Perspectives on Indigenous knowledge governance in collaborative environmental stewardship

by

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We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

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ABSTRACT

Growing from inherent rights to steward territories, the weaving of Indigenous knowledge into environmental stewardship is increasingly being acknowledged and mandated for, both in Canada and internationally. The deep settler colonial roots of environmental stewardship and resource management in Canada, as well as the violence enacted on communities within these spaces and through resource management practices, make this a contentious and deeply complicated task. Furthermore, engagement with Indigenous peoples and their knowledge systems has historically been, and continues to be, extractive, dismissive, and paternalistic, disrupting Indigenous ways of being and failing to recognize inherent rights. In tandem with environmental stewardship rights, Indigenous peoples have articulated and asserted their inherent right to govern their knowledge and data. Indigenous knowledges come from and are practiced on lands and waters and, as such, Indigenous knowledge governance and environmental stewardship are deeply interconnected. However, there are tensions between the recognition of and interest in weaving Indigenous knowledge into environmental stewardship, while adhering to Indigenous knowledge governance principles that ensure protection and prevent extraction, exploitation, or misuse. Growing from this tension, this study is situated in a collaborative Marine Spatial Planning (MSP) program on the South Coast of British Columbia where federal, provincial, and First Nations governments are partnering to envision and plan marine use in the region. Using community-based participatory research methodologies, this study was developed with First Nations partners at the First Nations Fisheries Council of British Columbia (FNFC) and asks how Indigenous knowledges may be ethically and equitably woven into the marine planning process. To do this, I hosted focus groups and interviews with individuals working for each of the MSP partners and sought to better understand perspectives on and experiences with knowledge governance in collaborative environmental stewardship work. The intention driving this study was to provide insight and potential recommendations that may support the FNFC and partners in establishing an MSP process that adhered to and was founded in Indigenous knowledge governance principles and practices. Project findings demonstrate that, rather than understanding knowledge as an object or evidence base separate from people and governance, knowledge *systems* must be recognized. Thus, expanding mainstream conceptualizations of knowledge governance to include support for and recognition of the systems and people that generate, practice, and hold knowledge. From this vantage, operational considerations include both technical approaches and tools, as well as transformational change required at a societal and individual level. This transformational change must be situated in decolonizing theory and grounded in everyday realities and practices.

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INTRODUCTION

Settler colonial expansion has depended on, promoted, and normalized the exploitation of lands and peoples. As the widespread failures of settler colonial systems become increasingly visible, there have been growing calls for a more equitable, just, and sustainable path forward to foster resilient ecosystems and communities (Chan et al., 2019; Davis & Todd, 2020; Whyte, 2018). Indigenous peoples have emphasized, and others have echoed, that this path forward must recognize and work to realize inherent rights to self-determination and sovereignty. Anti-colonial approaches, centred in decolonization that seeks to repatriate Indigenous lands, life, and powers (Tuck & Yang, 2012), require the dismantling of settler colonial power dynamics, and begin with the rebuilding of Indigenous and non-Indigenous relationships through truth-telling and accountability (TRCC, 2015). In the context of environmental stewardship and management, this means acknowledging resource extraction's foundational role in the colonial project, including the violence enacted through management practices and associated knowledge production (Smith, 1999; Atlas et al., 2021). In their discussion on violence and decolonizing dialogues, Holmes and colleagues (2015) emphasize the importance of expanding understandings of violence to include the persistent and pervasive ways it has been embedded in both systems and spaces to uphold settler colonial hierarchies. In tandem, they argue for the need to expand understandings of resistance to acknowledge "the agency and power of Indigenous people working to address this violence" (p. 544). From this vantage, the deep colonial roots of mainstream environmental stewardship and management make it an important arena for resistance where Indigenous peoples are pursuing the recognition of Indigenous rights, or what Corntassel (2012) argues is more appropriately framed as responsibilities, resurgence, and relationships to and with lands and communities.

Since time immemorial, Indigenous peoples have been stewards of their traditional territories, fostering and embodying intimate relationships with the environments that sustain and form the foundation of community, culture, and well-being. Despite the immense diversity amongst Indigenous peoples, many Indigenous scholars have highlighted that cultures and ways of being and knowing are guided by the goal of long-term existence within their territories, often centring respectful and reciprocal relationships that are founded in intrinsically holistic worldviews, which recognize and emphasize interconnections. There has been substantive documentation that both the environment and all peoples benefit from Indigenous partnership and leadership in resource management and environmental stewardship (ex. Ban et al., 2018; Ban et al., 2017; Garnett et al., 2018; Jessen et al., 2022; Leiper et al., 2018; Turner et al. 2022). Although evidence demonstrating the benefit and value of Indigenous perspectives, knowledge and partnership to society are widespread, many highlight that these narratives must coincide with understandings that Indigenous rights to stewardship of territories are inherent (Simpson, 2004; Coulthard, 2014; Atleo, 2016). Indigenous peoples have cautioned against singularly attaching respect for Indigenous peoples' authority and knowledge to their benefit to wider society (Smith, 1999; Simpson, 2004; Latulippe, 2015a; Milne, 2022). This dangerously supports settler colonial conceptualizations that allow Indigenous people's existence to be perceived as contingent on their benefit to non-Indigenous peoples and perpetuates extractive relationships (Smith, 1999; Simpson, 2004; Latulippe, 2015a; Milne, 2022). Importantly and differing from western practices, many Indigenous peoples ways of being cannot be separated from ways of

knowing: knowledge is embodied and practiced throughout all aspects of life (Simpson, 2004; Latulippe & Klenk, 2020; Milne, 2022). As such, governance is not siloed from knowledge generation and, instead, Indigenous knowledge systems encompass the very acts, processes, structures, roles, and principles of governance (Whyte, 2017). From this perspective, the use of Indigenous knowledge in environmental management cannot be separated from self-determination rights and responsibilities to govern and steward lands (Simpson, 2004; Latulippe & Klenk, 2020).

Although inherent, Indigenous rights are recognized internationally through the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP; United Nations, 2007), and in Canada, First Nations, Inuit, and Métis rights are recognized at national (*Constitution Act,* 1982, s35; *United Nations Declaration on the Rights of Indigenous Peoples Act,* 2021) and provincial (*Declaration on the Rights of Indigenous Peoples Act,* 2019) levels of government. Additionally, Canada has made significant commitments to reconciliation through the Truth and Reconciliation Commission's (TRC) Calls to Action. Underscoring all Calls to Action (2015), the TRC emphasizes that language, governance, law, education, and knowledge systems must be recognized, treated with equal respect, and provided the space and support required for resurgence. In environmental spaces, Indigenous knowledge has been formally recognized in various federal legislation including *Fisheries Act* (2019) and *Oceans Act* (1996), and policy such as the *Aboriginal Traditional Knowledge: Process and Protocols Guidelines* (2017) under SARA for COSEWIC has been developed to guide and support ongoing work. Similar commitments and legislation have been made at a provincial level, for example the province of British Columbia was the first government in Canada to legally recognize UNDRIP (through the *Declaration of the Rights of Indigenous Peoples Act,* 2019), which has influenced recent ministerial mandates and priorities (ex. Ministry of Water, Lands and Natural Resource Stewardship, 2023). Despite political commitments to reconciliation and legislative and policy requirements for Indigenous partnership and the use of Indigenous knowledge in environmental decision-making processes, Indigenous communities, leaders, and scholars have been clear that on-the-ground progress has been slow and "wholly inadequate" (McGregor 2021, p. 6). Importantly, critiques emphasize that mainstream governance and knowledge production continue to perpetuate an inequitable, extractive, and paternalistic relationship between Canada and Indigenous peoples, and fail to recognize Indigenous legal, political, and governance systems (von der Porten et al., 2019; Eckert et al., 2020). McGregor (2021) argues this lack of progress is reflective of Canada's discomfort and lack of readiness to accept what these recognitions may mean for Canadian environmental governance.

Positioned within this context, the present study grows from a marine spatial planning (MSP) program in Southern BC. This program was led by the federal government, who define MSP as "a collaborative and transparent approach to managing ocean spaces that helps to balance the increased demand for human activities with the need to protect marine ecosystems…[and seeks to consider] all activities and partners in an area to help make informed decisions about the management of our oceans in a more open and practical way" (GoC, 2018b). The Government of Canada through Fisheries and Oceans Canada (DFO) partnered with the province of British Columbia (BC) and First Nations on the south coast of BC through the First Nations Fisheries Council of British Columbia (FNFC) to collaboratively develop marine plans. The FNFC is a regional aggregate organization in BC that works to support capacity and

relationships that enable First Nations to exercise their inherent and legally recognized rights in integrated aquatic resource management, and to enable strong collaboration at the decision-making table. Viewing the program as an opportunity for First Nations to pursue and advance marine management aspirations by building capacity, relationships with government, and co-developing marine plans, the FNFC hosted early engagement sessions with interested First Nations and government partners to articulate guiding collaborative principles, goals, and objectives for the MSP program. Aligning with the commitments, legislation, and policy described above, partners agreed that Indigenous knowledge would be recognized and woven into marine plans.

Early on, First Nations partners shared concerns that knowledge exchange and collaborative processes within mainstream political contexts, such as policy development or planning, often reinforced status quo and rarely brought tangible benefit to community wellbeing. Many brought forward common experiences engaging in processes that put significant strain on First Nations' capacity and articulated highly frustrating and disappointing memories from attempts to establish meaningful collaborative processes within bureaucratic and funding limitations. Appreciating this and pushing back on early suggestions from government partners that were perceived to be extractive, the FNFC partnered with academics at the University of Victoria to undertake research on how the marine planning process may support ethical and meaningful inclusion of Indigenous knowledge. The MSP program was used as a case study, with the intention that findings may support related FNFC processes and ongoing work.

Guided by community-based participatory research methodologies, FNFC and UVic partners collaboratively scoped the project, including research questions and objectives. Hearing First Nations' concerns on the extractive nature of knowledge sharing processes alongside substantive interest to weave Indigenous knowledge into the MSP processes and resulting knowledge products, the partners asked: *how can Indigenous knowledge governance be supported in knowledge sharing processes for environmental stewardship initiatives*? Although this study only engages with First Nations on the southern coast of BC, I have chosen to use the term Indigenous knowledge governance, as it is more consistent with terminology used in the literature. The term *Indigenous* is used with the caveat and acknowledgement that Indigenous peoples are not a monolith, and this study does not intend to make any conclusions on behalf of First Nations with territories on the southern coast of BC, let alone Indigenous peoples globally. Instead, the purpose of this project was to better understand perceptions, experiences, and limitations to Indigenous knowledge governance in environmental stewardship initiatives to help inform the development of collaborative processes within and beyond the southern BC region, recognizing that many parallels and synergies exist elsewhere.

Indigenous Knowledge Governance

Indigenous scholars have been discussing and writing about their knowledge use and sovereignty for generations in both academic and non-academic spaces. Regarding the application of this work to more specific and operational contexts, significant work on knowledge sovereignty and governance has emerged in health and administrative data contexts. In part, the dominance of this perspective is reflected in terminology choices, with the terms *data sovereignty* and *data governance* most consistently used within the existing literature. Although

Rodriguez-Lonebear (2016) and Carroll and colleagues (2020) note that Indigenous peoples have been translating knowledge into data through oral histories, stories, calendar sticks, and totem poles, the term *data* is largely a western concept that is closely related to positivist research methodologies. The transformation of knowledge to data requires a more extractive research method, where context is removed creating an illusion of unbiased, factual evidence. This extractive and positivist nature diverges from Indigenous paradigms that recognize a more holistic approach to learning about the world, one that is built from a person's or community's experiences and cannot be removed from its context. Because of this I have chosen to use the terms *knowledge sovereignty* and *knowledge governance* to acknowledge this more holistic perspective. This choice also reflects the environmental stewardship and natural resource management context that this research is situated in, where traditional ecological and cultural *knowledge* (rather than health or administrative *data*) are relevant.

Indigenous knowledge sovereignty refers to the inherent right of Indigenous nations to govern the collection, ownership, and application of data about or relating to their communities (Carroll et al., 2021; Battiste, 2008; Schnarch, 2004; Tobias et al., 2013; Walter et al., 2021), and is recognized as a cornerstone of ethical Indigenous methodologies (Adams et al., 2014; Ball & Jaynst, 2008; Kovach, 2021; Latulippe & Klenk, 2020; Smith, 1999). This right is articulated and affirmed in Article 31 of the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP; United Nations, 2007). Knowledge sovereignty grows from an Indigenous rights framework and builds on the concept of 'sovereignty', a nation or state's rights and jurisdiction to self-govern and make decisions about their own peoples and futures. While *knowledge sovereignty* refers to an inherent right, *knowledge governance* is used to describe the operational means of asserting and realizing that right (Carroll et al. 2020; Carroll et al., 2021; Schnarch, 2004) Indigenous knowledge sovereignty rights acknowledge that governance must be done using methods consistent with the laws, practices, and customs of each group (FNIGC, 2019; Battiste, 2008; Robinson et al., 2022). Emphasizing the importance of knowledge governance in these contexts, McGregor and colleagues (2021) include Indigenous knowledge sovereignty and the development of knowledge system protocols and guidelines as a core recommendation for the Government of Canada to include in their Indigenous knowledge policy framework for proposed projects reviews and regulatory decisions.

LITERATURE REVIEW: Indigenous Knowledge Governance and Environmental Stewardship

Indigenous knowledge governance: key principles and values

Recognized as a cornerstone of ethical Indigenous methodologies, Indigenous knowledge sovereignty refers to the inherent right of Indigenous nations to govern the collection, ownership, and application of knowledge and data about or relating to their communities and territories (Smith, 1999; Schnarch, 2004; Battiste, 2008; Kukutai & Taylor, 2016; Carroll et al., 2020). Knowledge sovereignty grows from an Indigenous rights framework and builds on the concept of 'sovereignty', a nation or state's rights and jurisdiction to self-govern and make decisions about their own peoples and futures. Indigenous peoples' inherent right to sovereignty and self-governance is constitutionally protected in Canada and has been asserted by Indigenous peoples through Nation and community-led declarations and agreements (ex. Schnarch, 2004; Norgaard, 2014; FNIGC, 2014; Nickerson, 2017; Hayward et al., 2021). Internationally, these rights are affirmed through the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), with Article 31 articulating Indigenous peoples' right to "maintain, control, protect and develop their cultural heritage, traditional cultural expressions, as well as the manifestations…[and] the right to maintain, control, protect, and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions" (UN, 2007, p. 22-23). Additionally, alongside recognizing the significance of Indigenous knowledge in biodiversity conservation and sustainable use of natural resources, the Convention of Biological Diversity (CBD; UN, 1992) calls for the equitable sharing of benefits arising from the utilization of traditional knowledge. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (UN, 2011), a supplementary agreement to the CBD, reiterates this concept, asserting that Indigenous peoples should benefit from the use of their knowledge, innovations, and practices.

In reviewing the literature, two broad and interrelated motivations or arguments for Indigenous knowledge sovereignty are consistently referenced: (1) Indigenous peoples' collective right to steward their knowledge, which is highly connected to ways of being, and (2) knowledge sovereignty as a response to unethical settler colonial research and data collection practices. The first motivation emphasized throughout the literature relates to the interrelation between Indigenous knowledge, culture, and identity (Smith, 1999; Simpson, 2004; Schnarch, 2004; Battiste, 2008; Norgaard, 2014). As described by the First Nations Information Governance Centre (2019), "First Nations in Canada have an intimate relationship with and deep connection to their information, knowledge, and data particularly traditional or sacred knowledge that have been passed down from many generations to the next" (p. 58). Acknowledging these intimate ties between knowledge, culture, and identity, Nickerson (2017) describes Indigenous knowledge sovereignty as a cornerstone of nation rebuilding and an element of revitalizing culture and nationhood.

Secondly, Indigenous knowledge sovereignty has emerged as a response and means to address the unethical, extractive, and exhaustive history of research on Indigenous peoples and their territories, which in some cases continues today (Absolon & Willette., 2005; Tuck, 2009; Wong et al., 2020). For example, the term 'parachute researchers' has been coined to describe a

common practice of external researchers entering communities, collecting data for their own benefit, and exiting quickly, with research providing little to no benefit to communities. In more severe cases, researchers have deliberately collected data to harm communities (Tuck, 2009; Castleden et al., 2012). Walter et al., (2016) summarizes this violence, noting that data has often been collected to support narratives of disparity, deprivation, disadvantage, dysfunction, and difference ("5D data") and has been limited to blaming, aggregating, and de-contextualizing Indigenous peoples to restrict their access to resources. As Carroll and colleagues (2019) write, "data has been used as a tool to marginalize Indigenous peoples, eradicate their ways of life, and rewrite their histories to advance the colonial project" (p.3). Thus, Indigenous knowledge sovereignty rights grow from a need to resist and challenge these oppressive practices. Central objectives of Indigenous knowledge sovereignty are to reclaim identities, tell one's stories (FNIGC, 2019), and ensure that data is collected and used in ways that "support and enhance Indigenous peoples' collective well-being" (Walter et al., 2021, p.146; Ball & Jaynst, 2008; Carroll et al., 2020).

While *knowledge sovereignty* refers to an inherent right, *knowledge governance* is used to describe the operational means of asserting and realizing that right (Schnarch, 2004; Carroll et al. 2020, 2021). Importantly, governance must be done using methods consistent with the laws, practices, and customs of each group, and is broadly interested in all stages of knowledge and data creation, storage, and use (Schnarch, 2004; Battiste, 2008; FNIGC, 2019; Carroll et al., 2020; Robinson et al., 2022). Many frameworks have been developed to articulate Indigenous knowledge governance principles. For example, operating at an international scale, the Research Data Alliance's International Indigenous Data Sovereignty Interest Group articulated collective benefit, authority to control, responsibility, and ethics (CARE) principles to support Indigenous knowledge governance (Carroll et al., 2020). The core tenants of each principle are described by Carroll and colleagues (p. 5) as:

- 'Indigenous data must facilitate **collective benefit** for inclusive development and innovation, for improved governance and citizen engagement, and for equitable outcomes.

- Recognition of Indigenous rights and interests affirms **authority to control** both data for governance and governance of data.

- When working with Indigenous data, there is a **responsibility** to nurture respectful relationships, expand capability and capacity for data governance, and embed data within Indigenous communities and cultures.

- **Ethical** data practices seek to minimize harm, maximize benefits, promote justice, and allow for future use based on community values and ethics.'

The framework was developed as a response to the tension between Indigenous knowledge sovereignty rights and increasing calls for broad and open data sharing. It is intended to compliment the widely recognized scientific framework that promotes findable, accessible, interoperable, and reusable (FAIR) data (Wilkinson et al., 2016; Carroll et al., 2021). The CARE

principles demand that "the use of Indigenous data should result in tangible benefits for Indigenous collectives through inclusive development and innovation, improved governance and citizen engagement, and result in equitable outcomes" (p. 2) and recognizes the role and power of data in supporting self-determination, governance, and well-being.

The CARE principles draw upon multiple frameworks and guides developed at national scales that articulate foundational principles for Indigenous knowledge governance. For example, the Te Mana Rarunga (TMR) Brief outlines terms and principles for Māori data sovereignty and governance in New Zealand. These include authority, relationships, obligations, collective benefit, reciprocity, and guardianship (TMR, 2018). Additionally, the Maiam nayri Wingara Indigenous Data Sovereignty Collective and the Australian Indigenous Governance institute affirm the right to control data and knowledge as well as ensure that use supports individual and collective interests through accountable and respectful processes (MnW, 2018). Similar principles and affirmations are articulated by the United States Indigenous Data Sovereignty Network.

One of the earliest knowledge governance frameworks was developed in Canada by the First Nations Information Governance Centre (FNIGC) during a 1998 brainstorming session for the *First Nations Regional Longitudinal Health Survey*. The OCAP principles articulate ownership, control, access, and possession as four central dimensions of Indigenous knowledge governance (Schnarch, 2004; FNIGC, 2014). These principles are defined by the FNIGC (2023) on their website as:

- **"Ownership** refers to the relationship of First Nations to their cultural knowledge, data, and information. This principle states that a community or group owns information collectively in the same way that an individual owns his or her personal information.

- **Control** affirms that First Nations, their communities, and representative bodies are within their rights to seek control over all aspects of research and information management processes that impact them. First Nations control of research can include all stages of a particular research project-from start to finish. The principle extends to the control of resources and review processes, the planning process, management of the information and so on.

- **Access** refers to the fact that First Nations must have access to information and data about themselves and their communities regardless of where it is held. The principle of access also refers to the right of First Nations' communities and organizations to manage and make decisions regarding access to their collective information. This may be achieved, in practice, through standardized, formal protocols.

- **Possession** While ownership identifies the relationship between a people and their information in principle, possession or stewardship is more concrete: it refers to the physical control of data. Possession is the mechanism by which ownership can be asserted and protected."

Schnarch (2004) relates OCAP to the Royal Commission on Aboriginal Peoples (1997) analysis on effective government. They note that, centred in self-determination and self-governance, OCAP (1) supports First Nations' power which is understood as authority to act and control their own research and knowledge, (2) First Nations' capacity to enhance resources and build nations, and (3) serves the legitimacy and accountability of First Nations governments. Rather than prioritizing consultation and participation, OCAP emphasizes that communities must be positioned and recognized as researchers themselves. Although both the CARE and OCAP articulations promote similar standards, OCAP asserts the importance of ownership and possession, while CARE principles more broadly focus on Indigenous involvement and leadership in stewarding, accessing, and controlling Indigenous data (Schnarch, 2004; Gupta et al., 2020). The possession principle was added to address the risk associated with Canada's *Access to Information Act* (1985), which does not prioritize Indigenous ownership or control over data held by government**.** Some intended benefits of OCAP include minimizing biases within and misuse of data and knowledge. As well, OCAP is meant to support community empowerment and healing through relevant, useful, and transformative data and knowledge (Schnarch, 2004).

It should be noted that many of these frameworks use the term *Indigenous data governance* rather than *Indigenous knowledge governance*. However, most frameworks explicitly acknowledge that the term *Indigenous data* is used to encompass both data and knowledge about "Indigenous peoples, their territories, and their ways of life" (p. 3, Carroll et al., 2020; Schnarch, 2004; Kakutai & Taylor, 2016). The use of the term *Indigenous data* is in part reflective of the health and statistics contexts where significant work has been done to consider Indigenous data governance (ex. OCAP principles). In contrast, within environmental contexts, the term *Indigenous knowledge* is used more frequently to reflect holistic conceptualizations that encompass both data and knowledge owned and generated by Indigenous peoples. As explained in the introduction, I have chosen to use the term *Indigenous knowledge governance* to remain consistent with the environmental context where this study is situated. This choice is intended to support participants in this study to reflect upon and consider their own experiences and perceptions, using terminology that they are most familiar with.

Indigenous knowledge and environmental stewardship

Historic and ongoing settler colonialism has profoundly threatened and impacted Indigenous knowledge systems (Turner et al., 2000; Simpson, 2004; Wilson, 2008; TRCC, 2015; Reid et al., 2022). Generations were forcibly prevented from practicing and transmitting culture, knowledge, and language through various institutionalized and state-sanctioned methods including the Residential School system and the Indian Act (TRCC, 2015). Furthermore, the exploitation of lands and resources to support extensive and destructive economic development has impeded Indigenous peoples from accessing territorial lands and waters, the essential sites and sources of knowledge generation, transfer, and practice (Simpson, 2004; Norgaard, 2014). Despite these acts of cultural genocide, traditional worldview, stewardship practices, and culture continue to form the foundation of Indigenous communities' well-being and are being practiced and revitalized throughout Canada.

Although cultures and practices are diverse and distinct a common thread connecting many First Nations' environmental stewardship is an intimate, interdependent relationship with nature, one that is guided by a respectful worldview that treats all living things as relatives, emphasizes the importance of reciprocity, and recognizes interconnections (Turner et al., 2000; Garibaldi & Turner 2004; Brown & Brown, 2009; Jones et al., 2010; Ban et al., 2019). Sophisticated stewardship methods such as selective harvesting and enhancement technologies were designed to foster healthy ecosystems and long-term co-existence within territories over generations (Turner et al., 2000; Brown & Brown, 2009; Groesbeck et al., 2014; Lepofsky & Caldwell, 2013; Toniello et al., 2019). These practices serve as substantial evidence for the interdependent and mutualistic relationship between the environment and First Nations, with their interactions producing complex socio-ecological systems (Ban et al. 2017). Importantly, while there are similar values and worldviews that guide knowledges, cultures, and practices, there is no pan-Indigenous or pan-First Nations ways of being and knowing. Knowledge systems are as diverse as Indigenous peoples.

While each First Nation's worldview guides their interactions with all living things, harvested species have especially large cultural value. So much so that the term "cultural keystone species" has been coined, equating cultural significance to the ecological concept of keystone species who play a disproportionately large role in an ecosystem's overall structure and functioning (Garibaldi & Turner, 2004). Cultural keystones are characterized as being "vital to the existence and identity of Aboriginal people and a major conduit for the intergenerational transfer of traditional knowledge and values" (p. 3, Haggan et al. 2006). Examples include salmon for Northwest Coast peoples, red algae for Coast Tsimshian, Haida, Heiltsuk and Kwakwaka'wakw (Garibaldi & Turner, 2004), eulachon for the Nuxalk (Beveridge et al. 2020), abalone for Haida and Heiltsuk (Lee et al. 2019), and American eel for Mi'kmaq (Davis et al. 2004). The cultural significance of these animals is captured and embedded in cultural practices such as the First Salmon Ceremony and similar ceremonies hosted to celebrate the return of other important migratory species like herring and eulachon (Haggan et al. 2006). The representation of worldview in cultural practices reflects not only how deeply these values are embedded in all parts of life, but also an essential method of knowledge transfer across generations (Turner et al., 2000). Importantly, guiding principles and worldview are infused into all aspects of life, meaning that environmental stewardship and governance are not siloed from other dimensions community well-being (Simpson, 2004; Simpson, 2014; Whyte, 2018). As such, Indigenous knowledge systems encompass both wisdom that informs ways of being and knowing, as well as the embodied act of living that life (McGregor, 2018; Latulippe & Klenk, 2020; Henri et al., 2021).

Scholars have cautioned against an overemphasis on the traditional aspects of Indigenous knowledge, noting that this places a past-tense perspective on Indigenous knowledge systems and fails to recognize their ongoing evolution and embodiment (Simpson, 2004; Reid et al., 2021). Importantly, Indigenous knowledge systems include data and information collected using scientific methods (Cajete, 2000; Johnson et al., 2016). Indigenous peoples' are actively drawing upon and seeking out new technologies and methodologies while honouring and being guided by worldviews and ways of knowing that have supported generations (Whyte et al., 2016; Ban et al., 2017). Within environmental contexts, a broad range of knowledge is drawn upon to support governance, including traditional knowledge and traditional cultural expressions, as well as environmental monitoring data collected within territories to support holistic decision-making

processes (Proulx et al., 2021; Reyes-Garcia et al., 2022). Substantive work has focused on documenting Indigenous knowledge using methodologies such as participatory and community mapping (ex. Tripathi et al., 2004; Eaton-Gonzáles et al., 2021), Indigenous cartography and counter mapping (ex. Harris & Hazen, 2006; Mackenzie et al., 2017) and traditional ecological knowledge studies (ex. Berkes et al., 1999). Diverse context-based motivations drive this work, including interest in preserving knowledge, increasing use and compatibility with scientific studies, and supporting decision making and governance.

Marine and coastal management in Canada

In British Columbia, the provincial and federal governments split their legislative powers based on the *Constitutional Act* (1867), which states that the provincial government has jurisdiction over coastal shorelines, the intertidal zone, and near shore waters. Beyond these areas, the federal government manages prominent activities including fisheries, shipping, and marine pollution within Canada's exclusive economic zone. Canadian practices are centred in ideas that place humans in a hierarchy above all other living and non-living things and conceptualizes an ability and need to control the environment (Reid et al., 2022). This siloed, centralized, and hierarchical approach stands in stark contrast to many Indigenous peoples' practices, which are often described as stewardship, rather than management, and are guided by a collective relational responsibility to take care of lands and waters (Reid et al., 2022). Through settler colonization, First Nations have been displaced from their traditional territories and uprooted from their communities and culture, including access to harvesting and stewardship practices (Jones et al., 2010; Garibaldi & Turner, 2004; Haggan et al., 2006). Despite this, First Nations have asserted and continue to pursue the full realization of their inherent right to harvest from and steward their territories (Jones et al., 2010; Jones et al., 2017; von der Porten et al., 2019; Diggon et al., 2021). Both the federal and provincial government have a duty to consult and, as needed, accommodate First Nations when these rights are impacted by proposed policies, projects, or decisions.

In Canada, inherent rights are recognized through both Aboriginal and Treaty rights. Aboriginal rights were only formally recognized and affirmed by Canada in 1982 in Section 35 of the *Constitution Act*. While this was a monumental step, Section 35 does not define Aboriginal rights, and as a result has been a focal point of numerous court cases (ex. Calder v. British Columbia, 1973; R. v. Sparrow, 1990; R. v. Gladstone, 1996; Delgamuukwv v. British Columbia, 1997; Haida Nation v. British Columbia (Minister of Forests), 2004; Tsilhqot'in Nation v. British Columbia, 2014; Gitxaala Nation v. Canada, 2016; Ahousaht Indian Band and Nation v. Canada, 2018 and Tsleil-Waututh Nation v. Canada, 2018). While Aboriginal rights are "collective rights of distinctive Indigenous societies flowing from their status as the original peoples of Canada," Treaty rights are defined by individual treaties and apply only to their signatories (GoC, 2023a). For the majority of coastal First Nations, historic treaties do not exist and therefore traditional lands remain largely unceded. The exceptions to this are the Douglas Treaties between the crown and 14 First Nations on Vancouver Island and the Peace and Friendship Treaties between the crown and Mi'kmaq, Maliseet, and Passamaquoddy peoples in the Atlantic region. However, neither of these treaties surrenders rights to hunt and fish on traditional lands. In addition to historic treaties, the development of comprehensive land claim agreements (modern-day treaties) is an ongoing process with negotiations presently occurring

across the country. Comprehensive land claim agreements are meant to address Aboriginal rights in the absence of treaties or other legal means (GoC, 2015). They cover a wide breadth of issues, including resource development opportunities, harvesting rights participation in land and resource management decisions (GoC, 2015).

Indigenous knowledge systems have historically been dismissed and absent from Canadian governance and decision making. Furthermore, ecological perspectives have commonly reduced Indigenous knowledge systems to a series of facts, observations, and practices that may be extracted and translated (Latulippe, 2015b). Emphasis has been placed on Indigenous knowledge's supplemental value, where Indigenous knowledge is perceived as a form of data that can be integrated *into* western knowledge. These perspectives have been critiqued for reinforcing settler colonial power dynamics and failing to acknowledge Indigenous knowledge as a practiced and lived system that cannot be removed from the context where it is generated and embodied (Nadasdy, 1999; Simpson, 2004; Bohensky & Maru, 2011; Latulippe & Klenk, 2020; McGregor, 2021; Reid et al., 2022).

In the context of climate change and rapidly changing environmental conditions, as well as growing awareness of the environmental damage caused by traditional western management regimes, there has been increasing pressure and shifts towards more holistic management practices. Various pieces of legislation require the Canadian government to manage these marine and coastal management activities in a holistic, integrated way. Many Indigenous peoples and allies have demonstrated the value and effectiveness of Indigenous knowledge systems for adaptive, ecosystem-based management (Menzies & Butler, 2006; Berkes, 2012). For example, the *Oceans Act* (1996) mandates the Canadian government to promote integrated oceans management, develop a precautionary ecosystem-based national ocean strategy and create marine protected areas. Additionally, the most recent modernization of the *Fisheries Act* (1985), one of Canada's oldest pieces of legislature, includes a commitment to protecting all fish habitat, rebuilding depleted stocks, and strengthening Indigenous people's role in management practices. Further recognition of Indigenous knowledge is provided in the *Species At Risk Act* and *Canadian Environmental Assessment Act*. Importantly, all environmental legislation is interpreted within the context of Canada's commitments to reconciliation (TRCC, 2015), legal adoption of UNDIRP, as well as Aboriginal and Treaty rights outlined above. Despite these commitments and legislative requirements, marine and coastal management in Canada has a long history and ongoing practice of extractive and dismissive engagement with Indigenous peoples on decisions directly impacting community well-being. This engagement continues to further perpetuate deep-rooted mistrust and unequal power relations (Eckert et al., 2020; McGregor, 2021).

Case Study: Marine Spatial Planning

Control over how Indigenous knowledge is used for marine and coastal management in Canada is limited by legislative decision-making structures and policy that fail to recognize Indigenous self-governance and sovereignty rights and share decision-making power with Indigenous peoples. Community planning is positioned as a potentially viable tool and approach to supporting adaptive self-governance, including knowledge governance (Lane & Hibbard, 2005; Nickerson, 2017; van Assche et al., 2022). Different approaches to planning exist,

including Indigenous planning and environmental use planning. Indigenous planning differs from other types of planning in that it is grounded in and driven by Indigenous legal, political, historical, cultural, and social circumstances, and prioritizes culturally appropriate methodologies (Booth & Muir, 2011). In their review of Comprehensive Community Plans (CCP) developed by First Nations in British Columbia, Kobzik & Krawchenko (2022) note the role of CCP's in articulating "a roadmap to sustainability, self-sufficiency, and improved governance capacity" (p. 46). Additionally, Kobzik & Krawchenko (2022) highlight the potential value of local, regional, and community-level plans to support both provincial and federal implementation of UNDRIP legislation.

Collaborative planning processes, which often build upon community-level plans, present opportunities to equitably partner with Indigenous peoples and ensure control of how knowledge is used throughout all aspects of environmental stewardship (Parsons et al., 2021). One approach to collaborative planning in environmental contexts is Marine Spatial Planning (MSP) (Crowder and Norse 2008). MSP is often positioned as a more holistic approach to marine and coastal management. MSP approaches seek to address marine management from a spatial perspective by overlaying biophysical conditions with socio-economic uses and jurisdictional boundaries to strategically develop an integrated plan for marine use (Crowder & Norse, 2008). Throughout the planning process, partnership with rightsholders and the development of co-governance structures are integral to the strength and implementation of final plans (Zurba et al., 2012; Peart 2019; Diggon et al., 2021, 2022; Zuercher et al., 2022). Importantly, this partnership moves beyond participation and requires space for rightsholders to contribute to all aspects of the process, including the knowledge base upon which the marine plan is built (Diggon et al., 2021, 2022).

The Marine Plan Partnership for the North Pacific Coast (MaPP), a partnership between 14 First Nations and the province of BC, is a regional example of collaborative MSP that is grounded in community-level priorities. The MaPP process began with the development of community-based marine use plans that were developed by First Nations using methods that drew upon Indigenous knowledge and engaged with diverse perspectives within communities. Biologists, planners, and GIS analysts supported this work by helping to identify ecologically important areas (Diggon et al., 2021, 2022). The community-level marine plans supported Nations in bringing forward community priorities. Furthermore, starting planning at a community-level helped Nations to control how and what knowledge was shared during the development of sub-regional and regional scale plans. MaPP has supported the establishment of community-based monitoring and governance capacity, including working relationships, governance structures, and marine zoning (Diggon et al., 2021, 2022). Covering a spectrum of marine uses, the plans inform permits for marine tenures (ex. aquaculture), offshore renewable energy siting, and improve coastal infrastructure and governance coordination (Diggon et al., 2022). Lessons learned include the importance of (1) scoping and prioritizing topics, with an understanding that MSP is iterative and initial plans should be viewed as living documents that may be updated as implementation progress is made and priorities evolve; (2) clear processes for conflict resolution, especially when working at large scales with diverse stakeholders; (3) securing stable and sufficient funding; (4) collaboratively developing metrics to evaluate implementation success (Diggon et al., 2022).

Limitations to MaPP included the absence of federal partnership, which prevented the inclusion of activities under federal jurisdiction (Diggon et al., 2021, 2022). However, this work has been an important platform and foundation for First Nations to pursue other opportunities that enhance governance, including the development of a Marine Protected Area Network in partnership with coastal First Nations, the province of BC, and Fisheries and Oceans Canada (DFO) (Reid et al., 2022). This opportunistic approach to collaboration aligns with Zurba and colleagues' (2012) argument that co-management should be viewed as an ongoing process rather than a fixed state. Through this lens, communities may approach co-management strategically, participating in opportunities as they arise. By doing so, they may use these opportunities as steppingstones for building capacity, relationships and demonstrating capability.

Challenges and opportunities to support Indigenous knowledge governance in western environmental contexts

Legal Approaches

Multiple tensions and gaps exist within the Canadian legal system and the space and recognition it provides for Indigenous knowledge governance. For example, misalignments exist between the foundational principles underpinning western Intellectual Property (IP) and copyright regimes and Indigenous knowledge governance principles. Within IP and copyright, ownership is conceptualized as an individual right and, differing from Indigenous conceptualizations, provides little space for collective ownership or collective benefit (FNIGC, 2022). Furthermore, ownership can only be claimed when knowledge has been documented, posing challenges for oral knowledge. Further exacerbating difficulties to claim collective Indigenous knowledge as property, documented knowledge must fit the criteria of novelty, utility, and inventiveness (Moody, 2019). Lastly, copyright provides a time-limited protection and fails to recognize long-term claims to Indigenous knowledge generated and practiced over multiple generations (Moody, 2019).

Member states of the World Intellectual Property Organization (WIPO) have worked towards developing international legal instruments designed to protect Indigenous knowledge, with particular attention paid to genetic resources, traditional knowledge, and traditional cultural expressions. This work has been undertaken by the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge, and Folklore (Wendland, 2022). These negotiations are intended to support the perceived legitimacy and confidence of Intellectual Property systems by better understanding and expanding their capacity to support broad interest equitably and strengthen their contribution to sustainable development. Additionally, the Committee seeks to support Indigenous peoples cultural and economic interests by ensuring benefit from third-party use of their knowledge and providing clarity within research and development spaces. Challenges in this work include the fragmented nature of current policy and work, varying levels of political will, low public appeal, and complex interconnection across the entire IP system. In their summary of work thus far, Wendland (2022) highlights notable achievements including the enhanced recognition of traditional knowledge as prior art, which provides protection against patenting. Additionally, draft negotiation texts have been drawn upon and used to support related legislative initiatives at national and regional scales. The WIPO

Traditional Knowledge Division has provided technical assistance and capacity building services to support the development of policies, strategies, and laws.

The misalignment and tensions between Indigenous and western legal definitions and understandings of ownership and property are reflected in Canada's legislation. As summarized by the FNIGC (2014), the federal *Privacy Act* (1985), *Access to Information Act* (1985) and the *Library and Archives of Canada Act* (2004) create substantive barriers to Indigenous governance of knowledge collected by or shared with the government of Canada. The *Access to Information Act* enables the majority of information shared by or collected from First Nations to be released upon public request, with a few exemptions including the protection of personal information and information shared in confidence of another government (the definition of which only recognizes First Nations who have entered self-government agreements with Canada). This includes any information shared through data sharing agreements and licenses. Furthermore, when information is no longer used by federal departments it is transferred to Canada's Archives. When data is stored in the Archives the *Privacy Act* does not provide protection for individuals that have been dead for more than 20 years (FNIGC, 2014). Additionally, the Crown currently makes unilateral decisions on how Indigenous data is used, shared, or disposed of, disregarding Indigenous governance principles of ownership and control. Demonstrating the ways these issues are presently emerging, a recent article in the Globe and Mail reports on concerns raised by researchers working on First Nations claims against Canada. Researchers shared experiences where the federal government had prevented access to historic records by coercively requiring researchers to "divulge sensitive information about the cases they're working on and provide assurances they won't share the archives with anyone – including affected Indigenous communities" (White, 2023, n.p.).

Opportunities exist to amend these laws to support both individual and community interests and ensure control over knowledge and data. For example, in a 2022 discussion paper, the FNIGC present options to adopt a multilateral system that engages First Nations as decision-makers to oversee access, collection, and publication of First Nations data held by the Crown. Another option presented by the FNIGC (2022) would entail First Nations entering into agreements with the Crown that outline how data should be stewarded, with a long-term vision of data repatriation back to First Nations communities. Additionally, in Canada opportunities are emerging regarding the capacity of IP and copyright to support Indigenous knowledge governance. One of the key objectives of Canada's new Intellectual Property (IP) strategy is to build an understanding of issues relating to the relationship between traditional knowledge (TK), traditional cultural expressions (TCEs), and the IP system (GoC, 2018a). The Strategy seeks to support capacity building and Indigenous collaboration on development of IP law, policy, and programs.

In addition to legislative and policy changes, many opportunities also exist for innovative legal tools that support Indigenous knowledge governance. For example, Scassa and Taylor (2017) consider the need to develop legally binding knowledge sharing licenses and agreements that articulate how knowledge may be collected, used, and attributed, and who may use knowledge. Scassa and Taylor (2017) suggest templates that may be modified from menu options to support contextual needs and complexity. These must be developed with knowledge owners to ensure that tools are user-friendly. Demonstrating the potential of data governance

agreements, a project for the Canadian Institute of Health Research's signature initiative (Pathways to Health Equity for Aboriginal Peoples) co-developed agreements to support the repatriation of surveillance data to communities (Love et al., 2022). Data was stored in difficult-to-access forms and, through a data governance agreements process, co-ownership of data and co-authorship of relevant outputs was achieved. This work supported community responses and actions to local epidemics and helped to establish a legal precedent.

Another example of an innovative legal tool is the development of access and benefit sharing agreements for Indigenous knowledge. This work grows from the CBD's *Nagoya Protocol* (2011), which articulates that Indigenous communities should derive fair benefits from the use of traditional knowledge. A recent example, the Rooibos Agreement, was developed in South Africa and is financially the largest benefit sharing agreement between industry and Indigenous peoples and the first industry-wide agreement to be developed under the Nagoya Protocol (Schroeder et al., 2020). Through the Rooibos Agreement, the San and Khoi people receive a percentage of all rooibos sales between growers to processors. The Agreement also holds space and commits the rooibos industry to exploring non-monetary benefits for knowledge holders, including employment opportunities, bursaries, and support for livelihood creation. Although Canada is not presently a Party to the *Nagoya Protocol*, access and benefit sharing agreements present potential future resourcing opportunities to support Indigenous communities' knowledge governance, as well as environmental stewardship (Mardones et al., 2021). Other less formal mechanisms, such as Memorandums of Understandings, advisory committees and consent processes between the commercial sector and Indigenous communities, provide opportunities for communities to derive benefits from Indigenous knowledge use (Bullock et al., 2019; Artelle et al., 2021; Kobzik & Krawchenko, 2022)

Ultimately, settler colonialism is deeply embedded within Canadian law and governance and fails to recognize pre-existing Indigenous legal regimes. As well, although inherent rights are recognized in Section 35 and UNDRIP legislation, significant misalignment and inconsistencies within the existing system prevent full realization of these rights. Although modifications may be made within Canadian law to better support Indigenous knowledge governance, large scale reform is required to truly recognize inherent rights (Borrows, 2002; FNIGC, 2022). In the context of environmental governance, this would support Indigenous control over the ways knowledge is generated and used to inform decision making, as well as the decisions themselves. Borrows (2002) highlights that recognizing Indigenous sovereignty is consistent with existing principles of federalism, democracy, constitutionalism, and the rule of law that form Canada's legal and political identity.

Innovative Tools

Multiple innovative tools and approaches are being developed to support community control and ownership of knowledge. For example, many web-based platforms have been developed to store Indigenous knowledge (ex. Pulsifer et al., 2010; Aporta et al., 2014). The design of these platforms is often guided by Indigenous knowledge governance principles and community collaboration or leadership in the development process (Pulsifer et al., 2010; Aporta et al., 2014). Approaches to support knowledge governance on these platforms include developing and employing Indigenous data management programs that centre respect,

reciprocity, and responsibility and integrating mechanisms for multiple levels of consent within platforms (Pulsifer et al., 2011; Littletree et al., 2020). Additionally, the Traditional Knowledge and Biocultural Labels are an anticolonial metadata tool developed to articulate conditions under which Indigenous data may be accessed and used, including identifying the primary authority over data (Montenegro, 2019; Local Contexts 2023a, 2023b). These labels seek to address the gap between copyright laws and Indigenous knowledge governance and require collaborating between Indigenous groups and data repositories to customize and implement labels.

As larger platforms seek to engage with and include Indigenous knowledge, questions are raised on how increased accessibility of knowledge can adhere to knowledge governance principles and protect knowledge from misuse and exploitation (Stewart et al., 2019). These questions are particularly relevant within the context of open data movements that are intended promote transparency, accountability and research and innovation. Within environmental spaces, open and accessible databases are promoted as a valuable tool to support science and governance (Gries et al., 2019; Lannom et al., 2020; Hardisty et al., 2022). For example, the CBD's 2030 targets include the need to "ensure that the best available data, information and knowledge, are accessible to decision makers, practitioners and the public to guide effective governance." In tandem and tension with this, the targets also affirm that "traditional knowledge, innovations, practices and technologies of Indigenous peoples and local communities should only be accessed with their free, prior and informed consent, in accordance with national legislation" (CBD, 2023). Encouraging open data, the FAIR principles articulate the importance of findable, accessible, interoperable, and reusable data (Wilkinson et al., 2016). The FAIR principles were developed by a working group of scientific researchers and publishers and seek to set an international standard and norm, with the goal of "extracting maximum benefit" (p.1) from data (Wilkinson et al., 2016). The framework explicitly considers and advocates for machine agents as a targeted user of scientific data (Wilkinson et al., 2016). The FAIR principles are built upon understandings that data is objective and do not address the potential for data to cause harm and perpetuate existing inequalities (Taylor, 2017; Walter et al., 2021; Leonelli et al., 2021). In response and in support of Indigenous data governance, the CARE principles of collective benefit, authority to control, responsibility and ethics were developed as a complimentary framework that prioritizes Indigenous people's rights and interests as the ultimate decision makers and users of data related to themselves and their territories (Carroll et al., 2020). Sterner and Elliott (2023) argue that Indigenous knowledge governance principles present an opportunity for Indigenous peoples to be authorities over and contributors to data collected on Indigenous lands and informed by Indigenous knowledge, which in turn support Indigenous governance and stewardship.

Capacity Enhancement

Capacity is a central requirement for self-determining Indigenous knowledge governance (Norgaard, 2014; Kukutai & Taylor, 2016; McGregor, 2018). To maintain control over all aspects of knowledge production, storage, and use, capacity is vital at different scales and encompasses technical infrastructure and skills, as well as protocols and governance processes. Without this community-level capacity, the power over and exerted through knowledge production and use remains imbalanced and biased towards external groups. Milne (2022) highlights that community-based research capacity provides communities with opportunities to

generate knowledge within their own world, rather than within dominant settler colonial worlds. Milne encourages strategies that move knowledge production closer to home to create "new sites of community process for cultural revitalization" (p. 92) and renewal. McGregor and colleagues (2018) assert that establishing Indigenous research ethics guidelines and evaluation processes infused with community values and priorities is essential to ensure that Indigenous peoples are directing research agendas. Schnarch (2004) notes that capacity development and OCAP are interwoven, noting the feedback loop between capacity and control over research and knowledge they write: "having control implies a sense of ownership and responsibility that motivates – even requires- accelerated capacity development." Efforts should seek to recognize, uplift, and enhance existing capacity within communities so that all aspects of knowledge production support Indigenous self-determined governance systems (Schnarch, 2004; Taylor et al., 2018).

Governance capacity includes the development of research ethics, frameworks, policies, procedures, and review boards. In Canada, several organizations work to support Indigenous knowledge governance at national, regional, and community scales. At a national scale, the First Nations Information Governance Centre (FNIGC) was established over 20 years ago and mandated by the Assembly of First Nations' Chiefs in Assembly to "support the development of information governance and management at the community level through regional and national partnerships" (FNIGC, 2023). In a report for the BC First Nations Data Governance Initiative, Nickerson (2017) reviewed regional activities, summarizing the substantive work and capacity established by regional groups established Manitoba, Alberta, BC, Yukon, Quebec, Labrador, and Saskatchewan. Similarly, within environmental contexts, organizations such as the First Nations Fisheries Council of BC exist to support First Nations to engage and partner in environmental policy and decision making. These organizations compliment and uplift the priorities of rights holders and capacity existing at community levels (Nickerson, 2017; FNIGC, 2023). Reviewing Indigenous ethics boards, frameworks, and protocols across Canada, Hayward (2021) summarizes uniting threads that balance individual and collective rights, uphold culturally grounded ethical principles, and ensure community-driven and self-determined research.

From a technical perspective, capacity is also required and may be established at different scales to support different aspects of knowledge production, including data collection, analysis, and storage (Aporta et al., 2014; Pulsifer et al., 2010 Artelle et al., 2021). Significant opportunities exist in the establishment of Guardian Programs, which contribute community-level stewardship and decision making by gathering knowledge, monitoring activities, and enforce Indigenous law within territories (West Coast Environmental Law, 2018; Reed et al., 2021). Supporting foundational principles of knowledge governance, Guardian Programs may support communities in controlling what data is collected, maintaining ownership over that data, and applying data as needed (Schnarch, 2004; Carroll et al., 2021). As well, technical infrastructure and skills are required for the development and maintenance of relevant and effective knowledge storage and sharing tools (Pulsifer et al., 2010; Karuk Tribe et al., 2017). In their discussion on how external institutions may engage with Indigenous knowledge respectfully and foster mutually beneficial relationships, McGregor and colleagues (2018) bring forward the need for computer infrastructure and associated skills to enable community control and ownership over knowledge: if knowledge and data are held in external organizations' infrastructure, decision making power on how that knowledge is used is ultimately in the control of said organization. During the development of storage and analysis tools, attention should be

paid to digital capacity and literacy within communities and across generations to ensure that tools are accessible to community members (Scassa & Taylor, 2017).

Lastly, capacity is also required within non-Indigenous organizations, and, in turn, these organizations have played a role in providing resourcing and support for Indigenous knowledge governance (Arnott et al., 2020; Hayward, 2021). Many resourcing and funding opportunities have been critiqued for their short-term investment and misalignment with Indigenous priorities and values. As such it is vital to establish sustainable resourcing to support community needs (Kobzik & Krawchenko, 2022). Additionally, reviewing Tla-o-qui-aht fisheries governance initiatives, Milne (2022) notes the density of initiatives that the Nations strategically engage in as spaces for cultural regeneration and renewal. This complex patchwork and density of initiatives requires substantive governance capacity to manage and creates frustrations for community members. Milne (2022) argues that this form of funding, although strategically used to advance political priorities, coercively demands that community governance is configured to be compatible with Canadian systems. As such, while external funding is a strategic opportunity for community-based governance of knowledge, careful attention must be paid to the ways funding and initiatives support communities in their self-determining governance. In other words, funding and capacity building opportunities must seek to support Indigenous governance systems and self-determination, rather than supporting communities to participate in Canada's governance systems. Lastly, the FNIGC (2014) lists lack of knowledge as a preliminary barrier to OCAP and recommends educational opportunities to build a new culture within organizations and institutions that supports and respects Indigenous knowledge governance. McGregor (2019) brings forward similar points, articulating baseline understandings of difference as a requirement for respectful working relationships.

Summary

Environmental stewardship practices and principles are encoded within and embodied throughout all aspects of Indigenous knowledge and governance systems and represent a core dimension of culture and ways of being. As such, the protection and stewardship of knowledge within environmental stewardship contexts is an essential part of self-determination, cultural continuation, and resurgence. As many Indigenous scholars have articulated, Indigenous knowledge comes from and through the land. Environmental stewardship and management are fundamentally interested in access to and protection of land and, therefore, are deeply interconnected with and related to Indigenous knowledge governance.

Indigenous knowledge governance is described as the act of asserting and realizing Indigenous knowledge sovereignty rights to control the ways knowledge is generated, used, and stored. Discussions have considered the ways Canadian systems impede or pose challenges for Indigenous knowledge governance, as well as the diversity of opportunities that presently exist or are emerging. For example, control over how Indigenous knowledge is used is limited by Canadian legislative decision-making structures and policy that fail to recognize Indigenous self-governance and sovereignty rights and share decision-making power with Indigenous peoples. As such, legislative changes and system reform present opportunities to support and create space for Indigenous knowledge governance. Additionally, there are tensions between the rising popularity of open data movement and Indigenous knowledge governance principles. Many

innovative technologies and legal tools are emerging that help to support Indigenous governance over knowledge. Both technical and governance capacity are essential to support Indigenous knowledge governance. Importantly, capacity must centre in supporting Indigenous self-determining governance.

As articulated within Indigenous knowledge governance principles, Indigenous knowledge must bring benefit to communities and support self-determination and sovereignty (Schnarch, 2004; Carroll et al., 2020). Canada's commitments to partner with Indigenous peoples and recognize Indigenous knowledge for environmental stewardship necessitates careful attention to the ways that knowledge governance principles are recognized throughout all aspects of knowledge production, use, and storage. Collaborative contexts, such as MSP, present an opportunity to build community capacity and strategic relationships to support Indigenous governance. However, to accomplish this, MSP processes must be collaboratively developed with rights-holders and grounded in contextual needs. Given the numerous critiques of Canada's current approach to engaging with, valuing, and respecting Indigenous knowledge within environmental stewardship spaces, this study seeks to better understand how partners may apply Indigenous knowledge governance principles so that the weaving Indigenous knowledge into both the MSP process and outputs supports Indigenous ownership and control over knowledge use and ensures community benefit. This study is guided by the research question: *how can Indigenous knowledge governance be supported in knowledge sharing processes for environmental stewardship initiatives?*

THEORETICAL FRAMEWORKS

I draw on several theoretical frameworks to inform my research approach for this study. First, I use Indigenous knowledge governance, rooted in Indigenous knowledge sovereignty rights, as a framework to understand how Indigenous knowledge may be ethically valued and woven into collaborative environmental initiatives such as southern BC MSP (see literature review above for a summary of Indigenous knowledge governance frameworks). I draw upon anti-colonial and decolonizing theory to consider the ways knowledge is constructed and valued in dominant western systems and how this relates to Indigenous ways of being and knowing. I connect this to Indigenous knowledge governance by considering the transformations and actions required to support and create space for Indigenous knowledge governance. Informing my methodological approach and analysis, anti-colonial, decolonizing, and feminist theory inform my understanding that all knowledge is partial and situated, and that multiple worlds and realities exist. From this vantage, this study does not seek to find universal or static conclusions, and instead is grounded and centred in participants' perspectives and lived experiences.

Anti-Colonial and Decolonizing Theory

I draw upon anti-colonial and decolonizing theory to consider and question the ways Indigenous knowledge governance may be supported in the context of dominant settler-colonial governance and knowledge systems. Anti-colonial theory is a place-based critical analysis of colonialism to generate knowledge that "allows us to live in the catastrophic present" (Goyal, 2023, p. 4) while being interested in imagining and creating viable futures beyond colonial domination (Getachew & Mantena, 2021; Goyal, 2023; Patel, 2023). Goyal (2023) writes that anti-colonialism should "be seen as having both critical and reconstructive aims" (p. 361). Kempf (2009) draws upon a similar understanding, arguing that anti-colonial theory is both a tool for resistance and colonizer accountability. From this perspective, my research approach is grounded in relational methodologies that are founded in accountability and reciprocity. Tuck and Yang (2012) note that while anti-colonial theory is focused on undermining colonial powers and means of exerting authority, decolonizing theory is explicitly interested in undoing colonization, is centred in Indigenous self-determination and sovereignty, and cannot be removed from Indigenous lives and realities. Cautioning against the increasingly viral and surface-level use of the term decolonization to soothe settler guilt, Tuck and Yang (2012) emphasize that decolonization is incommensurable and in the context of settler colonialism requires the repatriation of Indigenous lands, life, and powers. Within this study, I apply decolonizing theory to Indigenous knowledge governance by reflecting on the ways settler-colonial power dynamics and relations disrupt access to land, recognizing land as a requirement for the ongoing embodiment and evolution of Indigenous knowledge systems and ways of being.

Anti-colonial and decolonial theory are closely related to post-colonial theory, and the distinctions between the three theories are complex and contested (Bhambra, 2014; Davis & Walsh, 2020). Comparing post-colonial and anti-colonial methods, Davis and Walsh (2020) write: "If post-colonial theory asks us to interrogate rigorously our theoretical inheritance, anti-colonial theory calls into question the situation from which we perform such an interrogation and demands that our political purposes be embodied in political praxis" (p. 386). They carry on by distinguishing decolonial perspectives from anti-colonial and post-colonial through Mignolo's

(2007) argument on de-linking to move beyond Eurocentric spaces with the goal of preserving, valuing, and fostering subaltern ways of knowing. Davis and Walsh (2020) conclude their comparative analysis by arguing that these theories and associated methods are neither competing or complementary and require "contextual judgement of situated agents as they challenge ongoing colonial projects in collective actions" (p. 386). Some scholars encourage the use of anti-colonial theory and decolonizing frameworks over post-colonial theory, arguing that the 'post' prefix insinuates a past-tense perspective on colonialism (de Leeuw & Hunt, 2018). Importantly, Wolfe (1999) argues that settler colonialism must be understood as a structure, rather than a singular contained event. From this perspective, I have chosen to frame this study in anti-colonial and decolonizing theory to critically reflect on the ways Indigenous knowledge governance may be supported in the context of the ongoing and persistent process of settler colonialism in Canada.

Although diverse, methodologies stemming from anticolonial and decolonizing theory, are united in their interest in questioning and exposing dominant forms of reasoning, thinking, and knowledge production, and the ways they produce and reproduce colonial inequalities and Eurocentric 'othering' (Smith, 1999). Importantly, western claims of objectivity, neutrality, universality, and superiority have been essential mechanism to privilege western ways of knowing (Smith, 1999). From this perspective, I draw upon feminist scholarship to understand knowledge as partial and situated, and that multiple realities exist (Haraway, 1988; Blaser, 2009; Milne, 2022). Although feminist scholars are recognized as leaders in discussions on situated and partial knowledge, in many ways these understandings align with Indigenous relational ways of knowing that are embedded within Indigenous ways of being and have been practiced long before the emergence of feminist scholarship in academic spaces (Smith, 1999; Wilson, 2008). I use these understandings to reflect upon my own positionality, centre participants' lived experiences and perspectives, and to acknowledge that findings and research may only ever be partial. Additionally, the recognition of the plurality of ways of being and knowing informs my understanding of Indigenous and western knowledge systems, and the diversity within them, as representing multiple rather than competing realities (Blaser, 2009; Milne, 2022).

Data Information Knowledge Wisdom (DIKW) Pyramid

The data information knowledge wisdom pyramid is generally attributed to Ackoff (1989) and has been a foundational framework within information and knowledge management and related disciplines (Rowley, 2007). While many understandings and visualization have been produced building upon Ackoff's (1989) model, all are premised on an understanding that higher units on the pyramid are generated through successive transformations of lower units of understanding (Rowley, 2007; Mercier et al., 2012; Merkus et al., 2019). The DIKW pyramid can be traced to positivist ways of knowing, which employ empirical methodologies that break down aspects of reality into smaller controllable variables with the intention of generating knowledge that may 'discover' universal laws and truths (Wilson, 2008; McDowell, 2021). Furthermore, the DIKW pyramid itself arguably reflects this positivist concept of universal laws and truths, as it is often positioned as a model that can broadly represent and explain how people come to know and understand the world (Rowley, 2007). Critiques of positivism apply to the DIKW pyramid, including the lack of attention provided to the political and situated nature of

knowledge (Smith, 1999; Haraway, 1988). As such, I acknowledge that the DIKW pyramid can only ever reflect a highly simplified version of reality (Mercier et al., 2012).

In their review of the literature, Rowley (2007) found that the data, information, knowledge, and wisdom components of the pyramid are the most frequently captured and discussed. Rowley (2007) reviews the definitions used for each unit of the pyramid, noting that many definitions and interpretations exist. They summarize their findings by highlighting popular understandings in the literature that (1) data commonly refers to discrete observations or symbols that convey little or no meaning; (2) there is limited consensus on the difference between data and information, but information is generally understood as organized data that holds meaning; (3) knowledge is frequently referenced as a synthesized and actionable unit; (4) the most ambiguous and rarely defined unit was wisdom, however where definitions exist wisdom is generally characterized as ethics, values, and principles that guide ways of being. The most common visualization of the pyramid includes data as the lowest and most abundant unit, with wisdom placed at the top as the rarest and highest form of processing. Some scholars have critiqued these visualizations and suggested alternatives, including inverting the pyramid so that wisdom forms the foundation, adding additional units such as 'symbols', 'understanding', or 'meaning' to the hierarchy, specifying types of knowledge (ex. tacit knowledge), or using venn-diagrams that demonstrate the overlap between units (Rowley, 2007; Mercier et al., 2012; Merkus et al., 2019).

Some scholars have used the DIKW pyramid as a tool to support the comparison of western and Indigenous knowledge systems. For example, applying the pyramid to their review of MSP decision support tools and their capacity to host Inuit knowledge, Aporta and colleagues (2020) consider the ways western decision support tools are founded in the DIKW pyramid, and often require the translation of knowledge to data or information. Using the DIKW pyramid, they demonstrate the ways that decontextualizing knowledge to produce data can remove essential context from Indigenous knowledge. In this example, the DIKW pyramid serves to support an understanding of how positivist ways of knowing inform the ways many western decision support tools are designed, reflect on the ways that Indigenous ways of knowing differ from a DIKW hierarchy, and use this comparison to better understand the degree to which western decision support tools may support different ways of knowing. Additionally, Mercier and colleagues (2012) use the pyramid to compare Māori knowledge (mātauranga Māori) to western knowledge systems. Mercier and colleagues (2012) argue that the DIKW pyramid can be "recast as a prism, or an observational lens with unique refractive properties that depend on the worldview and lead to different ways of seeing" (p. 103). This perspective emphasizes that knowledge is situated and partial.

The use of the pyramid in this study (Figure 1) was largely influenced by suggestions shared by participants during the project development phase of this study when research questions were collaboratively scoped. The DIKW pyramid is one of the most ubiquitous models in information and knowledge literature (Rowley, 2007) and utilizes terms (data, information, knowledge, and wisdom) that are commonly used and understood in collaborative environmental governance. As such, the pyramid serves as a frame of reference for participants to reflect on western ways of knowing, which presently dominate environmental management spaces in Canada. Explicitly presenting and reflecting upon this model helps to illuminate and support reflection on the often-implicit assumptions within western spaces on how knowledge is generated (Rowley, 2007).

Additionally, recognizing that the prevention of decontextualization and resulting misuse of knowledge is a central motivation of Indigenous knowledge governance (Carroll et al., 2020), the model served to represent basic understandings of how the inclusion of context transforms lower units of the pyramid to units that are placed higher.

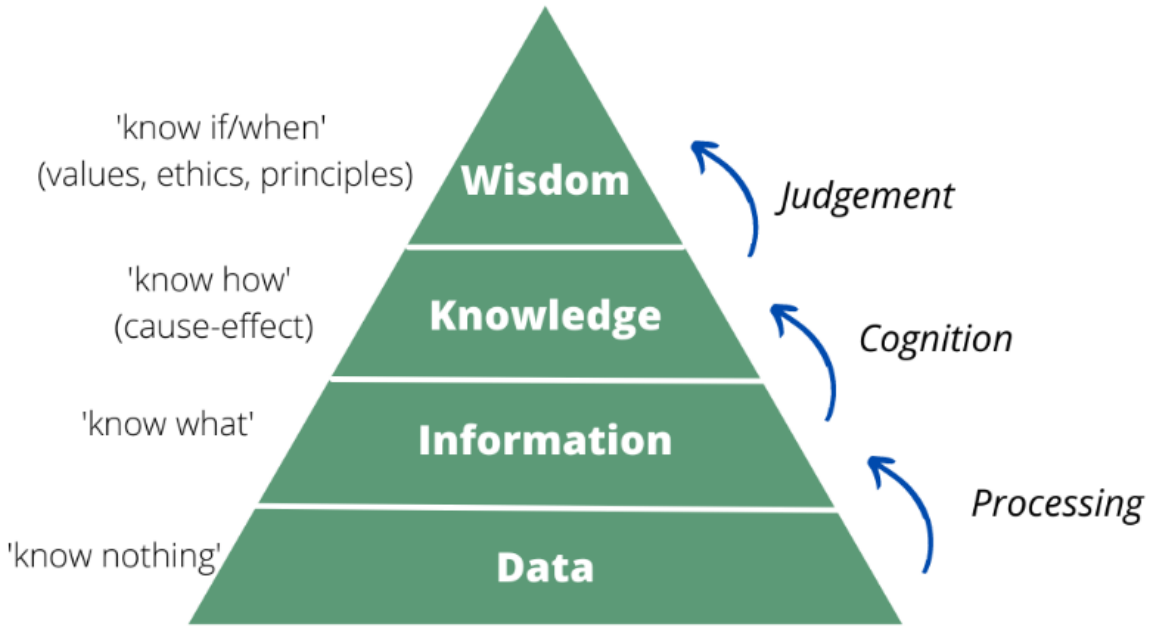

Figure 1. Data, information, knowledge, wisdom (DIKW) pyramid shared with participants to support focus group discussions. This model was developed using elements of Ackoff's (1989) original conceptualization and draws upon Rowley's (2007) summary of subsequent models and popular definitions. In particular, the elimination of an 'understanding' unit from Ackoff's conceptualization is reflective of critique and limited use in subsequent models presented in the literature (Rowley, 2007). The labels on the left side of the pyramid ('know nothing', 'know what', 'know how', 'know if/when') reflect definitions brought forward by Zeleny (1987). As well, the addition of the judgement, cognition, and processing labels denoting transformations from lower units of the pyramid to higher units of the pyramid reflect Choo's (1996) discussion and conceptualization of the pyramid, as well as Rowley's (2007) summary of common understandings.

I have used a relatively simple depiction of the DIKW pyramid (Figure 1) that draws upon commonly used definitions and understandings in order to provide space for different interpretations. This allows participants to bring forward and reflect upon their own experiences and understandings on the ways different units of understanding are valued, shared, and generated in collaborative environmental stewardship and governance (Mercier et al., 2012). Drawing upon anti-colonial theory and decolonizing frameworks, I use the DIKW pyramid to

support participants in examining and reflecting upon their understanding of epistemological and ontological characteristics of Indigenous and western knowledge systems. I consider these perspectives to critically examine how Indigenous knowledge governance may be supported in collaborative environmental stewardship initiatives (Wilson, 2008; Milne, 2022).

METHODOLOGICAL APPROACH

Indigenous and Community-Based Participatory Research Methodologies

Informed by anti-colonial and Indigenous theories discussed above, this research applies Indigenous and community-based participatory research methodologies with the intention of grounding this work in project partner needs and conducting research in a good way (Flicker et al., 2015; Johnston et al., 2015). Both research methodologies centre around collaborative relationships with project partners and are guided by a goal of democratizing the research process and its products. Drawing on anti-colonial theory, they aim to deconstruct the participant-researcher and Indigenous-settler power dynamics through the sharing of decision-making power (Ball & Janyst, 2008; Potts & Brown, 2005). While traditional research practices generally recommend and endorse linear processes, Indigenous and community-based participatory approaches recognize process as equally, if not more, important than product. As such, researchers are encouraged to leave space for flexibility in research programs to accommodate emerging needs and prioritize relationships (Attia & Edge, 2017; Ball & Janyst, 2008; Johnston et al., 2015; Potts & Brown, 2015).

Distinguished from other community-based methodologies, Indigenous research methodologies centre around "a commitment to recognize and support diversity and nationhood," and embrace Indigenous epistemologies (Johnston et al., 2016, p. 2). They recognize holistic Indigenous knowledge systems as legitimate ways of knowing and value relational methods for data collection. In this context, relational means taking what is needed, giving back, offering thanks, and emphasizing relationships (Kovach, 2021). The Aboriginal Capacity and Research Development Environment programs outline the four 'r's as a framework for Indigenous engaged research: respect, relevance, reciprocity, and responsibility. These four 'r's are achieved through accountable egalitarian relationships with and among participants, honest representation and use of knowledge shared by participants, accessible communication of findings and tangible benefit to communities. Johnston, McGregor and Restoule (2015) eloquently write, "we should strive to *be* good in our relations and to *do* good in our relations…if research is conducted in the same good way, with the same spirit and intent, then we will all have done research that meets a high standard of accountability to all our relations" (p. 19).

Positionality

All research is influenced by and carries the biases and personal history of the researcher. Reflecting on one's location at the outset is an essential and fundamental principle of Indigenous research methodologies (Absolon & Willett, 2005). This ensures that knowledge creation is not only accountable, but also reciprocal with the communities who share their experiences and perspectives in the research process. As Absolon and Willett (2005) point out, locating oneself is a customary practice in many Indigenous communities. They note that in many Indigenous communities, the first question asked is who you are (who you are related to) and where you are from (geographic place and community). Sinclair (2003) concludes that "*location* in Indigenous research, as in life, is a critical starting point" (p. 122). In this section I will reflect on who I am, where I come from, the experiences that have shaped me, and my intentions for this work (Sinclair, 2003).

My mother grew up in China, arriving in Canada in 1991 to complete graduate school at Queens University and obtained her Canadian citizenship shortly after. My father's family arrived from the United Kingdom and settled near what is now Montreal, Quebec in the late 18th century. This is important to acknowledge, as I inherit colonial history and carry privilege gained through an unjust system. Although I strive to be an ally and conduct anti-colonial and decolonizing work, I acknowledge that my understandings are deeply influenced by my positionality and that I cannot fully understand the lived experience of First Nations peoples and their knowledge systems.

I was born and raised in Toronto, Ontario, the traditional territory of the Mississaugas of the Credit, the Anishnabeg Chippewa, the Haudenosaunee, and the Wendat peoples. Growing up in Toronto and in a biracial household exposed me early on to a diversity of cultures. My parents are both geologists who spent a large portion of their careers travelling to and working internationally. These experiences were enriching for them and myself as they often came back from their travels with vibrant stories, photos, and friendships. They used these stories to teach me about my privilege living in Canada and the many worldviews and lives that existed outside of my immediate life. While these experiences were valuable for me to understand the multiplicity of ways of life outside of Canada, what I was not exposed to were the ways of life that existed before 'Canada'. I was largely ignorant to the peoples that had been displaced, the strategic acts of cultural genocide, and, importantly, the peoples and culture that continue to persevere and survive.

I moved to Halifax, Nova Scotia to pursue a Bachelor of Science in Marine Biology at Dalhousie University. Dalhousie is located in Kijpuktuk, in Mi'kma'ki, on unceded and ancestral Mi'kmaw territory. Although my undergraduate degree began broadly with classes ranging from cell biology to evolution, I quickly discovered and became passionate about conservation. My professors emphasized the value of 'wilderness', biodiversity, and positivist methodologies for examining the unknown. My degree was valuable in teaching me what western science knows about the marine environment, from the interactions within ecosystems to the evolution of traits and physiological adaptations of species. However, the social side of this equation, including the role that people and management practices play and the complexity of socio-ecological systems, remained largely untouched. During my final year at Dalhousie I started working for a marine conservation non-profit organization. Through this work, I became increasingly aware of the gaps in my education. In particular, the value of strong science communication, how management is an inseparable action pathway for conservation, and the people who were and, more importantly, were not being included. This experience motivated me to pursue a graduate degree where I could continue to learn about management and conservation in an action-oriented, ethical, and holistic way.

I moved to the unceded Coast Salish Territory of Lekwungen and W̱SÁNEĆ nations (Victoria, BC) to pursue graduate school at the University of Victoria through a project done in partnership with the First Nations Fisheries Council of BC. The project, which originally focused on spatial data and web-mapping to support marine planning, seemed to be an ideal setting for me to apply what I had studied in my undergrad (marine biology and GIS) using community-based participatory methods that were explicitly centred in people, policy, and management.

However, the project and FNFC's needs evolved substantially over the course of my degree. I initially found this very uncomfortable and felt uncertain about whether the evolving project aligned with my interests. As I spent time engaging in and supporting FNFC processes and built close relationships with partners at FNFC, I noticed both my interests and perspectives on marine and coastal management shifting. These experiences, relationships, and resulting personal changes culminated during the six months that I spent working at FNFC. This working experience was equally challenging, confusing, rewarding, exciting, inspiring, and frustrating. Importantly, it demonstrated the highly complex nature of this work and in hindsight was one of the most significant learning experiences in my degree. In this way, following my work at FNFC, this thesis topic held much more meaning to me as my interest was grounded personal experiences and relationships.

I've included this detailed description and reflection of how I came to this work to recognize how my current understandings of settler colonial relations and histories have been shaped by my collective experiences in work, education and beyond. As well, I include this detail with humility to demonstrate that my active engagement with decolonizing and anti-colonial work began relatively recently and, although it has involved substantive learning and transformations of my interests and perspectives, is an ongoing process that I can never consider complete. Much of my learning has taken place in the context of generous relationships that require reciprocity and hold me relationally accountable and responsible. I understand reciprocity to be a long-term active practice that obligates me to bring these learning and critical perspectives forward in all aspect of my life, including work, academics, and beyond. I believe I have a responsibility to remain conscientious of the historic and ongoing settler colonial context where this research is situated, acknowledge settler colonial power dynamics, and actively work to reduce these inequalities. As an ally, I am working to elevate voices equally, listen deeply, and expand my understanding of anti-colonial and decolonizing practices (Brophey & Raptis, 2015).

Collaborative Partnership with the First Nations Fisheries Council of BC

This research project was initiated by the FNFC, who sought to partner with academics at the University of Victoria through a research project that may support First Nations in the southern BC MSP program, using the initiative as a case study with the intention that findings may support other FNFC processes and work. The FNFC's Marine Research and Science Coordinating Committee (MRSCC) was engaged to support and guide this work. The FNFC regularly convenes the MRSCC to provide feedback and guidance on southern BC MSP. The MRSCC is composed of leadership and technical staff from First Nations with territories on the southern coast BC. Over the course of this project the MRSCC had dynamic open membership that fluctuated based on each First Nations' capacity and interest, with consistent representation from 17 First Nations and 5 aggregate First Nations organizations. Throughout the research process, I attended MRSCC meetings, met regularly with the FNFC and, when required, conducted follow up calls with key MRSCC members to discuss and further refine research topic, questions, and methods. These communications were important to ensure that the project was reflexive as needs evolved and supported the establishment of relationships between the researcher and project partners.

Case Study: Southern BC MSP

The federal government, through DFO, is presently leading a national Marine Spatial Planning (MSP) program that seeks to develop marine plans in five regions across Canada, including the southern coast of BC (GoC, 2023b). First initiated in 2020, the goals of the program are to develop plans that "describe a planning area's vision and economic, ecological, cultural and social objectives; establish boundaries for the planning area; provide an overview of the environmental context, activities and uses in that planning area; reflect our commitment to work with provincial, territorial and Indigenous partners to enable the advancement of their interests and priorities" (GoC, 2023b). DFO delineated each planning region's boundaries based on biological and physical characteristics, levels human activity, and their perception of "what is manageable for the marine spatial planning unit" (GoC, 2023c). As described on the Government of Canada's website (2023c), the southern BC region (Figure 2) contains highly populated urban areas, a rapidly growing population, and diverse and extensive economic activity, including shipping and transportation, ports and terminal, fish and seafood, tourism and recreation, technology, and forestry. Additionally, the planning area contains approximately 70 First Nations traditional territories with inherent and constitutionally recognized rights to steward, govern, and access marine and coastal environments. The current priorities of southern BC MSP, as defined by DFO, are to advance an early planning phase by focusing on information-gathering and engaging with partners and stakeholders. A primary deliverable for information-gathering has been the Canada Marine Planning Atlas, which "is an interactive mapping tool for decision-makers and other end users to access information about ecological processes, bioregion features and human activities in Canada's marine spatial planning areas" (GoC, 2023d). DFO describes the Atlas as a valuable tool to support decision-makers and the public in accessing and better understanding relevant data on ecological processes and human activities.

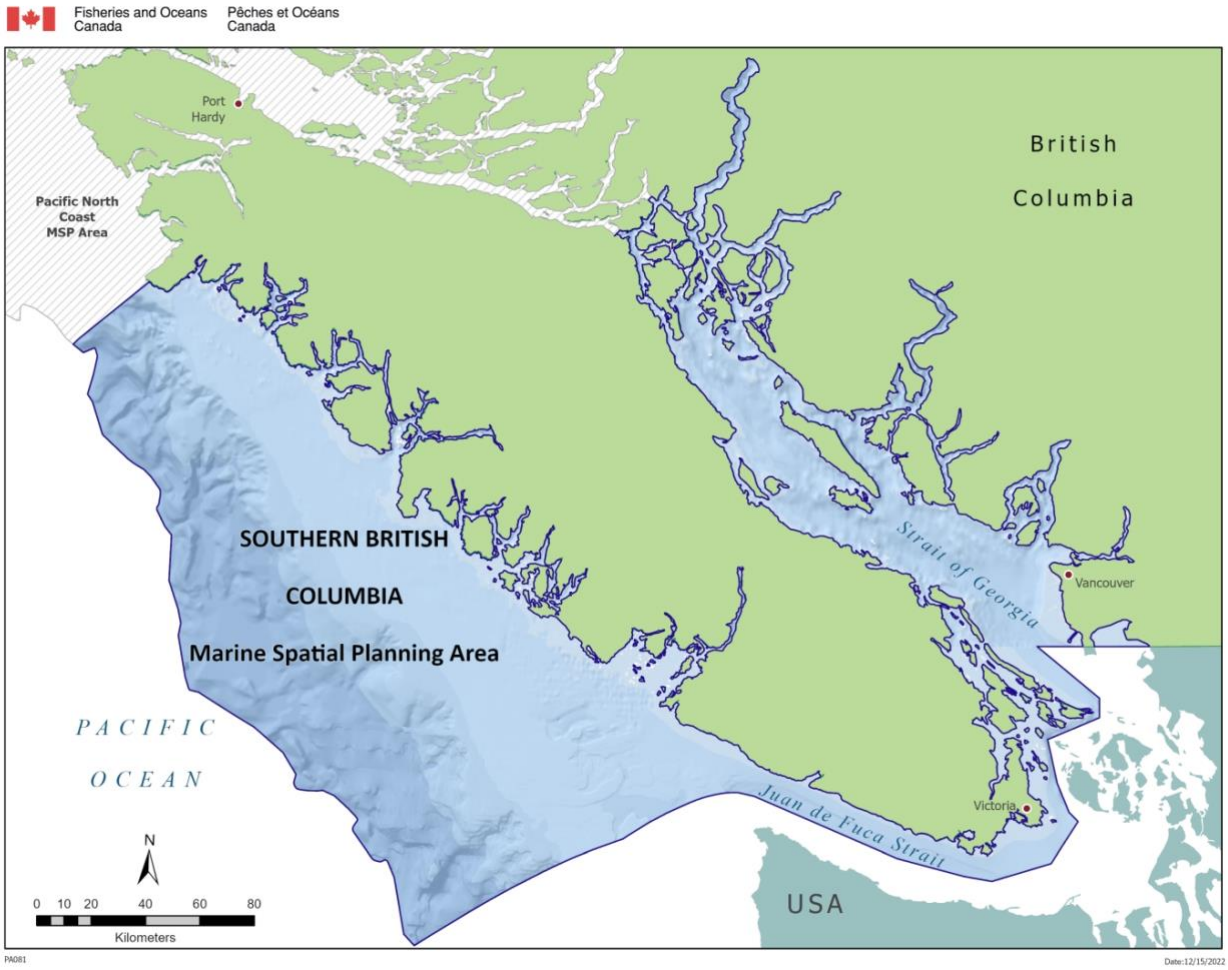

Figure 2. "The Southern British Columbia (BC) planning area encompasses the Southern Shelf Marine Bioregion and the Strait of Georgia Marine Bioregion. This area of approximately 37165 km^2 includes the Canadian portion of the Salish Sea and extends beyond the Strait of Juan de Fuca to encompass the continental shelf waters up to Brooks Peninsula on the west coast of Vancouver Island." (caption and figure from GoC, 2023d)

Scoping Research Topic and Question

I met regularly with FNFC representatives to discuss the project and attended the MRSCC meetings on southern BC MSP to better understand the context, needs, and interests. Through these meetings, concerns were raised by MRSCC members on how knowledge and data would be shared in the southern BC MSP process. In particular, this study grew from concerns from FNFC and the MRSCC that DFO's interest and proposed approach to including Indigenous knowledge in the Marine Planning Atlas paid little attention to Indigenous knowledge governance principles and failed to recognize Indigenous knowledge sovereignty rights. Through an iterative process of exploring and discussing research topics and questions that may address these concerns, the partners collaboratively scoped this work to focus on better understanding how Indigenous knowledge governance may be supported in environmental stewardship

initiatives like southern BC MSP. The objective of this project was for the findings to support the FNFC and MRSCC in establishing strong Indigenous knowledge governance in the southern BC MSP process.

Data Collection Methods

The project partners selected focus group methods to allow participants to share and discuss diverse perspectives and to centre findings in experiential knowledge. I used seven focus group questions (Appendix B) to prompt participants to reflect on their own conceptualizations, experiences, and limitations in their role in Indigenous knowledge governance, as well as provide recommendations for future work. I presented these focus group questions to the MRSCC for feedback to ensure focus group discussions were touching on topics of importance to MRSCC members. One recommendation from MRSCC members was to open the focus group discussions by sharing the Data Information Knowledge Wisdom (DIKW) pyramid and asking participants to reflect on the parts of the pyramid that were relevant to include in MSP (see Theoretical Frameworks section above for literature review on the DIKW pyramid). This opening question helped encourage participants to consider the different units of understanding, deconstruct how these units are valued in different knowledge systems, and reflect on how this influenced conceptualization of knowledge governance.

The project partners recruited focus group participants from each of the southern BC MSP partners, including the MRSCC, FNFC, Canada's Department of Fisheries and Oceans Canada (DFO) and British Columbia's Ministry of Forests, Lands and Natural Resource Operations and Development (FLNRORD, the marine and coastal management team now works within the Ministry of Lands, Waters and Resource Stewardship). The FNFC recruited government participants during working group meetings, and I recruited MRSCC participants during Committee meetings and via email. Follow-ups and flexible scheduling were offered to accommodate any interested MRSCC members.

This study was approved for human participant research under the University of Victoria Human Research Ethics Board. Prior to focus groups and interviews, a consent form (Appendix A) and interview questions (Appendix B) was shared with participants. The consent form outlined the intent and purpose of the study, including research questions, methods, and confirmed that all data collected would be kept confidential and anonymous. Participants were asked to send back a signed copy of the form prior to focus group and interview meetings. Additionally, presentations were given to the MRSCC to ensure that participants understood the scope of the project and had opportunities to ask questions and provide feedback. My contact information was also shared with participants as an alternative means to provide feedback outside of the MRSCC meetings.

I conducted a total of eight two-hour focus groups, with each focus group composed of two to four participants (n = 18). Focus groups were hosted over Zoom and I facilitated the discussions by presenting the questions, encouraging participants to explore the topic based on their own experiences and perspectives, and requesting that they clarify their responses when required. Questions were presented on JamBoard slides so that the participants could read the question and I could take live notes throughout the discussion. Live note taking helped

demonstrate that all contributions were being heard and valued, allowed participants to validate that the researcher had understood them correctly and supported participants in building off points made earlier in the conversation by referencing what had been said thus far.

During the recruitment process, some MRSCC members shared that it was difficult to commit two-hours for a focus group on top of their weekly workload. Additionally, there was difficulty coordinating multiple participants schedules to create focus groups. Based on this feedback, short one-hour interviews (n = 3) were conducted later in the project with MRSCC members and other First Nations representatives that had a relationship with FNFC to ensure that focus group discussions resonated broadly and to hear any perspectives that may have been missing. These semi-structured interviews focused on the preliminary findings from the earlier focus groups and asked participants to validate or elaborate on the themes. Additionally, any outstanding questions that had emerged through focus group discussions were posed to interview participants to further explore the topic. All Zoom sessions from the focus groups and interviews were recorded and later transcribed to capture the full discussions.

Theme Coding Analysis

Transcripts were theme coded to compare responses across and within focus groups and interviews. I began the analysis by reading through and reviewing the transcripts multiple times to ensure familiarity with the content. These early readings helped to highlight similarities and differences across focus groups and interviews. The transcripts were then theme coded manually with printed out copies and highlighters to identify high level themes. All themes were recorded when responses correlated with multiple themes. Upon completion of the first round of coding, the transcripts were imported into MAXQDVA where I spent more time identifying subthemes that emerged within these high-level themes. The software supported analysis by allowing for more organized coding of multiple subthemes and allowed for easier editing of coding as new themes emerged. Additionally, MAXQDVA supported me in efficiently recalling and bringing forward examples from each theme and comparing perspectives across transcripts.

Following the first round of coding and prior to writing the project findings section of this thesis, I spent five months working full time for the FNFC on marine and coastal management files (including the southern BC MSP program). During this contract, substantive time was spent coordinating, supporting, and attending engagement sessions and meetings with First Nations and government partners. The relationships, conversations, and time spent listening helped to ground the present study and analysis in evolving needs and realities. Although not officially used for analysis, this work experience influenced interpretation and analysis of transcripts.

All quotations that I have included in the project findings below have been kept anonymous with no identifying characteristics. This is because of the ethics consent form that participant signed, which guaranteed anonymity and confidentiality. Additionally, as no interview questions explicitly asked participant to reflect on and share their own positionality, analyzing identities or categorizing participants based on workplace, gender or race could only produce shallow conclusions that would problematically rest on my perception of their identity, rather than the participants self-identification and reflection of their own positionality.

PROJECT FINDINGS

In part, this study emerged as a response to DFO's requests to include Indigenous knowledge in their Marine Atlas. The FNFC was interested in better understanding how web mapping platforms, including the Marine Atlas or an Indigenous owned alternative, could practically support the weaving of Indigenous knowledge into the MSP process. As such, the project was originally focused on a more technical scale. However, as focus group and interview participants explored the topic and questions, larger scale and more philosophical considerations were brought forward. When asked to consider what Indigenous knowledge governance means and how it may be supported, many participants, either explicitly or implicitly, described the fundamental challenges that materialize when Indigenous and western paradigms interact in contexts laden with ongoing colonial histories and power imbalances. During a discussion on the challenges faced navigating environmental stewardship partnerships, one participant commented,

"*I think that's the other issue in the background is Nations still want to have this more philosophical discussion with Canada about what's the role of the Nations either within Canada or how you know what sort of parallel systems exist for the Nations and then they try to read it through all of these operational challenges…I still don't know that the conversation is that well positioned*."

This comment helped emphasize that solely focusing on Indigenous knowledge governance through an operational lens ignored important foundational questions and tensions that underpin this work[1]. In other words, aligning with an anti-colonial theoretical perspective, rather than solely considering practical approaches to Indigenous knowledge governance that may be applied within dominant settler colonial systems, participants' discussions emphasized the need to reflect on and examine the ways settler colonial ways of being and knowing exist in tension with and impede Indigenous ways of being and knowing, and how this translates to and influences understandings and applications of Indigenous knowledge governance principles.

Although focus group and interview discussions were broad and diverse, two broad finding themes emerged linking both philosophical and operational perspectives: (1) differentiating between Indigenous and western knowledge governance, and (2) operationally supporting Indigenous knowledge governance. In this discussion, I reflect on these themes, including the ways in which they were brought forward by different groups of participants and their relation to the broader literature on knowledge systems, Indigenous self-determination and sovereignty, and collaborative governance for environmental stewardship. Overall, the findings demonstrate that knowledge governance is complex and unique to individuals, communities, and organizations. However, woven throughout these distinct perspectives were underlying worldviews and the ongoing legacies of settler colonial relationships and power dynamics. The findings emphasize the need for reciprocity in collaborative partnerships and suggest that there is space and desire for a more equitable, socially just, and sustainable path forward that draws on the strengths of different knowledge systems and builds authentic and ethical partnerships to support resilient ecosystems and communities.

[1] I use the term operational based on the Merriam Webster definition: "performance of a practical work or of something involving the practical application of principles or processes" (Merriam Webster, 2023, n.p.).

Differentiating between Indigenous and mainstream knowledge governance

In multiple focus groups, some participants raised the question '*what is the difference between Indigenous knowledge governance and mainstream knowledge governance'* and extended this to ask whether it was beneficial to delineate between the two. These questions emerged for a variety of reasons. A few participants expressed hesitancy or discomfort with the term, with some arguing that the delineation may alienate or further reinforce the 'Othering' of Indigenous knowledge from other forms of knowledge. Other participants raised concerns that hyper-focusing on controlling knowledge sharing would slow processes down and felt that all knowledge should be shared if partners are working towards the same goals. There were also some who raised this question in a search for commonalities between Indigenous and western knowledge governance to help bridge their understandings. In differentiating what sets Indigenous knowledge governance apart from mainstream understandings of knowledge governance participants delved into deeper discussions on the similarities and differences between Indigenous and western knowledge and governance systems.

Similarities across and diversity within knowledge systems

The DIKW pyramid (Figure 1) was presented at the beginning of focus groups to help guide and support participants as they reflected on their perspectives and experiences with knowledge exchange in collaborative processes. A few participants critiqued the pyramid, with some suggesting that the units of understanding should be reversed so that wisdom formed the base of the pyramid while others felt that a non-hierarchical representation may be more useful. These comments reflect discussions in information and knowledge management literature, where many have proposed alternative conceptualizations of the pyramid (discussed in the Theoretical Frameworks section above). One participant noted that they associated the pyramid with western perspectives and knowledge systems, commenting *"There's a worldview embedded in that triangle, that I disagree with, which is great, it's fine, it makes sense, it's an analytical tool."* Another participant in the same focus group responded, *"Well, I mean no model is perfect that's why we work with them because everything is too complex."* I've chosen to use this short interaction to open this section as it demonstrates the limitations of models as simplified renderings of reality and the biases unavoidably embedded within them, and because these quotes reflect a greater theme that emerged across focus groups. That is, although all participants consistently articulated associations between specific ways of knowing and units of understanding with western and Indigenous worlds, the DIKW pyramid proved to be a valuable tool for participants to discuss and reflect upon their perspectives on the boundaries delineating the two knowledge systems. Participants demonstrated that, based on their work and lived experiences, practical understandings of western and Indigenous knowledge systems were fluid and flexible. Perspectives on the similarities across and diversity within knowledge systems emerged most prominently during discussions on the differences between data and knowledge, with many discussions on how units of understanding in the DIKW pyramid are generated, valued, and shared within western and Indigenous paradigms.

Overall, there was little consensus amongst participants on specific distinctions between each unit of the DIKW pyramid and participants were often inconsistent with their use of the terminology throughout the discussions. Despite this, most were comfortable describing the

differences between the lower (data and information) and higher (knowledge and wisdom) parts of the pyramid, which most referred to as 'data' and 'knowledge' respectively. Consistently, participants agreed that higher parts of the pyramid had undergone significant processing of lower parts of the pyramid to be transformed into a unit that could be practiced or actioned. Participants noted that for data to be transformed into the highest parts of the pyramid (i.e., wisdom), it required significant processing by multiple individuals over time. While many participants described data as a technical thing composed of numbers and values, descriptions emphasized that the defining characteristic of the lower part of the pyramid was that it represented singular measurements. Accompanying this understanding was a recognition that these measurements could be collected in different ways. In comparison, participants consistently emphasized that knowledge and wisdom were held in more flexible formats, including stories, songs, dance, reports, policy, and legislation. Having undergone more processing, participants felt that the higher parts of the pyramid reflected our understanding of connections, relationships, and represented a synthesis of the lower parts of the pyramid.

All participants applied these overarching understandings of the DIKW pyramid to both western and Indigenous knowledge contexts. A diversity of examples were brought forward that acknowledged commonalities across knowledge systems and recognized the ways Indigenous and mainstream contexts generate different types of knowledge, including scientific knowledge, local knowledge, and knowledge or wisdom embedded in cultural traditions and practices. Many participants emphasized that neither Indigenous nor non-Indigenous peoples are a monolith and that ways of knowing and being are diverse and evolving. Some noted the ways western knowledge systems are evolving, using marine planning processes as an example of shifts towards more holistic governance. Additionally, a few participants spent time exploring the ways knowledge is generated outside of western institutions, with one participant commenting, *"if my great-great grandfather was still alive, his knowledge set might be quite unique too, as is someone who has grown up in a particular environment and is intimately familiar with a place as well."* In tandem, and resisting reductive definitions of Indigenous knowledge, almost all participants described the diversity of methodologies and types of knowledge generated within Indigenous knowledge and governance systems. Discussions referenced both community-led programs collecting extensive data to monitor and support stewardship of territories and oral knowledge on the territory passed down over generations. Hunt (2014) articulates the necessity of recognizing the ways Indigenous knowledge systems continue to evolve and harness new technologies, noting "the future of Indigenous rights and political struggles depend on the ability of Indigenous knowledge to retain its active, mobile, relational nature rather than fixity it is given in colonial law, stuck at the point of contact with colonizers" (p. 30).

As participants reflected on their experiences with and understandings of each knowledge system, it became evident that neither were discrete categories and that both knowledge systems are evolving and expanding (Agrawal, 1995). Narratives of discrete and fixed categories further inaccurate and reductive tropes and reinforces hierarchies that Other non-positivist ways of knowing and create an illusion of distance. Smith (1999) discusses the ways colonization has facilitated and depended upon 'trading the Other', referencing bell hooks (1992) and Graham Smith's (1995) work, they highlight the commodification of Otherness, including Indigenous culture, rights, knowledge, land titles and fauna and flora (p. 90). De Leeuw, Greenwood, and Lindsay (2013) continue this discussion, drawing upon Ahmed's (2000) discussion on 'the

stranger', noting that for Indigenous knowledge to be deemed interesting or important it must first be labeled as different, exotic, and strange. Problematically, this shifts justifications for engaging with Indigenous knowledge away from rights-based arguments and places a settler-colonial gaze on Indigenous knowledge. While I do not intend to propose that Indigenous and western knowledge are the same, I found that the DIKW pyramid was a valuable tool for participants to consider foundational characteristics of all knowledge systems. Rather that solely focusing on differences, considering similarities was an important starting point to begin to understand perspectives and experiences different from one's own.

Foundational characteristics and distinctions between Indigenous and western paradigms

Alongside discussions on comparable features, participants also highlighted perceived differences between Indigenous and western knowledge systems. In particular, I found that participants' reflections on the wisdom portion of the pyramid helped to highlight and summarize distinctions between knowledge systems. The diagram of the DIKW pyramid that was presented to participants during focus groups included a short description of wisdom as values, ethics, and principles (Figure 1). Some participants contributed to this by sharing an understanding that wisdom was generated through the passing and continual processing of knowledge over generations, ultimately being woven into a worldview and way of being. Most participants felt this was a broadly applicable concept, however one participant struggled to apply this understanding to western spaces. Thinking aloud in an interview, they commented

"They have very little historical awareness of themselves and what they, they don't, there's no internal sociological analysis of what the department is and what their function is and so on. But in the Canadian bodied politic, DFO exists to maximize economic activity for the greater glory of the Canadian nation state when it comes to resources, they're not there to look after things, they're not, they're there to generate revenue that shows up on the GDP of Canada's economic reporting and they have been since the very beginning. Science, CMP, everything in DFO is there to make sure that large corps for the most part or fishers out east who are owners-operators can go out and harvest fish that get sold commercially and make money. It's always been that and if you don't appreciate that working for DFO you're incredibly, it's kind of like, they don't have a great deal of wisdom there, they don't have a structure that's set up to generate wisdom because it's not an end goal of DFO. The end goal of DFO is knowledge that can allow them to maximize economic benefits and you see it in the ongoing persistence of principles around optimization and maximization, that's how they're set up that's what they're supposed to deliver, and that is a knowledge function not, a wisdom by its nature is integrated, in my definition of it, and knowledge is more domain specific."

Later in the interview they added:

"Almost all of the decision making we do rests in part on a foundation of data and knowledge, like the way the decision-making systems are set up. We decide to open or close a fishery based on what our projections are for run size or we decide on the season based on our estimates of when mating periods occur or something, so wisdom doesn't form a part of fisheries decision making, and I was sarcastic about it earlier, but in a practical sense it's true, like it's just not the

way the system was built, it was built to receive inputs in the form of data and information and the knowledge for the most part is encoded in the decision making algorithms."

This quotation not only demonstrated this participants' frustrations and perception of the failings in western worldviews and ways of being (an emotion and opinion shared by many other participants), but also helped to suggest that wisdom may be understood as each culture's truths, which are deeply rooted in the positionality of the people, community, or organization (including their objectives, values, and histories) where it was generated. Throughout discussions, participants demonstrated the ways in which they perceived wisdom and positionality to influence all elements of the pyramid, informing what data or observations are collected, how they are processed, and what connections are made. In other words, the wisdom portion of the pyramid helped to convey that all knowledge is situated (Haraway, 1988). Echoing this understanding, Simpson (2014) discusses the role of Nishnaabeg stories in recording and transmitting wisdom, writing that "stories direct, inspire and affirm an ancient code of ethics" (p. 8). Simpson's writing helps to affirm participants' interpretations of wisdom as each knowledge systems' positionality, which is embedded, woven into, and transmitted throughout all aspects of the knowledge system.

The differing positionalities of western and Indigenous worlds and resulting distinctions between knowledge systems was illustrated through all participants' discussions on their experiences working within (and, for some, across) Indigenous and western spaces and as participants described their understanding of each paradigms' foundational characteristics. Participants perceived knowledge generation in western spaces to be a siloed or separate activity from governance. Generally, it was agreed that, while western knowledge systems generated diverse types of knowledge including local, observational, and experiential knowledge, western governance and decision-making processes are founded in positivist methods that seek to establish an unbiased evidence base and generally exclude other ways of knowing. Noting the current dominance of positivist ways of knowing, Duarte and colleagues' (2019) detail the ways data has become ubiquitous in mainstream governance and describe its foundational value across disciplines, drawing examples from crime enforcement, commerce, social media, government, communications, genetics, epidemiology, and artificial intelligence.

In contrast, descriptions of Indigenous knowledge systems demonstrated that most participants perceived it to be more holistic and founded in interconnections and relations. Participants consistently highlighted that they understood Indigenous knowledge and wisdom to be generated by intimately living with and caring for a place and people over many generations and, importantly, guided by the goal of continuation for many generations (Berkes, 1999; McGregor, 2004; Brown & Brown, 2009; Simpson, 2014; Jessen et al., 2022). Acknowledging the diversity of methods applied within Indigenous knowledge systems, some participants applied their understandings to Indigenous science and referenced their knowledge of extensive environmental monitoring programs that have been established within communities and are closely connected to governance activities. Some noted that decisions on what data to collect is directly related to community-well-being and, as such, the value of research is grounded in its validity to people. Reflecting on the ways embodied worldviews and culture differentiate Indigenous science from western science, Whyte, Brewer, and Johnson (2016) write, "research and work represent a dimension of the very activities of creating and renewing morally

significant relationships…practitioners of Indigenous science are not somehow separate or epistemically privileged in relation to the many humans and non-human relatives living" (p. 6).

Acknowledging the immense diversity across Indigenous peoples' ways of knowing and being, Wilson (2008) highlights that a uniting thread across Indigenous paradigms is relationality. In *Research is Ceremony* they describe the ways Indigenous ontology, epistemology, and axiology are founded in relationality and, as such, knowledge systems are intrinsically holistic. The world is known through relationships and connections, instead of through the identification and study of objects. In other words, to understand something is to understand how it relates to you and everything else you perceive and interact with (both physically and spiritually) in your world (McGregor, 2004; Simpson, 2004; Hunt, 2014; Simpson, 2014). Importantly, the governance systems that arises from this way of knowing and being value diverse forms of knowledge that are generated and embodied in all aspects of life (Whyte, 2018; Milne, 2022). Building on this understanding and participants' discussions described above, data and knowledge are not perceived as objects to be managed or applied separate from the contexts from which they are generated and practiced. As such, relational ways of being and knowing are deeply connected to people and place and need to be lived to be real (Simpson, 2004; Hunt 2014; McGregor, 2021; Milne, 2022). In this sense, Indigenous ways of knowing and being are distinct from western practices that place positivist ways of knowing hierarchically above other ways of knowing. Linking back to the first section of this discussion, this is not to say that other forms of knowledge do not exist within western knowledge systems but, importantly, knowledge generation for governance is separated or siloed from most other aspects of life.

Although many participants shared similar perspectives on the foundational characteristics of each knowledge system, some noted their discomfort with insinuations of universality or prescriptive definitions detached from reality. For example, one participant commented:

"I've never really understood what Indigenous knowledge means. I don't really believe in generic Indians or anything like that, if you want to talk about [First Nation] knowledge, but Indigenous knowledge I don't really know."

In the same focus group, another participant added:

"They told us we were Indigenous, and to some we want to be First Nations, we want to be our people, we want to be with our tribes. Never asked, they just said now we're Indigenous. No one is Indigenous people."

Additionally, in a different focus group, one participant considered the purpose that definitions serve:

"I mean you've heard me before, I'm very cautious with any of these constructs that compartmentalize Indigenous knowledge. I don't think it's ultimately the right way to handle it, I'd have to think through it more carefully, but I think it's something, epistemologically I think something similar is going on with what happens to ecosystem services. It's a way, its reductionist, it's a way of isolating something from its context, making it more amenable to

commodification and extraction and use and all those things that we do very well within the kind of world we live in."

Hearing these comments, I present the foundational characteristic and boundaries delineating Indigenous and western knowledge systems in this section cautiously and through the lens of strategic essentialism (Spivak, 1988; Spivak, 1996). Strategic essentialism is "a political strategy whereby differences (within a group) are temporarily downplayed and unity assumed for the sake of political goals," and is recognized as a viable pathway for resistance (Eide, 2016, p. 2). Importantly, the use of strategic essentialism requires us to be continuous critical and attentive to the use of categories. This includes considering the assumptions embedded within them and considering who benefits from their use. Applying the value of categories to decolonization, Sium, Chandni and Ritskes (2012) write: "This is not a search for a pan-Indigenous identity, but for relationships and alliances that can strengthen local decolonization movements" (p. 6). As demonstrated by the Haida, Heiltsuk, and Nuu-chah-nulth Nations, inter-Indigenous solidarity is a strategic and effective pathway for resistance to fulfill self-determining authority in the context of marine resources and environmental governance (von der Porten et al., 2019). Rather than being concerned with finding a perfect definition, Whyte (2013) argues that attention should be focused on using Indigenous knowledge definitions as a tool for collaboration that "invites people to engage in a process of respectful learning about significant differences" (p.10).

Tensions between Indigenous and western knowledge governance

When asked what the term 'Indigenous knowledge governance' meant to them, most participants began by reflecting on foundational and potentially cross-cultural principles guiding knowledge sharing. Many noted that the decision on how data or knowledge can be shared and used must be made by its owner, and that understanding ownership was highly context dependent. For example, one participant commented,

"…like if you're an academic, you're collecting your information, Jean, that you're collecting now is yours, you know the context of doing you dissertation, and then you choose to make it available. Right, and then in the context of information within a collaborative, the ownership question gets interesting, because it depends on what you're talking about. Like if it's wisdom then that's not really the individual owns that knowledge is also very personal, unless it's like expressed in a way analyzed and then put out there, but then information and data like if it's collected it depends on who collects it. And then so, it's very, it's very individualized to the person, institution, organization around ownership, so if you're a researcher, if you're a First Nation collecting the information, if you're a government agency that's collecting the information, or collecting data to create information, then that's all going to be different, ownership is going to be different in that context."

Another participant in a different focus group shared,

"It causes conflict sometimes, in my tribe and in [other participant in focus group's] tribe, some of the [First Nation] as well. For example, songs belong to families, and god help you if you

stand up at a potlach and you sing a song that doesn't belong to your family and you don't have the right to sing, you're liable to get thrown out right then and there in the potlach, so sometimes I see it come up very strongly, like the use of certain things, like symbols or dances, or my family has a curtain we use, only my family can use that curtain. I'm not even allowed, even though I commissioned it to be made, I can't even loan it to another family to use it, let's say they wanted to use it for a potlach and they didn't even have a curtain, I don't have the right to let them use it, because it's, even though I commissioned it, it belongs to my family. So sometimes yes, it's protected very much. Another example might be boundaries, between some tribes, that knowledge tends to be protected quite strongly."

These quotes help to demonstrate a consistent understanding amongst participants about general and broadly applicable relationship between ownership and decisions to share knowledge, with a collective understanding that the nature of this relationship varied depending on context.

As participants applied base understandings of each knowledge system to the concept of knowledge governance, discussions highlighted key tensions that emerge when western and Indigenous paradigms interact. The association between positivist ways of knowing and western governance was coupled with shared perspectives amongst participants that mainstream knowledge governance was largely handled with technical strategies that helped individuals and organizations to control the sharing of data or knowledge, with some noting they were more familiar with the terms 'data governance' or 'data management'. From this perspective, participants' examples of good practices referenced technical strategies including GIS platforms, formal data sharing agreements, copyright, intellectual property, and legislation that delineated the boundaries of ownership and sharing (see FNIGC, 2014 for a detailed description of these barriers). For some with limited experience working, collaborating, and building relationships with Indigenous communities, their discussions tended to remain largely on these concepts, focusing on technical considerations more in-line with 'data management'.

In contrast and growing from understandings of the differences between Indigenous and western knowledge systems, perspectives from participants working in more Indigenous-centred contexts tended to spend more time discussing relational considerations as they interpreted the concept of knowledge governance. Reflecting on knowledge sharing practices within their community, one participant commented that respecting knowledge ownership is coupled with an inherent trust from the community and individual responsibility to bring this knowledge forward when required to support community wellbeing. They provided the example, "*There's an agreement that that's their knowledge, and their stories are not anyone else's to tell, but they'll share that freely in the moment that it needs to happen within the community.*" Simpson (2014) reiterates this concept, describing their understanding of how trust and responsibility are built into Nishnaabeg knowledge systems they write, "Although individuals have the responsibility to self-actualize within this system, intelligence in this context is not an individual's property to own; once an individual has carried a particular teaching around to the point where they can easily embody that teaching, they, then, also become responsible for sharing it according to the ethics and protocols of the system" (p. 11). Aligning with this relational perspective on knowledge, some participants noted that individuals, families, or communities hold knowledge and, in some cases, have exclusive responsibility to share that knowledge. This understanding, which extends beyond individuals, is consistent with OCAP articulations that emphasize

collective community or group relationships to cultural knowledge, data, and information (FNIGC, 2014; Schnarch, 2004).

When asked what risks should be considered in knowledge sharing processes, participants brought forward examples of decontextualization, misuse, and cultural appropriation (Eckert et al., 2020; Carroll et al., 2020; McGregor et al., 2019; McGregor, 2021; Schnarch, 2004; Smith, 1999; Zanotti and Palomino-Schalscha, 2016). These concerns were united by the common thread of knowledge being translated in ways that harmed communities. Reflecting on the ways units of the DIKW pyramid are shared and used in knowledge exchanges, one participant commented that there was,

"A risk that what is wisdom or knowledge in one sphere or context or domain, when it gets translated into the planning program gets translated or trivialized. Yeah, the way I'm articulating it it's almost a mathematical relationship, like it's a transformation that is acted on the knowledge."

In a different focus group, another participant reflected on the ways translation of knowledge has been a vital tool for dispossession:

"They've got us over a barrel. You know [other participant's name], a lot of your knowledge of your elders you used in that court case, the [First Nation court case], with government and they turned it around and try to use it in their best interest and that's what we're all scared of, all of us are scared of the same thing. It's how we read it and how the judge reads it. It's not how we read it, it's not how we talk about it, it's about how they talk about it, and how they use it. It's a word processing system, they change words to mean another word, and it's scary and it's a trust issue with me, they tell their own version and their own story and it's always a matter of trust. You know we've lost so many tracks of land because one word meant a different thing and our chiefs didn't understand it. You know I look back at a specific claims area in our territory and a lot of documentations we couldn't use lawyers so in all these situations it was just X. You know one signature and a whole bunch of X's and the X's were all the same and so it's a real scary thing when we're talking about how we're backstabbed by the very government that was supposed to protect us…it's a hard thing to define what we want released and what we want to share. It's a hard to define process and scary."

Although participants tended to associate more technical strategies with western systems and more relational approaches with Indigenous systems, as discussed in previous sections, these delineations between knowledge systems were not discrete. Nonetheless, the tensions between technical management and relational approaches to data and knowledge sharing and usage was evident across all focus groups. Commenting on these tensions, one participant contributed:

"Previously researchers, people from universities would just go in, take the data, the people would get nothing back out of it and then they would go off and write their papers and make their money off of whatever it is they just did here, but there wasn't a lot of sharing, or maybe there was a stipend to the guy that helped them out but it, no meaningful reciprocity. But then taking that information out of the context from which it was gathered, kind of biases it towards a

western worldview because they're taking that data, that knowledge, they're taking out the Indigenous or the traditional component and they're turning it into something for consumption basically, and that's sort of where the whole the crux of the Indigenous traditional knowledge issue came about. But then we went about trying to fix it in a very western-oriented way of saying okay you guys own this data, tell us when and how we can use it, as opposed to you guys own this data, tell us what you know about it, tell us your understanding about it, and tell us how we should be doing things or maybe not should but tell us how you would go about interpreting it, using it and valuing it and again that's just that cultural disconnect where we're still trying to dig our way out of a hole we dug ourselves into."

Overall, these quotes emphasize the misalignment between Canadian policy directions and Indigenous perspectives. That is, the participants in these focus groups demonstrated that Indigenous knowledge (viewed as something that is practiced and embodied rather than an object) cannot simply be prescribed to be used in western governance and ethical use cannot be simplified to purely technical approaches to control data and knowledge. Instead, to prevent harmful decontextualization, misuse and/or cultural appropriation, knowledge must remain within the contexts and people where it was generated and practiced (Berkes, 1999; Brown & Brown, 2009; McGregor, 2004; McGregor, 2021; Latulippe & Klenk, 2020; Simpson, 2014). Drawing upon the wisdom discussion above, all knowledge is situated and, as such, the positionality of each knowledge system cannot be translated or transferred to another context. In the context of southern BC MSP, this misalignment is evidenced in DFO's understanding of how Indigenous knowledge may be valued in MSP.

In their discussion on the history and present use of Indigenous knowledge in Canada's environmental policy, McGregor (2021) argues that current policy fails by not acknowledging and recognizing Indigenous knowledge systems which, "includes how Indigenous peoples generate knowledge within their own legal and governance structures, and protocols, including political, economic, social and cultural systems" (p. 3). They argue that the lack of a knowledge systems approach is a primary reason why current policy fails to advance reconciliation and meaningfully engage with Indigenous knowledge and partner with rights holders. Similar findings are brought forward by Littletree, Belarde-Lewis, and Duarte (2020) in their discussion on Indigenous knowledge organization: "Indigenous knowledge organization is fundamentally a practice of liberation, and, therefore, is far less about attempting to reform or revise existing tools and methods, and far more about defining ways to discern and advance Indigenous knowledge systems" (p. 413). Whyte (2017) asserts the necessity of reuniting Indigenous knowledge's value with the wellbeing of current and future Indigenous peoples. Arguing that this is essential to move away from and avoid the extractive methods and supplemental value that scientists have often placed on Indigenous knowledge, they challenge all knowledge exchanges to consider: *What does Indigenous knowledge do for Indigenous peoples?* The sentiment aligns with the Collective Benefit principle in the CARE acronym, which emphasizes that all knowledge use must bring benefit to the communities who own and steward the knowledge (Carroll et al., 2020; Carroll et al., 2021).

As demonstrated by Indigenous scholarship and participants' discussions described above, the distinguishing relational and embodied characteristics of Indigenous knowledge systems and

the resulting intimate relationship between people, place, and knowledge means that Indigenous knowledge governance cannot be simplified to western versions of data or knowledge management. Instead, Indigenous knowledge governance is explicitly interested in the entire system where knowledge is generated and practiced, with an acknowledgement that knowledge cannot exist or be real outside of these systems. Reviewing international data and knowledge sharing frameworks, Carroll (2020) found that Indigenous frameworks notably differed from other mainstream frameworks in the ways they emphasize people- and purpose-oriented principles, rather than solely data-oriented principles. This understanding echo's Smith's (1999) articulation of Indigenous research agendas that emphasizes their central and inherent interest in the processes of decolonization, healing, transformation, and mobilization (p. 116), all of which are necessary to foster the continued embodiment and evolution of Indigenous knowledge systems. As such, Indigenous knowledge governance, grounded in self-determination and sovereignty (Schnarch, 2004), is a call to strengthen and support the knowledge systems themselves (TRCC, 2015). As one participant commented, "*knowledge is a process, not a static thing, it has to be made and remade*." This understanding recognizes that knowledge must be practiced to be real, and that supporting Indigenous knowledge governance necessitates creating space for this practice.

Bridging understandings for southern BC MSP

The findings discussed in the sections above demonstrate that understandings of knowledge governance are influenced by the systems where knowledge is generated and practiced and, as such, tensions exist between Indigenous and western approaches to knowledge governance. In the context of southern BC MSP, where both provincial and federal legislation and mandate requires partnership with Indigenous peoples on environmental stewardship, attention must be paid to the ways fundamental concepts such as knowledge and its relation to environmental governance are perceived by different actors. Considering this study's research question, the differing perspectives on knowledge governance, as well as many participants early questions on what the difference is between Indigenous and western knowledge governance, indicate the value of beginning collaborative work by explicitly reflecting upon and seeking to bridge understandings. In opposition to extractive or reductive conceptualizations, Whyte (2013) argues that Indigenous knowledge is inherently a pathway for collaboration, understanding differences, and interrogate assumption that underpin our conceptualizations of what constitutes knowledge. Castleden and colleagues (2017) reiterate this sentiment, noting that differences cannot be generalized or simplified and must be actively discussed to foster mutual respect.

Rather than simply framing these findings as different perceptions of knowledge governance, it may be valuable to consider them as a product of multiple worlds and approached through the lens of uncontrolled equivocation. De Castro (2004) brings forward the concept of uncontrolled equivocation, described as "a type of communicative disjuncture where the interlocutors are not talking about the same thing, and do not know this" (p. 9). In contexts where Indigenous and western ways of being and knowing intersect, Blaser (2009) relates uncontrolled equivocation to the existence of multiple realities, writing that "misunderstandings happen not because there are different perspectives on the world, but rather because the interlocutors are unaware that different worlds are being enacted (and assumed) by each of them" (p. 11). Blaser (2009) argues that conflicts that arise from these misunderstandings are a direct product of

attempts to stabilize or fix worlds and that "the modern world or ontology sustains itself through performances that tend to suppress or contain the enactment of other possible worlds" (p. 16; see also Milne, 2022; Yates et al., 2017). From this perspective, seeking to create space for dialogue on foundational concepts such as knowledge and governance to consider how these influence understandings and practices of knowledge governance may be understood as a vital starting point in an MSP process that seeks to shift or destabilize settler-colonial power dynamics, create space for Indigenous knowledge systems, and recognize Indigenous rights and responsibilities to knowledge, land, and community.

The importance of bridging understandings is discussed in knowledge co-production literature and relating frameworks for weaving knowledge across worlds (ex. Two-Eyed Seeing). Chambers and colleagues (2022) present co-productive agility as a concept that emphasizes the importance of constructively exploring tensions and differences by elevating marginalized agendas, questioning dominant agendas, and connecting diverse actors. Drawing upon Jarzabkowski and colleagues (2013) work, Chambers and colleagues (2022) encourage an understanding of tensions as complex interdependencies rather than competing interests. From this perspective, tensions arising from differences are an essential and productive force for transformation. As articulated in frameworks for weaving and valuing different knowledges, seeking to bridge understandings is not about finding compromises, it is about recognizing, valuing, and creating space for inherent differences (Bartlett et al., 2012; Reid et al., 2021; Maxwell et al., 2020). Importantly, bridging understandings, and potentially worlds, requires explicitly examining and seeking to address settler-colonial power dynamics (Berkes et al., 2006; Turnhout et al., 2020).

Summary

In conclusion, participant discussions on the DIKW pyramid, and the way units are generated and valued in Indigenous versus western systems demonstrated that lived experiences and understandings of knowledge systems were fluid and flexible. Importantly, all knowledge is situated in the people and context where it is generated and practiced. As such, it is vital to reflect on the boundaries delineating categories, including what purpose they serve, and the assumptions embedded within them. Recognizing this, participants lived experiences informed a common perception that relationality, interconnections, and connection to place and people are foundational and distinguishing features of Indigenous knowledge systems and paradigms.

Tensions exist between Indigenous and western understandings and practices of both knowledge and governance, and, ultimately, their interpretation of knowledge governance. Through the dominant lens, knowledge is seen as a singular truth that, with precise and unbiased methodology, can be discovered. And this conceptualization of knowledge, as something that is separate, depoliticized, and detached from people and place, informs the idea that knowledge is an object that can be governed. In contrast, Indigenous conceptualizations, as described by some participants in this study and reiterated by Indigenous scholars, view knowledge as something connected to people and place, inherently political in its relationship to governance, and as a thing that can only be known by generating and practicing. From this perspective, knowledge governance becomes much broader than the act of controlling or limiting knowledge or data sharing through technical strategies and prescriptive policy (i.e. data or knowledge management)

and is instead expanded to explicitly consider how all aspects of knowledge production and use benefits knowledge systems, which includes people and their culture and territories. Delineating between Indigenous and western knowledge governance based on ways of being and knowing suggests that different perspectives may be products of multiple worlds and approached through the lens of uncontrolled equivocation. Viewing MSP as a collaborative process where partners may weave Indigenous and western knowledges to co-produce marine plans, it is vital to bring these differences forward and use tensions as a productive force for bridging different ways of knowing and being.

These findings are by no means new in the space of ethical research methodologies, decolonization, or Indigenous knowledge systems scholarship. They have been powerfully articulated for decades by Indigenous thinkers and their colleagues. For example, applying a similar understanding to education contexts, Simpson (2014) writes: "Indigenous education is not Indigenous or education from within our intellectual traditions unless it comes through the land, unless it occurs in an Indigenous context using Indigenous processes…it requires re-creating the conditions within which this learning occurred, not merely the content of the practice itself" (p. 9).The clarifications described in this section are notably a shift from the technical and operational lens where this project was conceived and, with similar biases and lack of understanding evident in many participants' responses, are an important affirmation and reiteration to make in the first project findings section.

Supporting Indigenous knowledge governance: breadth of a systems approach

Most collaborative environmental stewardship work, such as the marine planning initiative where this study originated, occurs within western management regimes and legal landscapes. Although these contexts recognize rights holders and are increasingly driven by reconciliation commitments (ex. TRCC, UNDRIP), they continue to be dominated by western paradigms and significant barriers impede progress. While the clarifications made above were an important first step, the value of theory can only be measured by its applicability to reality (Hall, 1988). In this section I draw upon participants perspectives and the scholarly literature to consider the breadth of a systems approach and how existing barriers may be navigated for Indigenous knowledge governance to be meaningfully supported in collaborative environmental processes.

Knowledge production and exchange within and for environmental stewardship and governance

To begin, I consider the types of data and knowledge that are relevant in environmental contexts, as these differ from other contexts (eg. statistics or health fields) where significant work has been done to explicitly articulate and apply Indigenous knowledge governance principles. Generally, participants used the term 'Indigenous knowledge' in an all-inclusive way. Encapsulating both data and knowledge, it was used to describe worldview, ethics, spiritual and physical relations that were generated, stored, practiced, and/or shared through dance, stories, cultural and spiritual practices, observations, and governance structures and processes. Most participants interpreted 'Indigenous data' as a type of Indigenous knowledge but as reflected in the DIKW pyramid, felt that the term referred to more discrete measurements. Examples brought forward included environmental data on territories, fisheries catch data, and data recorded using

community mapping and other TEK methods. Participants felt that there was relevance for both Indigenous knowledge and Indigenous data terms, with the caveat that usage depended on context. One participant noted, *"I wouldn't use them interchangeably."* Lastly, reflecting increasing recognition of the value in collaborative work (Zurba et al., 2022), 'co-developed knowledge' was brought forward as a type of knowledge highly relevant to environmental contexts. Participants' examples included collaborative processes where partners established baselines, collected environmental data, or developed policy. Some participants noted that co-developed knowledge is collaboratively owned and, thus, knowledge governance must be understood collaboratively.

Overall, these understandings and usage of terminology reflects popular choices in environmental stewardship literature (Duarte et al., 2019). It should be noted that there seems to be more literature published on *Indigenous data governance* compared to *Indigenous knowledge governance*. Within the Indigenous data governance literature, terminology use differs from environmental contexts, where the term *Indigenous data* has been used in an all-encompassing way to include Indigenous knowledge and/or traditional knowledge (ex. Carroll et al., 2020; Williamson et al., 2022). Duarte and colleagues (2020) note that while all terms are equally valid and may be used in strategic ways, attention should be paid to why certain terms are selected and any implications or underlying meanings associated with them. Despite inconsistencies with Indigenous data sovereignty and governance literature, the environmental context where this paper is set, participants' perceptions on terminology, and findings on the importance of a holistic knowledge systems approach, indicate that *Indigenous knowledge governance* may be an appropriate term to use in this space.

Although the types of knowledge commonly associated with and used in environmental governance and stewardship understandably differed from other contexts, participants discussion on both positive and challenging knowledge sharing experiences demonstrated that guiding principles of Indigenous knowledge and data governance are broadly applicable and remain highly relevant across contexts. Overall, the examples brought forward by participants helped to stress that, to prevent translation, Indigenous knowledge must remain within the context and system where it is generated and practiced. This requires control over the ways that knowledge is generated and practiced, concepts that have been widely discussed and clearly articulated in scholarship on Indigenous knowledge governance and sovereignty. Discussions demonstrated the relevance of core knowledge governance principle that articulate and assert the need for knowledge owners to take care of knowledge, control how it's used and, not only protect from misuse, but also ensure that the way knowledge is used brings benefit to the people and communities and supports the ongoing embodiment and evolution of Indigenous knowledge systems. This conclusion aligns well with principles of ownership and control outlined in OCAP (Schnarch, 2004) and the collective benefit and authority to control principles outlined in CARE (Carroll et al., 2021; Carroll et al., 2020).

Technical tools and approaches

While the first section of this discussion emphasized that participants experiences and perceptions of knowledge governance extended beyond the technical realm of knowledge and data management, this did not mean that technical considerations not relevant or important.

Many tools or approaches to support community control of knowledge were brought forward. During analysis, I found that these could be grouped into four broad categories:

(1) storage and sharing tools such as mapping platforms,
(2) analysis tools such as masking sensitive locations,
(3) legal tools such as copyright, Intellectual Property, and data sharing agreements, and
(4) capacity-building approaches that enhanced communities' technical infrastructure and expertise alongside protocols and governance.

Opinions on the effectiveness of each differed substantively and many participants spent time reflecting on their own experiences to consider strengths and weakness of different tools and approaches. For example, considering their experiences using legal tools, one participant commented:

"I guess the fundamental concept of itemizing knowledge and data sets and building parameters around how they may or may not be used in a different setting can be very you know onerous and lengthy process, when what you really want to do is build a product that enables us to manage our natural resources more sustainably at the end of the day and so you can kind of, there's a bit of a risk in getting caught up in this a little bit. Which is maybe worth exploring a bit, because in my experience too at a certain point the lawyers will get involved and then the conversation goes straight to you know intellectual property rights and ownership and it can create tension in relationships to some degree, and it gets very legalese."

Conflicting with this opinion, another participant in a different focus group commented:

"I think in this day and age, you have to have a legal component, like, but like, you should have that. You should it should be implicit that you that you're building in that trust as well."

Additionally, while some described experiences where communities used legal tools as a requirement for knowledge and data sharing, others noted that some communities felt comfortable sharing without legal protection if the knowledge would be used to benefit communities.

Acknowledging the potential validity of all approaches and tools, one participant commented,

"I mean the important thing for nations here is the agency or autonomy to make those choices, so if a nation chooses to treat some of the knowledge within their community under Intellectual Property law so that they can derive a revenue stream from it, go for it. Right, nations allow for aquaculture to happen in their territories, they allow logging to happen, cannabis growing operations, whatever we may think of it as individuals, they're looking to look after the well-being of their members and more broadly and so I don't think we should ignore the possibility that Intellectual Property is an appropriate framework for this. It should be available to Nations but it shouldn't be seen as a necessary."

This perspective was reiterated by many participants who emphasized the importance of Indigenous leadership to determine the appropriateness of tools or approaches, and tailor them to

contextual needs. In other words, there is no one-size-fits all approach or tool. Drawing on personal experiences, focus group and interview discussions with participants clearly described the ways in which Indigenous knowledge governance is unique to individuals, communities, and organizations. As Schnarch (2004) outlines, the OCAP principles are "an expression of self-determination in research" (p. 80).

This consideration and perspective aligns with findings on the diversity within knowledge systems and the need to resist prescriptive recommendations. Importantly, technical approaches and tools should be developed to support the renewal of knowledge systems and self-determining governance (Karuk Tribe et al., 2017; Johnson et al., 2021; Milne, 2022). Furthermore, careful attention should be paid to the ways technology supports embodied and practiced knowledge, rather than solely serving as an archive (Simpson, 2004; Schreyer et al., 2014; Bonn et al., 2016). This is essential to harness technology's full potential to support resistance and resurgence and foster the continual evolution of Indigenous knowledge systems (von der Porten et al., 2019). For example, considering the increased interest in creating cultural repositories and digital representations to preserve knowledge, Taylor and colleagues (2018) remind designers and developers to consider the ways digital tools can move beyond preserving static knowledge artefacts and, from a perspective that technology is culturally situated (Irani et al., 2010), support people to enact and perform culture. This concept is demonstrated in Taku River Tlingit's development of an online web mapping platform that holds place names (Schreyer et al., 2014). Evaluating the ways this tool supports practiced knowledge, Taku River Tlingit community members noted the importance of learning language as a means of understanding responsibility and relation to land (Schreyer et al., 2014). Similarly, recognizing the ways the establishment of community monitoring programs and use of innovative oceans technologies has supported community-based governance, Ritts and Simpson (2017) encourage practitioners to remain critical and question "how and whether this new technological paradigm supports the particularistic enactments that make up Indigenous stewardship forms" (p. 374).

Importantly, all approaches require support, including time and resourcing, for community-based capacity and protocols (Battiste, 2014; McGregor, 2021; McGregor et al., 2019). Literature on knowledge co-production and knowledge governance emphasize the role of academic and government partners to support the building of this capacity to ensure projects are reciprocally beneficial for all partners and support Indigenous self-determination and cultural renewal (ex. Adams et al. 2014; Latulippe & Klenk, 2020; Kaurk Tribe et al., 2017; Taylor et al., 2018; Milne, 2022).

Towards transformational change: institutional opportunities and barriers

Most participants discussed the barriers and boundaries embedded in settler colonial institutions and systems, noting that many individuals have limited autonomy within their roles. Furthermore, discussions suggested that actors' understanding of responsibility was largely influenced by their roles and place of work (although there was also discussion on individuals' responsibility and capacity to resist settler colonial boundaries, which I discuss in a later section). During focus group discussions, one participant expressed their frustration with a lack of understanding of organizational positionality:

"They have very little historical awareness of themselves and what they, they don't, there's no internal sociological analysis of what the department is and what their function is and so on. In the Canadian bodied politic, DFO exists to maximize economic activity for the greater glory of the Canadian nation state when it comes to fish resources, they're not there to look after things, they're not, they're there to generate revenue that shows up on the GDP of Canada's economic reporting and they have been since the very beginning."

They carried on by considering how this deeply rooted history may be addressed within collaborative processes:

"*More than an acknowledgement, yeah you can't dismantle them and that's where a lot of these processes run, like the marine planning process in itself can't be charged with dismantling or undoing several hundred-year history of settler colonialism. It's not fair to it and it often breaks down because of that, but it has to go beyond an acknowledgement. Because, so now we have widespread land acknowledgements and sometimes they're sincere and meaningful, a lot of the time they're just like saying, I don't know, they're not meaningful. So, there's something else that needs to happen and what that is, is within the context of marine planning there have to be active measures to, I don't like the word mitigate but it's used a lot in that context, mitigate or alleviate or compensate or make up for, counteract, counterbalance, the deficiencies that arise out of the power relations. So for instance you have First Nation, let's just say you have First Nation elders coming in who have a tremendous amount of wisdom, they are actually the last of the speakers of their language and living off the sea and so on, you should in a marine planning context put a great deal of effort into making sure that the marine planning process you set up can really accommodate that kind of wisdom and knowledge and so you should go out of your way to help the community find people who can engage with those elders in a way that is culturally appropriate."*

This participants' reflections help to highlight that responsibility extends beyond individuals and emphasizes a requirement for institutions and organizations to explicitly consider, expose, and reflect upon the ways that histories, power dynamics and identities shape the process and make efforts to reduce these imbalances (Curtis et al., 2019; Greenwood et al., 2017; Maclean et al., 2022). From this vantage, supporting Indigenous knowledge governance within collaborative environmental contexts requires decolonizing transformational change. Importantly, as Tuck and Yang (2012) assert, decolonization is an incommensurable framework that is explicitly and singularly concerned with the repatriation of Indigenous land and life and is necessarily unsettling. Within the context of Canadian government systems, this means accepting and recognizing that decolonization goes beyond and is at odds with reconciliation, which is about preserving and rescuing settler normalcy and futures (Tuck and Yang, 2012, p. 35). Tuck and Yang (2012) assert: "Decolonization is not an 'and'. It is an elsewhere" (p. 36).

Critiques of settler colonial management systems were shared throughout the focus groups, and many discussed the problematic way the Canadian government currently engages and collaborates with Indigenous peoples. Calling into question the motivations driving requests to weave or engage with Indigenous knowledge, many participants expressed immense frustration that top-down pushes for Indigenous knowledge use in environmental contexts had

resulted in insincere and often coercive requests for knowledge or data sharing. For example, one participant reflected:

"So for example my tribe is preparing for a court case right now, and in court it's extremely adversarial, the only objective for the lawyers of the crown is to destroy and completely take away the credibility of the First Nation witnesses, that include elders, so I don't want any knowledge going into that court room, but on the other hand if I share knowledge with DFO at the local level, that's part of the government that I could end up in court against and they're going to keep all that knowledge and all that whatever wisdom they've gained and they're going to try to use it against us if we go to court. So, I don't know, you're damned if you do and you're damned if you don't. If you don't give the knowledge to them, they say that they can't consult with you, they can't assist the First Nation, if you give it to them there's always a threat that they'll use it against you in some future court case. When we in the 1980s my tribe was protesting lack of fish and we had over 300 charges against my First Nation members, which I'm happy to say we won every single one, but we had over 300 charges, and in that court case the DFO was bringing up things that they had heard from my tribal members years before, so even if they had promised not to disclose it, they can't, the court can order documents and testimony to be released to the court for a court case. So, it's really hard to say what the answer is to this one, sharing it with the government it doesn't matter if it's national DFO minister or if it's the local DFO office, eventually they can use it against you, there's nothing we can do to stop it."

Furthermore, multiple participants described experiences where interest in Indigenous knowledge was intended to 'check a box', rather than genuinely valuing or appropriately using the knowledge (Heidt & Jones, 2023; McGregor, 2021; McGregor et al., 2018).

In many ways these critiques were reminiscent of Tuck and Yang's (2009) discussion on decolonization, where they assert that decolonization is not a metaphor, and caution against Mawhinney's (1998) concept of '*moves to innocence'* which problematically "attempt to reconcile settler guilt and complicity, and rescue settler fertility" and negate transformative change (p. 9). Demonstrating the inherent limitations to support Indigenous knowledge systems within existing systems, Zannotti and Palomino-Schalscha (2016) consider the ways all cross-cultural work inevitably and inherently results in translation of knowledge. Reflecting on similar ideas, one participant commented,

"Whether it's cultural, sacred, spiritual, or scientific whatever the knowledge is, there is a Canadian institutionalized practice of knowledge creation and there is a [First Nation] practice of knowledge keeping and creation, and they're both you know, not an absolute rule…but is there a way where is the translation line between those two things? You know we're assuming that everyone says okay we have the same goal, even if we all have the same goals, how do we, is there a way to do that right? Can there be co-production across two different knowledge production regimes? Right, it's not just simply just saying I have a knowledge production regime come join me as I practice it, that's what's happening now."

In the same focus group, another participant responded:

"We're trying to shimmy Indigenous technical knowledge into it somehow"

The first participant carried on reflecting:

"Yeah, First Nations are generous enough to say, well you're inviting me in so I'm accepting your invitation, now it happens but it's more rare to be invited into a First Nation knowledge production regime. But is there a co-production regime that exists? I don't think so, I don't think there is a knowledge co-production regime."

In another focus group, a different participant commented:

"I really truly believe that if we saw things more clearly we'd understand that we're the ones that need help, that it's not, like the Nations might need help in other ways because of what has happened to their communities over the decades and longer, but in terms of wisdom around sustainable human use of marine space I think they have a lot more to offer than we realize. And the only way to really have that happen is to spend the time and to really learn."

These quotations suggest that supporting Indigenous knowledge governance requires transformational change within settler colonial systems and institutions. Latulippe and Klenk (2020) emphasize the importance of recognizing that knowledge co-production requires 'making space and moving over'. This means to "change the terms of engagement, attending to the need for research communities to not only make substantive room for the full expression of Indigenous sovereignty in both a material and discursive sense, but to step aside – that is, to be fundamentally changed via the transfer of resources and authority from the center to Indigenous communities" (p. 8). Some have put thought into what tangible actions are required to transform natural resource agencies with deep settler colonial histories (FNIGC, 2014; Cochlea, 2021; FNFC, 2021). For example, in a report for the Assembly of First Nations, Heidt and Jones (2023) outline short-term and long-term actions required from DFO to create space for the establishment of Indigenous Protected and Conserved Areas (IPCAs). Their recommendations include concrete operational, policy and legislation, funding, and capacity actions that may be taken to transform the department. Recognizing that, while progress is slow, there are spaces where good work has happened and can be learned from, these recommendations are off lessons learnt in collaborative experiences with other federal agencies, as well as reflections shared in interviews with a diversity of participants working within marine management. However, the degree to which the Canadian government is ready to adopt these learning is unclear. Considering what challenges exist for Indigenous knowledge to meaningfully woven into settler colonial resource management systems, McGregor (2021) writes "the underlying challenge identified by the panel was that external institutions/agencies are not ready to respect Indigenous knowledge systems and Indigenous peoples" (p. 2).

As discussed above, some participants spent limited time discussing technical considerations and instead their discussion were dominated by more philosophical reflections, including the need for transformational decolonization. Considering this, I draw upon de Leeuw, Greenwood and Lindsay's (2013) writing on 'good intentions' and highlight the importance of maintaining discomfort, arguing that at the very moment policy becomes attached to settler-colonial ideas of 'good', "the ability to critically reflect upon that work can slip away" (p. 392). The authors conclude, "dismantling colonial work must never be comfortable, must never reach

a place of stasis, and crucially, must never be allowed to be untroubled." (p. 392). Applying this understanding to MSP, supporting Indigenous knowledge governance is about pushing back on the limits of what is possible, rather than working to overcome challenges within what we already understand as possible (de Leeuw et al., 2013, p. 391). This ultimately requires shifting the gaze (Curtis et al., 2019; Whyte, 2018) and, rather than singularly focusing on making Indigenous peoples and knowledge more visible, making the structures and powers that facilitate their indivisibility more visible (de Leeuw et al., 2013, p. 389). Echoing questions raised by participants on the possibility of a knowledge co-production regime, Sium and colleagues (2012) write: "Decolonization is not always about the co-existence of knowledges, nor knowledge synthesis, which inevitably centers colonial logic. Whiteness does not 'play well with others' but, rather, fragments and marginalizes – so it must be asked: Co-existence at what cost and for whose benefit? Decolonization necessarily unsettles" (p. 4).

Latulippe and Klenk (2020) consider what it means to truly make space and support knowledge systems, considering the breadth that this entails they write: "this is about strengthening and removing barriers to Indigenous self-determination and access to land, which is essential to the nourishment and flourishing of Indigenous knowledge systems" (p. 8). Considering this within knowledge governance, some participants noted the ways knowledge governance cannot be separated from protecting land, supporting the idea that land violence is epistemic violence (Alfred, 2009; Coulthard & Alfred, 2014; Corntassel, 2012; Holmes et al., 2015). When asked what may be required within collaborative partnerships to support knowledge governance, one participant responded:

"I mean really big picture stuff would be support for Indigenous language revitalization and culturally appropriate knowledge keeping systems…The practice of knowledge and keeping it real, all those things would be very fundamental and transformative. And see it's the problem, because and not in any way of criticism of the work you're doing, but because of the way you're forced to work it's in these silos. It's hard to make these big kind of recommendations without sounding like a totally naïve romantic, like where do you get off on thinking anybody's going to do that, like it just sounds ridiculous but within a [First Nation] context, recommendations that are holistic that go at a foundational transformation, things that have to do with language and being out on the land and learning and rebuilding through time on the land, they're not seen as high in the sky, they're seen as totally natural and health giving."

As Sium and colleagues (2012) write: "Relationship to the land, and not in a romanticized or fetishized 'noble savage' sort of way, generates the knowledge (and theory) that is required for survival" (p. 5). While the breadth of a systems approach is undoubtedly daunting and complicated, participants reflections and Indigenous wisdoms often emphasize interconnections (Castleden et al., 2009; Simpson, 2014). As such, access to land is a fundamental component of Indigenous knowledge governance and the creation of space for generating, transmitting, and embodying continually evolving and ever-relevant Indigenous knowledge systems (Simpson, 2004; Battiste, 2008). In the context of southern BC MSP, this means ensuring that the use of Indigenous knowledge in marine plans reciprocally promotes the renewal, embodiment, and ongoing evolution of Indigenous knowledge systems by supporting access to lands and waters.

Relational processes

Recognizing the transformational change required to support Indigenous knowledge governance and create space for Indigenous knowledge systems, I consider the MSP case study where this work is situated. Collaborative policy contexts are important spaces where work towards this transformational change may be conducted. Although participants noted the value of technical solutions and approaches, most spent the majority of their time within focus groups reflecting on relational processes as a valuable and ethical space where dialogue and discussion can happen (Ermine, 2007; Gerlach, 2018; Held, 2020; Wilson, 2008). For example, one participant commented,

"If government folks came in and listened to community say how they wanted to work together you wouldn't need so many rules and guidelines around the right way of doing things. A lot of what we're trying to create is too prescriptive and I know that in governments and bureaucracies like rule sets it's how they work, but First Nations work on the basis of relationships. That's culturally how they're strong is through relationships, so if governments are going to do well around knowledge governance and exchange then what they need to do is focus on relationships."

Aligning with this participants' understanding of relationships as central to many Indigenous peoples ways of being and knowing, Kyle Whyte (2019) reflects on the ways relationality is embedded within Anishinaabe knowledge and governance systems, arguing that this is a necessary feature of adaptive societies. Whyte warns against calls for swift and urgent action that are driven by ecological tipping points and justify violations of consent, trust, accountability, and reciprocity. Instead, Whyte argues that relational tipping points have long been surpassed and must be mended to establish resilient societies capable of coordinated and efficient responses to change. In their argument, Whyte notes that this is not short-term work and, instead, repairing and establishing relationships requires substantive time over generations to establish. From this perspective, relational processes within collaborative work are, ultimately, a foundational requirement for environmental work that seeks to establish adaptive and holistic governance to respond to the environmental crisis.

Throughout discussions, the notion of consent underpinned participants' understandings of the core knowledge governance principle of control. Describing academic experiences working with their community, one participant commented on the scales they sought consent included individual, family, and political levels through the hereditary system. Importantly, this understanding of consent was embedded within trusting relationships. Consent, gained through the establishment of trust, is not static and cannot be accomplished in one interaction. Instead, it requires ongoing and dynamic relationships. Similarly, reciprocity and mutual benefit, when understood relationally, cannot be achieved by 'checking a box', or through singular interactions or processes (Castleden et al., 2012; Battiste, 2008; Kovach, 2021; Smith, 1999). Noting the importance of continual dialogue, one participant commented:

"To my mind, working with the communities makes a lot of sense about what permission means to them, and what consent means to them in those processes. So, you can come with your, like a university, kind of view of it, but then being open to what it means in the community as well. And

knowing that that will likely change. So that goes, you know, what started our conversation a long time ago was verbs and nouns. Right? So, a consent form, like you're saying is kind of a noun based thing like it's there, and it's done. And you've done your work. And then I think, on the Indigenous side, it's just ongoing, the expectation is that you're always going to be seeking feedback from the folks that you've been working with and seeking their consent actively."

Community-based and participatory practices are often recommended as a relation-centred approach to collaborative work. Although acknowledging the strengths of these approaches, de Leeuw, Cameron and Greenwood (2012) push back on the tendency to prescribe community-based and participatory practices to all contexts, noting their risk to "reinscribe and retrench unjust relations in the very pursuit of opposite aims" (p. 185). Throughout focus groups, there emerged a tension between the 'good intentions' behind MSP and the capacity burden experienced by First Nations engaged in the process (Adams et al., 2014; Zanotti & Palomino-Schalscha, 2016). Furthermore, many participants noted the misalignment with First Nations priorities and scales. There are approximately 70 First Nations with territories within MSP case study boundaries, with a diversity of interests, priorities, and capacity influencing engagement in the program, and multiple participants questioned who the MSP process truly served. Additionally, many brought forward complaints on the lack of capacity consideration and the engagement fatigue experienced through collaborative processes such as MSP. While participants demonstrated that knowledge governance must be understood through relational processes that prioritize ongoing dialogue and relationship building, participants discussions highlighted that these processes must be carefully attentive and listen to the needs, priorities, and interests of community partners.

Reflecting on their own experiences in collaborative and cross-cultural work, Zanotti and Palomino-Schalscha (2016) follow Smith's (1999) advice, encouraging continual reflection and questioning of "Whose research is it? And who does it serve?" (p. 142). Thus, in the context of southern BC MSP it is essential to ask: How is diversity being recognized within the MSP process? Who is engaged in the MSP process and who is absent? Who is benefiting from MSP? Furthermore, with specific regard to Indigenous knowledge governance, the southern BC MSP process must consider how knowledge owners (at individual, family, community, and Nation scales) are being supported in controlling how knowledge is used to protect from misuse and ensure that knowledge use brings benefit to communities. Drawing upon project findings discussed in previous sections on the importance of ensuring that knowledge use supports the embodied practice and generation of knowledge on lands and waters, relevant critiques also include questioning the extent to which engagement approaches (ex. frequency and location of engagement) are supporting Indigenous peoples in spending time on lands and waters.

As articulated throughout the literature, space for critique and questions is a requirement for decolonization (Adams et al., 2015; Schnarch, 2004; Tobias et al., 2013). Sium, Desai and Ritskes (2012) consider questions posed by Cruz (2012) and ask: "Is it possible to decolonize institutions of colonial power (such as the academy, government, etc.), but, further, it is possible to decolonize *through* them?*"* (g. 4). Furthermore, Coulthard (2014) questions whether seeking recognition from colonial structures reinforces and legitimizes colonial power as the ultimate authority over Indigenous lives. None of these questions have easy answers, however Sium and colleagues (2012) assert that "There is power in questions and questioning, in being able to live

in the understanding that not everything is known or knowable…This questioning is necessary because…decolonization is not interested in simply turning the colonial world upside down, but requires the courage and imagination to envision and construct a new future" (p. 3). Encouraging readers to accept the unknown they conclude by asserting that "decolonization as a tangible unknown leaves room for dialogue and for dissent, as well as for coming together to each contribute to one another's shared visions and goals" (p. 12). Arguing the importance of creative approaches and demonstrating that the transformations required to create space for Indigenous knowledge systems may occur beyond singular initiatives and bureaucratic institutions, one participant commented:

"And so when you think about ontologies, overlapping each other, you can think about that as a zone of interaction, and that those zones of interactions are incredibly productive. Right. So, in the physical world, like lots of things happen at the tidal line. And what they're saying is the same thing can happen when those ontologies overlap. So, it wouldn't want to say it's always a clash, or it's not always negative. There's lots of really cool, fun, interesting things that happen when those things overlap. And when folks are able to incorporate multiple worlds into how they do their thing. But somehow, when that then gets into that organizational bureaucratic overlay, a lot of those kind of promises, dissipate. And so you can't really realize them in a bureaucratic mindset, they have to be done a little bit differently, like so I think differently now than I did before about like, what we might consider the role of art, like canoe making, or totem pole making, or art in general, those to me have sometimes, and song and dance, have more kind of promising ways of integrating diversity into kind of a performance that lots of folks can see and being moved by, rather than the kind of bureaucratic stuff that were asked to do sometimes. So yeah, just thinking I don't want to put too much on our like, we won't be able to do it, so they can't. But yeah, I think there's more to be learned there about how things are integrated, how they're transmitted, used, understood, experienced by folks in new ways. So, lots of different ways my understanding it then because we're way down the pipe at this very specific point of consent, where all of these other things happen way back here. With the barriers that are a little bit looser and a little more flexible. Yeah, that's kind of how I've been thinking recently."

Positionality and Responsibility

Throughout the discussions many participants expressed immense frustration with past and present processes and the slow pace of progress towards sustainable futures, reconciliation, and equitable governance. These frustrations were set upon a backdrop of the historical power imbalances that exist within this work, the violence that has been perpetuated through settler colonization and associated management practices, as well as the ongoing racism that is embedded within our system and enacted in daily interactions within and beyond this work. Recognizing that relational work is conducted in the context of mistrust and broken relationships, reflecting upon ones' own positionality is a vital first step to begin to better understand the role and responsibility one carries within this space.

Discussing the concept of *Misit No'kmaq,* a Mi'kmaq word that roughly translates to 'all my relations', Hurley and Jackson (2020) argue against fixating on a binary of insider versus outsider and, instead, request that all researchers turn their focus to examining the ways their histories, contexts and relationships shape their identity, biases, intentions, and, ultimately,

actions. They emphasize that positionality is not fixed or static, but instead is constantly in a state of evolving and becoming. Attia and Edge (2017) emphasize the value of reflexive research, where processes, relationships, and individuals' roles are continually evaluated and reflected upon throughout a partnership. This practice of reflexivity produces adaptive, relevant, and relational processes that are deeply engaged with the people and communities most impacted by the work. Importantly, Sium, Desai and Ritskes (2012) emphasize that the recognition of power dynamics and positionality must go beyond simply stating 'magic words' that dispense complexity and, instead, be concerned with the responsibility these statements carry (p. 3). Similarly, Nagar (2002) critiques passive practices that focus on "the identities of the individual researcher rather than on the ways in which those identities intersect with institutional, geopolitical and material aspects of their positionality" (p. 182). This is problematic because it does not push us to question the "dominant meanings attributed to pre-defined categories…[that exist] prior to and isolated from specific interactions, rather than as created, enacted, transformed in and through those interactions" (Nagar & Geiger, 2012, p. 275). The findings in this study demonstrate the breadth of a systems approach and emphasize that all actors within a collaborative process are accountable and responsible to supporting knowledge governance and Indigenous knowledge systems. While individuals operate within and are undoubtedly influenced by the institutions they work for, individuals carry perceptions and biases influenced by their own experiences and histories which inform the ways that knowledge is interpreted and implemented. As such, individuals create ownership over the way collaborative work is conducted and how Indigenous knowledge governance is respected.

While many participants commented on the need to create space for Indigenous leadership in collaborative environmental processes, there was inconsistency and uncertainty on how that recognition, support, and space could be created by those who did not own knowledge. Importantly, the need to create space for Indigenous leadership does not remove responsibility from other actors and cannot serve as a justification to 'pass on' responsibility (Noxol et al., 2012, p. 421). Pushing back on conceptualizations of responsibility as top-down and linear, Noxol, Raghuram and Madge (2012) argue that the moral pull of responsibility must be attended to and considered carefully. Echoing participants' articulations on the risks of sharing knowledge or engaging in processes that do not support knowledge system outlined in earlier sections of this discussion, they note that "giving an answer can lead to vulnerability, to violation, or to political manipulation" (Noxol et al., 2012, p. 425). The authors carry on by arguing that withholding straightforward answers is a meaningful response and can be understood as a valuable strategy to interrogate the question itself. This understanding of responsibility forces "dialogue, not monologue….and a shift to recognising the limits of what we can hear" (p. 424). As such, within collaborative processes, taking responsibility does not mean to push forward during silence or lack of participation, and instead requires careful attention and reflection on what that silence may mean. Acknowledging the inherent complexity in this work, those seeking to support Indigenous knowledge governance must accept that there are no easy solutions and commit to "attentive, patient and care-full approaches that offer no guarantees" (Noxol et al., 2012, p. 427).

Koleszar-Green (2018) explains that a settler superficially engages with communities, for example by simply stating they are on stolen land, while a guest is someone who takes the responsibility to actively listen and learn about "the history and current story of the land they are on" (g. 174). Guests politicize this learning and seek to unsettle it by centring community rather

than themselves and offering actions instead of only words. Emphasizing the importance of listening, one participant commented,

"I think in order to ethically ask for knowledge you have to have an obligation to then listen and attempt to apply. Not just we're going to let you vent your frustrations, we're going to let you talk and then we're going to go off and do whatever we were going to do in the first place."

In a different focus group, another participant comments reiterated the importance of listening and suggested that this requires slowing down to truly hear what is being said:

"I think listening is a highly undervalued tool in the work that we do, we are always in a rush to do things."

The responsibility to listen aligns with the concept of cultural safety, which requires a rejection of the idea of cultural competency (the idea that one can and should learn cultural customs of another group in a one-sided manner) in order to engage effectively (Curtis et al., 2019; Papps & Ramsden, 1996). Cultural safety asks individuals to listen deeply and reflexively look inwards, paying careful attention to power dynamics and difference and shifting the gaze to themselves rather than the Other. Framed as a mutual empowerment and a rejection of multiculturalism and universalism that flatten and blur differences, practitioners are asked to recognize cultural difference, engage in mutual learning, and create space for Indigenous knowledge systems (Battiste 2008; Brascoupé & Waters, 2009). The success of this approach is evaluated by asking whether individuals felt safe during an interaction (AFN, 2008). Discussing Nishnaabeg intelligence and pedagogy Simpson (2014) emphasizes that the responsibility to listen and, furthermore, to learn requires "a considerable amount of demonstrated interest and commitment on the part of the learner, [otherwise] learning doesn't occur at all" (p. 15). In this way, desire and willingness are a requirement to unsettle responsibility and create space for individual transformations and learning. Adding a third identity to their discussion, Kolsezar-Green (2018) notes the damage and harm caused to Indigenous peoples when engaging with those with hostile perspectives. They assert that it is the responsibility of guests to teach those who are not conscious of their settler privilege and who remain purposefully ignorant.

In conclusion, the responsibility of settlers to support Indigenous knowledge governance requires transformation of both systems and individuals. Hunt contributes to a multi-author review of Coulthard's *Politics of Recognition* (2014) by presenting an argument that responsibility must be understood across all scales and resisting ongoing settler colonial violence requires "that we work in both directions, scaling resurgent actions down to the intimate level of our everyday relations" (Hallenback et al., 2016, p. 113). Asserting that knowledge must be generated from and practiced throughout all parts of life, Bawaka Country and colleagues (2015) write: "A methodology of attending means more than just listening deeply, through listening plays an important part. Attending means to listen, to feel and to act, to understand oneself differently, to care, to respond…It is this engagement, this doing and attending to others, to our co-becoming's, that allows us to develop an awareness of another's language, knowledge, and law" (p. 279). These articulations emphasize that accepting responsibility means to listen and reflect in all spaces of life, acknowledging that this work extends beyond the silos of a single initiative or professional spaces and necessitates an embodied form of learning and

responsibility. De Leeuw, Cameron and Greenwood (2012) discuss the importance of experiences and relationships outside of work, highlighting the value of friendships they argue that within friendships the "weaving of care, trust, and vulnerability holds us deeply accountable to each other" (p. 191). Noting that this should not be misinterpreted as a requirement to establish friendships within a specific project (as these will always be influenced and limited by the context of the project) but encourage the recognition of friendship beyond spaces that are "inherently non-extractive and foster deep discussion and presentation as whole people" (p. 191). Writing on Nishnaabeg intelligence, Simpson (2014) writes: "Theory is generated and regenerated continually through embodied practice and within each family, community, and generation of people. 'Theory' isn't just an intellectual pursuit – it is woven within kinetics, spiritual presence, and emotion, it is contextual and relational. It is intimate and personal, with individuals themselves holding the responsibilities for finding and generating meaning within their own lives" (p. 7).

Summary

Considering the original question: *How can Indigenous knowledge governance be supported in knowledge sharing processes for environmental stewardship initiatives?* I have discussed the ways in which responsibility is required from all actors to listen, even to the silence, attentively consider what they cannot hear, and take the required actions to transform settler colonial systems to create space for Indigenous knowledge systems. This requires dialogue within relational spaces, as well as time, capacity and space provided for Indigenous leaders and communities to establish protocols, context-specific approaches, and, most importantly, practice and embody Indigenous knowledge. In conclusion, supporting Indigenous knowledge governance in collaborative processes requires recognition of the breadth of a systems approach, which attends to both technical and philosophical questions.

This discussion on supporting Indigenous knowledge governance touches on many diverse topics and provides few clear or simple answers. Tuck (2009) asserts that these characteristics are a necessary shift away from damage-centred research and argue for a desire-based framework that is "concerned with understanding complexity, contradiction, and the self-determination of lived lives" (p. 418). Tuck builds this framework using the concept of third space (Lefebvre 1991; Soja 1996) arguing that "desire is a thirding of the dichotomized categories of reproduction and resistance. It is neither/both/and reproduction and resistance. This is important because it more closely matches the experiences of people who, at different points in a single day, reproduce, resist, are complicit in, rage against, celebrate, throw up hands/fists/towels, and withdraw and participate in uneven social structures – that is, everybody" (p. 419). Additionally, they draw upon the concept of complex personhood, quoting Gordon (1997) "that the stories people tell about themselves, about their troubles, about their social world, and about their society's problems are entangled and weave between what is immediately available as a story and what their imaginations are reaching toward" (p. 4). Although uncomfortable, which, as described above, is a necessary feature of decolonization, a desire-based framework necessitates a break away from singular answers.

CONCLUSION

I present the findings in this thesis as a summary of the dialogue that was generated during this research project and to capture some of the perspectives present in this work at this point in time. Importantly, as one participant commented "*knowledge needs to be made and remade and can only ever be partial*", and as such, interpretations and understandings of Indigenous knowledge governance are dynamic and contextual. In an attempt to resist any static conclusions or prescriptive recommendations, I recognize that it would be impossible to suggest any of these findings are universal, or that any singular answer may be discovered. Participants discussions highlighted the tensions that exist between Indigenous and western understandings of knowledge governance. These tensions reflect key differences in Indigenous and western ways of being and knowing. The literature on anti-colonial theory highlights that these tensions are inevitable and that decolonization is necessarily complicated. As De Leeuw, Greenwood, and Lindsay (2013) write "decolonization and anti-colonial work, like the colonization and colonial work with which it is necessarily in constant dialog and reference, is always shifting floating, incomplete, unstable, and contradictory" (p. 390) and must be understood as ongoing (p. 391).

From this perspective, I suggest that Indigenous knowledge governance might be partially understood as a pathway and tool for dialogue and attentive critique. In other words, it can serve as a starting point for questioning the assumptions and categories embedded within settler colonial systems, including who is benefiting from the use of Indigenous knowledge. This requires consistently attending to and being critical of the limits of our imagination and the boundaries of what we can hear. Building upon this, I highlight that Indigenous knowledge governance includes the actions required from all actors to ensure that knowledge exchange, production, and use support transformational governance systems founded in Indigenous sovereignty and self-determination. This is fundamental to ensuring Indigenous ownership and control over their knowledge systems, while also creating space and support for the continuation and evolution of embodied knowledge systems within environmental governance.

I conclude with the acknowledgement that supporting Indigenous knowledge governance, as it emerges in our present context, is underpinned with deeply complicated philosophical questions on the co-existence and potential creation of worlds. The interaction of knowledge systems has and continues to occur within deep colonial histories and power relations. Recognizing this, throughout focus groups, participants brought forward necessary examples where Indigenous knowledge governance is required, with a diversity of approaches that support Indigenous control and ownership of all aspects of knowledge systems. Findings emphasized that these approaches should be centred in supporting embodied and practiced knowledge on lands and waters to sustain and renew Indigenous knowledge systems. Importantly, discussions demonstrated that within and across communities there is a diversity of perspectives, experiences, and best practices. As is inherent to the right to self-determination, many participants emphasized that all approaches to Indigenous knowledge governance are equally legitimate, and that ultimately defining what Indigenous knowledge governance means and how it may be supported is an impossible question, as there is no one definition. Indigenous people are not a monolith and what it means to govern, protect, and meaningfully use knowledge is

unique to individuals, communities, Nations, and contexts. As such, this thesis explores the current spaces where approaches and means to support Indigenous knowledge governance are being negotiated and played out. These findings emphasize that, just as knowledge is dynamic and constantly evolving, approaches to Indigenous knowledge governance will and should continue to evolve.

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APPENDIX A: Consent Form

Project Title: Learning perceptions, experiences and limitations to Indigenous knowledge governance in natural resource management initiatives

Funded by: First Nations Fisheries Council (FNFC) and Mitacs Accelerate scholarship

Partner: First Nations Fisheries Council (FNFC)

Researcher: Jean Hodgson, University of Victoria, email: jeanhodgson@outlook.com

Supervisor: Dr. Crystal Tremblay, Assistant Professor, University of Victoria, email: crystalt@uvic.ca
Co-Investigator: Dr. Chris Bone, Associate Professor, University of Victoria, email: chrisbone@uvic.ca

Purpose and Objective of Research

- The objectives of this project are to better understand perceptions, experiences, and limitations to Indigenous knowledge governance in natural resource management initiatives. This project uses the South Coast MSP as a case study that is representative of common partnerships in BC natural resource management.

This research is important because:

- The FNFC has heard from First Nations partners that access to data poses a significant barrier and weaving of Indigenous knowledge with western science is essential to meaningfully collaborating in natural resource management initiatives with government. The findings from this project will help partners to better understand perceptions, experiences and limitations to knowledge sharing in natural resource management contexts. This will help the FNFC and partners better understand how they may support knowledge sharing in the present Southern BC MSP initiative and beyond.

Participation:

- Participants have been invited if they are partners in the Southern BC MSP Program. This includes First Nations members on the Marine Science Research Coordinating Committee and employees at Fisheries and Oceans Canada, BC Ministry of Forest Lands and Natural Resource Operations and Rural Development, and the First Nations Fisheries Council.
- Participation in this project is entirely voluntary
- Whether you choose to participate or not will have no effect on your position [e.g. employment]

Procedures:

- All research activities and focus group meetings will be online, through zoom platform or over phone. The researcher and FNFC will facilitate focus group meetings.

- *Duration:* We anticipate that focus group discussions will not exceed 2 hours.
- *Location:* All activities and meetings will be virtual
- *Inconvenience:* We do not foresee any inconvenience to participants

Compensation:

- The FNFC will provide an honoraria for First Nations attending the focus group meeting
- There is no compensation for participation in this project.

Benefits:

- A better understanding of knowledge governance will benefit partners collaborating and sharing knowledge during the Southern BC MSP Program.
- This project also aims to advance the state of knowledge by summarizing findings so that may be used to support similar natural resource management initiatives that require knowledge sharing and co-production with First Nations.

Risks:

- There are no known or anticipated risks to you by participating in this research

Researcher's Relationship with Participants:

- The researcher is a masters student, under the co-supervision of Dr. Tremblay and Dr. Bone
- There are no perceived conflict of interest or power-over conflicts in this research process

Withdrawal of Participation:

- You may withdraw at any time without explanation or consequence
- All focus group data will be summarized with no identifying information

Continued or On-going Consent:

- We do not anticipate any further data gathering processes once the project has been completed
- We do not intend to use the data in future research

Anonymity and Confidentiality

- Information that is provided will be kept confidential and anonymous

Research Results will [may] be Used/Disseminated in the Following Ways:

- This project will adhere to the Ownership, Control, Access and Possession (OCAP) data governance principles. First Nations will be consulted before any use or dissemination of their data.

- Research findings will be published in the form of a graduate thesis, articles and a report given to partners
- Findings will be shared during MSRCC meetings

Disposal of Data

- Electronic data from this project will be stored on the personal computer of the researcher, until the end of the project at which time all data will be transferred to the First Nations Fisheries Council and deleted from personal computers.
- Any paper copies of the data collected will be shredded

Questions or Concerns:

- Contact the researcher(s) using the information at the top of page 1
- Contact the Human Research Ethics Office, University of Victoria, (250)472-4545 ethics@uvic.ca

Consent:

Your signature below indicates that you understand the above conditions of participation in this study and that you had the opportunity to have your questions answered by the researchers, and that you consent to participate in this research project.

_____	_____	_____
Name of Participant	*Signature*	*Date*

Please save a copy of this consent and return a copy to the researcher.

APPENDIX B: Focus group questions

1. What type of data/information/knowledge do you believe is needed to inform marine planning? If you were to place this on a continuum of 'data -> information -> knowledge -> understanding -> wisdom' where would it fall?
2. Building off what was just described, what types would be beneficial to share in a collaborative environmental stewardship initiative like marine spatial planning? Who owns this data/information/knowledge? If this is something your community or organization owns, who do you believe it should be shared with?
3. Are you familiar with the terms "Indigenous data/information/knowledge governance"? What do these terms mean to you? Do you feel that one is more accurate in the context of resource management and partnership between Indigenous and non-Indigenous groups?
4. Describe a situation where data/information/knowledge sharing has supported or inhibited your work or partnerships. What worked or what do you wish had gone differently? Were there any governance measures required to support the sharing?
5. In your role in your community or organization, what have been opportunities or limitations for you to support data/information/knowledge governance?
6. What do you believe is required to support Indigenous knowledge governance in environmental stewardship initiatives in partnership with government?
7. How can we use UNDRIP as a mechanism to support ethical data/information/knowledge sharing in environmental stewardship initiatives between Indigenous and non-Indigenous groups?

Appendix C: Ethics Certificate of Approval

University of Victoria

Office of Research Services | Human Research Ethics Board
Michael Williams Building Rm B202 PO Box 1700 STN CSC Victoria BC V8W 2Y2 Canada
T 250-472-4545 | F 250-721-8960 | uvic.ca/research | ethics@uvic.ca

Certificate of Approval

PRINCIPAL INVESTIGATOR	**Crystal Tremblay** (Supervisor)	**ETHICS PROTOCOL NUMBER** Expedited review - delegated	**21-0103**
PRINCIPAL APPLICANT	**Jean Hodgson** **Master's student**	ORIGINAL APPROVAL DATE	17-Nov-2021
UVIC DEPARTMENT	**Geography GEOG**	APPROVED ON	17-Nov-2021
		APPROVAL EXPIRY DATE	16-Nov-2022

PROJECT TITLE **Learning perceptions, experiences and limitations to Indigenous knowledge governance in natural resource management initiatives**

RESEARCH TEAM MEMBERS
Chris Bone - Co-investigator, UVic

DECLARED PROJECT FUNDING
Mitacs Accelerate, UVic

DOCUMENTS INCLUDED IN THIS APPROVAL
TCPS2_Core_Certificate.pdf - 24-Mar-2021
FNFC Approval of Ethics.pdf - 21-Oct-2021
APPLICATION_SampleRecruitmentEmail.docx - 21-Oct-2021
APPLICATION_SampleTalkingPoints.docx - 21-Oct-2021
APPLICATION_ConsentForm.docx - 21-Oct-2021

CONDITIONS OF APPROVAL

This Certificate of Approval is valid for the above term provided there is no change in the protocol.

Modifications
To make any changes to the approved research procedures in your study, please submit a "Request for Modification" form. You must receive ethics approval before proceeding with your modified protocol.

Renewals
Your ethics approval must be current for the period during which you are recruiting participants or collecting data. To renew your protocol, please submit a "Request for Renewal" form before the expiry date on your certificate. You will be sent an emailed reminder prompting you to renew your protocol about six weeks before your expiry date.

Project Closures
When you have completed all data collection activities and will have no further contact with participants, please notify the Human Research Ethics Board by submitting a "Notice of Project Completion" form.

Certification

This certifies that the UVic Human Research Ethics Board has examined this research protocol and concluded that, in all respects, the proposed research meets the appropiate standards of ethcis as outlines by the University of Victoria Research Regulations Involving Human Participants.