdom in management processes, more progress is needed. We find that co-management can be impeded by individual to institutional to system level challenges, including differing perspectives towards approaches to decision-making, relationships founded from inauthentic intentions, and a system within which power is not equitably balanced. We conclude by offering seven reflections that could be considered in next steps towards reconciliatory and effective fisheries management: 1) Collaboration from the very start; 2) More and consistent communication; 3) Collaborative interactions should also take place on Indigenous lands; 4) Relationships and decisions need to be mutually beneficial; 5) Appropriate financial resourcing; 6) Space and appreciation for Indigenous-led research and knowledges; and 7) Each Tribe and First Nation requires equitable involvement in intergovernmental decision-making.

Introduction

There is growing interest and movement in scholarship, and among legal, policy and advocacy communities, to involve if not embrace Indigenous voice and wisdom more prominently in collaborative decision-making (Wheeler & Root-Bernstein, 2020). Discussions of Indigenous rights are prevalent in both Canada and the United States, particularly with regard to the management of lands and waters. At the international level, the United Nations Declaration on the Rights of Indigenous Peoples (hereafter UNDRIP) provides for a right of self-determination which includes the free pursuit of economic, social, and cultural development, and for a right for Indigenous Peoples to make and exercise decisions about their lands and waters (Lalancette & Mulrennan, 2022; UNDRIP, Article 18). UNDRIP was ratified into Canadian legislation in 2021. It is gaining momentum to extend beyond duty to consult obligations (as outlined in section 35 of the Constitution Act, 1982) to obtain the consent of Indigenous Peoples for activities that affect their rights. In the United States, UNDRIP serves as a guiding framework. While not legally binding it carries nonetheless moral and political force to improve relations with Indigenous Peoples.[17] Indigenous rights in the U.S. are more often recognized through court rulings that (re)affirm Tribal Treaty rights, including the right to participate in decision-making processes.

Academia, government agencies and society as a whole increasingly recognize the interconnectedness within and across the natural world (Whyte et al. 2017; Reeder-Myers, 2022; Berkes, 2009). Recent scholarship suggests that together Indigenous and Western knowledge systems can facilitate a fuller understanding and appreciation of the natural world, thus improving conservation outcomes (Bardwell & Woller-Skar, 2023). While there is a great diversity among Indigenous Peoples there are also some commonalities in Indigenous worldviews which can serve as foundation for making informed management decisions.

[17] As noted in the 'Announcement of U.S. Support for the United Nations Declaration on the Rights of Indigenous Peoples' the United States recognizes the significance of UNDRIP with regard to free, prior and informed consent. Several U.S. Tribes have passed resolutions endorsing UNDRIP into their own laws. For example, the Muscogee Creek Nation (a confederacy of many Tribes), the Seminole Nation, the Cherokee Nation, the Navajo Nations Human Rights Commission, and the National Congress of Native American Indians have implemented UNDRIP into their own legal processes and call upon the U.S. federal government to follow suit.

Indigenous wisdom is inherently connected to the land, centered on human-nature connections, and held by Indigenous Peoples (Berkes, 2012; Ban et al. 2018; Wheeler & Root-Bernstein, 2020). Thus, Indigenous ways of knowing cannot be extracted out of context and can only be drawn upon appropriately when done in good relations with the land and all living beings.

The Laurentian Great Lakes encompass a vast ecosystem spanning Canada, the United States, and more than 185 Indigenous communities, where fishing (commercial, subsistence, and recreational) is a valued means of livelihood and culture (Serville-Tertullien, 2022; Lukawiecki et al. 2021). Indeed, Indigenous Peoples have lived in balance within the Great Lakes ecosystem for thousands of years, long predating settler-colonial commitments to the health of its fish and waters.

The health of fish communities are continuously threatened by factors including habitat loss, fragmentation, and invasive species, a particularly significant one being the invasive sea lamprey *Petromyzon marinus*.[18] Sea lamprey proliferated in the Great Lakes through the construction of shipping canals in the 19th and 20th centuries (see Gaden et al. 2012b), providing impetus and critical requirement for a coordinated response to address impacted fish populations (Brant, 2019).[19]

The bilateral Great Lakes Fishery Commission (GLFC) was established in 1955 by the governments of Canada and the United States and is a focal point for Great Lakes fisheries management. The GLFC is tasked with suppressing sea lamprey, conducting and coordinating research, and maintaining working relationships. With respect to fishery management the GLFC facilitates cooperative perspectives of the five Lake Committees, each of which is composed of a senior level representative from each agency with specific fishery management authority on each lake. All represented agencies are signatory to *A Joint Strategic Plan for Management of Great Lakes Fisheries* (hereafter the JSP). The current Lake Committees and their role in cooperative fishery management are a product of the JSP, which itself is a product

[19] While sea lamprey *Petromyzon marinus* are indeed significant – compelling the governments of Canada and the United States to address fishery collapses in the Upper Great Lakes – dreissenid mussels also pose serious threats to the Great Lakes ecosystem (Karatayev et al. 2022; Ratliff & Cox, 2019; Hecky et al. 2004; Madenjian et al. 2010).

of its member agencies. The JSP is the agreement under which fishery management agencies on the Great Lakes cooperate for day-to-day and long-term strategic management of the fishery.[20]

The GLFC is a long-standing collaborative entity, contributing to a broad ecosystem of multijurisdictional Great Lakes decision-making (the mandates, roles and responsibilities for which often overlap). Tribes and First Nations, however, were not invited to participate in early fisheries and sea lamprey decisions despite these decisions being implemented within and directly affecting the lands and waters cared for by Indigenous Peoples since time immemorial (Nonkes et al. 2023; Mattes & Kitson, 2021).

The inclusion of Indigenous interests and rights in fisheries decision-making was the success of Indigenous activism in the 1970s, 80s and 90s which placed public pressure on non-Indigenous governments to reassess their interactions with Indigenous Peoples in Canada and the United States.[21] As a result, the first instances of collaborative management between Indigenous and non-Indigenous government agencies emerged (Pinkerton, 2003).[22] Whereas some Tribes in the United States were placed into co-management arrangements (often through the auspices of interTribal agencies) (Mattes & Kitson, 2021), First Nation fisheries in Canada continue to be managed by federal and provincial governments given there is consultation and no infringement on First Nation fishing rights (Gaden et al. 2012; Harris & Millerd, 2010).[23]

The collaborative framework for managing fisheries may be defined as an arrangement between and among actors who share responsibility for the management of a fishery (Pinkerton, 2019). "Co-management," by its very definition, suggests shared decision-making; a distribution of power between those with more and those with less. While co-management does

[20] Each of the eight Great Lakes states, the Province of Ontario, Tribes with management authority, and United States and Canadian federal agencies are signatory to *A Joint Strategic Plan for Management of Great Lakes Fisheries* (JSP). The GLFC facilitates the JSP's implementation by identifying the Lake Committees as the major action arms for the agencies to achieve their objectives.

[21] Such as the Boldt, Fox, and Voigt Decisions (United States) and R. v. Sparrow, 1990 (Canada). *Please see background text immediately following the introduction.*

[22] The first use of the term "co-management" originated from court decisions providing U.S. Treaty fishing Tribes with the right to "concurrent management", which has since evolved to mean "cooperative" or "collaborative" management (Pinkerton, 2003; Diver, 2016).

[23] Specifically, in the Great Lakes region settler government authority is delegated through the Federal Fisheries Act to the Province of Ontario (the Ministry of Northern Development, Mines, Natural Resources and Forestry) (Lowitt et al. 2023). The Ministry focuses on Western sciences as a basis for decision-making (Gaden et al. 2012).

not necessarily remove differing interests or perspectives it is premised on sharing knowledge and increasing the participation of relevant actors. The degree to which power shifts between participants, however, can be influenced by the colonial structures that inform interactions even today. Thus the definition and practice of co-management presents a picture of a continuum within which are found participants with varying levels of influence and agency.[24]

Over the past several decades scholars have suggested that collaborative management is an important step for advancing Indigenous self-determination and improving multijurisdictional management outcomes (reviewed in Pinkerton, 2019; Kendrick & Manseau, 2008; Pinkerton, 1989; Ohlson et al. 2008; Schmidt & Peterson, 2009; Zurba et al. 2012). The extent to which co-management achieves these objectives in practice is a growing debate (reviewed in Watson, 2013; Castro & Nielsen, 2001; Goetze, 2005; Stevenson; 2006; Pulley & Charles, 2022).

Indeed, collaborative initiatives between Indigenous and non-Indigenous groups are emerging in many regions and contexts around the world, including in the Great Lakes (Almack et al. 2023; Nonkes et al 2023; Red Cliff Band of Lake Superior Chippewa, 2022; Parsons et al. 2021; Cadman et al; 2022; Diver; 2016). However, there is relatively little research that examines the practical realities of how Indigenous and non-Indigenous groups working in support of healthy fish and waters make and implement decisions together, including in the Great Lakes and the management of sea lamprey. As the legal landscapes of rights and title continue to evolve, so too does momentum to reconcile and reassess such decision-making processes.

Through interviews with Indigenous and non-Indigenous fisheries professionals working for Indigenous fishery agencies situated around the Laurentian Great Lakes, this study seeks to understand: (i) the extent of involvement of Indigenous fishery agencies in sea lamprey and fisheries decision-making on the Great Lakes; and (ii) the perspectives of and experiences within collaborative work between Indigenous and non-Indigenous groups working support of

[24] Co-management is fundamentally about a continuum of shared or joint decision-making that may span from enforceable authority over a particular region or subject area to less formally binding but nonetheless influential roles.

healthy Great Lakes fisheries. Qualitative methods enabled us to learn about the challenges of co-management but also the opportunities towards more effective engagement and collaboration.

A Brief History of Indigenous Activism in the Great Lakes

In the 1960s the State of Michigan limited entry into the Great Lakes commercial fishery to prioritize recreational fishing. This prompted Tribal fishers to challenge the state's authority over Treaty-protected fishing practices.[25] In 1979, the U.S. District Court recognized Tribal right to commercial and subsistence fishing as reserved in the 1836 Treaty of Washington (*1979 U.S. v. Michigan*, or *the Fox Decision*). The Fox Decision found that Tribes maintained a right to commercially fish (as guaranteed in the 1836 Treaty of Washington). Two agreements were subsequently negotiated in 1985 and 2000 (i.e., the 2000 Consent Decree) which set allocations for harvest of fish. To facilitate co-management of the Great Lakes fishery, a Technical Fisheries Committee was formed with biologists from the Chippewa Ottawa Treaty Management Authority's member Tribes,[26] the Michigan Department of Natural Resources (DNR), and the United States Fish and Wildlife Service (USFWS) (see Spangler, 1997; Ferguson, 1999; Holtgren & Auer, 2022).

Predating the Fox Decision, the Boldt Decision (*United States v. Washington, 1974*) is often credited as the first example of fisheries co-management in the U.S. (Pinkerton, 1992). It granted Tribes the authority to manage their fishery under certain conservation principles and provided legal authority for Tribal participation in cooperative decision-making. In 1983, the Voigt Decision (*Lac Courte Oreilles Band of Chippewa Indians v. Lester. P. Voigt et al., 1983*) affirmed that the 1854 Treaty did not end Ojibwe rights to hunt and fish on their ceded territory. This decision ensured Tribes' reserved Treaty rights to fish, hunt and gather anywhere on ceded

[25] In 1976, Michigan's Supreme Court determined that the Tribes did indeed reserve fishing rights in the 1836 Treaty-ceded waters, and that the State of Michigan has limited authority to regulate those rights. With regard to the state's authority to regulate off-reservation fishing rights, the state's regulation is only valid if: i) it is deemed necessary for the preservation of the fish protected by the regulation; ii) the application of the regulation to the Tribal members holding the off-reservation fishing right is necessary for the preservation of the fish protected; and iii) the regulation does not discriminate against the Treaty Tribal members. Ultimately, the federal 6th Circuit Cout of Appeals agreed with both the Michigan Supreme Court's decision, as well as the U.S. District Court's decision in 1979 (*i.e.,* Fox Decision).

[26] The Chippewa Ottawa Treaty Management Authority became and is currently known as the Chippewa Ottawa Resource Authority (CORA).

lands and waters (Busiahn, 1989; Holtgren, 2014; Spangler, 1997). It provided the Tribes an active part in fishery management, where the state and the Tribes would collaborate on setting management objectives and conduct joint and independent biological assessments (Oberly, 2014).

In Canada, Ronald Sparrow – a Musqueam citizen from regions within what is currently called Vancouver – was arrested for fishing with a net longer than was permitted by federally introduced regulations. The Musqueam Peoples perceived the arrest as a threat to collective Indigenous rights and defended to the charge against Sparrow (Salomons & Hanson, 2009). The Supreme Court of Canada ruled that Sparrow had an "existing" right at the time of his arrest. It also ruled that the words "recognized" and "affirmed," as they appear in Section 35, meant that the government could not override or infringe upon these rights without justification (McNeil, 2021).

R. v. Sparrow (1990) was the first Supreme Court of Canada case to test section 35 of the Constitution Act, 1982. The decision has significantly influenced the jurisprudence concerning Indigenous Treaty rights and land claims under section 35, providing important precedent setting for Indigenous rights. It should be noted that the Court's determination that Indigenous rights are not absolute and can be infringed upon providing the government can legally justify it established the limitations of section 35 protections that continue to underly all First Nation rights claims (see Salomons & Hanson, 2009 and McNeil, 2021).

Methods

This study integrates social science, ecological literature, and mixed-methods research for the purpose of understanding perspectives and experiences on fisheries management in the Great Lakes. Semi-structured interviews gathered perspectives and experiences from fisheries professionals working for Indigenous fishery agencies to learn what is needed to effectively work together in the shared responsibility to safeguard Great Lakes fisheries.

Research philosophy

The research philosophy adopted for this study was based on a constructivism research approach, described by Honebein (1996) as an approach which asserts that people construct their own understanding and knowledge of the world through lived experiences and reflections on those experiences. It is a framework that recognizes the subjective nature of individuals' interpretations and aims to uncover the diverse meanings that they attribute, acknowledging the social, cultural, and historical factors that shape perspective and understandings (Mackenzie & Knipe, 2006). The constructivist approach employed in this research is an exploratory methodology that uses inductive methods to generate hypotheses. In this way, my background and experiences as a person of European descent in academia, and as an early-career fisheries professional with work experiences in federal, provincial and Indigenous governments, influence how the data was interpreted.

Study area

This research was conducted in the Great Lakes region of North America, an expanse of freshwater supporting people, place and widely valued water resources. The governance and legal system surrounding the Great Lakes is complex. It incorporates two countries, eight states, two provinces, Indigenous Rightsholders, American and Canadian transboundary agencies, and many local governments. These lakes (and the life within) do not recognize jurisdictional borders. Similarly, the concerns facing the health of these waters are diverse and often overlapping (albeit at times they can be at odds). The governance systems involved in the Great Lakes must address these concerns and also the multifaceted issues regarding ownership, access, and commodity use.

Sampling strategy & participant recruitment

We used a non-probability sampling method to identify participants who worked for Indigenous fishery agencies and who had specific knowledge and experience related to fisheries decision-making in the Laurentian Great Lakes basin. Participants were initially identified by the *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great*

Lakes research team via their relevant networks, followed by a snowball sampling strategy to recruit other participants who work for Indigenous fishery agencies around the Great Lakes. In the interviews, we asked about participant background information including type of agency (i.e., interTribal or Tribal/First Nation government), connection to the agency, location (i.e., situated in the U.S. or Canada), length of time in their role, and other relevant details.

Potential participants were emailed a letter of invitation by Postma which explained the study, what their participation would entail, ethics and consent information, and how this research contributes to and is guided by the larger collaboration: *Understanding Indigenous perspectives on sea lamprey control in the Laurentian Great Lakes.* Out of a total of 49 emails sent to potential participants, 23 individuals confirmed their availability for an interview. Prior to the interviews, consent forms were emailed to participants. Consent was obtained written or verbally, including consent to audio recording. Following the interview, participants were given the option to receive a $200CAD honorarium in gratitude for their time and participation in this research.

Data collection

Research procedures were approved by the Carleton University Research Ethics Board-B (CUREB-B). CUREB-B is constituted and operates in compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) (Protocol # 117457). Participants were assigned code numbers to maintain confidentiality in transcription, analysis and reported results. The average interview length was approximately 2 hours. The interview guide employed in our interviews was developed between December 2021 and May 2022 and went through several iterations of collaborative revision with the larger *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great Lakes* research team.

Semi-structured interviews were conducted by Postma in-person, by phone, or through Zoom video conferencing between June and October 2022. The majority of interviews (19 of 24) were conducted through Zoom. Two took place in person. The semi-structured interviews involved asking a series of open-ended questions allowing for natural digressions initiated by

the participant and flow of conversation (Wengraf, 2001). Topics ranged from participant position to experiences in sea lamprey and fisheries decision-making to reflections on engagement and collaboration (see Appendix B for full interview guide). The purpose of the interviews was to gain an understanding of participant perspectives on fisheries decision-making to learn about the depth of their involvement and the challenges and opportunities of co-management. The interviews were audio-recorded using Zoom internal recording software. Open Broadcaster Software was used in the case of phone interviews and as a back-up recorder for Zoom interviews. After the interview, the recording with the best audio quality was kept and all others were deleted. The audio was then entered into Trint transcribing software which generated a transcript. The transcripts were manually reviewed and corrected by Postma.

Once transcripts were complete, a summary of key points of the interview was developed and both the summary and transcript were sent back to participants to, if of interest, review, verify, and expand on the enclosed content. We welcomed response and conversation throughout all stages of analysis. This process is reflective of collaborative analysis, which is an Indigenous methodological approach that invites continuous feedback from participants, and allows for transparency and authenticity (Wilson, 2008). Some participants verified and provided suggestions/revisions on their transcript. These edits were incorporated into the final transcript. If a participant provided any adjustment to their transcript after analysis was complete, Postma incorporated these edits.

Analysis methods and techniques

Transcripts and reports were manually analyzed using a thematic analysis approach (Attride-Stirling, 2001), specifically a codebook method with a general inductive approach as described in Thomas (2006). Interview transcripts were first analyzed by re-reading and summarizing the data (Braun & Clarke, 2006). Initial codes were generated and then applied to the transcripts in NVivo 12.0 qualitative data analysis software. New codes were generated throughout the first coding analysis which established several categories and sub-categories (e.g., engagement and/or relationships would not exist outside of a specific pressure or requirement). A final

codebook was developed from all codes that were generated through the coding analysis, and then applied to all transcripts. Related codes were grouped into broader categories (e.g., inauthenticity of engagement and collaboration) that were then organized according to high-level organizing themes (e.g., challenges affecting co-management). Themes were reviewed and contributing data/text excerpts were re-read to ensure participant responses were appropriately represented and presented in the original context in which the information was provided.

Results & Discussion

In total, we interviewed 23 participants. Here, we present what participants shared with us including participant demographic information, perspectives and experiences of involvement in sea lamprey and fisheries decision-making in the Great Lakes watershed, and challenges in and opportunities towards building meaningful relationships between Indigenous and non-Indigenous fishery agencies.

1. Participant Demographics

Participants represented Indigenous fishery agencies from all five Great Lakes,[27] as well water bodies within the Great Lakes watershed. Fifteen of the 23 interviews were with individuals representing twelve Nation or Tribal fishery agencies, and eight individuals representing four interTribal (or similar) organizations. Six Tribes and three interTribal agencies were based in the United States, while six First Nations and one Canadian Indigenous fishery agency[28] representing multiple First Nations (Table 2-1).

Table 2-1. Affiliations of interview participants.

Affiliation	Abbr.	N
Indigenous interTribal fishery agency (U.S.)	INTTR	7
Indigenous conglomerate fishery agency (CAN)	INTFN	1

[27] These are Lake Superior, Lake Ontario, Lake Michigan, Lake Erie and Lake Huron.
[28] Not termed *interTribal* because Indigenous communities in Canada are First Nations, whereas in the U.S. Indigenous communities are Tribes.

Tribal government (U.S.)	TRG	9
First Nation (CAN)	FN	6

Eight participants identified as Indigenous,[29] of whom three were women (of 4 women total). Participants ranged in length of time in their role from approximately 1 year, to over 40 years. The average length of time spent in these roles (at the time of interviews) was 12.3 years. Eight participants had previous experiences working for other Indigenous fishery agencies prior to their current role, and almost all (N=22) participants described a learning background that includes Western training (further described in Chapter 3).

Participants explained that they received their direction of work from the Indigenous communities that they served. Their scopes of work included responsibilities to care for the Great Lakes and to represent Indigenous interests and rights including at the interface between Indigenous and non-Indigenous governments/government agencies. We noted that work responsibilities were described as interconnected. Participants also reported complex challenges in ensuring co-managers uphold Indigenous rights and prioritize conservation. One participant explained,

> *"How do we continue to provide resources, or relatives, for the Tribes to harvest moving forward, as these ecosystems face multiple stressors? Everything from climate change to invasive species to changes in land-use practices … And then how do we engage our co-managers to take actions that will ensure those resources are available for the future? There aren't good answers to those questions" (FP02, INTTR)*

Overall, this study interviewed individuals working for Tribal and First Nations governments, as well as interTribal agencies. The majority of participants were based in the United States. Participants had varying lengths of experiences in their roles (ranging from 1.5 to 40+ years).

[29] Wong et al. (2020) describe the underrepresentation of Indigenous Peoples in natural science fields. In Canada, only 0.9% of the Indigenous population hold a bachelor's STEM (science, technology, engineering, and mathematics and computer science) degree; 0.2% hold a graduate STEM degree.

2. *Involvement in Sea Lamprey and Fisheries Decision-Making on the Great Lakes*

Decision-making on the Great Lakes is facilitated through a broad ecosystem of governance and management processes involving diverse actors and jurisdictions. As one participant explained,

> *"The Great Lakes fisheries is a really big tent … Lot of governments on the Great Lakes, you know, crammed into one spot. We're all in this together, we all care about fish. Of course, invasives, once they get in one lake, they're in all of them. So we've got to be able to work together" (FP23, INTTR)*

In this section, we focus on how participants described their involvement in sea lamprey and fisheries decision-making. Throughout the interviews participants expressed perspectives and communication styles learned in part from their experiences with Indigenous communities, while also using Western terminologies. They rarely used terms such as "managers" and "management". Instead, they used the words "caretakers" and "stewardship", as well as "relationship with the ecosystem", to describe their involvement. We as co-authors realize the use and meaning of the term "management" fits an inherently Western paradigm that may be incongruous with an Indigenous worldview. For the purpose of maintaining consistency throughout this thesis, we employ the term "management" to encompass terms related to decision-making processes.

Participants spoke of involvement with the Great Lakes Fishery Commission insofar as sea lamprey control and participation within the Lake Committee structure is concerned. They also described their involvement in state/provincial co-management arrangements (such as the 2000 Consent Decree, the Fisheries Technical Committee under the Minnesota 1837 Ceded Fisheries Case, the Lake Superior Fishing Agreement, the Lake Superior Fisheries Management Plan and joint-management fisheries agreements between First Nations and the Province of Ontario). It is important to highlight that within Indigenous fishery agencies there can be different experiences and perspectives which are influenced by affiliation and location,

and the various legal and institutional systems in place. Some responses differed between fisheries professionals who work for inter-agencies (e.g., interTribal agencies) and Tribal (U.S.) or First Nation (CAN) governments. We draw some attention to these differences but interpretations are beyond the scope of this study.

Involvement with the GLFC and its partners

InterTribal (U.S.) participants described involvement in technical and formal decision-making spaces on the Lake Committee structure.[30] For example, interTribal agencies are formal signatories to *A Joint Strategic Plan for Management of Great Lakes Fisheries* and participate fully in all Lake Committee activities, often taking leadership roles. Although interTribal agencies are more (and) formally involved in the Lake Committee structure, participants explained that this arrangement does not fully represent Tribal interests. For example, some Tribes have on-reservation components to their fisheries, as well as off-reservation. Some interTribal agencies are only delegated to assist with off-reservation work unless specifically requested to work on-reservation. Tribal participants described their involvement in technical and sub-committee levels as *"very active"* (FP15, INTTR) although decision-making was limited to providing recommendations. Participants explained that while interTribal representation can include some of the interests and waters under Tribal jurisdiction, and do indeed serve a useful purpose, interTribal authority does not extend to the full responsibilities of Tribal governments. One participant shared,

> *"So far we have technical committee representation. Individual Tribes are not afforded the Lake Committee representation, yet. Hopefully that changes in the future. There is one representative at that level, but they represent all of CORA and not the individual Tribes. And that's, well, that's problematic. That's kind of like saying, well, you know, we get that there's two Nations, the US and Canada, but we're just gonna have one*

[30] *A Joint Strategic Plan for Management of Great Lakes Fisheries* (the JSP), implemented by the governments of Canada and the United States, tasks the GLFC with facilitating working arrangements amongst jurisdictions on the Great Lakes. Lake Committees are the primary working arrangements/bodies under which the JSP operates.

representative, 'cause it's North America, you know. Or like, yeah, there's five states on Lake Michigan, but like, you really only need one representative to represent all those states' interests. Like no one would ever buy into that. We have five unique governments, sometimes with aligning interests, oftentimes not, and one representative to reflect that" (FP18, TRG)

First Nation representatives did not describe any level of involvement on the Lake Committees.[31] Unlike Tribes in the U.S., First Nations in Canada do not have the same court affirmed management authority to influence decisions concerning fisheries management in the Great Lakes (including collaborative management facilitated by the GLFC). When describing involvement and experiences with the GLFC, First Nation representatives mostly referenced engagement outside of the Lake Committee structure (i.e., direct engagement between the GLFC and/or its partners and the First Nation's fishery agency). One participant shared their perspective,

"The [Province of Ontario] has taken the position that they represent First Nations interests at the GLFC … [We] have no relationship, aside from a one-off agreement [for a project in our waters] … In the past, [we] and other First Nations, you know, were actively excluded from participating in anything to do with the GLFC. I know years ago, [we] sent delegates to try to attend a technical committee meeting, and they were escorted out" (FP22, FNG)

In these interactions, First Nations were engaged (in some cases as a collaborative partner and in some cases to fulfill duty to consult obligations) but were not involved in decision-making spaces outside of waters under their jurisdiction. One participant noted that a member of the community they work for now after a long period of advocacy sits as an advisory member to

[31] Currently, no Canadian inter-agencies or First Nations are signatory to the JSP (or thus formally involved in Lake Committees or the Council of Lake Committees; GLFC, 2023). We note there may be some level of First Nation representation on technical or subcommittee levels. However, First Nation representatives in this study did not describe any involvement during the interviews.

the GLFC.[32] A participant who worked for a Canadian fishery inter-agency (*i.e.,* an agency which represents multiple First Nations) explained how their organization was engaged to help carry out a telemetry (animal tracking) project in Indigenous waters,

> *"So, our [First Nation] project probably has the most people involved. It's basically a telemetry project that's working with the DNR in the states, and I believe the MNR and DFO are involved. And basically, [we] were brought in to work with [the First Nation] because the MNR and DFO didn't have access to it" (FP05, INTFN)*

Involvement in sea lamprey control

We noted various interpretations of what participants considered *involvement* in the context of sea lamprey control (see Appendix C for a summary of Indigenous involvement in sea lamprey control on the Great Lakes). Nearly all (N=22) participants told us they were not involved in decision-making (past or current) about sea lamprey control methods or direction of the program (such as focusing research on control methods alternative to lampricides).[33] One interTribal representative described informal involvement on the Sea Lamprey Research Board and the Sea Lamprey Control Board. InterTribal representatives who sit on the Lake Committees referenced helping to set Fish Community Objectives (FCOs). FCOs represent a collective vision of a fish community that can support various levels of harvest and are influenced by the presence/absence of sea lamprey wounds on fish populations. Other participants (N=11), interTribal and Tribal representatives, were involved in field projects (e.g., monitoring traps), as well as through collecting sea lamprey wounding data from commercial fishers. One participant explained,

> *"So the fish we catch we will assess for sea lamprey wounds, and then that lamprey wounding data gets submitted to the Great Lakes wounding database every year. And*

[32] In the U.S., advisory members are appointed from each lake from a list provided by the Great Lakes governors. There are 39 U.S. members and "consideration is given to interests of state agencies, the commercial fishing industry, sport fishermen, and the public-at-large" (GLFC, 2023, web.). In Canada, members are appointed by the GLFC and "assist the commissioners in making informed decisions in support of Commissions objectives".

[33] TFM (3-trifluoromethyl-4'-nitrophenol) and Bayluscide (2',5-dichloro-4'-nitrosalicylanilide) are lampricides. Lampricides are chemicals designed to target and eradicate larval-stage sea lamprey and are applied at regular intervals to areas where larval populations are found (GLFC, 2023)

the Fish and Wildlife Service uses that information from the wounding database to inform basin-wide wounding rates" (FP12, TRG)

Participants (across all affiliations) noted that the communities they served were involved in making decisions about sea lamprey control when it comes to implementing these programs on their lands and waters. They described processes of *"[permitting] US Fish and Wildlife to do lamprey surveys on the tributaries on our reservation"* (FP12, TRG). One participant provided an illustrative example,

> (Interviewer: Have you been contacted by the GLFC or its partners to engage or collaborate in sea lamprey control of any kind?) *"No, we haven't had too much [regarding] sea lamprey control, except for when [our partner Tribe] did not want the rivers treated, because, I mean, they were basically told, 'Hey, we're coming in to do this'. And they were like, 'No, you're not, you have done nothing' … So, that's when they reached out [to us] to talk to [our partner Tribe], but it was in this like, panic mode of, 'Hey, go tell them they need to do this, and here's why'. It was not in any way like, 'Hey, wait a minute, why did they say no?' [Because the answer would be] 'Well, we went in and told them what we're going to do with the water'. And I mean, it's not even like us Tribes are looking for a, 'Come in and teach me', you know, it's 'Hey. Listen to what we're saying'" (FP04, TRG)*

First Nation representatives referenced agreements put in place and one-time partnerships to facilitate control programs and projects. One participant explained that progress to engage with First Nations in Canada may be impeded by a lack of clarity as to who the GLFC should contact, in part because the Province of Ontario retains legal authority over First Nation fisheries. Other participants perceived their role in sea lamprey decision-making to involve giving advice to the community (communities) they serve, and to help coordinate seminars about sea lamprey and control efforts. A minority of participants (N=3) noted that they were not directly involved in sea lamprey control efforts or decision-making because sea lamprey are not yet prevalent in

their areas. However, these participants expressed interest in becoming involved because "*all waters in the [Great Lakes] basin are connected"* (FP14, TRG) and "*because if anything, [Tribes] want to have a united front … they want to be at the table to support [the Tribes that are involved]*" (FP06, INTTR). The threat of sea lamprey invasions are wide reaching and imminent (Gaden et al. 2021b; Hume et al. 2021). Two participants spoke about previous involvement in supporting in-field projects, but *"it got to the point where we just didn't have the capacity to do it anymore"* (FP04, TRG). Participants across the U.S. and Canada made reference to the GLFC and its partners' efforts to keep Tribes, First Nations, and their respective fishery agencies, informed about sea lamprey. One Tribal representative shared,

> *"USFW, you know, they carry [sea lamprey control] out on our side of the lakes. They are very good – one of their biologists does an amazing job of keeping Tribes informed … I think the Commission and the Wildlife Service do a good job of talking about their upcoming plans for lamprey control with Tribal biologists" (FP15, TRG)*

However, being "kept informed" (e.g., through consultation requirements) does not equate to consent or participation in decision-making. It may perpetuate a reality whereby communication is left up to the individual or the institution as to what information is disseminated. When asked, 'What are your thoughts on the efficacy of the GLFC's sea lamprey control program?', participants by and large shared the following three perspectives,

> *"I do think they're successful. Albeit I feel like it's a very archaic sort of methodology. I know that there's some other ways of doing this that, you know, might not be totally approved by other public sectors and ethics … It's necessary, but my concern is the impact on the native lampreys, like the silvers and brooks, and the ones that are a little bit more rare who are affected by lampricide as well" (FP09, FNG)*

> *"Hard to say, because we're just not involved in the conversation. I would say, my perspective from the outside, is that they've been largely successful" (FP12, TRG)*

"The history of the Great Lakes is *invasive species. Sea lamprey is a problem. It's still a problem, despite all the control we have. Imagine what it would look like without control. How would anything have survived in the lakes? I always say at committees that without sea lamprey control, we would not be here. We wouldn't be meeting in this room, we'd be working in Subway" (FP23, INTTR)*

Involvement in other co-management arrangements

Without prompt, participants brought up involvement in other co-management arrangements, referencing involvement and interactions with many of the same actors across various co-management structures (e.g., state natural resource agencies are signatory to the Joint Strategic Plan and thus involved on Lake Committees, and are also directly involved in co-management arrangements with Tribal governments). Participants (interTribal and Tribal representatives) largely organized their descriptions of involvement into Treaty level co-management arrangements and the Lake Committees. We learned that Treaty-level collaboration involves more contentious management issues (such as allocation), whereas "*most of the biology on the Great Lakes that is shared among governments is under the JSP realm*" (FP23, INTTR).

Participants representing First Nation governments described their involvement with the Province of Ontario as "*joint-managers*" (FP09, FNG) and "*co-authorities*" (FP17, FMG) (e.g., fishing agreements between the Province and First Nations affirm co-management of the shared fishery). However these arrangements do not extend to lake- or system-wide collaborative decision-making.[34] Per consultative requirements, First Nations are approached by federal and provincial agencies to carry out projects and decisions proposed to take place in Indigenous territories (e.g., DFO carries out sea lamprey control in Canadian waters of the Great Lakes).[35]

[34] For example, the current iteration of the Great Lakes Water Quality Agreement (the primary agreement between Canada and the United States to protect, conserve and restore the Great Lakes), and the resultant Canada-Ontario Agreement, excludes First Nations as a party with jurisdictional authority.

[35] In accordance with the Convention on Great Lakes Fisheries between the United States and Canada, the GLFC mandates the U.S. Fish and Wildlife Service and Fisheries (USFW) and Fisheries and Oceans Canada (DFO) to carry out sea lamprey control throughout the Laurentian basin (Gaden et al. 2012).

Summary/Key Learnings

Overall, water governance and fisheries management on the Great Lakes involve multiple and overlapping actors and jurisdictions. Participants described involvement within the Lake Committee structure (noting that this is where most fisheries research takes place) and in other co-management arrangements with state, provincial and federal government agencies. Perspectives and experiences were influenced by affiliation and location and the various legal and institutional systems in place. InterTribal participants described involvement in both technical and decision-making spaces within the Lake Committee structure (e.g., participation in technical subcommittees and on the Lake Committees, representing an agency that is signatory to the JSP). Tribal and interTribal representatives noted that while interTribal agencies serve a useful purpose, they do not fully represent Tribal interests. First Nation representatives reported separate engagement and limited involvement with the GLFC and the Lake Committees, explaining that the Province of Ontario represents collective First Nation interests in lake-wide decision-making.

Almost all participants were not involved in decisions (past or current) about sea lamprey control methods. Participants noted that Tribes and First Nations were involved insofar as permitting the GLFC and its partners to access tributaries flowing through Indigenous territories. One interTribal representative described informal involvement on the Sea Lamprey Research Board and the Sea Lamprey Control Board. InterTribal representatives who sit on the Lake Committees referenced helping to set Fish Community Objectives (part of which represents a collective vision of a fish community that can support various levels of harvest and is influenced by the presence/absence of sea lamprey wounds on fish populations). Participants across affiliations described collaborative opportunities with the GLFC on certain projects (e.g., monitoring traps, working together to implement a sea lamprey barrier, or collaboration on acoustic telemetry projects). The GLFC's sea lamprey control program was largely perceived positively. However, participants did raise concerns about the lack of Indigenous involvement indecision-making, and the potential impact of some control methods on native species.

3. *Perspectives on Great Lakes Co-management*

Three participants referenced the efficacy of the Lake Committee structure, noting the benefits of a non-binding and consensus-based Joint Strategic Plan (e.g., *"the JSP does allow for new members, [recently], a new member was officially signed. It was the Red Cliff Band of Lake Superior Chippewa. They are now signatory to the JSP, and being on Lake Superior, they are an official member of the Lake Superior Committee. That meant all the other signatories to the JSP, including Ontario, had to agree to this new member. And in doing so, had to recognize that this new member had regulatory authority. They weren't just a group of people who wanted to go fish … even now, the Old Guard is letting the New Guard in"*) (FP23, INTTR). Participants described the GLFC as a research and facilitative body. They levied more critiques against federal, state, and provincial government agencies, acknowledging that the GLFC is less responsible for more contentious issues such as allocation.[36] Participants noted, however, that the GLFC *is* a product of a settler-colonial system, inseparable from broader discussions about fisheries science and decision-making. In general, participants spoke to positive relationships between individuals "on the ground". Two participants explained,

> *"We can work with the field staff very well. But when it comes to the actual provincial decision-makers, they are of the same concept that it's just [a First Nation], that they just want some fish, right? So we don't have to recognize what their rights are. And they have nobody qualified, they're just based on traditional knowledge … There are some good people within organizations. They will come right to the Council and ask for time on the agenda and stand before [them] and answer questions the best they can and take that information back and apply it the best they can. I guess that's where the rubber meets the road, because sometimes the best they can is not very good. And it's not their fault, it's the overall concept of the province" (FP20, FNG)*

[36] For example, the 2000 Consent Decree is an agreement that governs resource allocation, management, and regulation of state and Tribal fisheries in the 1836 Treaty waters of the Great Lakes. The 2000 Consent Decree involves five Tribes, the state of Michigan and the U.S. federal government.

"The field staff generally work [together] pretty well. We've worked on enough projects, collaboratively, that, you know, you've developed understanding or trust" (FP10, TRG)

We found widespread consensus among participants that some progress had been made to include Indigenous voice in fisheries decision-making (e.g., *"Just even in my eight-ish or so years, we have come from nowhere near equal to pretty damn near. In those specific rooms, right, [the technical committees within the Lake Committee structure]. Outside in the bigger world, not so much"*) (FP15, TRG). More progress is needed. Participants reported pervasive differences that can result in discordance between Indigenous and non-Indigenous fishery agencies and their respective scopes of work (such as work priorities and approaches to decision-making). Participants told us that, "*the dynamic in fisheries, where there's more than one user or interest group wanting the same fish, you're going to have politics*" (FP23, INTTR) and "*it's getting more contentious, there's less pie to fight over, and more forks are coming out*" (FP04, TRG). Participants explained,

"It seems like some of this dialogue about not just involving Tribes because they're Tribes, but actually listening to what they're saying, has been improving. [I was] talking with colleagues of mine that have worked in Tribal natural resources for a long time, and I feel like their perspective has been improving, too. So at least things are looking up, not down, but I feel like there's a long way to go" (FP12, INTTR)

"I think the Fish Community Objectives of the GLFC are so terribly out of date and don't include First Nation perspectives. I would say that things are improving, but it's a relationship. Is it a good one? I would say that it's a very loose relationship at this time. It would be a long ways to go to have a strong relationship" (FP22, FNG)

Participants spoke of progress as a result of the "new normal" of working in collaboration with Indigenous groups (e.g., "*There are people now that maybe weren't so reticent to recognize [this community's] rights to the resources … their attitudes have changed a fair bit over the*

years. And I think that's just from constantly talking about our rights and issues, and water quality issues, and all that other stuff that needs to be talked about when you're about fisheries") (FP20, FNG). We learned that individual attitudes and people in key positions play a role, noting current positive leadership within the GLFC. Relationships between states and Tribes are subject to change, shifting in positive and negative directions depending on political parties in power. Two participants shared illustrative examples,

> *"There's still a lot of individuals there that are entrenched in that same old way of thinking. But there's certainly some that are open to new ways. It seems like individuals like [the GLFC Science Director], and others, are open to a new way of doing things. It just will take time. We have been discussing with the Ministry of Natural Resources (the Province of Ontario) the idea that [our First Nation] needs to have a more active role. We now have a member from the community sitting as an advisor to the Great Lakes Fisheries Commission. So, there are signs that the GLFC is kind of shifting their perspective, but we have a long way to go yet in that relationship" (FP22, FNG)*

> *"I mean, a difference in a couple of key positions with [the DNR] can make a world of difference. And that's why I attribute pretty good years in the 1990s. I attribute that actually to one person, the fisheries chief … And we had quite a few disputes in the 15 years of that [Consent] Decree. We were in court a lot, and, despite that, the relationship with the DNR was quite good … There was never animosity. There were disagreements … It was transactional, rather than personal. I don't think it's that way, now" (FP23, INTTR)*

Summary/Key Learnings

Participants noted positives within current collaborative frameworks such as the non-binding nature of the JSP. Indeed, some progress has been made over the past several decades to include Indigenous voice in decision-making spaces. However, more progress is needed. Department/agency leaders were identified as drivers of change. Participants anticipate next

generations of fisheries professionals to be more prepared to work together with Indigenous groups and perspectives in decision-making (see Chapter 3).

Challenges

Our analysis identified three broad and interacting themes affecting collaboration in fisheries decision-making: i) *perspectives towards each other's decision-making approaches;* ii) *inauthenticity of engagement and collaboration;* and iii) *a slow to change and unbalanced system*. The following section breaks down each of the main themes and related sub-themes.

Perspective towards each other's decision-making approaches

> *"Everyone's driven to some extent by their own biases and their own emotional capacities or emotional understandings of themselves and others" (FP18, TRG)*

Scholarship has recognized the complexities of collaboration between Indigenous and non-Indigenous groups with regard to water governance and fisheries management (Holtgren & Auer, 2022; Holm et al. 2003; Busiahn, 1989; Jentoft, 2007). There are many reasons (reviewed in Jentoft et al. 2003; Jentoft 2007; Mattes & Kmiecik, 2006; Skogen, 2003; Hall & White 2008). A prominent perspective in the literature is that Indigenous patterns of water use and management are based on a different worldview, or cultural lens, than their colonial-based management counterparts (e.g., Holm et al. 2003; Natcher et al. 2005; Arsenault et al. 2018; Wilson & Inkster, 2018; Reo & Whyte, 2012).

Cajete (2000, p. 64) defines a worldview as "a set of assumptions and beliefs that form the basis of a people's comprehension of the world". Olthuis (1985, p. 29) defines a worldview as a "philosophy", a "framework or set of fundamental beliefs through which we view the world and our calling and future in it". Worldviews are defined by the connections between networks of concepts and systems of knowledge, values, norms and beliefs. Individual and collective (society as a whole) worldviews are shaped by history, environment, and culture, and provide a foundation from which to make decisions (Fisher, 2012).

Indigenous and non-Indigenous decision-making systems can be different, even contradictory, by nature (Natcher, 2005; Lerma, 2012; Mazzocchi, 2006). While Indigenous Peoples encompass diverse cultural contexts there can be a shared worldview within which relationships between and among humans and the natural world are centered (Michell, 2007; Michell et al. 2008; Battiste, 2000, 2002; Kawagley, 1995). Decision-making demonstrates holistic and whole-ecosystem values, considering seven-generation philosophies to care for all types of life (human and more-than-human) over past, present and future generations (Parsons et al. 2021; Muller et al. 2019). Management approaches based on Western worldviews make decisions based largely on objective and quantitative approaches to science,[37] removing the role and position of humans from nature (Patterson & Williams 1998; Lackey 2005; Mazzocchi, 2006).

Participants described responsibilities to work with and connect different approaches to science and decision-making (further described in Chapter 3). For example, *"…Ensuring that, say, Ooga, for example, are available for the next seven generations. That's something we get from the [Indigenous] task force. But how do you do that? And so, we take that directive, and try to figure out ways to address that directive and turn it into something actionable. For example, we've come up with a comparative walleye recruitment study where we have lakes where recruitment has been relatively stable over time, and then lakes where recruitment has declined over time. And then we look at the variables in those lakes, which variables are similar between those lakes, and which variables differ between those lakes? … If we see that development is an issue, maybe an option would be to put in conservation easements around that lake so that, you know, no further development can occur, or more land goes into the national forest system or into a county park or something like that, that's indefinite into the future*" (FP02, INTTR).

[37] Western approaches to science, or Western Knowledge Systems (WKS), aim to understand complex phenomena and processes by breaking them down into simpler forms (Patterson & Williams, 1998). The methodology employed is typically linear, following an approach wherein hypotheses are tested, verified or falsified to establish cause and effect relationships (Mazzocchi, 2006). In WKS, the observer is removed from the phenomenon being studied to produce an objective output. In other words, WKS separate emotions and human values from management decisions (Mazzochi, 2006, 2012; Weiss et al. 2013).

They also described a "*difference of philosophy*" (FP23, INTTR) that can contribute to different management approaches. One participant shared an example of how Indigenous and non-Indigenous ways of knowing can differ,

> *"But it's just interesting with, you know, the way the government places priority and importance on certain species at risk. Understandably so, because they are at risk of being endangered if certain steps aren't done to protect them. But that is a very different view from the government, for placing importance on things. It seems like rarity and low population numbers create importance. Whereas that's very, very much not the case for the Anishinabek worldview, where everything has importance … When it comes to collecting data, information about fish species, we don't want to do that just about the species at risk, but also the species around that particular species … we want to create a landscape of protections … landscape law protections are going to protect the species at risk that the government cares a lot about, but also the species that Anishinaabe People care the most about" (FP01, FNG)*

Participants explained that although people are willing to talk about their differences in worldview or philosophy, there remains a disconnect, or as Houde (2007) and Holtgren (2014, p. 29) describe, a "cultural distance" that results in "*people talking past each other*" (FP02, INTTR). In this context, cultural distance is perceived to stem from resistance between parties to shift their stance (where they differed) to accommodate the interests or perspectives of the other. One participant explained that "*in a lot of cases, [parties] expect the other party to see it from their perspective, and then change whatever the action might be that they're opposing. But they don't, a lot of times both parties don't see a change in the action"* (FP02, INTTR). Some participants described slow changes. For example,

> *"I would say [there are] some vast differences in perspectives between [the First Nation] and the values of what the GLFC stands for. And the value that's being placed within the GLFC on the recreational fishery. There are just some different values there*

that I would say aren't really reconciled. But I do think that we could find common ground on things that we both have equal interest in … We still have a long, long ways to go. The GLFC still has an awful long way to go. I would say there's still a lot of individuals there that are entrenched in that same old way of thinking. But there's certainly some that are open to new ways of doing things. It just will take time" (FP22, FNG)

Responses suggested that there were some differences in perspective over what types of knowledges were perceived as credible and necessary in decision-making, consistent with findings from other recent studies (e.g., Kadykalo et al. 2021). Several participants noted that management approaches which differed from a Western framework of understanding (such as those guided by observational data)[38] were not embraced or sought after in fisheries decision-making. Participants emphasized that modelling – the basis for many Great Lakes fisheries decisions – is indeed fallible, describing several examples when modelling outputs did not align with what was observed on the water and in real-time. We learned that removing human dimensions from decision-making contrasts with Indigenous approaches which realize the important role humans play. One participant explained,

"I was trained as a modeler, as a statistician. But I learned, from working here, that answers don't come out of a box. Does modeling tell you a safe level of harvest? I don't believe it does. I believe it can give you insight into that. But ultimately, humans have to make that decision. And that's been a pretty big point of conflict in recent years" (FP15, TRG).

Participants pointed out that while Western approaches are portrayed as "value free" (Holtgren, 2014, p. 28; Mazzochi, 2012; Weiss et al. 2013), they are primarily guided by and advantage the interests of Western constituents. For example, several participants noted concerns about

[38] Here, "observational data" means knowledge acquired through direct contact with the natural world over long-term lived experiences. This familial intimacy with nature enables the ability to detect often subtle changes by which to inform decisions and future interactions with the natural world (Chanza & Musakwa, 2022).

stocking priorities (of non-native fish) to support recreational fishing. This has resulted in very concrete community concerns about the impact to native and culturally significant species, as well as broader ecosystem perturbations over long periods of time. Another participant explained that "*if walleye, or Ooga, just disappear, then [the state] is okay with them becoming stocked systems. And that's not acceptable. We know that in lakes where there's natural reproduction, those lakes produce more fish than if they're stocked systems"* (FP02, TRG). Participants shared examples of Western (objective) approaches to decision-making, but in which certain human values carried significant influence,

> *"I could never understand why [the state DNRs] prioritized generating income, often over managing the resource … and of course, the state is in the camp of the sport fishery … I characterize it this way: the sport interests have puppeteered the DNR for so many years and in so many issues. When I hear [them] when it comes to these negotiations, or the previous negotiations, raise the flag of "science, science, science", I have to chuckle and say, yeah, science until your constituents walk into your office and say, "Hey, we don't like this or that" and all of a sudden then science goes out the window. Just like any other fishery management agency" (FP23, INTTR)*

> *"When alewife crashed [in the late 70s], walleye exploded. So, from a science perspective, we saw increasing catch rates. We said, 'Hey, X number of fish is increasing, this 15-lb bag limit doesn't make a lot of sense'. The [state] said, 'Well, yeah, but this is a resource issue', and that's because recreational fishers like walleye, and they don't like the idea of walleye being harvested commercially. The state thinks that walleye are a recreational species. Therefore, if you have a hook and line, and you're a state licensed fisher, you have full access to that species. But Tribes? No. That's commercial harvest. And so, it's a social issue to begin with … Honestly, those bag limits, there is zero science to support them. It was just what was politically acceptable to the state's constituent groups at the time. And that was it. And that's how*

a lot of things work. Now, if you ask the state, they're gonna say, 'No, no, no, our science backs this'. And they always say that, and they're just lying" (FP18, TRG)

Decisions made in response to certain human values (to the exclusion of others) disproportionately affect Indigenous Peoples. As one participant shared,

"[They] talk about regulating fish, and it's like, you're regulating people … You're not just regulating somebody's habits or hobbies. You're actually regulating this way of life" (FP04, TRG)

It has been suggested that greater learning and more encompassing decisions could be made when both Indigenous and Western worldviews are present (Vaughn & Caldwell 2015). Mazzochi (2006, p. 465) writes that "the real world is too complex to be compressed into static conceptualizations". Participants described growing interest from non-Indigenous groups to include more diverse ways of knowing, including Indigenous, in fisheries science and decision-making. This finding parallels broader recognition within fisheries and natural resource management about the shortcomings of the current system (Holling & Meffe, 1996). However, participants also noted that current means and opportunities to draw upon Indigenous knowledges in fact constrain it. One participant provided an in-depth example,

"...they want more input from Tribal members. And there's a push to include, whatever you want to call it, it's got a million names, but traditional ecological knowledge, or Indigenous knowledge, into the proposals, and into the actual work. They contact me and I'm like, 'I don't know what to put in there' … I think in general, we need to identify more mentors here. And so, we've been thinking about getting a group of Elders together that would advise on fisheries-related issues. And so, kind of creating an Advisory Panel for us to some extent … Research tends to work on a very defined timetable, based on what the funding agency has put out. And that does not jive with Tribes all that well. I'll give an example. We were asked to participate in a research proposal, and they wanted comments on it and turned around in a week. And that's me

seeing it, then, ideally, it would go to [the community decision makers] for approval. That turnaround time is just not acceptable. We need three or four months to get that information in front of the [right people] … And in some instances, there's no relationship between the researcher and the Tribes. So, why would they agree to that? You gotta build that relationship first, and then you decide whether you want to support that proposal or not. So, I guess that's another challenge for integrating [Indigenous knowledge] with science" (FP02, INTTR)

Western approaches were described as the main drivers of science and decision-making (e.g., "*I would actually say that the methodology [we use] would be promoting and protecting Treaty [fishing and harvest] rights through the use of Western science. That's the model that exists. Part of that was by design, not by Tribal design, but by Western folks' design"* (FP15, TRG). This finding aligns with Busiahn (1989) who found that Western approaches to science are used as the dominant frame by which to limit the harvest of Indigenous fishers in the United States (Holtgren, 2014; Holtgren & Auer, 2023).

Participants explained that the information they brought into collaborative spaces was generally embraced. We noted this was because of shared backgrounds in Western training and an ability to participate in conversations and data sharing that fit within a Western system of understanding (e.g., *"so, the observations that my team is putting forward, because the observations we're putting forward is data, the data usually gets put into the model"*) (FP12, INTTR). Another participant explained that "*if you don't have that formal [Western] education, I sometimes get the impression that they don't value what you're saying as much*" (FP02, INTTR). One participant shared a story about how their insights were received by non-Indigenous agencies. They explained,

"*We talked a little bit about this gear comparison using monofilament and multi-film gear … Three years ago, I'd completed the study. They all saw the presentation a hundred times, but there was always conflict. Getting that paper published was challenging, but we finally did get [it]. And the moment it was published, that whole*

conflict just dissipated … the take home from that is that we are still in a completely Western dominated system. Right? Publish it and people believe it … If these challenges can only be solved by publication, Tribes will always be at a disadvantage. Partially because, as much as I do like the whole scientific method, there's no way I can give more than 5% of my time to publication" (FP15, TRG)

From this experience and others shared of similar nature it appears that publishing the study in a Western science outlet was what resolved the conflict. Even with growing interests to collaborate and to draw upon Indigenous perspectives, current management systems are not set up to receive Indigenous ways of knowing (E.g., *"We've had a fisheries program since the '980s, we've been collecting, we've got databases with 40 years of data in it. And it's funny, like a lot of people don't realize that. I feel like we're a little bit untapped sometimes for these big basin-wide projects"*) (FP12, TRG). Jentoft (2007) and McGregor (2023) share similar findings, suggesting that fisheries institutions can be dismissive of alternative knowledge systems, and that Indigenous governance and knowledge systems in Great Lakes decision-making remain secondary to Western approaches.

One participant explained that "*there is oftentimes a hesitancy from the Tribes, to share their knowledge with others, 'cause it's looked upon as maybe like having to prove that their method works and is worthy"* (FP15, TRG). Another participant shared that the "*provincial decision-makers*" are "*of the same concept, that it's just a [First Nation], that they just want some fish, right … And they have nobody qualified … They're just based on traditional knowledge*" (FP20, FNG). As one participant told us,

"It seems very close minded, dealing with non-Indigenous agencies. It's just like our research doesn't carry the same weight" (FP04, TRG)

Summary/Key Learnings

Our findings show the reality of varying worldviews. The extent to which this is an obstacle to more collaborative decision-making is an opportunity cost to more respectful and satisfying

management. Contrasting values which influence management decisions and a reluctance to shift perspectives limits Indigenous governance and opens up a risk to the conflict between individuals representing different interests and worldviews. While there appears to be growing interest to drawn more upon Indigenous knowledges, our results reveal that Indigenous ways of knowing are expected to fit within the workings of a Western system that may be more focused on temporal material benefits as opposed to longer term sustainability, and which claims to remove human values but are largely guided by certain priorities.

Inauthenticity of engagement and collaboration

> (Interviewer: Would these co-management relationships exist outside of these legislative requirements?) "*No way. Not a chance. There is no doubt*" *(FP07, TRG)*

There are increasing opportunities to collaborate, share knowledges, and re-envision relationships with Indigenous partners in fisheries and natural resource decision-making (in the Great Lakes, and beyond) (UNDRIP, Article 18; Buschman, 2022; Snook, 2021). In all relationships it is essential that the context from which the relationship evolved is understood (Gray, 1985). Goetze (2005) and Stirling et al. (2023) suggest that when "negotiating new relationships" (Goetze, 2005, p. 256) in work centered around collaborative decision-making and knowledge sharing with Indigenous partners, colonial histories must be realized.

Participants described a "*long history between Tribes and the U.S. government*", applicable also to Canadian contexts (see the Indian Act, 1876), and which *"is often not very pleasant"* (FP02, INTTR). This history can be traced back hundreds of years to the arrival of European settlers. Arguably no other matter has been as definitive as the conflict surrounding the access to and control over Indigenous Peoples' lands and resources (Natcher, 2005). Settler-colonialism displaced Indigenous Peoples from their ancestral lands and from decision-making processes about those lands. Their perspectives and systems of governance, and indeed very identities, were suppressed and disregarded (Goetze, 2005; Natcher, 2005; Hedican, 1995). One participant explained how this created a *"legacy in which [Indigenous Peoples] were excluded from and not seen as necessary in the conversation"* (FP22, FNG).

Another participant noted that "*it's getting better, there is more trust from partners out there*" (FP12, TRG). However, they also shared an example where there remains a lack of trust,

> *"But, for an example, if you look at the current fishing agreement, one of the required data we have to get is on-board commercial monitoring. So, we have to get on board commercial vessels to see what fishermen are catching, effort, stuff like that. It's written in the agreement that we have to notify the state before we go out [with commercial fishers], and we have to give the state the option to send one of their own personnel out so they can co-observe. And that's a trust issue" (FP12, TRG)*

The 1960s and 70s were witness to conflict between and among Indigenous and non-Indigenous fishers (e.g., recreational anglers) in the Great Lakes (Nesper, 2002; Whillans & Berkes, 1986). Tribes preferred the use of gill nets, whereas recreational anglers feared that these methods would deplete the fishery resource and restrict recreational harvest (Busiahn, 1989). One participant explained how expanding alewife populations (an species invasive to the Great Lakes) in the 1960s and 70s resulted in the decision to stock coho and Chinook salmon, resulting in the expansion of the recreational fishing industry. They shared,

> *"Boom. The sport fishery exploded. And you can't have that while at the same time having commercial gillnets floating around the waters because of interference with the gear … to support that, the DNR had to support eliminating gillnets. The sport fisheries anti-gillnet sentiment is still alive and well. They don't want gillnets in areas where most of the sportfishing is, and they don't want the Tribes catching too many fish in gillnets that the sport fishery could otherwise catch" (FP23, INTTR)*

Subsequently, the state of Michigan banned the use of gill nets, prompting Tribal fishers to break from state regulations and assert their Treaty rights in court. As one participant explained, "*conflict had to be resolved, or there would have been a war on the water*" (FP23, INTTR). The Boldt Decision (United States v. State of Washington) guaranteed plaintiff Tribes the authority to manage their own fishery (including the use of gillnets) and participate in fishery

decision-making processes. Participants noted that involvement in decision-making (at both Treaty-level and within the Lake Committees) was led by and resulted from Indigenous advocacy, not from invitation. For example,

> *"The Tribes had to fight to be at the table with the Great Lakes Fishery Commission [which facilitates the Lake Committees and working groups formed pursuant to the JSP]. They had to just show up and be there until somebody said, 'Hey, what are you doing, do you want to join?' You know, the Tribes were not invited to the table" (FP06, INTTR)*

Participants noted that these histories influence present day realities. They described relationships as being formed through *"being forced to work together"* (FP21, INTTR). We learned that the motivation to collaborate would not exist outside of a specific pressure or requirement. Being "forced" to collaborate (particularly on interjurisdictional system-wide issues) has given rise to instances of engagement resulting from "*panic*" (FP01, FNG) and crises. Some participants told us that such relationships are not perceived to necessarily form in response to conservation (or restoration) priorities. One participant shared,

> *"I'm happy we do have a good working relationship, but we only have [it] because they wanted something from [the] community … When the government wanted to let people know about sea lamprey, they did. And that's because sea lamprey have a detrimental effect to sport fishing, and sport fishing has a huge economic impact" (FP01, FNG)*

Another participant explained how a relationship was initiated between the GLFC and a First Nation. They explained that, *"I think that the GLFC, in the last few years, and maybe starting with the [one] project, that there's been a shift in perspectives about the value of First Nations, and that there needs to be a relationship between the GLFC and First Nations, and that the old way of doing things, actively excluding First Nations, isn't going to work if the GLFC wants to fulfill their mandate. For example, sea lamprey control. We talked about the [barrier project].*

That was a case where the GLFC had to work with [us] in order to be able to make that project a reality. So, you know, that just goes to show that there needs to be a relationship, and I think that the GLFC now recognizes that" (FP22, FNG).

Tribal and First Nation representatives noted that communication from non-Indigenous agencies, while increasing in accordance with legislative requirements, appeared to occur on the agenda of non-Indigenous objectives (three participants referenced that a lack of meaningful communication may be in part due to capacity constraints within non-Indigenous agencies). Participants expressed concern that Indigenous fishery agencies may not be fully informed about matters that relate to or affect Indigenous communities (e.g., potential system-wide issues related to or affecting Indigenous lands and waters) and would also be reliant upon non-Indigenous institutions for information. One participant shared an illustrative example,

> *"I made a Facebook post earlier this year that got shared over 100 times because I shared the information from the federal government about the fish consumption advisory on smelts, and how smelts contain a lot of different contaminants that can be detrimental to the health of humans, especially young kids, children, babies, and women of reproductive age or pregnant women. Like, this is just one example, where the information is there, the government has this information, but they've not shared it with the people that need it the most. They haven't shared it with Indigenous communities because there's no precedent for them to share it with Indigenous communities. It doesn't have anything to do with their mandate ... But, when the government wanted to let people know about sea lamprey, they did. And that's because sea lamprey have an effect on sport fishing, and sport fishing has a huge economic impact. There is a huge economy in our province, and our country, so there's a lot of resources that are dedicated to that. But when it comes to the health and well-being of our people, there's not as much economic benefit to that, and therefore less resources to do it" (FP01, FNG)*

First Nation representatives noted that increasing engagement and consultation has resulted in a "*bombardment of government requests"* received by Indigenous fishery agencies *"to provide comments or feedback on various things*" (FP19, FNG). They referenced capacity constraints to provide meaningful response. While increasing consultation is described as a positive sign that "*people want to have these conservations*", participants told us that "*the burden of reconciliation should not be placed on the backs of Indigenous Peoples*" (FP01, FNG). This includes funding allocated to fishery agency employees for their time to respond to government duty to consult obligations.

Summary/Key Learnings

Participants perceived collaborative relationships to form out of requirement or crises and in response to a specific need (e.g., access to Indigenous lands and waters). Collaboration with Indigenous partners must consider the legacy of exclusion and colonial harms experienced by Indigenous Peoples. For example, Tribes were not invited to participate in the Lake Committee structure. First Nations are less involved in lake- or system-wide collaboration. As such, information critical to communities (such as matters that can affect their rights and members) is received when and as shared by non-Indigenous governments and government agencies. While participants reported increasing instances of outreach and communication, First Nation representatives noted that engagement without appropriate compensation for fulfilling duty to consult obligations falls short of meaningful progress.

A slow to change and unbalanced system
... that does not always change in ways that change power dynamics

There is renewed recognition of Indigenous rights. Nonetheless, Indigenous fishery agencies participate within Western-designed systems of interactions and decision-making that are constraining to the realization of these rights. In the Lake Committee structure, all federally recognized Tribes that fish on the Great Lakes (commercially or for subsistence) are represented

by an interTribal agency signatory to the JSP (16 Tribes).[39] InterTribal agencies were described as a vested management authority delegated by their member Tribes (e.g., CORA, GLIFWC, 1854 Authority). Throughout the interviews, participants spoke about Indigenous governments as sovereign entities with respective and inherent rights to make decisions. Participants across affiliations emphasized the importance of engaging directly with, *i.e.*, building a relationship with, and involving each Indigenous government in collaborative decision-making.

In the Canadian context, First Nations are not appropriately represented by the Province of Ontario. In the U.S., interTribal representatives stressed that they do not make decisions on behalf of Indigenous governments, noting that decision-making processes can be delayed by needing to gain consensus from member Tribes before returning to the collaborative table (some participants noted that this process is important to hold the Lake Committee processes intact).[40] Collective representation, or, in the case of First Nations, separate engagement and provincial representation, does not reflect shared power – or reconciliation – especially if and when represented voices do not have opportunities to decide how they wish to be represented.

Institutions and contemporary decision-making frameworks are products evolved from historical and cultural precepts (Sewell, 1992). Recognizing Indigenous rights by incorporating Indigenous voice and wisdom into a pre-designed arrangement that is ultimately situated within a colonial-based system does not demonstrate reconciliation. Yellowknives Dene scholar Glen Coulthard's book *Red Skin, White Masks: Rejecting the Colonial Politics of Recognition* argues that recognition can be deceptive in its promise of reconciliation. Coulthard argues that acknowledgement and/or recognition alone cannot transform the colonial relationship between Indigenous and non-Indigenous Peoples/governments.

Indigenous fishing rights are not just about the recognition of these rights within existing systems, but about the inherent sovereignty of Indigenous Peoples to make decisions about matters which affect their rights (Lowitt et al. 2023). The findings in this section

[39] Red Cliff Band of Lake Superior Chippewa became signatory to the JSP shortly after interviews for this study concluded. InterTribal agencies still represent Red Cliff in some circumstances.
[40] To clarify, all agencies must consult with their constituents (such as member Tribes or recreational fishing communities) prior to making any big or controversial decisions (such issues relating to the sport fishery, e.g., stocking).

demonstrate that despite the acknowledged understanding that Tribes and First Nations need be included, their participation is constrained by the institutional/systemic structures in which they are incorporated.[41] More generally, these findings illustrate that although Indigenous rights are recognized (e.g., Treaty rights affirm representation in natural resource decision-making), they are not fully realized, not fully accepted (including the legal, jurisdictional, authority, Treaty and constitutional rights of each Tribe and First Nation) (McGregor, 2023).[42] One participant shared,

> *"There's a lot of people that are willing to recognize [Indigenous] rights, but they're not willing to accept them. So, you can go to a meeting and end up butting heads with somebody fairly easily" (FP20, FNG)*

Another participant explained that "*[they] tolerate Treaty rights … And they know they have to tolerate it because it's law … So the things [the state agencies] don't like about [Treaty rights], they still have to tolerate. That doesn't mean they accept them. The difference there is a difference in attitude"* (FP23, INTTR). They further explained that the Tribes' ability to manage, regulate and represent Tribal interests carries on regardless of the frequent "*bad attitudes*" of some government agencies and their constituents. While it took litigation and negotiation to get to the point of co-management (in this case referencing *US v. Michigan* and the Consent Decrees), there is hope the next generation of state biologists and leaders will adopt an attitude of "*true acceptance*" across the board.

Co-management has been suggested as a means by which to include Indigenous voice wisdom, supporting Indigenous self-determination as well as strengthening collective care for valued resources. The concept is largely premised on the redistribution of power to increase participation and mutual learning (Jentoft, 2005). However, one participant shared an example of how current collaborative frameworks do not redress power disparities,

[41] A minority of participants explained that the agency for whom they work has had influence in the collaborative structures in the upper Great Lakes.
[42] *Acceptance* carries with it accountability and action. It goes beyond good intentions and requires implementation of realized change.

> *"[The Decrees] really did lay out in many ways what Tribal natural resources agencies should look like. And they basically set the Tribes up to look like the state DNRs. I mean, that was convenient as hell for the states, because then they only have to know one system, right? It's their system, and they pawned it off on the Tribes, so they don't have to learn anything new. The Tribes had to completely learn something new because that wasn't the Tribal system, right? So it sets up another power inequity. That becomes institutional inertia, right? The Tribes, to get reaffirmation, had to set up their natural resources agency exactly like the state … So now, the Tribal natural resource agencies have done this anywhere between like 20 and 45 years in this Western way. So it's also kind of become entrenched within the Tribe" (FP15, TRG)*

A primary theme identified by participants was resistance from non-Indigenous governments and government agencies to accept Indigenous governments as equitable co-managers. This finding aligns with scholars who suggest that many of the injustices experienced by Indigenous Peoples stem from the refusal of non-Indigenous governments and groups to fully realize Indigenous rights, particularly with regard to natural resource management (Parsons et al. 2021). One participant shared, "*so [we] co-manage, although some state agencies would disagree with how I term that there*" (FP02, INTTR). Another participant explained,

> *"It was a long road to gaining inclusion on higher-level committees of the GFLC. A framework for adding a new party was created, and we had to demonstrate, repeatedly, that we had management authority to participate on the committees" (FP12, TRG)*

Several participants perceived that reluctance resulted from fears that Indigenous interests would outweigh those of Western counterparts. Jentoft (2007) describes that fisheries management rests on power – the power to decide, to enforce, and to implement management decisions. As several participants noted, fisheries management is "*very political*" (FP22, FNG). Power can be a catalyst for change or a force that reinforces current circumstances. Participants shared,

"State agencies don't like working with the Tribes, and the concept of working with Tribes individually instead of working with a conglomerate interTribal agency… they don't like that. They don't want, I mean, they won't say it, but the conversations I've heard are that they don't want individual Tribes at the table, plain and simple. They don't want their voices to outweigh the interests of the states. And I've already seen interactions this way too. I mean, the states have non-native fisheries that are important, recreationally, to them. We see some of those non-native species as detrimental to the rehabilitation efforts we're doing for some native fishes, like coastal brook trout. So there's a big difference in management perspective that way. And those arguments have come to a head at Great Lakes Fisheries Commission meetings" (FP12, TRG)

"You know, states are fierce defenders of states' rights. And when Tribes come in and assert their sovereignty and assert their management authority, that jeopardizes the states'-rights-issue in their mind. And so, there's pushback against that" (FP23, INTTR)

Participants perceived non-Indigenous government agencies to be wary of including each Indigenous government at the decision-making table, noting potential for delayed decision-making (for example if each Indigenous government was represented on Lake Committees as an independent signatory to the JSP). One interTribal representative explained how this could be challenged,

"[We] have [many] member Tribes, and only a few of those fish on Lake Superior. But all [of them] have a Treaty reserved right to fish Lake Superior. We would still represent the Tribes that aren't at the table ... and [be] at the table as a consolidated front. There's the concern that if each Tribe has a voice, would we be able to get consensus? Well, the way it's structured is, I represent several Tribes. When there's a decision point, I go to each of the Tribes, I go to our committee that's represented by all of them, and I get an agreement. If one of those Tribes doesn't consent to that, but

> *the other two do, well, then I come back with 'I don't consent'. They never know which of the three Tribes doesn't consent, they just know there's no consent. This is challenging because the Tribes that do consent would be upset with me, and if I provide consent then the Tribe who didn't consent doesn't feel well represented" (FP06, INTTR)*

Participants do not perceive co-management arrangements as balanced or equitable (e.g., *"Equity in the co-management system? There's some, but it's not where it should be. It's kind of lopsided towards state anglers. And we're trying to, we would like to improve that system, but there's quite a bit of resistance to doing that")* (FP02, INTTR). In Treaty-scale arrangements (e.g., 2000 Consent Decree), Tribal representatives perceived states to retain final decision-making authority, regardless of negotiated terms in decrees/agreements (e.g., *"We don't make decisions that are legally binding by any means. And certainly, there've been state governments that walk in and make an agreement and walk out the room and do whatever the hell it is they were gonna do anyways")* (FP18, TRG). Other participants noted that while Tribal leadership could challenge any state violation (according to the terms of the Consent Decree), pursuing this avenue could demand a significant investment of time and resources.

First Nations described co-authority over fisheries decisions within their own jurisdiction but emphasized a consultative process that favours federal and provincial authority. There is currently no mechanism for First Nations to authorize or deny proposed activities (*i.e.,* no ability to provide free, prior and informed consent). For example,

> *"Any sort of development thing that we're asked to consult on, we can say that we hate the project, but ultimately, we never have stopping power for it … the legislation just says that you have to meaningfully consult with Indigenous [First] Nations, but that's it. To some, a notification is consultation. Which it is not" (FP19, FNG)*

Some participants referenced how action is only elicited from non-Indigenous governments and agencies when there is collective and sustained effort from Indigenous governments (e.g., *"if there is a joint Tribal issue, and we push hard enough and long enough, they do seem to respond*

… Beyond that, they seem to just figure out what's best for us") (FP18, TRG). Many made reference to how Western institutions appeared to prioritize recreational fishers (and other constituents) over Indigenous rights, and conservation. Two participants shared illustrative examples,

> *"If you're the state, sport fishermen are your constituents. Their input is totally political, because they push the DNR to what they want to occur, and if they don't see it going their way, they'll call up their legislator and the legislator will push the DNR" (FP23, INTTR)*

> *"One of the things that I especially have been thinking about is the 'economics versus ecological', where, you know, we have leaned so far towards the economics part that the ecology is getting totally ignored. And it goes back once again to look at dreissenids [aquatic invasive mussels]. Well, they come from the shipping industry. Huge economic impact in the area, huge ecological impact. That economic impact is always looked at as more important'… If we don't start focusing on how to get our lakes back to some sort of balance, then what are we fighting for?" (FP04, TRG)*

This is a recurrent theme. It resonates with scholarship which contends that non-Indigenous governments exhibit biases toward economic objectives and can be responsible for impeding reform that could alter their control (see Cantzler, 2013 and Lalancette & Mulrennan, 2022). In our study, participants questioned if Indigenous harvest rights would be or become more of a priority if environmental change resulted in a further impacted fishery. For example,

> *"I often wonder if climate change or some other unnatural sort of cycle occur, and there's an impact to the fishery, what would close first? I don't think the recreational fishery sits there in a very high hierarchy to sort of trump [Indigenous] rights. And in a way, I feel like the recreational fishery should take a hit before any big changes happen in terms of regulation on our behalf, you know. I can't justify the fact that some*

people can sit in ice shacks and order pizza and fish walleye. It's conflicting in my brain, the two activities" (FP09, FNG)

Several participants highlighted that funding and capacity challenges can affect the ability of Indigenous agencies to influence or be involved in decision-making processes. In addition to the multiplicity of responsibilities, several participants spoke of there not being enough resources made available to support Indigenous agencies to hire, and retain, biologists (e.g., *"a lot of our funding is based on grant programs … and a lot of these jobs are very short term, like one-year, two-year contracts. It's a less than desirable career path to always be jumping from single year contract to single year contract"*) (FP01, FNG). Participants explained that a lack of adequate financial resourcing can contribute to limited representation of Indigenous interests in some important spaces of negotiation and decision-making. For example,

"[They] have a lot of resources they can bring to the table. Us? It's just one biologist position, you know. It's not a level playing field that way" (FP12, TRG)

Scholars such as Roburn (2012), Wilson et al. (2019) and Nadasdy (2005), critique co-management arrangements (and, more broadly, publicized affirmation of Indigenous rights) that expand and promote Indigenous authority to include decision-making over matters that may affect them or their territories, but do not provide Indigenous governments with an increase in funding to build capacity and ensure sufficient financial resourcing.

S*ummary/Key Learnings*

The majority of participants perceived co-management as imbalanced in favour of state, provincial and federal interests. Resistance to relinquish power, and therefore resistance to enact broader governance transformation, was emphasized. Participants perceived this resistance to stem from prioritizing recreational fishing constituents. Although they noted that recreational fishing provides significant economic benefit on the Great Lakes, participants expressed concern about conservation priorities and Indigenous rights to fish and make

management decisions if the fishery further and seriously deteriorated. Participants also discussed the constraints of limited funding which can hinder the ability of some Indigenous groups to participate effectively or equitably in decision-making processes. Overall, co-management and self-determination challenges vary considerably across the Great Lakes basin. This section of results highlights the ongoing challenges faced by Indigenous fishery agencies in achieving equitable involvement and decision-making within existing systems.

Reflections

This section offers seven reflections emerging from the interviews that non-Indigenous fishery agencies could consider in next steps towards more reconciliatory and effective fisheries decision-making. These were developed based on their frequency in the data and are summarized below. Please see Table 2-2 for illustrative participant quotes.

Collaboration and commitment from the very start.

We learned that engagement and collaboration on projects/decision-making needs to happen at stages of design and planning, not at the end, and not once decisions have been made. Decisions generated together can help establish projects of shared interest, embrace the potential for program enhancement, and strengthen support for their implementation. Collaboration from the very start can lay a foundation from which to build relationships and sincere partnerships, and where working together feels wanted, genuine and valued.

More and consistent communication, the right way, with the right people.

Participants expressed a desire for direct communication and relationships between Indigenous and non-Indigenous governments and agencies. More and consistent communication, including the "*willingness to disseminate information*" (FP09, FNG) beyond mandates or other party's interests, was often referenced. Participants reported increases in communication and outreach efforts. First Nation representatives noted that while this was encouraging, their time spent fulfilling federal/provincial duty to consult obligations should be appropriately compensated.

Participants emphasized that they were not decision-makers on behalf of Indigenous communities. We learned that consideration should be given to if and how communication transpires between representatives and the Indigenous citizens that they serve. This finding is not shared as a critique against representatives, but as a curiosity as to what extent information is *able* to be shared (e.g., if there exist mechanisms to ensure Indigenous citizens have the opportunity to learn about and contribute to management decisions). Decision-making that relates to or affects Indigenous lands and waters should fundamentally center Indigenous Peoples themselves in those processes. One participant shared an example about what this could look like, referencing the "*annual or semi-annual meetings that discuss the state of sea lamprey in the Great Lakes*" (FP02, INTTR). They shared that meetings could be made accessible to Indigenous citizens through venues such as Zoom, where individuals could type comments and have these be brought into discussions by selected representatives (e.g., interTribal, Tribal or First Nation representatives).

Collaborative interactions should also take place on Indigenous lands.

A prominent theme was that collaborative meetings could at times be held on Indigenous lands. Scholars suggest (e.g., Cadman et al. 2022; Kendrick & Manseau, 2008) that successful co-management relationships include opportunities to meet on Indigenous land (which often are the regions in which management activities are applied) and focus on methods of interaction that align with Indigenous interests and practices. Some examples suggested by participants included meeting at a potlatch house or walking together through the woods. Gatherings should not be restricted to just work. It would be helpful to connect outside of what are often rigid and formal modes of communication and collaboration. Critical to note is that such gatherings and opportunities of sharing must align with community interests. Formality excludes a human dimension (Natcher, 2005; Armitage et al. 2011). We learned that co-management involves navigating interpersonal dynamics and building mutually respectful relationships as much as it involves fisheries decision-making.

Relationships and decisions made need to be mutually beneficial.

Relationships and decisions made should be mutually beneficial and critically in ways that align with and respond to Indigenous interests (e.g., approaches to science and decision-making). Participants explained that relationships could be approached in better ways to set the right context moving forwards. More meaningful relationships can start with asking and responding to what communities want or need (e.g., supporting Indigenous research goals). We learned that genuine relationships, trust, can develop if non-Indigenous agencies "stick around" after learning that a project might not proceed as planned, or on certain timelines. It feels disingenuous to engage a community simply to get something from it (e.g., access to lands and waters, checking a box, place-based knowledge).

Appropriate financial resourcing.

Participants highlighted that Indigenous agencies can face significant funding and capacity challenges. These capacity limitations are linked to historical and ongoing colonialism, which are experienced in very concrete ways in terms of insufficient staffing, funding and time (Simms et al. 2016). Tipa and Welch (2006) illustrate how capacity impedes Indigenous participation in system-wide water governance, highlighting that "co-management" can be misleading when one partner has greater access to resources such as "funding, staffing, expertise, statutory powers, and functions" (p. 382). These concerns are relevant to the context discussed here. Given these realities, there is increasing recognition that resources need to be provided for Indigenous governments to meaningfully participate in collaborative decision-making (Brandes & O'Riordan 2014; von der Porten & de Loë 2014).

Ensure space and appreciation for Indigenous-led research and knowledges.

Participants called for more opportunities to work with and involve Indigenous-led research and knowledges in fisheries decision-making (such as drawing upon fishers' observations to inform sustainable harvest). In that, Indigenous knowledge systems must be realized as distinct and legitimate in their own right. Accountability and transparency with regard to how

information is stored and put into action is critical. Indigenous knowledges cannot be separated from Indigenous rights, nor the people inextricably connected to that knowledge. Participants noted that priority should be given to hiring Indigenous Peoples in these fishery roles, while also acknowledging that these spaces may feel unwelcoming. Please see illustrative quotes in Table 2-2.

Each Tribe and First Nation requires equitable involvement in intergovernmental decision-making.

Indigenous governments each have distinct knowledges and rights to make decisions about matters that relate to or affect their rights and communities. Recent pursuit of Indigenous involvement (including access to Indigenous knowledges and fulfilling duty to consult obligations) is set within contexts of "historic and ongoing exclusion of Indigenous Peoples from Great Lakes governance" (McGregor et al. 2023, p. 1) and the deliberate resistance of non-Indigenous systems to realize Tribes and First Nations as equitable governments (Wilson, 2018; Simms et al. 2016; Muller et al. 2019; Wheeler et al. 2020; Parsons & Fisher, 2020). Indigenous ways of knowing and doing are expected to integrate into a colonial-based system. Without equitable involvement in decision-making, the opportunity for reconciliation, to build relationships and learn authentically from each other, is lost (Holtgren & Auer, 2022; Reid et al. 2021).

Table 2-2. Excerpts from interview transcripts to illustrate reflections.

Reflection	Participant Voices
Collaboration and commitment from the very start.	*"It makes it a lot easier if you want the Indigenous population to follow the plan, if they have a representative at the table that helped write the plan in the first place … The power of persuasion gets lost when the voices aren't in the room" (FP20, FNG)* *"When you're not involved, and people want to come into your yard, our backyard, and do stuff? That's when the walls go up. That's when people get frustrated and angry and everything else" (FP04, TRG)*

	"If I had to sum up everything that could help with our relationship with partners, it's involving [the communities] much earlier in the process. At the planning stage, rather than just asking them at the end … People ask me, 'How can we work with the [Tribes]?' I always tell them the same thing. You've got to establish relationships with them. You've got to talk to them, and understand. You can't come in with your own agenda. You've got to come in with an open mind and, you know, listen to what they're saying. It's time consuming, right? That is frustrating sometimes to people. 'Oh, I have a three-year project, I don't have time to do all of that'. Yeah, that's too bad. That's what it takes. And if you ask me, 'What does it take to work with Tribes?' And I tell you, 'Establishing relationships', don't tell me it takes too much time" (FP16, INTTR)
More and consistent communication, the right way, and with the right people.	*"...you could make it, in this day and age, publicly accessible, through a meeting like [Zoom], where maybe it's just comments or something that folks can type in the side, and then the reps are the ones that are discussing sea lamprey with the [GLFC]. But I guess, as a follow up to that, how are the actions of the [GLFC] and the input from the Tribes, how is that conveyed back to individual Tribes? How is that conveyed to Tribal members, is that information shared out, or does it just stop with the Tribal rep? … I don't know what would be the best way, but it should be, this should be shared back with Tribal members" (FP02, TRG)* *"...there is this constant bombardment of requests that shows that people are interested in having [these] conversations and establishing relationships … I think non-Indigenous organizations should know how to properly request people's time … Academia, government, and other organizations, [they get] a lot of benefit from sharing time with someone from a community. And that benefit doesn't always come back to the community. But it gets, you know, it's the government that's checking off the lists. It's the staff that's benefiting from this, and not-for-profit organizations, where, you know, [there's] good intentions in mind, but everyone gets a lot of funding as soon as they have Indigenous partners, and a lot of time that funding doesn't make it to the community" (FP01, FNG)*

Collaborative interactions should also take place on Indigenous lands.	(Interviewer: What could strengthen these relationships, from your perspective?) *"So, I don't know exactly what this might look like yet, but I think some sort of annual two or three day thing where managers and researchers in the Great Lakes come together. Instead of just talking about what research we might be doing, we would actually hear some stories and learn a little bit from an Anishinabek perspective. It would be an Anishinabek hosted and run meeting, somewhere in Indian Country, you know, that would be my preference. Hosted by, fed by, watered by Anishinabek agencies. And it would be a chance to teach both Tribal biologists and our state and federal colleagues a better way to get along, you know, a fuller story" (FP15, TRG)* *"We get a lot more done when you're just having a normal conversation with [the Province of Ontario], than sitting around in a big meeting … And getting those people to train other people, 'cause half the time they don't know how to deal with Indigenous People, communities, and that's where their research ends. They can't get past that first communication barrier … Tone it down a bit when you come in, don't come in too strong and be too serious. Chill out a bit. We've very easy going and we like to laugh" (FP17, FNG)* "*One of the things that we do here, that, I don't know if there'd be space for this within the lamprey control program or with any of those types of interactions, but, back in the early nineties, [there was] this event called Partners in Fishing. And what it is, is people from all the agencies getting together one day a year or so, we all get together, a whole bunch of guides get hired, and we go fishing. And so, you get, you know, Tribal leaders in the same boat with a DNR biologist, or, you know, somebody from the governor's office talking to [an interTribal] biologist or, you know, it's just everybody gets together and goes fishing. There's good food and the chance to get out on the water. The chance to enjoy the resources together. And it provides a really good understanding of who people are outside their job, because there's no point to it other than just being together … And so if the [GLFC], or anybody working in [fisheries management], could come up with an event like that? it would probably be really well received and help build those relationships" (FP21, INTTR)*

Relationships and decisions made need to be mutually beneficial.	*"I think [relationships need people to make] an effort ... even just [coming] to like a Tribal urban office, or reaching out and just [saying], 'Hey, I'm with the U.S. Fish and Wildlife Service. How could we help?' They do that sometimes, certain agencies do. But [when it comes to] like, 'What's your concern?' and actually listening, not talking over you, it's hard. There's politics at play. There's a reason why they don't listen to the Tribes, and there's a reason why some agencies don't want to collaborate. And there's nothing you can do about that. It's like, like identifying the agencies, that are wanting to help and then like strengthening those bonds, that's the way I kind of look at it" (FP07, TRG)* *"It's always at the request of outside organizations that Indigenous communities are basing their relationships off of, it's never what we want or need ... There's a better way to do things, and a lot of that starts by asking what people want, what communities want" (FP01, FNG)* "*I think the best types of partnerships are ones in which you have a common goal. You have an equitable type of relationship where you're both on the same footing and you have some kind of, some kind of drive, I guess, and openness to learn from each other. And even if you get bumps in the road, you have a willingness to work together to overcome any kind of issues that arise and move forward together. There's got to be some kind of mutual benefit coming to both parties out of whatever the work is that you're doing. So, at the end of the road, there's some kind of reward for what it is that you're doing" (FP22, FNG)*
Appropriate space and appreciation for Indigenous-led research and knowledges.	"*The sharing of knowledge and the acknowledgment of where that knowledge came from" (FP09, FNG)* *"The other part, and we're maybe a half step closer, is all of the positions in the world like mine need to be filled with Indigenous Peoples' rear ends, not white people. So, that way, an Indigenous person who heard the story from their grandmother could tell it at this meeting, while still having a lot of Western education to say, 'Yeah, you have seven faults in your code over here, that's no good. And my grandmother taught me this' ... I think it's so important to have Tribal folks in these seats ... I [a non-Indigenous fisheries professional] can get insight maybe into*

	what it feels like occasionally to be the other … For clarity, I don't compare my situation to the reciprocal. There are a few similarities, but I don't feel hatred of me for being the other. So, you know, I don't come home scarred. I think about if you were the one Tribal person in a room of nine Western trained, white scientists … I do not think that'd necessarily be a wonderful place for that Tribal person to be" (FP15, TRG) *"I think it's very important to hire locally as much as possible. There's a very high demand for young Indigenous people that are knowledgeable about the environment, about the land, and also who have different types of environmental education … I know that there's a high demand for people with my experience and skill set. So, I could go work for industry, I could go work for government, and I could probably make a lot more money doing that. But I don't want to do that. It's working for my community that brings the most value to my life, and it's working 10-minutes away from my home. So, I think when you hire people that are outside of the community, and they're in a one year contract, like, the majority of that year is just learning and gaining experience, and there might be a little bit of productivity from that, but then they're probably going to go somewhere to get paid more. If it's a community member that chooses to do that, that is a win. That is such a win for communities because they learn about our land supremacy, about the community and about the types of projects that are happening here. And then if [they] go into a fancy government position, or work for industry, [they're] knowledgeable about what it's like to be working with Indigenous communities. He can flourish and be a good quality employee for someone else, but that person will always be an advocate for the community. And maybe they'll bring that experience and education back home, and maybe they don't. There's always, always going to be benefit from having community members take these jobs, gain this experience, and then either move on to other positions or just stay here and work for the community" (FP01, FNG)*
Appropriate financial resourcing.	(see challenges text)
Each Indigenous government is a sovereign entity requiring equitable involvement in intergovernmental decision-making.	(Interviewer: What would strengthen these co-management relationships?) *"Including the different Tribes and [First] Nations around the*

	lakes. That would definitely strengthen it. Otherwise, you're just not talking to all the governments that exist on the lake. You're only coordinating among a subset of governments" (FP06, INTTR) *"One of the things that would be asked of the people asking for the meeting would be, from [our] standpoint, 'Please send somebody that can make a decision'. You know, people would come down and, you know, with good intentions, and we'd go through the whole meeting and the closing statement would be, 'Thank you for your time, we'll take this back and we'll discuss it with our bosses and we'll come back with a decision'. And so, we view that as a kind of a waste of time … because then you're leaving it up to that person that you spoke to, to accurately portray your concerns, your wants, your needs. And that often does not work out. That's why it's always important for us to have a seat at the table" (FP20, FNG)* *"Each Tribe is its own sovereign entity unto itself. And each Tribe has a rightful place on the Great Lakes Fisheries Commission. It should be each Tribe being a member. Oh, but then they say, 'There's so many First Nations and Tribes, they would just overwhelm, you know, the Great Lakes Fisheries Commission'. There's a little bit of a paranoia there, about letting all Tribes in, because they might outvote [them], or something like that. Overcoming that barrier would be a good thing. The recognition that each Tribe has their own sovereign ability to make their own decisions … We can do our role, but don't use us to avoid dealing with individual Tribes" (FP16, INTTR)*

Summary/Key Learnings

This section offers seven reflections from interviews with participants by which to support more reconciliatory and effective fisheries decision-making. One is the importance of collaboration from the very beginning, involving Indigenous groups in the design and planning stages. The second emphasizes the need for more and consistent communication between Indigenous and non-Indigenous governments and agencies, while considering ways by which Indigenous Peoples themselves can participate in decision-making processes. The third reflection highlights the value of holding collaborative interactions on Indigenous lands, realizing that

successful co-management relationships include opportunities to meet in community settings. A fourth emphasizes that relationships and decisions made need to be mutually beneficial, aligning with and responding to Indigenous interests. The fifth is the need for appropriate financial resourcing for Indigenous agencies, acknowledging the capacity challenges that can affect participation. The sixth calls for more space and appreciation of Indigenous-led research and knowledge systems in fisheries decision-making. The seventh and final reflection underscores participants' calls for equitable involvement of Indigenous governments in intergovernmental decision-making, realizing that Tribes and First Nations have distinct rights and knowledge frameworks related to their lands, waters and communities.

Limitations

Within the scope of this research there are a few methodological limitations that should be acknowledged. First, not all fisheries professionals who work for Indigenous fishery agencies were interviewed. Second, we interviewed more participants working for interTribal agencies in the United States.[43] Of the eight inter-agency fishery agency representatives, only one represented First Nations in Canada. Third, participants filled a range of positions from director to coordinator fisheries professional roles. How interviewees understood and responded to questions may be influenced by their respective scopes of work. In their responses, participants reported their own individual experiences and that of their agency as a whole. Lastly, the nature of thematic and inductive analysis and constructivist research means that the results of the study are interpreted through the researcher's experiences, biases and understandings. Therefore it is unlikely that they would be exactly replicable. While acknowledging these limitations, this research holds merit because of the diversity of the participants and the breadth and depth of answers provided. While the results are interpreted through the lens of the researcher, this does allow for some flexibility that reflects the complexity and nuance of the data.

[43] Proportionally, more Great Lakes waters are found in the United States. On a per capita basis there are more people in the U.S.

Conclusion

Decision-making on the Great Lakes is political and complex. It involves multiple actors and overlapping jurisdictions including Indigenous and non-Indigenous governments and government agencies. Participants in this study represented Indigenous fishery agencies spanning the Laurentian Great Lakes basin. Their perspectives and experiences varied based on their location, affiliation, and the legal and institutional systems in place. Participants described involvement with the Great Lakes Fishery Commission and within the Lake Committee structure. They also described relationships between Indigenous and non-Indigenous governments, levying more of their critiques at state/provincial/federal government agencies. We learned about challenges that can affect co-management as well as reflections shared towards more reconciliatory engagement and collaboration.

In the U.S., interTribal agencies represent Tribes who reserved fishing rights in Treaties with the United States government. These agencies are more and formally involved in system-wide decisions. For example, interTribal agencies sit on the Lake Committees, where members are signatory to the consensus-based Joint Strategic Plan (JSP). Some fisheries professionals who work directly for Tribal governments are represented, but generally at technical levels. It should be noted that after the interviews for this study concluded, one Tribe (Red Cliff Band of Lake Superior Chippewa, *hereafter* Red Cliff) successfully petitioned to become its own signatory. In Canada, First Nations are represented on the JSP by the Province of Ontario.

Nearly all participants were *not* involved in making decisions (past or current) about sea lamprey control methods or the direction of the control program outside of permitting lampricide treatment in waters within Indigenous jurisdiction. Several U.S. interTribal representatives described involvement insofar as helping to set Fish Community Objectives, which represent a collective vision of a fish community that can support various levels of harvest and which is influenced by sea lamprey mortality. Other participants (Tribal and First Nation representatives) participated in one-time and short-term collaborations with the GLFC to check sea lamprey traps, implement barriers, and coordinate components of a lake-wide

telemetry project that proposed to place receivers in Indigenous waters. The GLFC's sea lamprey control program was generally perceived positively. However, some concerns were raised about the lack of Indigenous involvement in discussion and decision-making spaces, and the potential and observed negative impact of lampricide on native species.

We also learned that although some co-management relationships exist directly between federal governments, states and Tribes, and First Nations and provincial authority (e.g., fishing agreements), final decision-making is retained by non-Indigenous governments. Tribal representatives reported that state government agencies are steered by the recreational fishing community. First Nation representatives noted that while there are increasing instances of engagement (such as duty to consult obligations), there lacks a mechanism by which First Nation decisions are heard and respected.

Participants reported positive progress. Insofar as sea lamprey control is concerned, some First Nation representatives explained that the GLFC has in recent years (<10) adhered to the decisions made by First Nation communities (see Barber & Steeves, 2019; Steeves & Barber, 2020).[44] As such, the GLFC has increased its efforts to build relationships with Tribes and First Nations regarding sea lamprey control and other fisheries projects (e.g., telemetry). In 2022, Red Cliff Tribe became a signatory to the JSP.[45] One First Nation citizen now sits on the GLFC's Advisory Board. There are increasing instances of outreach and communication with Indigenous communities, particularly about sea lamprey control. However, participants raised concerns about the lack of First Nations' involvement and suggested that interTribal representation does not align with Indigenous rights unless expressly authorized by the individual Tribes. As the legal landscapes of Indigenous rights and title continue to evolve so too should there be opportunity for Tribes and First Nations working to achieve self-determination to revisit how they wish to be represented.

[44] It is expected that as the legal landscapes of rights and title continue to unfold, external groups (e.g., government, NGOs, industry proponents, research organizations) will be increasingly compelled if not required to obtain full and informed consent for activities that may affect Indigenous rights (Gray, 2023).

[45] It should be noted that for Red Cliff to become signatory to the JSP all preexisting member agencies needed to reach consensus (i.e., approve or agree to the new member). The GLFC simply facilitates and is not itself a part of the determining process. It should also be noted that Red Cliff has reservation waters into the lake, which is "unusual". Other Tribes under the mantle of interTribal agencies have off-reservation fishing rights (e.g., the right to fish, hunt and gather in ceded waters).

The GLFC was described as a facilitative research organization that "*has some influence*" (FP18, TRG) in fisheries management.[46] More politics and challenges were found at Treaty-level co-management, where participants described interactions with state agencies as more contentious and subject to change depending on political parties in power and the people involved in key leadership positions. The Great Lakes is indeed a broad ecosystem of water governance and fisheries management. Just as aquatic ecosystems must be managed as a whole so too do the actors and agencies involved in Great Lakes fisheries decision-making overlap and interconnect.

Participants described that progress is needed at all levels of fisheries decision-making, from research to resource allocation to sea lamprey control. We learned that challenges affecting co-management span individual to institution to system levels. Ultimately, fisheries decision-making on the Great Lakes is a product of settler-colonialism. It is unbalanced with regard to what knowledges are sought after and to what extent authority is shared. A system which does not embrace Indigenous Peoples as rightsholders risks perpetuating inequalities.

In general, participants emphasized the need to work together (e.g., "*…lot of governments on the Great Lakes, you know, crammed into one spot. We're all in this together, we all care about fish"*) (FN23, INTTR). Participants offered seven interacting reflections that could support more reconciliatory and effective fisheries decision-making. Tribes and First Nations around the Great Lakes are independent governments each with distinct knowledge systems. Legislation and federal court rulings (re)affirm Indigenous Peoples' inherent and Treaty rights to fish and to make decisions about the fish that swim within and across jurisdictions and lakes. Yet, decision-makers and Knowledge Holders are not often those involved in spaces of negotiation and lake-wide decision-making (Wong et al. 2020). Indeed, building relationships with Indigenous communities, where human connection and trust can be

[46] The GLFC has authority to control sea lamprey. However when considering fishery *management* the GLFC does not possess management authority. The Lake Committees/JSP structure works because all involved agencies work together to implement decisions which are arrived at through a non-binding process.

developed, is critical “work before the work” in collaborative decision-making (Ferland et al. 2021, p. 16).

Respectful and mutually beneficial relationships, where decisions are made together, can help strengthen support towards and embrace potential for enhancement of fishery programs, such as the sea lamprey control program. Indigenous knowledges, while increasingly valued, are inextricable from the people connected to that knowledge. If an ecosystem requires lake- and system-wide collaboration – consensus – then it is especially important that rightsholders are at the table where decisions are planned and implemented. A reimagining of and shift within fisheries management to support and facilitate the equitable involvement of all who share in the responsibility to protect and manage the Great Lakes can be an opportunity to help ensure the continued success of fisheries programs, and the overall health of fish for all future generations.

Chapter 3: Preparing current and future fisheries professionals to work with and for Indigenous fishery agencies

Abstract

Indigenous Peoples around the world continue to resist colonialism insofar as it infringes on their rights and relationships with the natural world. For example, they are actively (re)claiming roles within water governance and natural resource management. Whilst there are increasing instances of collaboration between Indigenous and non-Indigenous groups the practice of this work can be affected by how the individuals involved relate to and interact with one another. Legal and ethical imperatives to work together in a spirit of reconciliation are contributing momentum to rethink the living out of these relationships. Recent attention to the importance of Indigenous voice and wisdom as equal participants in decision-making requires that groups be prepared to work together in mutually respectful ways. In so doing more holistic and encompassing decisions can be made in response to the evolving changes occurring within and across the natural world. Here, we draw on interviews with Indigenous and non-Indigenous fisheries professionals working for Indigenous fishery agencies around the Laurentian Great Lakes. This group is involved in fisheries decision-making including at the interface between Indigenous and non-Indigenous governments/government agencies. This chapter seeks to learn about their perspectives towards relevant training or other learning opportunities that could be helpful to individuals preparing to work in such roles and contexts. We note that participants, of whom the majority were trained in Western academic institutions, felt largely underprepared coming into their roles. We found that the most useful learning opportunities were acquired through mentorship and lived experience on the job. We offer ten reflections emerging from the interviews that could be useful for individuals who are employed by or who work in collaboration with Indigenous groups such as Indigenous fishery agencies: 1) complete mandatory courses about Indigenous and settler-colonial histories 2) participate in cultural awareness and sensitivity training; 3) receive training/experience in respectful and equity seeking communication; 4) seek training/experience in working effectively with multiple

knowledge systems; 5) spend time in Indigenous communities and with the people who live in those communities; 6) participate in conflict resolution training; 7) learn about Indigenous data sovereignty; 8) embrace self-directed efforts to learn about and spend time on the landscape, learning about the stewards of the region; 9) consider history and management structures relevant to a given location/issue; 10) enroll in interdisciplinary courses that frame natural resource management in a more holistic manner. These reflections and this chapter highlight that while more relevant learning opportunities are helpful, genuine intentions, respect, openness and honesty are critical underlying characteristics that are necessary to translate learning into collaborative action that that can strengthen relationships and care for the natural world.

Introduction

Indigenous Peoples around the world continue to resist colonialism insofar as it infringes on their rights and relationships with the natural world (Wilson, 2019; Wilson & Inkster, 2018; Muller et al. 2019). They are actively (re)claiming roles within water governance and management processes (Phare, 2009; Wilson, 2014). This is becoming evident in a variety of contexts and regions including Aotearoa New Zealand, where the Whanganui Iwi (a Māori Tribe) are asserting their rights to manage the Whanganui River (a River with recognized rights as a living entity) to ensure sustainable water use (Kramm, 2020; Hsiao, 2012); in Peru and Bolivia, where Quechua and the Aymara women are taking action to protect sacred waters such as those of Lake Titicaca (Chino, 2022; ECCC, 2019); in the Pacific Northwest, where First Nations in British Columbia are leading watershed monitoring initiatives and implementing their own water protection legislation (Diver et al. 2022; Fraser Basin Council, 2018); and in the Laurentian Great Lakes, where Tribes and First Nations across the basin are confronting their exclusion from governance and management processes with regard to fishing waters.

Each of these aquatic ecosystems in these colonized regions are affected by ongoing degradation from human-induced activities (Dudgeon, 2019). Global colonialism and the

resulting consequences of dispossession and marginalization threaten Indigenous rights to live in relation with and restore balance to water systems (Reibold, 2023; Matheson et al. 2022). Yet, Indigenous Peoples continue to care for the natural world and assert their right to participate as equitable governments in decision-making processes despite ongoing infringements on their sovereignty (Ford et al. 2020; Muller et al. 2019).

There are growing opportunities to work in collaboration with Indigenous groups in water governance and natural resource management (see Cooke et al. 2021; Wheeler et al. 2020; Brattland & Mustonen, 2018; McNeeley & Shulksi, 2011). Part of the motivation behind this collaborative work has been the recognition of the shortcomings of a solely Western approach to decision-making (McKinley, 2007; Ball & Janyst, 2008).[47] As such there is growing interest within local and international legal, policy and advocacy communities to advance collaborative initiatives which aim to elevate a diversity of perspectives and center more prominently Indigenous voice and wisdom for the benefit of short term decision-making, as well as longer term care and planning (ECCC, 2050; Reid et al. 2019; Latulippe & Klenk, 2020; Wheeler et al. 2020; Thompson et al. 2020). This change is exciting in terms of opening up possibilities to draw upon varying perspectives with which more holistic and encompassing decisions can be made.

One of the central premises supporting collaborative management is that the equal participation of relevant actors can help reduce conflict and strengthen management outcomes (Berkes, 2009; Pinkerton, 2019). The extent to which co-management achieves these objectives is a debate in literature and practice (see Swerdfager & Armitage, 2023). While co-management proposes opportunities to together respond to the many changes occurring within and across the natural world, the practice of this work can be influenced by the individuals involved in living out these relationships and arrangements (see Natcher, 2005; Diver, 2016). For example,

[47] Western approaches typically view water (and the life within) as a resource to be exploited for human benefit, the here and now (Holling and Meffe, 1996), whereas Indigenous approaches generally perceive water as a living entity imbued with deep spiritual and cultural significance, important also for the generations to come (Strang, 2019). Worldviews more sensitive to the holism of freshwater ecosystems can contrast with management systems which demonstrate economic priorities and linear approaches to science and decision-making (see Kapyrka & Dockstator, 2012).

collaboration can be limited by a lack of individual preparation or awareness of how to work effectively and indeed appropriately in spaces involving a diversity of perspectives (reviewed in Kater, 2022).

There are contemporary movements where Indigenous groups are turning away from contexts that do not respect Indigenous rights to make decisions which affect them (Mills, 2018; Harper et al. 2018; Elliot, 2016; Coulthard, 2014; Corntassel, 2012; Fache & Pauwels, 2020; Whyte, 2018; Woodman & Menzies, 2016). This can be considered problematic given the interconnectivity of the natural world and an ever-evolving matrix of environmental threats. It is therefore critical that the individuals involved in undertaking collaborative work between Indigenous and non-Indigenous groups be prepared to navigate such contexts in ways which uphold Indigenous rights.

This study focuses on the Laurentian Great Lakes, where fisheries management communities are rethinking approaches to engagement and collaboration with Indigenous groups in the region.[48] Working for these Indigenous groups are Indigenous and non-Indigenous fisheries professionals who represent Indigenous interests and perspectives in fisheries decision-making including at the interface between Indigenous and non-Indigenous governments and government agencies. These individuals are positioned to reflect upon their experiences in their roles as well as their education and relevant trainings and the extent to which these enable effective collaborative work.

Through interviews with Indigenous and non-Indigenous fisheries professionals who work for Indigenous fishery agencies on the Laurentian Great Lakes, this chapter aims to help inform next and current generations of fisheries professionals working in such contexts of the important skills and mindset to be effective in their roles. We: (i) assess the extent of participant preparedness to work in roles that involve representing Indigenous interests and perspectives in fisheries decision-making; and (ii) identify useful learning and/or training opportunities that can help prepare fisheries professionals to work for or in collaboration with Indigenous fishery

[48] With regard to the Laurentian Great Lakes region, “Indigenous groups” is a term inclusive of Tribes in the United States and First Nations in Canada. We realize there may also be Métis communities.

agencies. This chapter also discusses important underlying characteristics of healthy and effective relationships. We offer ten reflections that could help prepare individuals to work in these roles and contexts, each of which are inspired by the interviews with participants in this research.

Methods

This study combines social science, ecological literature, and mixed-methods research to explore perspectives and experiences related to fisheries management in the Great Lakes. Through semi-structured interviews, fisheries professionals working for Indigenous fishery agencies shared insights towards preparing the next (and current) generations of fisheries professionals to be effective in such roles. These roles involve representing Indigenous interests in fisheries decision-making including at the interface between Indigenous and colonial-based governments (Table 3-1). These findings are also applicable for individuals working in collaboration with Indigenous fishery agencies who represent non-Indigenous governments.

Table 3- 1. Affiliations of interview participants.

Affiliation	Abbr.	N
Indigenous interTribal fishery agency (U.S.)	INTTR	7
Indigenous 'conglomerate' fishery agency (CAN)	INTFN	1
Tribal government (U.S.)	TRG	9
First Nation (CAN)	FN	6

Research philosophy

This study followed a constructivist research approach, which emphasizes that individuals construct their own understanding and knowledge through experiences and reflections. It acknowledges the subjective nature of interpretations and aims to uncover diverse meanings attributed to phenomena, considering social, cultural, and historical factors. The research used an exploratory, inductive methodology to generate hypotheses instead of testing pre-existing ones. The researcher's background as a white European-settler descendent in academia, and as

a fisheries professional with experiences in federal, provincial, and Indigenous governments influence the relationships formed in this research and how the data was analyzed.

Sampling strategy & participant recruitment

We conducted semi-structured interviews with a targeted sample of participants who worked with Indigenous fishery agencies and possess specific knowledge and experience in fisheries decision-making in the Laurentian Great Lakes basin. These participants were involved in fisheries co-management arrangements. A total of 23 participants were individually interviewed.

The initial participants were identified by the *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great Lakes* research team, and additional participants were recruited through a snowball sampling strategy. Potential participants received an email invitation explaining the study, participation requirements, ethical considerations, and the larger collaborative project that this research contributes to. Interested participants responded to confirm their interest, and interviews were scheduled (of the 49 individuals contacted to participate, 23 responded and confirmed their availability). Consent was obtained through written or verbal means before the interviews. Participants who agreed to receive an honorarium were offered $200 CAD in gratitude for their time and participation.

Data collection

Ethics approval for the research procedures was obtained from the Carleton University Research Ethics Board-B (CUREB-B), in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) (protocol #117457). Participants were assigned code numbers to ensure confidentiality during transcription, analysis, and reporting of results. Prior to the interviews, written or verbal consent was obtained, including consent for audio recording. On average, each interview lasted approximately 2 hours.

Semi-structured interviews lasted between 50 and 180 minutes and were conducted by Postma in-person, by phone, or through Zoom video conferencing between June and October 2022. The majority of interviews (19 of 24) were conducted through Zoom. Two took place in

person. The interview guide was developed collaboratively with the *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great Lakes* research team and covered various topics related to participant backgrounds, fisheries priorities, reflections on sea lamprey and fisheries decision-making, and approaches to co-management relationships on the Great Lakes. The interviews were recorded using Zoom internal recording software or Open Broadcaster Software as a backup. The best quality recording was retained, transcribed using Trint transcription software, and manually reviewed and corrected by Postma using the audio recordings.

After the transcripts were completed, a summary of the key points was created, and both the summary and transcript were shared with participants for their review, verification, and potential expansion. Participant feedback was welcomed at all stages of the analysis, following a collaborative approach that aligns with Indigenous methodology, promoting transparency and authenticity. Some participants provided edits and suggestions to their transcripts, which were incorporated into the final document before analysis. Postma made adjustments if any participant requested changes after the analysis was completed, and there were no instances where reported results could not be revised.

Analysis methods and techniques

Transcripts and reports were analyzed using a thematic analysis approach by Postma, specifically employing the codebook method with a general inductive approach following Thomas (2006). In the first phase, each interview transcript was read and summarized. The second phase involved generating initial codes, which were then applied to the transcripts using Nvivo 12.0 qualitative data analysis software. A final codebook was developed, incorporating new codes that emerged during the initial coding analysis. These codes were then applied to all transcripts by Postma.

The qualitative analysis focused on finding thematic patterns and areas of consensus across participants. Each participant was asked to describe their learning background and experiences preparing them for their employment to (i) assess the extent of their preparedness;

and (ii) identify useful learning and/or training experiences that would be helpful for others in these roles and contexts to receive. These findings may be applicable for fisheries professionals working with and for Indigenous and non-Indigenous fishery agencies.

Codes with related content were grouped into categories and summarized in the results (e.g., learning experiences found most useful). To ensure accuracy, themes were reviewed, and data excerpts were re-read to ensure participants' responses were represented accurately and within their original context. The emergent themes from this study are supported with quotations and excerpts from within the interviews to present commonly held views of multiple participants. The quotations describe themes and intend to ground content within their original context (and relationship) with other ideas.

Results & Discussion

Participants were asked to describe their background and learning experiences to identify experiences that may be helpful for next (and current) generations of fisheries professionals working for Indigenous fishery agencies. These findings may also be applicable for fisheries professionals working for non-Indigenous fishery agencies.

1. Participant Learning Backgrounds and Preparedness for Roles

Participants described their scopes of work as being guided by the interests and perspectives of the Indigenous communities with whom they worked (see Chapter 2). They noted that direction and decisions therein flowed from Indigenous Peoples, particularly Indigenous leaders and councils/committees. Their work responsibilities ranged from interacting with community members to carrying out biological assessments to negotiating and advocating for Indigenous interests in collaborative spaces (e.g., "*a lot of fisheries management isn't science. It's politics, opinions. We had to learn fisheries management, I guess, as opposed to fisheries science. Had to do that, too, but in order to survive and be effective, you need to learn how to be a fishery manager"*) (FP23, INTTR). Participants described their roles as "interfacing". When

interacting with others (such as community members or external partners), participants described responsibilities to connect and communicate different perspectives about science and decision-making (Figure 3-1).

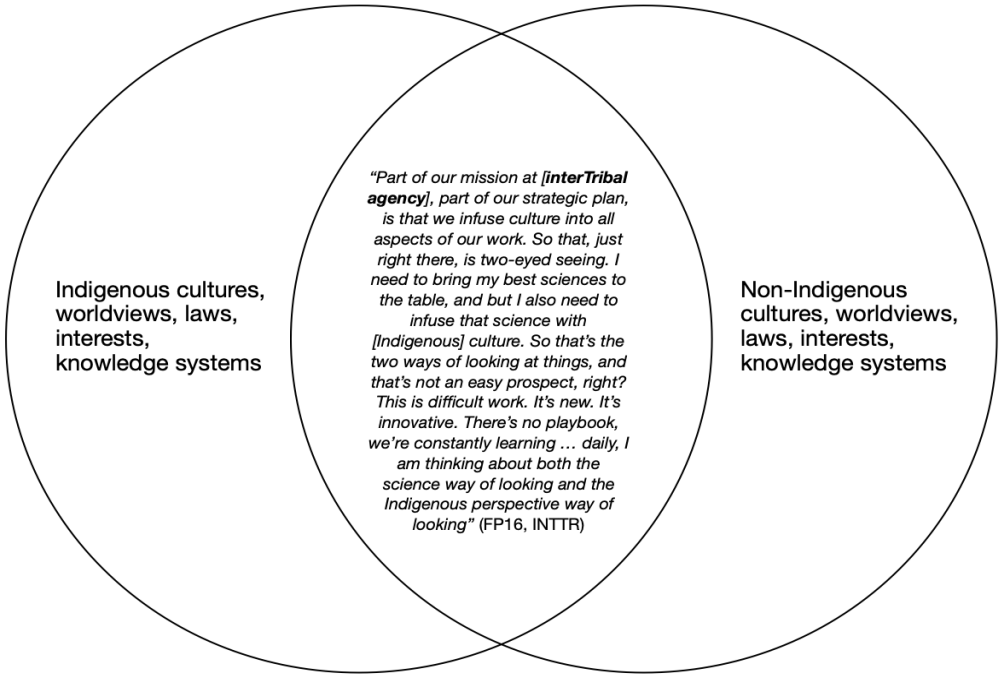


Figure 3-1. An example of the role of fisheries professionals working for Indigenous agencies and whose responsibilities include representing Indigenous interests and perspectives at the interface between Indigenous and non-Indigenous government/government agencies. This illustration is adapted from the Indigenous Governance Toolkit emerging out of Reconciliation Australia's work with Torres Strait Islander Peoples.

Participants described their learning backgrounds to include Western training (e.g., nearly all participants, N=22, described some level of Western scientific training; 75% of participants referenced a Master's degree or a further level of study, and others referenced current or future enrolment in graduate programs), diverse work experiences (e.g., employment with other Indigenous fishery agencies or with environmental NGOs to gain field and "soft" office skills; facilitated language and culture courses), and cultural and/or outdoors education gained from living in or spending time on community lands.

We noted varying responses to the question, "Did you feel prepared coming into your role?" A minority of participants said yes (4 of 23). Many participants told us they did not feel prepared. One participant shared,

(Interviewer: Do you feel that that background, all those different experiences, has well prepared you for your current role?) *"No, because mostly with the fisheries, in grad school and undergrad, it's all the research and working with the animals and doing your studies and writing those studies up, and there's a whole, you know, social interaction that you have to have as a biologist, communicating these findings … to people that aren't in the profession, you have to realize, you have to figure out a way to communicate what you found effectively. And that's been a, not a struggle, but it just wasn't something that was developed when I was in school. And so that's become a learning process, on how to communicate effectively to people who don't understand what a statistical model is … So, you know, in terms of the science, yeah, school is great and you're learning how to develop hypotheses and stuff like that, but actually learning to communicate to other people? That has been a learning experience. It's been good and I'm getting better at it, but that was definitely a shock" (FP03, INTTR)*

Participants explained that they did not expect, nor did they receive training, to navigate interpersonal dimensions.[49] They noted that a lack of interpersonal preparation appeared to also extend to fisheries professionals working for non-Indigenous organizations (e.g., "*[We work with] some scientists who are very smart, and they may come across as arrogant. But … they're just tactless. Their interpersonal skills are not there"* (FP06, INTTR). One participant shared an example of how their role extended beyond biological responsibilities,

"All of this work that we're doing is about humans. You know, it involves fish and habitat and wildlife and habitat, but it's a human-to-human job. The skills you need to succeed are the human-to-human skills … and folks have told me that they didn't know that they were getting into a human dimensions job" (FP15, TRG)

Some participants noted that they expected their professional responsibilities to be more than biological. However, they did not expect to what extent their scopes of work would require

[49] Here, "interpersonal dimensions" refer to human social interactions, relationships, and communication between individuals or groups. It encompasses the ways people connect, convey information, share experiences, and collaborate with others.

navigating relationships and drawing upon approaches to science and decision-making that differed from what was learned in Western education. One participant described how coming into these roles required a *"different way of thinking and communicating"* and that *"it's a little jarring when you come straight from other graduate programs, like, from academia, it's a very different way of interacting with the environment*" (FP03, INTTR). Another participant explained that "*it's a fair learning curve. I'm a white guy with a Western science background coming into an Indigenous community that doesn't necessarily follow that*" (FP11, INTTR).

When asked what part(s) of their learning background helped prepare them for their role, many participants told us that they came into their positions with "*absolutely nothing that could have prepared me for it*" (FP07, TRG). One participant explained that *"the only way to prepare for it is just to have an open mind and good work ethic and come in and try to figure it out"* (FP12, TRG). Participants frequently spoke to learning relevant skills through "*experience and exposure*" (FP23, INTTR) (such as on the job and place-based learning opportunities). Department leaders and mentors (e.g., community Knowledge Holders, Indigenous fishery colleagues, other community citizens) were referenced as influential in developing an understanding of the role. They also described learning from resources that were made available through interTribal agencies (e.g., introductory resources to Anishinaabemowin) and spending time on Indigenous lands and with the people who live on those lands.

Attending community events and "*walking in the woods with Elders*" (FP14, TRG) were described as important relationship building opportunities, including for identifying mentors and learning more about community interests and perspectives. Non-Indigenous participants often explained that their values and beliefs – indeed their interest in working for Indigenous agencies – aligned with Indigenous worldviews. For example, perspectives centered on human-nature interconnectivity and the long-term preservation of natural resources. They explained that these perspectives were made fuller and more profound through spending time on Indigenous lands and waters and with Indigenous Peoples. Two participants shared their feelings of preparedness and how they gained the experiences to work successfully in their roles,

> *"You come in with a background of fish biology and science, and it's like, it's not about science, it's about everything else that comes with it. It's about the people. But like, I made my own effort … I started attending ceremonies and powwows. I just kind of immersed myself, and I think that's how you learn [in these types of roles]. There was one good cultural training we hosted with an Elder here, but otherwise, I think you just got to learn by immersion, by making that effort" (FP07, TRG)*

> *"If I had to design a course, or the curriculum for that course, in order to teach somebody about this job, I couldn't do it. And I was an instructor for 30 years, so I'm familiar with the teaching end of things. But I couldn't do a course curriculum to teach anybody how to do this job. It's pretty much on-the-job learning and training and talking to local residents and making sure you're listening, and you hear what they're telling you when they tell you something" (FP20, FNG)*

Western education was described as a relevant requisite to participants' abilities to carry out technical work and "*go toe-to-toe with the other biologists*" (FP06, INTTR). However, several participants noted that Western training (and a mindset focused exclusively on Western training) can be a limitation. One participant explained,

> *"I think formal education puts you on a level playing field with the state or federal or other biologists. If you don't have that formal education, I sometimes get the impression that they don't value what you're saying as much. Now, on the flip side of that coin, I've received comments from Tribal Elders that my formal education means pretty much nothing to them … The gist of it was that I need a better education in their lifeways, and that my formal education did not prepare me to interact with the Tribes. Yeah, so, I guess formal education helped, but it was also a hindrance in some regards" (FP02, INTTR)*

Participants described how a diversity of professional and lived experiences proved helpful because in these roles *"we don't have as much capacity as a bigger agency. You're expected*

to do more, wear a whole bunch of different hats" (FP12, TRG). We learned that in-field training and abilities (such as setting nets and trailering) were skills desired by employers and useful in day-to-day work. Other participants spoke to the benefit of having developed "*soft-office skills*" (FP01, FNG) (e.g., learning to write grants, develop work plans, and manage limited budgets). Eight participants described previous work experiences with other Indigenous agencies. Although these experiences helped individuals know what to expect, we learned that each position and each Indigenous agency (and the communities they serve) is unique. Indigenous participants described how their background (such as growing up on the land and *"[having] a very strong ecological knowledge and a lot of strong outdoors experience"*) (FP01, FNG) provided a foundation from which to draw from in complement to other academic and professional learning experiences.

Indigenous fishery agencies are smaller organizations with less overall funding and human capacity (e.g., *"there's one person that's in charge of doing all of these activities and serving on all these committees, and I don't think anything really prepares you for that"*) (FP19, FNG). Participants referenced *"interacting on committees that people don't usually serve on until much later in their career"* (FP12, TRG). We learned also that positions are typically funded through proposals and grants, relying on funding provided by federal and state/provincial governments. Other scholars (e.g., Wilson, 2020; Parsons et al. 2021) illustrate how funding for Indigenous governments can change in response to shifting government priorities. This means that roles can be unstable in nature, and departments may only be able to employ a few individuals.

Working with Indigenous ways of knowing: Preparation and experiences

All participants told us they were guided by Indigenous ways of knowing in their roles.[50] However many participants (both non-Indigenous and Indigenous) emphasized that they did not hold Indigenous knowledges nor did they make decisions on behalf of Indigenous

[50] While being mindful of the diversity of Indigenous Peoples, cultures, and knowledge systems, here we understand Indigenous ways of knowing to reflect the worldviews, knowledges, and governance systems of Indigenous Peoples. These ways of knowing are tied to specific locations, transcend time, and reflect living in healthy relationship with all beings and the land.

communities. One participant shared an illustrative example of how Indigenous knowledge played a role in shaping their work,

> *"I was riding with one of the [Indigenous] commercial fishers and we were going over a spawning reef. He said the mining tailings that are on the shore are moving toward this reef, they're going to cover this reef, and there aren't going to be any fish spawning here. And I'm going to get blamed that I overfished them. Then he said, 'You need to do something'. Well, we wrote up a study, we studied the reef, we documented where those mining tailings were in the water in relation to the reef. And, over the course of my career, we've been trying to get those mine tailings sands removed I the shoreline ... It all comes back to riding on a commercial fishing tug with a Tribal member who had fished there for generations, and who knew that changes were happening to that reef. That mine tailings were on the move and covering a portion of the reef. He used to catch fish there, and he wasn't any longer. He would pull up pieces of the mine tailings and he knew that was the reason why. He didn't know why exactly the fish left, he didn't know these mine tailings pieces had copper in them that fish do not like, and so they move out of the area, he didn't know any of that. We had to do that through studies. But he knew that it was changing" (FP06, INTTR)*

In their roles, participants described "*learning new ways to think about things that do not exist in Western literature*" (FP14, TRG). Our findings align with Ban et al. (2018), who suggest that Indigenous and Western knowledge systems can have important complementary differences. This can include different approaches, but shared interests, to identify and understand drivers of environmental change. Two Indigenous participants shared,[51]

> *"I choose to use [Indigenous knowledge] because, in a way, it already speaks to the Western knowledge that you could get, and it's just complementary. It's explaining a different part of your answer in a different way that isn't approached using that*

[51] When using identifiers that specify Indigenous ancestry it is with the explicit permission of the Indigenous participant(s).

Western consistent scientific method … If I'm writing a report, and I'm pulling in some information that an Elder has told me, you know, say about the logging in this area, and how it's raised the water table, and how there's now more moose, well, I go in and look at old aircraft photos and topographic maps. I look at what the Elders said, and what the data looks like and, yeah, just verifying on the land versus acquired information. One is dependent data, one is independent data, in a way" (FP09, FNG)

"I've always said that science and traditional knowledge are pretty much the same thing, if you look at how they were approached, observationally and that sort of stuff, but the only difference in Western science and traditional knowledge is traditional knowledge doesn't require you to write it down and make a report" (FP20, FNG)

Participants expressed an interest in and need for more Indigenous approaches to science and decision-making in collaborative and broader scale decision-making (such as a perspective that prioritizes preservation over restoration initiatives). One participant shared an illustrative example,

[Interviewer: Do you use Indigenous knowledge in your role?] *"Needs to be a lot more. I'll give you a real life example that happened in Lake Huron. Under the 2000 Consent Decree, the parties, much to my dismay, agreed to manage lake trout … with a model generated quota that had never been tried here in the Great Lakes before ... The quota that the models introduced did not seem to match what we were seeing on the water, or what Tribal fishers were seeing on the water. Tribal fishers on Lake Huron have been there for a very long time. They saw changes coming ... We would talk to them at committee meetings, and I would have to talk to them about next years' quota. And [I remember] they looked at me with daggers and said, 'You don't have a clue what you're talking about. That's not what we're seeing. We're seeing this' … And, lo and behold, a couple of years later, the modeling group had to recognize that the model wasn't working, it was not lining up with what was being observed on the water. So the*

parties stepped in and negotiated a harvest limit, which was the very thing the state said they didn't want to do under the 2000 Consent Decree. They wanted to remove all politics from quota management, make it 'science-based'. But it wasn't working, and everything the fishers said they were observing ultimately turned out to be right" (FP23, INTTR)

Participants emphasized that Indigenous ways of knowing are distinct to the communities and peoples from which it originates. These responses echo scholars such as Wilson (2018) and Nonkes (2023) who suggest that while Indigenous knowledge systems can help improve understanding of environmental change (such as through place-based and long-term datasets), involvement cannot be uncoupled from the community or peoples from which it originates, nor their involvement in decision-making.

When asked how they learned about working with Indigenous ways of knowing in their roles, participants referenced mentorship from department leaders and Indigenous mentors (e.g., "*I try to lean on our Elders, our commercial fishers, as much as possible because they have a very detailed, long history of [Indigenous knowledge] that I'd say is generally unknown to, you know, the scientists working in the area*") (FP12, TRG). Some participants explained that learning about Indigenous ways of knowing "*[is] very off the cuff and requires just a lot of interfacing with our community [members]*" (FP18, TRG). One participant explained that they'd "*learned a lot from [my boss and coworkers] about living this way, like, thanking the animals that give their lives for us each and every day, and by saying prayers and going to ceremonies and doing things the way we culturally should be doing them*" (FP14, TRG).

We come to understand that although non-Indigenous individuals can acquire some learning experiences about Indigenous ways of knowing, it is Indigenous Peoples and Indigenous communities themselves who hold these knowledge systems and perspectives. Participants (of whom the majority were of settler descent) explained how the implementation of a type of Indigenous advisory board/committee, or direct relationships with Indigenous

communities, could support greater knowledge sharing between and among agencies involved in collaborative decision-making. For example,

> *"There's a push to include, whatever you want to call it, it's got a million names, but Traditional Ecological Knowledge, or Indigenous knowledge, into the proposals and into the actual work. And they contact me and I'm like, 'I don't know what to put in there'. And so, I think maybe connecting those researchers to [a group of Elders that would advise on fisheries-related issues] and kind of being the go between or the mediator facilitator, could be very beneficial to both parties" (FP02, INTTR)*

> *"Tribal biologists are all still, at least in Michigan, all Western trained. They're mostly settler descendants. And so in many cases, [co-managers are] preaching to the choir … what would it look like if instead of engaging with us, what would it look like if [they] engaged with Tribal citizenry?" (FP15, TRG)*

In this section of results, mentorship was described as key and valued.[52] This finding aligns with other scholars (e.g., Vaughn & Caldwell, 2015; Erhabor, 2018) who suggest that cross-generational and cross-cultural mentorship in natural resources management can foster good work and relationships, positively influencing the next generation of leaders through shared experiences and knowledges.

Bridging ways of knowing: Preparation and experiences

Participants told us they had not received training related to working with multiple knowledges (e.g., *"it's not something that's built into formal education"*) (FP02, INTTR). They expressed interest in such experiences while also suggesting that they anticipated more opportunities to be made available in the short- and long-term future (e.g., "*there probably are examples of [trainings related to bridging knowledge systems] that I'm not aware of because we are in a new sort of age*") (FP09, FNG).

[52] It should be noted that mentorship can place additional responsibilities on mentors, especially when sought from Indigenous Knowledge Holders and/or Elders. It is critical to realize that Indigenous mentors are sharing their knowledge, experience, time and energy for the benefit of the mentee. Gratitude and appropriate remuneration must be demonstrated (Ferland et al. 2021).

Some participants referenced Dr. Andrea Reid's (2021) paper, *"Two-Eyed Seeing": An Indigenous framework to transform fisheries research and management*, and opportunities to attend informal talks (e.g., guest lectures). However participants also told us that working with and bridging Indigenous and Western knowledge systems was a fundamental part of their roles. Participants explained,

> *"Training that weaves together two different ways of knowing? … No, I mean, I think that's something we do in our jobs consciously. It's more of an active, engaging component than it is something that's really taught. That'd be interesting, though, and I think we're there now, where you could probably create a curriculum around [working with multiple knowledges]. In terms of that two-eyed seeing approach, it's just something I do in my own job, my workflows and in my research methodologies" (FP09, FNG)*

When asked how they were able to work with multiple knowledges without training, most participants could not specify an answer. Some participants described bridging knowledges as an ongoing learning process (drawing from new and diverse experiences and interactions with community citizens) to *"think about the science way of looking, and the Indigenous perspective way of looking"* (FP16, INTTR). Indigenous participants explained that while they had not received formal training, bridging knowledges was the natural way in which they viewed the world. For example,

> (Interviewer: How did you learn to work with different knowledge systems?) *"Without even thinking about it. It's just the way it happens. That's the natural course of things. You know, I'm a biologist. I'm a Native [Person]. The ecology of it, how it all works, is always going to be at the forefront of my mind. Not just the politics of making these decisions … So, for me, two-eyed seeing is pretty much just an 'automatic, without thinking about it'. You start reading articles about it now, and it's like, 'Oh, that's not how everybody thinks about things? That's not how everybody is looking at things?' And it'd probably help if we did, right?" (FP04, TRG)*

Responses stressed the importance of preserving the integrity of each distinct knowledge system when sharing information.[53] Etuaptmumk (Two-Eyed Seeing) is a concept carried by Mi'kmaw Elder Dr. Albert Marshall, meaning "the gift of multiple perspectives". It can be a helpful framework by which to work responsibly with multiple knowledge systems, "learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing, and to use both these eyes together for the benefit of all" (Barlett et al., 2020, p. 335). Knowledges are not integrated or tested against one another, but rather bring together diverse ways of knowing in parallel for mutual learning and decision-making. As Bardwell and Woller-Skar (2023) write, "Two-Eyed Seeing is about the meeting of Western and Indigenous knowledge for a shared better tomorrow, for a more sustainable tomorrow, and that all hinges on accepting our responsibilities to nature and to each other" (p. 82).

The majority of participants in this study were familiar with the Two-Eyed Seeing concept and used the term unprompted and interchangeably throughout the interviews. Participants often spoke about two-eyed seeing in their role as a way to communicate knowledges (e.g., "*[a lot of our role is] listening and hearing what [Indigenous citizens] say, and then being able to translate it into 'science talk', right, and then when the science people talk, I'm able to translate it back into the way the Tribal leaders are talking about things. So that communication skill, that's critically important. I two-eyed seeing, being able to see things both ways" (FP16, INTTR)*

Dr. Marshall explains, "Two-Eyed Seeing is hard to convey to academics, as it does not fit into a particular subject area or discipline. Rather, it is about life: what you do, what kind of responsibilities you have, how you should live while on Earth … i.e., a guiding principle that covers all aspects of our lives: social, economic, environmental. The advantage of Two-Eyed Seeing is that you are always fine tuning your mind into different places at once, you are always

[53] Acknowledging and respecting various knowledge systems as distinct and belonging to respective Indigenous entities helps avoid the shortcomings of knowledge "integration" frameworks. As McGregor (2023) finds, these frameworks are still prevalent in many natural resource management structures, including those within the Great Lakes.

looking for another perspective and better way of doing things" (Bardwell & Woller-Skar, 2022, p. 79, as citing Marshall at the Institute for Integrative Science and Health). One participant shared how seeing with many eyes is important and helpful,

> *"I think it's important to use the two-eyed seeing theory in just about everything you do, not only committee work, but in the field as well. Just to understand the various other concepts and other ways to look at things. Particularly when you're talking about a scientist in a field, and the traditional knowledge holder in the field, they come to the same conclusion, but the roads to get there are sometimes entirely different. So you have to be able to, I wouldn't say rely on both, but take advantage of both and formulate your plan. Rather than just two-eyed, I'd say many-eyed seeing" (FP20, FNG)*

Participants emphasized the benefit and necessity of working together across the Great Lakes, including with diverse perspectives and varying worldviews. One participant explained how "*a lot of the challenges that we're facing now? No one agency can do it on its own. We have to do it with partners, or we're all going to fail. It's becoming more and more important"* (FP02, INTTR).

2. Preparing Next and Current Fisheries Professionals

Participants identified a number of recommendations that could be helpful for both current and future fisheries professionals (Table 3-2). These are not limited to those working for Indigenous fishery agencies but can be applicable to all individuals engaged in spaces involving Indigenous and non-Indigenous interests and perspectives. These findings highlight participant reflections and suggestions (e.g., what was missing from their learning experiences and what would have been or would be helpful to receive).

Table 3-2. Learning opportunities that could be helpful for fisheries professionals working for or in collaboration with Indigenous groups. Reflections are grouped into organizing themes and listed in order from most referenced (top) to least (bottom). Illustrative quotes are provided as examples.

Reflection	Participant Voices

Complete mandatory courses about Indigenous and settler-colonial histories, including Indigenous rights (inherent, Treaty)	(Interviewer: Would you feel that those courses would be beneficial to graduate students, fishery graduate students? *"Yes, no doubt. It's an attitudinal thing. My experience is that [the state] doesn't like the fact that we're doing what we're doing [fishing pursuant to Treaty rights]. And they act that way … Because either they don't get it, or they don't want to get it … If someone is going to work in the field of Great Lakes fisheries, if they have a career path in fisheries management, they should understand Treaty rights" (FP23, INTTR)* *"I was at a meeting and a [researcher] who worked on sea lamprey talked about how these Tribes see themselves as Sovereign Nations … So, I said, '[Look], the reason these Tribes won't work with you is because you're a racist … Treaties are only signed between Sovereign Nations. They literally can only be signed between Sovereign Nations. The Tribes don't think they're Sovereign Nations, they are Sovereign Nations'. I said, 'So how did you approach them? Did you approach them as a People who think they're a Sovereign Nation? Or did you approach them as a Sovereign Nation?" It's not so much a story about condemning but about pointing out that that was missing in their education" (FP15, TRG)*
Participate in cross cultural learning opportunities (e.g., cultural awareness and sensitivity training as part of onboarding requirements; integrate multicultural learning requirements into graduate programs)	*"I think cultural awareness would also be good for people who have been in this field for a long time, because, especially with the [state], there are a lot of biologists that are set in their ways, and set in their viewpoints, and not, you know, they're hesitant to kind of accept other viewpoints. So I think, you know, a broader appreciation for different perspectives would be good" (FP03, INTTR)* *"I think engaging with both the American Fisheries Society as well as the Native American Fisheries Society, that would help folks get an idea of both viewpoints early on" (FP02, TRG)* *"We train our up-and-coming professionals well in the sciences, hypothesis testing, statistics, all of that. But we do not train them at all in cross-cultural abilities, and that is a major weakness in our graduate level training … I'm trying to convince universities … that this kind of cross-cultural education needs to be a requirement in their graduate educational structures … And, you know, there are receptive audiences out there, I hear more and more about this … But it's a major hole in our natural resources educational process, I think. No matter where you go in North America, working in natural resources, you will work in a multicultural environment … And so, knowing how to deal with that*

	kind of environment is really important to being successful. And if we don't teach people how to do that, we're leaving them behind" (FP16, INTTR)
Receive training/experience in how to communicate in respectful and equity seeking ways across diverse groups	*"I guess the other thing that I think is missing [in our education system] is being able to convey, so, if worldviews are in the minority, how to convey those and in a way that puts them on the same level playing field as a predominating world view. And I guess the other piece of that is how to negotiate effectively with other co-managers. It's something that was never taught" (FP02, INTTR)* *"If they exist, take a lot of courses that offer the two-eyed seeing approach. Because, to come on a reserve with a wholly-Western-approach, it'd just, it'd go over the head a bunch of the time. Like, if you go to Council with a big document with a bunch of wording, a bunch of scientific words in it, it doesn't go very far. So you have to use our approach to it, and bring both together. And that goes over a lot smoother that way" (FP17, FNG)*
Seek training/experience in how to work effectively and ethically with multiple knowledge systems	*"I would like to see, if there was to be a formal training, both parties come together and present both viewpoints, and maybe provide some case studies, like how and where [co-management] can work really well, and then where it can just be a dumpster fire. I think that would help students to see, you know, that [two-eyed seeing] is probably the better path to take. Or maybe even an intermediate path where people work together, but at the end of the day, it didn't result in anything meaningful. And so, they could see kind of a range of interactions between scientists and Tribal members, or managers and Tribal members, and get an idea of those paths that are successful and the ones that are not" (FP02, INTTR)* *"I don't know of any courses, although there are some schools that are developing curriculum [that focuses on] Indigenous knowledge and Western science. I think it's getting there, but it's not on the curriculum quite yet" (FP06, INTTR)*
Spend time in Indigenous communities and with the people who live in those communities (e.g., internships)	*"My recommendation to a student would be to try to get an internship with an Indigenous agency or with an agency that's working within Indigenous communities, say, you know, Fish and Wildlife Service or one of the other agencies" (FP06, INTTR))* *"I think that there's so much value in the knowledge, again, that comes from within the community. And so I think the only real way you could get that is from actually being here on the ground and being open to*

	learning from people … I don't really see if there would really be another way to do that, except for going out with fisher and going fishing with them for the day and listening to what they had to say and those kind of things" (FP22, FNG)
Participate in conflict resolution-navigation training	*"Conflict resolution will be something nice to get training in, because when negotiating agreements with other parties there tends to be a lot of conflict. Pretty hard to navigate, sometimes, not being trained in that" (FP12, TRG)*
Learn about Indigenous data sovereignty	*"I also think that online, just recently, I took an online course, which was the First Nations Principles of OCAP course, which is ownership, control, access and possession. That was a surprisingly good online course which I think would probably be valuable for anyone that works with data and Indigenous communities" (FP01, FNG)*
Embrace self-directed efforts to learn about the landscape, including whose lands you are on, the geographies and biota, the stewardship practices	*"Basically anything that goes over traditional land use and anything that could kind of help you, like regulatory requirements, and that kind of stuff. Understanding whose land you're on" (FP05, INTFN)* *"I mean, having a good background on local communities, species, is invaluable. I mean, if you're going to be working with fish … know what different species there are" (FP10, TRG)*
Consider history and management structures relevant to a given location/issue (i.e., context)	"*So one of the biggest challenges when I first came was just even understanding the players. You know, we didn't spend much time talking about governance. And I think we should do a better job of that at university. I actually think if you graduate with a bachelor's degree in fisheries, especially from a place that's on the Great Lakes, you should be able to draw a chart of what Great Lakes management governance looks like. When I got [here], I didn't even know there was a Council of Lake Committees, the Lake Committees, the Lake Technical Committees, the Modeling Subcommittee, the Technical... I knew none of those things existed" (FP15, TRG)*
Enroll in interdisciplinary courses that frame natural resource management in a more holistic and encompassing manner	*"In the current world of fisheries management, it's modeling, modeling, modeling. Every time you turn around, there's another course in modeling. I think a lot of fisheries professionals come out of grad school with modelling drilled into them, but when they get into the real world they think all they need to do is write a model and the managers should just do what the model says. And it just almost never works out. Some managers will say, 'I don't believe what your model is telling me because I've seen this over my lifetime, that's*

	contrary to what your model says', that type of thing … I think leaning more towards interdisciplinary approaches in graduate school could encourage some of that, and maybe we'll drift that way, when First Nations and Tribes push us that way" (FP23, INTTR)

Preparedness would (ideally) include both technical experiences (such as those gained from Western academic institutions) and interpersonal training/learning experiences (such as conflict resolution training and learning how to work respectfully with multiple knowledge systems). Cross cultural training should include both broad and community-specific learning experiences (such as Indigenous and settler-colonial histories and learning experiences related to the traditions, languages and practices of individual communities).

Several participants noted that the best ways to learn were to "*get involved in everything, do not sit on your hands*" (FP23, INTTR) and to "*just ask questions*" (FP11, TRG). In response to the question, 'What lesson or reflection would you ensure to share with someone who is entering this space?' one Indigenous participant noted that there can be a hesitancy for non-Indigenous individuals to ask questions of an Indigenous citizen or Elder. They explained,

> *"It's okay to ask questions and it's okay to explain yourself in a way that people understand. And it is also okay to put your foot down. But knowing where you stand, knowing what you believe, and knowing that, you know, you want to help. You want to work here. You want to learn more. So, if you have questions, definitely ask them … And I will keep coming back to this. Sometimes you may be wrong, and that's okay. I've talked to so many non-Native people that say they've asked these questions, and they got, you know, an attitude towards them. They got a, 'Why? Why do you think that? Are you racist?' It's like, 'No, it's just a question'. And people don't know how to ask them without, you know, sounding a certain way. So, I try to keep that in the back of my mind every time I talk to someone that has those questions. People just don't know. And if they're willing to learn, and they're willing to ask, then I think it's on me, as a Native person, as someone in fisheries, to answer them to my best abilities without,*

you know, showing people that like, 'Oh, that was a dumb question', or 'That was racially said'. I'm just, you know, answering people. I want them to know that this could probably be said a different way. It's just to educate people, I guess, from my side of things" (FP14, TRG)

Participants told us that relevant training can be helpful in preparing for a role working for or in collaboration with an Indigenous fishery agency (as a Tribal or First Nation representative, or as an employee from a non-Indigenous government/government agency working in collaboration with Indigenous groups). This is particularly true if learning opportunities are attuned to the diverse and highly interpersonal scopes of work that fisheries professionals across contexts encounter (Natcher, 2005; Anderson, 2015).

However, participants emphasized that training is just one part of what can contribute to an individual's success in working with or for Indigenous communities. Throughout the interviews participants told us that individuals require "*the right kind of attitude*" (FP17, FNG) and a "*good heart*" (FP15, TRG). One participant explained that "*the only way to really learn [if someone has what it takes] is to test one's diplomatic ability, the skills to work with others. Sometimes it's the not really trainable traits that give an idea of how well you'll do working with other governments"* (FP23, INTTR).

3. *Characteristics of Healthy and Effective Relationships*

"*We're [in a] transition of change and understanding*, *but you may still be met with, I don't want to say hate, but anger, because transitioning is hard to accept, it's hard to understand*" (FP14, TRG).

This section presents findings about the characteristics important to relationships that can help translate learning experiences into positive action. Attitudes based on these characteristics can help set the right context from which to build relationships between individuals who represent different interests and perspectives (Gram-Hanssen et al. 2022). These results are applicable to interactions in co-management arrangements (such as interactions between Indigenous and

non-Indigenous groups in collaborative spaces) and between individuals employed by Indigenous fishery agencies and the communities that they serve. Coding of the interview data resulted in the identification of four interacting main themes and are illustrated by participant quotes. The four themes were developed based on their frequency in the data. These are: genuine intentions; respect; open-mindedness; and honesty.

Genuine Intentions

Successful collaboration is defined as the ability of all involved parties to achieve mutual and exclusive goals. However considering the historical and contemporary context of hegemonic control, and the underfunding generally experienced by Indigenous communities/governments, participants expressed that it has a *"big [positive] impact*" when individuals and agencies working for non-Indigenous institutions "*[use their] own skills and [their] own resources to do a project … that benefits [the] community*" (FP01, FNG). We learned that genuine relationships require commitments of time and mutual benefits for all who are involved. These collaborations go beyond short-term projects and interactions, emphasizing equitable and enduring partnerships (e.g., "*[working] with communities directly as a partner, not as a land consultant that you have to talk to. Actually being involved, maybe hiring monitors and coordinators and putting that money into the community to kind of build those capacities … Genuine help, wanting to engage communities and work with them and learn from them, not only just to do work, but to learn from them and the areas and the culture*") (FP09, FNG).

Respect

At the root of all successful relationships is respect (Gerpott et al. 2019; Overton & Lowry, 2013). Respect for the people involved and for their perspectives/worldviews. We learned that respect involves embracing other ways of knowing as valid, important, and on a par with Western/contemporary approaches. It involves understanding that Indigenous governments have distinct rights and knowledges that include ceremony, laws, governance structures,

languages and traditions.[54] Indigenous rights "*do not start and stop with counting fish at the dock*" (FP15, TRG), and Indigenous knowledge systems are not homogenous (e.g., *"What's valued in one group may not be valued in the same ways as another group, or there may be a different perspective … It's not a monolith. There's a lot of different cultures and entities within [the Indigenous population]"*) (FP13, TRG). Several participants explained that shared values of protecting natural resources can help diverse parties find and focus on common ground. Respect involves thoughtful consideration towards others and realizes the implication of power disparities that advantage and normalize Western ways of thinking, communicating and acting.

Open mind, open ears

> *"Keep an open mind. Don't try to ram things down people's throats. For example, not everything that modeling spits out reflects reality, most often it does not The person running the model thinks it's definitive because that's what they have been taught. But you just create conflict when somebody has that attitude … Fisheries can be a staunch and at times pompous discipline. We've got our formulas, our statistics, but real life often plays out much differently" (FP23, INTTR)*

A willingness to listen to and embrace new ways of knowing is a "*critical characteristic of successful research … when a researcher comes in and they're rigid in their way of thinking and doing things, that usually does not work well*" (FP16, INTTR). Openness to new perspectives between Indigenous and non-Indigenous actors can help address existing prejudices. One participant explained,

> *"If you have somebody that comes in [to these roles and spaces] with a preconceived notion of how things are done, whether it's [a perspective that] Tribal fisheries are depleting the resources and, you know, taking away all the opportunities, I think you're going to have some issues. But if you are open and willing to listen, and willing to learn*

[54] Ceded and unceded (i.e., Indigenous governments who entered Treaties and those who never relinquished lands to settlers-made-trespassers) retain inherent and reaffirmed rights to hunt and fish, and make decisions about actions/outcomes that relate to or affect their lands and water.

and willing to accept that, you know, there are these Treaties and there's these rights that these groups of people have, and what they, what they sacrificed for to get those rights … being open and willing to listen and being educated on both sides is vital to successful relationships (FP08, INTTR)

Honesty

Transparency and accountability in interactions (e.g., being clear and upfront about reasons for engagement) can help individuals and agencies ensure relationships are based on genuine intentions of collaboration and shared objectives, rather than opportunism or the interests of other parties. We learn that good communication (e.g., early and consistent dialogue that encompasses a range of topics) and the willingness to share information, including about topics beyond mandates or other party's interests, helps reduce doubt and develop foundations of trust.

Willingness: The key underlying factor

Within each of the four main themes, individual willingness emerged as a key underlying factor. Learning experiences more attuned to roles and contexts where individuals are undertaking collaborative work with Indigenous groups can be helpful. However, we learned that attitudes with characteristics of genuine intentions, respect, open-mindedness and honesty can translate to a willingness to embrace training, to learn about and appreciate the ways of knowing and perspectives of each other, and to build healthy relationships with which to carry out effective collaborative work. Attitudes can be encouraged in agency departments by leaders and mentors who model these characteristics.

"The more and more people that, you know, do want to educate themselves about [Indigenous and Western ways of knowing and doing], that do want to learn, it can be amazing. It can be beneficial to both sides at the end of the day" (FP14, TRG)

Limitations

Within the scope of this research there are some methodological limitations that should be acknowledged. First, interviews for this study were conducted during the Covid-19 pandemic and mostly through virtual platforms such as Zoom. This may have influenced the nature of communication and potentially posed barriers to interviewing more participants, particularly Indigenous participants, where in-person interviews could be preferred. Second, the minority of participants in this research were women (4 of 23). This could have limited the diversity of perspectives towards important learning opportunities and is particularly relevant given that the fisheries discipline continues to be largely composed of non-Indigenous men (Arismendi & Penaluna, 2016; Kleiber et al. 2014). Lastly, due to the nature of thematic and inductive analysis in a constructivist research approach, this chapter's findings are subject to interpretation through the researcher's individual experiences, biases and understandings. It is thus unlikely the study would be exactly replicable.

Conclusion

Most participants in this study described some level of Western education. Seventy-five per cent of participants referenced a Master's degree or a further level of study. An overarching theme in our study was that participants felt largely underprepared coming into their roles with Indigenous fishery agencies. Participants explained that while they expected their professional responsibilities to be more than biological, they were not prepared for the extent to which their scopes of work would require navigating relationships and drawing upon approaches to science and management that differed from what was learned in Western education.

They emphasized that Indigenous ways of knowing are distinct to the communities and peoples from which it originates. They referenced responsibility to, as one participant said, "*infuse Indigenous perspectives and culture in all aspects*" (FP16, INTTR) of their work. Many participants highlighted how learning opportunities related to working with multiple knowledges, such as training in Two-Eyed Seeing frameworks, *would* be helpful to receive,

noting that while they themselves had *not* received formal training, drawing upon multiple knowledges was an inherent aspect of their role.

Relevant learning experiences necessary for them to be effective fisheries professionals were largely gained on-the-job: through agency leaders and community mentorship, and by participating in community events and activities. Previous and diverse work experiences helped participants develop a range of useful technical skills. A background in Western education was described as a relevant requisite to interact with biologists from other agencies, but it was also described as a possible limitation insofar that a mindset focused exclusively on Western training can hinder growth and understanding.

Participants noted that Western education did not include any learning experiences related to Indigenous ways of knowing, Indigenous and settler-colonial histories, or how to communicate and engage in spaces where diverse interests and perspectives were present. Work experiences with other Indigenous agencies helped participants know, to some extent, what to expect. However each position and agency has unique contexts. Scopes of work and interpersonal dynamics specific to one Indigenous fishery agency may differ (at times greatly) from other Indigenous fishery agencies that serve different communities, and which are located in different parts of the Great Lakes.

All participants expressed interest to draw more upon Indigenous ways of knowing in fisheries decision-making. However, it was noted that there may be some hesitancy among Indigenous communities to share their knowledge – for training purposes with non-Indigenous agencies, and even with fisheries professionals under their employ. This makes sense given that Indigenous ways of knowing have been excluded, exploited, or manipulated to fit within (and in many cases benefit) Western approaches. Participants explained that opportunities to learn about Indigenous data sovereignty would be helpful. The First Nations Principles of Ownership, Control, Access and Possession (OCAP®) is one such opportunity identified by participants.

This research highlighted the importance of mentorship, specifically from Indigenous Peoples (such as Knowledge Holders). Meeting on Indigenous lands – when invited – can be an important step in creating more culturally appropriate spaces in which to share and grow

knowledges. Spending time with the people who live on these lands and attending community events can foster a deeper respect and openness towards different ways of knowing. It can also provide opportunities for Indigenous perspectives to be heard from Indigenous Peoples, and appreciated.[55]

Participants provided recommendations that could help prepare current and future fisheries professionals who work in spaces that involve Indigenous and non-Indigenous interests and perspectives. These recommendations include the completion of mandatory courses about Indigenous and settler-colonial histories, participation in cultural awareness and sensitivity training, and training in how to work respectfully with different knowledge systems. Indeed, training more attuned to roles and contexts where individuals are undertaking collaborative work with Indigenous groups can be helpful. Participants expressed interest in and hope for such opportunities to be made more available now and in the future.

These findings describe directed self-education as well as shifts within research and academic institutions to enable opportunities to learn about Indigenous rights and Indigenous realities within a settler-colonial society. In Canada, the 94 Calls to Action as released by the Truth and Reconciliation Commission (TRC) in 2015 provide important foundation from which governments and institutions can begin processes of reconciliation (TRC, 2015). Here it is also helpful to learn from Wong et al. (2020), who outline 10 Calls to Action to individuals working in natural sciences fields to enable reconciliation in their work. The authors highlight in Call 10 the need to "mainstream reconciliation in all aspects of the scientific endeavour" (p. 779), aligning with the TRC in that "all aspects of Canadian society may need to be reconsidered" for true reconciliation between Indigenous and non-Indigenous communities (TRC, 2015).

This chapter and indeed so much of this thesis emphasize the role of the individual in enacting meaningful progress. While the learning opportunities identified in this chapter were acknowledged as helpful, participants emphasized that having the right attitude and a "*good*

[55] Indigenous Peoples are underrepresented in natural science fields (Wong et al. 2020). Underrepresentation in the natural sciences can mean that non-Indigenous individuals predominately represent Indigenous interests and perspectives in decision-making, including at the interface between Indigenous and non-Indigenous governments.

heart" (FP15, TRG) were critical for success when working with (as a collaborative partner/agency) or for (as a representative) Indigenous communities. The key characteristics that establish a conducive environment for healthy and effective relationships include genuine intentions, respect, open-mindedness, and honesty. Underlying each of these is the willingness to learn from and embrace the perspectives of others. Encouraging such relational characteristics in agency departments, supported by leaders and mentors who model these attitudes/values, can support the voice and wisdom of Indigenous Peoples and promote beneficial outcomes for all.

Chapter 4: General Discussion

The objective of this thesis is to begin to learn how Indigenous voice and wisdom can be meaningfully supported in sea lamprey and fisheries decision-making on the Laurentian Great Lakes. Specifically, I[56] set out to learn from the perspectives and experiences of fisheries professionals employed by Indigenous fishery agencies on the Great Lakes. This group is involved in fisheries decision-making including at the interface between Indigenous and non-Indigenous governments. This research demonstrates that the equitable inclusion of Indigenous rightsholders can move us further along and together on a shared pathway of reconciliation. Tangibly, this translates as more effective decision-making and action taking in collaborative research and management. Although this research was specific to the Great Lakes it has wider implications for other collaborative freshwater management contexts within which Indigenous Peoples are impacted and can inform positive outcomes.

Summary

The insights and reflections of participants interviewed for this study suggest opportunity for a deeper collaborative management that will strengthen fisheries decision-making and support the health of the Great Lakes. This opportunity is complemented in that federally recognized Indigenous rights have evolved into increased possibilities of involvement in system-wide collaboration, reinforced by scholarship, and policy and advocacy movement to highlight the importance of meaningful engagement and commitment to a collaborative approach which values diverse perspectives.

I find however that on the Great Lakes while some progress has been made, more is needed from individual to institutional to system levels. Ultimately, a decision-making structure is impacted if it does not distribute power and responsibility equitably, as is a central tenant of co-management and principle of UNDRIP. This includes insufficient space-making for

[56] In this chapter "I" is used to indicate that discussion content flows from my own thoughts and interpretations.

different governance and knowledge systems. Importantly, the deeper inclusion of Indigenous voice and wisdom must also come with the realization that Indigenous governments are independent sovereign entities, each with inherent rights and distinct knowledge systems.

This thesis includes two complementary chapters that draw from the same methodology, offering reflections towards more reconciliatory and effective shared management. In Chapter 2, under the guidance and with the support of my co-authors, I interviewed twenty-three fisheries professionals employed by Indigenous fishery agencies to learn about the depth of their involvement in sea lamprey and fisheries decision-making on the Great Lakes. I learned about challenges that can affect co-management as well as reflections shared that can help inform more reconciliatory engagement and collaboration. Here it is important to note that 65% of participants did not identify as being of Indigenous ancestry.

Overall, I have learned that respectful and mutually beneficial relationships, where decisions are made together, can help strengthen support towards and embrace potential for enhancement of fishery programs, such as the sea lamprey control program. Indigenous knowledges, while increasingly valued by participants and partners alike, are inextricable from Indigenous Treaties, rights, and fundamentally Indigenous Peoples. Policy commitments and legislative requirements recognize and reaffirm Indigenous Peoples' inherent rights to fish and make decisions about the fish that swim within and across jurisdictions and lakes. Shared responsibility across the ecosystem asks for consensus from all relevant actors, highlighting the necessity for consistent dialogue and appropriate financial resourcing to enable fair participation. This research affirmed the reality that Indigenous Peoples are rightsholders, each government requiring opportunity for equitable participation and influence in decisions that take place within or affect their lands and waters.

In Chapter 3, I analyzed questions that specifically asked about participant learning backgrounds and professional experiences. Participants described their positions as interfacing with Indigenous community citizens and external groups/partners. I set out to learn about the extent of their preparedness and to identify useful learning and/or training experiences that could be helpful for others working in these roles and contexts to receive. I share ten reflections

emerging from the interviews that outline opportunities to help prepare individuals working for or in collaboration with Indigenous fishery agencies.

Participants expressed a lack of preparedness when stepping into their roles, citing the multilayered scopes of work that extend beyond what had been learned in more formal academic settings. While technical and other relevant training were considered valuable, participants emphasized how it's "*often the untrainable skills*" (FP23, INTTR) that contribute to an individual's success in spaces that involve diverse interests and perspectives. Responses emphasized that genuine intentions, respect, open-mindedness and honesty can go a long way towards appreciating the contributions of others and working together in good ways. Mentorship plays a role in cultivating these characteristics, complementing what I have learned throughout this thesis that leaders are pivotal in effecting progress. Non-Indigenous participants pointed out a lack of training in understanding or working with Indigenous ways of knowing, yet all participants noted that drawing upon both Indigenous and Western knowledges was a significant aspect of their roles. What was highlighted as being particularly helpful was spending time in and attending community events, and intentionally drawing from the learnings of previous and ongoing lived experiences.

Findings and Implications

Several findings have risen in significance throughout this research. One is that the legal situations vary by country and jurisdictional context. First Nations in Canada are less represented in collaborative and lake-wide decision-making than Tribes in the United States. A second is that representation on behalf of collective Indigenous interests and perspectives can be inadequate, especially if Tribes and First Nations do not have opportunities to decide how they wish to be represented. First Nations cannot be represented by the Province of Ontario. InterTribal agencies play an important and valued role, yet the majority of participants suggested that these organizations should not speak on behalf of all Tribal rightsholders. While it is acknowledged that Tribes granted management authority to interTribal agencies in the 1980s, the evolving legal dynamics surrounding Indigenous rights and title indicate that Tribes

and First Nations working for self-determination should have the opportunity to revisit how they wish to be represented.

Homogenizing Indigenous Peoples fails to promote reconciliation, just as engagement without appropriate compensation for fulfilling duty to consult obligations, or without a concrete mechanism to hear Indigenous decisions, falls short of meaningful progress (see Minode'e Petoskey, 2020). This is particularly relevant in Canadian contexts where UNDRIP received Royal Assent, becoming official Canadian law in 2021. A third key theme is the disconnect between recognition and acceptance of Indigenous rights, insofar as fisheries decision-making requires listening to and acting upon all voices in the room, including Indigenous voices which have historically been suppressed if not excluded. Several participants shared examples such as: "*I was working with one researcher that lumped tribes under stakeholders here in the Upper Midwest … here, they do not view themselves as stakeholders. They are Nations, Sovereign Nations. And the interaction is government-to-government negotiations. And [they] just did not have the history on any of that, even though [they've] lived here for a long time, to realize that you shouldn't do that*"' (FP02, INTTR)".

Throughout this thesis I have drawn inspiration and guidance from important principles within the United Nations Declaration on the Rights Indigenous Peoples. Article 18 states:

> "Indigenous Peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves in accordance with their own procedures, as well as to maintain and develop their own Indigenous decision-making institutions" (UNDRIP, 2007).

These words affirm that Tribes and First Nations on the Great Lakes have inherent rights to participate equitably in decisions about the fish that move within and across jurisdictions, and the waterways in which they move. UNDRIP gives strength to the full inclusion of Indigenous voice and wisdom as well as legislation to promote accountability and the responsibility of duty bearers.

1. *What is meant by meaningful?*

I used the word *meaningful* throughout this thesis. "Meaningful" carries the potential of significance and action, especially when associated with terms such as "participation" and "involvement". Fridkin et al. (2019, p. 12) suggests that "meaningful involvement requires attuning to the underlying power dynamics inherent in policymaking and taking action to decolonize and transform the policy system itself". Peltier (2018) describes "meaningful" as respectful research deriving from Indigenous worldviews, suggesting the application of Dr. Albert Marshall's Etuaptmumk (Two-Eyed Seeing) framework to reconcile Western methods with Indigenous knowledge. Other authors suggest that the facilitation of meaningful engagement requires working together within a framework that aligns with and appropriately supports the participation of Indigenous partners (Ruwhiu & Carter, 2016).

The intergovernmental Arctic Council (of which eight Arctic states work in collaboration with six organizations representing Arctic Indigenous Peoples) published the reference guide: *Meaningful Engagement of Indigenous Peoples and Local Communities in Marine Activities* in 2021. This reference guide suggests that "meaningful" has no single definition, nor does it have a one-size-fits all approach to collaboration and relationship building. I think this is an important consideration in research seeking to understand how to work together in good ways. Context is important, as is the timeframe in which research questions are asked. As the legal landscapes of rights and title continue to evolve, so too will there be renewed opportunities to understand what constitutes meaningful relationships and collaboration.

In this research, I have come to understand "meaningful" as *genuine* and *equitable* relationships, inclusive of the rights and knowledge systems of Indigenous Peoples. I have learned that "meaningful" should be described from the outset of its use, whether in scholarship or practice. Without assigning meaning to the word *meaningful*, it loses its essence of power and purpose.

2. *Supporting Indigenous Voice and Wisdom in Fisheries Decision-Making on the Great Lakes*

This research demonstrates that collaborative decision-making on the Great Lakes is positioned within colonial-based structures, thus positioned to prioritize colonial interests (e.g., recreational fishers) and knowledge systems. Growing momentum to more prominently include Indigenous voice and wisdom is constrained within a framework of science and decision-making that is distinctly non-Indigenous. As such, Indigenous rights and approaches to management are generally marginalized (although it is noted there is some variation across the Great Lakes). Scholarship suggests this is true in contexts and regions around the world, where knowledge and power-sharing initiatives are layered on top of colonial legacies (e.g., New Zealand, Peru and Bolivia, the Pacific Northwest) (Diver, 2016; Hsiao, 2012; Stevenson 2006). It is therefore unclear if refinements to current structures would be sufficient to rectify this problem or if there is need for new institutions and institutional frameworks.

Collaboration is often described on a continuum, where the participation of relevant actors can be presented on a ladder ranging from informing and consultation, to independent, bottom-up self-management. Ideally, co-management fits somewhere in the middle. Lower-level participatory arrangements may "*tolerate*" (FP20, FNG) Indigenous rights, while higher rungs accept and value Indigenous partners as co-managers and rightsholders. Terms such as "tolerate" and "accept" are personal verbs, implying that internal perceptions as well as external challenges (such as adequate financial resourcing) can affect the structure of the ladder. While a ladder metaphor may be limited by its otherwise linear and unidirectional representation, it nonetheless highlights the challenges of collaboration and the need for intentionality in striving towards equitable agency by all involved actors. Berkes (2009) describes the evolution of co-management as moving from a more top-down and fragmented arrangement to one with vertical and horizontal links between partners, equality among decision-makers, and the ability to shape and plan the future.

Equitable collaboration between Indigenous and non-Indigenous participants can be useful for Indigenous governments working to achieve self-determination. Indeed, participatory

decision-making across the Great Lakes is critical. Sea lamprey and an evolving matrix of environmental threats pose highly contextual and wide-reaching challenges to fish and fisheries managers, thus requiring a system-wide approach to research and decision making. Co-management can be invitational. It can provide opportunities to come together to share and grow knowledge with which more encompassing and holistic decisions can be made. However such approaches must be founded in the meaningful involvement of Indigenous voice and wisdom. This is being increasingly understood if not reinforced as the outputs of fisheries decisions (such as the implementation of sea lamprey control) take place within and across Indigenous territories where Indigenous Peoples/governments have increasing authority over their lands and waters.

I engaged with two case studies that further corroborate the findings of this research, outlining challenges of collaborating within colonial legacies and realities, but also some opportunities for reconciliatory and effective co-management. The first addresses opportunities for more equitable sharing of power and responsibility within the context of a Western system in Northern California. The second describes how appropriate space for Indigenous knowledges and worldview in research and management supported greater participation and agency of the Nunatsiavut government.

Example 1: Forestry co-management with Karuk Peoples in Northern California

Diver (2016) provides a case study about co-management between the Karuk People and the U.S. Forest Service in Northern California. Diver notes that while co-management is not a panacea, it can be a helpful tool or interim strategy to support broader goals of Indigenous self-determination in resource management decisions. In this case, a central element supporting the success of collaboration was the creation of an Interdisciplinary Team (ID Team), wherein a co-lead structure of Tribal and federal agency leaders was implemented as the primary mechanism for supporting management decisions. The U.S. Forest Service was not comfortable with the approach and resisted the idea of appointing a Karuk citizen as a full ID Team member. However, the idea moved forward under the direction of a key agency leader from within the

U.S. Forest Service. This individual also created opportunities to strengthen relationships, such as through a river float trip. The project was ultimately abandoned because of the dependence on the actions and intentions of the one key agency leader and the lack of accountability measures to ensure it could carry on despite leadership changes or shifting government priorities. This case study suggests that a greater level of institutional and legal accountability is needed if co-management arrangements are to become more than a temporary space for sharing knowledge and authority. However, Karuk leaders viewed the project as a success because it was the first time the U.S. Forest Service leaders had formally recognized the rights and ability of Karuk citizens to manage cultural resources within shared lands.

The findings of my research suggest similar opportunities. I found that agency leaders play an instrumental role in enacting positive progress, exhibiting an openness and willingness to embrace a different approach to management decisions. Leaders play a critical role in shaping agency direction and individual attitudes. We learned that a type of Indigenous Advisory Committee (such as a co-lead structure) could help facilitate direct connections between Indigenous and non-Indigenous groups. These connections could help ensure a deeper and more authentic sharing of Indigenous knowledges (if befitting of the Indigenous Peoples holding the knowledge) as well as potentially speed up decision-making processes (such as if community decision-makers serve on the Committee).

A prominent theme in my research was that each Tribe and First Nation should be equitably involved in intergovernmental decision-making. Engagement is important insofar as it can provide decision-maker-to-decision-maker interactions. It can provide a means of communication between non-Indigenous governments and research agencies, and Indigenous communities who may not be involved in spaces of collaborative decision-making.

However, involvement in system-wide collaboration is also necessary to ensure all Tribal and First Nation Peoples are fully informed and can influence decisions that affect or relate to them. Importantly, it lessens Indigenous Peoples' reliance on federal/state/provincial governments for information (e.g., about matters that may extend beyond federal/state/provincial mandates and agendas). The Great Lakes ecosystem is interconnected

and managed as such by various governance initiatives and research agencies, including the GLFC. This provides a further reason for involving all rightsholders in decision-making (and not simply relegating certain First Nations or Tribes to the receiving end of decisions made).

Indeed, my research emphasized that involvement in and power over the planning and design of science and decision-making can support Indigenous agency and embrace the potential for enhancement of fishery programs, such as the sea lamprey control program. As one Indigenous participant shared, "*It makes it a lot easier if you want the Indigenous population to follow the plan, if they have a representative at the table that helped write the plan in the first place … The power of persuasion gets lost when the voices aren't in the room"* (FP20, FNG).

Building partnerships is inherent in most co-management approaches (Nursey-Bray et al. 2018) but in this study participants made clear how collaboration is first and foremost about relationships. They suggested that informal opportunities to connect outside the parameters of work could help foster positive interpersonal dynamics. One participant explained how the event *Partners in Fishing* had been a helpful and important opportunity – organized by a key leader within a non-Indigenous government – to build human connection and lessen some of the seriousness and tension in fisheries co-management.

Diver (2016) characterized co-management as a means for the Karuk Peoples to progress towards self-determination, enabling power-sharing despite existing colonial-based structures and norms that marginalize Indigenous voice and wisdom. Karuk leaders described the relationship as a success because of the formal recognition of their rights as co-leaders and managers. I think this illustrates that even though the project did not continue, the realization of the Karuk Peoples' rights, as reflected by opportunities for Karuk-led research and decision-making, was an important step towards meaningful power sharing and collaboration. This case study and indeed my own research, illustrate that while relationships are key and foundational, there too must be structural policies and accountability within institutions. This ensures continuous progress towards power-sharing to influence decision-making processes and outcomes, irrespective of changing governments and key personnel.

Example 2: Fisheries co-management in Nunatsiavut

Cadman et al. (2022) shares an example of a fisheries co-management arrangement in an Inuit community in Nunatsiavut, where appointees from federal, provincial and Nunatsiavut governments conduct research and provide management recommendations. In this project, Nunatsiavut-led research and discussion plays a significant role. Cadman et al. (2022) writes that the initiative funds research programs that collect data from the data poor region in collaboration with Nunatsiavut fishers, marking a significant shift towards Inuit Peoples having more control over the research agenda, increasing local capacity, and including Indigenous perspectives in decision-making. Additionally, an Annual Fisheries Workshop provides an opportunity to gather in the questions, concerns and priorities of Nunatsiavut fishers. Cadman notes that while this venue is important, more opportunities to engage with Inuit communities in culturally appropriate spaces should be taken, opening the door to community decision-makers. Encouraging Nunatsiavut Peoples to communicate their needs and priorities should be done in ways that are culturally relevant and place-based, set up in ways to facilitate co-learning and active feedback. Cadman notes that a formal setting and structure may feel uncomfortable to some fishers, also pointing out the lack of women representation. Importantly, this case study illustrates a marked difference between the years 2010 and 2020, with earlier meetings more focused on administration and bureaucracies. The latter demonstrates more efficient meetings focused on research and outcomes. Cadman and other scholars demonstrate that co-management can be an evolving process (Berkes 2009; Armitage et al. 2009).

A prominent theme throughout this thesis was that momentum to strengthen relationships and deepen involvement of Indigenous voice and wisdom in Great Lakes decision-making is constrained within a framework that is distinctly non-Indigenous. A challenge is that those involved in collaborative spaces are necessarily decision-makers on behalf of Indigenous communities, nor are they holders of Indigenous knowledge or in positions to decide when or

how Indigenous knowledge can be drawn upon. [57] Research operates on a defined funding timeline that, as one participant said, "*does not jive well*" (FP02, INTTR) with Indigenous communities, as these communities' legal and decision-making systems may need additional time to filter projects and decisions through varied leadership channels. And not always do relationships or full knowledge of a project exist before a request is made for Indigenous input such as knowledge. I have learned also that while there is indeed some increased interest there is nonetheless the concern as expressed by participants that Indigenous approaches remain less embraced and less sought after in some important collaborative spaces.

The above points, and particularly the third, highlights the importance of building relationships with Indigenous communities (insofar as engagement and involvement in multijurisdictional collaboration are both concerned). For example, *"It's those individual relationships, interpersonal relationships, that are so critically important … People ask me, 'Oh, well, how can we work with [the] Tribes?' I always tell them the same thing: you've got to establish relationships with them. [This means] you can't come in with your own agenda. You've got to come in with an open mind and listen to what they're saying" (FP16, INTTR)*.

As Ferland, Chen and Villagrán Becerra suggest in *A framework and resources for Indigenous community engagement*, working in good ways with Indigenous Peoples – where knowledges can be shared and projects supported – are founded in sincere relationships, *i.e.,* the "work before the work" of developing partnerships (Ferland et al. 2021, p. 16). As Musset et al. (2022) writes, "Inherent to being in good relationships within these contexts [of Indigenous and non-Indigenous relations in fishery governance and water protection in the Laurentian Great Lakes] is the need for Indigenous languages, knowledges, and approaches to be on equal footing in current methodological frameworks in stewarding aquatic ecosystems" (p. 2).

[57] Participants described their work as guided by Indigenous ways of knowing. However they emphasized that they were not holders of knowledge that would be relevant to a given context/issue. This point is framed as such because several participants in my study were Indigenous. Some of these individuals explained that they were not Knowledge Holders (referencing community Elders).

Suggestions of an Indigenous advisory board/committee, as earlier mentioned, could provide one bridge between co-management boards and community Knowledge Holders and/or decision-makers (similar, too, to the Annual Fisheries Workshop described in Cadman et al. 2022). Other opportunities could include more and consistent opportunities of dialogue between government and research agencies, and Indigenous Peoples. One participant suggested that important discussions (such as the Sea Lamprey International Symposium) could include a virtual link wherein Indigenous citizens could listen and provide comments or future agenda topics in a monitored chat bar.

My findings echo Cadman's suggestion to create more culturally appropriate spaces to facilitate mutual learning. As referenced in this thesis, meaningful engagement and involvement in collaboration are both important components of reconciliatory and effective decision-making. This can include holding meetings on Indigenous lands, where the outputs of fisheries decisions such as sea lamprey control have been and continue to be implemented and shifting towards communication methods that better align with Indigenous interests and customs.

Spending time on Indigenous lands and with the people who live on those lands can be an important next step in creating spaces more respectful of Indigenous ways of knowing, being, and doing.[58] It can also provide opportunities in which a deeper understanding of Indigenous ways of knowing can be heard and appreciated, and relationships developed. For example, in my research participants suggested walking together with Indigenous Elders in the woods, participating in and supporting community events, and engaging in more social and informal dialogue (e.g., *"Tone it down a bit, when you come … just don't be so serious … Have a good time, we're very easy going, and we like to laugh*") (FP17, FNG).

I learned that there is a hesitancy to invite all Tribal and First Nation governments to the decision-making table (e.g., as signatories to the consensus-based JSP). A common critique

[58] I learned from participants that meeting and spending time on Indigenous lands could be an opportunity to shift away from norms and practices of colonial-based management, suggesting a re-envisioned "table" around which to gather. Social interactions and particularly in ways that welcome dialogue more fitting with Indigenous modes of communication – whichever these may be for each community – could be a helpful step towards building relationships.

of co-management is that the system can be hindered by additional layers of bureaucracy (see Pomeroy & Berkes, 1997; Marín & Berkes, 2010). Scholars such as Armitage et al. (2009), Nursey-Bray et al. (2018) and Cadman et al. (2022) illustrate how processes of shared decision-making can evolve but can also be impeded by persisting challenges that may limit co-management ability to support adaptation.

In my research, I learned there is hope for positive progress as working together with Indigenous partners becomes the "new normal". Indeed, one Tribe has since become signatory to the Joint Strategic Plan.[59] Some participants referenced how current means and opportunities to draw upon Indigenous voice and wisdom in management decisions (such as through interTribal representation) can in fact delay decision-making processes. Here, it is helpful to learn from Berkes (2009) who describes a process of adaptive co-management, further emphasizing flexibility and opportunities for mutual and enhanced learning. There is great potential for an adaptive system, one which can embrace more voices and opportunities to achieve sustainable fisheries management in the face of changing environmental conditions and uncertainties.

3. Truth: Inseparable from Reconciliation

These two examples and indeed so much of this thesis highlights the importance of relationship building and broader structural transformation within the context of decision-making. The equitable inclusion of Indigenous rightsholders will require shifts in mainstream approaches to protecting and managing the natural world. Barriers preventing full, collaborative partnerships between settler-colonial governments and Indigenous groups can be attested to a lack of understanding of Indigenous rights (Wong et al. 2020). Endeavours to advance reconciliation are fruitless without also acknowledging truths as laid out by the Truth and Reconciliation Commission of Canada and its subsequent 94 Calls to Action (TRC, 2015). Reconciliation is inseparable from truth. As such, truth is a requisite for understanding how to work together

[59] Red Cliff Band of Lake Superior Chippewa successfully petitioned to become the first Tribal signatory to the Joint Strategic Plan in October 2022. The JSP is consensus-based, meaning that all other signatories – including federal, state, and provincial government agencies – approved of the addition.

within the complex histories and realities of settler-colonialism. Simply recognizing (or tolerating) Indigenous rights neither translates into genuine intentions nor promotes the sharing of power and responsibility.

As I have learned from the important works of Glen Coulthard, Indigenous rights transcend recognition within a colonial-based system. This is discussed in a growing body of scholarship which calls for a new vision for conducting natural science (Harper et al. 2018; Fache & Pauwels, 2020; Whyte, 2018; Woodman & Menzies, 2016). Swerdfager and Armitage (2023) describe a collaborative wildlife management initiative – the North American Waterfowl Management Plan – where federal, provincial, state, and municipal governments, Indigenous governments and organizations, conservation groups and other local NGOs from across Canada, the United States and Mexico, come together to conserve and protect wetlands and waterfowl. Each party in this joint venture fully retains their decision-making authority, and the decisions made are binding only on the partners (not on any broader constituency). This initiative reminds me of A Dish With One Spoon, an agreement between Indigenous Peoples of the Great Lakes region which retained distinct sovereignties but enabled coexistence and sharing of lands and waters.

My findings in Chapter 3 suggest a need to reconsider what is core to the preparation of individuals involved in undertaking collaborative work with and between Indigenous and non-Indigenous groups, such as more diverse and decolonial training in the fisheries discipline and within the field of natural resource management as a whole. This is made even more important given shared commitments to healthy fish and waters and increasing opportunities to work together with Indigenous partners.

I learned that training more attuned to roles and contexts where individuals represent diverse (Indigenous and non-Indigenous) interests and perspectives can be helpful. Participants expressed hope for such opportunities to be made more available now, and in the future. For example, in fall 2021 Indigenous and non-Indigenous colleagues at Grand Valley State University in Michigan employed an Etuaptmumk approach to teach a well-received aquatic science seminar course (Bardwell &Woller-Skar, 2023). Additionally, the Centre for

Indigenous Fisheries (located in UBC's Institute for Oceans and Fisheries) offers *Co-Creating Aquatic Science*, a course co-created with community members from the University of British Columbia and the Haida Nation. Taught by Dr. Andrea Reid (Nisga'a Nation) and Kii'iljuus Barbara Wilson (Haida Nation), this course aims to train and empower the next generation of researchers to co-create aquatic science with Indigenous partners (Centre for Indigenous Fisheries, 2022).

While more relevant learning opportunities are indeed helpful, genuine intentions, respect, openness and honesty are critical underlying characteristics necessary to translate learning into collaborative action. *Effective* collaborative work, as expressed by participants, is work which respects Indigenous rights, interests and knowledges. It is helpful to learn from Wong et al. (2020), who outline 10 Calls to Action to natural scientists to enable reconciliation in their work. The authors highlight that reconciliation requires action beyond what is required. Call 10 calls upon all natural scientists and research institutions to develop a new vision for conducting natural science, ranging from prioritizing the hiring of Indigenous Peoples, to expending their own resources to support community initiatives, to engaging well before a research project or permit is even drafted. These Calls to Action offer non-Indigenous individuals clarity and tangible means to make progress along a shared pathway of reconciliation.

UNDRIP sets important context for relationships and institutions. Indigenous governments around the world continue to resist colonialism, asserting their right to protect their lands and resources, their right to self-determination, and their right to represent themselves. Momentum to reconcile and work more meaningfully with Indigenous partners is an opportunity to rethink processes of decision-making on the Great Lakes. The Great Lakes Fishery Commission is one such example. The GLFC has committed to engaging more closely with Tribes and First Nations, a first step being the funding of this research project.

Further Research Considerations

As Stirling et al. (2023, p. 59) writes, "with every new generation coming into such relationships, and as with reconciliation efforts across disciplines and sectors, it will never be resolved through easy step-by-step checklists or how-to guides". Indeed, meaningful engagement and collaboration is not a "one-size-fits-all". As Indigenous Peoples (re)claim their rights to protect their relationships with the natural world, processes of decision-making will evolve. More and consistent efforts to understand the realities of collaborative work, to understand what next stages of reconciliation and next stages of shared commitments to healthy fish and waters, are important and needed. I am aware of the reality that efforts to adopt co-management approaches may be subsumed by broader calls to move beyond collaboration or co-management to a focus on Indigenous governance and co-governance. Seen from this broader perspective, co-management can be considered a step along a path towards deeper systemic change.

There could be further consideration as to what Indigenous Peoples think about engagement and collaboration. What does meaningful mean to Indigenous Peoples? Is co-management a priority (especially given that Indigenous communities can be under-resourced)? What might pre- or simply requisites for reconciliation on the Great Lakes look like? Is interTribal – or a typology of collective representation – the preferred means to co-manage, *i.e.,* to represent Indigenous interests and perspectives at the interface of Indigenous and non-Indigenous fisheries decision-making? What might we learn differently from Indigenous communities and peoples, in contrast to fisheries professionals under their employ?

I have referenced throughout this thesis that Indigenous knowledge belongs to Indigenous Peoples. I have suggested a few means by which to (potentially) facilitate more authentic and appropriate spaces for knowledge sharing (e.g., meeting in more culturally appropriate spaces such as on Indigenous lands and with community Knowledge Holders). Are these suggestions conducive to safety and trust, and desired by Indigenous Peoples and their respective communities?

Participants described a need for direct relationships with communities, and community leaders and Knowledge Holders. There was also general consensus that

jurisdictions need to work together, especially regarding issues that can affect the whole ecosystem. In these multijurisdictional spaces participants described the importance of drawing upon Indigenous ways of knowing. Does this align with Indigenous interests? Would the implementation of mechanisms such as an Indigenous advisory board/committee, or an interdisciplinary team as suggested in Diver (2016), be helpful for co-management and importantly for Indigenous groups working to achieve self-determination?

Alex Duncan is currently undertaking a research project that may examine some of these questions, working with and under the guidance of Dr. Andrea Reid and the Centre for Indigenous Fisheries at the University of British Columbia. Duncan will undoubtedly provide a critical lens to the larger collaborative research project that I too am working within: *Understanding Indigenous Perspectives on Sea Lamprey Control in the Laurentian Great Lakes*.

More research could aim to understand if Tribes and First Nations not currently represented by an interTribal agency or the Province of Ontario would wish to be included in lake-wide collaborative spaces. For example, are there other communities that live on and in relation with the Great Lakes who have not been federally recognized (and thus not involved in collaborative decision-making)? A spin-off question could and should be: do federally recognized Tribes and First Nations indeed recognize colonial-based jurisdictional boundaries (and did Treaties established in the 19th century appropriately and ethically reflect the rights of Indigenous Peoples)? Further research in this area would be important to understand how better to support Indigenous voice and wisdom – from Indigenous Peoples themselves – in contexts shaped by settler-colonialism.

There are contemporary Indigenous environmental justice movements aimed (accordingly) at dismantling existing settler-colonial-based structures with the focus towards increasing Indigenous access to and control over resources, and to provide equal access in decision-making (Mills, 2018; Elliot, 2016; Coulthard, 2014; Corntassel, 2012). Work such as that produced by Indigenous scholars Nicholas Reo, Kyle Whyte, Deborah McGregor, and

others (2017) are important opportunities to learn how to support Indigenous involvement in collaborative initiatives and relationships.

Final Reflection

Current momentum suggests co-management can continue to evolve, in definition and in practice. There are considerations learned from this research about how Indigenous and non-Indigenous groups can work meaningfully together: in genuine and equitable ways, in overall good relationship (with genuine intentions, respect, openness and honesty), and in ways which strengthen care for the natural world. However, collaborative management can lose the essence of relationship and respect through bureaucratic processes by which to "facilitate" Indigenous involvement.

Court ordered rulings in the United States reinforce the involvement of Tribes in fisheries decision-making. UNDRIP has received Royal Assent in Canada. Article 18 of UNDRIP firmly articulates that Indigenous Peoples require involvement in matters that affect their rights, and can also determine how they wish to be represented. For power to be shared equitably, such as for policy work and effective decision-making about boundary-less fish and water resources, there should be greater intentionality as to who "sits at the table", listening to the words and perspectives of all as well as identifying ways forward that do not reify structures of inequality. Sitting at the table can be better presented and perhaps even actualized as sitting in or around a circle, in a room or within nature.

This research has made clear to me how engagement and co-management are colonial-based impositions on Indigenous Peoples. These initiatives and arrangements have emerged from Indigenous activism, not from invitation. When working together it is of utmost importance that the colonial histories and continued injustices experienced by Indigenous Peoples are understood. That Indigenous rights are inherent constitutes truth and are not to be tied down by colonial-based constitutions and legal systems.

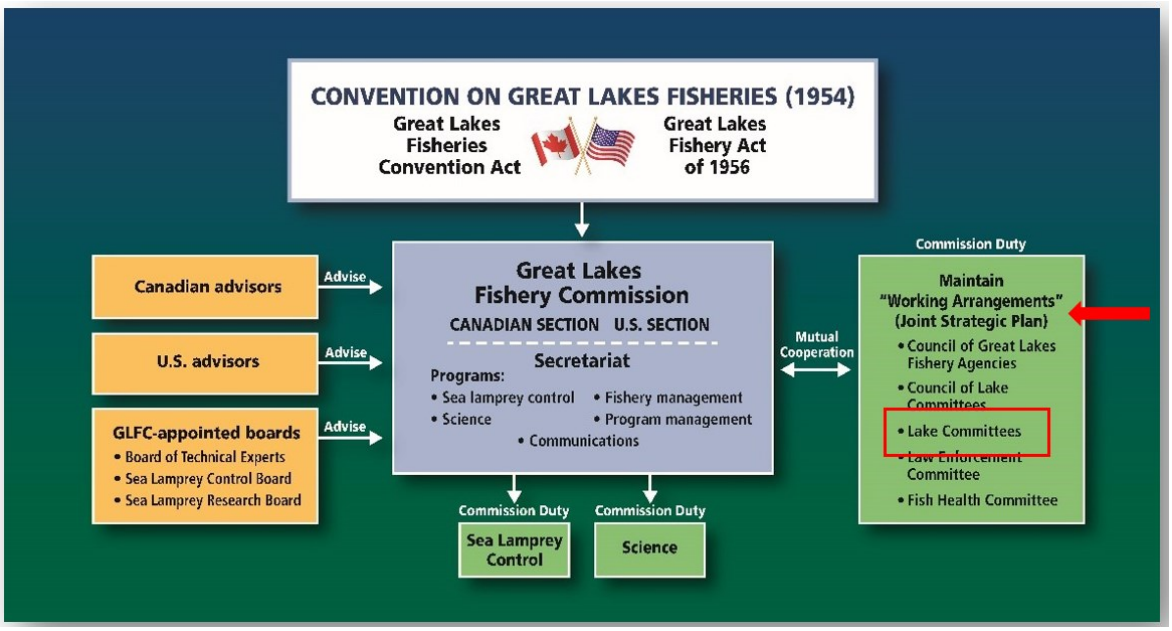
Considering the importance of reconciliation, the objective of my thesis was to begin to learn how Indigenous voice and wisdom can be supported in fisheries and sea lamprey decision-making on the Great Lakes. I am honoured to learn from the discerning voices of participants who illustrated the importance of transformative action at all levels, from within existing systems and institutional structures, to the individuals involved in carrying out research and management actions. Whereas engagement and collaboration are important, my research reminds me that co-management is also messy work. It is not a "quick-fix" (Jentoft, 2007, p. 429), nor are the challenges and opportunities presented in this thesis a "one-size-fits-all" solution. It would be helpful if institutions realized and gave prominence to the principles of UNDRIP, such as through public pronouncements.

The Laurentian Great Lakes – indeed, the five freshwater seas, or Nayaano-nibiimaang Gichigamiin – have been carefully stewarded for thousands of years. Since colonization these ecosystems have become increasingly vulnerable and greatly perturbed (e.g., sea lamprey and dreissenid mussel invasions). A shared pathway of reconciliation is a pathway of action, a commitment to transformation beyond inclusion. It is a commitment to listen, to being open to a new way of doing things, and to approaching relationships with the intention of building a safe and respectful community together. Reconciliation is not a single moment or place in time, but lots of small, consistent steps, and some big strides. Drawing on participant voices, I suggest that a reimagining of and shift within fisheries management to support and facilitate the equitable involvement of all who share commitments to protect and manage the Great Lakes can be an opportunity to help ensure the continued success of fisheries programs, and the overall health of fish for all future generations.

Appendices

Appendix A: Organization of the Great Lakes Fishery Commission.

Illustration of the roles of the GLFC in facilitating Lake Committee meetings in accordance with the Joint Strategic Plan. Image from *www.glfc.org.*



Appendix B: Interview Guide (associated with Chapters 2 and 3).

Fisheries decision-making in the Great Lakes: perspectives from fishery professionals working for Indigenous agencies

Perspectives and experiences of fishery professionals who work for Indigenous agencies in the Laurentian basin

Practitioner Interview Guide

SECTION A. Background and Position

1. Please introduce yourself *[Prompt: Name, position, connection to X Agency]*
   a. How long have you been in your current role?
   b. Have you worked with other Indigenous agencies, in fisheries or otherwise?
   c. How many fishery professionals do you work with at X Agency?
2. Can you describe your education and learning background?
   a. What parts of your education / learning experiences are most useful in your day-to-day work? *[Prompt: Do you feel this background prepared you well for your current role? Why or why not?]*
   b. Are there any education or learning experiences relevant to your current work that you wish you had received? *[Prompt: What are they?]*
   c. Were there any challenges associated with accessing education or other learning opportunities? *[Prompt: What were they?]*

3. Can you describe any training or professional development opportunities that you have received and which are relevant to your current role?
    a. Do any standout as most useful in your day-to-day work?
    b. How did you come to gain these experiences? *[Prompt: How were these opportunities made available to you?]*
4. **[If not disclosed]** Have you received any learning experiences or training opportunities that specifically relate to braiding – or rather bridging – Indigenous and western knowledges (i.e., two-eyed seeing)?
    a. If yes, what were they?
        i. Has this training been useful in your day-to-day work? *[Prompt: Can you share an example?]*
    b. If no, would you consider this type of training to be useful?
5. What education, training or other experiences would you recommend to early career and other fishery professionals who are interested in working with Indigenous fishery agencies?
    a. Why would you recommend these experiences? *[Prompt: What is the goal? How would they be useful?]*
    b. How could this be achieved? *[Prompt: Shifts in academia, within institutions, etc.]*

SECTION B. Fisheries Management

6. What are the top fisheries priorities you are currently dealing with in your role with X Agency?
    a. Why are these priorities? *[Prompt: Who decides current priorities? What are these decisions based on?]*
    b. Have these priorities changed over your time with X Agency?
7. Do you work with Indigenous knowledges in your role?
    a. Could you describe what that looks like? *[Prompt: On a day-to-day basis?]*
    b. Are you familiar with the term "two-eyed seeing"?
        i. Do you apply this framework in your work?
        ii. To what extent do you draw from both Western and Indigenous approaches to science and decision-making? *[Prompt: Can you describe an example?]*
        iii. **[If not disclosed, further prompt]** How did you come to learn to work with Indigenous knowledges? *[Prompt: How did you learn to draw from multiple knowledges?]*
8. Are you involved in fisheries decision-making on the Great Lakes? *[Prompt: On a system-wide scale?]*
    a. Please describe involvement *[Prompt: How did involvement come to be?]*
    b. What works well in including X Agency in fisheries decision-making? *[Prompt: What does X Agency contribute that other institutions or organizations do not?]*
9. Does X Agency partner with other Indigenous and/or non-Indigenous groups related to fisheries decision-making?
    a. Which ones?
    b. Can you describe your role in these relationships?
    c. How did they form? *[Prompt: What is the purpose of these collaborative initiatives and are they fulfilling their purpose?]*
    d. What has worked well?
        i. What if anything would strengthen these relationships/partnerships?

e. Do you encounter any conflicting priorities in current relationships/partnerships? *[Prompt: How are these navigated?]*
    i. Why do these issues persist?
f. How is the information which you bring to the "table" (so to speak) received? *[Prompt: How does it inform or carry weight in decision-making?]*
g. What makes a relationship/partnership successful to you? *[Prompt: What constitutes a successful relationship between Indigenous and non-Indigenous collaborators in fisheries decision-making?]*

SECTION C. AIS in the Great Lakes: Sea Lamprey

10. Does your work involve dealing with aquatic invasive species?
    a. Please describe involvement *[Prompt: Which species?]*
    b. If not involved, why?
11. **[If not disclosed]** Does your work involve dealing with sea lamprey control on the Great Lakes?
    a. Please describe involvement *[Prompt: If not involved, why?]*
    b. Do you encounter any conflicts or conflicting priorities when working with other agencies related to sea lamprey control? *[Prompt: What are they and how are they navigated?]*
        i. Why do these issues persist?
12. **[If not disclosed]** Are you familiar with the Great Lakes Fishery Commission and their sea lamprey control program on the Great Lakes? *[Prompt: Are you familiar with their control methods and treatment sites?]*
    a. Does your work with X Agency contribute to the efforts of the GLFC and its partners, as it relates to sea lamprey?
        i. In what ways?
        ii. How did relationships/partnerships come to be?
        iii. If not involved/unfamiliar, would your agency wish to be involved?
    b. Could you share reflections on the relationship/partnership with the GLFC (from your experiences)?
        i. Does it meet the metrics of a 'successful relationship' as earlier defined? *[Prompt: Why or why not?]*
        ii. What if anything would strengthen this relationship/partnership?
        iii. What are your perspectives on the efficacy of the GLFC's sea lamprey control program? *[Prompt: Is there anything that would enhance the program?]*

SECTION D. Closing Reflections

13. What attitudes or values strengthen meaningful engagement and collaboration between Indigenous and non-Indigenous colleagues? *[Prompt: Between partner agencies?]*
    a. Can you share an example of when these attributes/characteristics have played a positive role in shaping relationships/partnerships?
14. Can you describe any experiences or learnings from working for an Indigenous agency that you would not have experienced otherwise? *[Prompt: Lessons from working with your fishery colleagues?]*
15. **[If not disclosed]** Finally, what are key lessons or learnings that you would share with someone who is preparing to start working in this space (i.e., for an Indigenous organization)?

Appendix C: Summary of involvement of Indigenous fishery agencies in sea lamprey control on the Great Lakes.

Almost all participants in this study were not involved in decisions (past or current) about sea lamprey control methods or the direction of the control program. Participants noted that Tribes and First Nations were involved insofar as permitting the GLFC and its partners to access tributaries flowing through Indigenous territories. One interTribal representative described informal involvement on the Sea Lamprey Research Board and the Sea Lamprey Control Board. InterTribal representatives involved on Lake Committees referenced helping to set Fish Community Objectives (part of which sets a collective vision of a fish community that can support various levels of harvest, and which is influenced by the presence/absence of sea lamprey wounds on fish populations).

Participants across affiliations described some collaborative opportunities with the GLFC (e.g., working together to implement a sea lamprey barrier and/or collaboration on acoustic telemetry projects). Two participants spoke about previous participation in field projects, such as monitoring traps. Capacity constraints however prevented ongoing involvement. First Nation representatives referenced agreements put in place and one-time partnerships to facilitate control programs and projects. A minority of participants (N=3) noted that they were not directly involved in sea lamprey control efforts or decision-making because sea lamprey are not yet prevalent in their areas. However, these participants expressed interest in *becoming* involved, referencing the interconnectivity of the Great Lakes basin. Most participants referenced submitting sea lamprey wounding data (wounds inflicted by sea lamprey on fish) to the GLFC's sea lamprey wounding database and attending talks and symposiums focused on sea lamprey (e.g., Sea Lamprey International Symposium).

Participants across the United States and Canada reported that the GLFC does a good job of keeping Tribes and First Nations informed about sea lamprey control methods and application sites. However it was noted that being "kept informed", such as through consultation requirements, does not equate to consent nor participation in decision-making. It may perpetuate a reality where communication is left up to the institution (or the individuals

under its employ) as to what information is disseminated, including how and to whom. One participant noted that progress to engage with First Nations in Canada may be impeded by a lack of clarity as to who the GLFC should contact. Unlike the Tribes in the U.S. who are involved in the Lake Committee structure, First Nations are represented only by the Province of Ontario. A lack of relationship between the First Nations and the GLFC, and ambiguity as to who has authority to make decisions, can play a role in effecting progress towards meaningful collaboration. In general, the GLFC's sea lamprey control program was perceived positively. However participants did raise concerns about the lack of Indigenous involvement in decision-making and the potential impact of some control methods on native species.

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