Knowledge and Power through Pluralisms and Relationality in the Governance of Salmon on the West Coast of Vancouver Island

by

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Graduate Program in Marine Science and Conservation
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Dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy in
Marine Science and Conservation
in the Graduate School
of Duke University

2023

ABSTRACT

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Abstract

There is growing recognition that conventional Western approaches to fisheries governance and management are globally falling short in addressing many social and ecological challenges. Calls to "reinvent" or "reimagine" fisheries institutions through adaptations of ecosystem-based approaches increasingly intersect with interest in the "integration," "bridging," or "weaving" of knowledges and values held by Indigenous peoples with Western approaches. Generally, the intent is to improve decision-making processes and management outcomes, and to better recognize Indigenous rights following national and international legislative commitments such as UNDRIP. However, without appropriate strategies these efforts can echo harmful colonial histories, further marginalize Indigenous communities, and fail to restore fisheries of concern. Reimagining fisheries institutions will fundamental systemic changes to dominant worldviews, including how we approach multiple knowledges, conceptualize social and environmental relations, and even the very question of what constitutes "good" fisheries governance.

The purpose of the dissertation is to consider what it means to pursue "integration" of Indigenous and Western scientific ways of knowing for improved fisheries governance and management and to meaningfully recognize Indigenous rights and knowledges. I present a case study of salmon in Clayoquot Sound on the west coast of Vancouver Island (WCVI). Salmon are highly valued by WCVI coastal communities and are integral to the wellbeing of local Nuu-chah-nulth First Nations, but are at risk of extirpation. The federal government, through Fisheries and Oceans Canada, is tasked with recognizing Indigenous knowledges and the recently formalized commercial fishing rights of five Nuu-chah-nulth First Nations into WCVI fisheries. Development of the five Nations' fisheries within a context of multiple overlapping Indigenous and Canadian actors and authorities presents a particularly entangled challenge for local

governance reform and directly confronts colonial legacies and the historical distribution of power between Canadian and Nuu-chah-nulth governance structures.

In this dissertation, I present the findings of research built through five years of partnership with Tla-o-qui-aht First Nations and Ha'oom Fisheries Society and based in the Tla-o-qui-aht *hahouthli* (traditional territory). The methodology includes a combination of archival and place-based methods informed by approaches in critical geographies and Indigenous relational practice. The broader goal of our partnership is to support ongoing efforts to mobilize Nuu-chah-nulth knowledges and values in WCVI salmon governance and management for productive, healthy, and abundant salmon fisheries. In presenting the work, I first review the case study context with attention to colonial histories of BC salmon fisheries. I then present a literature review summarizing primary concerns and recommendations from other efforts to "integrate" or mobilize Indigenous and Western ways of knowing in fisheries. With these recommendations in mind, I detail the case study findings considering the mobilizations of knowledge and governance relations in WCVI salmon governance. I first identify pluralistic approaches to Indigenous and Western ways of knowing in Tla-o-qui-aht's internal management and governance structures. I then consider how specific relational approaches to knowledge coproduction and institution building support local decision-making and knowledge mobilization in the entangled salmon governance arrangements of Clayoquot Sound. Finally, I consider how the five Nations' fisheries are impacted by and strategically respond to colonial structures and knowledge hegemonies in State fisheries management, with implications for disrupting feedbacks between colonialism and conventional Western fisheries science. Throughout, I discuss insights regarding strategies for Indigenous rights implementation and knowledge mobilization which transform governance and power relations in small scale, multispecies fisheries.

The dissertation chapters collectively contribute to the following findings. First, Nuu-chah-nulth governance structures approach fisheries management through knowledge pluralisms and should be recognized as legitimate and capable governing bodies for self management. Second, relational strategies to partnership building between rightsholders and governance actors support coordinated decision-making, adaptive management actions, increased local capacity, and robust knowledge co-development, especially in when reflecting Nuu-chah-nulth embodied relational practice and with deference to Nuu-chah-nulth governing authority. Finally, strategically utilizing pluralisms and relational partnerships to challenge knowledge hegemonies and the settler state's authority can disrupt feedbacks between colonialism and conventional Western fisheries science and offers a potential avenue for decolonization in the context of a resistant bureaucratic structure.

The findings of this dissertation also contribute insight regarding broadly applicable steps forward through alternate pathways of information, understandings of relation, and arrangements of governance. Pluralistic approaches to knowledge and governance conducted in collaboration with Indigenous scholars and communities should be prioritized in efforts to mobilize multiple knowledges in the management of fisheries. Indigenous leadership and power sharing through co-governance are imperative to these approaches. Broadly, knowledge pluralisms and more-than-capitalist relational reimaginings present promising avenues for meaningful fisheries reform.

Dedication

For the child who wants desperately to know the how and why of everything, who believes fiercely in fairness, and who delights in the friendship of trees and fairies. Might your curiosity and sincerity carry you through seasons of cynicism, and help me continue learning how to grow with patience, to listen with compassion, and to imagine with hope.

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I have been generously welcomed and treated well as an invited guest in the Tla-o-qui-aht *ḥaḥuuɬi*. I have have witnessed traditional song, ceremony, *himwica* and *ḥaaḥuupa*. I hope in this work I have demonstrated *ʔiisaak* and helped to support the project of renewal and the regeneration of the relationship between the *ḥawˀ iiḥ, ḥaḥuuɬi* and *muscˇim.* I extend deep gratitude to the *Ḥawˀ iiḥ,* to the Chief and Council, and to the Traditional Resource Council, Natural Resources Department and Tribal Parks of Tla-o-qui-aht First Nations, and to all the many individuals who have supported the development of this research and offered time and mentorship along the way. In particular, I offer thanks to *Seitcha*, Terry Dorward, for his instrumental role in developing and facilitating this work. Further thanks for the time, teaching, and advice offered by Andrew Jackson, Saya Masso, and Francis Frank.

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And finally, to my family. To my parents, Petra and Bruce, and to my brother, Björn, thank you for teaching me to love the pursuit of knowledge, for showing me how to pay attention to the world around me, for your unwavering support throughout this and every journey, and for always welcoming me back home with open arms.

Statement of Positionality

This dissertation presents the culmination of five years of work in collaboration and partnership with Tla-o-qui-aht First Nations and Ha'oom Fisheries Society. My Nuu-chah-nulth partners have taught me the importance of story and accountability in sharing knowledge and holding space with others. To begin in a good way, one must introduce themselves – both in familial and experiential contexts and through their perspectives and motivations. I first begin, therefore, by telling you who I am and how I am situating myself within this work.

My name is Julia Anastasia Bingham. I am a white academic in the environmental sciences. I was born on Wiyot territory, in the town of Arcata, California. My mother is from Germany, and my dad grew up California's Central Valley. I have often been just a visitor to where I live and work. Growing up, I moved several times with my family from California to Oregon (Chinook and Mollala territories) to Colorado (Ute and Arapahoe territories). I returned to Oregon for undergraduate studies, where I lived on stolen Kalapuya territory and conducted coastal fieldwork in the ancestral lands of the Siletz, Yaquina, Alsea, Siuslaw, Coquilla, Umpqua, and Coos peoples. I currently live in North Carolina, on the ancestral stolen lands of the Coree and Neusiok peoples. My family again lives in Wiyot territory. Of these multiple places that have shaped my life experience, I most consider the area now known as Humboldt County, California, territory of the Wiyot, Hoopa, and Yurok peoples, as home. I deeply love the rich temperate forests and rocky coastlines of the Pacific Northwest, and the species we share them with.

I grew up in a home of scientists; my parents are botanists and forest ecologists who worked in conservation and resource management, specializing in old growth forests, and my younger brother is an atmospheric physicist. We grew up camping, hiking, canoeing, fishing, and generally seeking solace in the outdoors. My parents and other mentors taught me that our presence had impact in those spaces, and we have a responsibility to consider and take

accountability for those impacts. In initially deciding what to pursue in school and work, ecological sciences made sense to me, as did seeking to protect and restore the places that I feel raised me as much as my parents did. I have since found myself on a long and ongoing journey of learning (and unlearning) about ways of knowing, justice, relationships, and responsibility.

In my professional and academic work, I am an interdisciplinary social scientist. I am broadly interested in coastal ecosystems and communities and human-nature relationships. I study the intersections of social, ecological, and political dimensions of fisheries and coastal management. I seek to develop strategies to support environmental health and human well-being, while critically addressing harmful institutional structures. I believe sustainable and healthy futures for coastal communities require environmentally and socially just management and governance developed through interdisciplinary, place-based, community-informed research and collective action. I am motivated by a desire to shift dominant approaches to the environment from extractive practices to more sustainable relationships built upon care and reciprocity.

Before moving into the social sciences, I was trained in intertidal ecology and conservation biology at Oregon State University. Through research experiences where I worked with multiple stakeholders and local fishing communities, my interests expanded to the human dimensions of coastal systems. I recognized that pathways to bridge my data and my collaborators' interests and knowledge to policy were lacking, and I wanted to better understand systems of resource governance and management and so begin my disciplinary transition. Over time, my approach to research shifted from the positivist paradigms I grew up in towards a more constructivist approach, understanding that there multiple and layered ways of knowing, understanding, and experiencing reality.

For the last six years, I have been a PhD candidate under the mentorship of Dr. Grant Murray at the Duke University Marine Lab. In my current work, I primarily draw from fields

of critical human geography, political ecology, and science and technology studies. Indigenous scholars and collaborators have been immensely influential in shaping my learning during my doctoral studies, and especially in informing my approach to reflexive practice. I was not explicitly seeking to work in an Indigenous context when I began graduate school. Grant has held a research relationship with Tla-o-qui-aht First Nation for over seventeen years. He recognized that my general research interests aligned well with those of Tla-o-qui-aht, and so we began scoping a potential partnership. Grant introduced me to *Seitcha* (Terry Dorward) and Dr. Saul Milne. At the time, *Seitcha* was the Tla-o-qui-aht Tribal Parks Coordinator and through 2022 coordinated the Tla-o-qui-aht Traditional Resource Council. Saul was also Grant's student and partnered with Tla-o-qui-aht at the time, and is currently a strategic advisor to Ha'oom Fisheries Society. They guided me in building research relationships with Tla-o-qui-aht and Ha'oom Fisheries Society. As of the fall of 2023, I have worked in partnership with Tla-o-qui-aht and Ha'oom for five years on research conducted within the Tla-o-qui-aht *ha`houthli* (traditional territory). Seitcha and Saul have served as liaisons, collaborators, and coauthors throughout this work, which has been transformative to my own understanding of science, academia, and the responsibilities of researchers to reflexively consider the impacts of our methodologies and the role our identities play in shaping our research. I present this work in my doctoral thesis.

This dissertation is but one of several products from our project explicitly developed in support of Nuu-chah-nulth efforts of knowledge regeneration, fishery development, salmon population and habitat restoration, and paths towards self-determination and resource sovereignty. Through this dissertation, I aim to produce a "third party" analysis of the strengths and the tensions of governance processes and relationships between TFN, HFS, and Canadian actors including Fisheries and Oceans Canada (DFO) in salmon governance and management, with a

focus on Nuu-chah-nulth and Western Scientific knowledges. This was a specific request of my Nuu-chah-nulth research partners, who expressed that they value the potential of external reflections in academic formats to strengthen the legibility and validity of their story from the perspective of Western systems, and to potentially provide an additional perspective useful for informing their own strategies of self determination. In facilitating Traditional Resource Council meetings to review the work, *Seitcha* often described his vision of this project as a means of "bringing our [Tla-o-qui-aht] knowledge to an academic space on our terms, where more people can learn from us and where we can learn from them." Members of the Ha'oom Board of Directors, who represent the interest of the five Nations in the implementation of their rights based fisheries, expressed interest in using the products of this work in their communication strategies and as a point of feedback for identifying areas of strategic and structural adjustment. After the dissertation defense, we intend to meet again to discuss in what ways my analyses and the findings of this dissertation may provide useful information for their future strategic planning.

The effort presented in this dissertation is inherently a political project; Indigenous research is contextualized through and embedded in colonial history (Kovach, 2009; Todd, 2016). This extends beyond the colonial history of a "study site;" the institution of academia has a long history of colonial extraction of knowledge as research practice, which intersect with tensions in engaging with Indigenous perspectives through a written format (Coombes et al., 2014; Hunt, 2014; Kovach, 2009; Lindstrom, 2022; Smith, 1999; Todd, 2016; Tynan, 2020; Yang & Wayne, 2012). Western thought – particularly in academic discussions of ontology in anthropology and critical and feminist geographies – is often influenced by Indigenous ways of thinking in advancing theories of interconnectivity and subjectivity (Mott & Cockayne, 2017; Nightingale, 2019; Todd, 2016). Some of the most recognized of such scholarship in this "ontological turn" fails to acknowledge this influence while continuing to describe Indigenous ways of knowing as a

separate other (Todd, 2016). Even where these efforts advance theory, accurately reflect insights from Indigenous thought, and have good intention, they contribute towards 'epistemic violence' and fail to affect structural change in their erasure of Indigenous ways of knowing and embodied practice (Hunt, 2014; Todd, 2016; Yang & Wayne, 2012).

Reflexive discussions in critical geographies rethinking engagement with Indigenous perspectives and extractive practices in academic traditions with aspirations towards reconciliation, decolonization, and an "unsettling" of participatory research explicitly engage with Indigenous relationalities and legal orders, and emphasize collaborative approaches on Indigenous peoples' terms, engaging in the political context, and explicitly acknowledging Indigenous teachings (Coombes et al., 2014; Howitt et al., 2009; Howitt, 2019; Johnson et al., 2007; Todd, 2016; Whyte, 2013). Indigenous scholars Wilson (2008), Kovach (2009, 2016, 2019), Hart (2010), Smith (2012), and Tynan (2020, 2021) detail how Indigenous concepts and practices of relationality extend to Indigenous research paradigm and methodology, and a decolonized research practice. For example, writing and research in relation to Indigenous knowledges requires articulating positionality and grounding our work in our own experiences and perspectives. Pasqua scholar Margaret Kovach explains this "critically reflective self-location" provides "opportunity to examine our research purpose and motive. It creates a mutuality with those who share our stories with us" (2016). These considerations have informed my approach to research partnership and writing in this work. I am particularly influenced by the work of Eve Tuck and K. Wayne Yang (2012), Nicole Latillupe (2015), Margaret Kovach (2016, 2019), Zoe Todd (2016), Lauren Tynan (2020), Charlotte Coté (2021), and Katherine Crocker (Crocker, n.d.; see for example Crocker, 2021a, 2021b, 2022).

I do not claim an Indigenous methodology in this dissertation, and I am not immune to the risk of perpetuating colonial acts of harm in this work. Even while attempting to engage with

Indigenous relationalities and frameworks of pluralities, my own interpretation, embodiment, and communication of these practices is informed by my lived experience as a white settler academic trained in Western methodologies. I also seek to present this story with Indigenous collaborators in a way that is legible to a Western academic audience, ultimately writing through a Western management lens. My Nuu-chah-nulth partners are keen on using Western tools including academic texts as a means of communicating, extending their teachings, and influencing Western structures and so have been supportive of this arrangement. However, there are some dimensions of Nuu-chah-nulth ways of knowing and relating which are lost or oversimplified in this academic written format. I take responsibility for any resulting impacts to the communities with whom I work, and have worked to mitigate risks of harm with my research partners through our protocols. By engaging in research with Indigenous peoples, I can either disrupt or contribute to and perpetuate the colonial legacies which echo throughout governance, societal, and academic spaces. Decolonization must be led by Indigenous communities with the support of people who hold power and privilege. I aspire to provide this support to the best of my abilities and aim to wherever possible support my Indigenous collaborators' paths towards self-determination.

While I am aligned with Nuu-chah-nuth partners in the broader work and in this text, I am fundamentally an outsider to both Nuu-chah-nulth and Canadian structures. My interpretations of the findings presented in this dissertation do not reflect the official views of Tla-o-qui-aht First Nations, Ha'oom Fisheries Society, the leaderships of the five Nations, or Fisheries and Oceans Canada. I collected and analyzed all of the data presented in this dissertation. I developed the arguments and initial draft texts independently from my research partners. Dr. Milne and Nuu-chah-nulth collaborators have reviewed the contents to ensure the accuracy of the information included regarding Nuu-chah-nulth governance and ways of knowing, but did not direct my methods of analysis or my interpretation of the findings.

I work to be as respectful and accurate as possible in representing my collaborators' story on their terms, and to appropriately honor their trust and collaboration. I continue to learn and to agitate my understanding of what it means to be in good relation as a white academic researcher with Indigenous partners in Indigenous spaces. Since I am not an Indigenous person, my ability to fully understand the lived experiences and worldviews of my research partners is limited. I intend to act as an ally to my Indigenous colleagues but never to speak for their experiences or interests. I have therefore prefaced several chapters of this dissertation and closed the final conclusion with quotes from Nuu-chah-nulth fishers and leaders to help present the story through their own words parallel to but independently from my own discussions and arguments. I hope this work is found valuable by my research partners, to whom I extend all of my gratitude and respect

1. Introduction

1.i They have to recognize us.

> "I think, once we once we get a stronger voice, I think we can do it. We can do a lot more to the save this way of life. As long as we figure out how to gain that respect, to get people to listen. Because this knowledge that my skippers have, that the fishermen have, and that people have in this area, it goes back thousands and thousands of years. They survived, and they thrived here. But the voices haven't been heard in a long time. So finding that [recognition] is going to be the answer to, *can I tell my three year old granddaughter that she can fish what she's old enough, or do I tell her to do something else?* She loves this boat. She loves it out open the water. That's why I do it at the end of the day. So my kids can have that opportunity, and so my chiefs can have a potlach and have fish that we caught here. That we can go to Ophitsaht, our 10,000 year old village, and bring in fish, and give it away like they've been doing for thousands and thousands of years.
>
> And I'll do what it takes. I'll get arrested. Go out in bad storms and fish. And listen. Take the time to listen to the to the knowledge keepers and be that voice they need that gets heard. Even if I don't do it directly. I talk to people like you. Or the ladies [harvest monitors] on the dock. Or DFO. I've had many conversations with those guys. Some of them are on our side and some of them are different. That tension needs to go away. Between the tourism and the forestry industry and the T'aaq-wiihak fishery, the recreational fishery, the commercial fishery. There needs to be working groups where we're not pointing fingers at each other.
>
> …
>
> But you know, the government is still appealing. It's amazing that they can spend a couple million dollars to fight a couple of words in a law. But it's happening. … We can be our own fishery again. Like I was saying, there's that tenseness, but it's not as bad as it used to be. When we first started this fishery, there was a lot of swearing. There was racism and a lot of people fighting each other. But now the same people can come down and buy salmon off of us. Or prawn. I feel like the doors are being opened. It feels a lot better now than it did when we first started. It was almost like we were feeling criminalized by going out to practice our rights. You don't really have to do that anymore. And we have the backing of a lot of the guys down here, which is nice. It makes me feel comfortable that there is going to be a fishery in a few years, or next year, or the year after. Just because we're starting to get heard and starting to get recognized. All of that hard work and all of the testimony that's been given by the guys that have been fishing forever has been acknowledged. And the government is kind of in a corner now. So they have to recognize us. We're a high priority for fishing. We're not at the bottom of the food chain. The recreational fishery and the people that buy fishing licenses every year? We do the same thing. There're at least 30 boats now. It's never too late. … And if you listen to speakers like Paul Robinson, Elmer Frank, Vic Amos,[1] they are so full of knowledge. We can be as diverse as we need to be to survive. We can be able to tell our

[1] Experienced fishers and leaders from Ahousaht Nation, Tla-o-qui-aht First Nation, and Hesquiaht First Nation, respectively.

grandkids that they can fish. And T'aaq-wiihak or Ha'oom, they provide a lot of data and they take our input to go and fight for us. So it'll work out.

…

It's just the way that I feel about fishing, you know? And the faith that I have, that it's going to work. Before we get too old and nobody comes back in it. We need every single bit of information shared that we can give for us to be put out there for people to see, so that we can - I'm not going to say win because nobody fully wins in the end - but to be able to do what we want to do."

-Terence (Terry) Crosina, Tla-o-qui-aht commercial fisher and deckhand[2]

1.1 Overview

The question of how to create 'good' governance in fisheries is often asked in the context of managing use, responding to stock collapse or climate change impacts, or addressing socioeconomic inequities. There is growing recognition that management derived from a Eurcoentric paradigm and conventional fisheries science are globally falling short in addressing many social and ecological challenges (Wilen, 2006; Beddington, 2007; Holt, 2011; Silver et al., 2022). Calls to "reinvent" or "reimagine" fisheries management through adaptations of ecosystem-based approaches increasingly intersect with discourses regarding knowledge integration, knowledge coproduction, and Indigenous rights recognition (Davis & Jentoft, 2001; Denny & Fanning, 2016; Bennett et al., 2019; Fache & Pauwels, 2020; Reid et al., 2020; Cooke et al., 2021; Silver et al., 2022). This reimagining will not be easy or simple, but is imperative. Reimagining fisheries requires more than adding to the knowledge bases of existing fisheries governance and management structures; it requires fundamental systemic changes to dominant worldviews, including how we approach the question of "good" governance.

The ways that knowledges are conceptualized, mobilized, negotiated, and applied in resource governance and management matters. They affect the efficacy of resulting policy or practice and also affect the ways in which the knowledges, values, rights, and interests of

[2] Excerpts from an interview in Tofino Harbor, October 20, 2021, brackets my addition.

communities are (or are not) incorporated into resource governance and management, with implications for procedural, recognitional, and distributive (in)equity and (in)justice (Bennett et al., 2019; Leach et al., 2018; Liboiron, 2021; Reid et al., 2020; Jennifer J. Silver et al., 2022). The dominant worldview in Western fisheries structures in particular is hierarchical, paternalistic, and adherent to a "command and control" approach to resource management (Davis & Jentoft, 2001; Reid et al., 2020; Jennifer J. Silver et al., 2022). Efforts to "integrate" other ways of knowing such as Traditional Ecological and Indigenous Knowledges (TEK/IK) are increasingly pursued as important for better informed and more adaptable governance structures, and for recognizing Indigenous rights under national and international legislative commitments such as UNDRIP (United Nations, 2007; Gratani et al., 2011; Weiss et al., 2013; Denny & Fanning, 2016; Raymond-Yakoubian et al., 2017; Bennett et al., 2019; Reid et al., 2020; Atlas, 2020; Cooke et al., 2021; Bingham et al., 2021; Silver et al., 2022). However, without appropriate strategies, rights recognition and knowledge "integration" efforts can also potentially serve to reinforce knowledge hierarchies and colonial legacies, perpetuating harm to Indigenous communities, while also failing to restore or sustainably manage fisheries of concern (Reid et al., 2020; Weiss et al., 2013b). Recognition of Indigenous rights in fisheries is broader than simply acknowledging Indigenous ways of knowing in State management or adjusting State-controlled Indigenous rights and access. Indigenous paths towards self determination are multifaceted and especially tied to resource sovereignty. Empowerment of Indigenous peoples and regeneration of important food systems and traditional practices requires decolonizing the structures which initially (and continue to) dispossessed and marginalized them, through efforts led by Indigenous peoples (Tuck & Yang, 2012; Whyte, 2017; Todd, 2018; Coté, 2022; Gram-Hanssen et al., 2022)

This case study, in which I examine the treatment of different knowledge systems and the interactions between actors within three different scales of salmon fishery governance,

illuminates the importance of pluralistic and relational frameworks in approaches to knowledge mobilization in reimagining fisheries governance. A shift towards pluralistic, relational frameworks such as those modeled in some Indigenous governance structures may not only support more effective and equitable efforts to bridge or integrate knowledge systems, but also challenge inequities embedded in Western resource governance and contribute towards necessary reimaginings. The governance of fisheries including salmon on the west coast of Vancouver Island presents examples of pluralistic, relational and of fragmented, hierarchical approaches to resource governance and of ways in which efforts of Indigenous right assertion illuminate frictions between these approaches to challenge the dominant system.

The purpose of this dissertation is to consider what it means to appropriately and effectively pursue "integration" of Indigenous and Western scientific ways of knowing in fisheries, both for the purpose of "improved" fisheries management and to meaningfully recognize Indigenous knowledges, rights, and sovereignty, with critical consideration of colonial legacies and knowledge hegemonies in Western fisheries management systems. I focus on a case study of salmon in Clayoquot Sound and neighboring waters on the west coast of Vancouver Island (WCVI). Salmon hold high economic value for WCVI coastal communities and are integral to the wellbeing of local First Nations (Indigenous peoples), but some species are at risk of local extirpation (Atleo, 2011; DFO, 2018, 2021; Coté, 2022). The Federal government, through Fisheries and Oceans Canada (DFO), is tasked with incorporating Indigenous ecological knowledges into fishing plans and supporting the implementation of recently formalized commercial fishing rights of five Nuu-chah-nulth First Nations into WCVI fisheries (Ahousaht et al.v. Canada, 2009, 2021; Bill C-68, 2019). Currently, the five Nations' commercial fisheries are managed through Ha'oom Fishing Society, with the long term goal of the five Nations' holding independent sovereignty over their rights based commercial multispecies fisheries and sharing

management and monitoring responsibilities in their territories through co-governance and co-management, challenging the historical distribution of power between Canadian and FN governance structures.

Based upon research built through over four years of partnership with Tla-o-qui-aht First Nations (TFN) and Ha'oom Fisheries Society (HFS), I consider the role of knowledge mobilization and dynamics of power in this case study. I specifically explore the strategic approaches, benefits, and tensions that arise through the (re)arrangement of local governance with attention to Indigenous rights implementation, responsible to Indigenous authority and traditional leadership, but tasked to be legible to the federal institution of the Settler state.

With the guidance and support of local liaisons, I collaborated with TFN and HFS to develop the project which informs this dissertation. The primary goal of the broader project is to support ongoing efforts of mobilizing Nuu-chah-nulth knowledges and values in WCVI salmon governance and management for productive, healthy, and abundant salmon fisheries. The second goal is to explore the ways in which mobilization of Indigenous and Western scientific ways of knowing may serve strategic purposes in both advancing First Nations' paths towards self determination and more broadly reimagining fisheries institutions which are better equipped to support the well-being of both ecosystems and of local communities. This dissertation addresses four focal research questions to support these broader project goals:

RQ1. What is the existing academic understanding of efforts to mobilize multiple knowledges in fisheries governance and management, especially in contexts with both Indigenous and Western authorities and rightsholders?

RQ2. How do governing bodies and user groups interact in key focal arenas to make decisions regarding access and use of WCVI fisheries, focusing on salmon in Clayoquot Sound?

RQ3. In these interactions, in what ways are Indigenous and Western scientific knowledges and values produced and mobilized?

RQ4. In these interactions, how does the mobilization of Indigenous ways of knowing and Western fisheries science serve to (re)shape governance relations and dynamics of power?

In order to answer these questions, I have (1) reviewed the academic literature regarding strategies of Indigenous knowledge "integration" into fishery governance and management, (2) mapped the governance structures of WCVI salmon fisheries, focusing on interactions and relationships between actors, (3) identified and described the ways Indigenous and Western scientific ways of knowing are produced and mobilized in decision – making and management, particularly through these interactions and relationships, and (4) considered how dynamics of power shape and are shaped by actor interactions and their mobilization of knowledges. Research question 1 is detailed through a literature review, which is described in Chapter 2. Research questions 2-4 are considered together throughout the case study, and are concurrently engaged in the research findings throughout Chapters 3, 4, and 5.

Through multiple avenues of inquiry presented in this dissertation, and through a story shared with guidance from and permission by my Nuu-chah-nulth research partners, I detail the importance of plural understandings of knowledges and governance arrangements which provide insight towards reimaging fisheries institutions through a fundamentally relational lens. More broadly, this work contributes to an important and growing discourse challenging colonial approaches to knowledge integration and fisheries management in Canada and in comparable contexts in the U.S., New Zealand, Australia and other Western settler-state nations.

1.2 Theoretical Approach

Throughout this dissertation, I engage multiple avenues of inquiry regarding approaches to Indigenous and Western scientific knowledges, environmental governance, and dynamics of power. I draw from a combination of feminist and Indigenous informed critical geographies, institutional approaches to resource governance studies, and Indigenous theories and methods of relation. While each chapter has a specific theoretical focus, I thread the chapters together through both the story of the case study context and through the ideas of pluralism and relationality, further described below.

1.2.1 Key Terms

1.2.1.1 Knowledges and knowledge "integration"

Throughout this dissertation, I understand all systems of knowledge as situated, or fundamentally inseparable from their knowledge keepers and their environmental and cultural contexts (McGregor, 2014; Reid et al., 2020). I predominantly discuss Western scientific knowledges (WSK) and Indigenous ecological knowledges as epistemological processes and tools of science are not distinct to Western systems. I particularly focus on Nuu-chah-nulth ways of knowing and on Western fisheries sciences. I refer to knowledge "integration," "co-production," "sharing," and "mobilization" as various was of actively producing and engaging Indigenous and Western scientific ways of knowing within systems of fisheries management (e.g McMillan & Prosper, 2016; Ban et al., 2017; Eckert et al., 2018; Reid et al., 2020). In these terms, which intersect with similar discourses regarding "bridging" or "weaving" of knowledges (e.g. Johnson et al., 2016; Weiss et al., 2013), I am attentive to critical considerations of language, and what the literal meanings of these words infer regarding the treatment of knowledges in fishery management and governance systems.

Indigenous knowledges (IK), often termed traditional ecological knowledges (TEK), generally refer to environmentally oriented ways of knowing which are place – based and dynamic; they are intergenerational and relational in nature, acquired experientially and through knowledge sharing, and formed through close relationships with the local environment (Berkes, 2018; Ban et al., 2018; Reid et al. 2020). Held by Indigenous peoples, IK/TEK are often described as contextualized through "cultural" or "traditional" practices (Berkes, 2018; Reid et al., 2020; Wheeler & Root-Bernstein, 2020). However, this framing erases ways in which Indigenous was of knowing are interconnected to Indigenous systems of law and in which they are active and adaptive rather than a relic of a past or pre-colonial context (Whyte, 2013; Reid, 2020). Further, all IK/TEK cannot be fully described through a single set of characteristics. Each Indigenous worldview is distinct; 'Indigenous' does not refer to a single group of people or way of knowing but rather a multiplicity of Indigenous communities and thus a multiplicity of ontologies or ways of fundamentally understanding and engaging in reality (Mol, 1999; Howitt & Suchet-Pearson, 2003, 2006; Howitt et al., 2009; Reid, 2020).

WSK is typically exemplified by systematic processes and positivist or reductionist perspectives, informed by Enlightenment era philosophies and often employing experimental approaches to answer questions about an assumed single true reality (Weiss et al., 2013; Muller et al., 2019). Based on assumptions of epistemological validity, Western science has often been framed as superior in accuracy, rigor, objectivity, modernity and reliability to other knowledge systems (Mistry & Berardi, 2010; Whyte, 2013; Weiss et al., 2013; Reid et al., 2020). It is often perceived (erroneously) to be apolitical as well as more objective and less culturally embedded than Indigenous ways of knowing (Weiss et al., 2013; Muller et al., 2019; Reid et al., 2020).

In seeking articulation of the differences and relationships between Western ecological sciences and IK/TEK, these ways of knowing are often treated dichotomously, where WSK is

defined through contrast to IK/TEK in what it is perceived *not* to be and by grouping IK/TEK as a collective whole. For example, relationally-driven, experiential Indigenous knowledges shared through storytelling and ceremony are typically contrasted to hypothesis and experiment-driven production of (especially quantitative) data as information in WSK (Ban et al., 2018; Wheeler & Root-Bernstein, 2020). The assumptions regarding connectivity, the role of relation, practices of categorization, and learning about the whole of reality through engaging with discrete data (WSK) as compared to learning about pieces of reality through engaging with the whole (TSK) tend to further differentiate the two approaches (Muller, 2012; Kimmerer, 2013; Datta, 2015).

Many Indigenous authors challenge a dichotomous view of TEK/IK and WSK and the marginalizing effects of "integrating" TEK/IK within Western-defined knowledge systems (N. Latulippe, 2015; Muller, 2012; Reid et al., 2020; TallBear, 2014; Todd, 2016). There are overlaps between WSK and IK/TEK through the use of observation, integration of new technologies, goals to understand social - ecological systems, and production through socially and politically embedded processes (Kimmerer, 2013; Ban et al., 2018; Weiss et al., 2013). WSK and IK/TEK can mutually inform each other, and can apply each others' tools and technologies through their respective methods of inquiry. Potawatomi scholar Kyle Whyte (2013) proposes that Indigenous knowledges are best described and enacted in collaborative efforts of continuous co-learning about respective approaches to knowledge. This approach supports careful thought and engagement of knowledge systems throughout shared long term stewardship efforts (Whyte, 2013). In contrast, "integration" efforts that seek to identify and catalogue TEK/IK as a data source for WSK management systems without meaningfully recognizing the contextualizing knowledge system or the agency and rights of knowledge holders risk reifying colonially produced knowledge hegemonies (Simpson 2007; Whyte 2013, 2018; Todd, 2016, 2018). Integration, along with phrases like inclusion or incorporation, often refer to processes of

assimilation where Indigenous ways of knowing are fit into and subjugated by Western governance or management programs that hold on to a hierarchy of knowledge that places Western Scientific Knowledge (WSK) above all other epistemologies (Nadasdy 1999, Baker 2020, Reid et al 2020). Definitions of IK/TEK and knowledge "integration" produced within Western academia can privilege non-Indigenous and scientific agendas or frame IK/TEK through their "utility" as a way to fill gaps in scientific knowledge through assimilation (Whyte, 2013; Reid et al., 2020). Non – Western knowledge holders are disempowered and their knowledges lose dimensions of meaning and may be misapplied in such contexts. Attentive to this concern, part of the literature review I present in the first chapter assesses the ways in which IK/TEK, WSK, and knowledge "integration" are conceptualized in fisheries specific literature.

Throughout the dissertation, I pluralize knowledges and ways of knowing in recognition of the widely varied and are contextually specific diversity of knowledge systems which cannot be singularly defined as one body of knowledge (Howitt et al 2009, Whyte 2013, Reid et al. 2020). In the case study, Nuu-chah-nulth ways of knowing are detailed through the processes of teaching, learning, and collaboration my research partners and I engaged throughout the work. Engaging with Indigenous ways of knowing requires attention to Indigenous diversity and particularities, even as they are often grouped in Western academia as a collective 'type' of thought (Howitt et al., 2009; Todd, 2016; Reid et al., 2020). In this dissertation, *pluralisms* (defined below) inform my primary strategy of approach to this tension, which further underlines my critical understanding of the idea of "integration." Knowledge "integration" moves towards plurality but is problematic when enacted as a method of collecting pieces of information detached from their situated knowledges and filtered through a single – often more powerful - lens (Nadasdy, 1999; Hart, 2010; Reid et al., 2020).

1.2.1.2 Governance and management

I use the term governance to encompass the various structures, processes, and arrangements through which the practice of governing, or the organization of order, rule, and decision-making, occurs. Governance is distinct from government and from management; it is a question of coordination across the political, economic, and social dimensions (Bridge & Perreault, 2009). *Management* centers on the actions used to carry out decisions, while *governance* attends to the ways in which decisions are made, including the various actors and authorities of decision making beyond the *government* institution of a nation state. I use the term *institution* to refer to the structures and processes, including norms and rules, of governance and management (Ostrom 2005).

Co-governance and *co-management* are frequently referenced in this dissertation in the context of the 'question of governance' in WCVI fisheries. *Co-governance* is a sharing of authority in governing responsibilities, though the extent of power-sharing, meaningful recognition of all authorities, and processes used to co-govern may vary across different contexts (Berkes, 2009a; Carlisle & Gruby, 2019; Dodson, 2014; Kooiman, 2003). *Polygoveranace* is a similar concept, extending co-governance to more than two governing authorities, though they may not all hold the same level of influence (Kooiman, 2003; Carlisle & Gruby, 2019). *Co-management* refers to the sharing of responsibilities and authority in implementing, monitoring or maintaining, and assessing management interventions, where actors with management responsibilities may be members of different user groups or organizations or may even be responsible to different governing authorities (Berkes, 2009a; Dodson, 2014; Kooiman, 2003). Co-management and co-governance both involve some amount of mutual recognition, collaboration, and power-sharing between participants which may take a variety of different forms. A distinction is that in co-management participants share responsibilities in

implementation and may all be responsible to the same authority, whereas in co-governance the participants share in decision-making and authority (Berkes, 2009; Dodson, 2014).

1.2.1.3 Power

In conceptualizing how power "works," there are various approaches to understanding its actor-oriented, institutional, constitutive, or discursive properties (Ahlborg & Nightingale, 2018; Svarstad et al., 2018). In this dissertation, I primarily approach relations and expressions of power through the relations between actors. Following traditions informed by Foucault (1980, 1991), I consider emergent arrangements of governance through understanding that people, things, species, institutions, markets, and governance systems form networks characterized by relationships of power (Ahlborg & Nightingale, 2018; Allen, 2003). I view power relationally, where power is evidenced by the ability to act and to affect, and the internalization and (re)expression of power through relation produces subjects and subjectivities (Foucault, 1991; Butler, 1997; Allen, 2003; Nightingale, 2019). Through interactions with each other and with the environment, relationships of power exist between people, place, and nature as well as between governments and their subjects (Allen, 2003; Ahlborg & Nightengale 2018, Svarstad et al. 2018). Power is *not* a tangible item or a thing which is wielded, nor an affective entity or force which exists independently from relations and interactions. It is context dependent and may be intentionally and strategically mobilized through vehicles such as norms, laws, information, or behavior (Foucault, 1991; Allen, 2003). Power is dynamic, imminent, and may be expressed through a variety of forms and relational acts (Allen, 2003; Ahlborg & Nightengale 2018).

Knowledges can be produced, shared, and mobilized as strategies in governance relations in order to affect actions and influence actors, placing knowledges alongside relational practices as vehicles of power (Foucault, 1980; Ahlborg and Nightengale 2018; Svarstad et al. 2018). In this dissertation I am considering the implications of and on power through the expressions and

methods of knowledge mobilization and relationship in Chapters 4 and 5, and discuss these as strategies in rights assertion and fisheries reimagining in Chapter 5.

1.2.1.4 Pluralisms

Pluralisms are a consistent theme throughout the chapters. In a broad sense, *pluralism* refers to multiplicities, wherein there are a plurality of ways to interpret, understand, and describe the world (Mol, 1999; Carter, 2017; Reid, 2020). There is no single 'correct' way of understanding highly dynamic, complex, and nonlinear systems such as fisheries, which instead may be best approached through a plurality of methods and perspectives (Reid, 2020). I particularly engage with plural ways of knowing, or the notion of *knowledge pluralism*. I broadly conceptualize knowledge pluralism by drawing on epistemic pluralism (Carter, 2017) and ontological multiplicities (Mol, 1999; Howitt & Suchet-Pearson, 2003, 2006). However, I do not assume each way of knowing to be entirely separable or without influence upon each other. I approach the notion of knowledge pluralism with the simultaneous recognition that there exists a multiplicity of ontologies and epistemologies that require attention to particularities, and the rejection of binary or dichotomous definitions between knowledge systems (Howitt et al., 2009; Whyte, 2013; Todd, 2016; Reid, 2020, Reid et al., 2020). From this lens, I understand Indigenous and scientific ways of knowing as fluid, dynamic, ever changing ways of knowing that are mutually informative and may be concurrently mobilized.

I also extend this particular notion of pluralism to discussions of governance. Knowledge production and mobilization are ways of rationalizing and directing governance and are often also a goal of governance relations (Lemos & Agrawal, 2006). Ways of knowing are contextualized through the social, environmental, and political contexts in which they are situated (Haraway, 1988, Harding, 2016; McGregor, 2018). Indigenous ways of knowing include "embodied, practiced, and legal governance aspects" (Todd, 2016).

Plural coexistence as described by Howitt & Suchet-Pearson (2006) in the context of natural resource management requires not only recognition and respect of Indigenous ways of knowing and being, but also attention to the current and historical dominance of Western and European thought. Practices of knowledge production and mobilization rationalize and give purpose to decision-making and institutional arrangements of governance (Lemos & Agrawal, 2006; García Lozano, 2020). Pluralisms of knowledge therefore infer pluralisms of governing actions and relations. In considering where pluralities emerge or are intentionally practiced, I also consider where pluralities *are not*. That is, in discussing ways that Indigenous and Western ways of knowing and governing interact in the case study, I also note instances where an actor or institution resist or rejects pluralities.

1.2.1.5 Frictions and Entanglements

The notions of "entanglements" and "frictions" inform my broader conceptualization of the case study and specifically inform my analyses and discussions in Chapters 4 and 5. Approaching the case study governance dynamics as products of interconnection, "entanglement" refers to the inseparable, co-constitutive, and indeterminate nature of interconnectivities (Haraway, 2016; Harding, 1986; Sunderberg, 2004, 2014; Tsing, 2018; Nightingale, 2019), paralleling aspects of Indigenous understandings of inherent relationality, further detailed below. Interconnectivities and relationalities in this sense extend to the more-than-human (Haraway, 2016; Tsing, 2018; Mighingale, 2019). In the context of this work, they refer also to the ways in which relations to salmon bind the environmental, social, and political; a multiplicity of people, systems, and species are interconnected through salmon systems and also actively engage with and relate to each other in the context of salmon. I use "entanglement" to understand the arrangement of governance in this case study through interactions between actors, and in recognizing these arrangements as products of entangled salmon relations. I use "friction"

following Tsing's metaphor (2004) in examining how tensions and discordance in interactions within entangled relations markedly influence shifting arrangements of relations, dynamics of power, and even the very nature of the actors or groups. The interconnections of fish, humans, and environment are mutually impactful. Through entangled frictions and through Indigenous relationalities, they 'bend and diffuse' colonial and capitalist processes and institutions, an aspect of the processes Métis scholar Zoe Todd describes as "fishy refractions" (Todd 2018).

I extend the notion of entanglement to an assumption of entangled pluralities, contextualizing the co-constitutive process of engaging and practicing pluralisms, further described below. The multiple ways of knowing and being present in the case study exist in parallel and are mutually informative and influential to the point where individuals who "walk in both worlds" (Marshall et al., 2015) do not or cannot always draw a distinct line between the two.

1.2.2 Mobilizing Pluralisms

In identifying and enacting pluralisms of knowledge in theoretical framing, analytical focus, and practices of partnership, I am explicitly informed by Indigenous frameworks for knowledge coexistence that reflect a philosophy and practice of collaborative knowledge generation and which recognize and exercise the strengths in Indigenous and Western scientific knowledges while not subsuming one within the other. Many Indigenous frameworks reflect variations of this ethic which not only represent a specific way of conceptualizing pluralisms but also ways of appropriately enacting upon them (Reid et al., 2020), as Indigenous thought is deeply tied to embodied practice and legal order (Hart, 2010; Milne, 2022; Todd, 2016; Tynan, 2021; Whyte, 2018b). These provide direction on Indigenous terms for approaching 'blended' worlds without a dichotomy of worldview or ontology while retaining Indigenous specificities and in an effort to not subsume these frameworks *into* a Western lens. For example, the *Māori* framework of *Waka-Taura* (Double-Canoe) uses the metaphor of lashing together two canoes to

represent “the worldview and values of people who are coming together to achieve a common purpose” (Maxwell et al., 2019; Reid et al, 2020). The *Yolngu* metaphor of *Ganma* (Two Ways) gives direction for ethical and equitable approaches for two-way collaborations through the idea of the distinctness of fresh and salt waters which is retained even at points where they meet and mix and co-produce a new arrangement (Muller, 2012; Reid et al., 2020). Receiving increasing attention in fisheries is the *Mi’kmaw* framework of *Etuaptmumk* (Two-Eyed Seeing) or the “gift of multiple perspectives” (Reid et al., 2020). Coined in 2004 by Elder Albert Marshall, Two-Eyed Seeing is a pluralism metaphor meaning “learning to see from one eye with the strengths of Indigenous knowledges and from the other with the strengths of Western knowledges and ways of knowing, and to use both these eyes together, for the benefit of all” (Bartlett et al., 2012). I frequently refer to the Two-Eyed framework of pluralism in this dissertation with regards to engaging multiple avenues of inquiry, communicating examples of knowledge pluralisms, and considering in what ways pluralisms may appear in the case study.

Nuu-chah-nulth frameworks through the lens of *ḥaaḥuułism* (further described below) also concurrently hold dualities and interconnectedness where individualities are retained even while they interact and influence each other. These have been important teachings for me from my Tla-o-qui-aht partners regarding ways to engage in partnership and how to understand Tla-o-qui-aht goals in resource management. *Seitcha,* a Tla-o-qui-aht collaborator in this work, offered reflections on the lessons of practice and embodiment he received from his teachers and family. Saul often supplemented my learning based on the teachings he received from Tla-o-qui-aht knowledge holders, and reviewed much of this text for accuracy in appropriately reflecting the teachings and descriptions provided by Elders over the course of this work. Nuu-chah-nulth knowledge holders from the Tla-o-qui-aht, Ahousaht, Hesquiaht, Mowachaht/Muchalaht, and Ehattesaht First Nations referenced in this case study have spoken at length regarding their

understanding of the appropriate role and practice of Western knowledges, tools, and technologies in the case context, which have informed the analysis and results described through chapters 3,4,and 5 to present a Nuu-chah-nulth specific understanding of pluralisms. Attentive to particularities, there are nuances to these perspectives across the five individual Nations. I note when a perspective comes from knowledge holders of a specific Nation and otherwise describe approaches that come from arenas of consensus shared by the five Nations.

Independently of this project, Two-Eyed Seeing is growing as a reference term among my partners and the Canadian and Nuuchahnulth staff at Ha'oom Fisheries Society. It increasingly informs HFS's approaches to Nuu-chah-nulth and Western knowledge systems as an actionable supplement to the Nuu-chah-nulth guiding idea of *hishikush tsawalk* (everything is one") and a means of conceptualizing *ḥaaḥuuɬism.* As such, Two-Eyed Seeing has become an increasing point of conversation in our iterative methodological reflections.

Pluralisms enacted through Indigenous theory inform ethics of practice and reflection, and thus inform in my actions and performances of research. I use multiple paths of inquiry in a way that reflects plural practice. I reflect on the ways in which I engage with multiple arenas of knowledge, governance, and scholarship may reflect a plural approach, and the implications and risks where they do not. I refer to Indigenous frameworks in conceptualizing and engaging in pluralisms and practices of relation, which I further elaborate below and which have also iteratively and reflexively informed the methodological approach to this work I take with my Nuu-chah-nulth collaborators.

1.2.3 Approaching Governance as an Relational Concept

Governance is a theme throughout the entirety of this dissertation. The challenge of environmental governance is made more complex when there are many social and political actors with overlapping interests and rights, especially in an already degraded and vulnerable resource

system, such as the case study I present in this dissertation. Chapter 4 is explicitly concerned with the emergent and dynamic arrangements of fishery and fish conservation governance in entangled pluralities of knowledges and governance relations in Clayoquot Sound. In this dissertation, I engage a multitheoretical approach to understanding governance, engaging critical approaches to environmental governance with relational approaches from diverse economies and feminist critical geographies scholarship, in conversation with Indigenous theories of relationality. This approach enables me to explore arrangements of governance as a product of relationships shaping and shaped by mobilization of knowledges and power.

Critical approaches towards environmental governance generally seek a more "politicized" approach to institutional analysis (Chilvers, 2009; Clement, 2010, 2019; García Lozano et al., 2019; Smith et al., 2020; Villamayor-Tomas et al., 2020). Such scholarship tends to be concerned with questions like that posed by Bridge and Perrault (2009): "governance of what, by whom, to what end?" These approaches interrogate the dynamic, politicized, and emergent nature of governance arrangements through the interconnectivity and influence of local and marginalized actors and an understanding of authority as multi-layered and multi-scalar (McCarthy 2005; Lemos & Agrawal, 2006; Bridge & Perreault, 2009, Castree 2003). From this approach, decision-making in environmental governance proceeds through complex networks of multiple types of actors and institutional arrangements, particularly in localized and day-to-day management contexts, and is rationalized and given purpose through practices of knowledge production and meaning making (Hajer & Versteeg, 2005; Lemos & Agrawal, 2006; García Lozano, 2020). Governance arrangements are not static or predetermined and politicized 'governance issues' can be critically interrogated "in terms of who is included and excluded" (Chilvers, 2009, p.359). Relations of power and the ability of marginalized actors to influence their own outcomes may be centered in critical analysis (Lemos & Agrawal, 2006; Nightengale,

2100; 2019). Actors may assert their interests and act to shape decision-making and even broader structures of governance through collective action and social movements (Villamayor-Tomas & García-Lopez, 2018), leveraging of political influence through interest groups (Moe 1995), or strategic use of discourse including policy narratives (Dryzek 2005; Garcia Lozano et al., 2019). Relationships between actors enable these avenues of influence and coordinated action, and thus a broader arrangement of governance is at least in part a product of relationship.

1.2.4 Relations and Relationality

I approach the concept and practice of relation in governance through multiple perspectives in geography and through Indigenous theories of relating and governing. Relation as in 'relationship' is a reference to literal connections and interactions between two things. 'Relationality' is a reference to inherent interconnectivities, where things always exist in relation and relativity to others (Atleo, 2004, 2011; Barrett, 2021; Tynan, 2020, 2021). The role of individuals in creating and maintaining relations and what it means to be in good relationship are variably defined across theoretical approaches to understanding the nature of relationalities and how they shape and are shaped by reality.

Diverse economies scholarship and feminist informed approaches in critical geographies pay particular attention to relationship as an organizing point in communities and governance, and relation as an affective force; that is, one which is outside of conscious intentionality and exists and operates through encounters[3] (Koivunen, 2010; Gibson-Graham 2011; Haraway 1991, 2016; Sundberg 2004, 2014; Nightingale, 2019; Tsing 2018). Relations extend beyond the human and living nature to all living and non living components of reality (Nightingale, 2019; Haraway

[3]Some critiques of affect theory note its risk of erasing dynamics of politics and power if used to infer an individual has no choice in their relational connections and actions (Pedwell et al., 2012). I approach this tension with the understanding that all beings have and can mobilize individual choice to varying degrees of influence, but are also always subject to affective forces.

2016). Binary ways of thinking are challenged, as they produce hierarchies and obscure human-nonhuman relationships and systems of oppression and exploitation (Gibson Graham & Roelvink, 2010; Nightingale, 2019). Power is also viewed relationally, often through a Foucaultian lens, where the internalization and multidirectional (re)expression of power through relation produces subjects and subjectivities (Foucault, 1995; Butler, 1997; Allen, 2016; Nightengale, 2019). Relationships and identities are intersectional, shaping how individuals experience and perform power (Haraway, 2016; Gonzáles-Hidalgo & Zografos, 2019; Nightingale, 2019). Political communities emerge from and also create relations between individual, community, place, and the more-than-human as socionatures or "socionatural becomings,"including and especially through the exercise of power (Gonzáles-Hidalgo & Zografos, 2019; Nightingale, 2018).

Indigenous understandings of reality and relationship parallel these perspectives in critical and feminist geographies (De la Cadena, 2010; TallBear, 2011). Socionatures and "socionatural becomings" as fundamental organizing concepts are shared: in Indigenous realities, "relationships are reality, and reality is relationship," applying to all beings and systems (Wilson, 2016). However, conceptual constructs, analytical tools, and the extension of relational reality to lived practice are distinct (TallBear, 2011, 2015; Todd, 2018). Indigenous theories of relationality and those of feminist informed critical geographies are not direct analogs of each other and so can be placed into conversation but are not interchangeable (TallBear, 2015; Todd 2018).

Relationality as understood through Indigenous methodologies and philosophies of reality typically reflect a recognition of multiple truths, where knowledges and expertise are plural and taught through relation (Wilson, 2008; Kovach, 2009; TallBear, 2011; Tynan 2016). In addition to an organizing concept of reality, relationality informs responsibilities between kin (meaning all relations), recognition of individual agency and the importance of consent, and an enacted process of learning, teaching, and connecting through specific practices (Atleo, 2004,

2011; Tynan 2020, Lindstrom, 2022). Embodiment or ways of living and appropriately practicing relation according it Indigenous relationalities are often summarized through concepts of respect, responsibility, reciprocity, and recognition (Atleo 2011; Pidgeon 2019; Tynan, 2020). Beyond day to day life, embodied relationality includes practices of knowledge production, knowledge sharing, and meaning - making (e.g. stories and storytelling), as well as ways of engaging with the physical and non-physical world (e.g. specific methods of harvest) and with the community (e.g. specific methods of governing), which extends beyond the human (Wilson, 2001; Atleo, 2006; Atleo, 2004, 2011; Kovach, 2009; Tynan, 2020, 2021). Contributions to these perspectives include Indigenous scholarship from multiple different Indigenous contexts and worldviews across the world, representing a plurality of approaches from a multiplicity of distinct experiences and contextualities. As the case study I describe is situated in a Nuu-chah-nulth context with Nuu-chah-nulth research partners and Nuu-chah-nulth hosts, Nuu-chah-nulth theories of reality, relation, and governance specifically inform this dissertation and are further detailed below.

Relational practice is also core to Indigenous methodologies of research through its reciprocal approach to partnerships (Wilson, 2001; Kovach, 2009, Milne, 2020). Knowledge itself is relational, and so relational paradigm extends to methods of research with a foundation of respect, reciprocity, and relationality (Wilson, 2001, 2008). Relational approaches support contextually defined engagement in the work, moves collective responsibility of impact to the forefront through a shift from research 'on' to research 'with,' and is inherently reflexive through 'situating the self' (Wilson, 2008; Kovach 2009,2016; Smith, 2012; Tynan, 2021). Relationality in research requires articulating positionality, or "critically reflective self-location" (Kovach, 2016); describing where the researcher is coming from – literally and figuratively - and grounding our work in our own experiences and perspectives. Kovach explains this allows researchers to "examine our research purpose and motive. It creates a mutuality with those who share our stories

with us" (2016). Wilson (2008), Kovach (2009, 2016, 2019), Hart (2010), Smith (2012), and Tynan (2021) further detail how Indigenous concepts and practice of relationality extend in particularities as Indigenous research paradigm and methodology, and discuss its role in a decolonized research practice. I do not claim an Indigenous methodological approach in this dissertation. Still, in order to engage in work with Indigenous partners and ways of knowing I have worked to conduct the research through relational partnership with my Nuu-chah-nulth collaborators and through reflexive practice.

1.2.3 Feedbacks between Colonialism and Western Science

Historically, Western practices of resource management and governance are built upon hegemonic bureaucracies and the legally encoded hierarchy of Western Scientific Knowledge (WSK) over other knowledge systems (Wolfe, 2006; Whyte, 2018; Silver et al., 2022). Science is not separate from political processes and dynamics of power. A central strategy to Western European Colonialism is the appropriation and control of resources through dispossession of Indigenous territories and the dismantling and erasure of Indigenous laws and governance structures(Alfred & Corntassel, 2005; Jennifer J. Silver et al., 2022; K. Whyte, 2018a). Genocidal tools and physical violence are implemented in order to appropriate and maintain control, and become sanctioned through laws, norms, and the centralized and hierarchical structures of settler nation-state institutions (Wolfe, 2006; Silver et al., 2022). These structures are perpetuated; they are what current societal structures, law, and knowledge production including science in settler-colonial nations are built upon, and together with capitalist ideas of relation are from which the logics of industrialization and neoliberalization proceed (Liboiron, 2021; Whyte, 2018a; Wolfe, 2006). In turn, knowledges produced from these structures which "assume unfettered access to Indigenous land," including Western science, are used to reinforce their logics (Todd, 2018; Liborion, 2021). As such narratives like "best available science" are political ones that mobilize

power and reinforce the authority of Western state management structures claiming a scientific foundation to restrict or prohibit Indigenous practices of resource use and to deploy tightly controlled and extractive resource management agendas (Liboiron, 2021; Jennifer J. Silver et al., 2022; Vinyeta, 2021). Key to maintaining these feedbacks is knowledge hegemony; externally produced knowledges are not easily accepted or integrated unless resonant with (and not disruptive of) colonial-capitalist ideals (Silver et al., 2022). Disruption of these feedbacks is necessary for reimagining fisheries institutions.

In Chapter 4, I use feedbacks of colonialism and Western fisheries science in settler-colonial State management institutions to frame major frictions I identify in the interactions between HFS and DFO. Building upon the arguments and avenues to disrupt these feedbacks offered by Silver et al. (2022), I explore how Western and Indigenous knowledges and relationalities are employed in navigating frictions and, with attention to tensions, where this may illuminate possible avenues to more broadly reimagine fisheries institutions.

1.3 Case Context: (re)Negotiating governance of salmon management and rights to fish in Clayoquot Sound

The question of how to build "good" governance in fisheries in the context of dynamic, interrelated challenges is especially resonant in Clayoquot Sound. Indigenous assertion of fisheries rights, conservation concerns, industry interests, and contested management and governance authority between Indigenous and State actors all intersect, especially in the context of local wild salmon populations. Multiple Canadian and Indigenous actors are seeking ways of better managing salmon and salmon fisheries, concurrently to pursuing meaningful recognition and mobilization of Indigenous ways of knowing alongside Western ones. The emergent arrangement of governance and the local mobilization of Indigenous and Western scientific ways of knowing may serve strategic purposes in both advancing First Nations' paths towards self

determination and more broadly reimagining fisheries institutions which are better equipped to support the well-being of both ecosystems and of local communities.

Clayoquot Sound is a large (100km wide) coastal system on the central west coast of Vancouver Island (WCVI), bordered by Hesquiaht peninsula to the north and Esowista Peninsula to the south (Fig 1). The majority of the sound is comprised of remote, far reaching inlets and many islands. Its surrounding watersheds cover over 1,300 square miles of diverse land and ocean ecosystems including extensive coastal and montane temperate rainforests with intact old growth systems, rocky coastal shores, alpine peaks, and aquatic, estuarine, and marine systems (Braun, 2002; Murray & Burrows, 2017; *Clayoquot Sound*, 2021). Clayoquot Sound was designated as a UNESCO Biosphere Reserve in 2000 (*Clayoquot Sound*, 2021).

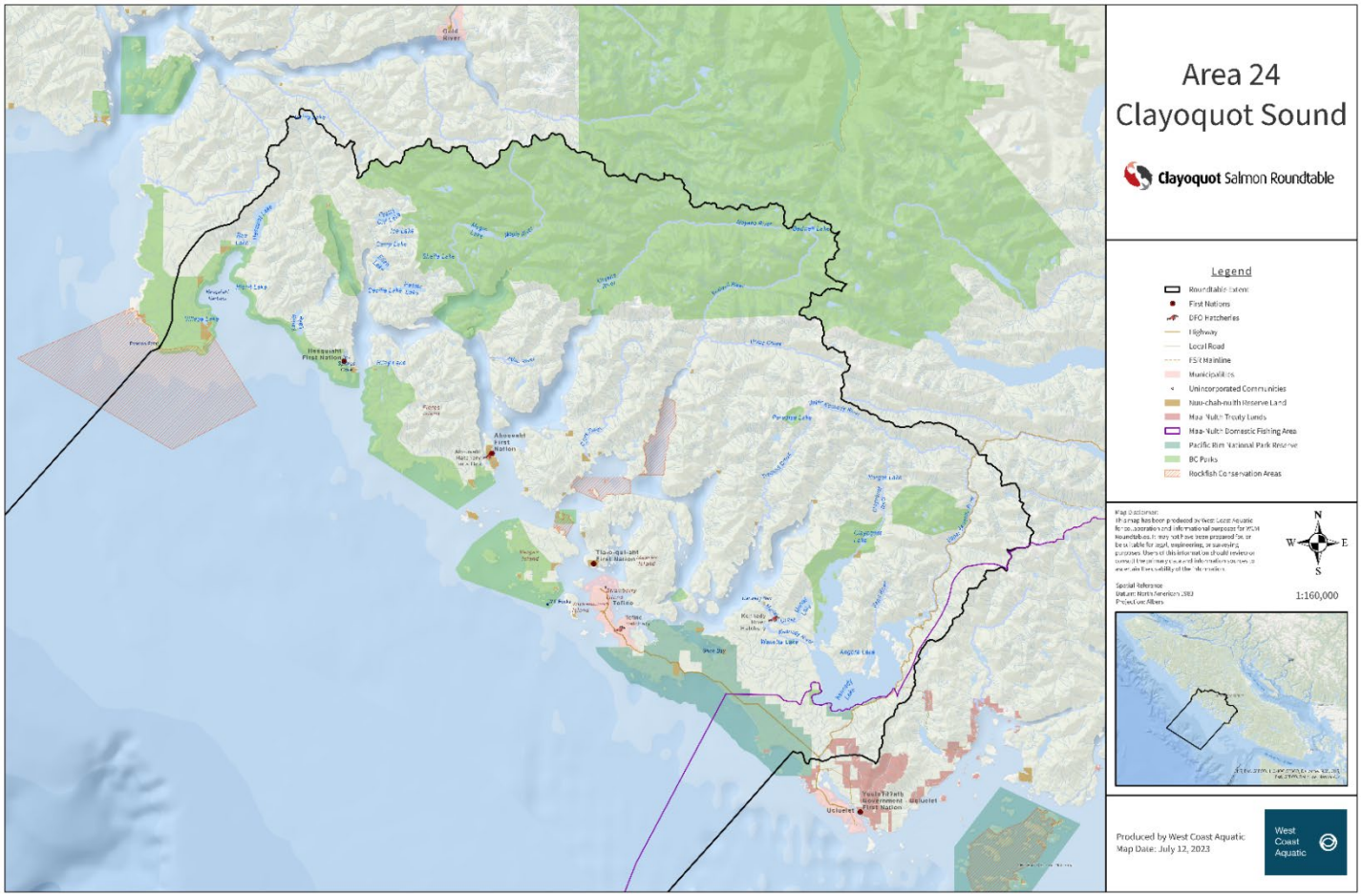

Figure 1: Map of Clayoquot Sound. Produced by Cassandra Middleton and Tim Hawkins. Shared with the permission of West Coast Aquatic.

Nuučaanułaṯḥ (Nuu-chah-nulth peoples) have lived on Vancouver Island for at least 4,000 and possibly over 9,000 years(Marshall, 1993; Horsefield & Kennedy, 2014). There are fifteen First Nations sharing the *nuučaanuł* language on Vancouver Island, fourteen of which are members of the Nuu-chah-nulth Tribal Council (NTC, 2023). The *ḥaḥaḥuuɬi* (traditional territories) of three Nuu-chah-nulth First Nations encompass Clayoquot Sound. The *ƛaʔuukʷ iʔaṯḥ* (Tla-o-qui-aht) First Nation's *ḥaḥuuɬi* (traditional territory) includes much of the southern portion and its watersheds (Figure 2). The primary Tla-o-qui-aht communities include Opitsaht on Meares Island and Esowista and Ty-histanis on the Esowista peninsula. 'Tla-o-qui-aht' and the name Clayoquot are anglicized versions of the same *Nuučaanuł* origin. The *ʕaḥuusʔaṯḥ* (Ahousaht) Nation's *ḥaḥuuɬi* includes much of the central portions of Clayoquot Sound and its islands and watersheds. The primary Ahousaht community is located on Flores Island. The *ħiʃkʷiːʔaṯħ* (Hesquiaht) First Nation's *ḥaḥuuɬi* includes the northern reaches of Clayoquot Sound, and is the most remote of the three Nations in Clayoquot. About one third of Clayoquot Sound's nearly 5,000 residents are *Nuučaanułaṯḥ* (*Clayoquot Sound*, 2021). The remaining are Canadian residents living in the town of Tofino, on the point of the Esowista peninsula, opposite and in sight of Ophitsat. Originally expanded as a logging and fishing community, Tofino is now an extremely popular destination for ecotourism, surfing, and sport fishing with over one million visitors annually (Horsefield & Kennedy, 2014; Murray & Burrows, 2017).

Figure 2: Map of the Tla-o-qui-aht *hahouthli* (traditional territory). From Tla-o-qui-at First Nations, 2008 (https://www.tla-o-qui-aht.org/territory).

The recent history of Clayoquot Sound includes large amounts of social and political conflict over resource extraction and First Nations' assertion of rights over resources in their *ḥaḥuuli.* From the 1870s through the 20th century, the area was targeted for private logging, mining, fishing, and salmon farming with the support of the Canadian government (Braun, 2002; George, 2003; Horsefield & Kennedy, 2014). Conflicts over logging, mining, and old growth protection escalated in the 1980s during the "War of the Woods" and a Tla-o-qui-aht initiated blockade against the MacMillan Bloedel logging company with the support of several Canadian and large international environmental groups to halt logging on Meares Island, which Tla-o-qui-aht declared as a Tribal Park (Murray & King, 2012; Horsefield & Kennedy, 2014; Murray & Burrows, 2017; Clapperton, 2019; Tindall, 2021, see Appendix A). Following a signed agreement between Tla-o-qui-aht and Canada in 1994, negotiations towards co-management and Nuu-chah-nulth direction over local logging activities reduced logging practices and eventually

included a transition of 51% of MacMillan Bloedel to Tla-o-qui-aht ownership (Goetze, 2005; Clapperton, 2019). Fisheries, fish farming, and conservation related concerns and conflicts have exist among Nuu-chah-nulth and Canadian actors concurrent to the logging and mining conflicts, having particularly escalated in the late 1990s and early 2000s with massive wealth erosion in WCVI fishing fleets and the steep decline of local wild salmon populations (Schwindt et al., 2003; Goetze, 2005; Butler, 2008; Henn, 2009). Following the logging conflicts, the development of multi-stakeholder advisory boards laid the groundwork for collective action between Nuu-chah-nulth and Canadian actors to influence local resource management and conservation efforts (George, 2003). The West Coast Aquatic (WCA) Governance Board was established to serve this purpose with specific attention to marine and aquatic fisheries and aquatic systems, later serving as a facilitator for local Salmon Roundtables across Vancouver Island, including Clayoquot Sound (WCA, 2023). Appendix A includes a detailed visual timeline of these events, which set precedence for local and federal recognition of Nuu-chah-nulth authority regarding the extent and type of resource extraction practiced within the Tla-o-qui-aht *ḥaḥuułi*, with support from allied environmental groups and Tofino community members and businesses.

In 2001, eleven Nuu-chah-nulth Nations sued Canada for the right to commercially fish. Five of these First Nations continued pursuing litigations in 2003, with an initial decision in their favor and several subsequent appeals to detail the right over the next two decades (Ahousaht et al. v. Canada, 2009, 2018, 2021; Mandell Pinder LLP, 2018; 2021). These five Nations include Tla-o-qui-aht, Ahousaht, Hesquiaht, Mowachaht/Muchalat, and Ehattesaht. Mowachaht /Muchalaht and Ehattesaht are located just to the north, in Nootka Sound. Their court defined fishing areas currently extend nine miles offshore from each of their respective *ḥaḥaḥuułi* (Figure 3). The Ahousaht et al. v. Canada court case was groundbreaking. Several court decisions elsewhere in Canada (e.g. R. v. Sparrow, 1990; R. v. Gladstone, 1993) had already contributed to affirming

Indigenous fishing rights and set some precedence for the initial decision, but the 2009 ruling was only the second to establish Indigenous rights to commercially sell fish outside of a treaty process and was the first to explicitly state that the right applies to any species of fish within a First Nation's territory (Ratcliff, n.d.).

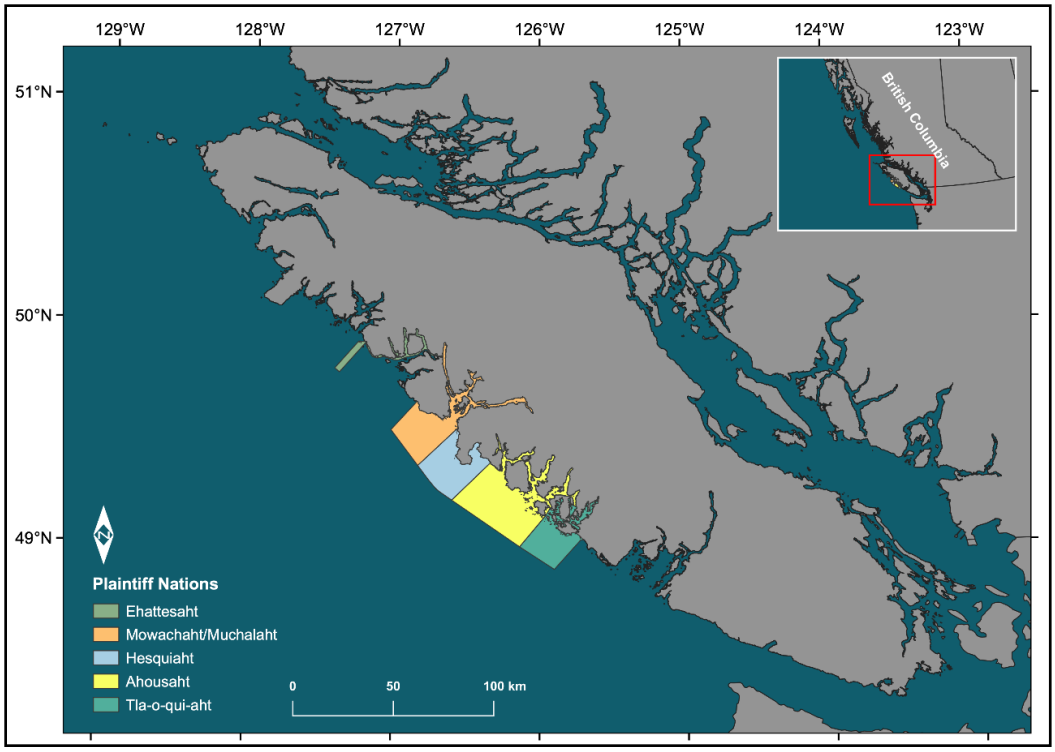

Figure 3: Court affirmed fishing areas of the five Nuu-chah-nulth First Nations.Figure produced by and shared with the permission of Jess Edwards and Ha'oom Fisheries Society.

Governance relations and the role of Indigenous and Western knowledges and authorities in managing Clayoquot Sound salmon began to rapidly transform as the five Nuu-chah-nulth Nations asserted their rights and authority, and as Canadian policy began to explicitly detail requirements to recognize Indigenous rights and knowledge in fishery management plans (Bill C-68). These relations continue to be highly dynamic. Efforts towards Nuu-chah-nulth self determination and resource sovereignty, meaningful recognition of Nuu-chah-nulth ways of

knowing alongside Western ones, and responses to overlapping salmon conservation and harvest concerns continue to intersect with unresolved conflicts of Indigenous and State authority.

1.3.1 *Hishukish-tsawalk*: Nuu-chah-nulth Reality and Relationality

Nuu-chah-nulth ways of knowing are specific to the *ḥaḥaḥuuɬi* (traditional territories) of Nuu-chah-nulth First Nations, including the lands, waters, and beings of Clayoquot Sound. Nuu-chah-nulth structures of governance, practices of decision-making and of harvest, approaches to relationships, and ways of learning and teaching are contextualized through specific understandings of reality and natural law. The Nuu-chah-nulth worldview is a relational one where fundamental understandings and values of interconnectedness are embodied through lived practices of learning, teaching, governing, and relating in line with *ḥaaḥuuɬism* (Table 1).

Ḥaaḥuuɬism is an understanding of reality (*qua,* "that which is") rooted in "balance and harmony forged of inherent polarity" where *ḥaa* and *ḥuu* are root terms reflecting all things as intimately and infinitely close and interconnected (*ḥaa*) as well as individually and infinitely separate (*ḥuu*) (Atleo, 2004). *Hishukish-tsa'walk* or "everything is one", is a phrase which invokes this understanding and places an emphasis on interconnectedness where balance and harmony through *tsa'walk* is maintained through relationships (Atleo, 2004, 2011; Cote, 2021; Milne, 2022). Relationships are a fundamental aspect of reality; they are *qua* and apply to all life forms, meaning all beings are inherently connected to others through relation. There are specific processes and rules for maintaining good relationships. Living by these methods are, in combination with *ḥaaḥuupa* (teachings, storytelling), how one practices and embodies *ḥaaḥuuɬism* (Atleo, 2004, 2011, Atleo, 2006).

Table 1: Key terms contextualizing Nuu-chah-nulth governance, especially regarding salmon and fisheries. Sources include *Hawilthpatak Nuu-chah-nulth* (1999), Atleo, 2004, 2011; Sam, 2013; Werle, 2014; Coté, 2022; Milne, 2022; and conversations with Tla-o-qui-aht knowledge holders *Autlieyu* (Francis Frank), Andrew Jackson, and *Seitcha* (Terry Dorward).

Nuu-chah-nulth term (alternate spellings)	**Anglicized pronunciation**	**Approximate definition and purpose in practice**
c'ac'aaɬuk	ts-acs-aa-tluk	"riverkeeper" or "streamkeeper;" a traditional role often held by a *ḥawiɬ* or *t'iquwiɬ* where responsibilities center on taking care of rivers and streams within the *haḥuuɬii* and the fish of those systems, including providing *ḥaẃiiḥ* with important knowledge for decision-making regarding harvest. Sometimes referred to as "traditional guardians."
čaapi̓	chapee	Pink Salmon
caʔinwa	tsa-een-wah	Gooseneck barnacle
ćiiƛ̓nuɬ	chee-n-ulth	Totem poles; more than symbols or spiritual tokens, *ćiiƛ̓nuɬ* teach natural law and provide a record of history and important stories (Milne, 2022)
cuẃit	su-wit	Coho salmon
haʔum	ha-oom	traditional foods
ḥaaḥuuɬism (hahuulism)	ha-huu-tlism	A practice and worldview grounded in "balance and harmony forged of inherent polarity," where *ḥaa* and *ḥuu* are root terms reflecting all things as intimately and infinitely close and interconnected (*ḥaa*) as well as individually and infinitely separate (*ḥuu*). All things, both physical and non-physical, influence each other even as they are distinct from each other. To practice *ḥaaḥuuɬism* is considered more than a process of learning or a set of beliefs; it is a way of being in the world and of knowing, and is among the embodied values of Nuu-chah-nulth governing practices.
ḥaḥuuɬi (hahouli, hahouthli)	ha-hoo-thlee	Traditional territory; land (and its resources) traditionally looked after by a *ḥawiɬ*. The plural form is *ḥahaḥuuɬi* (ha-ha-hoo-thli), referring to the collective territories of the *ḥaẃiiḥ*. Nuu-chah-nulth *hahaḥuuɬii* are along the west coast of Vancouver Island, from the Jordan River to the Brooks Peninsula to the north and extending westward from the mountains out several miles in to the ocean; *ḥaa* and *huu* are root terms.
ḥaaḥuupa (haahuupa)	ha-huup-a	Traditional "teachings" dictating a way of being and knowing reflective of and embodying the values of *ḥaaḥuuɬism. Haa* and *ḥuu* are root terms.

ḥaaḥuupstaƛ (haahuupstalth)	ha-huup-staltl	"Teaching one another;" whereby teaching is an important relational practice, *Ḥa* and *ḥuu* are root terms.
hakum	ha-kuum	Women of high rank who may be of counsel to *ḥawiiḥ* and are important knowledge keepers, historians, and guides directing following of protocol.
hamipšiƛ (hamipsiv)	ha-mip-shtil	To recognize, to practice recognition in an intentional and relational way, of others and of the self. To practice *hamipsiv* is an important part of practicing *ḥaaḥuuƚism*, and is among the principles or embodied values of Nuu-chah-nulth governing practices.
hasaamac	Ha-saam-ac	crab
ḥawiƚ (ha'wilt)	ha-wilth	Chief, or "wealthy one" where wealth is both material and spiritual, and where the traditional role of chief in accordance with wealth is hereditary or familial. The responsibilities of a *ḥawiƚ* inclde maintaining the wellness of the *musčim* and their relationship to the *hahuuƚi*.
ḥawiiḥ (ha'wiih)	ha-wilth-ah	Plural of *ḥawiƚ*, and in reference to the collective group of hereditary chiefs for a Nation, or for the collective 14 Nuu-chah-nulth First Nations in the current political body of the Nuu-chah-nulth Tribal Council (NTC). The NTC and each individual First Nations' Chief and Council are parallel electoral governing structures developed following the Indian Act (1876) and remain the officially recognized tribal government by Canada. Each Nation has a distinct way of navigating this dual – governance structure and enacting the authority of the *ḥawiih.*
himwica	him-wits-a	Storytelling; A key practice in knowledge sharing, passing on of lessons, ceremony, formal decision-making, and enacting *ḥaaḥuupa*
hinḵuuʔas	hin-kuu-ahs	Dog salmon / Chum salmon
hishukish-tsa'walk	hish-nu-kish tsa-waak	Roughly translates to "Everything is one," where *tsa'walk* is akin to "oneness." This phrase directly refers to the understanding that all things are deeply and inseparably interconnected even as they are individual.
huupiiƚ'aƛ (huupiistalth)	huup-eest-ahltl	"Helping one another;" an important aspect of appropriately embodying and living *ḥaaḥuuƚism* with the understanding that each individual life has a role in supporting others through reciprocal relationships, which are *qua* - inherent to reality.
ʔiisaak (iisʔiak', isaak)	ees-ak	Sacred respect, respect for all beings. The way respect is understood is based upon the assumption that all life forms have purpose, and is connected to a "natural law to have integrity of being" and Nuu-chah-nulth understanding of continuity, mutuality, or harmony (Atleo 2004, 2011). To practice *ʔiisaak* and apply these understandings of continuity is an important part of practicing *ḥaaḥuuƚism*, is among the principles or embodied values of Nuu-chah-nulth governing practices, and informs Nuu-chah-nulth perspectives regarding co-management and co-governance.

iisʔakstaƛ (isaakstalth)	ees-ak-staltl	"Respecting one another," where the notion of respect is rooted in *ʔiisaak*
ƛ'aakoo (klecko, kleco)	kleck-oh	"Thank you." Often said twice when used, as in "Kleco Kleco".
łilimakƛi	thli-thli-mak-tli	prawn
miʕaat	me-aht	Sockeye salmon
musčim	muus-cheem	The people who make up the community.
Nuučaaʔnuł (nuu-chah-nulth)	nuu-chah-nulth	"all along the mountains and the sea;" with the suffix *-atḥ* (pronounced alth and meaning "people of"), *Nuučaanułatḥ* means "people who are from all along the mountains and the sea." Nuu-chah-nulth is now used to refer to the Indigenous peoples of the west coast of Vancouver island who share the Nuu-chah-nulth language and are part of the formally recognized Nuu-chah-nulth First Nations, of which there are 14 individual Nations.
omeek	oh-meek	"good fisherman" where "good" refers to skill and knowledge but also to appropriate and responsible practice through attending to *ʔiisaak, uuałuk, yaʔakstaƛ,* and ceremony and protocols as in *ʔuusumc*
p̓uuʔi	puu-wii	halibut
qua	koo-a	"that which is;" A includes all dimensions of reality and of realities beyond confinement to single empirical and physical domain. When enacted as a root for other words or phrases, implies the inherent reality accepted of those concepts where they are fundamental or inarguable.
quuʔas	koo-as	Originally referred to any life form, today typically used to mean "human." The root word is *qua*.
qwuuasasa is	koo-asa-sa is	A phrase of multiple meanings, such as "that is just their way, the way they are" or in reference to characteristic behavior. It is also invoked to imply recognition of others, and recognition that intent or purpose is not always evident to others. "Others" in this sense extends to non-human beings. Implied in this phrase is also a recognition of agency and of "democratic consent." Through understanding reality as "characterized by purposeful diversity" (Atleo 2011), *qwuuasasa is* emphasizes the importance of individual expression and of mutual consent within a set of communally recognized norms. Consent is therefore an important principle of governance and of building and maintaining governing relations with rules and norms agreed upon through a process of consensus and enforced through protocols. The root word is *qua*.
suuḥaa	soo-haa	Spring salmon / King salmon / Chinook salmon / Tyee salmon
t'aaq'wiihak	taak-we-haak	Fishing, with permission granted by the *ḥaw'il*

t'ayiii ḥawiɬ	tyee ha-wilth	Highest ranking chief
t'ayiiiʔas	tyee-ahs	Highest ranking female chief
t'iquwiɬ	ti-ku-wilth	Advisors to the *ḥawiiḥ* with specialized knowledge and expertise; typically a hereditary position given to a family member with the most understanding of Nuu-chah-nulth government and governing principles.
titiiccu	ti-teach-tsu	The life principle within a person
tsa'walk	tsa-waak	One, as in wholeness, unity, balance, or harmony. *Tsawalk* is described and maintained through relationships and interrelationships, which are *qua*.
tuškuuḥ	toosh-kooh	Lingcod
uuaɬuk (uuathluk, uu-a-thluk)	ooh-ah-tluk	"taking care of" or "looking after" in a way reflective of stewardship but attentive to relational nature of care, where the community, the self, and the land or resources are participants of relation, and where care of fish and rivers (or other species and systems) is an obligatory reciprocal act because those species and systems in turn enact *uuathluk* of people through the provision of food, medicine, shelter, tools, and teaching as in *ḥaaḥuupa*.
ʔušuu	oo-oo-tsuh	"To be prepared"
ʔuusumc (uusmich, oosmich)	oos-mic	Typically translated as "vision quest" but also connected to terms meaning "to be careful." Among the findings of *ʔuusumc* is the notion that "all life forms require the development of protocols if balance and harmony are to be achieved" (Atleo 2011), or that formal and sacred protocols are necessary to the maintenance and practice of *tsawalk.* As such, protocols are a necessary part of embodied practice in line with *ḥaaḥuuɬism.* "Protocol" in this sense is used in a way similar to the western concept of a legally binding contract between signees. They are co-developed agreements which serve to set expectations and responsibilities between individuals or groups, define appropriate behavior and ways of interacting to uphold and enforce *hamipšiƛ* and *iisʔak'*, and determine methods of accountability and consequences for those who break protocol. A breaking of protocol damages or may even end the relationship. Protocols are thus an extremely important tool of governance, and for building and maintaining governing relations. As with other dimensions of Nuu-chah-nulth law and embodied practice, enacting protocol extends to relation with the more than human, such as the formalized responsibilities for appropriately enacting *uuaɬuk* and *ʔiisaak* with regards to salmon.

Relationships require *hamipšiƛ* (intentional and reflexive practices of recognition), *ʔiisaak* (sacred respect with universal assumption of value and purpose), mutual consent, mutually developed and enforced protocols (akin to binding contracts[1]), and reciprocal practices of care and support (Atleo 2004, 2011). These ideas are enacted through "living the values" and inform legal order (Milne, 2022). For example, *ʔiisaak* is not simply the concept of 'respect' or a principle qualifying a relational position; it is a method of recognition and of practicing care, with the acknowledgement that actions affect others through inherent interconnectedness (*tsawalk*) with the assumption that all life forms have purpose (Atleo, 2004, 2011; Milne, 2022; F.Frank, personal communications, 2021,2022). There are many ways to practice *ʔiisaak.* It is tightly tied to practices of *hamipsiv* and of *uuathluk* ("taking care of") (Atleo, 2004; Milne, 2022).

Atleo (2011, p 81) explains that ways of living and enacting Nuu-chah-nulth relationality apply across formalities and everyday practices: "In principle there is no distinction between what is practiced formally during ceremonial feasts and what was practiced informally every day." *Uuathluk* extends to care for the self, for the family, and to other life forms and so informs Nuu-chah-nulth approaches to interpersonal relations, governing obligations, and priorities of resource stewardship, including fisheries management. Reciprocal relationships with salmon are of especially high importance; salmon offer themselves as food in exchange for the people's celebration by public ritual and for the care and guardianship of the rivers (George, 2003; Atleo, 2011; Coté, 2022). Salmon are kin, and *ḥaaḥuupa* (stories and traditional teachings) emphasize their role as sacred knowledge holders (Atleo, 2011; Coté 2021). Traditional 'guardians' such as

[1] According to *Autlieyu* (Francis Frank, Tla-o-qui-aht), 'protocols' are more than a standardized approach or directive for action. They are mutually obligatory agreements to dictate relationship and in application are closer to the Western concept of a legally binding contract. Breaking a protocol is akin to breaking a contract and has consequences which may include penalizing sanctions and termination of the mutual relationship (Francis Frank, personal communications, 2022).

c'ac'aaɬuk (riverkeepers) are responsible for knowing and caring for steam systems and the fish within them, and have specific obligations with regards to salmon.

These practices and relational understandings of responsibilities for maintaining relationships are dictated by "natural law" and extend to roles, structures, and processes of Nuu-chah-nulth governance (Table 1, Appendix A). The *ḥaẃiiḥ* (hereditary chiefs), with *hakum* (high ranking women) and advised by *t'iquwiɬ* (appointed knowledge holders) are responsible for maintaining the wellness of the *musčim* (people of the community) and their relationship to the *hahuuɬi* (traditional territories) (Sam, 2013). *C'ac'aaɬuk* practice *uuathluk* within their responsibilities and also play an advisory role to *ḥaẃiiḥ* with this expertise. The relationship between a *hawiɬ* and *hahuuɬi* is a responsibility given by the creator, *n'ass* (Uu-a-thluk, 2008; Sam, 2013; Milne, 2022). As explained by *ḥaẃiiḥ Wickanninish* (Cliff Atleo, Sr., Ahousaht) and *Maquinna* (Ahousaht), the position of a *ḥaẃiiḥ* are spiritual rather than political, though the *ḥaẃiiḥ* themselves are not spiritual, and their position is not about political transitions but rather upholding relationship to the *hahuuɬi* according to Nuu-chah-nulth lived values and natural law (Milne, personal communications, 2023).

"Resource," "stewardship," and "management" are not Nuu-chah-nulth concepts, and do not fully represent Nuu-chah-nulth values and practices towards relating to and caring for others, including maintaining relationships with life forms who provide food, medicine, tools, and more in their own roles in relationship to humans (George, 2003; Atleo, 2011; Cote, 2022; E. Angel, personal communications, 2021). These terms, along with ideas like "sustainability" are Western concepts with epistemological parallels to Nuu-chah-nulth values and relationality, but assumptions regarding reality and the ways to enact and practice 'good management' do not encompass the same meanings as *uuathluk* and other concepts (Atleo, 2011; J. Martin, personal

communications, 2019, 2021). They can, however, serve as ways of making Nuu-chah-nulth practices legible to Western resource management and government structures.

Equivocating the Nuu-chah-nulth and Western understandings of 'protocol' or drawing a direct parallel between *ʔiisaak* and the Western notion of 'respect' are simplified "epistemic translations" which "neglect the reality of Nuu-chah-nulth lived values and does not contribute to projects of renewal"(Milne, 2022). As with the importance of noting that concepts of 'relation' are not exactly analogous between Indigenous and Western theories, Nuu-chah-nulth and Canadian actors' approaches to rules and ethics of being, knowing, or governing are not directly translatable, and so actor relations that engage in one are distinct from ones that engage with the other, or ones that engage with both. Table 1 provides an extended list of important terms in Nuu-chah-nulth ways of understanding and of teaching reality and particularly to practices of governing in the context of fisheries. Milne (2022) details a more in-depth discussion of *ḥaaḥuupa*, fisheries, and regeneration in the Tla-o-qui-aht context with discussion of *hishukish-tsa'walk*, *ʔiisaak,* and *uuathluk*, among other embodied values and practices.

1.3.2 Salmon on West Coast Vancouver Island

The question of what "good" fisheries governance might look like in Clayoqout Sound given these dynamic complexities can be illuminated through salmon. Salmon connect nearly all of the ecosystems of the sound; their life histories begin and end in rivers and streams, while the majority of their life is spent in the ocean, where they migrate over international boundaries (Wilson & Halupka, 1995; Schnute & Sibert, 1983). They nutritionally support many species in forests, aquatic, and marine systems, and are impacted by logging, mining, development, pollution, climate change, and fishing (Atlas et al., 2021; Earth Economics, 2021). They are deeply entangled in a multiplicity of environmental, social, and economic systems, and their multiple values within each illuminate interconnectivities of these systems, often with highly

political implications (Reid et al., 2022; Swanson, 2019; Atlas et al., 2021). This is not unique to WCVI; these dynamics of salmon entanglement are prominent from northern California through Alaska, and are mirrored in parallel systems with other salmon species in the Atlantic and western Pacific (Atlas et al., 2021; Carothers et al., 2021; Earth Economics, 2021; Mustonen & Feodoroff, 2018a; Reid et al., 2022)

There are five species of salmon (*Oncorhynchus spp*.) native to BC waters: *miʕaat* (Sockeye), *suuḥaa* (Chinook or King), *cuẃit* (Coho), *čaapi̓* (Pink), and *hinḵuuʔas* (Chum). Salmon, especially *miʕaat* and *suuḥaa* and *cuẃit*, are integral to the well-being of Nuu-chah-nulth First Nations (George, 2003; Atleo, 2011; Bingham et al., 2021; Earth Economics, 2021; Coté 2022). They are highly economically valued across many Canadian, US, and Indigenous fisheries (Schwindt, 2003; Price et al., 2017; DFO, 2018). Declines in salmon populations across BC caused extreme concern in the 1990s, reaching their lowest recorded levels in 1999 (Grafton & Nelson, 2005). Despite fleet reductions, fishery closures, and hatchery propagation for population enhancement, most populations have not recovered; particularly many local stocks of *miʕaat* and *suuḥaa* and *cuẃit* (Price et al., 2017). In recent years, Canadian and Nuu-chah-nulth estimate some populations of wild *suuḥaa* and *cuẃit* native to the watersheds of Clayoquot Sound have had returning numbers in the single digits (DFO, 2019a, 2019b, 2020d; A. Jackson, personal communications, 2021). Causes of their decline and the failure of many populations to recover are multifaceted, and no single type of conservation or habitat restoration effort has been sufficient on its own. Management of salmon is complicated by the species' entangled natures, and by uncertainties and information gaps related to a limited ability to survey spawning locations in remote stream systems, differentiate wild from hatchery fish, identify spawning origins of wild fish, prevent genetic introgression through enhancement efforts, among other challenges (Price et al., 2017; Bingham et al., 2021). Large amounts of DFO funding have been directed to research,

conservation, protection, and monitoring of wild salmon and salmon fisheries, which remains a high priority in DFO policies (DFO, 2016, 2018b, 2021c).

Many actors in Clayoquot Sound have interest in and/or rights to harvesting, restoring, conserving, or otherwise managing salmon. In addition to Nuu-chah-nulth and Canadian community members, commercial fishers, and recreational or sport fishers, a large number of environmental NGOs concerned with salmon research and restoration are based in or have offices in Tofino. Many have overlapping concerns and priorities but are typically responsible to differing and often conflicting (Indigenous vs Canadian) governing authorities and may operate from differing though not incompatible (Indigenous and Canadian) worldviews. Through Nuu-chah-nulth concepts of relation, salmon are not a 'valued traditional resource' so much as a living being with whom a kin relationship is shared as an inherent truth through the salmons' integral role in the wellbeing of many life forms including people (Atleo, 2011; Coté 2022). Most existing fishing efforts in the area by Nuu-chah-nulth and Canadian sectors target hatchery-produced fish and ocean or offshore populations passing by on their way to other river systems in order to protect wild terminal stocks.

1.3.2.1 Canadian management of BC Salmon Fisheries

Fisheries and Oceans Canada is Canada's federal fisheries management organization. It was established in 1868 under the initial Fisheries Act as the Department of Marine and Fisheries, later restructured as Canada's Department of Fisheries and Oceans (DFO), and is currently popularly referred to as DFO. Under Canada's Fisheries Act (1985), DFO manages the harvest and protection of marine fisheries resources. DFO implements limits on commercial, recreational, FSC, and Aboriginal fishing allocations in their fishery management plans, and works to oversee all monitoring efforts of BC salmon fisheries.

Federally managed BC salmon fisheries and the coast-wide establishment of salmon canneries began in the 1870s and rapidly accelerated through industrial expansion during the first World War and in to the 1930s (Newell, 1993; Harris, 2001; see Appendix A). At the same time, Indigenous peoples were systematically removed from salmon fisheries except as deckhands or in canneries, which became a particularly important area of employment and social connection for Nuu-chah-nulth women (Newell, 1993; Harris, 2001; Menzies et al., 2007). By the 1950s, the BC salmon fishery was among BC's most valuable industries. As conventional fisheries science developed in the 1960s, it became integrated in to most Western management practices, including through Canada's 1968 Davis Plan, 1985 revised Fisheries Act, and the 1984 Canadian – US Pacific Salmon Treaty. BC Salmon fisheries transitioned to a limited access licensing structure assessed largely through landing size and value and the application of market-based management (Pinkerton, 1999; Haas et al., 2016; Schnute & Sibert, 1983; Atlas et al., 2020).

First Nations FSC fisheries were granted priority in 1990 following R. v. Sparrow. The 1992 Aboriginal Fisheries Strategy and the 1999 Salmon Allocation Policy dictated terms of Indigenous access and ownership of commercial licenses under Canadian monitoring, though with the declining fishery opportunities were and remain limited. Restrictive policies and multiple license buybacks implemented by Fisheries and Oceans Canada (DFO) between 1996 and 2012 in response to massive salmon declines drastically reduced the Canadian salmon fishing fleet in an effort to protect remaining populations and reduce the overcapacity of the Canadian salmon fishery (Pinkerton, 1999; Muse, 1999; James et al., 2004; Grafton & Nelson, 2005; Haas et al., 2016; see Appendix A). Consequences included substantial wealth erosion across BC salmon fisheries, an increasingly corporatized centralized fleet, and the coast-wide degradation of dockside fishing infrastructure and closures of salmon canneries (James et al., 2004; Grafton & Nelson, 2005; Haas et al., 2016). Concerned stakeholders, especially Canadian owner-operator

commercial fishermen who were getting squeezed out of the fishery, developed vocal advocacy groups, and in parts of WCVI Nuu-chah-nulth and Canadian fishers were and remain allied in their frustrations with DFO management. Through more recent policies, such as the 2016 revised Fishery Act (Bill C-68), DFO's fishery management prioritizes a more integrative ecosystem – based approach and, at least on paper, is supposed to incorporate local and Indigenous rights, interests, and knowledges.

1.3.3 Colonial Legacies in Clayoquot Sound

Nuu-chah-nulth peoples were first approached by Spanish explorers in 1774 and again by British explorers in 1778 in Nootka Sound, just north of Clayoquot (Arima, 1983). Nootka Sound became the center of dispute between Spain and Britain into the 1790s until Spain agreed to abandon its claims (Arima, 1983; Marshall, 1993). Mowachaht Chief Maquinna took advantage of Nootka Sound's popularity to regulate competition between Spain and Britain, and in the following years Nuu-chah-nulth Nations increasingly traded with the British and Americans, though not always amicably[2](Arima, 1983; Marshall, 1993). The area was highly valued by Settlers for its rich resources. The first trading settlement in Clayoquot Sound was established in 1855, and by 1900 the increasing numbers of homesteads of British Canadian settlers and assimilationist federal policies forced Nuu-chah-nulth communities on to government created reserves and was actively stripping away traditional practices, community structures, and access to resources (Horsefield & Kennedy, 2014; Marshall, 1993). The 1876 *Indian Act* banned traditional Nuu-chah-nulth governance, replacing it with Canadian designed band councils. By 1894, ceremonial practices including potlatches were banned, Indigenous implemented

[2] Mowachaht, led by Maquinna, captured and killed the crew of an American trading ship in 1803, keeping two as slaves, and Tla-o-qui-aht destroyed a British trading ship in Clayoquot Sound in 1811 in response to insult by the ship's captain(Arima, 1983).

commercial fishing was outlawed, traditional fishing practices and other forms of harvest were increasingly criminalized, and attendance of residential schools through the Indian Residential School (IRS) system[3] was mandatory for First Nations children (TRC, 2015; see Appendix A).

Colonial legacies are ever present in Clayoquot Sound. The name of the town Tofino comes from a Spanish navy commander who named Tofino Inlet to honor another Spanish Captain (Thorburn, 2018). The Church of England funded the area's first church in 1913; it remains a prominent building in the middle of Tofino. The visible discrepancy of wealth and wellbeing between Tofino and the neighboring Tla-o-quiaht communities is a lasting legacy of the dispossession of resources and land, and the systemic intergenerational traumas inflicted through the IRS and other genocidal tools. Most of the Nuu-chah-nulth individuals referenced in this dissertation have family members who were placed in the residential schools, and several were enrolled themselves as children.

The IRS intersected with prohibitive policies regarding traditional practices to dispossess First Nations from resources including traditional foods and the ability to make a livelihood through harvesting. Reconciliation and renewal projects explicitly acknowledge these intersecting processes, including in efforts towards rights of commercial access and self management in fisheries. Rights to access for various nations were slowly acknowledged and defined on Canadian terms over series of court decisions, treaties, and Indigenous organizing efforts and activism. Appendix A includes a timeline of these events, among others, which created the

[3] The IRS system was a system of boarding schools specifically designed for isolating Indigenous children from their families, languages, and traditional practices and assimilating them in to Canadian culture and Christianity. Residential schools were in place in Canada from 1831 through the late 1900s (TRC, 2015). They were modeled after the parallel U.S. system as a partnered effort between government and Christian churches, imitating military structures and run primarily by church organizations who implemented corporal punishment as a primary disciplinary measure (TRC, 2015). Physical and sexual abuse were exceedingly common. Conditions led to malnutrition, starvation, epidemic disease, and the deaths of an estimated 6,000 children (TRC, 2015, Mosby, 2021). The intergenerational trauma inflicted through residential schools is directly linked to the disproportionate rates of PTSD, depression, alcoholism and addiction, diabetes and other diseases, and suicide in First Nations communities (TRC, 2015; Coté, 2022). The last residential school in Canada closed in 1997.

present colonial legacies, socio-political dynamics, BC salmon fisheries structures, and the legislative precedents contextualizing the ongoing dynamics of Nuu-chah-nulth assertion of fishing rights and resource sovereignty in Clayoquot Sound.

1.3.5 Five Nuu-chah-nulth Nations' Rights Assertion and Reconciliation

In 2003, thirteen Nuu-chah-nulth Nations filed to sue Canada for recognition of aboriginal rights to fish within their *ḥaḥaḥuuɬi* and to commercially sell that fish (Ahousaht et al. v. Canada, 2009). The initial filing was dismissed, and several Nations pursued alternate treaty routes to acquire aboriginal commercial fishing access. Five Nuu-chah-nulth First Nations including Tla-o-qui-aht First Nation, Ahousaht Nation, Hesquiaht First Nation, Mowachaht – Muchalaht First Nations, and Ehattesaht First Nation continued the suit in 2007, which went all the way to the B.C. Supreme Court. In 2009, Justice Garson released her decision affirming the right in *Ahousaht Indian Band and Nation v. Canada,* BCSC 1494. Canada appealed multiple times. The BC Court of appeals twice affirmed the right, and in 2014 the right was made final and protected under the Canadian constitution by the Canadian Federal Supreme Court (Mandell Pinder LLP, 2021). The court acknowledged that the five Nations have rights to co-manage a multi-species commercial fishery in their *ḥaḥaḥuuɬi*, and mandated that Fisheries and Oceans Canada work with the five Nations to negotiate the terms of co-management (Ahousaht et al. v. Canada, 2009). In the Nations' understanding, the right grants the five Nations sovereignty over fish and fishing in their territory which they are "willing to share" with Canada on negotiated terms (F. Frank and C. Atleo, personal communications). Negotiations were generally tense and often antagonistic, breaking down repeatedly. DFO refused to adopt the fishing plans developed by the Nations, instead detailing terms of access through DFO management plans. The Nations returned to court, asserting that Canada had not made sufficient accommodations and done nothing to implement the right.

From 2015-2017, a series of "Justification Trials" took place in which DFO was charged with proving that their policies, management plans, and actions did not *unjustifiably* infringe on the Nation's rights (Mandell Pinder LLP., 2018). In 2018, Justice Humphries determined that Canada unjustifiably infringed on the Nation's rights and engaged in negotiations in bad faith, requiring that DFO return to negotiations and allowing either party to return to litigation if an agreement was not reached in two years' time (Ahousaht et al. v. Canada, 2018). Humphries' decision also further defined qualifiers which narrowed the right based on vessel size and fishing capacity limitations and lowered the Nations' fisheries' constitutional priority for some species. The five Nations appealed. A final unanimous decision from the BCCA ruled in favor of the five Nations in 2021, determining that Humphries had erred by limiting the right and inferring circumstantial priority (Ahousaht et al. v. Canada, 2021). From this decision, boat size qualifiers were removed, the entirety of the commercial right was provided priority second only to conservation and FSC or Treaty needs, and the courts recognized that fisheries had always been of "great economic importance" to Nuu-chah-nulth Nations. Confident that the 2021 decision affirmed that DFO could not implement unilateral decisions or direct their fishery, the Nations opted to assert their right in the summer of 2021 by implementing *T'aaq-wiihak* when DFO initiated a coast-wide closure of all salmon fisheries (Plummer, 2021). The assertion was costly but reinforced the Nation's intent to implement their own management plans and require bi-lateral decision-making for co-management of the resource with Canada. DFO and the five Nations' team of lead negotiators returned to negotiations in spring 2022.

Concurrently to the final court proceeding and ongoing negotiations, the five Nations are engaged in a parallel reconciliation process with Canada. The Nations and Canada's Department of Justice have worked towards a Reconciliation Agreement for Fisheries Resources (RAFR) through Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), with interim

agreements since 2019. These interim agreements have informed the most recent set of negotiations regarding co-management, as DFO is required to abide by decisions in the reconciliation process and neither party wishes to return to court.

1.3.5.1 Building a Rights-Based Fisheries Institution

The Five Nations' communities were eager to immediately access their fishing rights following the initial 2009 court decision by implementing *T'aaq-wiihak* (a Nuu-chah-nulth word meaning "fishing with permission of the chiefs") with fishing and management plans for key species developed by the Nations (T'aaq-wiihak, 2022). T'aaq-wiihak Fisheries was developed in 2014 to support the process of implementing the court affirmed fishing rights of the Five Nations. It was a limited and temporary structure implemented concurrently to efforts to build a management organization and support expansion of the Nation's fishing capacity so that Nuu-chah-nulth fishers could access their rights to fish and sell their catch. There was no prior existing institution to fill this role. T'aaq-wiihak was initially described as a "demonstration fishery," or an opportunity for the Five Nations to *demonstrate* their ability to manage a for-sale fishery while the Nation's rights were still being defined through negotiations and court appeals (T'aaq-wiihak, 2022). The demonstration fishery was granted with the permission and oversight by DFO. The five Nations did not see this as fulfillment of the right, which would allow them to self govern their fisheries and co-manage with rather than under DFO. However, without a completed negotiation agreement and with funding dependence on DFO, the demonstration fishery structure remained the de facto structure for several years.

In 2020, the growing management and implementation institution of T'aaq-wiihak was incorporated as Ha'oom Fisheries Society (HFS). HFS is the current fisheries management institution of the Five Nations. HFS is not a Canadian institution responsible to the Fishery Minister's authority, but rather a parallel structure to Fisheries and Oceans Canada, and is

responsible to the Five Nations' governing authorities. Authority over decision-making and management remains contested between the Nations and Fisheries and Oceans Canada.

HFS is an intermediate structure for coordinated communication with Canada and for capacity expansion and infrastructure development. It is also an evolving structure meant to develop a new institution for fishery management that reflects Nuu-chah-nulth priorities for pursuing self determination in resource governance and long term management of a productive multispecies Indigenous fishery. It is responsible for supporting the traditional knowledge and authority of the Nations and their leaderships in management of the fisheries, and collaborating with DFO staff on management and monitoring where appropriate. In accordance with *hishukish tsawalk*, *iisaak,* and *uu-a-thluk*, it is also in the scope of HFS's mission and Strategic Plan to attend to the health and productivity of the fished populations and habitats (HFS, 2022). From the Five Nations' perspectives, HFS is not meant to be a permanent institution. According to the Ha'oom mission statement as well as its Board of Directors and the five Nations' team of lead negotiators, HFS is an interim structure for coordinating the decision making, management actions, and negotiations necessary to implement the court affirmed rights and monitor the T'aaq-wiihak fishery until the five Nations' individual governing authorities and managing bodies are able to build capacity and network to collectively co-govern (HFS, 2022; personal communications 2021-2022).

1.3.5.2 Co-governance and co-management as defined by the five Nations

Co-governance and co-management can take a variety of forms with variable arrangements of power sharing and authority. In the case of the Five Nations' rights-based fishery, there are multiple governing authorities: those of each of the individual Five Nations, the collective governing authority of all fourteen Nuu-chah-nulth First Nations, and Canada's governing institutions. Individual Nations and the collective Nuu-chah-nulth First Nations have

various dual governing structures between their *ḥaw̓iiḥ* and their elected Chief and Councils. The *ḥaw̓iiḥ* are considered by a First Nation as sovereign and inherent, and their role is to maintain relationship to the *hahuuli* (Uu-a-thluk, 2008; Milne, 2022). Band or Tribal Councils serve an administrative and political role, and remain the formally recognized governing authority by Canada. Co-governance arrangements ensure both council and *ḥaw̓iiḥ* objectives are attained and adhere to *tsawak*, *iisaak*, and *uuatluk*. This shared recognition of individual but interconnected responsibilities and respective authority, where Canadian political structures serve specific purposes but Nuu-chah-nulth structures retain sovereignty over resource and territory relationships presents a blueprint for the five Nation's understanding of co—governance.

HFS provides an interim structure for coordinating the decision making necessary to implement and monitor the fisheries until the five Nation's rights are fully realized and their individual governing authorities and managing bodies have capacity to collectively co-govern and co-manage. Governance responsibilities and power regarding fishery decisions are shared across the Five Nations through a process of consensus based decision making through the HFS board of directors. The board is comprised of two representatives from each of the Five Nations, appointed by their respective communities and accountable to the interests of their *ḥaw̓iiḥ*. The board members express that in their view, to appropriately implement the Five Nations' rights, this internal co-governance structure should *laterally* extend to shared power in co-governance with Canada, making HFS and DFO collaborators in co-management. Co-governance in this sense is not yet realized. For HFS and the Five Nations, strategic management of salmon and coastal systems is deeply tied to moving towards a more fully realized co-governance between Canada and the Nations' sovereign *ḥaw̓iiḥ*, where tools and practices from Nuu-chah-nulth and Western ways of knowing support regeneration of relationship to the *hahuuli* and renewal of Nuu-chah-nulth fisheries .

1.3.5.3 More than Fish: Sovereignty and Regeneration

The Five Nations' assertion of fishing rights represents more than a claim to an economic opportunity. Fisheries are important in that they contribute to multiple avenues of renewal and regeneration beyond economic community support. Recentering traditional foods such as salmon in dietary practice is important to addressing the disproportionate rates of illness and disease in Indigenous communities (Coté, 2022) In addition to providing nutrition and food security, fishing is one of the many actions that is a part of practicing relationship to salmon and to *ḥaḥuułi,* and practices of preparing , eating, and sharing salmon are an important part of embodying relationships in community (Atleo, 2004; Coté, 2022; Milne, 2022; T. Dorward, personal communications, 2021). In her book *A Drum in One Hand, a Sockeye in Another, Ċišaaʔatḥ* (Tseshaht) scholar Charlotte Coté (2022) explains:

> "My people, the Nuu-chah-nulth, are restoring respectful and meaningful relationships with our environment that are situated within the concept of food sovereignty. We are actively engaging in decolonization and sustainable self determination through reinstatement of authority over our *ḥaḥuułi*, ancestral territory, and through strategies and policies aimed at the sustainable food production and consumption of traditional foods through ecologically sound food systems. Our Nuu-chah-nulth communities … [understand] we must honor the wisdom and values of ancestral knowledge in maintaining responsible and respectful relationships with the natural world; therefore these efforts are grounded in Nuu-chah-nulth philosophies of *hishukis cawaak*, everything is interconnected, *uuałuk*, to take care of, and *ʔiisaak*, to be respectful."

Fisheries regeneration is among the many projects of renewal pursued by Tla-o-qui-aht and other Nuu-chah-nulth Nations. Parallel efforts include language regeneration, building tribal parks, dveloping strategic external alliances, renewing ceremonial practices and teachings in line with *ḥaaḥuułism*(Nuu-chah-nulth worldview), among others. These efforts all contribute towards Tla-o-qui-aht's pursuit of self determination and an active process of decolonization on Nuu-chah-nulth terms, especially through regeneration of traditional governance structures and

renewal of relationships of the *ḥawi̓iḥ* (hereditary chiefs) and *hakum* (high ranking women) to their *ḥaḥuuƚi* (Milne, 2022).

1.4 Overview of the Research Methodology

This work was developed through a long term research partnership with Tla-o-qui-aht First Nations (TFN) and Ha'oom Fisheries Society (HFS). The project methods were informed through placed-based approaches and reflections in critical geography (Howitt et al., 2009; Coombes et al., 2014; Johnston et al., 2016), institutional ethnography and archival review (Smith, 2009; Ventresca & Mohr 2017), and Indigenous informed relational practice (Kovach, 2009, 2016; Smith, 2012). My methods and the broader project were developed with permission and direction by the Tla-o-qui-aht Traditional Resource Council, Tla-o-qui-aht Chief and Council, and by Ha'oom's Board of Directors, representing the interest of the five Nations.

Seitcha (Terry Dorward) and Dr. Saul Milne served as key facilitators and liaisons throughout the research scoping, design, and implementation and directed me in appropriate pathways of relationship building and partnership development. *Seitcha* is from the Seitcher family and of the house of Tla-o-qui-aht's *taayii* (Head Chief) *Haayuʔiiḥ* (Ray Seitcher). He is the Tla-o-qui-aht Tribal Parks coordinator and through 2022 coordinated the Tla-o-qui-aht Traditional Resource Council. He is a founding member of the Native Youth Movement and the West Coast Warriors Society, which are Indigenous rights activist groups. Dr. Milne is from the Coast Salish community of *Xwchíyò:m.* Saul has worked as a research partner to Tla-o-qui-aht and as a strategic advisor to Ha'oom and the five Nations for several years. Through April 2022, Dr. Milne was also a doctoral student partnered with TFN and HFS. Our doctoral research advisor, Dr. Grant Murray, holds a long standing research relationship with Tla-o-qui-aht.

Our broader approach to the research methods and tools of data collection and analysis is informed by a relational approach to collaborative partnership and knowledge production (Kovach, 2009, 2016; Whyte, 2013; Coombes et al., 2014) and recognizes of the inseparability of action and praxis (Freire, 1970), with goals prioritizing Nuu-chah-nulth partners' interests and needs over immediate academic output and impact. This dissertation is one of several products of the broader project (see Appendix B).

I approach the research questions and methods in this dissertation through a plural approach to the concept of 'relationship.' I discuss relations in the sense of the literal interactions and negotiations between actors as entry points for analysis, in the recognition of inherent interconnections and entanglements in the case study, and with respect to Indigenous and particularly Nuu-chah-nulth theories and practices of relationship as a reference for both method and interpretation. Despite this layered use of relation, the focus on human actors in this dissertation is a relatively narrow lens. Implicit in this context are human-salmon and other human-non human relationships which are both intentional and also inherent in the ecological context, and which play a non-insignificant role in facilitating relationships between human actors. As relationship is an inherent truth of reality in Indigenous perspectives, I approach relationship as the initial and primary point of analytical attention and as the root from which a governance arrangement emerges. I consider the performance of interactions between actors with Indigenous concepts of relation and pluralism in mind.

A Nuu-chah-nulth understanding of relationality and appropriate means of relation likely influences actor relationships in Clayoqout Sound, so approaching an analysis of governance in Clayoquot Sound must be informed through Indigenous notions of relationality and Indigenous perspectives of knowledge production and governing structures. Relational and plural practice is embedded in my research partnership with Nuu-chah-nulth collaborators. Pluralism as

methodology was not an initial priority but emerged as a product of iterative adjustments through co- learning and through co-developing shared verbiage with my collaborators to communicate the work in Western contexts while retaining accuracy to Nuu-chah-nulth particularities.

1.4.1 Project Development

I began scoping a potential research partnership with TFN in July 2018 and with HFS in April 2019. At the time, HFS was not yet incorporated and was operating as T'aaq-wiihak Fisheries. The scoping process was initiated by Dr. Murray, and supported by *Seitcha* and Dr. Milne. We began without an expectation that this project would inform my doctoral dissertation work; we were open to the possibility that TFN would determine my interests and skills did not align with their research needs, or that my involvement would be limited to assistance with ongoing or shorter term applied projects. The Tla-o-qui-aht Traditional Resource Council (TRC) and administrative leadership of T'aaq-wiihak expressed interest in developing a project supportive of Nuu-chah-nulth knowledge mobilization and the institutional development of the five Nations' fisheries.

Over the course of two years of relationship building, we co-developed goals, methods, and a protocol for the project informing this dissertation. Scoping included three in-person visits to Tofino, to build the research plans with the support of the TFN TRC, TFN administrative leadership, and Ha'oom Fisheries Society. Scoping visits ranged from 10 days to three weeks in August 2018, April 2019, and November 2019. The TFN TRC conditionally approved the project protocol in November 2019 pending Duke institutional ethics review, which was completed in May 2020 (IRB permit # 2020-0518) after making methodological adjustments to delay long term in-person work due to *COVID-19*. The TFN TRC provided a letter of support for the adjusted protocol in May 2020. Relationship building and research protocol co-development with HFS continued through remote communication over the following year, and the HFS Board of

Directors finalized approval of a protocol detailing terms of a reciprocal partnership with the five Nations in May 2021. During the two year scoping process, I assisted in Dr. Murray and Dr. Milne in the completion of a related project, EPIC4[4] (Koop et al., 2021), which allowed me to learn necessary background context and build a working relationship with TFN resource managers. The scoping work and assistance in the EPIC4 project substantially informed Chapter 3 and the questions asked and themes prioritized in Chapter 2.

1.4.2 Methods Implementation

I conducted a systematic literature review to address RQ1, presented in Chapter 2. With the assistance of a Masters student, I developed a standardized search string to collect academic literature from three databases. We used Colandr (Cheng et al., 2018) to sort literature returned from the initial search, Excel to extract and organize data from all accepted texts, and R (R Core Team, 2016) to analyze extracted data. We selected a subsample of key texts for in-depth review using a grounded theory approach to qualitative thematic analysis in NVivo 14 (Lumivero, 2020).

I addressed RQ2-4 using place-based methods practiced through reflexive and relational principles of research, especially ones specific to Nuu-chah-nulth practices directed by my collaborators and coauthors throughout the research. Methods included archival review, informal interviews, semi-structured interviews, observational and reflective journaling, and participatory observations of decision-making and management practices. Data informing chapters 3,4, and 5 included copies of meeting records, fishery reports, management plans, and recorded negotiations between Ha'oom, TFN, and DFO, observations of negotiations, planning meetings, fishery assessment and monitoring, and other interactions between rightsholders and governance groups,

[4] EPIC4 (Enhanced Production in Coho: Culture, Community, Catch) was a multi-institutional research project, funded from outside of the Tla-o-qui-aht community, seeking to address challenges in Coho salmon conservation and management through genomics. Dr. Milne, Dr. Murray, and I contributed to a section of EPIC4 focused on First Nations' knowledge mobilization and project impacts to community well-being.

and semi-structured interviews with representatives from each relevant rightsholder and governance group. Due to COVID-19, the long term fieldwork and in-person collaborations planned for 2020 and the first eight months of 2021 were transitioned to remote engagement. During this time, I collected text based data and observed virtual meetings held by HFS and WCA. I also worked closely with Terry Dorward, Dr. Milne, TFN Natural Recource Manager Sayachapsis Masso, and TFN Aboriginal Fishery Manager Andrew Jackson on completion of the EPIC4 project summary report, production of a TFN decision-making support tool, and co-authorship and publication of Chapter 3.

I conducted in-person fieldwork over the course of three trips to Tofino in September – November 2021, April – June 2022, and August 2022. During these trips, I conducted 28 semi-structured interviews with Tla-o-qui-aht fishers and resource managers, Tla-o-qui-aht leadership representatives, WCA and DFO staff, and representatives from multiple local stakeholders including ENGOs and other fishing sectors. Three of these interviews were unrecorded for interviewees who were open to conversation with my note taking, but not to recording. Many individuals I interviewed hold multiple relevant local roles in both organization leadership and fishery participation, and in some cases governmental leadership, especially within the five Nations including Tla-o-qui-aht. I also recorded written notes of many extended conversations with individuals beyond the recorded interviewees. Participant observation during these trips was largely focused on HFS operations and meetings between actors. I spent over 200 hours sitting in on day-to day operations at the HFS main office and conversing with HFS staff regarding governance and management of the Five Nations Fishery and HFS partnerships with other management, research, and conservation organizations. I attended 22 fishery offloads in the spring and summer of 2023 to observe monitoring procedures and converse with fishers and

dockside monitors. I also joined HFS staff members on three community outreach events and two days of scientific monitoring of habitat and species.

Participant observation extended to meeting spaces for decision making, negotiations, and knowledge sharing amongst local actors. All meetings proceeded virtually between April 2020 and August 2021 due to COVID, and all following meetings were structured for hybrid remote and in person attendance. I attended all HFS meetings in-person while in the field, and remotely during COVID and between and after fieldwork trips, for a total of 14 Board of Director meetings, 6 Lead Negotiator meetings, one negotiation meeting with DFO, and 23 other administrative meetings including ones where HFS staff met with DFO staff, with research and monitoring partners at other organizations, or with the five Nations' fishery managers, fishers, or Fisher Steering Committee to coordinate management actions and communicate to fishery participants. Ha'oom provided copies of meeting presentations internal communication documents, fishery management plans, and a summary of their communications with DFO.

With permission from West Coast Aquatic and roundtable participants, I also observed Clayoquot Salmon Roundtable (CSRT) meetings, where representatives of over 24 stakeholder groups and three rightsholding First Nations (Tla-o-qui-aht, Ahousaht, and Hesquiaht First Nations) coordinate action related to conservation, restoration, research, and harvest of local salmon populations. Between spring 2019 and spring 2023, I sat in on 8 main CSRT meetings and 3 CSRT working group or risk assessment meetings to observe actor communications and relations, knowledge sharing, action coordination, and informal decision making between actors. I attended 7 of these meetings virtually due to COVID-19 restrictions or because of mismatched timing between fieldwork and CSRT scheduling. I was allowed to review all text and visual materials shared in all meetings I attended, as well as all publically available meeting records and management reports from CSRT participants.

My primary method of analysis was iterative triangulation of observations, texts, and information gathered through the multiple sources of data. Data analysis also included thematic, narrative, and discourse analysis methods with NVivo 14 software (Limovero, 2020), I iteratively collected and analyzed data from May 2020 to February 2023, including during in-person fieldwork and through virtual communications during COVID-19 and in between and after fieldwork trips. In the final months of the partnership, I worked remotely to finish analysis and develop the remaining academic outputs, with regular communication with project partners and key collaborators to iteratively review the progress. I conducted a final trip to return project deliverables and receive approval of the draft dissertation and all other relevant research products from TFN and HFS in May 2023.

1.4.3 Working in good relation and reciprocity

Working in good relation is a priority of my Nuu-chah-nulth collaborators in its embodiment of *tsawalk* and *ʔiisaak* (see Table 1). I was guided by *Seitcha*, Dr.Milne, and by many other individuals at TFN and HFS in contextualizing the research presented here through relational practice defined through co-developed protocols, which has influenced how I have conducted the work and then analyzed, understood, and presented the story. At all stages of the project, I deferred to TFN and HFS leaderships regarding appropriate ways of engaging including spaces I was allowed to access, people I should learn from, information I am allowed to share, and our respective responsibilities and methods of accountability for maintaining good relationship. We also centered mutual benefit in project plans; our co-developed protocols prioritized goals that would benefit my research partners distinct from and concurrently to my benefit gained through the research experience, learning, and production of academic products furthering my own education and career. Throughout this research, I produced several other documents and administrative or communication tools with and for Tla-o-qui-aht and Ha'oom,

listed in Appendix B. This dissertation is also produced with the intent to return benefit to Tla-o-qui-aht and the communities of Clayoquot Sound and to limit the amount of knowledge and labor extracted through the research process, where TFN and HFS retain intellectual ownership of portions of the data they provided and of other products from this research. Our protocols directed methods of accountability, where I provided regular updates to TFN and HFS leaderships and ensured that they had opportunities to review, provide feedback, and approve any relevant published works coming from this project. In closing this project following the completion of this dissertation and related publications, we do not end our relationship; I will remain available to TFN and HFS to support continued related work.

1.5 Overview of the Dissertation Structure

The chapters of this dissertation can be read as individual pieces of work. However, they each contribute important insights regarding strategies for Indigenous knowledge mobilization and rights implementation in fisheries with evolving governance relations and power dynamics. As a collective whole, they present reflections on necessary deconstructions and reimaginings in Western approaches to fisheries management. Chapters 2 – 4 follow a manuscript format, where Introduction, Methodology, Results, and Discussion sections structure the narrative. As such, there is some overlap in these chapters regarding case context and theoretical framing. Chapter 5 is closer to a monograph style, so as to and to place the critical discussion in conversation with reflections relevant to the previous chapters. This “hybrid” format provides space for presenting the narrative as story, where even as chapters can be read independently they also build upon each other. Read sequentially and collectively, they produce a greater whole. Story is an important practice of teaching through embodied Nuu-chah-nulth values.

The first chapter, this Introduction, presents a summary of the research approach and the broad thematic framing for the overall thesis. It provides important background context regarding the case study and relevant to multiple chapters, including important guiding Nuuh-chah-nulth principles, the Five Nations' past and ongoing process of rights assertion, and the broader issues of continued impacts of colonial legacies on fisheries and First Nations' fishing communities.

Chapter 2 presents a comprehensive review of academic literature regarding global efforts to bridge, "integrate," or otherwise mobilize Indigenous knowledges with Western science in fisheries governance and management. This chapter reflects on gaps and limitations in State implemented and Western scientific led "integration" efforts and loosely defined approaches to 'participation,' and identifies strategic priorities for knowledge coproduction and mobilization which contextualize and are further explored through the following chapters through the notions of plurality and co-governance.

Chapters 3, 4, and 5 bring the attention of the reader from a global perspective to a focus on Clayoquot Sound and the Tla-o-qui-aht *hahouthli*. These chapters focus on different actors and dynamics, at differing but intersecting scales, to weave multiple avenues of inquiry through various contextual and situated entry points to explore reflections regarding pluralisms and relationalities of knowledge and governance in complexly entangled issues of fishery management, salmon conservation and restoration, Indigenous rights assertion and implementation, and decolonization.

Chapter 3 explores knowledge pluralisms which are already in place in many Indigenous contexts provide robust models of effective management, where Tla-o-qui-aht First Nation is the case example. Nuu-chah-nulth lived values are contextualized in Tla-o-qui-aht decision-making and management regarding salmon and salmon habitat. I discuss Tla-o-qui-aht First Nation's structures of decision-making, management, and monitoring for salmon, which are attentive to

Western and Indigenous produced sciences as well as traditional Nuu-chah-nulth ways of knowing and practices of resource guardianship. Chapter 3 demonstrates Tla-o-qui-aht's ability to self-govern and self-manage and also the advantages of a locally defined and developed plural and collaborative approach to knowledges under Indigenous leadership that differs from most structures of Western fisheries management practices. A manuscript version of Chapter 3 was published in *Marine Policy* in April 2021.

Chapter 4 shifts the focus beyond Tla-o-qui-aht to the multiple rightsholders, stakeholders, and other actors in the case context. I use multiple interwoven threads of inquiry to "map" and analyze the emergent governance arrangement concerning salmon in Clayoquot Sound, where salmon conservation, restoration, harvest across multiple commercial recreational sectors and home use fisheries, and first Nations' rights assertion are interconnected issues. Fisheries governance is one entangled component of the broader governance structure and the relationships between actors play important roles in this entanglement. I consider the Clayoquot Sound Salmon Roundtable a key "action arena" to explore how knowledges are mobilized and decision-making and management responsibilities are locally negotiated through relational approaches to partnership, particularly those reflective on Nuu-chah-nulth philosophies and lived practices of relationality. This chapter connects the previous reflections on knowledge pluralisms to the notion of entanglements and pluralisms in governance. It also offers discussion regarding power sharing and Indigenous leadership in participatory approaches, echoing recommendations in Chapter 2. Chapter 4 illustrates the utility and the tensions in weaving together Western and Indigenous frameworks of governance, knowledge, and relation to better understand resource governance issues in contexts with both Indigenous rightsholders and State institutions.

With the reflections from the previous chapters in mind, Chapter 5 focuses on Ha'oom Fisheries Society and the five Nations' interactions with Canada and DFO. The relatively novel

position of HFS as a Federally recognized institution implementing a judicially affirmed Constitutional right but responsible to Indigenous authority provides an interesting story of institution development, but also an entry point to consider systemic issues of knowledge hegemony and colonialism in State fisheries institutions that create barriers to co-governance and full realization of the right. I present the frictions between HFS, the five Nations and DFO which emphasize feedbacks between colonialism and Western Fisheries Science, and a need for a reimagining of fisheries institutions more broadly. I consider the five Nations' and HFS's strategic navigation of these frictions in the context of potential strategies to disrupt those feedbacks. Though these strategies present some tensions, they also support a broader discussion considering a possible reimagining of fisheries institutions through pluralisms and relational, decentralized structures of knowledge coproduction and management practice fit to the community context (here, through Indigenous co-governance). This chapter brings the earlier reflections on pluralisms and relationalities to a conversation regarding the ways in which mobilization of Indigenous and Western scientific ways of knowing may serve strategic purposes in both advancing First Nations' paths towards self determination and more broadly reimagining fisheries institutions which are better equipped to support the well-being of both ecosystems and of local communities.

A final Conclusion chapter connects the threads of the chapters together to underscore the primary arguments of the dissertation, based upon findings from the work and which the five Nations' story exemplifies. Collectively, the chapters demonstrate that Indigenous leadership and plural, situated recognition of Indigenous ways of knowing and governing are imperative for efforts to better recognize multiple ways of knowing in the management of fisheries, and this requires a fundamentally relational and anticolonial reimagining of fisheries institutions.

2. Participation and Power: Critically Reviewing Efforts to "Integrate" Scientific and Indigenous Knowledges in Fishery Governance and Management

2.i Authorship note

This chapter presents a literature review which is the product of a collaborative effort. While I lead all stages of the work, many colleagues assisted in the development and completion of this review. Dana Grieco, Dr. David Gill, and Dr. Lisa Campbell provided references in early stages for the design of the text search, sorting, and data extraction methods. Sage Riddick assisted in the literature sorting and data extraction steps. Dr. Andrea Reid provided support and recommendations in developing the framing of this chapter. Dr. Grant Murray provided feedback in development of the draft text, with additional support from Dr. Campbell. The pronoun "we" is used for the first-person voice in this chapter to reflect the collaborative nature of this effort.

2.1 Introduction

Indigenous and traditional ecological knowledges[5] are receiving growing attention from academic and scientific researchers and practitioners in environmental conservation and management. Western scientific research, management, and governance systems increasingly recognize the potential for multiple benefits of considering, incorporating, bridging, pairing, or otherwise "integrating" (Nadasdy 1999) Traditional Ecological Knowledges (TEK) or Indigenous Knowledges (IK) with Western Scientific Knowledge (WSK) research and technologies. Generally, anticipated benefits include better informed, more effective, and adaptive environmental management, especially in the face of complex environmental challenges (Bethel

[5] We pluralize knowledges here in recognition of the wide diversity of different ways of knowing that are widely varied and are contextually specific, environmentally and culturally embedded, intergenerational and relational in nature, fundamentally inseparable from their knowledge keepers, and cannot be singularly defined as one body of knowledge (Howitt et al., 2009; Whyte, 2013; Reid et al., 2020).

et al., 2011; Davies et al., 2020; DREW, 2005; Fernandez-Gimenez et al., 2006; Matuk et al., 2020; McElwee et al., 2020; Menzies, 2006; Weiss et al., 2013). Beyond practical arguments for the utility of knowledge integration, recognition of TEK/IK is also important to equitable rights-based resource governance (Reid et al. 2020). The importance has been recognized at the international level, including through the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), among others (UN General Assembly, 2007; Poto et al., 2021). However, frameworks to appropriately and meaningfully recognize TEK/IK in practice without subjugating Indigenous ways of knowing within hegemonic Western strategies of governance that perpetuate harmful power imbalances are lacking, especially in fisheries (Nadasdy, 1999: Latulippe, 2014; Reid et al., 2020; Poto et al., 2022)

Calls for knowledge integration in resource management, especially fisheries, often provide little specificity of what the processes of integration actually can or should look like, including how knowledges are conceptualized, what the intended and realized outcomes of integration efforts are, or what challenges and successful strategies have been encountered. The broad purpose of this paper is to critically review existing published research on the integration of TEK / IK and WSK within fisheries governance and management, and to provide insight to guide current and future efforts.

TEK and IK are variably defined across fields of environmental scholarship, with academic roots in sustainable development literature (Agrawal, 1995; Berkes, 2012). Critiques or nuances offered by many Indigenous authors challenge a dichotomous view of TEK/IK and WSK and the marginalizing effects of Western-defined knowledge systems (Whyte 2013, TallBear 2014, Todd 2018, Reid 2020). The concept of "integration" itself is further challenged by Indigenous scholars (Arsenault et al., 2019; Nicole Latulippe, 2015; Muller, 2012; Reid et al., 2020) and others (Agrawal, 1995; Fernandez-Gimenez et al., 2006; Baker & Constant, 2020;

Bingham et al., 2021). Integration, along with phrases like inclusion or incorporation, often refer to processes of assimilation where Indigenous ways of knowing are fit into and subjugated by Western governance or management programs that hold on to a hierarchy of knowledge that places Western Scientific Knowledge (WSK) above all other epistemologies (Nadasdy 1999, Baker 2020, Reid et al 2020). Non – Western knowledge holders are disempowered and their knowledges lose dimensions of meaning and may be misapplied in such contexts. Specifically, "integration" efforts that seek to identify and catalogue TEK/IK as a data source for WSK management systems without meaningfully recognizing the contextualizing knowledge system or the agency and rights of knowledge holders risk reifying colonially produced knowledge hegemonies (Simpson 2007; Whyte 2013, 2018; Todd, 2018).

In this review, we use the word *integration* in order to engage with the academic discourses regarding the coproduction, mobilization, and application of TEK/IK and WSK, but we are mindful of the implications of this language. Knowledge co-production and more pluralistic approaches to knowledge mobilization and co-governance such as the M'kmaw framework of Two Eyed Seeing or the Haudenosaunee *Kaswentha* (Two-Row Wampum Treaty belt) are alternate framings to Western "integration" efforts, with increasing recognition in the fisheries world (Latulippe 2015; Reid et al 2020; Bingham et al. 2021; Almack et al., 2023). Broadly, "integration" efforts driven by external interests and implemented within hegemonic frameworks can perpetuate harmful legacies of extractive research on Indigenous communities and knowledges (Smith, 2012), while more plural, relational, reflexive approaches alternately support Indigenous empowerment and expansion of equitable and adaptive co-governance (Latulippe 2015), so it is worthwhile to critically consider the treatment of knowledge and "integration" frameworks in the reviewed literature.

Interest in WSK - TEK/IK knowledge 'integration' in fisheries is growing, but the overall body of available reference literature is small compared to terrestrial resource domains. The majority of works addressing integration of TEK/IK and Western science and technology tend to focus on terrestrial resources and land management or marine spatial planning (Armitage et al., 2011; Mantyka-Pringle et al., 2017; McElwee et al., 2020; Molnár et al., 2020). No comprehensive review exists to identify the key takeaways from this literature regarding what efforts to integrate TEK / IK and WSK specifically within fisheries can or should look like. Explicit attention to governance in land-sea systems (including fisheries) is lacking, and 'accessing' knowledge is listed as a key challenge in such governance structures (Pittman & Armitage, 2016). We therefore specifically focus on knowledge "integration" in the governance and management of fisheries.

We focus on fisheries because they are complex resource systems with challenges that overlap with and are also distinct from those of terrestrial resource systems and marine spatial planning interventions. Extractive histories in multiple Western resource regimes influenced by colonial development, industrialization, and neoliberal globalization apply to fisheries (Wolfe, 2006; Silver, 2013; Pinkerton & Davis, 2015; Pinkerton, 2017; Whyte, 2017, 2018; Todd, 2018; Liboiron, 2021; Silver et al., 2022). The literal fluidity and multidimensionality of marine systems, where species are mobile and even elusive across distance and depth and are tightly connected to a multiscale of incompletely understood ecosystems, produce distinct challenges to management ill suited to the models of classic Western resource management (Berkes 2003; Olsn et al. 2004). Globally, state and international fisheries management policy tends to be rooted in WSK and designed for the management of single species, industrial scale fisheries even though over 80% of the world's motorized fishing fleet consists of small vessels under 12m in length operating in small-scale, multispecies fisheries (FAO, 2020). Such small-scale fisheries produce

over half of the world's fish catch, upwards of 90% of which is consumed locally, and are often central to the wellbeing of Indigenous coastal communities through livelihood, food security and nutrition, and cultural practice (Jentoft et al., 2019; FAO, 2020; Arthur et al., 2021). These systems are integral to the worldviews, knowledge systems, and governance regimes of coastal Indigenous cultures. In acknowledging Fisheries Sciences' colonial and neoliberal origins, as well as Western institutional limitations to access, study, know, and moderate marine systems for fish harvest, a reformation of fisheries governance and management with appropriate recognition of Indigenous ways of knowing and governing necessitates a comprehensive reflection on lessons learned from institutional failure.

As the already wide array of strategies and methodologies to bridge knowledge systems grows, we should be attentive to whether those strategies are in fact effective in supporting successful 'integration' efforts or appropriate in navigating challenges to mobilizing multiple ways of knowing in fisheries without reproducing colonial hegemonies and associated negative social, political, and environmental impacts. Geography of authorship, authors' field of study, and Indigenous representation in research partnerships and manuscript authorship is also worth attention in this review; issues of knowledge hegemonies and Indigenous subjugation through knowledge "integration" are reproduced in the academy and compounded in colonial or "parachute" science (Kuokkanen, 2007; Coombes, 2014; Nelson & McGregor, 2014; Belhabib, 2021; Singeo & Ferguson, 2023). A critical reflection on authorship, frameworks, strategies, and efficacy much less suitability of current approaches to WSK - IK/TEK 'integration' from within academia is timely, as calls grow for academia to recon with its Eurocentric scholarship traditions and its colonial and imperialist roots (Nelson & McGregor, 2014; Aiyad, 2021; Chaudhury & Colla, 2020).

In this review of primary peer-reviewed published literature published between 2000-2020, we assess the current state of academic literature on Indigenous and Western scientific knowledge "integration" in fishery governance and management. Following an initial assessment of the literature's dominant authorship characteristics and geographical focus, our review is broadly guided by the following questions:

1. How are TEK/IK and WSK defined and their mobilization conceptualized?

2. What are the primary objectives or motivations for knowledge "integration" efforts in fisheries, and how do they compare to the outcomes of such efforts?

3. What does 'successful' knowledge "integration" look like, i.e. how is success defined?

4. What barriers, challenges, or beneficial strategies exist for facilitating 'successful' knowledge integration?

We then critically consider the results of this review, informed especially by Indigenous scholarship regarding methodological and institutional reflection on the engagement of the academic environmental sciences with TEK/IK and Indigenous peoples. We end with a suggestion of four priorities for practitioners and researchers seeking to effectively and appropriately mobilize multiple knowledge systems in fisheries governance and management. Ultimately, we aim to critically reflect on the information gathered through the review to answer the above research questions, and consider guiding perspectives to inform ongoing and future efforts to build fisheries governance and management through multiple ways of knowing.

2.2 Methods

We conducted a review of academic literature considering the role of Indigenous knowledges and their integration with Western science and technology into the governance and management of fisheries. We structured the review through two tiers of analysis to allow for both

a broad, comprehensive review of the authorship and geography of relevant literatures and a targeted, in-depth qualitative review of selected papers that best fit the target and research questions of the review. All articles accepted through an initial systematic search of the literature were analyzed for the purpose of describing the broader body of literature, and a subsection of relevant articles were selected using a comprehensive protocol for in-depth qualitative analysis. Search strings were developed and search results captured in November 2020. Literature sorting and data extraction was completed in June 2021. Analysis in R and in Nvivo were conducted iteratively and concurrently in 2022.

2.2.1 Literature Search

Following Pittman and Armitage (2016) and Ban and Frid (2018) we utilized a search string of key terms to collect papers which we sorted and reviewed according to standardized selection criteria and analysis methods informed by review objectives. We organized our search criteria into five categories: Population, Intervention, Strategy, Outcome, and Qualifier, referred to in the rest of this paper as PISOQ (Table 2). This strategy is informed by the PICO/PICOS literature review strategies (Livoreil et al., 2017; Methley et al., 2014; see Appendix C). We developed the search string to reflect the PISOQ search criteria by testing iterations of the search string using various keywords and index terms (e.g. fishery governance, Indigenous knowledge, knowledge integration) to reflect the topic of the review and include synonyms or variants of key terms (e.g. coast, inshore, or marine) and exclude terms that were overly broad or non-specific (e.g. stakeholder). The final search string is available in Appendix C. Testing iterations of the search string helped to improve search sensitivity (capturing of more potentially relevant articles) and specificity (capturing of fewer irrelevant articles). A small selection of relevant articles that were already familiar to us were used as a proxy test for sensitivity; an appropriate search string would capture these articles. Specificity was improved by adjusting iterations of the search string

to return fewer numbers of results without failing the baseline test for sensitivity, until adjustments stopped resulting in substantial changes to the number of results.

Table 2: Specific qualifying descriptors within the Population, Intervention, Strategy, Outcome, and Qualifier (PISOQ) categories. This PISOQ framework was used to inform the development of search strings and guide decisions to accept or reject literature during the two-stage sorting process.

Population	Intervention	Strategy	Outcome	Qualifier
Texts must address coastal, marine, or inshore fisheries	Texts must address structures and processes of fishery governance and management	Texts must consider knowledge integration strategies (or comparable framings such as 'bridging', 'mobilizing' , 'including', or 'combining' multiple knowledges)	Texts must consider how outcomes relate to (impact or are impacted by) knowledge integration efforts	All texts must consider Indigenous or Traditional Ecological knowledges (TEK/IK) in the integration strategy

We searched for literature in SCOPUS, Web of Science, and three ProQuest Central databases: Agricultural & Environmental Science Collection, the Earth, Atmospheric & Aquatic Science Database, and the Social Science Database. We selected these databases to ensure breadth of the search across multiple fields, capturing work within both natural and social sciences and within topic-specific journals. The final search string returned 379 results from SCOPUS, 414 results from Web of Science, and 257 results from the ProQuest databases. All papers returned were published before we ran the final search in November 2020. The citation information and abstracts of all results were exported into EndNote, which was used to search for and eliminate duplicates. After eliminating duplicates, there were a total of 584 texts. We then uploaded these results into Colandr (Cheng et al., 2018), which we used to sort the texts and remove irrelevant or inappropriate results.

2.2.2 Literature Sort

We divided sorting in Colandr into two levels; first by title and abstract, and then by full text. In each sort, we used the PISOQ structure to determine the relevancy of each paper to the project. Texts were removed at the title and abstract level if they clearly did not match the PISOQ categories. Texts that were unclear at the title and abstract level (e.g. discussed marine management and Indigenous knowledge in the abstract and may or may not focus or discuss fisheries within the greater text) were included in the first round of sorting. We also used the PISOQ categories to guide the secondary sort in which we reviewed the full text of all papers accepted in the first round. Using the full text sort, we accepted all relevant papers for data extraction for a meta-analysis of the state of the literature. During this step, we also identified a subset of accepted articles as key texts for an in-depth, qualitative analysis. Key texts were identified by reading the full text of each article and determining its relevance to answering the research questions using a standardized protocol of ten considerations regarding the purpose, scope, and discussion of the paper. In all steps of the sort (title/abstract, full text, and key text selection), all decisions were reviewed independently by two researchers briefed on the sorting protocols. When a text presented a conflicting decision, the sorters conferred with each other directly to come to an informed agreement regarding the final decision.

We identified 145 papers as relevant through the title and abstract stage. Of these, we confirmed 72 articles met the inclusion criteria after full text review. We included all 72 in a primarily quantitative meta-analysis of the state of the literature, and selected 29 as key texts for in-depth qualitative review.

2.2.3 Analysis

We divided the literature review into two stages of data extraction and analysis. First, we conducted data extraction concurrently to the full text review. For all accepted papers, we recorded bibliographic information, field of study, definitions of knowledge types, paper type, study methodology, the geography of authorship, and for case studies the geography, fishery, and Indigenous community of focus. We also noted which papers were selected for in-depth qualitative review. This information was extracted while reading each accepted text in full, and recorded using Excel. Bibliographic information and reason for rejection was also recorded for any rejected articles during the full text review. The extracted literature metadata of accepted articles was then analyzed using R, with coding partially informed by a similar review analysis (Grieco et al., 2022).

Authorship information was collected using the listed institutional affiliations on each publication and, when possible, a short web search of publicly available professional profiles (via institutional affiliations, ResearchGate, etc) to affirm the first authors' institutional affiliation, primary field(s) of study, geographic location, and whether they self-identify as an Indigenous person. Some authorship may be misrepresented if they did not self-identify as Indigenous in their public professional and academic profiles. For various reasons including respect of privacy, we did not directly reach out to individual authors or seek external validation of identity.

Key texts selected for qualitative review were imported into NVivo 12 Pro. These were analyzed using thematic coding developed through a grounded theory approach (Bazely, 2013; Creswell & Poth, 2018). We first developed an initial list of anticipated thematic categories to code for in selected texts, broadly organized according to the four guiding research questions. During analysis, these themes were adjusted and through emergent coding and inductive analytical approach to data interpretation (Creswell & Poth, 2018), we developed secondary and

tertiary coding terms to categorize and describe the detailed content of broader themes. Table 3 provides a condensed list of the resulting coding groups that organized the more detailed analysis. This approach allowed us to describe how the literature conceptualizes different ways of knowing and determines "success" in knowledge integration efforts. Our coding structure also allowed us to compare common motivations to realized outcomes of knowledge integration. In analyzing instances of co-coding text excerpts across various themes, we could also assess literature based evidence of how different strategies address various challenges, enable specific outcomes, and contribute to successful or unsuccessful knowledge integration efforts.

2.2.4 Limitations

This review provides summary and critique of an inherently limited set of perspectives on knowledges and knowledge integration frameworks in fisheries. By containing the scope of the search to academic journal articles, authorship is skewed to heavily favor academic scholars and fields with Western science and European liberal education, which has its own colonial legacy and Western empirical hierarchies. Many Indigenous perspectives on knowledges and marine systems are underrepresented in academia, and this review is as likely to reflect that gap as it is to produce insights into academically determined "successful" practices of knowledge integration. Further, as outcomes of intervention efforts are often reported out in more ways than through journal publications (e.g. funding reports, project summaries and newsletters, etc), there may be additional insights to what constitutes a "successful" integration effort in gray literature not included in this review.

2.3 Results

2.3.1 Summary characteristics of the literature and authorship

All 72 accepted papers were published between 2000 and 2020, with most papers published after 2015 (Fig 4). Accepted articles were published across 45 different journals and by 67 different first authors. The most common first author name occurred four times, though this name and several others occurred as frequently as six times in coauthor lists.

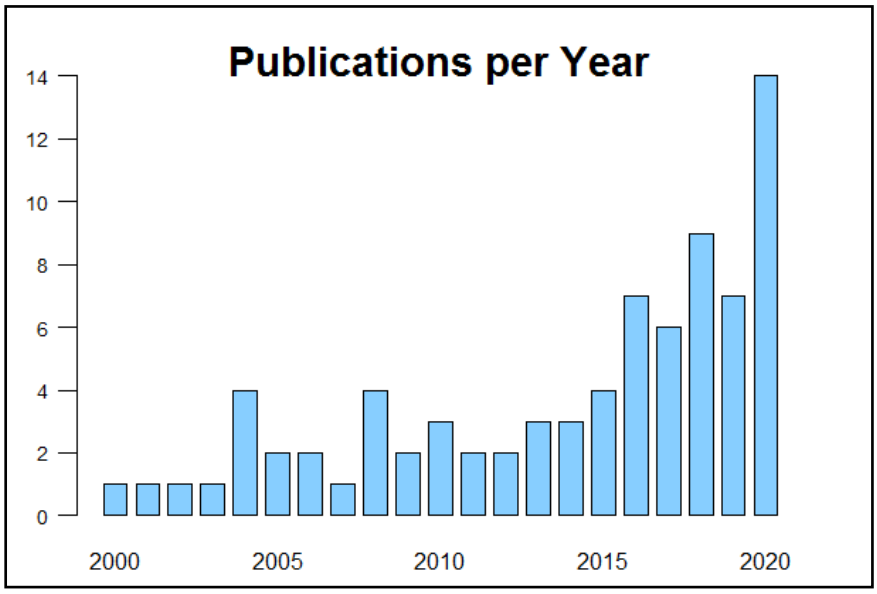

Figure 4: Number of articles published per year between 2000 and 2020.

10 first authors (14%) identified as an Indigenous person on public profiles. 20 papers (28%) had Indigenous individuals or organizations as coauthors. The rate of Indigenous representation in authorship is increasing; 82% of papers with an Indigenous first or coauthor were published since 2016. Most first authors held primary affiliations in academia. Government funded agencies, NGOs and ENGOs, and private industry organizations together made up about one quarter of the authorship affiliations. Three first authors listed a primary affiliation with an Indigenous governance or research organization.

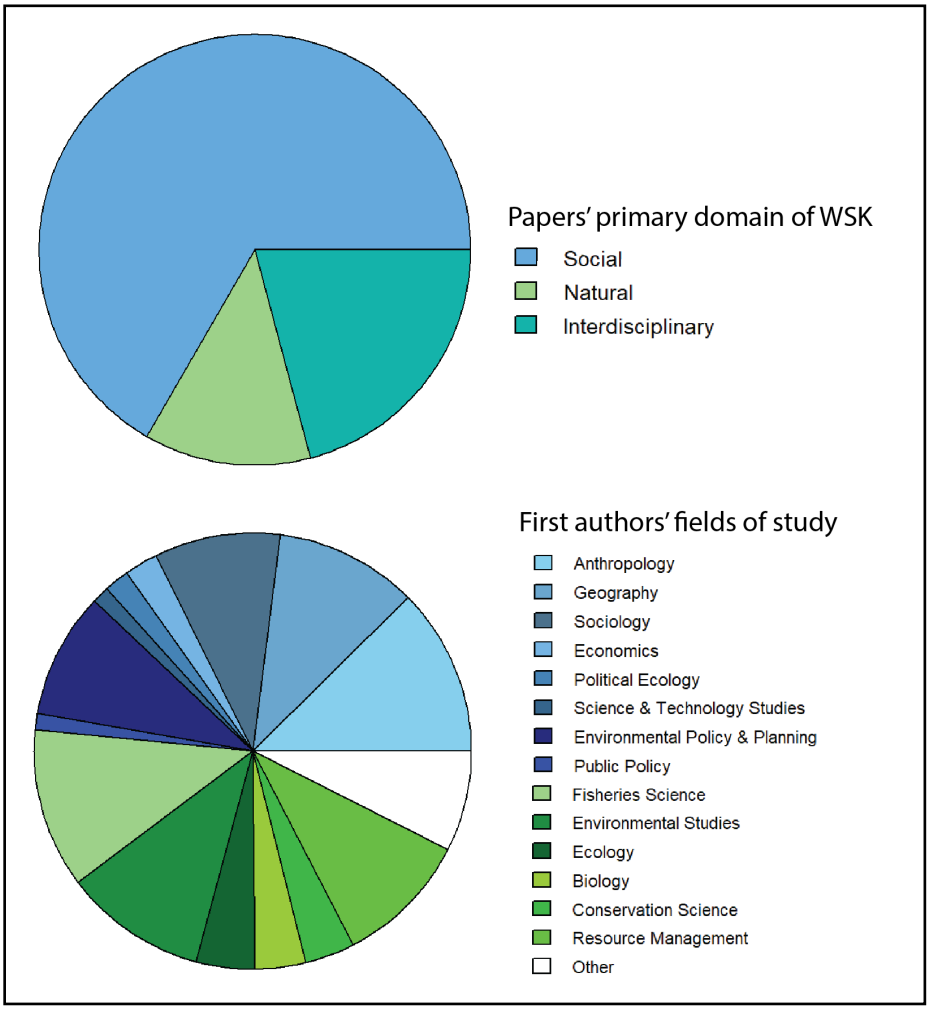

Figure 5: Fields of study and domains of Western Scientific Knowledge (WSK) represented in the literature.

The authorship and the journal outlets of the literature spanned a wide variety of academic disciplines, primarily centered by WSK methodologies. Papers were guided primarily by social science methodologies and theory, and about a fifth of all papers employed both natural and social sciences in interdisciplinary studies. First authorship spanned a total of 22 different fields of study from both the natural and social sciences, and coauthors represented an even more diverse array of disciplines. The most common primary fields of study of first authors, according to their public profiles, were Anthropology and Fisheries Sciences (Figure 5). Other common

authorship fields included Geography, Resource Management or Environmental Policy, Sociology, and Ecology. Journal outlets were comparably multidisciplinary; the most common journals were *Marine Policy* and *Ecology and Society*, which publish both social and natural science informed manuscripts.

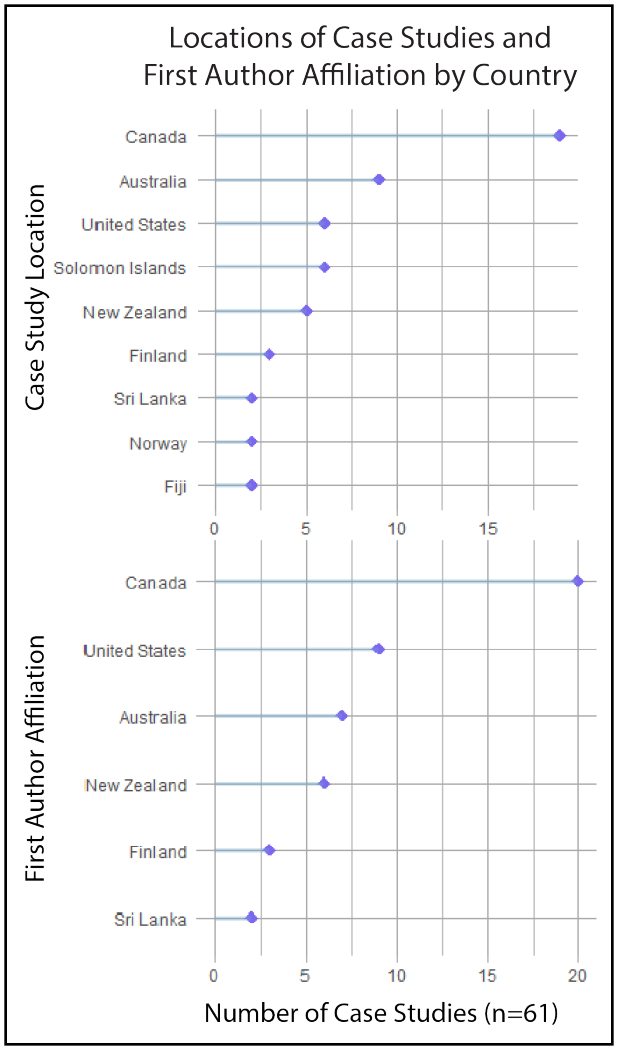

Figure 6: Location of study sites and first author affiliation by country represented in original research articles reporting on case studies with Indigenous communities, where two or more countries are represented in the literature.

Most (85%) papers reported on original research on fisheries conducted in or with Indigenous communities. The remaining papers presented reviews or perspectives, all of which

also referenced case studies to support their arguments. The 61 papers that reported on original research with specific communities named 65 different Indigenous communities or Nations located across 55 different locations within 16 different countries, mostly in Canada, the United States, and Australia (Figure 6). 11 papers did not specify names of the Indigenous communities in the work. First authors held affiliations in 19 different countries, but the majority work was published from Canada and the United States (Figure 6). In 20% of the case studies, first authors were from a different country than where the work was conducted. All authors conducting research in a foreign country were based at institutions in the US, Canada, Europe , Australia, or New Zealand, in decreasing order off frequency.

Case studies highlighted 31 different species across 54 species-specific fisheries, and 21 mixed or multiple-species fisheries. These include some non-fish species such as shellfish, turtles, or dugong that were included in the review since their harvest structure was referred to and managed as a 'fishery' in the study or local governance.

While nearly all 72 papers in the broader review described the planning and/or implementation stage of knowledge integration efforts, only 15 included a focus on initial or long-term outcomes of integration efforts. Other papers considering outcomes did so only in a general or even speculative sense rather than in empirical detail. 25 papers reflectively critiqued methods of knowledge integration, either within their own original case study or as critical commentary in perspective articles.

2.3.2 Objective 1: Conceptualizing Knowledges and Knowledge "Integration"

As a whole, the literature either does not define the knowledge systems of interest or tends to define TEK/IK without defining WSK. Only 8 of the 72 articles offered a definition of WSK. Definitions of WSK generally focused on its systematic methodological approaches using observation and testable hypotheses and data-intensive, centralized strategies of investigation and

analysis, typically through a positivist- reductionist paradigm. Several papers noted WSK as "modern" or "contemporary" compared to TEK/IK. Four papers noted that WSK is typically considered more objective, rational, and free of bias than other ways of knowing in dominant research, management, and governance spheres. Two papers (Weiss et al., 2013; Roux et al., 2016) noted that this framing contributes to a lack of recognition of WSK as culturally embedded, an (often erroneous) assumption of WSK's full objectivity, and to the power of WSK relative to other knowledge systems in resource management.

32 papers offered some definition of the non-WSK Indigenous knowledge considered, usually using terms like Indigenous Knowledge (IK) and Traditional Ecological Knowledge (TEK), and in some cases including Local Ecological Knowledges (LEK) as a term including local Indigenous ways of knowing. (Berkes, 2009b, 2012) is a frequent reference for definitions of TEK/IK. Most highlighted the situated (in place and worldview), intergenerational, holistic, and experiential nature of most Indigenous ways of knowing. Several papers' definitions of TEK/IK acknowledge the dynamic, complex, and adaptive nature of knowledge generation, and that IK/TEK are umbrella terms for various types of ways of knowing specific to Indigenous communities. Weiss et al. (2013), Deepenada et al. (2015), Roux et al. (2016), and Reid et al. (2020) noted the similarity between TEK/IK and WSK in relying on observable and experimental information, describing Indigenous produced science as Indigenous knowledge with parallel empirical pathways to WSK.

A wide variety of terms beyond "integration" are used to describe how knowledges are collected, produced, and mobilized or applied to fisheries management and governance. After "integration," "incorporation" and "inclusion" are the most common terms used in the literature to describe the mobilization and application of WSK and TEK/IK together. 17 papers used methodological strategies such as co-management, hybrid research, and knowledge co-production

or collaboration in place of "integration" terms. Other lesser used terms included "utilizing" / "using" TEK/IK or "informing" management through TEK/IK, and "combining," "recognizing," "sharing," "translating," "considering," "contributing," "bridging," or "pairing" knowledges. The full list of knowledge mobilization terms is extensive, but worth noting are the various examples of Indigenous frameworks used to describe approaches to utilizing multiple knowledges, typically presented by Indigenous authors or author teams with Indigenous coauthors. These include Two-Eyed Seeing (Etuaptmumk; Mi'kmaw; Eastern Canada), Two-row Wampum (Kaswentha; Haudenosaunee; Central Canada), Double Canoe (Waka-Taurua; Māori; Aotearoa/ New Zealand) Two-Ways (Ganma; Yolngu; Northern Territory, Australia), Tikanga (Maori), among others (Beveridge et al., 2020; Giles et al., 2016; Jackson et al., 2018; McMillan & Prosper, 2016; Mustonen & Feodoroff, 2018; Reid et al., 2020). Though these frameworks come from many different Indigenous communities, they share similar conceptual approaches to engaging with multiple ways of knowing and systems of governance in which the multiples exist concurrently and equally with mutual recognition, and typically guide decisions through congruence. 11 of the 29 papers selected for in-depth analysis considered Indigenous knowledge frameworks or used language reflective of this parallel, reciprocal, recognition oriented, and plural approach to multiple ways of knowing, however each specific one rarely occurred in more than one paper.

In some cases, Indigenous frameworks were explicitly as alternatives to WSK-led approaches to "integration." For example, Reid et al. (2020) considered Two-Eyed Seeing among other Indigenous frameworks in direct contrast to and critical reflection of the harms of "integration" and similarly assimilative language. In case study examples employing these frameworks, such as McMillan & Prosper (2016) and Mustonen & Feodoroff (2018), WSK is positioned as collaboratively building upon traditional practices with Indigenous expertise, complimenting rather than validating TEK/IK, or even being directed by TEK/IK, and sometimes

mobilizing multiple ways of knowing concurrently and without clear separation between knowledge systems. According to these authors, using such pluralistic frameworks provides fundamental guiding principles of knowledge co-production and decision-making necessary to reach specific governance and management goals in Indigenous contexts. Community definition of the knowledge base (rather than external, academic definition) were in these case examples described as necessary priorities for accurate, appropriate, and ethical engagement with Indigenous ways of knowing in a fishery management context (Jackson et al. 2018; Beveridge et al. 2020; Reid et al. 2020).

Table 3: Qualitative coding structure for selected key articles, and the corresponding research objectives.

Research Objective		**Primary Themes**	**Research Objective**		**Primary Themes**
1	Conceptualizing and Defining Knowledges and "Integration"	TEK & IK WSK Comparators Differences Mobilization	3	Defining Success	Qualifying Success Quantifying Success Lack of Success / Failure
2	Motivations, Goals, or Objectives	Ecological or Environmental Economic Political Social and Cultural Improved Knowledge Base Addressing Complexity	4	Challenges and Risks	Conflict Harmful Outcomes Historical Legacies Knowledge - specific Social and Cultural Limitations and Barriers Power Dynamics
	Outcomes and Effects	Ecological or Environmental Economic Political Social and Cultural Improved Knowledge Base Improved Integration Methodologies Positive Negative		Integration Strategies	Addressing Challenges Facilitating Successful Outcomes Approaching Knowledge Systems Governance Management Research Social

2.3.3 Objective 2: Motivations, Goals, and Outcomes

In the 29 texts selected for in depth review, we coded for various motivations or objectives of knowledge "integration" efforts as well as outcomes. We grouped objectives and outcomes into broad political, social, economic, environmental, knowledge related, and complexity or methodological thematic categories (Table 3), with multiple emergent secondary and tertiary codes to describe specific themes and narratives within each broader theme. We noted both general descriptions of broad motivators for why integration should be pursued, as well as explicitly stated goals for specific projects or case studies. Outcomes were specific, realized effects of integration efforts described by the authors. For example, general descriptions such as "the formal documentation of TEK and LEK can provide important insights for marine conservation and fisheries management" (Eckert et al. 2017) or explicitly stated goals such as "To protect and increase habitat was identified as a priority by [participants]"(Marty Holtgren & Auer, 2016) were both coded in the *Ecological or Environmental* theme of the *Motivations, Goals, or Objectives* coding category, and specified within the secondary categories of "conservation" and "habitat protection", respectively. This coding strategy allowed us to capture and assess both general sentiments of anticipated benefits of "integration" common to academic narratives, as well as the specific goals of case study examples.

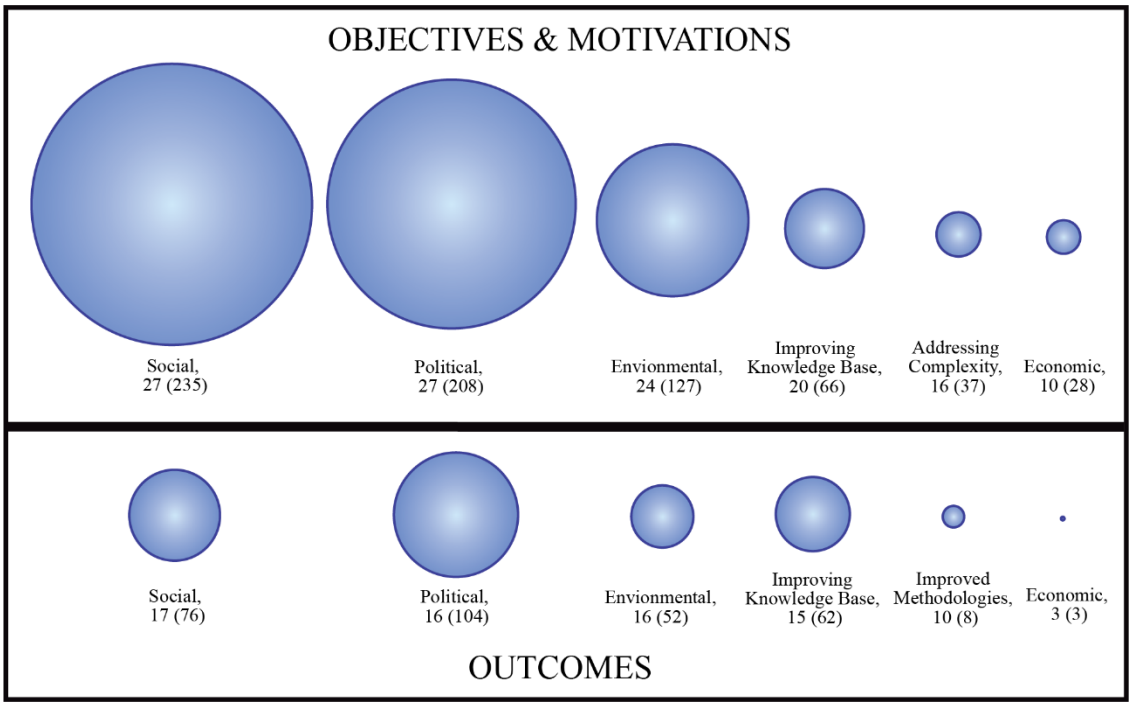

Figure 7: Coding frequency of themes in the *Objectives and Motivations* coding category compared to that of themes in the *Outcomes* category. The label below each circle notes the broad thematic coding category, the number of papers containing references to that theme out of the 29 texts reviewed in-depth, and in parentheses the total frequency of each instance of coding across all subthemes. Circles are ordered by the number of papers referencing the theme, and their size corresponds to total coding frequency of coding instances.

Social and political themes were the most commonly described motivations for as well as outcomes of knowledge integration efforts; they were referenced in the highest number of papers and received the most amount of descriptive attention within texts (Figure 7). Environmentally oriented objectives and outcomes were noted in nearly as many papers but received far less descriptive attention within texts. Overall, economic concerns were rarely noted, and generally were in the context of supporting livelihoods or meeting economic development goals through environmental interventions to revitalize a depleted fishery. Relevant emergent broad thematic categories included addressing complexity as a goal, and improved methodologies of integration

as an outcome. With the exception of improving knowledge bases, realized outcomes were described far less frequently than objectives or motivations for all thematic categories.

27 of 29 papers in the in-depth review described social and political themes in their motivations or goals of knowledge integration ((Figure 7). Social themes referred to various sociocultural aspects of community structure and wellbeing. A dominant motivating social theme was the maintenance, strengthening, or revival of cultural and traditional practices through knowledge integration efforts. Other relevant motivations included supporting community interests and highlighting values in decision-making and management. Authors often discussed social value inclusion concurrently to various political or environmental goals, such as protecting or restoring traditional governance practices and populations of culturally important species by expanding connections between knowledge systems. Value inclusion and revival of cultural practices were the most frequently identified social outcomes, along with several examples of community buy-in or approval of the project and of decision-making grounded in information produced through community involved participatory knowledge coproduction.

Political motivations for knowledge integration, which were more specific to the governance and management structures of a case example, were noted slightly less frequently than social ones but were often described in greater detail and with extended discussions regarding their relevance. The most common political motivators for integrating TEK/IK in fisheries governance were improved governance and management structures and processes. These were often broad goals, accompanied by general calls for inclusive and comprehensive management. Sometimes, authors paired generally described motivations regarding the "potential" of improved governance and management to come from integration efforts with more specific goals in other broad themes, such as better informed decision-making (*Improved Knowledge Base*) and better cross-cultural understanding (*Social*). Other common political

objectives included adhering to existing federal legal requirements and international commitments such as UNDRIP, otherwise supporting Indigenous rights. More specific political goals regarding Indigenous political empowerment were less common. For example, Indigenous leadership in integration efforts was only noted as a politically aligned goal in six papers, compared to a general goal of Indigenous 'involvement' or inclusion in governance referenced by 13 papers. Recognition of Indigenous governance or management practices were noted by eight papers, and three noted supporting reconciliation efforts, compared to the 14 papers that made at least a general call to supporting Indigenous self-determination and sovereignty.

Improved governance was the most frequently described realized political outcome, detailed through the development of clear governance recommendations, expanded adaptive management capacity, development of decision-making support tools, and creation of specific rules or regulations as outcomes of integration projects. Texts demonstrated improved environmental management through examples of efficacy or efficiency in reaching environmental goals. Recognition or assertion of Indigenous rights, empowerment, self-determination or sovereignty, and justice were among the frequently referenced motivations, however they were described in realized outcomes by only eight papers, were mixed in positive and negative sentiments, and as in motivations offered relatively little specificity.

Environmentally oriented themes were specific to the ecosystem state or the environmental dimensions of management practices in a case study. The papers attentive to such themes especially highlighted conservation, sustainability, responding to depleted stocks, and various dimensions of environmental health. Specific environmental goals most often centered on restoration or protection of specific species of concern and typically employed population or habitat specific metrics, especially where Indigenous knowledge was expected to assist in informing historical baselines. Realized outcomes to match these goals were relatively rare, in

most cases because a targeted assessment of environmental outcomes had not yet occurred, or because more time was needed to see any direct changes in biogeological indicators. The dominant theme in the environmental outcomes category was instead the general improvement of local environmental management practices. These examples especially included increased monitoring accuracy or frequency, improved accuracy of system modeling, improved assessment practices through appropriate indicators and expanded data, and more adaptive responses to changes in stocks or habitats.

The creation of an *Improved Knowledge Base* to best support the various social, political, and environmental goals was an important thematic category. In most cases, outcomes matched expectations for increasing the scope of knowledge available to management. Specifically, motivators and outcomes across various studies included filling knowledge gaps and complimenting scientific data with additional relevant and accessible information. These themes paired frequently with the narratives around expected improvement of political and environmental dimensions of governance and management. Authors often highlighted the utility and relevance of locally specific TEK/IK as justification for integration. “Proof” or “validation” of information from TEK/IK as accurate based on a paired scientific assessment was sometimes framed as an outcome to demonstrate such utility and relevance (Aswani & Hamilton, 2004; Lauer & Aswani, 2010). Conversely, practices of community - driven validation of information used in management through “collaborative interpretation and analysis” (Strangway et al., 2016) or “convergence” (Gratani et al., 2011) through shared learning and knowledge coproduction with appropriate knowledge documentation were also noted as relevant, specific, and long-term knowledge oriented outcomes (Rachelle Beveridge et al., 2020; Brattland et al., 2019; Mustonen & Feodoroff, 2018). Less frequently noted but also consistent with outcomes were goals to

revitalize, strengthen, or otherwise support Indigenous knowledge systems, mostly through documentation of elder experiential knowledge and expertise.

Addressing Complexities was an emergent broad thematic category of motivations for knowledge integration. Such complexities intersected with various themes relevant to concurrently addressing overlapping environmental, social, and political concerns through multiple sources of information, such as speeding the relative pace of decision-making through reduced uncertainties to better match rapid environmental change. By far, the most commonly described complexity was scale. Authors often referred to the potential for knowledge integration efforts to support bridging local to regional or broader scales of governance and environmental monitoring. This beneficial outcome was evidenced through connecting multiple scales of governance to broadened knowledge bases, informing scale appropriate decision making tools, and improved spatial refinement of local information and monitoring (Ban et al., 2017; Diggon et al., 2020; Kourantidou et al., 2020; Mackinson, 2001; Mustonen & Feodoroff, 2018). Improved methods of knowledge integration was not a common explicit goal, however 7 papers did identify it as an outcome. Improved integration methods were identified based on other project outcomes highlighted as positive and meaningful, often connecting various social and political themes. Such outcomes included expansion of local capacity for appropriate documentation, articulation, or mobilization of knowledge, revitalizing traditional practices of management, stewardship, or territory, producing or improving community engagement and a sense of collective responsibility, reduction of conflict between rightsholder groups, a reduction of dependency on formal State bureaucracy for local management, and upholding or strengthening local Indigenous authority. The methods themselves that were credited for these beneficial social and political outcomes included developing projects through research agreements and protocols with Indigenous partners (Eckert et al., 2017), co-producing management indicators (Kourantidou et al., 2020), centering

relational practices and trust building (Weiss et al 2013), collaborations built on shared priorities (Holtgren & Auer, 2016) shared leadership and decision making (Diggon et al., 2020), knowledge-inclusive and power-neutral partnerships (Reid et al., 2020), iterative participatory engagement and public sharing of results (Eckert et al., 2017), community agency over long term continuation of the project (Strangway et al., 2016), and building from a foundation of Indigenous knowledges and governance systems to fit local context and recognize Indigenous rights and agency (Mustonsen & Feodoroff, 2018; Beveridge et al., 2020).

Realized outcomes of attempting to bridge or integrate TEK/IK and WSK were not always positive. Negative or unexpected outcomes were detailed in several papers, such as knowledge integration methods causing offense to Indigenous communities and leadership, failure to apply relevant TEK in management, decontextualizing, distorting, and degrading Indigenous knowledge systems, entrenching instead of reducing economic vulnerability, reducing Indigenous access to traditional food systems, politicization of knowledge systems, and general frustrations, distrust, and other harm done to Indigenous - federal state relationships. While some of these examples reflected incomplete, stalled, or even total breakdowns of past knowledge integration efforts as a whole, many were identified where beneficial objectives were also achieved (Alexander et al., 2019; Baker & Constant, 2020; Butler et al., 2012; Mustonen & Feodoroff, 2018; Walsey & Brewer, 2018). Typically, these issues were discussed through critical reflection by scholars assessing previous efforts to contextualize their own methodological choices or offer insights to necessary methodological adjustments.

2.3.4 Objective 3: Defining "Success" and Successful Outcomes

Evidence from authors regarding positive and negative results, considered contextually through their methods, gave insight to the fit and efficacy of different strategies to bridge or "integrate" knowledges. During analysis, we coded for where desired outcomes were or were not

achieved and where general positive or negative sentiments regarding outcomes were expressed, and also noted the strategies described as having contributed directly to those outcomes. We considered the resulting coding patterns along with explicit reference to "success" by authors to determine how "successful" integration is identified and described, and which strategies contributed to said successes, or failed to do so. Examples of mixed outcomes and authors' methodological reflections offer nuance to what might be considered a successful knowledge integration effort, common challenges, and the efficacy or risks of specific strategies.

Success was broadly and variably described by 17 of the 29 selected papers, and often contextualized or qualified through described outcomes. It was uncommon to explicitly quantify success of the integration process, but such metrics included what proportion of the original goals or intended stages of the project were completed, the number of management plans or actions produced and implemented, or the percent representation of relevant local and Indigenous groups in the process (Butler et al., 2012; Atlas et al., 2017; Diggon et al., 2020). 15 papers included examples, either from original research or in reference to past efforts, of incomplete or failed integration attempts with unsuccessful or even negative outcomes, particularly where collaborations broke down or harm was done to the Indigenous communities (see above).

Positive outcomes cited as evidence of success include better informed research or management interventions (e.g. study site selection, monitoring protocols, or designing marine reserves), accessible, appropriate, and relevant documentation of knowledges, a significant and long-term increase of local management capacity (eg through training of community members), and new or expanded Indigenous leadership over local research and monitoring efforts beyond the initial project. In some examples, efforts were considered successful not just due to an expanded available data and knowledge base, but specifically because the community gained or retained control over the knowledge production, collection, and mobilization processes

(Strangaway et al., 2016; Beveridge et al., 2020). Jackson et al. (2018) explicitly noted that success was identified through "local leadership, local knowledge and *mātauranga* [traditional knowledge] supported by external expertise and other data as needed." Shifts in the role of different forms of knowledge to support various scales of self determination were also considered successful, for example connecting IK/TEK to international governing bodies alongside WSK to demonstrate the efficacy of cultural indicators (Mustonen et al. 2018). Community satisfaction regarding the process or outcomes of the integration project (especially with regards to representation and participation), and community affirmed success was not often referenced, but authors who did identify it listed it as a key indicator of success (Gratani et al., 2011; Beveridge et al., 2020). One robust example of success describes how Nuxalk Indigenous authority, knowledge, and tradition were strengthened in efforts to support management of endangered *Sputc* (Eulechon / Herring), and the project was affirmed by local leadership as an effective and appropriate model for future projects:

> "community agreement and collective responsibility were evidenced by well-attended community feasts and Nuxalk community open houses, and by the continued support of the annual Sputc Ceremony by Nuxalk organizations after the project. … community agreement around eulachon management priorities were demonstrated during a small eulachon return in 2018, where Stataltmc, Nuxalk guardians, and fisheries technicians successfully monitored community interactions with the fish to minimize disturbance. Meanwhile, references to the book [a primary project product] as a source of knowledge and authority are regularly made on Nuxalk radio and community announcements. … this process provided a foundation of legitimacy in the eyes of the community that will enable unified, cohesive action on identified priorities, bolstering Nuxalkmc capacity to engage with both community constituents and interjurisdictional management processes [through] community-derived authority." (Beveridge et al., 2020)

In some cases, knowledge validation strategies used as integration tools were also tools for assessing success. In these cases data, visualizations, or models produced using WSK was used to compare and confirm the accuracy or reliability of "integrated" IK/TEK, demonstrating a successful expansion of knowledge or information sources available to Western governance and

management systems (e.g. Mackinson et al., 2001; Lauer & Aswani 2010; Gratani et al., 2011). In contrast, the 'successful' expansion of a knowledge base within Indigenous communities and governance was described through strengthened self-management characteristics, such as expanded local capacity to appropriately utilize both science and traditional practices and the ability to strategically use expanded evidence bases to contest state jurisdiction, enforce Indigenous fishery management decisions, or otherwise pursue recognition of authority through de facto legal pluralism (Weiss et al. 2013; Mustonsen et al. 2018; Atlas et al.,2017; Beveridge et al., 2020). Six papers explicitly noted that community approval or affirmation was sought out to confirm project success.

2.3.5 Objective 4: Strategies and Challenges

2.3.5.1 Identifying Strategies

Methods used in integration efforts spanned a wide variety of qualitative and quantitative approaches to documenting, archiving, communicating, transforming, and modeling information from Indigenous communities. The wide variety of strategies correlates to the frequently expressed uncertainty about best practices of knowledge integration in fisheries. Specific tools for data and knowledge production or collection include interviews, surveys, participatory mapping, among many others. Such tools can be used in multiple ways depending on the broader framework of a project; for example, different strategic approaches and broader methodologies could both use interviews as a base tool for recording elder expertise, but how the interviews are conducted and how the knowledge collected through the interview is treated might look very different in different methodological frameworks. We therefore acknowledge specific data collection tools where appropriate for contextualizing a strategy, but primarily focus our discussion of strategies on broader methodological frameworks, institutional structures, and practical adjustments in this diverse array of context-specific projects.

The most referenced management, governance, and research strategies employed in knowledge integration efforts were, by far, "participatory" approaches. Participation is variably described, ranging across a broad spectrum of scope and depth of community engagement in research, management, and governance. Participatory approaches range from Indigenous consultation and inclusion in advisory boards, to community participation in management and monitoring, to co-management by State and Indigenous institutions, to implementation of knowledge mobilization strategies through co-governance, Indigenous leadership, and Indigenous methodologies. These latter three were rare and often listed aspirationally, but still labeled as within the scope of 'participatory' frameworks.

Epistemic strategies centered on how knowledges were conceptualized or treated within an integration project, and ranged from science-led management seeking Indigenous input, to Indigenous research methodologies in Indigenous led projects, with various degrees of knowledge sharing or co-production. Knowledge validation, where information from the Indigenous knowledge systems are compared to information and data provided through WSK research or technology was commonly implemented in science-led approaches (e.g. Mackinson et al., 2001; Aswani & Hamilton, 2004; Lauer & Aswani, 2010; Gratani et al., 2011). All case studies that built the participatory and epistemic strategies project with guidance from Indigenous leadership and a community-defined knowledge base, or were informed by Indigenous methodologies and principles, were authored by Indigenous scholars (eg Giles et al., 2016; Jackson et al., 2019; Mustonen & Feodoroff, 2018; Kozich et al. 2020), and/or were coauthored with Indigenous contributors (eg. Beveridge et al. 2020).

Relevant strategies to provide institutional support for "integration" efforts included state-led programs and implementation of legislative policy or formalized agreements within existing management systems. Practical strategic adjustments focused on directing time or

resources towards development of relationships and trust between Indigenous and academic participants, and ensuring clarity, adaptability, and transparency of project methods. Other notably common strategies meant to facilitate successful outcomes included supporting the financial or experiential capacity of local community-based management, prioritizing shared goals, leaning on strategic partnerships between Indigenous, academic, and non-governmental organizations, and centering Indigenous values and traditional practices in project design.

2.3.5.2 Identifying Challenges

A variety of epistemic, political, practical and systemic challenges were identified in the literature as complicating factors for developing effective, successful, or efficient processes of knowledge 'integration.' The most commonly listed obstacles included uncertainty about the best or most appropriate methodologies for integration efforts, contextual complexity, and political or bureaucratic barriers in Western management or governance institutions. Dominant epistemic challenges included the existing dominance of WSK in fisheries, fundamental differences between TEK/IK and WSK, and perceptions of different ways of knowing, particularly by non-Indigenous actors regarding the legitimacy of non-WSK knowledges. For example, Weiss et al. (2013) noted that non-Indigenous resource managers in their study consistently had a narrow and fragmented understanding of Indigenous ways of knowing. Various types of logistical or practical concerns presented limitations on the scope of knowledge integration projects, including scale, intellectual ownership of project products and co-produced knowledge, State bureaucratic barriers, and the need for decisions to meet multiple objectives. Several papers pointed to capacity concerns, such as needing to invest large amounts of time, money, and labor to support appropriate knowledge coproduction and other community driven collaborative methods of knowledge integration. Relevant political challenges included political conflict and unequal power dynamics that intersected with systemic issues including historical and continuing

exclusionary and marginalizing treatment of Indigenous knowledges and governance systems by federal and state institutions. Such issues obstructed social and political objectives of integration projects. Core to many of these political and systemic challenges, and to the above noted epistemic challenges, are colonial legacies, which most authors acknowledged.

Papers that explicitly described failed or incomplete integration efforts and specific negative outcomes most often noted political and systemic problems as well as specific relational challenges. Conflict grounded in mistrust and harm done through procedural inequities and problematic top-down methods of engagement led to a breakdown of collaboration. Consultation processes and other dimensions of federal or state - led efforts to 'integrate' knowledges that are difficult for remote and low-income Indigenous communities to access, or that present bureaucratic barriers such as requiring communities to submit formal proposals or requests to incorporate Indigenous knowledges were also identified as major roadblocks to incorporation of TEK/IK into decision-making and management practices. Ill-defined, misunderstood, or misapplied Indigenous knowledges were also cited as specific reasons for "failure."

2.3.5.3 Efficacy of Strategies in Addressing Challenges

It is worth considering whether strategies of knowledge integration efforts mitigate the identified challenges. By considering how, or indeed if, the various strategies address common challenges in integration efforts and whether they support successful efforts, we can better identify which strategies most support meaningful bridging and incorporation of TEK/IK with WSK in fisheries governance and management – and which carry the highest risks. Several interesting patterns emerge when examining where strategies and challenges were coded together in the in-depth review of 29 papers (Figure 8).

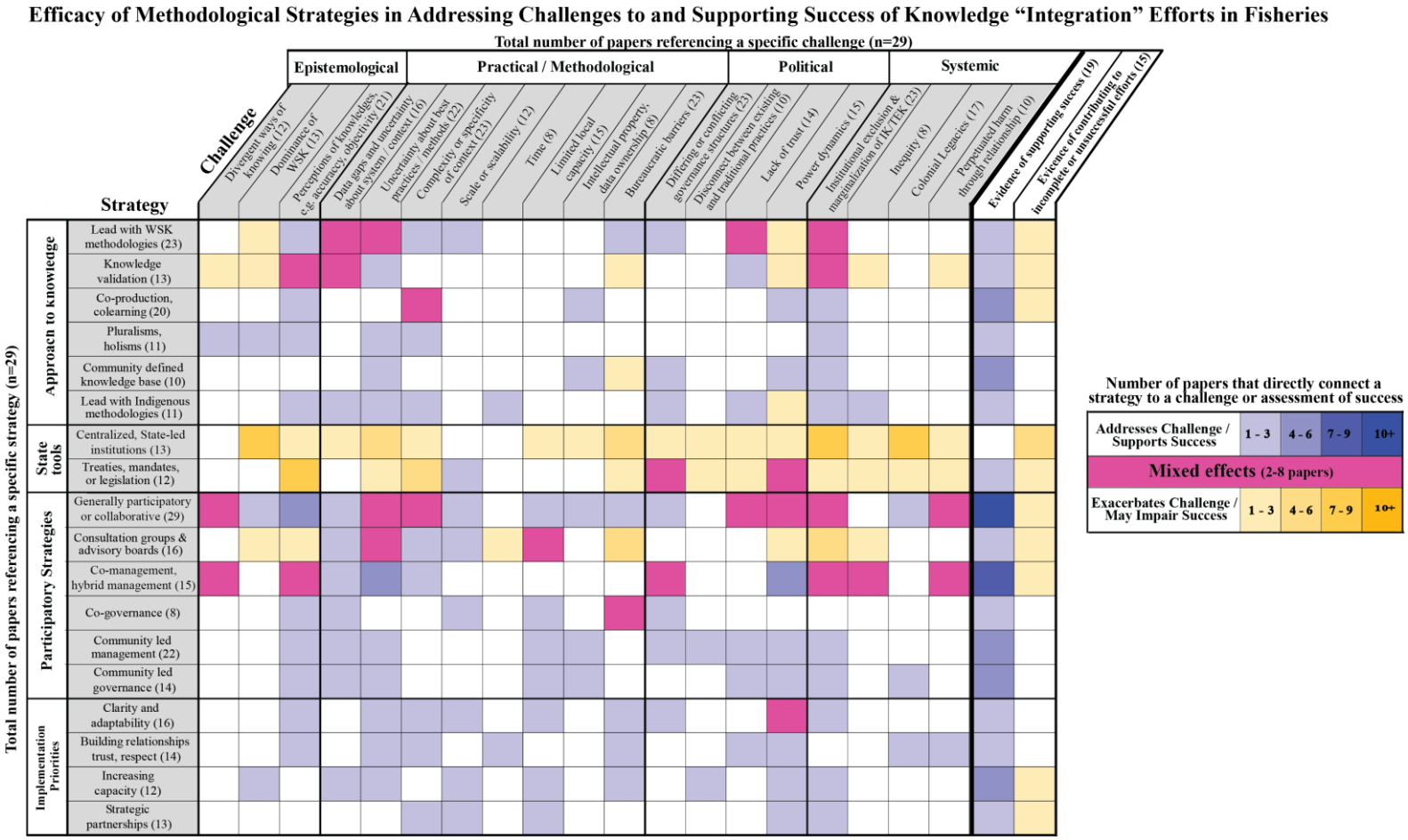

Figure 8: Assessment of strategies used in knowledge "integration" efforts by their relation to common challenges or project success, identified through overlapping instances of coding in the focal 29 texts. Instances of co-coded text were individually assessed to determine the nature of the relationship. Blank squares indicate where the two themes were not explicitly linked in texts.

Non-participatory efforts, projects utilizing top-down organization, and especially efforts rooted in federal or state institutional structures of decision-making and stakeholder consultation exacerbated nearly all challenges (Figure 8). Similarly, formalized agreements, State legislation, and other mandates prompting recognition and incorporation of Indigenous rights and knowledge systems by State management institutions did not reliably mitigate any challenges identified in the literature. These agreements in some cases helped create structure that improved Indigenous communities' political leverage or enabled Indigenous and State governance systems to negotiate across structural differences (e.g. Jackson et al., 2018), but often instead were noted as amplifying political and systemic barriers to actual implementation of rights and meaningful incorporation of knowledges by further situating oversight of knowledge production, validation, and application within State-defined bureaucratic processes (Johannes & Yeeting, 2001; Weiss et al, 2013; Baker & Constant, 2020). These strategies can also contribute to a reduction of local capacity to cope with dynamic systems by limiting adaptability of local structures (Brattland et al., 2019).

Second, while participatory structures are the most frequently identified strategies in successful efforts, the efficacy of participatory strategies in mitigating or addressing common challenges is highly varied. Often, projects considered participatory in nature had mixed or inconsistent success in addressing common challenges. We found a relevant factor is that "participation" is defined extremely variably across the literature. Specific patterns of efficacy in addressing challenges emerge across different types of participation. For example, more nominal participatory decision-making processes such as requiring Indigenous community members to join consultation meetings or advisory boards embedded in a federal consultation structure and requiring excess time, money, or travel to attend not only place excess burden on community members to join, making the participation space less accessible to low-capacity communities, but can also be viewed as unproductive, inappropriate, or even offensive and paternalistic in nature

by attendees who do not see meaningful local outcomes from these processes (Gratani et al., 2011; Walsey & Brewer 2018). In contrast, participatory governance and co-management built locally using processes that recognize Indigenous authority, are collaboratively designed with community members or Indigenous leadership partners, and are accountable to agreed upon protocols of engagement between Indigenous and non-indigenous participants were much more frequently cited as effective in navigating common challenges and contributing to successful projects and positive outcomes (e.g. Giles et al., 2016; Eckert et al., 2017; Kozich et al., 2020; Beveridge et al., 2020).

Much like different approaches to participation influence whether challenges are exacerbated or alleviated, how projects approach different knowledge systems within the broad term of "integration" has variable efficacy. Methodologies that were primarily grounded in WSK or designed based on WSK-derived data that then sought additional input from TEK/IK sources, and those that required validation of TEK/IK by WSK, had highly variable efficacy in addressing challenges. While in some cases they empowered local confidence in TEK/IK (e.g. Gratani et al., 2011), they typically reinforced knowledge hierarchies and political power dynamics, and in a few cases further entrenched an idea that the different sources of knowledge may be incompatible. Knowledge coproduction, typically helped alleviate various epistemological challenges. These were typically the papers that utilized Indigenous frameworks or terms like "bridging" or "pairing" knowledges as an alternate to framing the effort as "integration." The influence of projects building from a community-defined knowledge base (often including both TEK/IK and WSK) and those grounded in Indigenous methodologies on addressing knowledge – related challenges were not always explicitly identified in the literature; however that could also indicate that fewer challenges were experienced when employing those methods. They were

noted more consistently than other epistemological strategies as helping to address political and systemic challenges.

2.3.5.4 Connecting Strategies to Outcomes and Success

Some authors noted direct connections between strategies in their case studies and specific outcomes, or supported overall successful efforts. For example, bridging usually separate projects, such as Indigenous cultural and language revival efforts with environmental stewardship education and outreach efforts, can contribute to a strengthening of traditional practices while concurrently building a more robust local knowledge base of TEK/IK and WSK (Atlas 2017). More broadly, participatory strategies are consistently linked to success, especially in community based or "bottom-up" contexts (Figure 8). Comparatively, relatively shallow participatory approaches employing consultation efforts were linked to more mixed and negative outcomes, and "top-down" approaches consistently lacked evidence of success (Figure 8). Centralized, State-led strategies had the highest instance of unsuccessful or failed efforts. Co-management or hybrid management and co-governance were also linked to success, as were practical strategies for local capacity expansion and epistemic strategies employing knowledge co-production or building from a community-defined knowledge base (Figure 8). Where co-management was linked to failure or mixed outcomes, efforts were designed externally to the community and implemented without true co-governance. Other practical strategic adjustments noted as important for supporting positive outcomes and long-term success included transparent and adaptive processes, local capacity support, and long term iterative projects centering strategic partnerships and community engagement.

Based on the patterns we observe through the literature, Indigenous leadership involvement in the knowledge integration process, specifically through a co-governance structure, contributes to successful efforts with low instances of failure (Figure 8). In one example,

Indigenous leadership and co-governance not only supported robust structures for sound decision-making, but also improved buy-in from Indigenous and non-Indigenous stakeholders in fisheries management decisions:

> " The co-led governance structure engrained First Nations' knowledge into the five planning outputs and brought together Indigenous knowledge with Western or academic science throughout the planning process. The integration of knowledge from many sources allowed the Partners to draw on scale-appropriate information and *resulted in decisions that were credible, defensible, and ensured high levels of buy-in from Nations and stakeholders*." (Diggon et al., 2020, italics my addition)

Mustonen & Feodoroff (2018) also noted the importance of local leadership, in combination with targeting specific local concerns, both in supporting positive social outcomes and in mitigating some widely referenced practical and bureaucratic challenges:

> "As the initiative was under Sámi control, fishermen and women and reindeer herders did not have to sacrifice the time spent on land for working with formal governance bureaucracy, enabling them to continue to engage with cyclical nature as is important for their wellbeing and self-determination."

The earlier highlighted examples of success from Jackson et al. (2018) and Beveridge et al. (2020), as well as the reflective and critical narratives provided by Baker & Constance (2020) and Reid et al. (2020) further emphasize the importance of Indigenous leadership in collaborative processes. These texts, as well as Giles et al. (2016) and Kourantidou et al. (2017), share similar strategies in approaching of multiple ways of knowing. Specifically, they approach mobilization of multiple knowledges by building from a community-defined knowledge base. Many other papers also approached knowledges through a comparable co-learning or co-production format (e.g. Eckert et al., 2017) or at least with the importance of recognizing each body of knowledge as equal (e.g. Holtgren et al., 2016; Mackinson et al., 2001). However, those approaching knowledges specifically through pluralistic, community defined, or Indigenous frameworks had a more consistent link to success in the form of meeting intended environmental *and* political outcomes with little to no link to failure or negative outcomes (Figure 8).

2.4 Discussion

The literature engaging with knowledge "integration" in fisheries governance and management is evolving. The body of literature as a whole is growing rapidly, with small but increasing Indigenous representation in authorship and reflection on important participatory methods. It is a highly interdisciplinary space, informed by both the social and natural sciences and utilizing a variety of strategies to produce, organize, mobilize, model, or apply multiple knowledges. This is reflective of the multifaceted objectives of "integration" efforts across social, political, and environmental domains, as well as the growing interdisciplinarity of fisheries and marine environmental studies more broadly (Blythe & Cvitanovic, 2020; McKinley et al., 2020).

The relatively recent increase in publications, especially in Canadian and US publications and case studies, is contemporaneous with the increased attention to rights-based approaches and recent fisheries oriented legislation in these countries. For example, Canada formally recognized UNDRIP in 2015, and in 2016 revised its Fisheries Act to include a mandate for Fisheries and Oceans Canada to attend to local and Indigenous knowledges in management plans (Duncanson et al., 2021; Bill C-65). Such mandates prompt research interest and State funding towards how best to pursue and achieve knowledge integration in fisheries, though as our review has revealed, State led efforts lacking in deep participatory processes tend to be unsuccessful and even harmful. Additionally, the dominant geographical focus of the literature is in Canada, the US, and Australia, despite the fact that Indigenous fisheries - dependent communities with a multigenerational lived experience of colonialism and continued struggles for marine tenure and food sovereignty exist globally (Cisneros-Montemayor et al., 2016; Jentoft et al., 2019).

Motivations to integrate, bridge, or co-produce knowledges in fisheries vary across social, political, and environmental domains of governance and management, with a strong emphasis on the improvement of efficiency and efficacy of management and on sociopolitical

changes to decision-making in line with rights recognition and Indigenous empowerment. Outcomes thematically mirror motivations, but are less frequently described. As the literature often highlights the design and implementation stages of a project, there is a gap in understanding regarding realized outcomes, which may contribute to the sense of uncertainty regarding "best practices" that seems to remain present in the literature.

The prevalence of sociopolitical themes across both goals and outcomes presents a tension with the current dominance of WSK perspectives that typically do not identify WSK as a social or political body of knowledge, or which hold up WSK as a more 'objective' field with which to validate IK/TEK. WSK is often (erroneously) considered apolitical, and its ontological roots in Enlightenment-era Anglo-American and Eurasian philosophies, and continued Eurocentric tendencies, are often ignored in Academia (Harding, 2008; Haraway, 2012; TallBear, 2014; Todd, 2016). Knowledge "integration" or knowledge coproduction and Indigenous empowerment are inherently political projects in their challenging of colonial and WSK-dominated realms of academia and resource management. Western and Indigenous ways of knowing are therefore both politicized through these efforts. Further, knowledge systems and ways of knowing are tightly connected to their respective contextualizing worldview, physical place, and sociopolitical structures (Whyte, 2013; Reid et al., 2020). This applies to TEK/IK, non-Indigenous local knowledges, as well as WSK. Assumptions of WSK's overt objectivity can result in "integration" approaches where information produced through other knowledge systems is extracted and "verified" by the epistemology considered more "objective" by Western managers and practitioners (Fernandez-Gimenez et al., 2006; Baker & Constance, 2020; Reid et al., 2020).

We are somewhat concerned by the apparent lack of specific realized outcomes described in the literature compared to the robust array of motivations. Given the risk of harm to Indigenous

communities, it is extremely important to follow the impacts of these efforts even though outcomes may take a long time to be fully realized. Accordingly, time and other practical challenges such as local capacity limitations were noted limiting factors to "success." "Time" in particular was a challenge which was rarely mitigated, and only through attention to relationship building and application of Indigenous methodologies, which are fundamentally relational (Wilson, 2008; Kovach, 2009, 2016; Tynan, 2020). We were surprised at how infrequently long term relational work and investment in local capacity were prioritized given the prevalence of narratives regarding local and Indigenous empowerment and the dominant interest in participatory methods.

We are critical of the idea that a need for long-term and in-depth engagement is a challenge to overcome rather than a fundamental component of research partnership with Indigenous communities which should be prioritized in project design and funding allocation. Investment of time is important; our review found that success and achievement of desired outcomes were directly supported by strategies which prioritized long term projects and where local capacity expansion was among stated project priorities. More broadly, Western and Indigenous partners working to bridge knowledges in co-learning and transformed governing and managing practice are embarking on a relational, collaborative project requiring sustained commitment (Wilson, 2008; Whyte, 2013; Reid et al., 2022). Relational long-term work is also necessary in avoiding extractive colonial practices of "parachute science," where researchers "drop in" to a field-based study within a community, often in a foreign and remote location, and conduct work based on their own assumptions without meaningful engagement with local communities or ways of knowing and leave without long term commitment or follow through and typically without returning any benefit to the community and place from which they took (Singeo & Furguson, 2023). Disingenuous and short term engagement with Indigenous communities and

ways of knowing under the guise of rights recognition and other justice related language risks a resettling of knowledges, a further settling of resource management projects, and undermining of "collective continuance" (Whyte, 2018). If the goal is simply collating information from Indigenous sources to be "filtered through white intermediaries" (Todd, 2018), so as to add to a settler State institution's data sources, the work will not meaningfully contribute sociopolitical changes to rectify power imbalances or uplift Indigenous sovereignty. Decolonization is then left as no more than a metaphorical signal rather than active practice (Tuck & Yang, 2012). If researchers and practitioners are indeed sincere in these efforts to move beyond "integrating" additional information in to an existing knowledge base, and to meaningfully support Indigenous rights, knowledge regeneration, and self determination, then long term, reciprocal and relational engagement with Indigenous communities to follow through the entirety of the project and its outcomes is imperative.

"Success" is variably defined across most texts, and often asserted by authors without corroboration of community members' perspectives, which also illuminates a troubling trend of externalized research processes and a lack of reflexive clarity regarding what "integration" is supposed to accomplish, and for whom it is meant to benefit. When affirmed by community participants, descriptions of success highlight local approval of methods and outcomes, a long-term presence and continuous positive impact of the process, and a strengthening of traditional practices and rights-based approaches alongside the reaching of environmental goals in sustainable or regenerated fisheries monitoring, species management, and conservation. Such examples can be described as *meaningful* impacts that fundamentally shifted both the efficacy of locally lead governance and management efforts and the role of non-WSK knowledges and traditional practices in those efforts – outcomes in line with the popularly referenced transformative sociopolitical objectives. When discussing "success" below, these are the types of

community-affirmed positive outcomes to which we refer. Most often, these examples were described in contexts where Indigenous perspectives were prominent in the authorship of the text and, crucially, the design and implementation of the described project, and so were representative of only a small subset of the literature.

Critically, the trends in the literature emphasize that baseline legislative requirements or formal agreements to pursue integration or 'consider' TEK/IK, even when centered in a rights-based approach, do not inherently support effective knowledge "integration." While they can be powerful in prompting federal governance and Western fisheries management institutions to direct attention to TEK/IK, these mandates do little to meaningfully empower Indigenous rights or knowledges without substantive recognition of Indigenous authority or sovereignty, or at minimum a commitment towards consistent and autonomous Indigenous representation and collaboration. However, outside of Indigenous scholarship, the reviewed literature does little to critique existing management or governance structures that continue to subjugate, exclude, or otherwise harm Indigenous peoples. Colonial legacies are typically only nominally acknowledged, and perhaps this is part of why many participatory processes are inattentive to certain relationships and power dynamics. Some of the more critical and reflective papers note that the dominance of WSK in institutional structures of fisheries governance and management are an inherent systematic barrier in most non-Indigenous institutions and a production of western colonialism and imperialism. Knowledge hegemonies, in combination with inaccessible, inflexible, bureaucratic structures, perpetuate patterns of exclusion and marginalization.

A cynical interpretation might assert these trends in our results to expose continued academic commitment to or apathy regarding colonial imperatives, disguised under rights-based and decolonizing language. That is, that knowledge "integration" is coded assimilation and epistemological re-settling, or at minimum an effort by Western academic and resource

management institutions to respond superficially to calls for rights-based efforts without systemic adjustments. It is also likely that, rather than an intentional continuation of colonial acts, these trends reflect the problematics of working within – much less the challenge of working to change – an institutional structure built within a colonial dynamic. We are hopeful that at least some of those engaging in efforts to bridge multiple ways of knowing in fisheries from Western academia are keen to see a more fundamental transformation of the role of knowledges and the rights and sovereignty of Indigenous peoples in fisheries, and are open to learning with and from Indigenous scholars and partners, but are caught in methodological uncertainty and the difficulty and discomfort of reckoning with academia's colonial legacies.

Broadly, our review showed that the body of literature as a whole displays a lack of clarity around best practices and specific strategies, especially across a sweeping range of "participatory" approaches. However, by focusing particularly on clear examples where strategies addressed or exacerbated challenges to integration, and by especially focusing on examples of community affirmed success and a conversation with Indigenous scholarship, we have drawn four priorities that we believe are important considerations for future efforts to engage multiple ways of knowing in the governance and management of fisheries in Indigenous contexts in such a way that supports both better understandings of ecological systems and the genuine empowerment and recognition of Indigenous knowledges, rights, and authority.

2.4.1 Four Priorities for informing future efforts

2.4.1.1 First: Prioritize Indigenous Perspectives

First, non-Indigenous authors should better acknowledge Indigenous collaborators and engage with multiple ways of knowing more reflective of Indigenous perspectives, beyond a fragmented and utilitarian approach to "integration." Indigenous perspectives remain in the minority despite the explicit focus on Indigenous ways of knowing, and engaging extensively

with discourse regarding Indigenous empowerment and self-determination. Increasing Indigenous scholarship in recent years is promising for growing efforts to "decolonize" academia, however it should be noted that representation alone is not an undoing of the institution's colonial roots; and surface level adoption of decolonizing discourse in scholarship carries its own risk of entanglement in resettlement (Tuck & Yang, 2012; Todd, 2016).

Papers which employed Indigenous methodologies or were guided with Indigenous perspectives were in the minority. However, these were the most consistent frameworks and strategies referenced as alleviating common challenges and supporting successful outcomes. Indigenous scholarship was also the primary source of reflective and critical discussion of methods in the reviewed literature, and typically offered a more pluralistic approach to engaging with multiple ways of knowing, the benefits of which are also highlighted by our results. Indigenous led projects were the least likely to engage in "validation" methods or to assert 'success' without community affirmation. This does not necessarily mean WSK has to take a backseat to all knowledge related projects, or that non-Indigenous academics should not pursue this work, but does emphasize that Indigenous perspectives are fundamentally vital to meaningful knowledge bridging for fisheries transformation.

2.4.1.2 Second: Prioritize Practical Adjustments

Second, efforts to bridge or co-produce knowledges in fisheries need to prioritize practical adjustments regarding transparency, adaptability, and capacity investment. By "practical adjustments," we mean relatively simple shifts in project design and praxis according to specific priorities in methods of implementation which support trust, transparency, adaptability, and long-term capacity. While there are a wide array of challenges and some gaps in understanding how different strategies might address them, a variety of straightforward strategies potentially mitigate many of these uncertainties. Those highlighted by this review are (1) investment in expanding

local capacity including funds, resources, and skills (where appropriate and in a non-paternalistic manner), (2) ensuring transparency of clear and adaptable project methods through reciprocal communication and flexible project design, and (3) building trust and long term strategic partnerships between management actors, and especially between Indigenous leaders and non-Indigenous practitioners or researchers engaging in knowledge "integration." These are relatively simple adjustments to project design that can be applied across a wide variety of knowledge and participation frameworks.

2.4.1.3 Third: Prioritize Pluralistic, Collaborative Frameworks Over Utilitarian "Integration" Approaches

Third, knowledge co-production through relational collaboration and plural understandings of knowledge systems should be prioritized over utilitarian "integration" or WSK-led "validation" strategies. The utilitarian treatment of TEK/IK as sources of discrete information, especially in the context of top down or State led "integration" efforts, not only risks perpetuating colonial harm but can actively exacerbate challenges and contribute to unsuccessful "integration" efforts. Beyond the discussion in our introduction regarding the problematics of dichotomous views of knowledge systems and the hegemonic nature of knowledge "validation" through WSK, this review provides evidence that these frameworks do not necessarily achieve desired outcomes. Even when validation affirms TEK/IK as a legitimate source of information, excess scientific review undermines the intent to broaden a knowledge base beyond science, and decontextualizes TEK/IK into discrete pieces of information valued on its utility and scientific legibility. Decision-making processes that reject TEK/IK without proof of validity through WSK reinforce knowledge hegemonies, epistemic exclusion of Indigenous ways of knowing, and fragmented understandings of knowledge systems. Co-production processes and more plural understandings of knowledge typically avoided these issues and supported successful outcomes. Various different approaches

can meet this shift, but all require collaborative approaches to knowledge definition and production and a baseline rejection of hierarchical conceptualizations of WSK and IK/TEK, where both realms of expertise are concurrently recognized for their strengths, and are equally held to account when necessary (McGregor, 2002; Bartlett et al., 2012; Muller, 2012; McMillan & Prosper, 2016; Maxwell et al., 2019; Reid et al., 2020). The small subsection of Indigenous authored or coauthored papers offered a variety of Indigenous frameworks that already approach this plural understanding, further underlying the necessary prioritization of Indigenous perspectives. Non-Indigenous scholars should consider how to approach pluralisms in their own work, to ensure that WSK and TEK/IK can build off of each other without subjugating TEK/IK under WSK – directed knowledge extraction and validation. Whyte (2013, 2017) offers working collaboratively with Indigenous partners to develop a shared, contextually appropriate understanding of 'knowledges – in – place', and urges non-Indigenous scientists and practitioners to reflect on their valuation of Indigenous knowledges as a starting point.

This is not an argument for fully conflating TEK/IK and WSK; these ways of knowing overlap in epistemological tools and strengths, but are situated in different worldviews, cultural contexts, and practices of knowledge sharing (Latulippe, 2015; Reid et al., 2020). The emphasis here is instead on a critical reflection regarding a projects' potential privileging of WSK and use of assimilative "integration" language, and an invitation to shift from a lens of "integration" and "validation" towards less hegemonic strategies of knowledge coproduction and plural recognition which are more fundamentally participatory, contextually adaptable, and tend to support meaningful 'successful' outcomes.

2.4.1.4 Fourth: Prioritize Indigenous Leadership and Power-Sharing in Co-Management, Co-Governance, and Participatory Approaches

Finally, participatory approaches and co-management must feature genuine power sharing with Indigenous collaborators and recognition of Indigenous authority. To move beyond claiming knowledges as equal to fundamentally enacting that philosophy requires genuine partnership with knowledge holders, and equal advancement of Indigenous knowledges with scientific achievements (Coombes et al., 2014; Sunderberg, 2014; Latullippe, 2015). A clear emergent pattern from our review is that participatory strategies that meaningfully recognized or even deferred to direction by Indigenous structures of leadership, and those which operated from a bottom-up or community-driven approach to knowledge generation and mobilization support success. Meanwhile, 'participatory' frameworks or 'co-management' that only nominally involve community members, especially in top down or state led approaches exacerbate, issues. "Participation" alone is an insufficient descriptor for a project's methodology, and practitioners looking to pursue knowledge coproduction or the meaningful and effective mobilization of Indigenous ways of knowing in fisheries must intentionally consider the implications of their chosen strategy in engaging with TEK/IK and Indigenous partners.

The emergent pattern highlights the importance of participation that moves beyond tokenism towards partnership or even citizen control (Arnstein, 1969), ultimately through a sharing or delegation of power to the Indigenous community in context and a recognition of Indigenous authority and principles. Moving beyond co-management to co-governance is a similar shift, also supported by trends in our results. In many Indigenous frameworks, protocols are fundamental to accountable, reciprocal partnerships with Indigenous collaborators (Atleo, 2011; Whyte et al., 2016). Relationality is also key to many Indigenous philosophies of research and environmental study (Kovach, 2009; Smith, 2012; McGregor et al., 2018; Kannegieser &

Todd, 2020; Tynan 2020, 2021). When developed with Indigenous leadership in recognition of Indigenous authority, relationally informed protocols support mutual responsibility in shared commitment to knowledge coproduction and mobilization for shared environmental and sociopolitical objectives. An important aspect of following through with this commitment is for practitioners to seek affirmation of "success" from Indigenous partners; unilateral claims of success are counter to a collaborative approach, and reinforce a paternalistic role of non-Indigenous practitioners in assessing the status of Indigenous peoples and systems. Non-Indigenous practitioners should prioritize partnerships with Indigenous partners that root all stages of project design, implementation, and assessment in collaboration and partnership.

Finally, awareness of power dynamics in participatory processes is important in supporting the three other priorities. Intentional, reflexive recognition of existing power dynamics between State governance, western fisheries management and researchers, and Indigenous communities should direct strategies away from extractively collecting or 'validating' knowledges and towards more pluralistic approaches, recognition of Indigenous perspectives, and both practical and systemic shifts in management and governance beyond broadening what 'counts' as data. These steps are among the necessary shifts for remedying rather than perpetuating or amplifying uneven power relations (Muller 2012; Reid et al., 2020). Pursuit of co-management, and especially co-governance, must be attuned to power and prioritize meaningful recognition of both Indigenous ways of knowing and Indigenous authority.

2.5 Conclusion

Peer reviewed papers presenting efforts to bridge, mobilize, or "integrate" Indigenous and Western scientific ways of knowing in fisheries are a growing body of literature. An important concern regarding these efforts is that assimilative knowledge 'integration' under

dichotomous Western frameworks of knowledge and top down bureaucratic structures are liable to cause harm to Indigenous communities through perpetuated epistemic and institutional exclusion, without producing the improved knowledge base or effective management and governance of fisheries they claim to pursue. Based on the patterns we've observed in this literature, holistic and plural approaches to knowledge systems and especially deep participatory and community-based strategies that recognize and uphold Indigenous authority provide an alternative to the current status quo of knowledge integration in fisheries. Indigenous perspectives and broader geographic representation are still lacking but recently increasing, and consistently emphasize the importance of deep participatory work and a rejection of knowledge dichotomies and hierarchies.

Of the many possible iterations of participatory and collaborative strategies, those that were lead or co-led by Indigenous communities and pluralistically engage knowledges were most likely to support positive, intended outcomes, mitigate challenges, and produce community-affirmed success. Rooting efforts to bridge and co-produce multiple knowledges in frameworks and strategies that center power sharing is imperative to shift knowledge 'integration' from an assimilative practice to a collaborative and equitable practice of knowledge mobilization and co-production. We encourage non-Indigenous researchers and practitioners to move away from dichotomous approaches to knowledge systems and scientific validation of TEK/IK, in favor of a more plural understanding of knowledges, and prioritize Indigenous recognition and power-sharing in the strategies and methods employed in efforts to bridge and collectively mobilize multiple ways of knowing. Specificities of these methods will necessarily vary across contexts, but we suggest that the four priorities we've identified can be useful starting points.

There is great potential to explore how these more transformative approaches to co-producing and mobilizing multiple ways of knowing in fisheries governance and management

could not only avoid exacerbating challenges but lead to greater success and more holistic social, political, and environmental positive outcomes. These adjustments will take time and, importantly, a growth in critical reflexivity within fisheries and academia, including a willingness to recognize and deconstruct these institutions' systemic colonial legacies and to challenge nominal or tokenizing approaches to 'participatory' management and knowledge 'integration.' In the meantime, fisheries research, management, and governance structures can and should immediately prioritize practical adjustments identified here to facilitate improved efforts to mobilize multiple ways of knowing in fisheries.

3. Knowledge Pluralism in Tla-o-qui-aht First Nation Salmon Management

3.i Publication note

This chapter was co-authored with Saul Milne, Grant Murray, and Terry Dorward, with review from Tla-o-qui-aht collaborators. The chapter was previously published in May 2021 in the journal Frontiers in Marine Science in their Marine Conservation and Sustainability section as a part of a research topic entitled "Marine Conservation: Knowledge, Experience and Tools for Change" and is reprinted here with permission (Bingham et al., 2021). The pronoun "we" is used for the first-person voice in this chapter to reflect the co-authored nature of this effort. Ha'oom Fisheries Society and T'aaq-wiihak are both referenced in a way reflective of the existing status of the five Nation's fishery management and rights implementation institution as it existed at the time of writing and publication, and so are described slightly differently than in the rest of the chapters. I have elected to keep the description as is since it is accurate to the context at the time of writing, and illustrates changes to the institutions referenced in other chapters that occurred during my research partnership with Tla-o-qui-aht. It also provides insight to my own growth in understanding over time through the work, as over two years passed between publishing this chapter and completing the dissertation. I have added a figure that is not in the original publication but has since been a key tool in presenting this work to broader audiences and illustrates the structures described in the results. As in the Introduction and in the following chapters, I have also included a quote to preface the chapter from an interview with Tla-o-qui-aht's Aboriginal Fisheries Manager which was not a part of the original publication but helps to situate this chapter within this dissertation and more specifically within this story from the voices of those who live it.

3.ii We've been doing it on our scale here, on our local scale

> "We go there [to the rivers and fish streams]. We [TFN Natural Resources and Fisheries] mostly concentrate on the conservation and protection. We're able to because [Tla-o-qui-aht Tribal Parks] are taking on the environmental role. … we show them how to get to these places [key habitats]. My guys are familiar with environmental work, but it's nice that Parks is able to do it. Hopefully we can start to get [Clayoquot watersheds] rebuilt … to restore habitat and enhance, not just Coho or Chinook, but all the salmon that are present in the system now. We need Chum, we need Coho, Sockeye, and Chinook. But the knowledge I have also comes from my father, who was in salmon enhancement. I don't know how long - probably as long as I am right now. 30 years in. He's the one that showed me where to go, when to go and what to expect to see. … That's exactly [traditional ecological knowledge] because that's what he told me his grandfather showed him as a kid. It was all connected, right? They didn't just go there and learn about salmon, he showed them … everything that is in the environment, whether it was in medicine or bears or fish and providing other forms of sustenance like deer and stuff. He showed my father. And it wasn't just my father's father. It was also his uncles that he always told me about. People share their knowledge of our Nation's territory to teach the next generation of what is supposed to be there - not what is there, that is important. They always talked about what was there. And he shared with me.
>
> …
>
> You know, I've also said that Europeans have been here a long time. We have to listen to them, too, because we're able to mix the two now. Fisheries [DFO] here, they're seeming to be just grasping that now. Like, okay, we have to mix this somewhere. Well, guess what, guys? We've been doing that here, in Tla-o-qui-aht, and in a roundtable over our traditional knowledge and Western knowledge. So we've been doing it on our scale here, on our local scale. And Fisheries seems to be finally getting the message.
>
> …
>
> [For] true management, I like to think of us as a whole. It's not just management for Tla-o-qui-aht or the [Canadian] government, but this whole community. … I've always said that to our people. You know what? [Settlers] They're not going anywhere. We need them now. They're there. Their science, and our traditional knowledge, we need each other. And it's going good. Fisheries is finally sort of accepting traditional knowledge and I think that's because we're partnering with our whole community now, rather than individuals."
>
> - Tla-o-qui-aht Aboriginal Fisheries Manager, October 2021

3.1 Introduction

There is growing interest in the 'integration' of Western science with the knowledge and values held by Indigenous peoples into natural resource governance and management. The stated intents of these efforts to 'bridge' or 'integrate' Indigenous knowledges with western science include enriched ecological knowledge, improved decision-making processes and outcomes in

conservation and management, and empowerment of Indigenous peoples (Berkes, 2009; Weiss et al., 2013; Mistry & Berardi, 2016; Whyte, 2018; Ban et al. 2018.; Thompson et al. 2019; Thompson et al., 2020; Wheeler & Root-Bernstein, 2020; Reid et al, 2020). Some of this work has cautioned against 'integration' efforts that feature an artificial dichotomization of these knowledge systems, appropriation of one knowledge into another based on perceived utility to western scientific management objectives, or conditional validation where non-scientific knowledges are only accepted as legitimate if they match assumptions in western science (Mistry & Berardi, 2016; Weiss et al., 2013; Reid et al., 2020). Integration efforts like these serve to echo harmful colonial histories, displace Indigenous values and worldviews, limit the agency of Indigenous peoples and marginalize their own decision-making processes, precipitate negative ecological and socio-cultural outcomes, and contribute to Indigenous peoples' distrust of Federal governments (Coombes et al. 2014; Whyte, 2013; Muller et al., 2019). In this article, we build on work that challenges this legacy and pushes towards equitable, just, and decolonized practices in resource management.

In the academic literature, Indigenous knowledge (IK), often termed traditional ecological knowledge (TEK), broadly refers to environmentally oriented ways of knowing which are place-based, adaptive, acquired experientially and intergenerationally, and held by Indigenous peoples (Berkes, 2012; Ban et al., 2018; Wheeler & Root-Bernstein, 2020). IK is contextualized by specific worldviews and cultural practices and formed through close relationships with the local environment and with community (Berkes, 2012, Thompson et al. 2020). There is no single Indigenous knowledge system, and IK cannot be selectively described through discrete pieces of information; knowledge is embedded within the worldview and traditional practices of an Indigenous community (Wheeler & Root-Bernstein, 2020). English language and academic articulation of IK/TEK originated in international development and adaptive governance literature

(Agrawal, 1995; Whyte, 2013). These definitions are sometimes embedded in controversy and tend to privilege non-Indigenous and scientific agendas or frame IK/TEK as a way to fill gaps in scientific knowledge through assimilation (Whyte, 2013; Reid et al., 2020).

In seeking a clear definition of IK/TEK and an articulation of the differences and relationships between science and IK/TEK, Indigenous and scientific ways of knowing are often treated dichotomously. Mistry & Berardi (2010) among others (Whyte, 2013; Weiss et al., 2013; Reid et al., 2020) note that science has been framed as superior in accuracy, rigor, objectivity, modernity and reliability. Some academic literature has specified science as different from IK/TEK through its systematic processes and positivist or reductionist perspectives and in noting that science is perceived, if erroneously, to be more objective and less culturally embedded than Indigenous ways of knowing (Weiss et al., 2013; Muller et al., 2019). Hypothesis and experiment driven science and (especially quantitative) data is often contrasted with place-based, relationally-driven, experiential knowledge shared through storytelling, ceremony, and other oral traditions (Ban et al., 2018; Wheeler & Root-Bernstein, 2020). However, these differentiations are not absolute nor do they inherently make science more accurate or relevant. There are also clear epistemic similarities in these knowledge systems. Both scientific and Indigenous ways of knowing frequently rely on observation, are developed and applied through culturally embedded processes and the integration of new technologies, and can seek to understand ecological systems and the impacts of human behavior (Kimmerer, 2013a; Ban et al., 2018; Weiss et al., 2013). Differences between Indigenous and scientific ways of knowing are more ontologically grounded; for example Indigenous ways of knowing center relational worldviews (Datta, 2015) and a focus on connection, compared to practices of categorization or separation in western knowledge traditions (Muller, 2012).

Indigenous scholars Whyte (2013, 2018), Kimmerer (2013a, 2013b), and Marshall (Bartlett et al., 2012), among others, reject ideas of a hierarchical division between science and IK, the supposed objectivity of western science, and the categorization of IK as antiquated, lacking rigor, or dependent on myth. They argue that dichotomous views of Indigenous and scientific ways of knowing preclude collaborative relationships and shared understanding between Indigenous peoples and environmental scientists and conservation practitioners. Further, recognition of IK as valid alongside rather than mediated or subjugated by science is important for disrupting colonial legacies in resource governance and for more effectively integrating knowledges into management efforts (Whyte, 2013; Muller, 2014; Reid et al., 2020).

The challenges of knowledge integration efforts are exemplified in salmon fisheries of the west coast of Vancouver Island, BC, Canada (WCVI) where governance features contested sovereignty between Canada and First Nations (Indigenous peoples). In this chapter, we discuss an example from Tla-o-qui-aht First Nations and the management of Coho salmon (*Oncorhynchus kisutch*) on WCVI. We describe TFN's management priorities for Coho, contextualized through Tla-o-qui-aht worldview, and consider the roles of western science and Indigenous knowledge in TFN's salmon governance and management. We demonstrate a practice of integration that enacts knowledge pluralism embedded in the salmon governance and management of Tla-o-qui-aht First Nations. In this case, knowledge pluralism refers to the idea that Indigenous and scientific ways of knowing are fluid, evolving ways of knowing that are mutually informative and may be concurrently mobilized. We conceptualize knowledge plurality by drawing on epistemic pluralism (Carter, 2017) and on Indigenous frameworks for knowledge coexistence which reflect a philosophy and practice of embracing collaborative knowledge generation, recognizing strengths in Indigenous and scientific knowledges, and rejecting dichotomous definitions between knowledge systems (Whyte, 2013; Reid et al., 2020). Our use of

the term “pluralism” is reflective of ontological multiplicities discussed by Howitt & Suchet-Pearson (2003, 2006) and Mol (1999) and requires attention to Indigenous diversity and particularities (Howitt et al., 2009; Reid et al., 2020).

The specific details in this chapter directly stem from 6 year research project entitled EPIC4[1] that utilizes western science and is intended to support application of conservation tools and technology to Coho salmon management. EPIC4 itself grew out of a long-term engagement between authors on this project through multiple research-oriented projects spanning close to 15 years that have built considerable trust, identified shared areas of interest and that have collectively sought to maintain ethical engagement with First Nations’ governance structures and uphold First Nations’ agency. The specific goals of this article are to illuminate Tla-o-qui-aht values, worldviews and knowledge development and decision-making processes relevant to the management of coho and to demonstrate the strengths of a practice of knowledge pluralism that differs from most western scientific management or academic approaches of knowledge integration.

3.2 Methods

3.2.1 Case Study: Tla-o-qui-aht First Nations

The traditional territory (*hahouthli*) of the Tla-o-qui-aht First Nations (TFN) is on the west coast of Vancouver Island and encompasses the southern watersheds of Clayoquot Sound, three Tla-o-qui-aht communities, and the Canadian town of Tofino. TFN is one of fourteen language-sharing Nuu-chah-nulth First Nations who have lived along the west coast of Vancouver Island for thousands of years. The history between Nuu-chah-nulth people and

[1] EPIC4 (Enhanced Production in Coho: Culture, Community, Catch) is an ongoing research project, funded from outside of the Tla-o-qui-aht community, seeking to address challenges in coho salmon conservation and management through genomics. This paper does not explicitly consider genomics. It is part of one section of EPIC4 focused on First Nations’ knowledge mobilization and project impacts to community well-being.

Canada following white settlement includes violent displacement, forced assimilation, resource disputes, and contested sovereignty. First Nations have well-established structures of resource governance but have historically been subjugated by de jure and de facto practices of Canadian governance systems (Truth and Reconciliation Commission, 2015; Ban et al., 2019). The history of conflict over territory and resource use rights between Canada and First Nations complicates tense and often antagonistic negotiations over fishery management decisions.

Canada attempts to accommodate asserted food, social, and ceremonial (FSC) fishing rights of each Nuu-chah-nulth First Nation and, after lengthy and ongoing struggles in the courts, recently recognized the commercial fishing rights of five Nations, including Tla-o-qui-aht (Ahousaht et al. v. Canada, 2018). T'aaq-wiihak (fishing with the permission of the chiefs) and Ha'oom Fisheries Society were developed to coordinate negotiating and implementing these rights. T'aaq-wiihak negotiates with Fisheries and Oceans Canada (DFO) to determine catch allocations, season openings and lengths, and other restrictions. Ha'oom works collaboratively with each of the five Nations to implement the results of negotiations through managing demonstration commercial fisheries and establishing local practices for the catch monitoring, restoration, enhancement, and harvest of salmon populations. Recent modification of the Fisheries Act (Bill C-68, 2019) includes a directive for DFO to incorporate Indigenous rights and knowledge into fishery management practices and to strengthen obligations to build partnerships with First Nations. While Federal strategies towards meeting this legislative mandate are evolving, Tla-o-qui-aht and other FNs have developed their own strategies of applying traditional and scientific knowledges in territorial resource governance and management. TFN hopes to eventually hold full agency over the management of fish stocks within their traditional territories.

The five species of salmon (*Oncorhynchus spp*.) native to BC waters hold high economic value to many coastal BC communities and are integral to the well-being of Nuu-chah-nulth First

Nations on Vancouver Island (Atleo, 2011; George, 2003; Price et al., 2017). Wild salmon populations across British Columbia have not recovered from drastic declines despite fishery closures and population supplementation through hatchery propagation (Price et al., 2017). Recent escapement surveys estimate coho numbers in the Tla-o-qui-aht watersheds to be at a fraction of the 12 year average, and some river surveys report returning coho numbers in the single digits (DFO, 2019a, 2019b, 2020). Management is complicated by a limited ability to differentiate wild from hatchery fish, identify spawning origins of wild fish, prevent genetic introgression, and to easily identify wild fish as part of specific Conservation Units (Price et al., 2017). With these challenges in mind, First Nations and DFO are highly invested in salmon conservation and management using both Indigenous knowledges and scientific tools.

3.2.2 Information and Analysis

Our approach used ethnographic traditions grounded in critical theory within a western research paradigm that was also informed by the growing literature on indigenous methodologies. A western research paradigm is limited in its ability to account for and incorporate Indigenous worldviews, so we referred to Smith (2012) and the reflections of Coombes et al. (2014), and Reid (2020) on the praxis of appropriately engaging in critical research with an Indigenous community, especially regarding the importance of Indigenous leadership. Further, we centered relational ontologies in our conceptual framework (Datta, 2015) and placed ethics and reciprocity as central to the methodology (Kovach, 2010).

We prioritized direction by and meaningful engagement with Tla-o-qui-aht First Nations, building on a 15 year history of work together. TFN representatives led our conversations towards developing research objectives and we followed TFN's formal permission guidelines to conduct the research and write about Tla-o-qui-aht knowledge, governance, and management practices. All research objectives, methods of data collection, and agreements on data and

research ownership were first reviewed and approved by TFN through the Tla-o-qui-aht Traditional Research Council (TRC). We collaborated with the TFN administration and Ha'oom Fisheries Society in collecting data. In developing the results presented here, we synthesized information provided through the review of relevant documents (e.g. post-season reports, management protocols), 12 individual conversations with TFN resource managers, administrators, and Elders between August 2018 and November 2019, two TRC meetings in 2018 and 2019, co-development of written records of TFN *cuẁit* (coho) management protocols with TFN's natural resources manager, and observation of five Salmon Roundtable[2] meetings between November 2018 and February 2021. Most stories by elders were shared in a group during the TRC meetings. Individual conversations were held at the TFN offices, following introduction by a community liaison. Documents were acquired either through publically available records or were provided directly by a TFN archivist, whose work was financially supported in part by this research. TFN leaders discussed and verified research findings with the authors. All research efforts were guided by a community liaison supported by the project who is listed as the fourth author on this paper.

3.2.3 Positionality and Limitations

The first and third authors are non-Indigenous researchers with white settler lived experience. The second author is Indigenous (Xwchíyò:m) and works with T'aaq-wiihak in negotiations and with Ha'oom in implementation. The fourth author is also Indigenous (Tla-o-qui-aht) and is a Tla-o-qui-aht Councillor, TFN Parks Project Coordinator, and plays a crucial role as a liaison and guide in this research. Other Tla-o-qui-aht collaborators have expressed

[2] The WCVI Salmon Roundtables are bi-annual meetings between First Nations, commercial and recreational fishers, DFO, and other stakeholders to address salmon research, restoration, enhancement, and harvest planning efforts through co-management processes. Meetings are coordinated and moderated by West Coast Aquatic.

support and approval of this paper and have for their own reasons chosen to not be listed as individual authors though we do work together to produce other allied research products of direct interest and value to Tla-o-qui-aht First Nations. We write with the intent to act as ethical allies to our Tla-o-qui-aht colleagues but not to speak for their experiences or interests. We extend gratitude for their leadership and guidance in this research.

When reviewing Nuu-chah-nulth values, sacred principles and relationships with salmon, we do not provide a complete summary or speak for Nuu-chah-nulth experience. As the first three authors are not Nuu-cha-nulth people, we cannot explain Nuu-chah-nulth worldviews or experience with complete accuracy, nor is it our rightful place to do so. Instead, we recommend the reader refer to work by Nuu-chah-nulth scholars (Atleo, 2008a; Atleo, 2008b; Atleo, 2004, 2011; Coté, 2019; George, 2003).

3.3 Results

We separate our results into broad categories (worldview, management priorities, knowledge pluralism, and external relationships) to illuminate the key aspects of how knowledge is produced, valued, and deployed towards the management of *cuẁit* and other salmon in TFN.

3.3.1 Nuu-chah-nulth relational worldview and traditional practices

TFN managers and Elders emphasized that all aspects of resource governance are informed by values grounded in the Nuu-chah-nulth worldview and that decisions regarding the enhancement, restoration, and harvest of salmon populations are bound by these traditional values and principles. This includes ways of collecting, sharing, and using knowledge as well as processes of decision-making. Elders and managers stress that external partners learn about Tla-o-qui-aht values and worldview when engaging with Tla-o-qui-aht resource governance, especially in any attempts to connect western science and management with Tla-o-qui-aht

practices. Here, we offer some broad descriptions of this worldview, focusing on what Tla-o-qui-aht Elders and fishery managers identified to be of key importance for non-Nuu-chah-nulth practitioners to understand about salmon management in the Tla-o-qui-aht *hahouthli*.

The Nuu-chah-nulth worldview is grounded in the concepts of *His-shuk-nish-t'sa-waalk,* or "everything is one" and *Iisaak*, or "respect with caring" (Atleo, 2004, 2011). In this relational worldview, all components of the physical and spiritual worlds are understood as intimately connected; everything impacts everything else through close knit and sacred relationships (Atleo, 2004, 2011). Recognition, Respect, and Reciprocity are core principles in the Nuu-chah-nulth value system that honor and maintain these relationships (Atleo, 2011; TFN, 2020). Salmon, including *cuẁit* (coho), hold a particular relational value within the Nuu-chah-nulth worldview. Traditional stories, for example, tell of the Salmon people as "blood relatives" and as sacred knowledge holders with whom the people hold an important reciprocal relationship: salmon offer themselves as food in exchange for the people's celebration by public ritual and for the care and guardianship of the rivers (Atleo, 2011). Much of Tla-o-qui-aht's management for salmon is therefore focused on habitat restoration through traditional river guardianship to address the lasting detrimental impacts of forestry practices on freshwater habitat (DFO, 2002; TFN, 2020).

In addition to honoring valued relationships through respect and reciprocity in ceremony, habitat restoration, and harvest, Nuu-chah-nulth worldview guides traditional governance practices in political oversight of salmon management. For example, TFN's administrative natural resource management plans require approval of the Council of *Hawiɬ* (hereditary chiefs). The *Hawiɬ* review management plans to ensure that they follow *His-shuk-nish-t'sa-waalk* and *Iisaak,* uphold Tla-o-qui-aht's values, and honor traditional practices (TFN, 2020).

3.3.2 Priorities: Enhancement, Restoration, Harvest

Tla-o-qui-aht's protection of salmon is organized into three strategic programs: restoration of key habitat to improve salmon survivorship, enhancement of fish populations through Tla-o-qui-aht owned hatcheries, and careful harvest management that upholds traditional practices and relationships without further threatening the fish stock (Figure 9). Restoration and enhancement programs support stock health and abundance, annual rates of return, and reproduction in salmon populations. Harvest programs address both home[3] fisheries and commercial salmon fishing, though *cuẁit* populations are currently too low to support commercial harvest within the *hahouthli* (TFN, 2020). Strategic programs are intended to "reinvigorate and maintain important relationships between *cuẁit* and the Tla-o-qui-aht community," and support continued traditional practices in river guardianship, fish harvest, and ceremony (TFN, 2020). According to TFN resource managers and Elders, these strategies are maintained for multiple additional reasons including protecting culture, identity, and knowledge, honoring sacred relationships, abiding by Nuu-hah-nulth worldview, and enacting Tla-o-qui-aht sovereignty in the *hahouthli*.

[3] TFN refers to FSC fisheries as "home" fisheries.

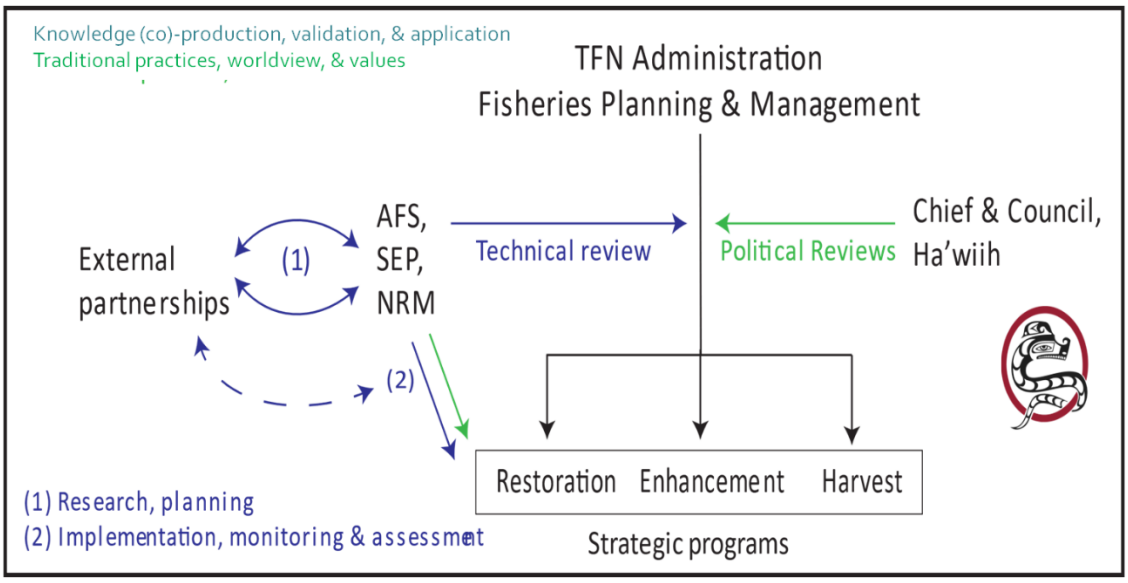

Figure 9: Representation of the general process of strategic program development for Tla-o-qui-aht fisheries. Administrative positions responsible for implementation of management programs include the Aboriginal Fisheries Strategy Manager (AFS), Salmon Enhancement Program Manager (SEP), and Natural Resource Manager (NRM).

Tla-o-qui-aht recognize that dwindling numbers of *cuẁit* and other salmon threaten a food source and the sacred, reciprocal relationships between people, salmon, and rivers. All of TFN's cuẁit management programs are designed to prioritize abundance and genetic diversity of coho. Only then does the maintenance of home fisheries follow, with commercial harvest as a long-term goal. This order of priorities was explained to us by a Tla-o-qui-aht fishery manager as: "putting the health and abundance of the fish first, so our relationship … supports productive and healthy fish." River habitat restoration and enhancement of wild *cuẁit* populations follows tenets of respect and care for the salmon. Harvest would enable salmon to perform their side of the relationship, but cannot be supported without proper respect, recognition and reciprocity through Tla-o-qui-aht guardianship. To prioritize harvest over restoration and enhancement would further harm *cuẁit* populations. One Elder carefully differentiated this approach from sustainability frameworks in scientific fishery management: "We understand the concept of sustainability, but

the way you [white people] use it frames the fish only in how they are useful to people. Sustainability sets our goals low ... rather than high enough to support both our needs and the fish's needs." In a Traditional Resource Council meeting, an Elder called this approach, "abundability." This order of priorities stands following the affirmation of TFN's commercial fishing rights. TFN intends to eventually hold full authority over a commercial *cuẁit* fishery within the *hahouthli*, developed and managed through this philosophy, but does not plan to open a terminal commercial fishery in the *hahouthli* until *cuẁit* populations have substantially increased (TFN, 2020).

3.3.3 Knowledge Pluralism

Although Nuu-chah-nulth worldview and traditional practices are central in Tla-o-qui-aht governance and management, scientific knowledge also plays an important role in informing decisions and monitoring management efforts. TFN works towards achieving management goals through application of the "best available knowledge" (TFN, 2020). TFN considers "best available knowledge" to include both Nuu-chah-nulth and scientific approaches to such tasks as stock assessments, river surveys, and monitoring environmental change. TFN's staff includes an Aboriginal Fishery Manager (AFM) and a Salmon Enhancement Manager (SEM), who are trained as traditional Guardians[4] and are well versed in scientific data collection and interpretation in the context of fisheries biology and management. Guardians hold important Indigenous knowledge of river systems and fish populations, abide by traditional practices of river stewardship according to Nuu-chah-nulth values, and guide traditional river walks to assess habitats, among other duties. They also coordinate their work with external collaborators,

[4] TFN Guardians represent the Nations' interests with regard to the *hahouthli*. In traditional Tla-o-qui-aht governance, individual keepers are trained from a young age as guardians and knowledge holders of specific systems (eg. river keepers or *c'ac'aɬuk*). In the absence of active *c'ac'aɬuk*, TFN Guardians currently fill those missing roles (A. Jackson, personal communication, February 11, 2021).

consulting with fishery biologists from other management agencies such as Ha'oom, and nonprofits such as the Clayoquot Biosphere Trust. TFN Guardians oversee stock assessments, escapement surveys, and other scientific monitoring projects conducted by fishery biologists in their waters. They communicate with Tla-o-qui-aht fishers about the dates of salmon runs and the patterns of return to collect experiential knowledge of salmon populations in the rivers. Information from scientific surveys, river walks, and fisher consultation are utilized together in TFN's decision-making and development of restoration, enhancement, and harvest plans (TFN, 2020) (Figure 9).

TFN's administration values this synthesis of traditional and scientific approaches to knowledge production for well-informed management, particularly with regards to restoration and enhancement projects. Emerging scientific technology that may be useful for improving management strategies is considered positively, but carefully guided through Nuu-chah-nulth worldview and TFN authority when applied with traditional knowledge practices to well-informed management plans (Figure 9). For example, the SEM and AFM expressed interest in the possibility of utilizing genomics to improve enhancement efforts. Important to this application, however, is that such tools are used concurrently to Tla-o-qui-aht knowledges and alongside traditional practices, and that their application is overseen by Tla-o-qui-aht AFM, SEM and other relevant TFN staff or Guardian and with deference to the *Hawiɬ* and elected Chief and Council.

3.3.4 External governance and management relationships

Tla-o-qui-aht's pluralistic approach to knowledges is further evident in their external relationships. Clayoquot sound and coastal waters are shared with multiple stakeholders, including non-Indigenous commercial and recreational coho fishers. TFN currently does not have unilateral decision-making power in their watersheds. External collaborations with Ha'oom, T'aaq-wiihak, and local research and conservation groups are important in navigating this reality.

The *Hawił* and elected Chief and Council appointed a Lead Negotiator to work with T'aaq-wiihak and Canada in reconciliation efforts. Ultimately, DFO oversees the conservation efforts regarding WCVI salmon, sets limits to total allowable catch across all harvest, and determines allocation of catch to recreational, commercial, and First Nations fisheries. In this context, it is advantageous to First Nations' to demonstrate their understanding of scientific reports and language while advocating for inclusion of their interests and knowledge in DFO management plans. When communicating with local DFO representatives during bi-annual Salmon Roundtables, for example, TFN's fishery managers use storytelling to convey Tla-o-qui-aht knowledge and advocate for Nuu-chah-nulth principles in addition to discussing scientific data sets presenting stock assessments, pathogen rates, and other statistics gathered and presented by DFO representatives through scientific methodologies. TFN considers such quantitative data alongside traditional knowledge when responding to DFO's draft regional management plans. In the following chapters, I consider how knowledges and knowledge mobilization are strategically engaged across external relationships, especially between TFN, Ha'oom, and DFO, and where plural approaches similar to those internal to TFN are reflected.

3.4 Discussion

Tla-o-qui-aht's management of rivers and salmon reflects a robust use of Indigenous and scientific ways of knowing, applied together to strategic management programs informed by an Indigenous worldview that honors relationships with salmon. IK and science are not treated as separate bodies of knowledge requiring translation of static pieces of information. Instead, they are actively co-constructed and mobilized together. Specific structures and individuals within TFN salmon governance and management facilitate this approach. TFN managers and Guardians – often the same person - play multiple roles within different ways of knowing and

communicating, enacting and guiding the ontological pluralities that shape TFN's river and fishery management practices. TFN's governance structures allow for the sharing of multiple knowledges in decision-making, guide traditional and scientific practice in *cuẁit* management, and help to make the data or knowledge gathered legible to both traditional leaders and to external collaborators. Overall, TFN's *cuẁit* management is grounded in Nuu-chah-nulth worldviews, protects Tla-o-qui-aht identity through maintenance of traditional practices, employs scientific methods, is guided by intergenerational knowledge, requires internal political approval, and is communicated strategically to navigate multiple and ontologically diverse internal and external governance relationships.

Our findings reinforce that productive, meaningful, and ethical use of Indigenous and scientific knowledges doesn't necessitate separation of and translation between knowledge bases and instead benefits from collaborative and pluralistic strategies. Whyte (2013) proposes a philosophical shift to conceptualizing Indigenous knowledges as collaborative practice and notes that many definitions of Indigenous knowledge fit this framework which facilitates "cross-cultural and cross-situational collaboration among actors working for Indigenous and non-Indigenous institutions of environmental governance." Reid et al. (2020) point out that "it is the actions taken that matter most, rather that the words used to describe them" when considering pluralistic integration strategies through Indigenous frameworks like "Two-Eyed Seeing" or *Etuaptmumk* (Mi'kmaw). Epistemic plurality (Carter, 2017) is not the use of discrete pieces of information from multiple sources to understand a single reality, but rather the engagement with multiple perspectives, understandings, and ways of being to navigate shared and differentially experienced environmental realities which are highly context-specific. There is no singular 'correct' approach to these strategies in praxis; Indigenous diversity and specificity must inform knowledge pluralism through particularities of local contexts (Howitt et al., 2009).Well-

documented Indigenous frameworks include “Two Row Wampum” or *Kaswentha* (Haudenosaunee), “Double Canoe” or *Waka-Taurua* (Maori) and “Two Ways” or *Ganma* (Yolngu), all subject to contextual specificities (Bartlett et al., 2012; Muller, 2012; Maxwell et al., 2020; Reid et al., 2020). Along with these authors, we challenge dichotomous approaches to science and IK/TEK and instead point to Indigenous conceptualizations of collaborative, co-productive, multiplicative, or other congruent pluralistic strategies of knowledge production and application.

Indigenous leadership in facilitating the use of multiple knowledges within Indigenous territories is especially important. Indigenous leadership in knowledge integration supports Indigenous autonomy in environmental governance. This is important for improved local management outcomes and adaptive capacity in responding to environmental stressors such as climate change (Thompson et al., 2020; Whitney et al., 2020). Further, Indigenous leadership and self-determination are key to disrupting colonial legacies and harmful relationships of power (Reid et al., 2020). Resource governance implicates colonial pasts when western science takes precedence over or selectively uses Indigenous knowledges according to a western scientific management agenda and in the absence of Indigenous leadership (Muller et al., 2019). Rather than ‘integration’ strategies that subsume Indigenous wisdoms into western paradigms, Indigenous leadership in strategies such as the above frameworks are necessary to “remedy…existing power relations, respect differences ... and uphold, as opposed to diminish, their unique strengths”(Reid et al., 2020). Even the best intentioned knowledge integration efforts uphold colonial legacies and harmful power dynamics if directed within an Indigenous space by non-Indigenous peoples through hierarchical divisions of knowledges (Coombes et al. 2014; Howitt et al., 2009; Muller, 2014; Muller et al., 2019). In this case study, our collaborators emphasize that TFN leadership in research and management within the *hahouthli* supports TFN’s

agency and efforts towards self-determination. Throughout our research, our liaisons have guided us through traditional customs, deferral to TFN leadership in determining management objectives, and respectful consultation of Elders. They express that such engagement, following TFN's protocols of research permissions, better aligns the application of scientific methods and tools with First Nations' interests.

3.4 Conclusion

In this case study, Indigenous governance demonstrates effective pathways for applying science and Indigenous knowledges to local salmon management efforts through pluralistic knowledge mobilization and ontological multiplicity. These pathways, coordinated and led by Indigenous peoples, reduce the frictions presented in dichotomous approaches to knowledge integration for locally scaled conservation and management efforts. The exact strategies identified in this study are contextually specific and not necessarily transferable to other Indigenous communities. However, the philosophical approach embedded in the practices where Indigenous and scientific knowledges are recognized as multiple concurrent ways of knowing and being is more broadly informative. This epistemic pluralism, through Indigenous leadership, enables Indigenous governance to direct knowledge production and application, disrupts colonial legacies, and resists scientific dominance in local practice without compromising accuracy of data or quality of management practices. We hope this illumination is helpful for researchers and managers seeking to concurrently apply Indigenous and scientific knowledges to fishery governance and management in a meaningful, ethically responsible, and effective manner. Ultimately, this shift in 'integration' away from translation or assimilation and towards epistemic pluralism better supports Indigenous agency, empowers indigenous governance, and recognizes indigenous knowledges as valid in efforts to improve efficacy and equity of fishery management.

4. Entanglements and Pluralities: Mapping Governance Relations in Clayoquot Sound

4.i We weren't being listened to, not individually.

> **"**In my honest opinion, it's us that's seemed to care more about it than the ones that are supposed to be in charge [DFO], because everybody lives here. Everybody at the [Salmon] Roundtable … we all have the same concerns. And the first one is conservation and habitat. … we're saying we have no Sockeye, or our Coho is low, and our Chinook is, well, we're inching ever closer [to extripation]... First Nations in B.C., we're second only to conservation, and we're telling the department the numbers are there. We would tell them they're low, and they're like 'oh you can take 500, you can take 1,000. That won't matter.' And we're like, wait it matters to us, because of that thousand how many females are we going to remove from the system? How many eggs, how much of the future are we going to take? So individual Tla-o-qui-aht First Nation and all the other entities which are now one in terms of the Clayoquot Sound Salmon Roundtable - that's why we agreed, because we weren't being listened to, not individually."
> *– Tla-o-qui-aht First Nations Aboriginal Fisheries Manager, October 2021*

> "I think one thing we all want to see right here is that the resource is still here 50 years from now … I think another way is to reach some protocol, some agreement with all sectors for how we protect the resources. … I think that's what's missing here [in fisheries], is a governance agreement that brings in the locals. So when we had the provincial agreement, with [logging in] Clayoquot Sound, we created what is known as the Central Region Board. So we weren't looking for jurisdiction only for ourselves, but we wanted to bring in the municipality of Tofino, municipality of Ucluelet. And we also wanted to have representation from the forestry industry there. Then it became a shared decision making [body]. … And we look for much the same on fishing."
> *– Tla-o-qi-aht Lead T'aaq-wiihak Negotiator, November 2021*

4.1 Introduction

The question of how to create effective, sustainable governance for management of common pool resources systems, such as fisheries, has been a prominent issue of interest for decades (Symes, 1997; Ostrom, 1990, 1994, 2005; Kooiman & Bavinck, 2005, Jentoft & Chuenpagdee, 2009; Haas et al., 2021). Complexity increases with the number of social and political actors with overlapping interests and rights, and with an already degraded and vulnerable

resource system (Blomquist, 2009). The politicized nature of governance is particularly amplified in cases where rightsholders include colonially dispossessed and marginalized Indigenous communities seeking self-determination and reconciliation (Todd, 2018, Wilson, 2021; Lalancette & Mulrennan, 2022). These are also contexts where multiple worldviews, e.g. Indigenous and Western understandings of knowledge and governance, influence actor interests and relations. Ontological incompatibilities have been offered as an explanation for conflict between actors regarding knowledge production, decision-making, rule building, and authority (Blaser, 2013). However, multiple examples exist where co-management occurs between actors of multiple worldviews and priorities, and where governance efforts place multiple worldviews in conversation rather than conflict (Whaley et al., 2010; Denny &Fanning, 2016; Giles et al., 2016; Mustonen & Feodoroff, 2018; Maxwell et al., 2019). Growing discourses in resource management and critical geographies seek ways of building governance which "weave" together these multiple ways of knowing, being, and governing, especially with regard to issues of equity, justice, and appropriate treatment and recognition of Indigenous rights and knowledges (Alexander et al., 2019; Almack et al., 2023; Cooke et al., 2021a; Johnson et al., 2016; Memon et al., 2003; Weiss et al., 2013).

There is also opportunity - if not responsibility - to first ask how this "weaving" might inform approaches towards understanding (as opposed to designing) governing possibilities. Indeed, resource governance contexts with both Western and Indigenous actors cannot be appropriately analyzed and described from a purely Western approach to governance theory; Indigenous contexts require Indigenous perspectives (Kovach, 2009; TallBear, 2011, 2015;. Latulippe, 2015). Such contexts might be better understood through engaging multiple lenses of inquiry, for example where critical geographies and Indigenous theories may collectively contribute towards the analytical approach.

On the West Coast of Vancouver Island (WCVI) and particularly in the watersheds and coastlines of Clayoquot Sound, degraded salmon populations are of particular social, economic, environmental, and political concern across Indigenous and Canadian actors. Needs for conservation and restoration efforts are entangled with a shifting arrangement of access rights and management responsibilities as the rights-based multispecies fishery of five Nuu-chah-nulth First Nations grows following the assertion of fishing rights by five Nuu-chah-nulth First Nations through Canadian judicial systems (Ahousaht et al. v. Canada, 2009, 2018, 2021). The many actors present in Clayoquot Sound and the multiple concerns, challenges, and objectives regarding the conservation, restoration, and harvest of WCVI salmon contribute to a highly complex local social-ecological context in which these multiple actors attempt to negotiate governance and management action.

In this chapter, I explore how actor relations produce specific collective arrangements of governance with regards to salmon systems of Clayoquot Sound. I focus on relationships between actors in a complex array of interconnected environmental, social, and political challenges, and map the governance arrangements produced through these relations. I focus on several key actors, including First Nations' governing and management structures, Ha'oom Fisheries Society (HFS), Canadian ENGOs, and Fisheries and Oceans Canada (DFO). I describe the dynamically bundled and entangled nature of actor relationships and map the emergent arrangements of governance. I focus especially on the negotiation (or lack thereof) of rules and norms that vary across different actor relationships. These are reflective of multiple distinct yet intersecting ways of knowing and being, which I refer to as pluralities. I inquire how knowledges are mobilized through these entangled relationships and pluralities to inform decision-making, and the tensions produced through such arrangements of governance. Though there is a multiplicity of action arenas in the case context, I specifically focus on the locally produced characteristics of one, the Salmon

Roundtables, and the way it is shaped by and in turn shapes and mediates even politically contentious actor relations and facilitates the coordination of other collective arrangements of actor relationships. Finally, I consider the benefits and the tensions of the emergent governance strategies and structures, with attention to challenges where contention regarding rules-in-use are highly politicized through Canadian (non)recognition of Indigenous governing authority.

Following the reflections on pluralities from the previous chapters, I take a multitheoretical approach to this analysis in concurrently engaging concepts of relation informed by critical perspectives in geography and by Indigenous theories of relating and governing. I understand governance as a performative and dynamic process of assemblage, where structures and processes of decision-making are produced through and influenced by variable actor relationships. Through this approach, I demonstrate how implementing multiple lenses of inquiry allows flexibility in characterizing and mapping actor relations matched to the context of local perceptions of governance. This work offers insight towards approaching and understanding diverse ways of institution and governance building where a plurality of worldviews produce (or inhibit) actions of governance, including knowledge coproduction and collaborative management.

4.2 Theoretical Framework

I use the term governance in reference to the various structures, processes, and arrangements by which governing occurs, and where *governing* is the organization of order through rules, norms, strategies producing and produced through decision-making. Governance is distinct from management; it is a question of co-ordination across political, economic, and social dimensions (Bridge & Perreault, 2009). While *management* centers on the actions used to carry out decisions, *governance* attends to the ways in which decisions are made, including the various actors and authorities of decision making including and beyond the government of a nation state.

Institutions refer to the norms, rules, and strategies that structure processes of governance (Ostrom, 2005). Groups or individuals who are a part of these structures and processes are referred to as actors, and in general interact and make decisions within specific contexts and locations, or action arenas (Ostrom, 2005, 2011; Basurto et al., 2020). Governance may take a variety of forms and is a dynamic process where shifts in arrangements reflect changes across these dimensions (Bridge & Perreault, 2009).

'Governance' as an analytical and explanatory concept carries distinct meanings across disciplinary contexts. Various theoretical approaches towards governance make specific assumptions about the nature of actor relations, influence of environmental systems and species, and power, among other dynamics within a governance arrangement. I have elected to engage in the question of governance of salmon in Clayoquot Sound by interweaving threads of critical and feminist geographies and Indigenous understandings of relation, especially those specific to the Nuu-chah-nulth context. I take this approach for five reasons. First, because attempting to describe and analyze a context including Indigenous actors who invoke a specific understanding of governance, co-governance, and principles of governance design through an exclusively Western institutionalist framework – even one informed through critical perspectives – is likely to flatten, simplify or otherwise ignore important dynamics in the actor relations that produce local governance arrangements, and echoes colonial problematics of academia that tend to towards extractive practices and often attempt to fit Indigenous contexts and worldviews into Western perspectives (Wolfe, 2006; Kovach, 2009; Hart, 2010; Todd, 2018). Second, because this context also includes non-Indigenous actors including State institutions where Western perspectives regarding actor relations and aspects of governing are useful and appropriate analytical tools. Third, because Indigenous scholarship regarding "relationship" has specific meaning and weight distinct from but not incompatible with the concept of relation as it is applied in Western critical

governance narratives and may allow for important insight in to more diverse ways of understanding, imagining, and producing "governance" in complex and challenging resource use contexts. As discussed in the previous chapters, a *plurality* of ways of knowing, with explicit "responsibility to the place from which knowledge emerges" offers an alternative to "integrating" or incorporating Indigenous knowledges and contexts in to a Western framework through an "ethic of knowledge coexistence and knowledge generation" (Reid et al., 2021). While I am substantially influenced by the framework of Two Eyed Seeing (Reid et al., 2021; Bartlett et al., 2012) as a guide for approaching this plurality, I do not claim this chapter itself to be an example of Two Eyed Seeing because (fourth) I, as a non-Indigenous person who's academic training is rooted in Western science and philosophies, have an incomplete understanding of Indigenous perspectives and cannot fully or appropriately apply them as a primary much less singular analytical tool or theoretical framework. And fifth, because I believe a context of entangled actors may perhaps be made more visible through entangled theories of governing and relating.

4.2.1 Approaching a relational understanding of governance

In my analysis of governance arrangements in Clayoquot Sound, I focus on actor relations and the interactions that shape and are shaped by the institutions which govern actors, (Ostrom, 1994, 2005; Basurto et al., 2010). I root this analysis in a multitheoretical approach to actor relationships. Critical approaches to governance tend to foreground the emergent, dynamic, and politicized nature of environmental governance (Castree, 2003; Lemos & Agrawal, 2006; Clement, 2010). Scholars working from critical theory recognize authority as multi-layered and multi-scalar, and often pay explicit attention to the role of non-traditional and non-State actors and the exercising of power through their interactions (Castree, 2003; Bridge & Perreault, 2009; Villamayor-Tomas & García-Lopez, 2018; Garcia Lozano, 2020; Smith et al., 2020). The rule of

government by nation-states is still prevalent in this lens, however decision-making is understood as proceeding through complex networks of multiple types of actors, particularly in localized and day-to-day management contexts, and is rationalized through practices of knowledge production and meaning making which give purpose to the practice of governing (Hajer & Versteeg, 2005; Lemos & Agrawal, 2006; García Lozano, 2020). Actors may assert their interests and act to shape decision-making and even broader structures of governance through collective action and social movements (Villamayor-Tomas & García-Lopez, 2018), leveraging of political influence through interest groups (Moe 1995), or strategic use of discourse including policy narratives (Dryzek 2005; Lozano et al 2018). Dynamics of power and the ability of marginalized actors to influence their own outcomes is not only acknowledged but may be centered in critical analysis (Castree,2003 ;Lemos & Agrawal, 2006; Nightingale, 2019). Relationships between actors enable such avenues of interaction, influence, and coordinated action, and thus in this approach broader arrangements of governance are understood at least in part as a product of relationships (Lemos & Agrawal, 2006; Castree 2003; Nightingale, 2019).

Diverse economies scholarship and feminist informed approaches in critical geographies also pay particular attention to relationship as an organizing point in governance, and governance is understood as co-constructed (Gibson-Graham, 2006; Nightingale, 2018). These approaches tend to view relation as an affective force (one which exists and operates through encounters to influence the nature or behavior of something but is outside of conscious intentionality) (Gibson-Graham 2011; Haraway 1991, 2016; Sundberg, 2014; Nightingale, 2018; Tsing, 2018). Relations often extend beyond the human, and even beyond living nature (Haraway 1991). Binary ways of thinking are challenged in their production of hierarchies and in their obscurity of human-nonhuman relationships and of systems oppression and exploitation (Gibson Graham & Roelvink, 2010; Nightingale, 2018). Through this lens, actor relationships in environmental governance are

not simply based on rational choice regarding necessity or benefit; political communities emerge from and also create ties between individual, community, place, and the more-than-human, including and especially through the exercise of power (Nightingale, 2018). There is not a clear boundary between individuals and their socionatural environments; human and nature are not separate but instead produce, perform, and are produced by interconnectivities (Singh, 2017; Nightingale, 2018; Tsing, 2018).

Much of this conceptualization of relation is parallel to Indigenous understandings of reality and relationship. However, they are not direct analogs of each other and so while they can be placed in to conversation, they are not interchangeable (Todd, 2018). “Socionatural becomings” (Nightingale, 2018) as a fundamental organizing concept is shared: in Indigenous realities, “relationships are reality, and reality is relationship” (Wilson, 2016). However, conceptual constructs, analytical tools, and the extension of relational reality to lived practices are distinct (TallBear, 2011, 2015; Todd, 2018). Relationality through Indigenous lenses are typically reflect an understanding of multiple truths, where knowledges and expertise are plural and taught through relation (Kovach, 2009; Tynan 2020). In addition to an organizing concept of reality, relationality is a practice about responsibilities between kin (meaning all relations), a recognition of agency and the importance of consent, and an enacted process of learning, teaching, and connecting (Atleo, 2004; Tynan 2020, 2021). “Principles” or ways of living and appropriately practicing relation are often summarized through concepts of respect, responsibility, reciprocity, and recognition (Pidgeon, 2019; Atleo, 2011; Tynan, 2020). These extend to practices of knowledge production, knowledge sharing, and meaning - making (e.g.stories and storytelling), ways of engaging with the physical and non physical world (e.g. specific methods of harvest) and with the community (e.g. specific methods of governing), which extends beyond the human (Atleo, 2004, 2011; Atleo, 2006; Kovach, 2009; TallBear, 2011, 2015; Tynan, 2020, 2021).

Contributions to these perspectives include Indigenous scholarship from multiple different Indigenous contexts and worldviews across the world; 'Indigenous' does not refer to a single group of people or way of knowing. There are a multiplicity of Indigenous communities and thus a multiplicity of Indigenous theoretical or philosophical frameworks (Howitt & Suchet-Pearson, 2003, 2006). Discussing Indigenous perspectives requires attention to Indigenous diversity and particularities (Howitt et al., 2009; Reid et al., 2020).

As the case study I describe is situated in a Nuu-chah-nulth context, Nuu-chah-nulth theories of reality, relation, and governance specifically inform how I have attempted to engage Indigenous perspectives in this chapter. Relationship is core to the lived value and understanding of worldmaking in Nuu-chah-nulth worldview, and holds a specific meaning interpreted and enacted through practices of teaching, learning, care, and through values and responsibilities which guide Nuu-chah-nulth governance (Atleo 2004, 2011; Cote, 2016, 2022; Milne, 2022). A Nuu-chah-nulth understanding of relationality and appropriate means of relation likely influences actor relationships in Clayoqout Sound, so approaching an analysis of governance in Clayoquot Sound must be informed through Indigenous notions of relationality and specifically Nuu-chah-nulth perspectives of knowledge production and governing structures.

In taking a 'relational approach' in this chapter, attentive to distinctions in the above theoretical threads, I engage a layered use of 'relationship.' I discuss relations between actors reflective of institutional governance approaches regarding the literal interactions and negotiations of rules between actors. I otherwise engage feminist informed perspectives of relationship, recognizing that the focus on human actors in this chapter is a relatively narrow lens and that implicit in this context are human-salmon and other human-non human relationships which are both intentional and also inherent in the ecological context, and which play a non-insignificant role in facilitating relationships between human actors regardless of individual

economic choice. This is especially apparent when approached through Indigenous concepts of relation; salmon are not a 'valued traditional resource' or a human-more than human interaction with social and economic importance so much as a living being with whom a relationship is shared that must be actively attended to and is also an inherent truth through the salmons' integral role in the wellbeing of many life forms including people. As relationship is an inherent truth of reality in Indigenous perspectives, I approach relationships as the initial and primary point of analytical attention and understand relationships to be the root from which a governance arrangement emerges. I also consider the performance of interactions between actors with Indigenous concepts of relation in mind, by looking where actors intentionally engage with Nuu-chah-nulth relational practice.

4.2.2 Entangled Pluralities

Building from the reflections of pluralisms in previous chapters, a concept influential to my approach to this chapter is the notion of "entanglements," and an assumption of entangled pluralities. "Pluralities" refers to the multiple ways of knowing and understandings of reality that exist in this context, and which some actors simultaneously apply in their actions and relationships through plural treatment of Indigenous and Western knowledges (Bingham et al., 2021). As knowledge production and mobilization are ways of rationalizing and directing governance and are often a goal of governance relations (Lemos & Agrawal 2006), and since ways of knowing are contextualized through the social, environmental, and political contexts in which they are situated (McGregor, 2018; Reid et al., 2020), I extend the notion of pluralities of knowledge to pluralities of governing relations.

The notion of "entanglements" refers to the inseparable and indeterminate nature of the interconnectivities described in certain feminist informed geographies (Haraway 1991; Tsing, 2018), and paralleled in aspects of Indigenous understandings of inherent relationality (Tallbear,

2015). Indeterminacy references the unplanned and uncertain nature of reality, or the many possibilities of assemblage through "constitutive encounters" (Tsing, 2018). I refer to the relations and arrangement of governance in this case study as "entangled" rather than "nested" intentionally, as governing relations are dynamic in nature and while action arenas can be nested within others they can also be separate from or overlapping with each other.

Entanglement offers an approach to understanding assemblages, which parallels understanding governance as a relational and co-constitutive process of emergent arrangements. Assemblages, in Tsing's words, are "an open-ended entanglement of ways of being ... [in which] varied trajectories gain a hold of each other, but indeterminacy matters. To learn about an assemblage, one unravels its knots" (Tsing, 2018, p. 83). I have attempted to learn about the assemblage that is a dynamic arrangement of governance concerning salmon in Clayoquot Sound by at least partially unraveling a few knots in the relationships between actors, and through an understanding that pluralities of relation type, purpose, and form exist. I am describing a snapshot of governance arrangements *as a process* rather than a static, determinate formation. Allowing an entanglement of theoretical threads in this process has been useful for understanding the entangled threads of relation.

4.3 Methodology

This work is based on data collected through a long term research partnership with Tla-o-qui-aht First Nations and Ha'oom Fisheries Society (HFS). Our broader research goals include strengthening the role of Nuu-chah-nulth knowledges in local salmon management and to explore key strategic governance approaches to Nuu-chah-nulth - led management of salmon fisheries in Clayoquot Sound. The project methods are informed by placed-based approaches and reflections in critical geography (Howitt et al., 2009; Coombes et al., 2014; Johnston et al.; 2016),

institutional ethnography and archival review (Smith, 2009; Ventresca & Mohr 2017), and Indigenous informed relational practice (Kovach, 2009, 2016, 2019; Smith, 2012; Latulippe, 2015; Tynan, 2020). Data collection primarily included participant observation, interviews, and archival analysis. The analytical approach for this chapter was informed in part by grounded theory (Creswell & Poth, 2018) and the Institutional Analysis and Development (IAD) framework (Ostrom 2005, 2011). My broader methodology recognizes the inseparability of action and praxis (Freire 1970), guided through a relational approach to collaborative partnership and knowledge production (Kovach 2009; Coombes et al. 2014; Whyte 2013), with goals prioritizing Indigenous partners' interests and needs over immediate academic output and impact.

Working in good relation is a priority of my Nuu-chah-nulth collaborators in its embodiment of *tsawalk* and *ʔiisaak* (Atleo, 2011; Milne, 2022; see Introduction). Relational practice is core to many Indigenous methodologies, prioritizes a reciprocal approach to partnerships, allows a fluidity of approaches through contextually defined engagement in the work, moves collective responsibility of impact to the forefront through a shift from research 'on' to research 'with,' and is inherently reflexive (Wilson, 2008; Kovach 2009; Smith, 2012; Windchief, 2019; Tynan, 2020, 2021). Tla-o-qui-aht and Ha'oom liaisons guided the research presented here through relational practice defined through co-developed protocols, which has influenced how I have conducted the work and then analyzed, understood, and presented the story. Together, we iteratively (re)assessed the methods and their analytical outcomes throughout the duration of the project, in line with a relational and context-specific approach to methodology and informed in part by a shared interest in implementing principles of Two Eyed Seeing (Reid et al., 2021). I work to align my research approach with my collaborators' needs and with deferral to Nuu-chah-nulth leadership, mindful of important priorities for unsettling participatory and placed-based academic approaches to Indigenous geographies (Mistry et al., 2009; Coombes et al

2014; Tuck & Yang, 2012; Howitt, 2019). As a white academic trained in Western academic methodologies, I continue to learn and agitate my own understanding of what it means to be in good relation in the position of researcher with Indigenous partners in Indigenous spaces.

4.3.1 Methods implementation

Research partnerships were built through a two-year scoping process beginning in 2018 develop research goals and shared protocols, which were approved through appropriate institutional ethics review processes and by each of the five Nations' respective authorities. The scoping process included three in-person short term visits to Tofino[5] to build the research plans with the guidance and support of liaisons from the TFN Lands Department and Ha'oom Fisheries Society (then T'aaq-wiihak Fisheries). During the scoping phase, I also worked with West Coast Aquatic (WCA) to learn about the other various actors in management of salmon, salmon fishing, and salmon habitat in Clayoquot Sound. All approvals were completed by spring of 2020. The research was carried out over the following three years through a mix of in-person and remote work. Due to COVID-19, the long term fieldwork and in-person collaborations planned for 2020 and the first eight months of 2021 were transitioned to remote engagement.

Between September 2021 and August 2022, I spent a total of five months over two long (>2 month) and one short (2 weeks) trips conducting in person fieldwork based in Tofino. During this time, I conducted a total of 29 semi-structured interviews with 30 interviewees representing multiple local actors and fishing sectors (Table 4). Many interviewees hold multiple roles, especially within the five Nations.

[5] Tofino is located on the point of the Esowista peninsula on the south coast of Clayoquot Sound. It is within the Tla-o-qui-aht *ḥaḥuuli* and its waterfront includes a primary offloading site for local fishers. Many local actors have primary offices in or near Tofino.

Table 4: Number and affiliation of interviewees

Interviewee Affiliation	Interview format (n = # interviewees)			Total Interviewees (n=76)
	Semi-structured, Recorded (n=26)	Semi-structured, Unrecorded (n=4)	Informal (n=46)	
T'aaq-wiihak Fishers	8	1	12	21
DFO-directed Commercial* Fishers (Nuu-chah-nulth)	5	0	6	11
DFO-directed Commercial* Fishers (Not Indigenous)	1	0	0	1
Recreational / Sport Fishers	1	0	1	2
HFS Board of Directors	3	0	6	9
HFS Staff and Administration, including Contractors	1	2	11	13
Five Nations' Lead Negotiators and Strategic Advisors	2	0	4	5
TFN Resource Managers and Resource Management Admin	2	0	2	4
First Nations' Leadership (Chief and Council members)	3	0	2	5
First Nations' Leadership (*Ḥaw̓iiḥ*)	1	0	3	4
Uu-a-thluk Staff and Administration	2	0	2	4
DFO Staff and Representatives	2	1	2	5
ENGO representatives	5	0	4	9

* DFO-directed salmon fisheries in Clayoquot Sound include Area G (troll), Area D (gillnet), Area B (seine), communally held Aboriginal commercial licenses, and FSC fisheries. Most fishers holding an individual Area license in the area have an Area D or G license. Some Nuu-chah-nulth fishers hold both an Area license and a T'aaq-wiihak license.

Interviews ranged from 45-75 minutes and only extended beyond 60 minutes with the interviewee's permission. One interview included two participants who requested interviewing together and extended to 110 minutes following their expressed preference to be able to both fully answer every question and incorporate storytelling. Four interviews were unrecorded for interviewees who were open to formal interviews with my note taking, but not to recording. I had extended and in some cases multiple conversations with 47 additional individuals from these representative groups in informal and unstructured interview formats documented through note taking. This format was useful for iterative communication with HFS and ENGO staff regarding operational procedures and dynamic shifts in governing relations, and for having discussions with

DFO staff who were hesitant to have their perspectives officially on record. It was also a format preferable to many Nuu-chah-nulth fishers who were not comfortable with individual interviews and preferred unstructured conversations with other fishers present, typically at the docks and during offloads. Relationships were not a primary focus of the initially designed interview scripts outside of asking Nuu-chah-nulth fishers about their perceptions and experiences with HFS and DFO for informing the next chapter. However, nearly all actor representatives discussed governance and management through the context of their partnerships with other actors and relations to salmon, which informed the relationally focuses analytical approach.

Fieldwork also included participant observation. I spent over 200 hours sitting in on day-to day operations at the HFS main office and conversing with HFS staff regarding governance and management of the Five Nations Fishery and HFS partnerships with other management, research, and conservation organizations. I joined HFS staff members on three community outreach events and two days of scientific monitoring of habitat and species. I observed monitoring procedures and conversed with Nuu-chah-nulth fishers during Chinook and Sockeye fishery offloads in 2023. Participant observation extended to meeting spaces serving as primary "action arenas" (Ostrom, 2009) for decision making amongst local actors. I attended all HFS meetings in-person while in the field, and remotely during COVID and between and after fieldwork trips, for a total of 14 Board of Director meetings, 6 Lead Negotiators meetings, one negotiation meeting between the Leads and DFO, and 23 other administrative meetings including ones where HFS staff met with DFO staff, with research and monitoring partners at other organizations, or with the five Nations' fishery managers, fishers, or Fisher Steering Committee to coordinate management actions and communicate to fishery participants.

With WCA permission, I also observed Clayoquot Salmon Roundtable (CSRT) meetings, where representatives of over 24 stakeholder groups and three rightsholding First Nations (Tla-o-

qui-aht, Ahousaht, and Hesquiaht First Nations) coordinate action related to conservation, restoration, research, and harvest of local salmon populations. Joining CSRT meetings facilitated my connections to many actors beyond my immediate project partners. Between spring 2019 and spring 2023, I sat in on 8 main CSRT meetings and 3 CSRT working group or risk assessment meetings to observe actor communications and relations, knowledge sharing, action coordination, and informal decision making between actors. I attended 7 of these meetings virtually due to COVID-19 restrictions or because of mismatched timing between fieldwork and CSRT scheduling. I was allowed to review all text and visual materials shared in all meetings I attended, as well as all publically available meeting records and management reports from CSRT participants. Throughout the work, I assisted TFN and HFS in production of several other relevant products beneficial to their needs as a part of our protocols for reciprocal partnership including writing and editing support of decision-making protocols and strategic plans and review of Canadian fishery policies (Appendix B). These efforts further contextualized my understanding of institutional operations and interactions.

4.3.2 Background: Entangled Salmon Relations of Clayoquot Sound

In Clayoquot Sound, salmon link multiple complex ecological, social, and political systems and are a dominant focal point of resource governance and management challenges. Salmon are deeply entangled in a multiplicity of environmental, social, and economic systems; they are anadromous fish which migrate across international borders in the ocean, nutritionally support many species in forests, aquatic, and marine systems, are a highly economically and socially valued food fish, and are of a high conservation concern (Price et al., 2017; Swanson, 2019; Atlas et al., 2019). Their many values and relations to human communities, industries, and management and governing bodies illuminate the complexity and interconnectivity of these systems, often with highly political implications. High contextual complexity and the political

intersections between Indigenous rights and environmental restoration and conservation are especially prevalent in the management of salmon for restoration, protection, and harvest

Local populations of several salmon species, especially *miʕaat* (Sockeye), *suuḥaa* (Chinook or King), and *cuẇit* (Coho) are impacted by a variety of factors including logging related habitat degradation, fisheries, climate change, disease, and competition with or predation by other overly abundant native and non-native species (Atlas et al., 2019). Canadian fisheries policies and conservation management practices specific to Pacific salmon species are extensive, however many local actors express discontent with Canadian management structures as the loss of salmon impacts fisheries, ecosystem health, and Nuu-chah-nulth and Canadian communities' wellbeing. Restoration of local salmon populations intersects with issues of fishery management, Nuu-chah-nulth cultural regeneration and self determination efforts, and conflicts between Canadian and Nuu-chah-nulth governing authorities.

Clayoquot Sound spans the *hahahouthli* of *ƛaʔuukʷ iʔatḥ* (Tla-o-qui-aht) First Nation, *ʕaḥuusʔatḥ* (Ahousaht) Nation and *ħiʃkʷiːʔatħ* (Hesquiaht) First Nation, three Nuu-chah-nulth First Nations who have lived in WCVI for thousands of years (*Clayoquot Sound*, 2021; Marshall, 1993). Salmon are integral to the well – being and traditional practices of Nuu-chah-nulth peoples, who have historically been prevented from participating in or implementing their own commercial fisheries through colonial policies and processes (Newell, 1993; Harris, 2001; see Appendix A). About one third of Clayoquot Sound's population is Nuu-chah-nulth. Regeneration of salmon – people relationships, salmon centered traditional diets, and fishing livelihoods are among the core strategies of Nuu-chah-nulth efforts towards self determination, food and resource sovereignty, and reconciliation (Coté, 2022; Milne, 2022).

The three Nuu-chah-nulth First Nations of Clayoquot Sound are among five Nuu-chah-

nulth First Nations[6] who have relatively recently affirmed rights to commercially harvest fish within their *hahahouthli* (traditional territories). Fisheries and Oceans Canada (DFO) is charged with addressing inequities in their management which infringes upon that right. Authority between the five Nations and DFO is highly contested, with many disputes regarding the rights based fisheries centering on concerns regarding already highly limited salmon access and harvest monitoring given the conservation concerns. Salmon fisheries in BC have shrunk over time as license based entry to the fishery became exceedingly limited in response to crashing stocks, leading to a fleet highly centralized under primarily corporate ownership (Muse, 1999; James, 2004; Haas, 2016). Canadian commercial salmon fisheries have nearly disappeared from Clayoquot Sound, though the recreational sport fishing sector is locally highly active. Nuu-chah-nulth fishers generally fish offshore from Clayoquot Sound by direction of their Nations' fishery programs as local populations cannot support a terminal fishery, or the harvest of salmon in their natal streams as they return to spawn (Schnute & Sibert, 1983).

Much of the decision-making and management for resources in Clayoquot Sound and its adjacent watersheds are centralized in the Canadian town of Tofino, a well known ecotourism destination with a history of fishing and logging industries and conflict between overlapping Canadian and Nuu-chah-nulth socioeconomic and political landscapes. Relationships between actors and the role of Nuu-chah-nulth and Canadian governing and management organizations especially have shifted in recent years. Interest in and efforts to build effective local salmon governance given these complexities and interconnectivities are shared by many local actors.

[6] Tla-o-qui-aht First Nation, Ahousaht Nation, Hesquiaht First Nation, Mowachaht – Muchalaht First Nations, and Ehattesaht First Nation

4.3.2.1 Actors in Clayoquot Sound Salmon governance

The local governance and management landscape of Clayoquot Sound includes a lengthy list of actors (Table 5, see Appendix D). The multiple actors with interest in and rights to conserving, restoring, and harvesting salmon in Clayoquot Sound have overlapping concerns and priorities but are typically responsible to differing and often conflicting (Indigenous vs Canadian) governing authorities and may operate from differing though not incompatible (Indigenous and Western) worldviews.

Table 5: Select actors in Clayoquot Sound salmon governance and management.

Actor	Type
ƛaʔuukʷ iʔatḥ (Tla-o-qui-aht) First Nation	
Ha'wiih (hereditary chiefs)*	Nuu-chah-nulth Governance
Chief and Council*	Nuu-chah-nulth Governance
TFN Natural Resources and Fisheries Departments*	Nuu-chah-nulth Resource Management
ʕaḥuusʔatḥ (Ahousaht) Nation	
Maaqutusiss Hahoulthee Stewardship Society (MHSS)	Nuu-chah-nulth Resource Management and Economic Development
ħiʃkʷiːʔatḥ (Hesquiaht) First Nation	
Nuu-chah-nulth Tribal Council (NTC)	Nuu-chah-nulth Governance
Uu-a-thluk (Taking care of) Fisheries	Nuu-chah-nulth Fisheries Management
Ha'oom Fisheries Society (HFS)	Nuu-chah-nulth Fishing Rights Implementation and Management
Fisheries and Oceans Canada (DFO)	Canadian Fisheries Management
West Coast Aquatic (WCA)	ENGO
Ecotrust Canada	ENGO
Redd Fish Restoration Society	ENGO
Cedar Coast Field Station (CCFS)	ENGO
Coastal Restoration Society (CRS)	ENGO
Clayoquot Biosphere Trust (CBT)	ENGO
Various Industry Actors	Industry
*Ahousaht and Hesquiaht First Nations also have traditional governance structures (*Ha'wiih*), elected Chiefs and Councils, and internal administrative resource management structures.	

Tla-o-qui-aht First Nation, Ahousaht Nation, and Hesquiaht First Nation each have their own governments and resource management programs consisting of both traditional and

Canadian implemented structures (Table 5). The Nuu-chah-nulth Tribal Council (NTC) supports the political and administrative coordination of all fourteen Nuu-chah-nulth Nations. Its aquatic and marine resource management organization, Uu-a-thluk, has a regional office based in Tofino. Fisheries management departments of individual Nuu-chah-nulth First Nations, Uu-a-thluk, and Ha'oom Fisheries Society (HFS) are each accountable to Nuu-chah-nulth governing authorities.

The Federal government claims authority over the ocean and coastal spaces and marine resources through Fisheries and Oceans Canada (DFO), though this is contested by local Nuu-chah-nulth First Nations. DFO departments coordinate federally funded stock assessment, population monitoring, research, and conservation efforts. All Nuu-chah-nulth First Nations have Food, Social, and Ceremonial (FSC) fishing rights recognized by Canada, allocated by DFO, and internally managed by the Nations' fishery departments with support from Uu-a-thluk. Many Nations also have communally held Aboriginal commercial fishing licenses through DFO. The five Nations' commercial fishing rights are second in priority only to FSC and conservation concerns, and hold priority over other commercial and recreational fishing sectors (Ahousaht et al. v. Canada, 2021). DFO is legally obligated to account for these priorities in developing its annual multispefies fishery management plans (MSFMPs). Ahousaht and Tla-o-qui-aht in particular have several community members who participate in the Five Nations Fishery, implemented and managed by HFS. The main office of HFS and the south coast regional office of Uu-a-thluk are located in Tofino. Most of DFO's Pacific Region staff is based in Nanaimo, on the other side of Vancouver Island from Clayoquot Sound.

There are multiple environmental non-governmental organizations (ENGOs) also based in Tofino (Table 5). Their priorities cover a broad range of salmon-related topics including habitat restoration, population monitoring, wild salmon conservation and advocacy, conservation risk assessment, and general scientific study. Various other actors also express concern regarding

the local conservation, restoration, production, or harvest of salmon. These include tourism, recreational fishing, non-Indigenous commercial fishing, and fish farming industries, as well as other NGOs and Indigenous-led health and education organizations and advocacy groups. In this chapter, I focus on actors that most often participated in some level of decision-making or were most active in implementing salmon management actions during this research.

4.3.2.2 Key Action Arena: Clayoquot Sound Salmon Roundtable

The Salmon Roundtables facilitated by West Coast Aquatic (WCA) provide an analytical entry point to observing actor relationships and processes of knowledge mobilization in local level salmon governance. WCA hosts and facilitates multi-stakeholder Salmon Roundtables for various regions and fishing areas of WCVI, including Area 24 or Clayoquot Sound. WCA evolved as a technical secretariat to the West Coast Aquatic Governance Board, which was established through agreements between First Nations, Canada, and industry groups following logging and fisheries disputes in the 1990s (WCA, 2023; see Appendix A). The governance board was comprised of representatives from over 10 righstholder and stakeholder groups as well as Canadian and Nuu-chah-nulth governments. The board is less active now, however WCA's current role supports important governance processes across actor groups including facilitation of strategic initiatives, co-management efforts, conflict resolution, political advocacy, and knowledge coproduction.

Each Area Roundtable facilitated by WCA has a primary focus on harvest, restoration, stewardship, or some combination depending on the local context. While the CSRT is primarily focused on salmon recovery and restoration, stewardship and harvest are also relevant concerns at the table. The Clayoquot Sound Salmon Roundtable (CSRT) serves to support partnership building for co-management of wild salmon and to provide a forum for actors to coordinate formal provision of local knowledge, advice, and recommendations to DFO. The CSRT includes

representatives from 22 local actors or interest groups including those highlighted in this chapter. There are many action arenas in this case context through which actor interactions for decision-making and management implementation occur. I am specifically attentive to the CSRT; it is one of the only arenas through which nearly all actors interact, and while the roundtables are not a formal governance process they do assist in governance facilitation.

4.3.2.3 Nuu-chah-nulth theory of governance, relationship, and ways-of-being

In the Nuu-chah-nulth worldview, fundamental principles and values of interconnectedness are embodied through lived practices of learning, teaching, governing, and relating in line with *ḥaaḥuułism*. *Ḥaaḥuułism* is an understanding of reality (*qua*) rooted in "balance and harmony forged of inherent polarity" (Atleo, 2004). That is, all beings and aspects of reality are recognized individually as their own, but are inherently in relation to and influential on all others. The phrase *hishukish tsa'walk* or "everything is one" invokes this understanding with an emphasis on interconnectedness where balance and harmony is actively maintained through relationships (Atleo, 2004, 2011; Cote, 2021; Milne, 2021). *Hishukish tsa'walk* is an explicit operational principle of Nuu-chah-nulth government and administration structures, and informs methods of governing and of knowledge production and mobilization through an embodied practice of *ḥaaḥuułism* (Atleo, 2011; TFN, 2020; Bingham et al., 2021; Milne, 2021; HFS, 2021; Ahousaht, 2022; Uu-a-thluk, 2023).

Ḥaaḥuułism is practiced though *ḥaaḥuupa* (teachings, storytelling) and specific processes and rules for appropriate relationship in order to maintain harmony (Atleo, 2004, 2011; Milne, 2022). Relationships are *qua*, apply to all life forms, and require *hamipšiƛ* (intentional and reflexive practices of recognition), *ʔiisaak* (sacred respect with universal assumption of value and purpose), mutual consent, mutually developed and enforced protocols (akin to binding contracts), and reciprocal practices of care and support (Atleo 2004, 2011; Coté 2010, 2022; Milne, 2022).

These extend to rules, structures, and processes of good governance, and to specific practices in maintaining good governing relationships, including in co-management and co-governance.

Ḥawiiḥ (hereditary chiefs) are responsible for practicing good governance in line with *ḥaaḥuuɬism* (Sam, 2013; Milne, 2022). Their roles uphold the relationships to the *ḥaḥuuɬi* for the individual and collective wellbeing of all life forms including *musčim* (people of the community). *Ḥawiiḥ* receive council from *t'iquwiɬ* (appointed knowledge holders) including traditional 'guardians' such as *c'ac'aaɬuk* (riverkeepers) who hold important roles including *uuaɬuk* ("taking care of") in relation to the *ḥaḥuuɬi* (Sam, 2013; Milne, 2021; Dorward, 2021, personal communications). Maintenance of relationships with salmon are of especially high importance; salmon offer themselves as food in exchange for the care and guardianship of the rivers practiced with *ʔiisaak* (Atleo, 2002; Atleo, 2004, 2011; Dorward, 2021, personal communications). Salmon are kin, and *ḥaaḥuupa* emphasize their role as sacred knowledge holders (Atleo, 2011). *C'ac'aaɬuk* specifically are responsible for knowing and caring for steam systems and the fish within them, and have specific obligations with regards to salmon (Sam, 2013; Jackson, 2020, personal communications; Frank, 2022, personal communications). *T'iquwiɬ* and *c'ac'aaɬuk* are among several positions that were largely lost as a result of Canadian efforts to dispossess First Nations from their languages, resources, and knowledge systems (Coté, 2022). Regeneration of traditional governance structures includes renewal of these positions along with the roles of the *ḥawiiḥ* within Nations' current governance arrangements (Coté, 2022; Milne, 2022; F. Frank, personal communications, 2022).

Each individual Nuu-chah-nulth Nation has its own governing structure specific to their *ḥaḥuuɬi* under the authority of the *ḥawiiḥ*. Most Nuu-chah-nulth Nations have a "dual governance" structure where an elected Chief and Council and an administrative body perform many responsibilities of day-to-day governance. Elected councils have variable level of

recognition within each Nuu-chah-nulth Nation, as they are products of Canadian legislative requirements for tribal recognition which initially outlawed traditional governance structures (Indian Act, 1876; see Appendix A). Individual Nations' current dual governance arrangements inform their approaches to co-governance more broadly, where specific responsibilities and some amount of power sharing allows for effective decision making with some amount of recognition from Canadian structures, while traditional structures of governance are renewed and retain sovereignty over maintenance of relationship to the *ḥaḥuuli*.[7]

4.4 Results

There is not one single structure or institution that consistently directs all actor interactions and action arenas in Clayoquot Sound. The emergent broader governance arrangement is characterized by entangled pluralities of knowledges and approaches to governance. Figure 10 provides a simplified conceptual diagram of the (current) emergent "map" of actors arranged by relationships, governance objectives or action types, and rules-in-use.

[7] An extended list of important terms in Nuu-chah-nulth ways of understanding and of teaching reality and particularly to practices of governing in the context of fisheries is included in the Introduction (Table 1). The previous chapter noted how some of these terms and the current dual governance arrangement influence governance and management practices within Tla-o-qui-aht specifically. Milne (2022) details a more in-depth discussion of *ḥaaḥuupa*, fisheries, and renewal in the Tla-o-qui-aht context.

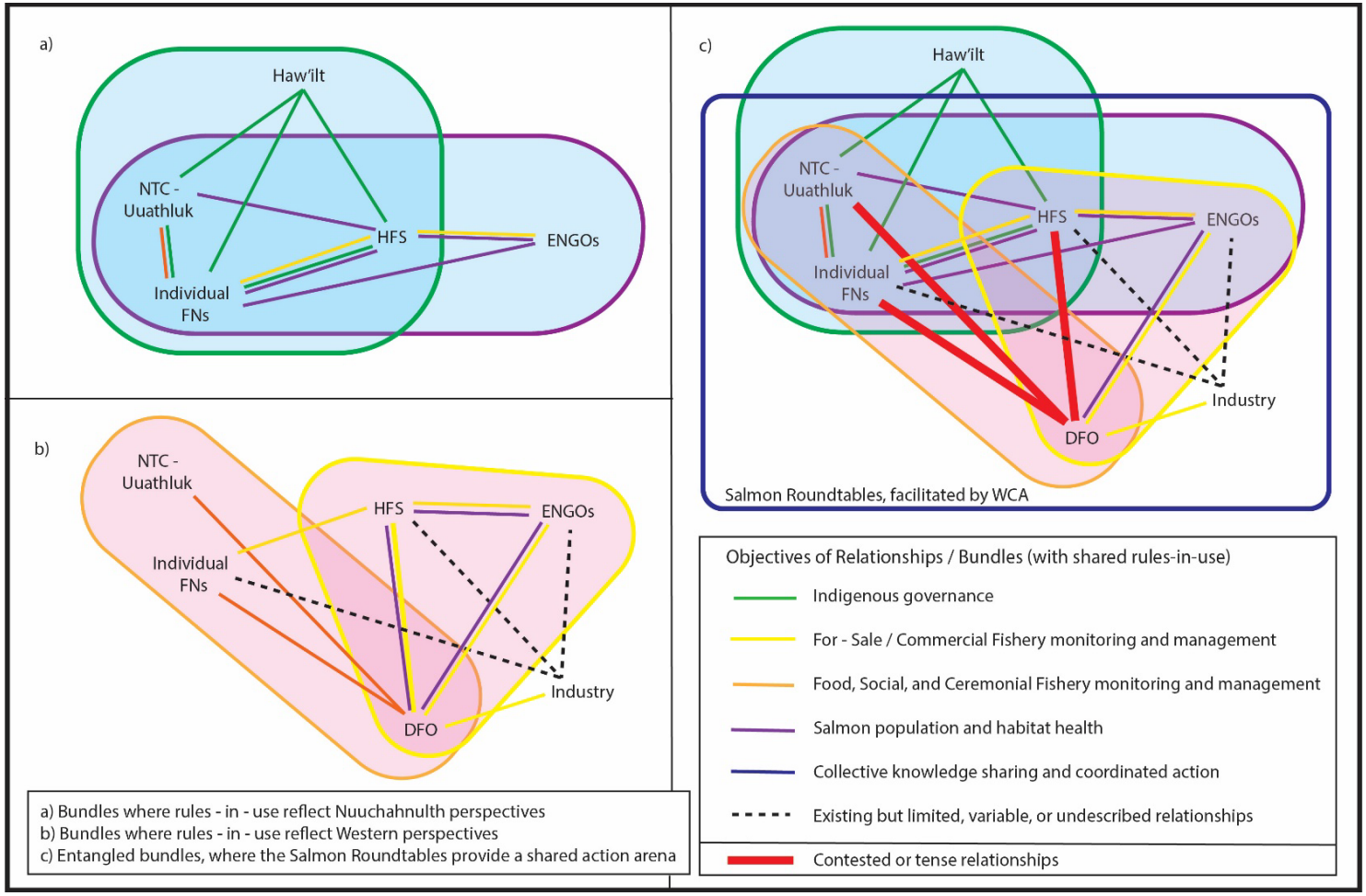

Figure 10: Conceptual model of current Clayoquot Sound salmon governance arrangements. Bundled groups of actor relationships are organized by objectives and rules and norms generally reflective of either Nuu-chah-nulth or Western perspectives.

Broadly, actor relationships can be categorized by four specific priorities: renewing and upholding Indigenous governance, managing First Nations FSC fisheries, managing Indigenous commercial harvest through the five Nations' rights based fishery, and attention to salmon population and health through research, restoration, and enhancement efforts (Fig 10). Actor relationships can be grouped by priority and shared sets of rules and norms, which are made visible through actor interactions and may reflect Nuu-chah-nulth or Western perspectives, and sometimes reflect aspects of both. Grouped actor relations, which I refer to as bundles, function as smaller governance arrangements within the broader assemblage of Clayoquot Sound salmon governance. They serve to support knowledge coproduction and mobilization, coordinated and adaptive action, shared power and understanding, collective influence, and conflict mitigation. However, there are also several tensions in local governance strategies and conflict remains in specific actor interactions where authority is contested. In the following sections, I detail how actor relations are coordinated and how rules of actor interactions in shared action arenas are determined. I then consider the products and tensions of the highly relational strategies characterizing most local governance arrangements.

4.4.1 Governance arrangements reflecting Nuu-chah-nulth relational practice

Governance processes and actor interactions which serve to renew and uphold Indigenous governance in Clayoquot Sound primarily reflect Nuu-chah-nulth relational practice (Fig. 10a). In this context, actor relationships are structured primarily through embodied *ḥaaḥuuƚism* (balance and harmony in polarity) and *hishukish tsa'walk* ("everything is one") where interconnectivity and harmony are maintained through relationship and specific relational practices (see Introduction, Table 1). These embodied practices are reinforced by formalized rules of Nuu-chah-nulth governance, internal policies of actor groups, and specific structures, procedures, and norms in action arenas.

Nuu-chah-nulth Nations' internal decision-making and management practices are informed through their internal co-governance arrangements between Chief and Council and the *ḥaw̓iiḥ* (hereditary chiefs). The NTC connects individual Nations'traditional governance structures to its fishery management organization, Uu-a-thluk, through the Council of *Ḥaw̓iih* comprised of the hereditary chiefs or their representatives of the collective 14 Nuu-chah-nulth nations. The Council periodically meets to coordinate decisions on fisheries issues to inform Uu-a-thluk's management priorities and actions (Uu-a-thluk, 2023). The Uu-a-thluk Fisheries Program Manager at the time described this structure to me using the term "polycentric governance" as "the appropriate approach to taking care that it is not a hierarchical system on the whole…we have multiple sites of authority and governance. First and foremost, we see ourselves as accountable to the *ḥaw̓iiḥ* through the Council of *Ḥaw̓iiḥ* forum on fisheries."

HFS also works to support Indigenous governing authority in management of the five Nations' multispecies rights based fishery.[1] A monthly HFS Board of Directors' meeting discusses and advises HFS management actions, where Board members are appointed by their nations and responsible for coordinating decisions in the best interest of the five Nations' communities and in line with their *ḥaw̓iiḥ.* HFS administrative directors described their accountability to the five Nations similarly to the above description from Uu-a-thluk, where the five Nations share governing authority. Both Uu-a-thluk and HFS also work in partnership with individual Nations' fishery departments, primarily through coordination with Nations' fishery managers, who are trained in both Western fisheries management and in traditional Nuu-chah-nulth roles and in some cases act as "guardians." Interconnectivity, respect and caretaking as

[1] HFS is not a governing institution, but does provide an interim structure for coordinating the decision making necessary to implement and monitor the five Nation's rights are fully realized and their individual governing authorities and managing bodies are able to build capacity to collectively co-govern and co-manage.

conceptualized through Nuu-chah-nulth embodied values and relational worldview direct these actors' individual actions and their approach to relationships with other actors. *Hishukish tsa'walk, ʔiisaak* (sacred respect)*,* and *uu-a-thluk* (taking care of) are highlighted in the mission statements, strategic plans, and many communications and management planning documents of all of these actors as guiding decision-making and management practices (NTC, 1999; Ahousaht, 2021; TFN, 2021; NTC, 2021; HFN, 2022; HFS, 2022; Uu-a-thluk, 2023).

Co-governance spaces such as the HFS Board or the Council of *Ḥaw̓iiḥ* are held to strict terms of reference for managing proceedings and steps of formal decision-making requiring quorum in line with Nuu-chah-nulth use of protocols in managing relationships and enforcing accountability. Formal meetings internal to and between these actors are generally facilitated by an individual familiar to but not representing Nuu-chah-nulth governance, often an administrative personnel or strategic advisor. Meetings typically begin with a welcoming prayer spoken in Nuu-chah-nulth by a representative of the host Nation, and often include a round of introductions whenever there are new participants or guests. As it was described to me, this is an intentional procedure for "starting the meeting in a good way," where participants participate in reciprocal recognition (*hamipšiƛ̓*), are transparent about where they are coming from in their perspectives, and where there is an implied collective commitment to practicing *ʔiisaak* within the meeting space. In instances where these protocols are not followed, an elder or *ḥaw̓iiḥ* stops the meeting to reinforce these practices and explain their importance and necessity, often through storytelling and recounting the teachings they received, enacting *ḥaaḥuupa.* When there is disrespect, the meeting is paused to resolve the conflict or halted to end the interaction until the conflict is appropriately resolved. Nuu-chah-nulth embodied values and practices of good governance enforce normative behavioral expectations and rules-in-use in these actor relationships.

Beyond the bundled relations specifically tied to Indigenous governance, specific actor relationships serving to direct fisheries management and salmon restoration also primarily reflect Nuu-chah-nulth relational governance. For example, Uu-a-thluk and individual Nuu-chah-nulth Nations' coordination of FSC management includes decision-making, management objectives, and relational practices guided by the imperative to uphold salmon relations through *ʔiisaak* and *uu-a-thluk* with respect to authority of the *ḥaẃiiḥ*. These rules are meant to ensure harvest supports the well-being of the *musčim* and that impacts do not adversely affect salmon populations of local stocks or of other Nations, where similar rules and norms of engagement also apply to relationships with Nations far from Clayoquot Sound:

> "We got individual families who'd come, "can I go get 200 [Sockeye]?" And we would go up there and make sure that's all they cut. They used to want to go right in Cannery Bay or Ook Min – that's our name for it. We told them to go fishing outside there. 'Well it's harder up there,' Well, it's safer [for the fish] too. We don't want you to catch 300 or 400 when all you need is 200. And they were good with that. … [But] we can't really get [food fish] from any of our rivers anymore. So now most of it's from the passing by stocks on the outside in Area 124. … But we have to be mindful that these fish are going somewhere. We get calls from the Fraser Nations reminding us that 'we have hardly any here too.' And we're respectful of that because we're in the single digits here. We hear from the Nations south of us and we're in turn communicating our concerns to the Nations north of us" (TFN Fisheries Manager, October 2021)

Nuu-chah-nulth rules of good governance such as *ʔiisaak* and recognition of *hishukish tsa'walk* inform norms of relationship maintenance between even very physically distant First Nations who are connected through salmon migrations, and so dictate the responsibility of Nuu-chah-nulth First Nations to communicate as the TFN manager described. Nuu-chah-nulth governance structures and Nuu-chah-nulth directed action arenas for co-management such as the Council of *Ḥaẃiiḥ*, and protocols between the multiple Nations formalize such expectations. This extends in Nuu-chah-nulth practice to non-Nuu-chah-nulth First Nations. For example, formalized agreements in line with these norms between Nuu-chah-ulth and Haida Nations were in progress before COVID and are intended to resume in their development.

4.4.2 Governance arrangements reflecting Western approaches to fisheries

Across various actors' relationships with DFO, interactions are structured by Western fisheries management tools, deferral to Western science, and decision-making through centralized, hierarchical Western institutions (Fig. 10b). For example, coordination between Uu-a-thluk and DFO regarding FSC fisheries is generally dictated by DFO operational policy. DFO provides funding to Uu-a-thluk and individual Nuu-chah-nulth First Nations to support FSC management and in turn requires specific forms of reporting in line with their fisheries management plans, which are developed through Western governance structures. Research and monitoring reporting by First Nations must be legible to Western fisheries management to be recognized by DFO. For example, when Uu-a-thluk, HFS, or individual First Nations coordinate management interventions with the help of DFO staff, reporting outcomes to DFO occurs on terms matching internal DFO structures:

> "Since DFO administers the funding, DFO oversees the information that we're collecting. So all the information that we collect on, say, during the spawning surveys … Nations of course get a copy and then we send that information to DFO stock assessment. ... they [DFO] have pre-formatted data sheets we have to use" (Uu-a-thluk biologist, November 2021).

As a result, Nuu-chah-nulth actors frequently express frustration that their knowledge and interests are not acknowledged, or must be produced or verified in a way specific to DFO operations. As a resource manager at Tla-o-qui-aht put it, "They [DFO] want to take traditional knowledge and then scientifically prove it or justify it with science or data. They won't take oral history or oral statements … They'll take it as a reason to action, but then they'll have to dot all the i's and cross t's with science and data." Additionally, decisions regarding FSC allocations and fishable areas are generally made unilaterally by DFO, with state structured avenues of consultation (primarily through written feedback) though ultimately determined externally based on departmental data:

> "We have a duty to consult. But what's consultation? … if you're on the top line with the authority, if you're a guy over on this side near the Fisheries Minister or as a DFO manager, then … it's on the information-out. So we're going to send you information, you give us feedback, usually in writing. This is the process. … you've got a certain amount of time to do that. … It doesn't matter what your uses of [salmon] … the rules are based on the science that's coming out. And so we're doing it for a reason." (DFO stock assessment biologist, 2021)

Multiple interviewees expressed a sense that their input is not fully considered in DFO's consultation processes. Building direct relationships with regional DFO staff is one approach by Nuu-chah-nulth actors to build more direct, productive avenues of communication and shared knowledge for co-management and potentially influence decision-making. Uu-a-thluk's fisheries program manager expressed, "We know, practically speaking, that a lot of [DFO] decisions do actually get made at a very local level. So let's form the best collaborative working relationships we can have with those DFO staff." The Nations initiate much of the communication and coordination strategies with DFO, and are as a result fairly well versed in navigating and participating in partnerships through Western natural resource management structures. The reverse cannot be said for DFO outside of select individuals who work locally.

Similarly to Uu-a-thluk, HFS necessarily interacts with DFO in a way that primarily reflects Western fisheries governance and management. As the five Nations' lead negotiators and DFO's Pacific Region directorship continue negotiating terms of co-governance and rights implementation, HFS coordinates with DFO program managers and staff on monitoring and management of the *T'aaq-wiihak* fishery. Allocations for the five Nations' fisheries are ultimately determined in annual DFO fishery management plans for the five Nations' fisheries (MSFMPs), which are largely based on the broader management plans for all DFO fisheries in the region. HFS and DFO staff have regular virtual meetings to provide fishery and research updates and to maintain transparency regarding any shifts in management policies. Although the five Nations would prefer to have HFS run management designed through the five Nations' management

plans, DFO does not currently allow the Nations to self manage their rights based fisheries outside of terms set through the MSFMP. At this management level, interactions between HFS and DFO are tense but relatively consistent.

Both HFS and DFO coordinate with local ENGOs to support fishery monitoring and management efforts. HFS contracts Ecotrust Canada to conduct dockside monitoring of the rights-based Five Nations Fisheries. Relationships between HFS, Ecotrust, and DFO as they apply to monitoring all follow rules reflective of Western fishery management practices. DFO stock assessment staff design the monitoring protocols based around Canadian and departmental policy regarding wild salmon. Dockside monitoring methods are extensive, especially for the salmon fisheries, as monitoring protocols are meant to accurately assess the fisheries' impacts on wild salmon and DFO requires 100% reporting of the five Nations' salmon catch. Ecotrust provides HFS with as much of the catch data as they can, but all DNA samples and hatchery tags from landed fish must be provided to DFO.

4.4.3 Governance arrangements reflecting both Nuu-chah-nulth relational practice and western approaches to fisheries

Most actors and some industry groups are attentive to at least some rules informed by Nuu-chah-nulth perspectives regarding 'good' governance. In many governance bundles where relationships include both Nuu-chah-nulth and Canadian actors (Fig. 10c), actors employ both Nuu-chah-nulth and Western tools of knowledge mobilization and iteratively discuss and adjust formal rules of decision-making through protocols and terms of agreement for shared action arenas. These strategies are especially apparent in relationships between HFS, Uu-a-thluk, local ENGOs, and individual First Nations' fisheries departments. Relationships between DFO and other actors are generally lacking in Nuu-chah-nulth relational practice.

HFS implements Western and Nuu-chah-nulth informed methods of knowledge production while deferring to the Five Nations' governing authorities and implementing Nuu-chah-nulth relational practice in relationships with Nuu-chah-nulth actors. HFS works extensively with the five Nations' fishery managers, Uu-a-thluk, and additional ENGOs to support *T'aaq-wiihak* management needs. HFS coordinates with individual Nations' fishery managers to communicate about in-season details of the fishery, given that HFS cannot yet formally apply the Nations' management plans in place of DFO's. Coordination with Uu-a-thluk, individual Nations, and other ENGOs are also important for knowledge production, particularly with regards to habitat and population monitoring. Interviewees at Uu-athluk, Tla-o-qui-aht, and multiple ENGOs all spoke positively about their relationships to HFS. In these relationships and especially in HFS coordination with the five Nations, rules dictated through protocols, contracts, or internal policy and norms relationship maintenance are reflective of Nuu-chah-nulth embodied practice.

In governance dynamics focused on salmon restoration, a blending of Western conservation management principles and Nuu-chah-nulth relational practice are especially apparent in actor interactions. Nearly all actors are concerned with the broader state of wild salmon populations and habitats in Clayoquot Sound. Restoration efforts are a shared priority across Canadian and Nuu-chah-nulth actors, as are research and management efforts that support these goals. For example, while HFS is primarily a rights implementation and fisheries management organization, in accordance with *hishukish tsawalk* it is also in the scope of HFS's responsibilities to attend to the health and productivity of the fished populations and habitats in order to best support a productive fishery in line with the Nations' intended management plans. Actors' shared and individual efforts to restore salmon populations include hatchery based enhancement, habitat restoration, impact mitigation, and risk assessment. Most actors don't individually have capacity to support the huge amounts of time, labor, tools, infrastructure, and

funding these efforts require, so collaborations and partnerships are key in determining priorities and enacting interventions.

ENGOs are important for supporting and expanding the capacity of Nuu-chah-nulth First Nations, of HFS, and of DFO in salmon monitoring, and especially in research and restoration efforts. Local ENGO's likewise value and prioritize their partnerships with First Nations and HFS. The Redd Fish director reflected extremely positively on their 17 year collaboration with the Tla-o-qui-aht's Natural Resource Manager. A CSR representative described partnerships to host First Nations in any territory where they conduct restoration work as "unequivocally" their most important commitment. CBT holds a similar priority, as does Redd Fish.

These relationships are maintained through formal structures, processes, or agreements that ensure mutual accountability and acknowledge Nuu-chah-nulth authority in the *ḥaḥuuli* and are specifically defined in many ENGO's internal policies and especially within each actor relationship. Redd Fish intentionally incorporates Nuu-chah-nulth authority into their decision-making and maintenance of trusting and respectful relationships through a Board of Directors that includes representatives of host Nuu-chah-nulth Nations:

> "we take direction from each of the Nations on like restoration priorities and research priorities … it helps us … it first recognizes rights and title and so nothing can happen without the support and the backing of the Nations. And then secondly, it helps give us that communications avenue. … it's another avenue for collaboration between Nations for larger projects. It's been I think one of the key strengths of the organization and it's something that I take great pride in … we have been able to maintain amazing relationships with each of the Nations."

CRS's approach is reinforced through co-developed protocols with host Nations, as a part of a "full and prior informed consent" process, using Nations' protocol structures where possible to set agreed bounds and methods of habitat rehabilitation projects. In this sense, protocols act as a binding contract and consensus and consent are embedded in to partnership and protocol development, much like in Nuu-chah-nulth governing practices and rules of relationship

maintenance. Formalized rules of the partnership are thus legible to both Nuu-chah-nulth and Western structures.

Generally, local ENGOs are Canadian organizations that primarily employ Western science. Most do not independently refer to Nuu-chah-nulth concepts or lived values like *ʔiisaak, uu-a-thluk,* or *hishukish tsa'walk* to guide their actions. However, in co-developing formal rules to guide the partnership or through structures which ensure Nuu-chah-nulth representation and participation in consensus-based approaches, Nuu-chah-nulth actors are able to enact relational practices of governance. CRS, Redd Fish, and other ENGOs who engage in partnership this way were spoken well of by Nuu-chah-nulth interviewees, who view them as respectful, well intentioned, and essential partners for salmon restoration needs.

4.4.4 Coordinating actors and bundles through Salmon Roundtables

Interconnectivity of threats to salmon populations, efforts to restore and enhance local salmon, and management of harvest practices means that actions to address or produce knowledge regarding one concern might impact or inform another, and could be supported by multiple actors with overlapping concerns. Overlaps between the bundled governance arrangements produces a risk of duplication of efforts, conflict of authority, lack of clarity regarding roles and responsibilities, conflicting actions, and fragmented efforts of knowledge production and mobilization. The CSRT hosted by West Coast Aquatic supports coordination of actions and knowledge production across actors to mitigate these potential risks, support co-management, assist in maintaining governance relationships, consistently and transparently share DFO produced information, and support actor organizing for political advocacy and influence. Though the organization is broadly focused on marine and aquatic resources, the roundtables are salmon – focused precisely due to entangled salmon relations:

> "The salmon become the species that is sort of a vehicle for the work. … the values around salmon kind of bracket what the work entails. It's also a lot to do with the biology of the fish in the way that they tend to travel. … it has to be a collaborative effort to recognize our impact on [salmon] and our role as caretaker around that species, which then overlaps with all the watershed work, with marine work, with all of our government systems. It throws it all into view that our human systems don't line up neatly with the ecological systems that we're embedded in. So, the constraints I guess we've put on our scope are mainly around that salmon biology, but then it ends up overlapping with everything else" (CSRT facilitator)

This facilitator further described their role at the table as creating a space for people to "relate to each other perhaps differently than they related to each other in the past," creating opportunities for collaboration or "synergies" and then specifically identifying and supporting those collaborations. The meetings I observed facilitated several of such collaborations. For the most part, the tables do seem to support that goal from the perspective of local actors as well:

> "We all kind of work together to get things done … [in] Clayoquot Sound, especially with the roundtable, everyone gets together, you build those relationships and everyone's kind of working toward the same goal. I definitely find here that there's good collaboration on projects" (Uu-a-thluk biologist).

Although the CSRT is not itself an official governance arena in that decisions produced by the table are not formal policy or binding laws, it facilitates many governance functions. In addition to coordinating collective action and helping actors' to identify and act upon shared priorities, the CSRT provides an arena for sharing and mobilizing locally produced knowledge to support collaborations and to inform and influence State actors. Participants appreciate the role WCA plays in facilitating the CSRT and synthesizing the knowledge, information, and interests shared at the table. The Tla-o-qui-aht co-chair of the CSRT noted, "[WCA] mediate, moderate, science gather, minute take for us. God bless. They're there to help us. … there is someone carrying the torch, bringing data forward or outcomes to DFO."

Structured facilitation of the CSRT, transparent communication, a co-developed terms of reference, and collectively enforced norms at the table are key for maintaining this action arena.

The table is co-chaired by two individuals representing different actor groups, currently one from a Canadian ENGO the other from Tla-o-qui-aht. It is facilitated by comparably neutral WCA staff. Terms of reference are designed by CSRT participants and can be renegotiated at any point. The current CSRT terms of reference are prefaced with both Nuu-chah-nulth and Western ideas of governance and resource management, including *hishukish tsa'walk*, *ʔiisaak, uu-a-thluk,* conservation, precautionary approach, adaptive management, sustainability, shared responsibility, among others. Decision making is explicitly required to consider Western and Indigenous knowledges as "best science." The first priority listed as the CSRT's purpose is to build partnerships across all actors specifically for the linked purposes of salmon recovery and sustainable harvest management. Transparency, accountability, efficacy, and other listed objectives inform the standard procedures of CSRT meetings and communications. The CSRT agenda items support record keeping, knowledge collating, information sharing, and policy advocacy with transparency and accessibility to all participants and recognition from DFO. All meetings start with actors' updates and include time for presentations regarding ongoing or recently completed projects. WCA provides records of all presentations, meeting minutes, project plans, and shared documents from the meetings to roundtable members and archives them along with the roundtable's terms of reference in a publicly accessible online Dropbox. Participants and facilitators noted that the CSRT can serve to create a space for actor interactions to play out differently than in direct partnerships, though the table can also be disrupted when internal politics or conflict is brought in from individual actor relations and other action arenas. Such issues are generally avoided through shared commitment to rules in the co-developed terms of reference, collective enforcement of behavioral norms where aggressive and disrespectful behavior is not tolerated, and external relational work conducted by WCA's facilitators with CSRT participants outside of the meetings.

Information exchange with local and State actors at the CSRT seemed relatively reciprocal compared to other action arenas. I observed several CSRT meetings where time was dedicated towards collating actors' concerns and perspectives with regards to DFO policies, programs, management decisions, or consultation processes. WCA staff would then draft a letter to DFO Regional Directors based on this work and send it after review and approval from CSRT participants via email or at a follow up meeting. DFO provides draft and final annual management plans and seasonal assessment reports to the table participants via email listserv. DFO staff regularly attend the meetings to present data coming from DFO stock assessment departments and provide information regarding departmental programs and potential funding opportunities, both of which often received a great amount of attention from all table participants and often prompt discussions where fishery managers and biologists from local actors discuss their own (traditional and scientific) knowledge of local systems.

4.4.5 Outcomes of governance arrangements produced through entangled relationalities

Rules and norms directing interactions between actors and across bundled actor relations are distinct across the entangled salmon governance structures of Clayoqout Sound. However, relational strategies of co-governance and co-developed rules and norms were present in all partnerships and action arenas that were positively described by interviewees or appeared to me to be generally collaborative and effective at resolving, mediating, or preventing conflict. Not every rule, norm, or group of actors practice relationship fully within the Nuu-chah-nulth sense of governance theory and natural law, however Nuu-chah-nulth relationality and complementary Western principles were often pluralistically engaged in formal and informal contexts for coordinating local decision-making, and normatively enforced through their performance in

shared action arenas and through interpersonal relationships. These governance arrangements enable several functions viewed positively by local Nuu-chah-nulth and Canadian actors.

4.4.5.1 Mobilization and co-production of multiple knowledges

Knowledge sharing and knowledge co-production are frequently prioritized goals and products of many of the actor relationships and action arenas. Governance structures between local actors support plural engagement with Nuu-chah-nulth and Western scientific knowledges and coordinate Canadian and Nuu-chah-nulth efforts for science production to inform actions. Several representatives from science based ENGOs expressed a sense of synergy between ecosystem based approaches to Western management with Nuu-chah-nulth approaches to knowledge production and environmental stewardship. One DFO staff I spoke with also pointed out this parallel. While many interviewees noted the importance of making sure Nuu-chah-nulth traditional knowledges are an active part of local governance, it was also common for local actors to neither prioritize nor be able to draw a clear line between Indigenous knowledges and Western science, especially in shared scientific efforts. Staff from Uu-a-thluk, Tla-o-qui-aht, and even some scientific research oriented ENGOs noted that it is difficult and generally not productive to try and draw a hard line between Western science and Nuu-chah-nulth ways of knowing in practice. Any local expertise is important for informed action. A representative from CCFS noted,

> "working out here, I find it hard … knowing where the line is at this point between traditional and scientific knowledge. … working with a diverse number of diverse knowledge holders …. with people that are scientists, but also from Ahousaht and from Tla-o-qui-aht …. At this point I find it hard to know. It just seems so blended. … I'm not sure if it is a useful thing [to differentiate between IK/WSK] if you're just using it as like a metric or a checkmark to say we're including different way different ways of knowing. … [Instead of] about, this is what we know about the subject matter at hand, the question that we're trying to answer and what information we have."

Most of the locally produced research is conducted by locally based scientists and Nuu-chah-nulth knowledge holders. Uu-a-thluk in particular produces an enormous amount of data

every year, often in partnership with the science team of HFS and always in partnership with local First Nations. This information supports goals in First Nations' fisheries management, research and restoration, and HFS research priorities in support of the five Nations' fisheries development, and is more broadly distributed to other local actors through CSRT meetings. Outside of the table, most local actors actively and sometimes concurrently engaged with the ideas of *hishukish tsa'walk* and ecosystem based management as guiding methods for approaching restoration and management efforts, supporting knowledge mobilization efforts.

Perceptions of effective knowledge co-production and respectful, meaningful knowledge sharing structured through relational norms contribute to actors' sense of successful and effective partnerships. For example, at the CSRT I observed multiple instances where sharing of scientific research included descriptions of how the data was produced, by whom, what analyses were used, and what the presenters' interpretations were with open invitations for feedback. This latter condition, implied by the rules and enforced through the norms of CSRT meetings, seemed to be an important factor for how the tone of the meeting proceeded, and whether actors were interested in working together based on the information shared. Tla-o-qui-aht managers also expressed that the CSRT created space for Nuu-chah-nulth produced science and traditional knowledges to be received and treated by actors with the same if not greater priority as DFO or ENGO produced science, mitigating some of the earlier noted points of tension regarding inconsistent or dismissive DFO treatment of Indigenous knowledges. In TFN's fisheries manager's words, "I find it more useful [to share knowledge] with the local stakeholders. Like at the [Salmon] Roundtable." Likewise, regional DFO staff expressed that information shared and decisions made between actors at the Roundtables help fill in the local level specificities that are not captured by annual regional management plans.

4.4.5.2 Collective influence on State management

Coordination of actors and actor relationships through the Salmon Roundtables supports collective action to influence DFO through knowledge production and policy advocacy. Since interactions facilitated through the CSRT are bilaterally structured, local actors feel that their input might hold more leverage than in individual consultation, and they can use the space to strategically engage with other actors to bring local perspectives to DFO with broader support.

According to WCA, DFO has recently supported the production of multiple other Salmon Roundtables in other regions of Vancouver Island. This is a relatively recent development; when I first began sitting in on the CSRT, WCA representatives expressed that the Roundtables were generally not receiving the attention they'd hoped for from DFO as a relevant structure of facilitating local co-management or decentralizing local level governance needs. Nuu-chah-nulth leaders and Canadian commercial fishers recalled how 20 years ago, DFO actively tried to dismantle similar collective strategies among commercial fishers and Nuu-chah-nulth groups, including earlier structures supported by the WCA Governance Board. A retired Canadian commercial fisher who was involved in political advocacy throughout his career described this dynamic referencing a previous sustainability coalition part of the early iterations of WCA and his conversations with ex-DFO contacts,

> "the reason we formed this board was to try and save these guys [commercial fishers] … when they negotiated the board into existence, a number of senior DFO people decided they had to find some way to kill it. It was counter to the centralist corporatist management regime that was already in place. So there's been lots of work done to try and make the board more meaningful over the years. … this board was supposed to be the primary place where you dealt with fisheries policy for the region. That's what it says right in the in the terms of reference. You had the feds, the province, First Nations governments, and stakeholder interests ... [operating in] a consensus process to govern that region. … those terms were negotiated by those four governments at the core. So they were well aware of what they were supposed to do."

In the last five years, the recognition and support by DFO of the CSRT and other Salmon Roundtables has grown. The Roundtables are specifically referenced in the two most recent annual management plans as a primary avenue of consultation and a source of local and traditional knowledge, which was noted as a priority in Canada's revised Fisheries Act (Bill C-68, 2016). WCA facilitators note that the growing written and digital documentation of meeting records, CSRT – facilitated projects, and synthesis of collective knowledge has helped to provide quantitative and qualitative weight to the roundtables' perceived value and efficacy. Local actors in Clayoquot Sound have expressed that through the CSRT they have seen more success in advocacy and communications to DFO than through their individual efforts.

4.4.5.3 Shared power and understanding

Relational practice is not just a priority for negotiating and maintaining rules and participation. It is also an avenue of actor empowerment. Actors' ability to influence each other is amplified through direct partnerships and arenas with external facilitation such as the CSRT. Co-negotiated rules and norms help to mitigate uneven dynamics of power. Empowerment of Nuu-chah-nulth actors and systems was also noted by Nuu-chah-nulth participants as an important advantage of these partnerships in supporting their path of self determination and projects of renewal. From a Tlao-qui-aht participant's perspective, "the Salmon Roundtable's power is that you have the ability to influence people that live alongside [each other]."

A parallel product of these arrangements is increased mutual understanding between actors. Within Clayoquot Sounds' governance structures, co-developed management strategies and consistent sharing of knowledge supports Canadian and Nuu-chah-nulth actors mutual recognition of each others' interests, motivations, positive intentions regarding salmon recovery and long term abundance, and conceptualization of local systems. This is specific to actor relations that are facilitated through protocols or action arenas with terms of reference that are co-

designed and reflect compatible Nuu-chah-nulth and Western ideas of interconnectivity and ecosystem approaches, transparency, accountability, and respect. For interviewees, such spaces allow for participants to more directly and openly hear and be impacted by others' points of view.

4.4.5.4 Coordinating dynamic complexity

Adaptability enabled through mutual responsibility in relational practice supports long term coordination. High capacity demands of restoration, enhancement, and monitoring efforts and the dire state of several local species' populations amplify the need for coordination between actors to prevent inefficiencies such as "wasting funding." Whether as a direct response to this need or as a product of attempts to build coexistence more generally, relationally co-developed structures of local governance support coordinated actions and decisions, mutually amplify individual actors' capacity, and allow for flexibility of structures to respond to shifting dynamics. Local actors recognize that relationships and decision-making processes shift over time due to entangled and indeterminate environmental, social, and political dynamics; this is a part of the motivation for periodically re-negotiating terms of reference in shared action arenas. Several interviewees representing different actors noted that their relationships with HFS will shift over time as the organization "comes into its own" while the fishery develops, their capacity grows, and as negotiations between the five Nations and DFO proceed. Positive sentiments about collaborative partnerships contextualized interviewees' willingness to adjust as needed with overall optimism about future partnerships.

4.4.5.5 Mitigation and Prevention of Conflict

Intentional relationship maintenance and co-development of specific rules and norms across the multiple structures of Clayoquot Sound governance are important for preventing and mitigating conflict. Consistent commitments to transparency, knowledge sharing, and knowledge

co-production in actor relationships also helped alleviate tensions and prevent conflict in many local action arenas. This was an especially valuable feature of the CSRT identified by multiple Canadian and Nuu-chah-nulth actors. They described how the CSRT helps to mitigate interpersonal conflicts or "internal politics" in otherwise tense actor relationships.

Political conflicts of power and authority rarely occurred between Nuu-chah-nulth actors and local Canadian actors, including fishers and ENGOs. Most Nuu-chah-nulth participants in the various actor groups are well versed in Western science, industry, business, and politics and frequently apply tools from each where useful in advancing or influencing partnerships. The priority is simply that the application of Western tools is in line with Nuu-chah-nulth values and laws. Even for ENGOs that operate predominantly through WSK, conflict beyond internal politics was relatively absent or short lived. Differences in knowledge systems were rarely an issue, especially because Canadian actors respect Nuu-chah-nulth knowledge holders' expertise, Nuu-chah-nulth actors highly value science, and because the overall approach to knowledge systems in many of these relationships is generally pluralistic or "blended." Conflict is further avoided through the co-development of formal rules (e.g. protocols and terms of reference) and the shared commitment to behavioral norms rooted in compatible Western social environmental values (respect, stewardship, restoration, social-ecological connectivity) and Nuu-chah-nulth embodied relational practice (*ʔiisaak, uu-a-thluk, hishukish tsa'walk*).

Key to relationship maintenance is the recognition of Nuu-chah-nulth authority in the *hahahouthli*, even by groups who ultimately defer to Canadian legal authority. Canadian ENGOs navigate knowledge pluralisms with Nuu-chah-nulth partners with successful outcomes supported by relational practices of governance with relatively little conflict because they recognize Nuu-chah-nulth sovereignty. Nuu-chah-nulth authority did not compromise local Canadian actors'

ability to produce high quality science, pursue restoration and management efforts, or abide by Canadian governing authority and Canadian law. As a CRS representative stated,

> "as original stewards of these lands and resources, and as upheld by First Nations rights and titles under our Canadian Constitution, [First Nations are] the stewards of these lands and have the right to govern how … resources are allocated. … that's the way of the work."

4.4.6 Tensions

The entangled nature of actor relations in Clayoquot Sound and the highly specific relational approaches to localized co-governance also presents some tensions. While actor relationships can expand localized capacity, dispersed responsibilities and specificity of actor groups can't fill all capacity needs in place of the State institution. Relationships with DFO remain necessary for several First Nations, even though they are generally not relational in practice and can conflict with or even undermine Nuu-chah-nulth knowledge and authority. A high reliance on individuals to enact relational practice and contextually specific nature of relational governance structures also present challenges.

4.4.6.1 Reliance on individuals

The importance of individuals in performing actor relations can be extremely useful for trust building, direct knowledge sharing, and the performance of good governance in the Nuu-chah-nulth sense. Relational governance practices in line with *isaa, uu-a-thluk,* mutual responsibility, and transparency can be performed in and are often reinforced through interpersonal interactions between two people. Interpersonal relations can of course also be a source of conflict, and generally demand a high amount of effort and investment, especially when broader actor dynamics are tense. Representatives of multiple Nuu-chah-nulth actors described the additional amount of labor and strategic relationship management they find themselves conducting with collaborative DFO staff. Uu-a-thluk's fisheries program manager describes:

> "Who the individual [DFO] staff are can make a tremendous difference within certain parameters. There's limits to how far any staff person can go. Clearly they have to abide [by rules] within the [DFO] system, but even within that there's a lot of scope. So you have some DFO staff who are very hostile to First Nations. … And then you have other staff who are extremely collaborative and really bend over backwards to do everything they can. … when we find staff who really want to work with us, then we put the effort in and then it makes them look good and that helps them. When we get met with staff who are really problematic, we complain about them, and hopefully they change their behavior or they're told that they have to or they move on or whatever the case. But it's very time consuming"

Similarly, CSRT facilitators from WCA described to me how their work often extends outside of the table in keeping interpersonal communications with table participants that help to mediate some frictions between table meetings. The shared space of CSRT that links the multiple local governance bundles helps to provide a normative even if informal check across multiple relations, but isn't always sufficient; neighboring Roundtables have been at risk of dissolving due to conflicts between actors that play out between individuals at the table.

Reliance on individuals can also limit knowledge mobilization. Redd Fish's director noted that even with the shared priorities for informing projects through Indigenous knowledges, there are limitations in being able to do so when the existing structures often rely so heavily on individuals. If one invitation was missed or a key knowledge holder couldn't make a meeting time or location, that important source of knowledge remained absent from the work. This is a difficult tension to reconcile. Nuu-chah-nulth ways of knowing are traditionally shared communally and not considered to be individually held, but colonial legacies include the massive loss of traditional knowledge across much of Nuu-chah-nulth communities. Nuu-chah-nulth knowledge and expertise regarding a river system can often be specific to one person, such as a Nations' fishery manager filling the role of *c'ac'aaɬuk* (riverkeeper / guardian).

4.4.6.2 Specificity, Legibility, Scalability

Since rules and norms are co-developed between actors for each relationship and action arena, they are often highly specific. There is no cohesive governance institution, or single set of rules and norms, for all of Clayoquot Sound salmon governance. This does allow for great amounts of localized flexibility and an ability to ensure rules and norms are well understood and supported by resource users. However, greater specificity makes also local governance structures and rules less transferable across other systems. Lack of transferability or scalability can hinder local structures' ability to gain support by the State actor or to address more distant threats to salmon as they migrate. The CSRT helps to mitigate some of these issues, but in doing so can also produce contexts where efficiency or flexibility of actions is negatively impacted; local actors do note that decision-making is slower than they would prefer in the CSRT due to the many distinct participants and consensus-based process. Some of the five Nations' leadership representatives at the HFS Board of Directors have also expressed concerns that the current approach to partnerships prioritizing specificity and flexibility can result in relatively short term, reactive, or transactional decision-making, which are counter to Nuu-chah-nulth relational practice and priorities in long term governance of salmon relations.

4.4.7 Unresolved conflicts of authority

Some relationships remained consistently difficult throughout my observations. Relationships between DFO and Nuu-chah-nulth actors especially appear consistently characterized by points of frustration, tension, and conflict. These relationships are often characterized by knowledge - related conflicts in day-to-day interactions. For example, an Uu-a-thluk biologist noted DFO's treatment of Indigenous knowledges is inconsistent and conditional depending on perceived validity: "they don't accept our traditional ecological knowledge. When they [the knowledges] are at odds, they're [DFO] right. When they're both right, they [DFO] go,

yes, that's good. That's good TEK." Similar frustrated sentiments were broadly shared by many Nuu-chah-nulth interviewees. However, through further discussions, interviews, and observations, it became apparent that conflict between Nuu-chah-nulth actors and DFO is ultimately rooted in conflicts of power, and specifically contested authority.

The political structures that make up DFO as well as many individual DFO staff at various regional and provincial levels of the organization do not view Nuu-chah-nulth First Nations' governments as authorities outside of the Canadian Fishery Ministers' discretion. In turn, the Nuu-chah-nulth First Nations in Clayoquot Sound do not recognize DFO as a governing or management authority for their fisheries. From the five Nations' perspectives, Nuu-chah-nulth Nations hold the primary authority regarding management decisions in their *hahahouthli*, including management of the five Nations' rights based fishery. Representatives from the five Nations on the Lead Negotiators team and the HFS Board of directors express a preference for a co-governance relationship where DFO and the five Nations share power in determining allocations to Canadian and Nuu-chah-nulth fisheries and otherwise have authority over managing their own fisheries, with the expectation of shared accountability and collaboration in management. The *ḥaẃiiḥ* in this sense would hold a comparable position of authority and ability to leverage power to the Canadian Minister of Fisheries. One lead negotiator from Tla-o-qui-aht noted that lateral co-governance is "a foreign concept to Canada. They're used to having all the authority." The five Nations' representatives on the negotiations team expressed a consistent perception of "a policy of denial" from Canada based on DFO's approach to communications with the Nations. The following chapter further explores these dynamics.

A key step towards building co-governance would be the co-development of mutually agreed upon rules, norms, and strategies in decision-making and management actions. Ultimately, DFO does not co-produce protocols or terms of engagement with the individual Nations between

respective authorities. DFO personnel typically do not participate in Nuu-chah-nulth led governance spaces in line with Nuu-chah-nulth practices of governance, particularly with regards to a priority of consensus-building, norms of communication and participation informed by *ʔiisaak* and *hamipšiƛ*, and coordination across issues with regards to *hishukish tsa'walk*. Uu-a-thluk noted that invitations to higher levels of DFO authority to participate in the Council of *Ḥaẃiiḥ* are generally ignored; instead, regional staff or program managers join in a space that is otherwise a local action arena between governing leaderships. HFS also noted that requests for meetings between the *Ḥaẃiiḥ* and provincial leadership or the Fisheries Minister are often dismissed. HFS provided me with a DFO – produced record of communications which included emails to DFO administrative staff as a part of their record of consultation with the five Nations, even though HFS is not a governing body and its staff do not speak for the Nations' interests. Ultimately, contested authority produces more damaging conflict between DFO and Nuu-chah-nulth actors than disagreements about knowledge.

4.5 Discussion

In Clayoquot Sound, many actors navigate management actions addressing interconnected salmon management challenges across multiple overlapping sets of actor relationships through entangled pluralities of governance. The broader emergent structure of governance is characterized by synergies produced through relational co-governance. Various – though not all - actors share compatible relational values of engagement from multiple worldviews, and recognize multiple authorities, where protocols or rules for actor interactions are negotiated iteratively. Actions are coordinated across bundles of actor relationships and the shared action arena of the CSRT. Knowledge sharing and knowledge coproduction is facilitated by this approach, and these practices in turn provide benefits of timely, well informed decisions

with shared agreement and expanded capacity to act. Relationships between actors are important mobilizing (and maintaining) tools for local salmon management, and are themselves an emergent institutional property of the interconnectivities and overlaps of salmon related management challenges and human – salmon relations.

Governance relations are highly specific. In many cases, protocols or terms of reference which formally dictate rules and norms within each partnership and action arena are negotiated iteratively and often performed through individuals'actions. There is not a single institution or collective set of rules, norms, and strategies that applies to every actor relationship or all action arenas. Instead, where governance includes both Western and Indigenous actors, relational approaches to partnership building that attend to Western and Indigenous relationalities, pluralistic treatment of knowledges and worldviews, and action arenas structured around the entangled nature of salmon relations. In contrast, conflicts are present in actor interactions characterized by dichotomous and treatment of knowledges, unilateral decision-making, and failure to recognize Indigenous authority or co-design institutions. This is especially an issue in relationships between the State actor and local Indigenous actors, and less so between local Canadian and Indigenous actors who participate in relational pluralities, even if the Canadian actor is a WSK-based organization responsible to Canadian authority.

Highly relational strategies to support collaboration with deference to Nuu-chah-nulth authority within the *ḥaḥuułi* support efforts towards meaningful recognition of Nuu-chah-nulth First Nations' rights and sovereignty. Relational strategies in partnerships with Canadian actors help Nuu-chah-nulth actors to build beneficial partnerships, to support ongoing and future recognition and co-governance, to coordinate efforts to influence DFO with greater leverage, and to maintain an active and intentional practice of *hahuulism*. Relational practice and pursuit of self determination are also important to projects of regeneration and decolonization, which is distinct

from changes to policies and processes of the State institution. It is important to note that in co-developed structures between Canadian and Nuu-chah-nulth actors, a shared relational approach does not require that all actors conceptualize relationality in the same way, and in fact should not be pursued. Simplified "epistemic translations" like equivocating the Nuu-chah-nulth and Western understandings of 'protocol' or drawing a direct parallel between *ʔiisaak* and the Western notion of 'respect' "neglect the reality of Nuu-chah-nulth lived values and does not contribute to projects of renewal" (Milne, 2022). As with the importance of noting that concepts of 'relation' are not exactly analogous between Indigenous and Western theories, Nuu-chah-nulth and Canadian actors' approaches to rules and ethics of being, knowing, or governing are not directly translatable, and so actor relations that engage in one are distinct from ones that engage with the other, or ones that engage with both. Co-developed rules and norms through terms of reference, protocols, or normative meeting procedures allow Canadian and Nu-chah-nulth actors to retain their respective understandings of relationality; agreement is about the performance of interaction rather than finding an entirely shared view of reality. There are also tensions and possible inefficiencies in the structures and dynamics of local relational co-governance, and structures will continue to shift with the ongoing changing political and ecological dynamics. Difficult relationships with DFO persist as an issue, and internal politics or interpersonal conflict can impact governance relations. Still, the structures in place support several necessary and useful governance functions and process and enable pluralistic approaches to knowledge. Regardless of independent choice, actors are inherently entangled through salmon relations and so intentionally relational cultivation of this connectivity is an important strategy for localized governance.

Nuu-chah-nulth structures are among several Indigenous led salmon management systems across the Pacific Northwest where locally based and accountable decision-making, a high priority on achievable and actionable decision-making, a focus on ecosystem and

community health, and watershed specific fishing and management contribute to resilient salmon systems (Menzies &Butler, 2007; Beveridge et al., 2020; Atlas et al, 2021; Reid et al, 2022). Though they contrast heavily to the centralized structures of authority in contemporary fisheries management, these approaches are not incompatible and often engage with ecosystem based approaches to research and management (Reid et al., 2022). Key to concurrently mobilizing Western and Indigenous science and traditional knowledge and management systems is using their tools within the local context (Simonds, 2013; Koop et al., 2021). In the Nuu-chah-nulth context, this means applying Western and Indigenous tools in ways attentive to methods and understandings of relationality for maintaining harmonious interconnectivity; this is "living the values" or embodying Nuu-chah-nulth practice (Milne, 2022).

While the structures and practices of relational co-governance in Clayoquot Sound are highly specific, some broader themes mirror important aspects for fisheries governance in Indigenous contexts worldwide. The importance of ENGOs and collaborative action arenas like the CSRT in facilitating and sustaining partnerships and collective action echoes findings from coastal fisheries in Mexico (Garciá Lozano & Hinen, 2016). In Quebec, recent work demonstrates collaboration of Indigenous and non-Indigenous fisheries actors supports adaptability and addresses vulnerability of Indigenous fishing communities, centering social relations in organizing natural resource dependent community development (Alberio & Soubirou, 2022). Collaborative co-existence and co-management is supported by pluralistic treatment of knowledges through Two-Eyed Seeing in Nova Scotia (Denny & Fanning, 2016). Efforts to support Indigenous traditional fisheries governance and management structures with collaborative science coproduction produced positive local outcomes in British Columbia (Eckert et al., 2017) and Polynesia (André et al., 2022). Co-governance is important for knowledge mobilization in marine planning in the Pacific Northwest (Diggon et al., 2020). Locally scaled Samí leadership

helps to facilitate direct management actions to avoid federal bureaucratic barriers (Mustonsen & Feodoroff, 2018). Including or directing efforts through traditional structures and practices was also identified as important in New Zealand (Jackson et al., 2018) and British Columbia (Beveridge et al., 2020). Centering knowledge inclusive, power-neutral partnerships are highlighted in multiple contexts (Weiss et al, 2013; Reid et al, 2021; Almack et al., 2023). In Clayoquot Sound, co-constructed relational governance intersects with each of these strategies for facilitating management and knowledge coproduction.

4.6 Conclusion

This chapter details a case example where relational & pluralistic practices produce and are produced by local institutional structures for commons governance and management. Through a multitheoretical approach to governance and plural understanding of relationality, I was able to describe in depth the entangled structures of governance produced through actor interactions and strategies, and explore how variable understandings and ways of embodying relation through rules, norms, and interpersonal performance produce distinct relations of collaboration or conflict with implications for local knowledge production and management actions. The characteristics of the case study I found through this approach closely mirror several findings from Chapter 2, especially the four priorities identified for supporting effective knowledge mobilization of IK and WSK. They particularly emphasize the benefits of pluralistic approaches to knowledge, and the importance of including Indigenous perspectives and structuring collaborative, participatory structures with power sharing and deferral to Indigenous authority for working within Indigenous spaces. Entanglements in the governance of Clayoquot Sound salmon systems invites us to consider how we might reimagine fisheries and conservation management institutions more broadly through relational, pluralistic approaches.

5. Frictions and Disruptions to Reimagine Fisheries

5.i There's no sign of reconciliation

> *"*Even though we're the highest monitored fishery, we're still being watched by DFO. They're trying to find more infractions and there's no sign or no indication at all that DFO is trying to reconcile or Canada's trying to reconcile with the Nations by their actions. … It just seems like they're wanting to continue to keep pitting each Nation up against each other and starting to cause chaos. … They'll take licenses from a nation and say, this is your license to use to accommodate the rights based fishery. We didn't win that. We didn't win an administration office. You know, they're treating it like we just won an administration office. To administer all of the five Nation's assets, trying to put them in one bowl and make us use our own assets to fish something that DFO lost. … right now, unfortunately, they do have an authority to be able to shut down [access]… We won a court case. That probably is going to piss people off … they assume that it's done for free, when we did actually spend millions and millions of dollars to go through the court system. And so it necessarily wasn't free at all."
> – Elmer Frank, Tla-o-qui-aht fisher, current Tla-o-qui-aht elected chief and past HFS Board of Directors member, November, 2021. Brackets my addition.

5.1 Introduction

State led fisheries management institutions, particularly those of Western settler-colonial nations, are typically centralized, hierarchical systems characterized by structures of power and conditions of inequity produced by colonialism (Denny & Fanning, 2016; Silver et al., 2022). In these institutions, the implementation of fisheries science is used to uphold the colonial authority, which in turn rejects alternate ways of knowing and managing (Wolfe, 2006; Simpson 2007; Silver 2022). This "feedback loop" between fisheries science and colonialism (Silver et al., 2022) is neither inevitable nor impervious to disruption, and indeed reform and reimagining of fisheries is greatly needed. An adaptive and interconnected set of strategies spanning diverse ways of knowing are necessary across fisheries contexts globally, but especially in working to reform hegemonic colonial fishery institutions privileging a highly industrialized, capitalized, privatized, and corporately dominated fleet. Increasingly, Indigenous efforts to assert fishing

rights and to build capacity to self govern and manage in fisheries are directly challenging hegemonic State structures (Ferguson et al., 2022; Jones et al., 2017; Lowitt et al., 2019; Mustonen & Feodoroff, 2018; Todd, 2018). These efforts may potentially disrupt the feedback between colonialism and fisheries science and produce opportunities to explore reimagined systems and relationships in fisheries.

Ha'oom Fisheries Society (HFS) and Fisheries and Oceans Canada (DFO) are the fishery implementation and management institutions of Nuu-chah-nulth and Canadian governing bodies, respectively. By court mandate, they must formally negotiate the implementation of five Nations' rights-based fisheries.[1] Notably, they must expand the five Nations' involvement in fisheries management and increase allocations of a range of species throughout the five Nations' *hahouthli* (traditional territory) on the west coast of Vancouver Island. Negotiations between the five Nations and DFO have broken down a number of times since the initial court acknowledgement of the right in 2009[2] as well as following the constitutional affirmation of the right and mandates to negotiate in 2014 and 2018.[3] Following a final court decision in 2021[4] and concurrent to a reconciliation process, negotiations have resumed as the relationship between the two management institutions continues to evolve through sporadic, tense, and discordant interactions. Continued conflicts regarding power-sharing in co-governance and barriers to rights implementation are rooted in colonial hegemony.

In the Five Nations' interpretation of their rights and the purpose of *T'aaq-wiihak* and Ha'oom, HFS is *not* a Canadian institution responsible to the Fishery Minister's authority.

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[1] The Five Nations include Ahousaht Nation, Tla-o-qui-aht First Nations, Hesquiaht First Nations, Mowachaht/Muchalaht First Nations, and Ehattesaht First Nations. These five Nuu-chah-nulth Nations have rights to fish and to sell their catch recognized by Canada and detailed through Ahousaht et al. v. Canada (2021)
[2] Ahousaht et al. v. Canada (2009)
[3] Ahousaht et al v. Canada (2018)
[4] Ahousaht et al v. Canada (2021)

Rather, HFS is responsible to the five Nations' governing authorities as a parallel structure to Fisheries and Oceans Canada. The strategic development of the five Nations' *T'aaq-wiihak* fishery offers windows to consider specific strategies to challenge and disrupt the relationship between colonialism and fisheries science. And indeed, the evolution of Ha'oom Fisheries Society is itself a story of reimagining the practices and culture of fisheries institutions, predicated on decentralized co-governance, broad and adaptive pathways of decision-making, and an intentional prioritization of multiple ways of knowing (including fisheries science) in a pluralistic approach to knowledge co-production.

In this chapter, I discuss how multiple practical barriers to the implementation and full realization of the Five Nation's rights and sovereignty are reinforced by colonial law and reflect institutional and knowledge hegemonies within the centralized Canadian fisheries management institution. I explore frictions between the focal institutions, and the barriers they produce. I discuss how these frictions exemplify the feedback loop between colonialism and fisheries science, as well as points of disruption. I describe the strategic avenues of negotiation and resistance pursued by the five Nations and Ha'oom, along with their implications and potential risks. In particular, the intentional mobilization of Indigenous and Western ways of knowing and governing, reinforced through strategic engagement with and manipulation of State structures, serves to reshape certain governance relations and dynamics of power. I suggest these strategies illuminate some potential pathways towards deconstruction of knowledge hegemonies in fisheries and a broader reimagining of fisheries institutions. These disruptions and reimaginings are important for vulnerable coastal communities and Indigenous populations working towards self-determination, and are also vital components for reformation of State fisheries institutions to address inequities, create more environmentally responsible management, and meaningfully pursue pathways of reconciliation.

5.2 Background

5.2.1 Feedbacks Between Colonialism and Fisheries Science

Western structures of resource management and governance are built upon hegemonic bureaucracies and the legally encoded hierarchy of Western Scientific Knowledge (WSK) over other knowledge systems (Alfred and Corntassel, 2005; Wolfe, 2006; Whyte, 2017, 2018; Silver et al., 2022). Genocidal tools and physical violence are implemented in order to appropriate and maintain control, and become sanctioned through laws, norms, and the centralized and hierarchical structures of settler nation-state institutions (Wolfe, 2006; Whyte, 2017; Silver et al., 2022). Privatization of property is a core tool of aggregating control in colonial processes, and typically is quite central to fisheries governance in Western and settler-colonial nations (Bhandar, 2011; Olson, 2011; Carothers, 2015; Pinkerton & Silver, 2011; Silver et al., 2022). The dispossession and appropriation of Indigenous peoples' territories, resources, sociopolitical structures, and beyond are facilitated through Settler appropriation and private property regimes under centralized control (Alfred and Corntassel, 2005; Whyte, 2018; Silver et al., 2022).

These colonial projects and inequities are perpetuated; they are what current societal structures, law, and knowledge production including science in settler-colonial nations are built upon, and together with capitalist ideas of relation are from which the logics of industrialization and neoliberalization proceed (Wolfe, 2006; Whyte, 2018; Liborion, 2021). In turn, knowledges produced from these structures which "assume unfettered access to Indigenous land," including Western science, are used to reinforce their logics (Todd, 2018; Liborion, 2021). For example, narratives like "best available science" serve a political purpose in mobilizing power and reinforcing the authority of Western state management structures claiming a scientific foundation to restrict or prohibit Indigenous practices of resource use and to deploy tightly controlled and extractive resource management agendas (Liborion, 2021; Vinyeta, 2021). Dispossession of

Indigenous peoples and delegitimization and criminalization of Indigenous knowledges and harvest practices entrench inequities into sociopolitical structures, and are enforced by legal regimes of the Settler State (Alfred and Corntassel, 2005).

Knowledge hegemony is a feature of this system: ways of knowing, relating, and governing must be *integrated in to* (and cannot disrupt) the cultural, political, and epistemological contexts of Western management systems, legal regimes, and scientific disciplines to be accepted (Nadasdy, 2003; Silver et al., 2022). Non-human species and ecosystems are managed primarily through a utilitarian "resource" lens by the Western world (Scott, 1988; George, 2003). Indigenous ways of knowing and even Western scientific approaches that pursue more system-oriented and holistic approaches to sustainability or incorporate broader social dimensions of equity and wellbeing are less acceptable to such a lens (Liborion, 2021; Silver et al., 2022). In coastal communities and ecosystems under this structure of hegemony, such as conventional Western fisheries management, colonial and environmental challenges are deeply intertwined, and structures addressing (or perpetuating) one are entangled with the other.

Silver et al. (2022) describe this "feedback loop" between colonialism and Western logics as it presents in Western fisheries. Colonially generated inequity in fisheries and the assumption in conventional fisheries science of state authority to manage and determine objectives of fisheries reinforce each other and operate through centralized, hierarchical state led fisheries management (Harris, 2001; Silver et al., 2022). Western governance regimes in particular use private property models of licensures and quotas to moderate fisheries access, managed through neoliberal market based tools (Mansfield, 2004; Pinkerton & Edwards, 2009; Barnett et al., 2017; Silver & Stoll, 2019). When potential value of the property is threatened, control is tightened and access even more limited. For example, a fleet at 'overcapacity' is often addressed through license retirements or 'buyback' programs, which reduce the number of available licenses and

drive up their value as well as the cost of entry to the fishery (Schwindt et al., 2003; Grafton & Nelson, 2005). Access and ownership become concentrated among a select few and move farther and farther out of reach of the broader population (Edwards & Pinkerton, 2019a; Silver & Stoll, 2019). In the case of BC salmon fisheries, property models of licensure and employment of buybacks to (unsuccessfully) address overcapacity have facilitated the stratified transformation of a commercial fleet dominated by corporate ownership without mitigating the issues of overcapacity and resource depletion (Grafton & Nelson, 2005; Haas et al., 2016; Edwards & Pinkerton, 2019a, 2019b, Silver & Stoll, 2019). Fisheries science itself is constrained by management options, economic and biological reference points, and modeling approaches that fit within colonial and neoliberal capital logics (Pinkerton 2017; Silver et al., 2022). Conventional fisheries science is typified by single-species approaches to research and monitoring and a limited consideration of human dimensions outside of economic modeling of catch effort, capacity, and landed value (Pinkerton, 1999; Haas et al., 2016; Schnute & Sibert, 1983; Atlas et al., 2021; Silver et al., 2022). For example, assessment of overcapacity risks (and economic concerns of "underexploitation") in conventional fisheries science to determine when to tighten control and restriction of resource access and license (property) ownership is largely based on the construct of Maximum Sustainable Yield (MSY) and market-based approaches to considering catch effort and landed value (Finley, 2011; Finley & Oreskes, 2013; Hubbard, 2014; Pinkerton & Davis, 2015; Silver et al., 2022). Limitations to MSY and other single-species and market-based approaches are long critiqued and increasingly recognized within a growing push towards ecosystem-based-approaches in Western fisheries science and management (Holt, 2011; Finley, 2011; Manach et al., 2021; Silver et al., 2022) However, the problem of knowledge hegemony and the dominance of market and property based management tools continue to constrain and direct the objectives, assumptions, and application of fisheries science, even from an ecosystem based perspective.

State authority to manage fisheries under the 'best available science' is reinforced through the application of a specific 'flavor' of fisheries sciences constrained by and acceptable to Western colonial logics and market demands (Pinkerton & Davis, 2015). Indigenous ways of knowing, holistic dimensions of wellbeing, equity concerns, and local knowledges of Indigenous and settler fishing communities hold little value or influence in dominant monitoring and management tools of conventional fisheries science (Harris, 2001; Silver et al., 2022).

Silver et al. (2022) proposes several specific "points of disruption" in the feedback loop between fisheries science and colonialism to support necessary pathways of transforming and reimagining fisheries to include multiple ways of knowing, dispersal of authority, and a shift from siloed hierarchical structures towards a relational reimagining of fisheries systems and communities. In the case study presented here, the strategies of five Nuu-chah-nulth First Nations and Ha'oom Fisheries Society to selectively challenge or coordinate with Canada and DFO are targeted at specific points of friction between conflicting institutions, which I explore through select points of disruption on the colonialism – fisheries science feedback loop.

5.2.1 Colonialism and Salmon Fisheries of BC

There are five species of salmon (*Oncorhynchus spp*.) native to BC waters: *miʕaat* (Sockeye), *suuḥaa* (Chinook or King), *cuẃit* (Coho), *čaapi̓* (Pink), and *hinḵ̓uuʔas* (Chum). Salmon, especially *miʕaat* and *suuḥaa* and *cuẃit*, are integral to the well-being of Nuu-chah-nulth First Nations, who have lived on the west Coast of Vancouver Island for over 9,000 years (Atleo, 2011; George, 2003; Price et al., 2017; Bingham et al., 2021). Nuu-chah-nulth territories were highly valued for their rich terrestrial and marine resources by European colonists, who began establishing settlements on the west coast of Vancouver Island in the 1850s. By 1900 the increasing numbers of British Canadian homesteads and assimilationist federal policies forced Nuu-chah-nulth communities on to government created reserves and was actively stripping away

traditional practices, community structures, and access to resources (Horsefield & Kennedy, 2014; Marshall, 1993; see Appendix 1).

Colonialism first produced the conditions for inequity in BC fisheries. The 1876 Indian Act banned traditional Nuu-chah-nulth governance, replacing it with Canadian designed band councils (Parrot, 2022). Between 1884 and 1894, ceremonial practices including potlatches were banned, Indigenous implemented commercial fishing was outlawed, traditional forms of harvest were increasingly criminalized, and attendance of residential schools through the Indian Residential School System (IRS) was made mandatory for First Nations children (TRC, 2021; see Appendix A). The intergenerational trauma inflicted through residential schools is directly linked to the disproportionate rates of PTSD, depression, alcoholism and addiction, diabetes and other diseases, poverty, and suicide in First Nations communities (TRC, 2021; Coté, 2022). The visible discrepancy of wealth and wellbeing between Nuu-chah-nulth communities and neighboring Canadian towns is a lasting legacy of the dispossession of resources and land, the marginalization of harvest-based livelihoods, and the systemic intergenerational traumas inflicted through genocidal tools (Coté, 2022).

Fisheries and Oceans Canada is Canada's federal fisheries management organization. Under the Canadian Fisheries Act (1868), DFO manages the harvest and protection of marine fisheries resources. DFO implements limits on commercial, recreational, FSC, and Aboriginal fishing allocations in their fishery management plans, and works to oversee all monitoring efforts of BC salmon fisheries. Federally managed BC salmon fisheries and the coast-wide establishment of salmon canneries began in the 1870s and rapidly accelerated through industrial expansion during the first World War and in to the 1930s (Newell, 1993; Harris, 2001, 2009; Atlas et al., 2021, see Appendix A). At the same time, Indigenous peoples entered Canadian commercial salmon fisheries as deckhands or by working in canneries. In these positions,

Indigenous harvesters were critical to the commercial fisheries and to the onshore processing sector in the mid 1900s (Newell 1993; Harris 2001). While traditional harvesting and Indigenous led management was prohibited, there was extensive commercial fishing knowledge, infrastructure, and experience within coastal First Nations (and those along riverways) through the late 1800s and up into the 1970s (Newell, 1993).

By the 1950s, the BC salmon fishery was among BC's most valuable industries. As conventional fisheries science developed in the 1960s and became integrated in to most Western management practices, including through Canada's 1968 Davis Plan, 1985 revised Fisheries Act, and the 1984 Canadian – US Pacific Salmon Treaty, salmon fisheries transitioned to a limited access licensing structure assessed largely through landing size and value and the application of single-species fisheries science models (Harris, 2001; Schwindt et al., 2003; Haas et al., 2016). In response to massive salmon declines in the 1990s, restrictive policies and multiple license and vessel retirement and redistribution programs, or buybacks, implemented by DFO between 1996 and 2012 drastically reduced the Canadian salmon fishing fleet in an effort to protect remaining populations and reduce the overcapacity of the Canadian salmon fishery (Pinkerton, 1999; Muse, 1999; James et al., 2004; Grafton & Nelson, 2005; Haas et al., 2016; see Appendix A). Reduction of the salmon fishing fleet caused substantial wealth erosion across BC salmon fisheries, an increasingly corporatized centralized fleet, and the coast-wide degradation of dockside fishing infrastructure and closures of salmon canneries (James et al., 2004; Grafton & Nelson, 2005; Haas et al., 2016; Edwards & Pinkerton, 2019). Most small-scale fishers and single license holders were edged out of the fishery as it became increasingly financially prohibitive to access and participate. By 2012,a handful of corporate industry players owned a substantial portion of B.C. salmon licenses; the most dominant processor alone owned 5% of the entire licensure (Haas et al., 2016). These contemporary waves of fisheries rationalization since the 1970s eliminated a

large amount of Indigenous participation in commercial fisheries, adding yet another colonial trauma of Indigenous marginalization and dispossession (Harris, 2001, 2009). Concerned stakeholders, especially Canadian owner-operator commercial fishermen who were also getting "squeezed out" of the fishery, developed vocal advocacy groups, and in parts of WCVI Nuu-chah-nulth and Canadian fishers were and remain allied in their frustrations with DFO management (D. Edwards, personal communications, 2021).

A long history of litigation[5] allowed incremental steps towards decriminalized Indigenous fishing for Food, Social, and Ceremonial (FSC) practices and some amount of commercial harvest, though under strict allocation and gear limitations enforced through surveillance by DFO. Following the Sparrow Decision (R. v. Sparrow, 1990; see appendix A), First Nations FSC fisheries were granted priority in 1990. Judicial precedents such as the 1999 Marshall Decisions and policies like the 1999 Allocation Policy for Pacific Salmon (SAP) established legal grounds for DFO to provide fishing opportunities to First Nations, but also to hold authority over defining and enforcing the nature of those opportunities. With the declining fishery, opportunities for Indigenous commercial fishers were and remain limited.

Indigenous communities including Nuu-chah-nulth First Nations continue to be affected by Canada's delegitimization and criminalization of Indigenous peoples' fishing livelihoods and the impacts of residential schools and other colonial tools to dispossess and disempower Indigenous practices and governments (Harris, 2001, 2009). Reconciliation and Indigenous renewal projects explicitly acknowledge these intersecting processes, including in efforts towards rights of commercial access and self management in fisheries. Recentering traditional foods such as salmon in dietary practice is important to addressing the disproportionate rates of illness and

[5]See Appendix A for a collated timeline of relevant court decisions. The Sparrow decision in particular set precedence for the favorable Ahousaht et al. v. Canada 2009 decision.

disease in Indigenous communities (Mihesuah & Hoover, 2019; Shukla & Settee, 2020; Coté, 2022; , 2020). In addition to providing nutrition and food security, fishing is one of the many actions that is a part of enacting Nuu-chah-nulth relationship to salmon and to *ḥaḥuuli* (traditional territory), and practices of preparing , eating, and sharing salmon are an important part of embodying relationships in community (George, 2003; Atleo, 2004; Atleo, 2006; Coté, 2021; Milne, 2022).

Since formally endorsing UNDRIP in 2015 (Duncanson et al., 2021), Canadian legislation regarding fisheries and Fisheries and Oceans Canada has included more explicit language regarding the recognition and incorporation of Indigenous rights, knowledge, and territory in Canadian decision-making and management. Bill C-15 (2021) makes UNDRIP enforceable as federal law, though the methods for appropriately and meaningfully doing so are relatively undefined in legislation. Through revised Fisheries Act (Bill C-68, 2019), DFO's fishery management now prioritizes a more integrative ecosystem – based approach and, at least on paper, is supposed to incorporate local and Indigenous rights, interests, and knowledges. The act explicitly calls for "incorporation of Indigenous rights and knowledges" in to fishery management decisions, again without clarity regarding best practices for ensuring the "incorporation" is meaningful and appropriate. As noted in earlier chapters, there are risks to state led knowledge "integration" efforts that fail to recognize pluralities and dynamisms of knowledge systems, and legislative policy is no guarantee of meaningful or necessary transformative change to the state institution. The First Nations Fisheries Council criticizes DFO's engagement as a 'lead' for reconciliation in fisheries and in 2022 found DFO to not be working in good faith to implement Indigenous rights-based fisheries (FNFC, 2022).

5.2.3 Building an Institution for the Five Nations Rights – Based Fishery

Following the initial 2009 court decision (Ahousaht et al. v. Canada, 2009), the five Nations' communities were eager to immediately access their fishing rights with the intent to implement fishing and management plans for key species developed by the five Nations' fisheries departments (T'aaq-wiihak 2016; Frank, 2021, personal communications). Canada required that the five Nations and DFO negotiate the terms of rights implementation, and that the Nations have a management structure in place in order to allow access to the right (Ahousaht et al., 2009, 2014). DFO did not recognize the Nation's management plans, and instead authorized "demonstration fisheries" in 2012, or a limited opportunity for the Five Nations to *demonstrate* their ability to implement for-sale fisheries (F. Frank & A. Gagne, personal communications, 2021; Figure 11).

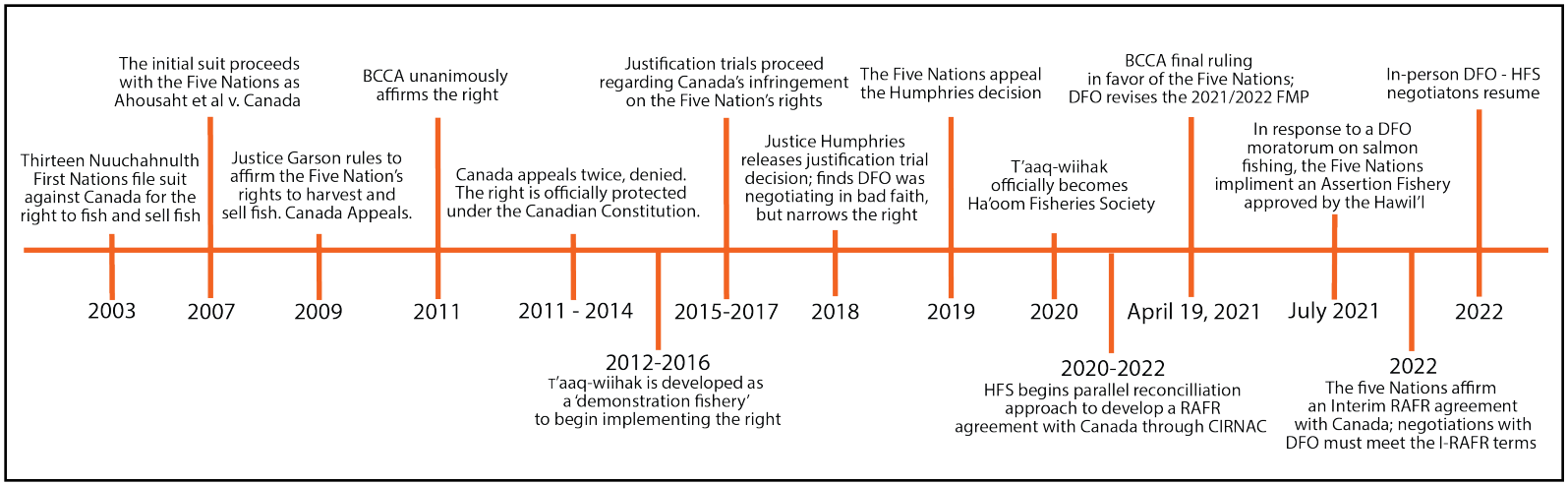

Figure 11: Timeline of the Ahousaht et al. v. Canada court case decisions and the development of the Five Nations Rights Based Fishery through T'aaq-wiihak and Ha'oom Fisheries Society.

The Nations' *Ha'wiih* (hereditary chiefs) did not consider the demonstration fisheries as rights-based fisheries, as they did not reflect the principles and objectives outlined in the Nations' fishing plans (T'aaq-wiihak 2016; F.Frank, personal communications, 2021). As negotiations between DFO and the Five Nations' appointed lead negotiators continued, intermittently halting for up to three years at a time during additional legal disputes,[1] the Five Nation's accepted some terms of the "demonstration" fisheries in order to provide at least limited access to opportunities to fish and sell their catch. Over time, *T'aaq-wiihak*, a word meaning "fishing with permission of the Chiefs," became the name for the interim structure supporting these demonstration fisheries (T'aaq-wiihak, 2016). In 2020, the growing fishery management and rights implementation institution was incorporated as Ha'oom Fisheries Society (HFS) and the fishery itself is formally referred to as the Five Nations Multispecies Fisheries or the Five Nations Fisheries (HFS, 2022; Figure 11). Many Nation members continue to refer to the fishery itself as *T'aaq-wiihak*.

HFS currently serves as an interim structure for coordinating the decision making, management actions, and negotiations necessary to implement and monitor the Five Nations Fisheries until the five Nation's rights are fully realized and their individual governing authorities and managing bodies are able to build capacity to collectively co-govern (HFS, 2022; F. Frank & A. Gagne, personal communications, 2021). HFS is not itself responsible for carrying out negotiations, though early on some administrative members of *T'aaq-wiihak* were also part of the five Nation's team of negotiators.

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[1]In 2014, DFO was found to have been engaging in negotiations in poor faith, when not otherwise actively stalling negotiations (FNFC, 2022). Negotiations halted again during the "Justification trials" from 2016-2018 which found that DFO could not justify their infringement on the Nations' rights and must re-engage in negotiations in good faith, but which also reduced the previously described scope of the right (Ahousaht et al v Canada 2018), and again from the Nations' appeal in 2019 through the 2021 decision which re-affirmed the right in lieu of the 2018 restrictions (Ahousaht et al v Canada, 2021). Negotiations resumed in 2022 as a concurrent reconciliation process towards a Reconciliation Agreement for Fisheries Resources (RAFR) with interim agreements since 2019 nears potential completion in 2023.

While HFS is not a governing body, it does provide structural support for co-governance across the inshore and offshore spaces of the five Nations' *hahouthli*, as understood by local rightsholders and sovereign Nuu-chah-nulth First Nations and where processes of decision-making are ultimately defined by the five Nations. Governance responsibilities and power regarding fishery decisions are shared across the five Nations via Nuu-chah-nulth informed processes of consensus based decision making through the HFS board of directors (F. Frank & A. Gagne, personal communications, 2021). The board is comprised of two representatives from each of the five Nations, appointed by their respective communities and accountable to the interests of their Nations' *Haawi'lt* (traditional hereditary chiefs). The Nations' representatives have expressed that in their view, to appropriately implement the five Nations' rights, this internal co-governance structure should *laterally* extend to shared power in co-governance with Canada, making HFS and DFO collaborators in co-management, as opposed to the current uneven power dynamic where HFS and the five Nations must carefully calculate the potential risks of "noncompliance" through any divergence from DFOs' allocations, gear restrictions, monitoring requirements, among other terms of management (A. Gagne, personal communications, 2021)[2].

HFS currently works towards rights implementation by supporting fishers' ability to access the fishery through distributing DFO's allocations across the Five Nations, managing the logistics of fishery openings and closures, and prioritizing assessment and monitoring that supports the ecological responsibility and economic viability of the fishery under direction of the Five Nations' *Ha'wiih* (HFS, 2022). The broader administrative goal of Ha'oom Fisheries Society is to develop an institutional structure for fisheries management that is well-informed, responsible to concerns of Five Nations' rightsholders, and facilitates its own eventual replacement by direct

[2] This sentiment was also noted repeatedly in multiple meetings I attended between 2020-2022 of the HFS board of directors and five Nations' negotiation leads.

co-governance and co-management between the five Nations (Gagne, personal communications, 2021; H. Wright, personal communications, 2022). Though the Five Nations Fisheries are no longer formally considered "demonstrations" and HFS is better able to act on some of the Nations' management objectives, they are still ultimately constrained by relations with DFO, which is structurally very different from HFS and often (attempts to) asserts authority over the Five Nations Fisheries.

5.2.4 Frictions between institutions

Differences between the structures and processes of institutions that encounter each other through entanglements can create frictions, especially in the context of relations of power (Tsing, 2004). I use the word "frictions" following Tsing's metaphor (2004) in considering how tensions in entangled institutions' interactions, specifically in discordant encounters and uneven engagement, markedly influence shifting arrangements of those same institutions and relations of power.

DFO and HFS are entangled through management of fisheries and marine systems, colonial history, Nuu-chah-nulth pathways towards self determination, and Canadian legislative mandates. Nuu-chah-nulth structures of governance reflect a pluralistic, relational, adaptive approach to decision-making, co-management, monitoring, and the production and operationalization of multiple ways of knowing in the context of local fisheries and resource management (see Chapters 3 & 4). Accordingly, HFS, in fulfilling their role following the direction of the *hawi'lt* (hereditary chiefs), prioritizes these same approaches in their implementation and management of the Five Nations' rights-based fishery. Canada's governmental organization of fisheries through DFO is a comparatively static, siloed, and centralized institution which prioritizes decisions and fishery management practices that protect the current privatized structure of the Canadian fishing fleet and the capital value of Canadian

fisheries, reinforced by a privileging of capital market demands and calls to fisheries science in policymaking (Silver et al., 2022). Regional branches of DFO operate relatively independently of each other, but it is ultimately a federal institution that defers to the authority of Canada's Minister of Fisheries (DFO, 2022c). This is also an inverse geographical arrangement of authority to Indigenous fisheries (Atlas et al., 2021). Compared to First Nations' structures where authority is locally distributed, in Canadian governmental structures authority is concentrated at the regional and ministerial level while local levels of DFO staff have fairly little authority.

The interacting institutions are both impacted by frictions in their interactions, ultimately shaping and shaped by each other. By intensifying pressure (leveraging power), one may force the other to sway; alternately, both may adjust so as to facilitate better coordination. Either form of adjustment relieves the initial friction and can potentially prompt the institutions to more closely resemble each other over time, though each results in very differing power dynamics; an intensified unequal relation of power in the first, and a more evenly distributed or shared relation of power in the latter. Regardless, interactions are rarely singular or isolated, and neither institution leaves an interaction exactly the same as before (Tsing, 2018). Co-constitutive interactions continue iteratively through entanglement between institutions and continuous reshaping of relations.

5.3 Methods

I have worked in partnership with Tla-o-qui-aht First Nations since 2018 and with HFS since 2019 to develop research regarding the mobilization of Nuu-chah-nulth and Western knowledges in salmon governance. The work presented in this chapter is based on evidence gathered through archival review and over three years of combined passive and participatory observation. Between 2019 and 2023, I reviewed publically available draft and final fishery

management plans, stock assessment and escapement reports, policy documents, and various other related documents produced by both Canadian and Nuu-chah-nulth actors. All documents reviewed were either publically available or provided to me by HFS, Tla-o-qui-aht First Nations, or West Coast Aquatic with their permission and following formal research protocols and institutional ethics review. Between summer of 2020 and spring of 2023, I sat in on meetings between key actors, including 22 HFS board of director meetings, 6 meetings of the five Nation's lead negotiators, one meeting between the Nation's negotiators and DFO, and multiple management coordination meetings between HFS and DFO staff. Due to COVID-19, all attendance was virtual between November 2019 and August 2021.

In the fall of 2021 and the spring and early summer of 2022, I conducted a total of four and a half months of fieldwork based in Tofino, the location of the HFS office and a primary offload site for the Five Nations Fishery. During this time, I joined meetings in person, spent over 200 hours with HFS staff in the office or joining in management operations for community engagement and habitat assessment, and observed 22 salmon fishery offloads and monitoring procedures. I also conducted 29 semi-structured interviews with key representatives of local governance actors and *T'aaq-wiihak* fishers, and spent portions of each offload informally interviewing and conversing with fishers, monitors, and occasionally DFO staff. In May of 2023, I returned to Tofino for a short trip to present the draft dissertation to my research partners to affirm their permission to share the data included in this chapter.

5.4 Frictions and Disruptions

Broadly, HFS is a boundary spanning institution, engaging daily with both Canadian and Nuu-chah-nulth structures of governance. Pluralistic, adaptive, and relational Nuu-chah-nulth structures contrast with the comparatively static and siloed federal institution. Pressured to be

legible to DFO while responsible to the Nations' interests, Ha'oom does not fit neatly in to either existing set of institutions. Boundary spanning efforts by HFS are complicated by tense and even hostile interactions between respective leaderships in negotiations, concurrent to challenging administrative dynamics between HFS and DFO. Tensions include conflict over power-sharing in co-governance and barriers rooted in colonial hegemony. As these fundamentally disparate structures interact and conflict, particularly as the Five Nations' challenge Canadian authority over their fisheries, frictions become visible through the fishery and within Ha'oom operations.

Each department within the regional DFO bodies focus on specific programs including stock assessment, license management, catch monitoring, salmon conservation, among others, with little horizontal integration across departments (DFO, 2022c). There is evident siloing internal to the department. A DFO interviewee affirmed that between sectors of the department is often "the place you get [the] least transparency," and another noted they do not know much about other salmon focused programs outside of their own, even when they are physically separated by only a building or a floor at the DFO Pacific Biological Station. Accordingly, staffs from each department and program are apparently not well informed of each others' ongoing relationships with HFS, or of broader interim agreements between the five Nations and DFO regional directorship. For example, the expectations of monitoring in the Five Nations Fisheries as annually negotiated in the reconciliation and rights implementation process are often apparently unfamiliar to DFO staff in stock assessment, management and monitoring, and other departmental programs, contributing to miscommunications during meetings with HFS program level staff, errors in annual management plans, and occasionally causing delays to fishery openings and mistakes in monitoring and enforcement actions. These issues are exacerbated by a high turnover rate within the departments HFS interacts with most frequently. HFS staff communicate with staff of various departments within DFO in order to provide catch data,

coordinate monitoring of fishing activity and catch landings, and establish season opening and closing dates. HFS program level staff, while not involved in negotiations or administrative interdepartmental communication, are kept up to date by HFS directorship regarding relevant interim agreements in order to appropriately coordinate fishery implementations. On multiple occasions, I watched HFS staff fill in DFO staff on active agreements relevant to department level operations related to the Five Nations Fishery, and consult with Nations' fishers and fishery managers to clarify misinformation received through DFO staff. Substantial amounts of meeting time between the organizations' staffs meant to discuss and coordinate upcoming in-season adjustments in fishery operations are instead spent on review.

Beyond structural differences, frictions arise through incongruent understandings of authority and the role of HFS. The five Nations and Canada appear to have fundamentally differing views for what the court affirmed commercial right will mean long term for the extent of Indigenous self-determination and agency over management actions. Co-governance and co-management with DFO, following the Five Nations' perspective, would consist of mutually agreed upon distribution of catch shares and management efforts. Canadian management plans would direct Canada's area-based commercial and recreational fleets, and HFS management plans would direct the Five Nations' fleet, with the two plans mutually communicated, approved, and supported by respective governing agencies. Monitoring would be the respective institutions responsibilities, with transparent practices and even potential data sharing while retaining intellectual ownership over data produced through self management. This design is not dissimilar to the Pacific Salmon Treaty, an arrangement between Canada and the United States to coordinate the impact of fisheries on salmon that migrate across international boundaries. In the current arrangement, decision-making, monitoring requirements, and data reporting are ultimately still largely directed by DFO with deferral to ministerial authority. DFO also appears to conflate the

roles of HFS and the roles of the five Nations' leads negotiation team, and typically addresses the five Nations as a singular unity rather than five distinct rightsholder groups, much less individual governing authorities (A. Gagne, personal communications, 2021). Fisheries and Oceans Canada either understands co-governance differently than the Nations, or it does not consider co-governance a goal outcome of the negotiations and understands rights fulfillment primarily through the increase of allocations.

Conflicts are not a product of HFS failing as a boundary spanner, but rather reflect the five Nations' challenge to State authority and a structural inability of DFO to appropriately recognize and articulate ways of knowing, managing, and governing divergent from the State institution. Even as HFS's boundary work helps to alleviate some frictions to enable the fishery to proceed, these frictions continue to produce local barriers to accommodating small scale multispecies fisheries, implementing multiple ways of knowing for appropriate management, and the ability of the five Nations to exercise their rights to fish. A member of Tla-o-qui-aht First Nation's Chief and Council stated, "I feel like when you engage with Fisheries and Oceans here, you're wasting your time because it doesn't go anywhere, anyway." These barriers, and the power leveraged by the DFO, are reinforced by colonial law and reflect institutional and knowledge hegemonies within the centralized Canadian fisheries management institution, which defers to fisheries sciences and State/Minister authority to validate unilateral decisions. The feedback between colonialism and fisheries science is apparent in these frictions, and the entrenchment of hegemony is a factor in why many sentiments from both Nuu-chah-nulth and non-Indigenous Canadian individuals in Clayoquot Sound are relatively pessimistic regarding possible change:

> "on top of all that [ecological challenges], you've got … a command and control central government in a colonial nation that … covers a huge territory and has arrogated to itself the supposed authority to be the last word on everything fisheries related under the Constitution Act. The [Nuu-chah-nulth] Nations don't accept that, and they've never signed treaties, and the authority of their *Haa'wiilth* is undiminished as far as the Nations

> are concerned. So you have a tremendous mismatch between the centralized federal government and its fisheries program, Fisheries and Oceans, and the way the *Haa'wiilth* function. You know, we have meetings between the *Haa'wiilth* and DFO where the decision makers from the Nuu-chah-nulth are there in the room and we always get lower to mid level DFO staff. It's extremely difficult to get anyone who represents some kind of [federal] decision maker. The vertical integration in the department is antithetical to making decisions close to where they need to be made, and the emphasis on holding control and holding resources tightly so that you don't lose power is incredibly pervasive throughout the department. I don't know why I continue to be astonished by it. I've been watching Federal Government departments, first Indian Affairs and then DFO, for three decades now and they are remarkably impervious to change." - NTC Uuathluk administrative lead (non-Nuu-chah-nulth), Oct 2021

Ha'oom necessarily engages with DFO, and so with this feedback loop, to support the five Nation's rights assertion and implementation. HFS has changed over time in response to inter-institutional tensions, shifting legal definitions of the rights, and changes to monitoring requirements of and species allocations, with interim agreements between DFO and the five Nations changing as frequently as twice per year. Given that, in reality, the bureaucratic system is already performing as it is designed to with regards to knowledge and rights integration and implementation, and is itself limited by feedbacks between colonialism and fisheries science, it is necessary to look towards strategies of subverting or resisting the state, and to propose that the bureaucratic system needs a more fundamental set of changes including an overhaul of the political and legal structures that are colonial holdovers. Where the Nations and HFS influence DFO through points of frictions in their interactions, they may potentially disrupt the relationship between colonialism and fisheries science and provide insights to reimagining possible systems and relations of fisheries science and fisheries institution.

5.4.1 Disrupting the feedback loop

In this section, I review several friction points between the five Nations and DFO as well as Ha'oom's navigation of these challenges, with variable outcomes and efficacy, using points of disruption adapted from Silver et al. (2022) fit to this case example to illustrate both the

hegemony of the State institution and the directed action of five Nations. While all disruption points noted in Silver et al.'s conceptual model are applicable to this case example, I specifically focus on "appropriation and dispossession", "delegitimization and criminalization through enshrined State legal order", "state authority reinforced through fisheries science", and "ill suited reference points, models and modeling approaches." Key to the five Nations' strategies is a "multi-pronged approach" coordinating HFS institutional design and administrative action, especially regarding knowledge production, with parallel judicial pressure on DFO through a reconciliation process and the threat of litigation should negotiations fail once again. Pressure on the links between colonialism and fisheries science within DFO may enable the five Nations to move their own institution if not that of the State towards an alternate form of fishery management for the Five Nations Multispecies Fisheries that more closely resembles Nuu-chah-nulth structures.

5.4.1.1 Appropriation and Dispossession

Nuu-chah-nulth communities have extensive knowledge and experience in commercial fishing and were critical to Canada's commercial salmon fisheries and processing sectors through the 1970s (Newell, 1993; Harris, 2001; George, 2003). However, the coast-wide degradation of commercial salmon fisheries infrastructures through multiple license retirement and fleet reduction programs left limited resources to develop a new fishery. The five Nations did not have the funds or infrastructure to self-develop a complete institution, or to support fishers' cost of entry to the fishery. Funds were supposed to come in part from the settlement decision and through the following negotiations with DFO, however as appeals continued and negotiations continued to fail, large portions of settlement funds remained in flux. T'aaq-wiihak developed lacking both a prior structure and sufficient resources to fully support fishers' access. Funding

from Canada and especially through DFO programs were, and remain, a primary support the development of the fishery.

Dependency on the colonial structure for financial and capacity support constrains the Nations' abilities to realize self-determination or to diverge from DFO's licensure structures. An HFS board of directors' member noted this constraint: "the government gets the audit [of HFS operations]. We make a [financial] report to the membership…[but] when you're tied to government funding, they set the rules." Federal fishery management using private property tools intersect with continued constraints of being financially tied to DFO programs through colonial legacies. The impacts of DFO's licensure structures and buyback programs have exacerbated the challenges the five Nations face in accessing and implementing their right:

> "I've been watching buybacks since 1967 and they haven't worked. … [a buyback] just eliminates opportunities from the coastal communities. That's what happens every buyback here and that's how we ended up in this court case. … in 1994, and we had 70 boats. … [The] buybacks 96 and 97, that's what really destroyed it. In 1998, we were we were down to ten or 12 [boats] .... By 2009, we were down to three people who made a living. ... They're trying to remove us for some reason. [Remove] all fishers! …. [buybacks] remove the non-native people that that are helping support the infrastructure that we rely on. If you do more buybacks, there can be less non-native people. And it's going to make it very difficult for us [Nuu-chah-nulth fishers] to survive in this fishery." – Hesquiaht fisher and HFS board of directors representative, October 2021, brackets my addition.

Further, socioeconomic impacts and intergenerational traumas of colonialism have constrained the number of Nuu-chah-nulth individuals who are able to independently access the fishery without support. It is extremely costly to pay for and maintain the gear, boat, fuel, crew, monitoring tools, and other expenses of fishing. Without financial support, many individuals either take out large loans. Typically, only fishers who can access both the Five Nations Fisheries and DFO directed fisheries with capacity to land large numbers of fish can realistically cover the cost of fishing full time as their primary or singular livelihood. A Hesquiaht fisher who was also on the HFS board of directors through 2022 explained,

> "we [my crew] will participate in both of them. And we generally come out of there with around a thousand pieces [of Chinook] a year, from both. So if you get about $100 per fish - that's a good price for good quality fish - you'll gross $100,000 just on Chinook alone. But that's hard to maintain … it's not enough to make it. You need other [species]. So we'll do the black cod, we'll do the halibut, we'll do the rockfish. And so you [have to] add these little pieces together and make a season out of it. …. [Five Nation fishers] will get excited about going fishing and they'll get their, say, 200 Chinook from the T'aaq-wiihak, and that's it, right? They don't have anything else … people may need $150,000 individually [to cover annual costs and still have livable income]. If we can earn $100,000 on salmon, then, you know, we can make up the balance of that from halibut. So if you're going to get 200 fish [from T'aaq-wiihak], that that's going to be *gross* $20,000, right. And you look 20 years out, then you start getting your mortgage and your insurance and your repairs and your fuel, all your fixed costs, there's nothing left. I mean, these guys are not making money …. If I had to rely [only] on what the government gives us for the court case fishery, I would starve. I would not make it."

This set of issues directly links the processes of appropriation and dispossession to a market-driven approach to determining fisheries access and allocations, and the limited consideration of human dimensions in fisheries decisions outside of catch and effort – two other 'points of disruption' on Silver et al.'s model. Prohibitive costs combine with the uncertainty and perceived instability of past years regarding what allocations and monitoring requirements would be provided in DFO fishery management plans. Because of this, many potential or past fishers end up deciding not to fish. Unfortunately, this can exacerbate the issue of continued limited and uncertain allocations since DFO considers "interest" in the fishery (as in, number of active fishers and license applicants) and especially the previous season's total catch and leftover "underutilized" allocations (or fish "left in the water") in determining the Nations' allocation and funding needs. This reflects a very narrow definition of the fisheries' "value" for Nuu-chah-nulth fishers. In a Tla-o-qui-aht fisher's words,

> "They're only managing cash! They're not effectively managing the resource that's coming out of the ocean! It's a fish before it's money. And I would really like them to focus on what that seafood means before it even hits land they don't see. To fully understand that the meaning for the First Nations on what they gather and why they gather … I'm pretty passionate about when the disconnect between what comes out of the ocean and our lands doesn't have that deeper sentiment to it because it's not only a job. "

In response to these frictions, HFS seeks out external partnerships that can contribute support to fishery development and otherwise works to modify the in-place model of property internally to the T'aaq-wiihak fishery. DFO treats the Five Nations Fisheries allocations similarly to a communally held Aboriginal Fisheries license in order to make it legible to existing structures, so HFS is able to work with the five Nations to distribute access. While DFO views the five Nations as a single group, internally the five Nations negotiate what portions of the Five Nations Fisheries' TAC are distributed among each Nation. Agreements are based on geography or distribution of species across the respective *hahahouthli* (chiefly territories), number of fishers from each Nation, available infrastructure for landing catch within Nations' *hahahouthli,* among other considerations, and they are annually renegotiable.

Each individual fisher must apply for a T'aaq-wiihak license and seek approval from their *hawilt* to access the fishery. Their license functions more like an access permit than an individual quota. For species like crabs, individual quotas refer to total number of traps that one fisher can put in the water, and are assigned annually based on the size of their Nations' portion, where they will be fishing, what type of boat and gear they have, and how many other fishers are active in the fishery. For species limited by total pieces caught, catch per trip is counted as a part of their Nations' portion of the allocation. For example, a day fisher from Tla-o-qui-aht might bring in twelve *suuha* (Chinook) one day, another with a larger boat might bring in forty, and another might bring in three. All fifty-five pieces would count towards Tla-o-qui-aht's take.

HFS keeps the Board of Directors and the Nations' fishery managers up to date with their fishers' total catch and what amount of the allocation remains for the fishery. The board of directors can then determine if in-season adjustments should be made on the Nations' behalf, and the Nations' fishery managers can play an active role in managing and coordinating individual fishery participants. If one Nation's communal rate of catch is far outpacing another and is at risk

of causing a Nation to fill their proportion far before the end of a season (a risk if fishers are depending on continued fishery access through the entire season) or drawing from others' portion of the allocation, HFS management program staff may make recommendations to the board of directors for determining in-season adjustments. The Nations' fishery managers may also make recommendations to or even direct HFS staff regarding necessary adjustments for appropriate management or even potential restrictions in the case of an individual who is breaking protocol or fishing illegally. If necessary, the Nations' *hawilti* may direct such action – for example by removing an individual's permission to fish.

The five Nations also work to push back on the DFO fishery management policies which exacerbate issues of limited infrastructure and prohibitive cost of entry, and draw on external expertise to do so. For example, when DFO announced the Pacific Salmon Strategy Initiative (PSSI) in 2021, the plan's narratives regarding conserving and rebuilding wild salmon and providing funding and consultation to Canadian and Indigenous fishers had few concrete actionable goals compared to the intended license retirement program (a government funded buyback) and internal departmental program development steps. The five Nations and many other Indigenous and Canadian commercial fishers and interest groups were extremely apprehensive about impacts of another buyback and the likelihood of program funds getting internally redistributed instead of reaching rightsholders. The HFS board of directors asked me to provide a review of academic literature regarding the impacts of past buyback programs to synthesis external sources for considering risks and points of concerns. The board members were already well aware of the risks through their own lived experiences, but hoped to amplify the weight of their perspectives in a format more likely to be legible to DFO through evidence in the review. Following, HFS has been working with the Five Nations Fishery Council and other allied groups to coordinate messaging to DFO. Unfortunately, the implementation of PSSI plans and internal

funding use proceeded faster than the pace of consultation processes so at this point the messaging efforts have had little apparent impact.

HFS has also sought external expertise to develop economic models to help determine what is necessary to support an "economically viable fishery" where fishers can reasonably earn a "moderate livelihood," specified dimensions of the right (Ahousaht et al. v. Canada 2021). In order to fulfill the right according to court mandates, DFO must provide enough allocation and access to sufficient "economic opportunity" for the five Nations. With direction from the board of directors, HFS utilizes this key phrase and externally produced economic modeling to determine what allocations are necessary to be able to actually develop the fishery. While the modeling is externally produced, the qualifiers for what makes a fishers' livelihood "economically viable" are determined according to the fisher's reported costs, revenue, and well-being needs, and the expenses for HFS to adequately support the commercial fishers' safety and success. The model that HFS brings to the negotiation table more accurately represents multiple human dimensions beyond catch value and gear costs.

Through these strategies, the five Nations' are better recognized as individual entities while still treating the management of the fisheries as a communally shared responsibility. When fisher – specific quotas are put in place, such as total number of traps, this is an intentional use of more conventional property – based fishery management to help more fairly distribute catch so no single individual can take a disproportionate amount of the catch and impact other fishers' abilities to make a livable profit or draw from other Nations' allocations. The internal restructuring of property tools can also better connect traditional structures of governance and management to decision-making for allocation distribution. It also facilitates Nations' fishery managers' involvement in the fisheries, moving closer towards the Nations' intended self-management structure. Finally, coordinated

There are some tensions here – while subverting the property model of the state to some extent, the internal strategy is still ultimately constrained by DFO – determined TAC, uses metrics and some tools from conventional fisheries license – based management, and is reported in such a way that is legible to DFO rather than foregrounding practices of Indigenous knowledge sharing. There is a risk of these practices causing Indigenous ways of knowing and structuring harvest management to remain marginalized even within HFS. There is also added complexity for fishers who participate in both DFO directed commercial fisheries and the Five Nations Fisheries and so are engaging with multiple licensure structures at the same time and in some cases are more used to DFO's license structure. Further, implementing license management arrangements differently from DFO might amplify DFO's resistance to concede greater allocations in future management plans or agree to more equally balanced co-management arrangements, much less Nuu-chah-nulth self management. Moving allocations outside of the Canadian TAC is a loss of property for DFO, antithetical to the centralized control model of the state. Differentially managed allocations are less legible to conventional fisheries management and monitoring structures, so increases the perception of the fisheries' "risk" for detrimental impact based on conventional fisheries science assessment strategies. A loss of property and increased perception of risk incentivize colonial state-led centralized fisheries management structures to attempt consolidation rather than distribution of management authority, potentially adding to DFO's resistance to transfer allocations and push to increase monitoring. Finally, external partnerships to increase funding resources and support fishers' financial access to the fishery are important, but don't yet sufficiently fill the financial need and while negotiations and reconciliation agreements are ongoing do not replace the ongoing financial entanglement of HFS with DFO.

5.4.1.2 Delegitimization and criminalization through enshrined State legal order

The five Nations and Ha'oom continue to struggle with DFO failing to acknowledge legitimacy of the Nations' fishing plans and of HFS input regarding management decisions better fit to the context of the Nations' small scale multispecies fisheries. Despite the five Nations' court victories, limitations and infringements on Indigenous commercial fishing rights continue, sanctioned by pre-existing policies from Canada's history of criminalizing traditional practices and controlling commercial access. For example, the BC Supreme Court found the SAP to be among the DFO policies and practices that unjustifiably infringed on the five Nations' rights by privileging recreational sectors over First Nations, but has yet to be revised and continues to inform DFO's allocation decisions (Ahousaht et al. v. Canada, 2018). Leadership representatives in the five Nations' rights-based for-sale fisheries frequently express frustrations about continued delegitimizing of Indigenous led fisheries structures. A lead negotiator for Ahousaht expressed, "They [DFO] do not recognize us; even with the court decision saying this is our right, which is different from the Canadian privilege, they do not recognize it as such. They refuse to. And ever since that racist, racist law [the Marshall decision], it has been reinforced" (April 2022, brackets my addition). Indeed, section 35(1) of the Constitution Act recognizes Aboriginal and treaty rights such a way that Indigenous people hold "a different legal relationship to the fisheries than non-Aboriginal Canadians" (Harris & Millerd, 2010, p. 82; Denny & Fanning, 2016) and legal precedents established through Mik'maq litigations affirm that any infringement must be demonstrated as justified by the Crown (Danny & Fanning, 2016). Despite this, centralized state-sanctioned management continues to infringe on Indigenous fishing rights, and by extension impacting food security and systems of governance and knowledge transmission (Harris and Millerd, 2010). The 2018 Humphries decision affirmed that DFO was unjustifiably infringing on

the right, but outside of the court decisions from the 2021 appeal and explicit interim reconciliation agreements not much has changed in DFO's approach to managing the Five Nations Fisheries. Several members of the five Nations leadership as well as multiple fishers expressed to me their interpretation of DFO's institutional actions – and indeed of individuals within DFO, particularly those in more powerful positions – as malicious, with explicit intent to continue delegitimizing the fishery. The very framing of the initial fisheries as "demonstration" added to the sentiment that DFO does not view the fishery as legitimate. In one fishers' words, "They [DFO] haven't given it [our rights] to us yet because they're telling us that we're on a - how do they say it again? They called it a demonstration fishery. [That means] Nothing. It's like how a kid is with training wheels and a bike. That's how it makes me feel anyway."

Among DFO's strategies to maintain state legal order is the enforcement of management rules and limits on Indigenous fishing with the threat of monetary penalties or arrest for infractions. Tight control is justified by claims that Indigenous fisheries are "high risk" for impacting conservation, which is the one management category with legal priority over FSC and rights based Indigenous fisheries. Surveillance is a tool of DFO enforcement for fishery management. Fishers of any sector who fish illicitly – without a license, outside of season openings, with prohibited gear, in prohibited areas, on protected stocks, beyond allocation, or otherwise – are subject to fines and possible arrest by DFO enforcement officers. DFO considers their fishery management plans and regulatory policies as binding for the Five Nations Fisheries, so fishers with T'aaq-wiihak are subject to surveillance by DFO as well, and potential arrest if found to be noncompliant with existing DFO regulations. Fishers typically only ever engage directly with DFO staff through enforcement officers who patrol the Five Nations Fisheries' Court Defined Fishing Area (CDA) by boat and by plane. On more than one occasion during my visit, the "fish cops," as some fishers refer to them, came down to the docks specifically to look

over T'aaqwiihak boats while in full gear: bulletproof vests, handcuffs, bully sticks, and firearms. This surveillance and ever-present threat of arrest frustrates many fishers, who interpret the behavior as explicitly targeted towards them over other fisheries:

> "When I participate in other fisheries like the area G, you don't see anybody. … You call in and you tell them how many fish you have. And that's the end of it. Right. But when I go out on a T'aaq-wiihak opening, DFO flies low enough to shake our poles every day. … Or they come out in the Zodiacs and they want to get on our boat. You know, they come down [to the dock] and take pictures … but in other fisheries, you don't see them at all. … It makes me uncomfortable. And I don't think it's very fair to be so heavily scrutinized for for doing what I love to do, really. And other fishers, they might not even want to get into this industry. They might not want to get into this fishery just because … [it's] almost like they're criminalizing this. Like we're going to go in and break the rules and break the law. You know, I could come in, get caught with some undersized fish. But I'm right beside the cleaning area and the cleaning stations right there. And I see sport boats come in here and they catch more fish than our fishery do. And they're undersized [salmon] and they're bringing in yelloweye and they're breaking all these rules, and nobody comes down to look at them." – Tla-o-qui-aht fisher, 2021

Despite its problematic implications, this level of enforcement combined with strict oversight of allocations and management decisions are considered necessary by many DFO staff. Some doubt First Nations' willingness to abide by DFO restrictions, with the assumption that fisher's do not understand or do not care about conservation risks or allocation distributions: "the local guy that's going fishing may not care or may not understand … but the fact is that he's affecting what might be happening, you know, way up the Fraser, three months from when he's fishing. …. we can't show them a stock recruit curve and get them to understand that." As noted in previous chapters and as I describe further below, Nuu-chah-nulth First Nations do understand the interconnectivities of migratory stocks and the long term impact of overharvest, and want to avoid it themselves. However, in their perspectives, they pose a much lesser risk than other fisheries, particularly the sport fishing industry sector of recreational fisheries. The issue is also one of continued colonial legacies of dispossession. In February of 2023, an HFS Board of Director member and Leads Negotiator team member for Mowachaht/Muchalaht stated matter of

factly, “First Nations on the west coast have always had a want to be out on the water without being policed out of our lives.”

The most direct strategy of resistance from the five Nations in this point of friction is to outright reject DFO decisions regarding fishing limits and closures by enacting *T’aaq-wiihak* (fishing with permission of the chiefs) and turning all authority to the *Hawilt*. *T’aaq-wiihak* carried out separately from the DFO management plans or restrictions is pursued if the Nations are confident that the restrictions infringe on their rights and they could prove so if further litigation were to occur as a result. In the summer of 2021, DFO closed all salmon fisheries due to concern regarding returning stock numbers. The five Nations rejected the closure for its disproportionate impact on their fisheries and the rights infringement of a unilateral decision, and so enacted *t’aaq-wiihak*. With the permission of their hereditary chiefs, fishers continued to fish according to the prior management plans as an act of exercising their rights with management support from HFS. Carrying out *T’aaq-wiihak* not only asserted the fishers’ rights to access the fishery, but also the authority of traditional governance to determine appropriate fulfillment of the right. In addition, many fishers were proud to participate in the assertion fishery and enact the sovereign authority of their *hawilt*. One explained, “I recognize the government of Canada, but I recognize more of the law of the Chiefs, really. If chief tells me that I can fish then I go out and fish.” Several interviewees used it as an example to show why they feel confident that HFS has their best interest in mind and intends to move the Fisheries out from under DFO control, even if the organization is not a traditional Nuu-chah-nulth management structure.

Successful litigation has been instrumental for making assertion fishing a viable strategy of disruption. The April 2021 court decision favorable to the five Nations buffered the Nations’ confidence that their assertion would be upheld should any fishers be arrested or should litigations resume as a consequence. Indeed, this leverage appeared to work in the Nations’ favor

and effectively undermined the legal authority of DFO. Mindful of the court decision and wary of returning to further litigations, DFO did not arrest any fishers participating in the assertion fishery and so far no fishers have been charged. The assertion added pressure on DFO to return to the negotiation table by 2022. The presence of the HFS legal representation and lawyers from Canada's Department of Justice involved in the reconciliation process have helped to keep negotiations moving forward in a favorable and productive manner compared to past negotiations. An Ahousaht member of the HFS Board of Directors calls these strategies, using their (Canada's and DFO's) own tools against them."

To navigate these strategies effectively requires extensive knowledge and understanding of the state legal systems and bureaucratic tools, and a hefty amount of time and work to effectively engage. Adapting tools of the colonial state also comes with its own tensions (Atleo, 2008). Further, enacting *t'aaq-wiihak* is a very risky strategy. There was no guarantee that DFO would not arrest or at minimum charge participating fishers, or that they would not re-initiate litigations and charge HFS with overstepping their management authority within bounds of the right. Even with confidence in a win for the Nations, returning to litigation is a costly process that further delays the full implementation of the right. There are also alternate avenues for retaliation by the state to assert control. HFS administrative staff and several fishers recounted how during the 2021 assertion fishery, DFO decided against risking litigation through arrests but did still worked to shut down the fishery by threatening to arrest buyers or confiscate their purchased fish. The fishers lost many of their buyer options as a result, and the value of their catch was decreased. Fish that didn't go to waste brought in a much lower price. In the following year, buyer options remained limited. The five Nations' have raised the priority of finding new buyers and developing their own Nation-owned processing businesses as a result. Additionally, not all five Nations are always aligned in deciding to enact *T'aaq-wiihak* due to the risks. Internal

politics and conflict between the Nations risks the ability to present a united front in negotiations with DFO. With these tensions in mind, pursuing an assertion fishery through enacting *T'aaq-wiihak* remains a last resort option for further resistance.

5.4.3 State authority to manage is reinforced through fisheries science

Allocation limits and monitoring requirements are described by DFO's management plans for the Five Nations Fisheries (MSFMP) (Figure 12). The five Nations do not consider management plans from DFO as policy for the Five Nations. These documents also do not reflect co-governance in line with the five Nations' understanding of the right, as they ultimately list the Canadian Fisheries Minister as having final authority over the plans, and they are internally drafted and finalized by DFO. Despite this imbalance of authority, the MSFMP annually includes a note that DFO "looks forward to working with" the five Nations to allocations and "fishing opportunities" within future MSFMPs. Divergence by the Nations' fishers from the MSFMP during the fishing season under HFS management can risk fisher arrest or other repercussions from DFO and a potential end to negotiations and return to litigations. Ha'oom thus builds seasonal plans for the fisheries within the scope of allocations and other parameters dictated in the MSFMP.

Box A: DFO Fishery Management Plans

Fisheries and Oceans Canada coordinates the management of all salmon fisheries through annual (June – May) and publicly available Integrated Fishery Management Plans (IFMP) (DFO, 2022a). DFO also produces an annual (April – March) Five Nations Multispecies Fishery Management Plan (MSFMP) that is specific to the "opportunities" DFO "provides" to the five Nations in order to implement the court affirmed rights-based for sale fishery (DFO, 2023b). The allocations in the MSFMP are a portioned quota within the Canadian Total Allowable Catch (CTAC) across all fishing sectors and is to be adjusted until the Nations' rights are sufficiently met (DFO, 2022a, 2023b). DFO has been producing a MSFMP annually since 2018, in line with the 2018 court decision; prior to that, the five Nations' allocations were detailed in the regional IFMP (DFO, 2017, 2018b). Following the 2021 decision, the MSFMP was revised to better implement the right, though several items, including salmon allocations, remain "up for review" in following years' MSFMPs (DFO, 2021b, 2022b, 2023b).

The regional IFMP references the 1999 Salmon Allocation Policy (SAP) to contextualize all allocation percentages (DFO, 2022a). The SAP is claimed to be "of no force and effect in its application to the Five Nations" due to the existence of the separate MSFMP, and through the ongoing review and supposed forthcoming revision or replacement of the SAP (DFO, 2022a). Allocations are justified through use of the precautionary principle and sustainability indicators in the context of stocks of concern, though these principles and indicators are vaguely and inconsistently defined, especially in the MSFMP (DFO, 2022a, 2022b, 2023b). Decisions reference catch rates of previous years, escapement forecasts for future stock years, stock conservation status, alongside other data produced by various DFO departments (DFO, 2022a). Specific calculations or models used to produce the final allocation numbers are not included in the text, though procedural description of decisions include reference to "relevant departmental policies, scientific advice, consultation [with harvesters and other interest groups], and [staff] experience" (DFO, 2022a).

Initial drafts of the FMPs are developed internally to DFO. Consultation and advocacy stages where fisheries sectors can respond to the draft generally occur before a final plan is released and in advance of the upcoming spring season. In some years, especially for the Five Nations Fisheries, the initial draft came late in the year, the response period was constrained, and the finalized plan was released after the season openings. Response to the IFMP by Area 24 stakeholders are typically coordinated through Salmon Roundtables facilitated by West Coast Aquatic, though individual sectors can also respond through sector-specific advocacy groups. Sector responses are collated through the Integrated Salmon Harvest Planning Committee.

The five Nations' response process includes administrative review of the draft by HFS program management staff with consultation form the Board of Directors and if necessary the Nations' negotiation leads and legal representatives. HFS sends line-by-line corrections and comments on the draft back to DFO with a letter summarizing any concerns. HFS responses address concerns regarding infringement on rights including overly limited allocations and inappropriate monitoring requirements for the fishery context, as well as critiques of potential inaccuracies in estimated stock forecasts and catch impacts with reference to information from both the HFS science team and the five Nations' science and traditional knowledge production. I discussed this process with several HFS administrative staff, and in addition to viewing previous years' draft MFMPs was allowed to observe HFS's review and response process in detail in Spring 2023.

HFS administrative staff noted that, especially in past years before the 2021 court decision, responses from the five Nations were largely dismissed and lacking from final plan drafts. For example, *cuẁit* (Coho) allocations for the five Nations have remained below what the Nations considers fulfilling their rights, with only one marginal increase to allocations in 2020 (DFO, 2020b). Similar issues apply to many other species in the MSFMP including and beyond salmon; even after adjustments following the 2021 decision, allocations of select stocks of *suuhaa* (ocean Chinook) and *hiǹkuu?as* (Chum) salmon only reached 16.4% and 7.5% of the available CTAC respectively, and *miʕaat* (Sockeye) and *č'aapi* (Pink) salmon stocks of conservation concern remain as low as 0.152% (DFO, 2023). 50% of terminal stocks (fish that return to rivers in the *hahouthli*) go towards the five Nations, though these stocks include ones listed in the highest conservation concern "RED" status in the IFMP (DFO, 2022), and most stocks in Clayoquot Sound are too low to support terminal fisheries. Other sectors including commercial fisheries within the same Fishing Areas receive substantially larger allocations (e.g. up to 98% of *hiǹkuu?as* and 82.5% of conservation threatened *č'aapi* CTACs). Recreational sectors are only limited by daily catch.

Through the 2022 MSFMP, no mention of Nuu-chah-nulth values or principles fundamental to the five Nations' management practices were included in initial or finalized plans, with the exception of *Isaak* mentioned for gooseneck barnacles, a species with no IFMP for other sectors (DFO, 2022b). The 2023 MSFMP does reference *Hishukish Tsawalk*, *Isaak*, and *Uuathluk* as key management principles for the five Nations linked to the Nations' support of ecosystem-based conservation and sustainability priorities (DFO, 2023). However, in the initial 2023 draft, the key principles were absent and existing interim reconciliation agreements between DFO and the five Nations were erroneously referred to as "Nations' requests." Inclusion of key principles, language adjustments, and other corrections were the direct result of feedback from Ha'oom regarding the initial draft.

Figure 12: Details regarding the annual IFMP and MSFMP produced by DFO.

The BC South Coast Integrated Fisheries Management Plan (IFMP) and the MSFMP are ostensibly produced as fisheries science documents (Figures 12, 13, 14). DFO calls to 'conservation', 'sustainability', 'precautionary approach', and 'science based' decisions to justify limited allocations, restrictive management decisions, and (non)negotiation. Consistently, disputes regarding allocations, fishery areas and openings, enforcement requirements, and the five Nation's preference for self management are stalled to the point of non-starters by DFO calls to conservation concerns that any divergence from the IFMP or MSFMP might risk. Heavy loads of monitoring (Figures 16, 17) are also justified through DFO's categorization of the Five Nations Fishery as potentially "high risk" for impact on stocks of conservation concern, and the management priority for a "precautionary approach" to all fisheries. The IFMPs and MSFMPs do not detail how a fishery or fishing sector's risk is determined[3] as opposed to the vulnerability of a species or the general risk of impact on a vulnerable species by fishing in certain areas or at certain times of the year. No one I spoke to could exactly explain to me the reason for the high risk categorization of the Five Nations Fisheries, but the general consensus was that DFO considers the fishery's potential impact status as having too much uncertainty due to a lack of the data necessitated by their assessment methods and so by default is considered a significant possible risk. I found this perplexing, as sources from nearly every representative group affirmed that the Five Nations Fisheries have the highest rate of catch reporting out of all WCVI salmon fisheries and, as I describe below, the monitoring and data collection efforts on their salmon fisheries are exceptionally thorough (Figures 16, 17).

[3] A high risk fishery is a different classification than the type of risk specified by the Species at Risk Act (SARA, 2002), which is specific to species which are endangered or particularly vulnerable to negative impacts from fishing and other human impacts, as opposed to a fishing sector that is at risk of impacting said vulnerable species. Determination of at risk species is relatively detailed in IFMPs compared to determining high risk fisheries.

Production of the FMPs is supposed to include application of both DFO produced data and input through consultation and feedback on draft FMPs (Figures 12, 13, 14). Local and Indigenous knowledges are meant to be applied through the consultation stages, however, political lobbying from various interest groups is also influential at these points, and most participants at these stages don't have a sense that their input outweighs DFO models or industry lobbying. Even for DFO stock assessment staff I interviewed, the actual mechanics of collating all the many sources of scientific data and consultation inputs in to the final decisions in the FMPs is more than a bit opaque. However, there is a general consensus that the IFMP is too broad reaching to be able to incorporate locally specific information since it is a regional document. The MSFMP is comparatively locally specific Further, while ecosystem based approaches are referenced in more recent IFMPs, MSY and various models based on MSY continue to be among the primary tools listed in the FMPs for determining catch limits (DFO, 2018, 2020, 2021, 2022, 2023b, 2023a). As noted in the previous chapter, DFO is resistant to using information outside of Western fisheries science to inform management decisions.

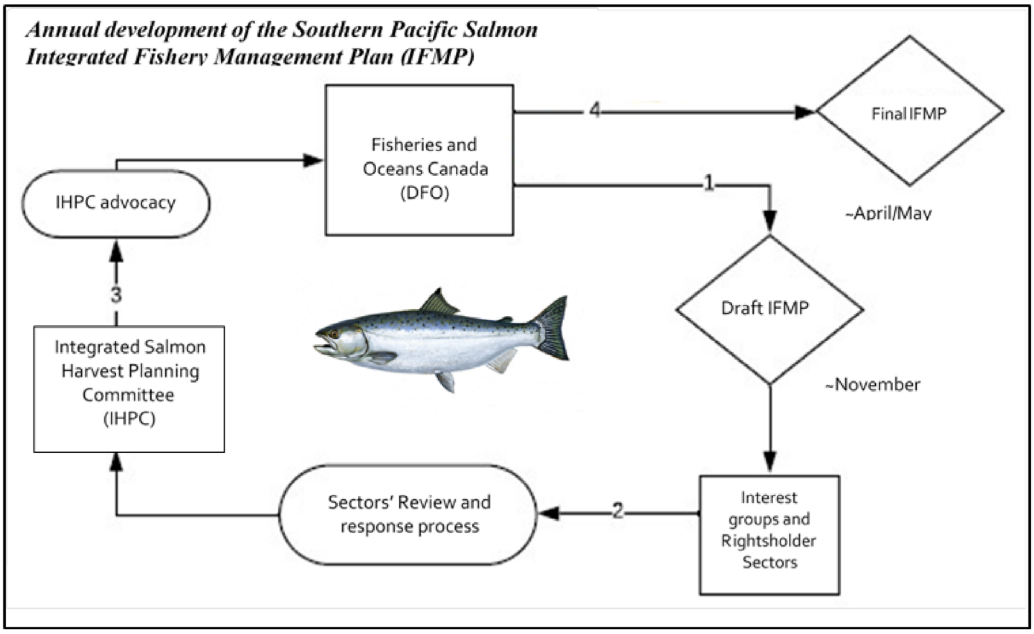


Figure 13: Overview of the annual development of the Southern Pacific Salmon Integrated Fishery Management Plan (IFMP).

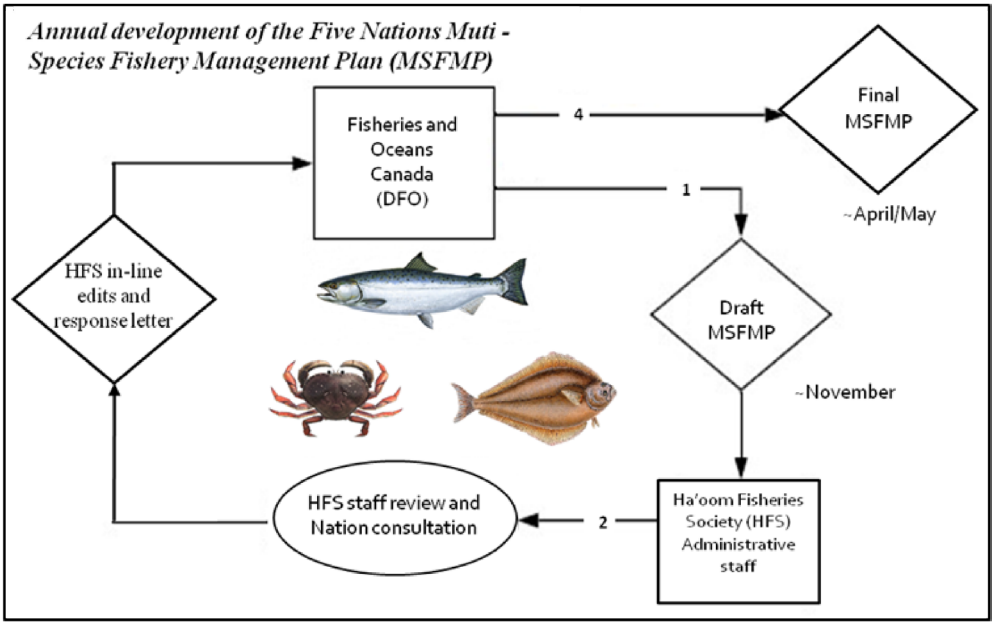


Figure 14: Overview of the annual development of the Five Nations Multi-Species Fishery Management Plan (MSFMP).

In order to maximize the five Nations' influence on the MSFMP outcomes while negotiations continue, HFS pursues two specific strategies. First, the HFS administrative staff works extensively to thoroughly review and revise the draft MSFMPs with input from Nuu-chah-nulth knowledge holders, HFS science staff, and legal council (Figures 12, 14). Second, HFS invests heavily in building out the capacity of their own science team, and aligns with scientific partners (mostly ENGOs) that are viewed from DFO as producing 'valid' data. HFS has to 'outsource' some amount of scientific production for the purpose of legibility, but can also through these partnerships increase coproduction of empirically sound WSK and Indigenous produced science to challenge DFO claims, and reinforce locally a relational approach to governance through the partnerships that center Nuu-chah-nulth practices.

Through these strategies, HFS has been able to catch inaccuracies in draft MSFMPs, assert expertise at the negotiations table, and amplify the influence HFS has in adjusting MSFMPs to be more in line with the five Nations' preferred management plans, if only slightly. The amplified production of local science by HFS and with local partners expands the knowledge base that HFS has to inform internal management decisions and adds perceived validity to their research and co-management capacity from DFO's perspective. This is useful both for HFS and DFO program staff relationships and coordination and for bringing weight to HFS provided information. In the most recent iteration of the MSFMP review process, more dimensions of Nuu-chah-nulth ways of knowing were explicitly acknowledged in the final management plan (Figure 12). These strategies help to influence the final outcomes of DFO management plans and add proof to the Nations' ability to enact informed management, hopefully demonstrating that the state institution is not the only 'qualified' scientific authority.

This is not the only motivation for increased knowledge coproduction with an emphasis on science. As noted in previous chapters, Nuu-chah-nulth First Nations take a pluralistic

approach to knowledges and value developing and applying science concurrently with traditional Indigenous knowledges, particularly in system oriented ecological approaches that align with the Nuu-chah-nulth understanding of *Hishukish Tsawalk* ("everything is one"). The science team coordinates often with Nuu-chah-nulth fisheries managers and the Nuu-chah-nulth Tribal Councils' fishery management program Uuathluk to identify priorities with input and direction from Nuu-chah-nulth expertise, as Nations' fisheries managers typically are knowledgeable regarding both traditional and scientific ways of knowing. This strategy of pluralistic knowledge coproduction offers an alternative approach to informing fisheries management through multiple ways of knowing. Ecology applied in line with a relational Nuu-chah-nulth worldview provides both expanded approaches to producing local scientific data, and directs application of science more holistically than conventional fisheries approaches:

> "Nuu-chah-nulth quite literally have that integrative model for looking after the relationship with salmon that has been the holy grail of ecosystem based management for decades. It's already here. You don't need to go out and invent it. It's already built into the way Indigenous people have looked after the relationship. And I keep saying [relationship] instead of saying manage because it's not a question of management. Management is a different practice. But if it's relationship based, then you have responsibilities between you and salmon as relations, you have responsibilities between you and trees and you and your community and you and your *Haa'wiilth* and so on. …[Nuu-chah-nulth are] very supportive of seeing science done because it can fit in with their larger model of what it's like to be responsible in the world, to act with *IIsaak*, with respect to everything, to act to *Uu-a-thluk*, taking care of things. And then of course there is *Hishukis Tsawalk*, the understanding that everything is connected. And so those aren't just phrases, they're not buzzwords, they're not like "sustainability" or something like that. They are very deep principles that are very much expressed in the way people go about their business. [There's] potential for Western science to be part of the Nuu-chah-nulth toolbox rather than the other way around." -uuathluk admin, brackets my addition

5.4.4 Ill-suited management options, reference points, and modeling approaches

Multiple disruption points on the fisheries side of the feedback loop model (Silver et al. 2022) are in this case extremely entangled. While distinct issues, fisheries science produced

reference points that privilege select economic and biological parameters (such as MSY and fleet capacity indicators), modeling approaches and models that are a poor fit for local context and complexity, and existing management options that further constrain those models and reference points aggregate in their impact on the Five Nations Fisheries in highly interrelated ways. HFS responds to each with a similar set of strategies.

Models applied to local salmon populations to predict and assess stocks to inform local management decisions are potentially ill suited for the local context. The HFS science lead told me in frustration that a chief biologist for DFO's regional stock assessment program wouldn't believe the local projections for maximum abundance or the Nations' narratives of historical abundance or what could be realistic targets for renewal. His interview affirmed that sentiment, and even described the same interactions with the HFS science staff member: "they said this is [from] traditional kind of local knowledge. And so what do you do with that … the science says that that size watershed potentially could, but … we know that as we would dig into that, it would be a lot less than that" He described how, when Nuu-chah-nulth knowledge holders express their knowledge of local streams' historical baselines predating written records, he doubted their accuracy since the departmental models produced substantially different estimates:

> "there's a lot of that kind of stuff that I think a lot of us as experts, biologists, we hear and it kind of go, because we do the stock recruits we go, no, you'd be way over that [estimated capacity] … so things, stories have been handed down, like, *we used to be* able to walk across the fish. We say, Yeah, that's probably right, for chum salmon, but not Chinook."

He further elaborated that traditional knowledge "isn't hard numbers," and "there is no evidence" to support stories from elders regarding historical abundances that differ from DFO estimates, and a suggestion that the Nations misattributed those stories to the incorrect species of salmon. The HFS staff member and a scientist at a local ENGO noted that the department applied models were fit to larger river systems with biological and geological factors that differed greatly

from the rivers and streams feeding in to Clayoquot Sound. Estimates derived from models fit to rivers different in size, flow, latitude, geology, among other factors might not be an appropriate tool for making estimates in Clayoquot Sound rivers compared to local Nuu-chah-nulth knowledge of the river systems.

Figure 15: Three small boats from the Five Nations Fisheries "mosquito fleet" and one trawler docked in Tofino (a) to offload their *suuha* (Chinook) (b) from a day of fishing during the spring season, 2022. Fishers unload their day's catch into totes and carry them up a narrow ramp to the monitoring and buyer site. On busy days, as many as three boats will tie up to each other and fishers will help each other carry their catch across the boats to get to the dock. Occasionally fishers will catch and sell *ƥuu?i* (halibut) (c), which are not their target species for the day but are within the Five Nations Fisheries allocations.

Figure 16: Fishers stand back and wait while their *suuha* (Chinook) are monitored and processed (a). For each fisher's catch, the buyer weighs each fish to sort by size and quality (b), and weighs the total amounts of each size class of fish to determine his payment amount to the fisher. Fishery monitors employed by Ecotrust count the wild and hatchery caught fish as the buyer sorts, and then follow sampling protocols from DFO to collect DNA samples through fin clips (c), scan hatchery fish for C-Tags (d), and remove the heads of fish that contain C-Tags (e). After sampling, the monitors return the fish to the buyer to clean and pack on to ice (f).

In conversations with HFS leadership, administrators, and staff, there were repeatedly expressed frustrations that DFO attempts to "fit" HFS and the Five Nations Fishery in to pre-existing management structures, much like the pressure to produce DFO-legible scientific data. This issue is compounded by the fragmentation and siloing internal to DFO and the species specific application of fisheries science in departmental program organizing. The Five Nations Fishery does not resemble the other commercial fisheries; it is explicitly multi-species and

extremely small scale compared to the predominantly industrial Canadian fleets. Most participants fish using very small boats and bring in catches that are a small fraction of the capacity of a typical commercial boat[4] (Figure 15) Fishers also fish across multiple species, adapting different gear types to their boats as needed, and within a relatively confined area[5]. DFO fisheries management is designed for larger boats with species and gear specific regulations based off of traditional applied Western fisheries science. A consistent point of conflict between HFS and DFO has been electronic on-deck monitoring requirements that are based off of this large fleet species-by-species design that create extreme barriers to fishers through additional expense, create redundancy (eg. requiring five different types of simultaneous on-deck monitoring for a single boat that targets five species) and add to the already hefty load of fishery surveillance and catch monitoring (Figures 16, 17). Fishers in particular are frustrated when DFO prompts additional monitoring requirements, noting that most of the uncertainty regarding bycatch and overharvest are related to other, less monitored sectors:

> "[there needs to be] better management in the non-Indigenous sector because there's no saying that you should lose count in the thousands of overfishing. They need to figure out their monitoring system. They want to put a damn camera on [our] boat like, you've gone to all the effort, like, you know whether it's our fishery or not. Like they need to get they need to get their shit together, quite honestly. It's laughable. It really is laughable. It's just an unfortunate miscount on such a valuable resource." –T'aaq-wiihak fisher from Tla-o-qui-aht

The fishers are not against management, monitoring, or research. Many take pride in how well reported their fishery is, and even feel that HFS "actually sets a really solid example for what fisheries management should be." They are simply frustrated that they are so much more heavily monitored than other sectors and that the knowledge of their experienced community members

[4] A mid size commercial salmon vessel, typically 40 to 60 feet in length, can hold up to around 50,000lbs (25tons) of salmon. Larger industrial vessels can hold anywhere from 50-200 tons (Corbin, 2015).
[5] The CDA extends only 9 miles offshore. The boundary is among the points of contention in negotiations.

and their river keepers are not considered in current management. Most believe that self management and a coordination between science and Indigenous knowledges would not only better empower traditional practices and reduce racially targeted surveillance, but also allow for more flexible, environmentally responsible, affordable, and context-specific management actions suited to their coastlines and directed by abundance-based approaches to management.

HFS and DFO staffs both experience the limitations that ill suited management, models, and reference points produce. Individuals within DFO with intent to work in alignment with the Nations and interest in broadening the scope of data sources and management tools have limited ability to act on those interests, much less actively engage with Indigenous knowledge and governance structures in their work. While many Nuu-chah-nulth individuals expressed to me that they did not trust the intent of anyone employed by DFO, I found that several individuals working within DFO with whom I spoke[6] did support First Nation's rights to fish, though to varying degrees of support regarding their self management.

[6] I was able to interview two DFO staff and had informal conversations with six others and two individuals who no longer work with DFO. All currently employed staff I spoke with worked at regional or local levels within relatively specific departments. Staff at higher levels of employment within the DFO Pacific Region offices declined meeting for interviews.

Box B: Notes from the field - Suuhaa Offloads, Spring and Summer 2022

Between four and seven o'clock in the evening, all fishers who went out for the day must offload their catch at the Tofino 4th St. dock. These are "day fishers," who come puttering in with a wide variety of small boats. The 14-28 foot "mosquito" boats are a substantial portion of the T'aaq-wiihak fleet. Many fishers go out solo or with one other person on these small boats. One or two day fishers might come in on a small troller with a crew of two or three, usually family members. Multi-day fishers typically offload at another location with infrastructure to take their larger haul; the one small crane on this dock is usually broken, and ice is extremely limited – when it's available at all. The buyer at this dock is a member of Tla-o-qui-aht First Nations, buying on behalf of a smaller seafood distributor. His family is here to help him handle and pack the fish before he spends the evening driving it to various locations on Vancouver Island. Naas Seafood, a recently opened local fish store in town run by a member of Ahousaht Nation , is the other usual buyer at 4th Street.

This time of year, day fishers are typically fishing for *suuhaa* (ocean Chinook) and also bringing in the occasional *ƥuu?i* (halibut). Typically, about eight boats go out per day. If conditions are good, as many as fifteen might be out at once from Tofino. The day fishers are mostly from Tla-o-qui-aht and Ahousaht; this harbor is too far south for the other Nations' fishers. The fishers will pull up to a narrow floating dock and haul their catch in plastic totes up a steep ramp to the processing site. Two or three young women wearing reflective gear stand by an aluminum table, some scales, and a few empty totes at the top of the ramp. They work for Ecotrust, an ENGO Ha'oom hires to carry out dockside monitoring. Their table is covered with the gear they need to measure, sample, and record the days' catch. For now, DFO does not allow Ha'oom to hire staff or coordinate with the Nations to monitor offloads.

Portions of the evenings are quiet while we wait for fishers to arrive. The monitors walk me through their sampling tools, data sheets, and protocols. In addition to processing the fish, they are responsible for recording the fisher name, boat name, numbers of each species caught, total weight of each species, the proportion of wild to hatchery fish, how much of the catch was sold versus retained for home use, time of offload, and area fished for each fisher. They also must collect fishers' signatures and ensure the fishers' logbooks are properly filled in.

When a fisher brings up their catch, the buyers and monitors jump in to action. They have a system to minimize how much the fish get handled, and how long they are off of the ice. The buyer weighs every fish to sort them by size before he weighs the sum of all fish in a catch. He pays each fisher based on weight and quality. A good price was about $10/lb at the start of this season, though a more typical price range is $7-$9/lb. Bigger *suuhaa* (>11 lbs) bring in good money per fish, but most of the fish coming in are in the "medium" range(7-11lbs).

As the buyer weighs and sorts the fish, a monitor counts them, tallying the numbers of fish with and without an adipose fin; hatcheries clip the adipose fins to distinguish from wild stock. Another monitor measures one of the fish and uses a hole puncher to clip a tail fin for DNA sampling. Every few boats, they must also wave a large yellow T-shaped device along each hatchery fish to scan for a C-Tag, or a coded wire tag that identifies the fish's hatchery origin. When the yellow T beeps, they use a serrated knife to remove the fish head, which contains the magnetized metal C-Tag. At least twice this season, the requirements for frequency of sampling and scanning changed. Throughout, the buyer and the monitors keep an eye out for undersized *suuhaa* and other species that can't be sold, and so must be retained as home use. Once the monitors have finished processing the fish, the buyer can clean and pack the fish on ice as the monitors go over the data sheet and logbook with the fisher.

I stand back and chat with the fishers while they watch their catch get weighed, counted, scanned, clipped, and handled by as many as five people in the process. They tell me that at this price, and knowing most of their fish were under 10lbs, they have to catch at least five in a day just to cover gas, and really should bring in at least 13 to make it "worth" it compared to an hourly wage at a job in town. Some of the more accomplished fishers manage to bring in 25-30 fish on a good day, and the occasional day troller will bring in as many as 40. Most of the time, I watch as fishers carry up 10-15 fish from their day's work, but often as few as 3. The fishers joke and smile with each other, but are relatively quiet with most of the monitors except for one who has been here for multiple years and has built some rapport with her ability to joke along.

Midway through the season, a DFO order required that the monitors go down to the docks and look inside the fishers' boats to catch any unreported catch before signing the offload forms, and that the monitors ask the fishers to point to their exact fishing spot on a map. This seemed to cause the monitors a good amount of stress, as it meant they were required to enter the fisher's property regardless of whether the fisher granted permission or not. Most fishers allow the boat check by the apologetic monitors. When presented with a map, they coyly shrug that they're not sure exactly where they were fishing.Though the extensive processing and handling of their fish bothers many fishers, most tell me they don't blame the monitors, who are doing their jobs based on DFO directions.

Figure 17: Observations of the daily *suuhaa* (Chinook) fishery offloads in Tofino, May – August 2022

Occasionally, DFO staff members make the three hour trip to Tofino to see the fishery. I spoke with one individual from the stock assessment program who had designed the sampling protocol for the offload process as we watched Ecotrust monitors process *suuhaa* (ocean Chinook) brought in by day fishers (Fig7). She was genuinely excited to see the sampling process in action, and expressed hope that it would help benefit the Five Nations Fishery by informing sustainable management and by supporting eventually reaching a system of data sharing and transparency where the Nations would retain ownership of the data produced in their fishery. She also expressed interest in being able to bring in multiple forms of knowledge, or at least additional information pathways, in to management, beyond the fisheries science specific stock monitoring methodologies her protocols employed. However, she found herself limited in trying to apply these interests while also adhering to departmental requirements regarding data quality and production specific to Western fisheries science methodologies, the various data needs of multiple differing DFO departments (who do not collaborate on data processing or application) and DFO data ownership. As a result, departmental directions based on her monitoring protocols produce extensive amounts of data regarding which salmon stocks are impacted by the fishery, which DFO retains and processes before HFS can access it (taking up to two years), but also exacerbate tensions on the dock where fishers expressed feeling over monitored and frustrated that the quality of their catch was degraded through extensive handling (Figures 16, 17).

Other DFO staff I interviewed noted experiencing similar tensions between their intent to support First Nations' fisheries development and their ability to actually act within the confines of their departmental programs. Limitations on management and monitoring actions ranging from what type of data are prioritized, how to control that data production so that it fits within a narrow scope of acceptability, a species-by-species approach to fishery assessments, and what actions to take on a fishery based on that data (e.g., area closures or license reductions / buybacks) constrain

DFO staff to a specific set of reference points and means of engagement with HFS science staff. As a result, DFO simultaneously produces more data than they can manage in a timely manner, and continues to have substantial gaps regarding the assessed state of salmon populations in many streams on the West Coast of Vancouver Island. It also inhibits Ha'oom's ability to self manage or utilize the existing data themselves or to challenge poorly applied models and inaccurate results, and all but eliminates traditional and local ecological knowledges and even Indigenous produced science from being accepted by DFO. Challenges borne of ill suited single species models and inappropriate management designs create consistent day-to-day frictions felt by fishers, HFS and DFO staffs, and negotiators alike. They not only amplify the difficulty of trying to work with or challenge the colonial state institution, but also point to an overdue need for management reform internal to the state management structure.

Ha'oom's administrative priorities and the Ha'oom strategic plan both respond directly to these issues. Building robust community outreach practices and developing local infrastructure to support more efficient offloading and Nuu-chah-nulth led processing are among the more recently amplified priorities determined by the board of directors. These efforts help to maintain a positive relationship to the five Nations' communities and fishers in lieu of continued frustrations with DFO directed management and monitoring. Improved local infrastructure buffers the risks of degraded catch quality that come from extensive handling of the fish during monitoring by addressing limited ice, shade, and space at offload sites.

The strategies for HFS-produced science and knowledge coproduction with local partners described above also help to directly challenge inappropriate management decisions, and to build the knowledge base to which HFS retains access and intellectual ownership. They also have provided leverage in recent years for building collaborative working research relationships with DFO staff. Research co-produced from HFS and DFO data has been used to validate the

knowledge of Nuu-chah-nulth fishers regarding species distributions and potential conservation benefits of fishing area adjustments which had previously been dismissed by DFO in negotiations as conservation risks. Staff from DFO and HFS are now working together to coauthor the research. These efforts have also added to the success of acquiring funding from the department to pursue further research, and to the interest of DFO program staff to engage in future collaborations - even considering ways to develop more pluralistic approaches based on the Two-Eyed Seeing framework (Reid et al., 2021). Finally, they have also been a key dimension of HFS's ability to build and maintain positive, mutually beneficial local partnerships which in turn further asserts the five Nation's influence and authority within the local governance landscape of Clayoquot Sound (see Chapter 4).

HFS is ultimately meant to be a management and rights implementation organization. Expanded knowledge production is important to build informed management. However, it is inequitable that HFS would have to direct so much additional time, money, and labor towards adjusting the state's management plans, especially considering the financial need to support fisher participation. Further, while these strategies have amplified the ability of HFS to use science to assert authority and challenge or influence state decisions, they do not necessarily negate DFO's claim to science-informed authority. They also risk continuing to forefront Western science over Indigenous knowledges. Still, knowledge coproduction guided through local perspectives and priorities and conducted by local actors, is proving to produce valuable information for local adjustments to management and modeling, and amplifying the legitimacy of Indigenous knowledge.

5.5 Discussion

The five Nations' assertion of fishing rights and development of a new fisheries institution in frictions with DFO illuminate the feedback loop between colonialism and fisheries science mediated by settler State management and enforced through Western institutional and knowledge hegemonies (Silver et al., 2022). The silos of State fishery institutional structures, the inflexibility of DFO to recognize or shift in accordance with Indigenous governance, the application of locally ill-suited models, reference baselines, and management practices with roots in species specific fisheries science, and the deferral to vaguely and inconsistently defined management concepts (often in lieu of actual data) to validate state authority are all explicit barriers in this context. Whether or not these barriers are intentional on the part of Fisheries and Oceans Canada, efforts at co-governance, reconciliation, and any recognition of Indigenous governance and sovereignty are undermined by the structures and policies in place in the State fisheries management institution. The frictions in HFS and DFO interactions and the barriers they produce for implementation of the Five Nations' fishing rights not only illuminate specific aspects of the feedback loop in which the Canadian fisheries institution is embedded, but also provide windows for imagining necessary transformations in fisheries.

The five Nations and HFS are tasked with balancing coordination with DFO to implement fishing rights while appropriately representing the Five Nations' interests and Indigenous authority. The recent evolving strategies from the five Nations and Ha'oom Fisheries Society to do so reveal multiple avenues to resist, challenge, and potentially begin deconstructing knowledge and institutional hegemonies in fisheries, and to reimagine fishery institutions through relational practices of co-governance and knowledge coproduction. Strategic partnerships to diversify funding sources and amplify locally produced research efforts help to diminish the leverage of the State over the five Nations. Ha'oom's internal reconstruction of licensure

structures and knowledge production pathways create a structure more compatible with traditional Nuu-chah-nulth systems and practices, and support a management organization that is overall positively regarded by Nuu-chah-nulth fishers for its transparency, engagement, responsiveness, and approach to management. A "multi-pronged approach" to strategic planning combines HFS's knowledge production and partnership building operations with the five Nation's reconciliation and litigation strategies and coordinates multiple avenues of pressuring the state and amplifies the influence the Nations' hold in negotiations.

This effort is not without tensions; HFS risks reifying the problematics of colonial fisheries management within its own operations through institutional and financial pressure to operate in a way legible to the State institution. "Using their own tools against them" requires adept wielding and some level of adoption of those same tools, and so engaging with and strategically utilizing the legal structures, licensing formats, and knowledge hegemonies of the state. As the five Nations' fisheries institution continues to develop, its leadership and partners must work to mitigate that pressure as yet another colonial barrier counter to the power sharing necessary for Indigenous food and resource sovereignty and genuine reconciliation between First Nations and Canada. Further, the long litigation process has been exceptionally costly and time consuming, and over time many fishers have become disillusioned with the likelyhood of a truly fulfilled right or doubtful that the negotiation team is doing as much as it actually can on behalf of the fishers. There have been second doubts about the path taken to achieve a court affirmed commercial right. Other First Nations, such as the Manulth just south of the five Nations and among the 11 on the originally filed Ahousaht et al. lawsuit, opted to take a treaty route and have since been able to move much farther along in their commercial fishery development without the expense and delay of drawn out court proceedings. However, their treaty rights do not fulfill the five Nations' visions for co-governance and self determination in a "true" realization of the right

in the same way that was the ambition of the litigation process (F. Frank, personal communications, 2021). The court affirmed right enabled a relatively novel dynamic where the five Nations can assert their own authority over fisheries management decisions, outside of Canada's Ministerial authority. Still, the full realization of the long term vision of the five Nations' rights based fisheries is a long way off.

The structure of HFS has certainly been influenced by interactions between the five Nations and DFO, but the re-shaping through frictions is not unilateral. Though many local actors continue to retain the sentiment that Federal departments like DFO are "impervious to change," and meaningful transformations are unlikely if not impossible, in recent years especially DFO has also made adjustments. Not all are are desirable to the five Nations, but regardless they are responses to HFS strategic operational actions or to alternate parallel litigation and reconciliation strategies by the five Nations in points of friction. DFO has not been immovable in this case, despite its rigidity and centralized hierarchy. Even if the state institution is itself not shifting away from colonial tools and knowledge hegemonies, the five Nations' strategies are redistributing the balance of power and disrupting multiple dimensions of the fisheries science – colonialism feedback loop on the local scale to further distance themselves from DFO's influence and hold greater agency in the development of their own fisheries institution.

5.5.1 Opportunities to reimagine fisheries

A reimagining of fisheries is necessary, especially in State led fisheries management institutions of Western settler-colonial nations. Silver et al. (2022) proposed urgent goals for addressing the problem of hegemony in colonial state fisheries institutions, including a reimagining of the pathways of informing decision-making to explicitly include a multiple of values and ways of knowing, a devolution and broadening of governance authority and processes to support multiple ways of knowing, and an overall transformation of siloed Western scientific

institutions through a "reimagining relationships and systems of fish, people, and place." These goals are broad, but are generally reflected by the intended structure of Ha'oom and the Nuu-chah-nulth worldview of *hahouthism* and *hishukish tsawalk* (see Introduction, Table 1). Disruption of colonial dispossession and the role of privatization requires rethinking models of property and economy; strategies grounded in Indigenous perspectives are one avenue (Whyte, 2017; Todd et al., 2018; Silver et al., 2022). State structures like DFO resist change, a frustration of many in leadership positions in the various organizations that engage with DFO regarding WCVI salmon and other fisheries. However, the case of the five Nations and parallel efforts by neighboring nations (e.g. are evidence that shifts *can* occur within the state institution. Ultimately, the combined strategies of the five Nations have redistributed the balance of power, and especially in recent years they have been able to influence at least some dimensions of DFO's recognition of Nuu-chah-nulth rights and practices of governance, acceptance of locally produced knowledge, and participation in negotiations. In just the last few months, there has been increasing promise of a finalized reconciliation agreement with Canada to come in the near future, with at least a temporary conclusion (rather than breakdown) of the negotiations, and more Nuu-chah-nulth fishers are able to access and participate in the Five Nations Fisheries than ever. Further, this case demonstrates that new structures can be developed which reflect a different understanding of systems and relations that are more interconnected, supported through a plurality of knowledges and information systems, and both broaden and devolve governance processes in a redistribution of power between knowledge systems and between communities.

There are variable perspective regarding how achievable this reimagining is in practice beyond the very local level without a complete dismantling of the State institution. Despite the challenges experienced by Nuu-chah-nulth First Nations in engaging with Canada, there does remain great hope in the eventual ability to achieve goals of self determination, confidence in

support of neighboring Canadian communities, and even some optimism that people within the State institution can be a part of enacting necessary change. The Tla-o-qui-aht First Nations Lands Department Administrator reflected,

> "I believe biologists and these people doing river walks with us … have some integrity and ambition for our fisheries. And even people that are dealing with IFMP and catch and closures and such. ... I feel like we there's room to trust the people at the table and there is optimism that the type of management change we need is possible, but it doesn't happen easy or fast."

There will not be one single set of 'best practices' for all contexts where equitable and decolonized fishery reform is pursued. An important recognition in a movement towards place-based and adaptive, relational strategies is the importance of local and regional contextualities of environment, culture, economy, and history. Still, in this pathway we see a novel institutional development that provides an opportunity to explore potential for what fishery management utilizing coproduction of knowledges, relational principles, dispersion of governance authority, and actions fit to local systems as fundamental institutional building blocks might look like. The pluralistic and relational practices of local actors including HFS offer a reimagining of fisheries governing structures and processes, and of pathways between information, decision-making, and action through coproduction; a reimagining and devolution of such which is necessary in addressing inequitable, colonial hegemonies in western state-led fisheries.

5.6 Conclusion

Interactions between the Five Nations and DFO reveal specific barriers to Indigenous self determination in the T'aaq-wiihak fisheries rooted in the colonial, hegemonic conditions within the State fisheries institution's processes and structures that allow for inequity in fisheries and contribute to the breakdown of negotiations. This case study illustrates ways in which Fisheries Science and state-led Western scientific management practices, reinforcing and reinforced by

colonial structures and processes, produce the bureaucratic barriers the Five Nations' experience in developing a fully realized rights-based fishery under Indigenous sovereign authority. Fisheries science is encoded into the bureaucratic structure of Fisheries and Oceans Canada through policy with colonial origins. Siloed institutions and state authority reinforced by fisheries science perpetuate colonial legacies and inequity, concurrently to failing to appropriately manage for environmental, socioeconomic health and wellbeing and failing to fully recognize the rights of First Nations fishing community and the sovereignty of First Nations governance. This is not a problem unique to Canada's salmon fisheries. The Samí territories settled by Scandinavian countries, the Chukchi people and other Siberian Indigenous communities displaced by Russia, the Inuaput and Yup'ik of Alaska, and the Yurok, Karuk, and Hupa of the Klamath river in California are just a few examples where Western salmon fisheries intersect with past and ongoing colonial processes (Johnson, 1997; Most, 2007; Mustonen, 2017; Whyte, 2017; Walter, 2019). A similar legacy of knowledge hegemonies is embedded in the State-led resource governance of many colonial nations. Efforts to reform fisheries management and move towards reconciliation and regeneration of Indigenous sovereignty are intertwined, and there is no single correct strategy to disrupt and disentangle them. In the case of the five Nuu-chah-nulth First Nations' rights-based fisheries, pluralisms and relational, decentralized structures of knowledge coproduction and management practice fit to the community context (here, through Indigenous co-governance) challenge points of disruption in hegemonic barriers. Utilizing pluralisms and relational partnerships strategically to pressure points of feedback between colonialism and fisheries science is active resistance to the settler state's authority, and a potential avenue for active and intentional decolonization in the context of a resistant bureaucratic structure.

6. Conclusions

In this dissertation, I examined what it means to appropriately and effectively pursue the mobilization of Indigenous and Western scientific ways of knowing in fisheries, both for the purpose of "improved" fisheries management and to meaningfully recognize Indigenous knowledges, rights, and sovereignty, with critical consideration of colonial legacies and knowledge hegemonies in Western fisheries management systems. The work I present has two broader goals. The first is to support ongoing efforts of mobilizing Nuu-chah-nulth knowledges and values in WCVI salmon governance and management for productive, healthy, and abundant salmon fisheries. The second goal is to explore the ways in which mobilization of Indigenous and Western scientific ways of knowing may serve strategic purposes in both advancing First Nations' paths towards self determination and more broadly reimagining fisheries institutions which are better equipped to support the well-being of both ecosystems and of local communities.

6.1 Review of key findings

I began this dissertation presenting four primary research questions to guide the work. The chapters have each contributed towards answering these questions, and have collectively contributed important findings towards the broader goal.

RQ1. What is the existing academic understanding of efforts to mobilize multiple knowledges in fisheries governance and management, especially in contexts with both Indigenous and Western authorities and rightsholders?

RQ2. How do governing bodies and user groups interact in key focal arenas to make decisions regarding access and use of WCVI fisheries, focusing on salmon in Clayoquot Sound?

RQ3. In these interactions, in what ways are Indigenous and Western scientific knowledges and values produced and mobilized?

RQ4. In these interactions, how does the mobilization of Indigenous ways of knowing and Western fisheries science serve to (re)shape governance relations and dynamics of power?

Chapter 2 directly addresses the first question through a comprehensive review of academic literature regarding global efforts to bridge, "integrate," or otherwise mobilize Indigenous knowledges with Western science in fisheries governance and management. Though the literature includes a broad array of listed objectives of and approaches to these efforts, there are comparatively fewer clearly demonstrated realized outcomes, leaving uncertainty regarding the efficacy and broader impacts of many efforts. Most efforts employ some level of participatory methods, though 'participation' is variable defined. Still, the growing body of literature does reveal important patterns. State led approaches and the use of legislation or formal treaties and other agreements are insufficient on their own. Knowledge "integration" is more successful when co-led or directed by Indigenous collaborators and scholars, and when employing shared practices of knowledge co-production where multiple knowledges are equally valued. Pluralistic approaches to multiple ways of knowing, power sharing in participatory approaches, long term engagement with emphasis on trust and relationship building, and engagement with Indigenous perspectives should be prioritized in efforts to mobilize multiple knowledges in order to achieve success in desired outcomes regarding improved fisheries management, informed decision-making, and recognition of Indigenous rights.

Following this review, Chapters 3, 4, and 5 address the remaining research questions through the case study, focusing especially on salmon in Clayoquot Sound, the Tla-o-qui-aht *hahouthli,* and the rights-based Five Nations Multispecies Fishery. Through multiple avenues of inquiry across different analytical entrypoints to the case context, the findings of these Chapters also echo the importance of key considerations identified in Chapter 2.

Chapter 3 details Tla-o-qui-aht First Nation's approach to Indigenous and Western scientific knowledge, and offers a single First Nation context towards answering RQ2 and RQ3. This chapter demonstrates that Tla-o-qui-aht First Nations' structures of decision-making, management, and monitoring for salmon are robust in both technical and political review, attentive to both scientific and Indigenous knowledges and practices, and collectively approach restoration, enhancement, and harvest. The findings demonstrate that Tla-o-qui-aht management structures approach informed decision-making and management using pluralistic understandings of and approaches to multiple ways of knowing, supported through key partnerships. Pluralistic strategies enable the concurrent mobilization of Indigenous and Western produced sciences and traditional Nuu-chah-nulth knowledges and practices that are key to Tla-o-qui-aht management. Chapter 3 demonstrates Tla-o-qui-aht's ability to self-govern and self-manage, as well as the advantages of a plural and collaborative approach to knowledges under Indigenous leadership that differs from most structures of Western fisheries management practices.

In Chapter 4, I approach RQ2, RQ3, and RQ4 through a governance mapping effort. Through interwoven theoretical approaches to governance and relationship, I analyze the entangled governance arrangements concerning salmon in Clayoquot Sound. I found that interactions between local actors are structured through highly specific rules and norms, many of which emphasize Nuu-chah-nulth and Western approaches to relational practice. In actor interactions, and in shared decision-making arenas, relational approaches to decision-making with meaningful acknowledgement of local Indigenous authority support coordination of the many local actors and intersecting salmon management challenges. Pluralistic approaches to knowledge mobilization are shown to facilitate knowledge coproduction and support locally directed action. In combination with governance approaches that also mobilize Nuu-chah-nulth embodied values, pluralistic knowledge coproduction allows for greater flexibility and responsiveness in local

action to respond to salmon monitoring and management concerns, and for a greater leveraging of power through collective action to influence state actors. This chapter connects the previous reflections on knowledge pluralisms to the notion of entanglements and pluralisms in governance, and returns to a discussion regarding power sharing and Indigenous leadership in participatory approaches, echoing recommendations in Chapter 2. Further, the chapter demonstrates how a pluralistic approach to governance inquiry can illuminate key characteristics, outcomes, and tensions of governance dynamics where there are multiple overlapping Indigenous and Western actors, governing authorities, and knowledge systems.

Chapter 5 focuses on Ha'oom Fisheries Society and the five Nations' interactions with Canada and DFO. The relatively novel position of HFS as a Federally recognized institution implementing a judicially affirmed Constitutional right but responsible to Indigenous authority provides an interesting story of institution development. Through the frictions and power imbalances between the focal actors and the strategic response of the five Nations and HFS, this chapter also serves as an entry point to consider systemic issues of knowledge hegemony and colonialism in State fisheries institutions, and explore opportunities of disruption and avenues of reimagining. In addition to adding additional case specific detail to the questions posed in RQ2 and RQ3, this chapter provides evidence of ways in which strategic knowledge mobilization and coproduction alongside other strategies of resistance shift the balance of power between the five Nations and the State. In particular, utilizing pluralisms and relational partnerships amplify the Nations' ability to challenge the intellectual authority of the state by producing locally specific and appropriate knowledges. Institution building and knowledge production priorities informed through Indigenous frameworks and leadership help to locally counter the marginalizing impacts of the colonially informed market and property based management tools of the State. Though these strategies present some tensions, they also support a broader discussion considering a

possible reimagining of fisheries institutions through pluralisms and relational, decentralized structures of knowledge coproduction and management practice fit to the community context (here, through Indigenous co-governance). This chapter engages earlier reflections on pluralisms and relationalities with ways in which mobilization of Indigenous and Western scientific ways of knowing may serve strategic purposes in both advancing First Nations' paths towards self determination and more broadly reimagining fisheries institutions which are better equipped to support the well-being of both ecosystems and of local communities.

6.2 Opportunities towards reimagining fisheries

Calls for reform of fisheries are growing across disciplinary contexts. Systemic, ecosystem-oriented, holistic approaches to fisheries and fisheries sciences are receiving growing attention, as are knowledges beyond Western science. Recognition of Indigenous rights and knowledges are also growing, both for broadening the knowledges informing fisheries and for supporting Indigenous self-determination and efforts of reconciliation (United Nations, 2007; Gratani et al., 2011; Weiss et al., 2013; Denny & Fanning, 2016; Raymond-Yakoubian et al., 2017; Bennett et al., 2019; Reid et al., 2020; Atlas, 2021; Cooke et al., 2021; Bingham et al., 2021; Silver et al., 2022). Still, colonial legacies and knowledge hegemonies of conventional Western fisheries management remain largely intact and difficult to disrupt (Whyte, 2017, 2018; McGregor, 2018; Todd, 2014, 2018; Silver et al., 2022). Shifts away from colonially rooted Western outlooks regarding structure (siloed institutions and practices), relations (extractive, utilitatrian, capitalist), knowledge (neoliberal logics), and authority (centralized hierarchy) of fisheries management are urgently needed (Todd, 2018; Liboiron, 2021; Silver, 2022). Alternate relationalities challenge these outlooks; the relations between salmon, people, and structures of

power refract the colonial structures of the state and advance both Indigenous self-determination and renewed, resilient fisheries (Whyte, 2017; Atlas et al., 2021; Todd, 2014, 2018).

The findings of this dissertation contribute insight regarding actionable and necessary steps towards these transformations, specifically through alternate pathways of information, relational structures, and arrangements of governance. First, pluralistic approaches to knowledge and governance, especially those attentive to Indigenous principles and led by Indigenous scholars and communities, should be prioritized in efforts to mobilize multiple ways of knowing in fisheries. Second, many Indigenous governance structures already practice pluralisms, demonstrate important strategic insights for improved fisheries governance and management, and should be recognized as legitimate and capable governing bodies for self-management and co-management. Third, relational strategies to partnership building and power sharing between governance actors support coordinated decision-making, adaptive management actions, increased local capacity, and robust knowledge co-development, especially when rules and norms reflect community values and frameworks of relationship. Finally, utilizing pluralisms and relational partnerships to strategically pressure and potentially disrupt feedbacks between colonialism and fisheries science resists and decenters the Settler State's authority, and is a potential avenue for active and intentional decolonization and reimagining of fisheries institutions.

Legislative change and formalized agreements through pathways of litigation, treaties, or reconciliation remain necessary. However, they are not sufficient on their own to produce the transformative change needed in fisheries to address knowledge hegemonies, limitations of conventional management, and colonial legacies. Further, state-led efforts to better manage fisheries or recognize Indigenous rights by "integrating" Indigenous knowledges and governance frameworks into hegemonic management structures perpetuate colonial harm. Instead, power sharing through co-governance, Indigenous leadership, and plural, situated recognition of

Indigenous ways of knowing and governing are imperative for efforts to better mobilize multiple ways of knowing in the management of fisheries, and this requires a fundamentally relational and anticolonial reform of fisheries institutions. In sum, pluralisms of knowledge and more – than – capitalist relational reimaginings present promising avenues for meaningful fisheries reform.

6.3 Here on the docks, and in the land of our Chiefs

The work presented here provided hopeful conclusions from a small snapshot of a long and ongoing process of Indigenous rights assertion, salmon restoration, traditional regeneration, and local governance reform. Challenges remain, and for now the struggle over authority, rights, and knowledge recognition in Clayoquot Sound continues. Still, recent years have seen promising advances of the five Nations' pursuit of self determination. As of summer 2023, the interim reconciliation agreement between the five Nations and Canada is expected to be finalized within a year. It is hoped that a finalized reconciliation agreement will ensure negotiations can come to an end with an agreed upon co-management structure in the near future. The Five Nations Multispecies Fisheries continue to grow in membership, and projects of salmon food systems renewal in Clayoquot Sound are receiving increasing local support. Many fishers remain hopeful regarding the full realization of their rights to fish with local, Nuu-chah-nulth led governance and management. To close this chapter of the story, I leave you now with their words.

> "[I want to see] more fishers from my tribe. It's building now. Yeah, DFO is slowly getting the idea of what's going on and how it should be. And we're starting out with smaller boats. I'd like to see everybody in a trawler like how used to be. I remember my grandparents in their era. Everybody had a trawler and there was a sustainable fishery back then. So I want that. Yeah, I want to see that again."

“I feel like they've [HFS] actually set a really solid example for what fisheries management should be. And, you know, it's great that the Nations have something that’s so, you know, well established in the manner that they've practiced … all I can hope is that that's our example, right? Like that that structure, that delivery of, of our reporting every year is the proof in the pudding that we can effectively manage what we do in our territory”

“[It’s] place. It's really hard to explain. You can make a good living out of it [fishing], but it's not only necessarily about that … it's part of our teachings, it's our tradition. And I think that we've become good at it. Like we can fish sustainably … with conservation in mind and that's how we do fish when we’re out there. I'm not sure if it's a connection to the water or what it is. It's - you forget about everything that's happening on land. And forget about everything … you can't be disturbed. It's just, you know, you can go through rough weather, you can go through windy days and go through also really calm flat days and it's really beautiful out there. I just think that it's something that I always dreamt about doing since I was a kid. … And then when we won this court case … There was a good opportunity to start doing that and to change my boats from doing charters to doing *T'aaq-wiihak* on my speedboat. And then I just built it from there. … I just think that it's in our blood. It's, you know, there's no greater feeling than when you're pulling a fish. And it's just the relaxation, you know, when you're leaving Tofino to go up to Esperanza. And it's just, it's priceless.”

“There's always hope. Now the Chiefs have that voice. And they're not just standing by and just letting this industry die. They're taking a stand. And the fishermen are taking a stand. Some of the buyers are taking stands. And the government is running out of options in fighting us over something that's been affirmed under Canadian law and has been all the way to the Supreme Court. That our guys, we matter. Here on this dock, and in the land of our chiefs. It's recognized.”

Appendix A

This Appendix presents a visual timeline of policies, events, and processes which contextualize the sociopolitical dynamics of Clayoquot Sound and the development of the five Nations' multispecies rights based fisheries currently implemented by Ha'oom Fisheries Society. Events are organized across four categories: court decisions and relevant non-fisheries federal legislation, treaties and federal fisheries policies, coastal communities and salmon fisheries, and impacts of these three threads on Indigenous communities as well as First Nations' organizing and rights assertion in response. The information presented in the visual displays how past and ongoing Western fisheries management practices intersect with the systematic colonial dispossession of First Nations peoples alongside the massive expansion, industrialization, and then reduction and privatization of BC salmon fisheries. It also displays the roll of Canadian court decisions in mandating federal recognition of Indigenous rights to access, harvest, and sell fish as a strategy of Indigenous rights assertion.

The timeline ends at 2022, as the five Nations and Fisheries and Oceans Canada resume negotiations concurrent to an ongoing reconciliation process supported by Canada's Department of Justice. As of summer 2023, the interim reconciliation agreement between the five Nations and Canada is expected to be finalized within the year. The reconciliation process now informs several aspects of the negotiations between the five Nations and DFO, and it is hoped that a finalized reconciliation agreement will ensure negotiations can come to an end with an agreed upon co-management structure in the near future. All parties hope to avoid returning to litigation.

The timeline is split across five pages in this text. A digital version of this visual in its entirety is available, and an interactive web based version is in process, to be housed on the websites of Tla-o-qui-aht First Nations, Ha'oom Fisheries Society, and potentially the Five

Nations Fishery Council (FNFC) and Nuu-chah-nulth Tribal Council (NTC). With the help of undergraduate assistants, I also constructed a text archive companion document to this timeline, where all dates noted on the visual in addition to others that could not be included due to space constraints are listed with additional details and references to contextualize the events.

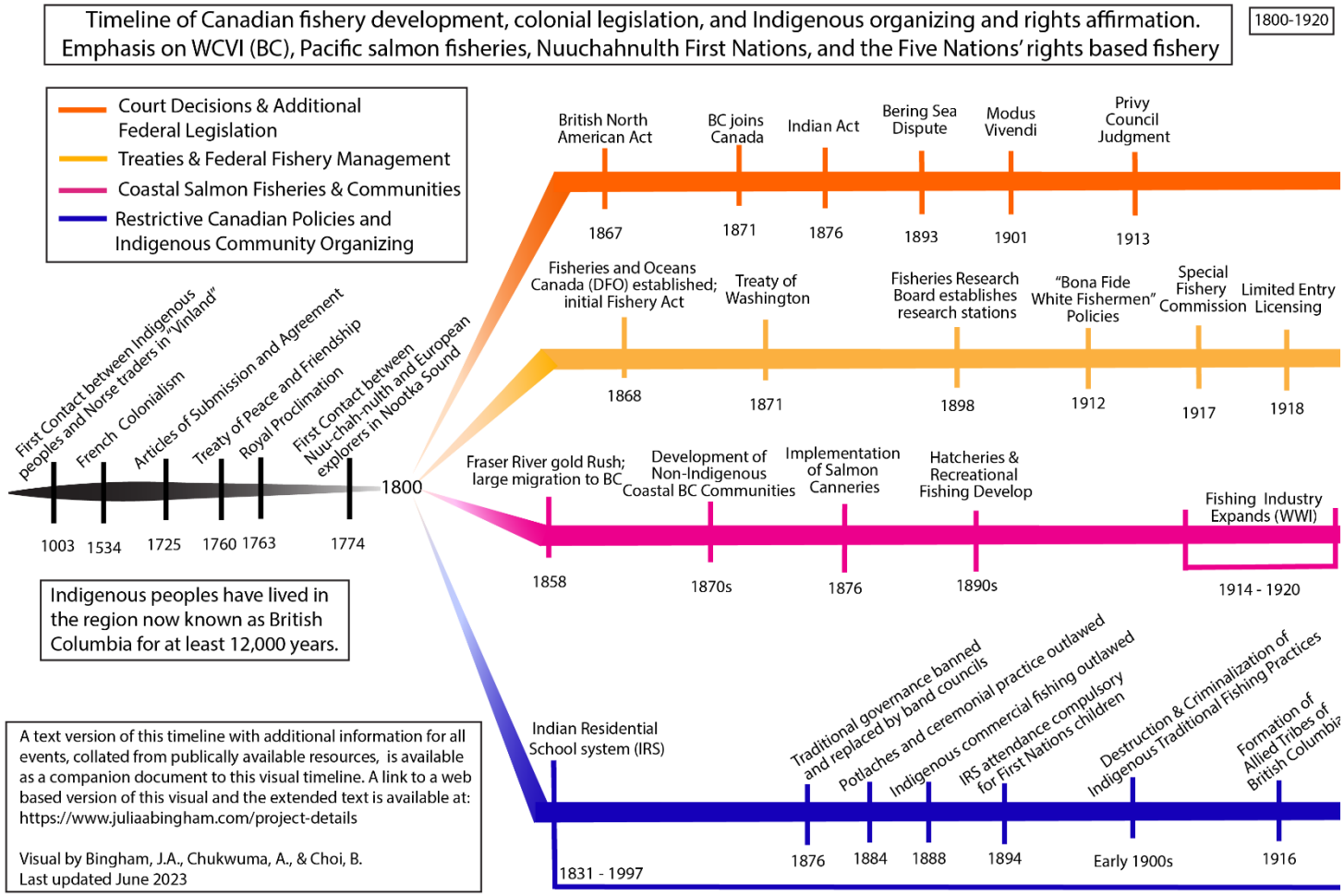
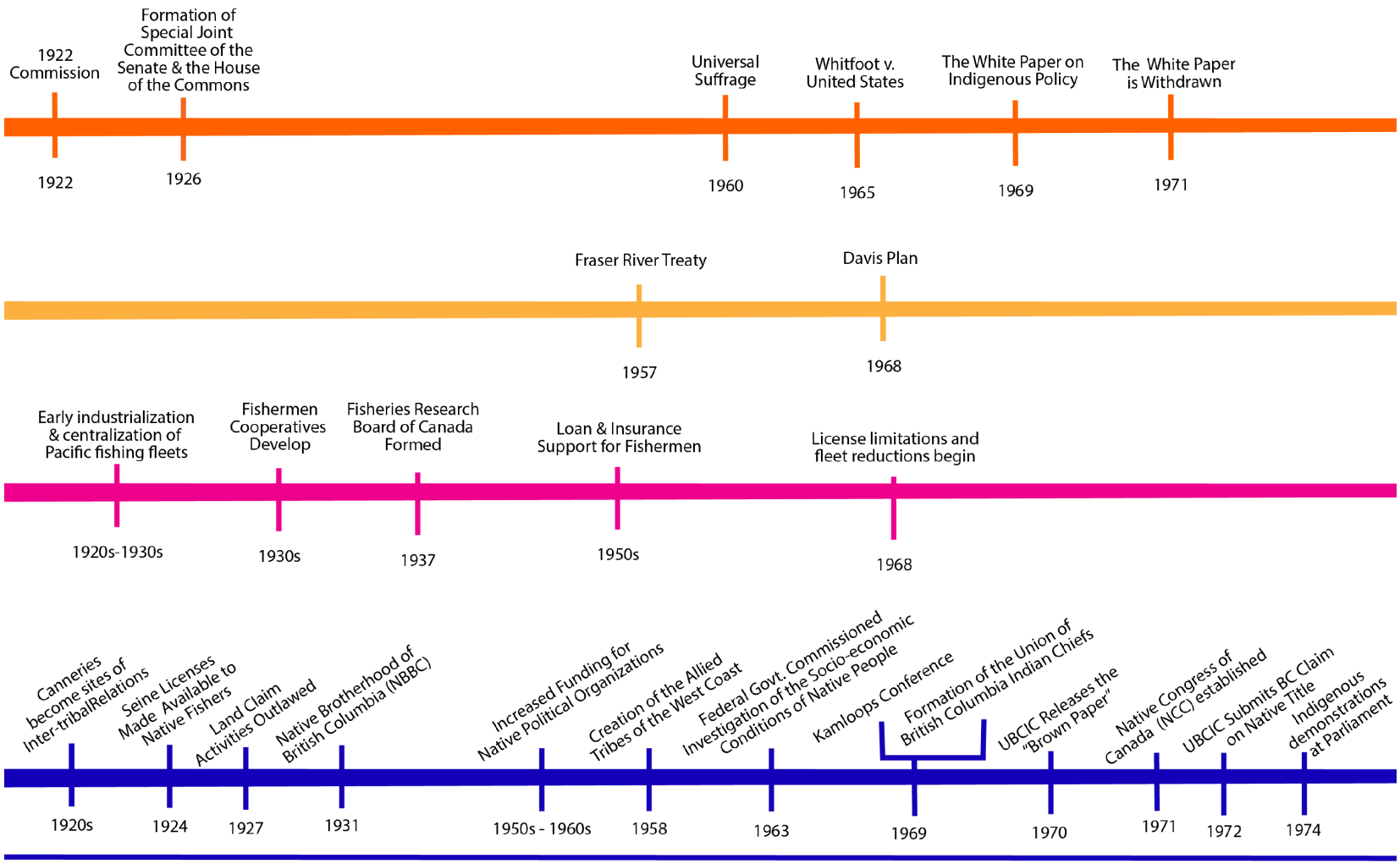
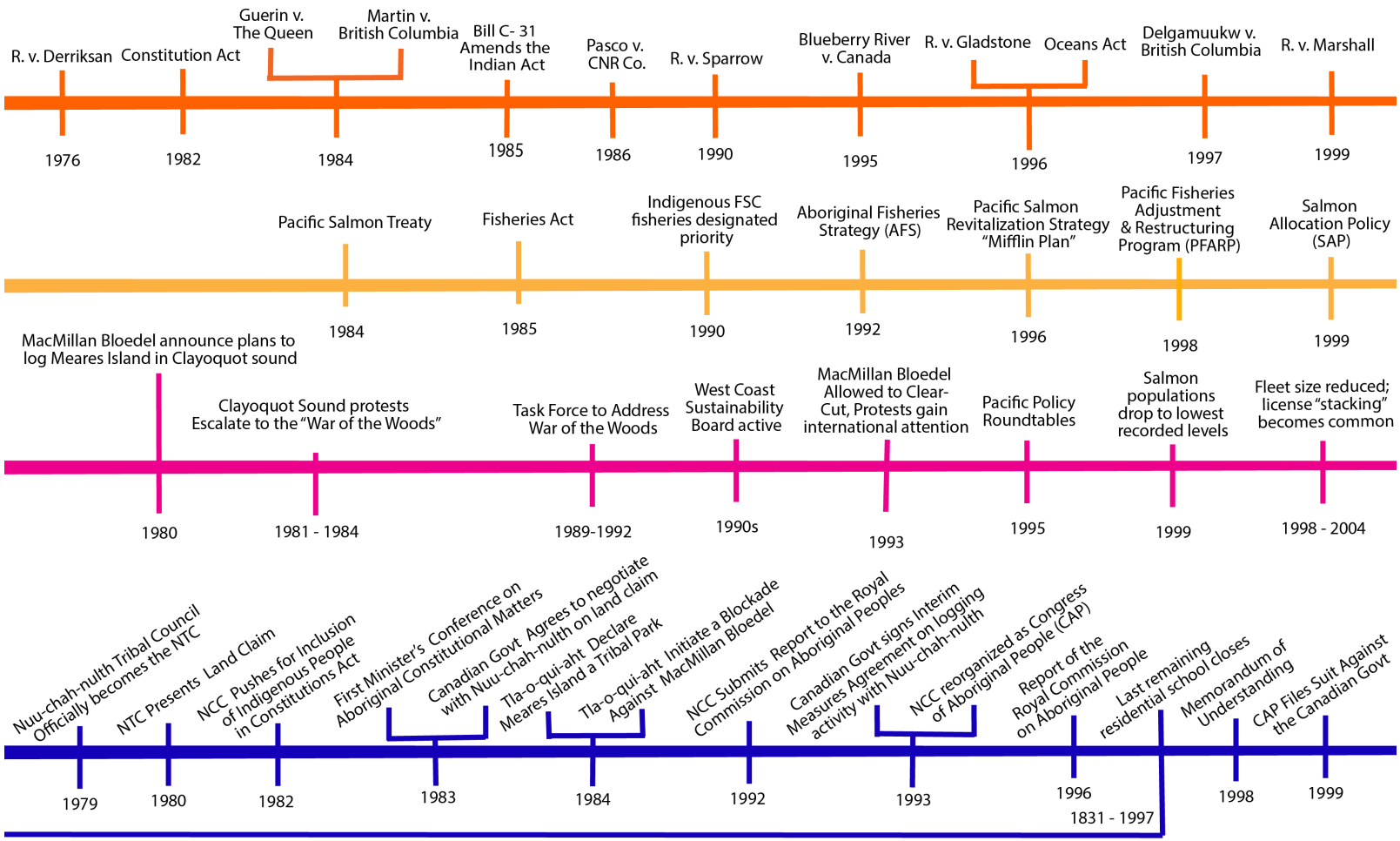


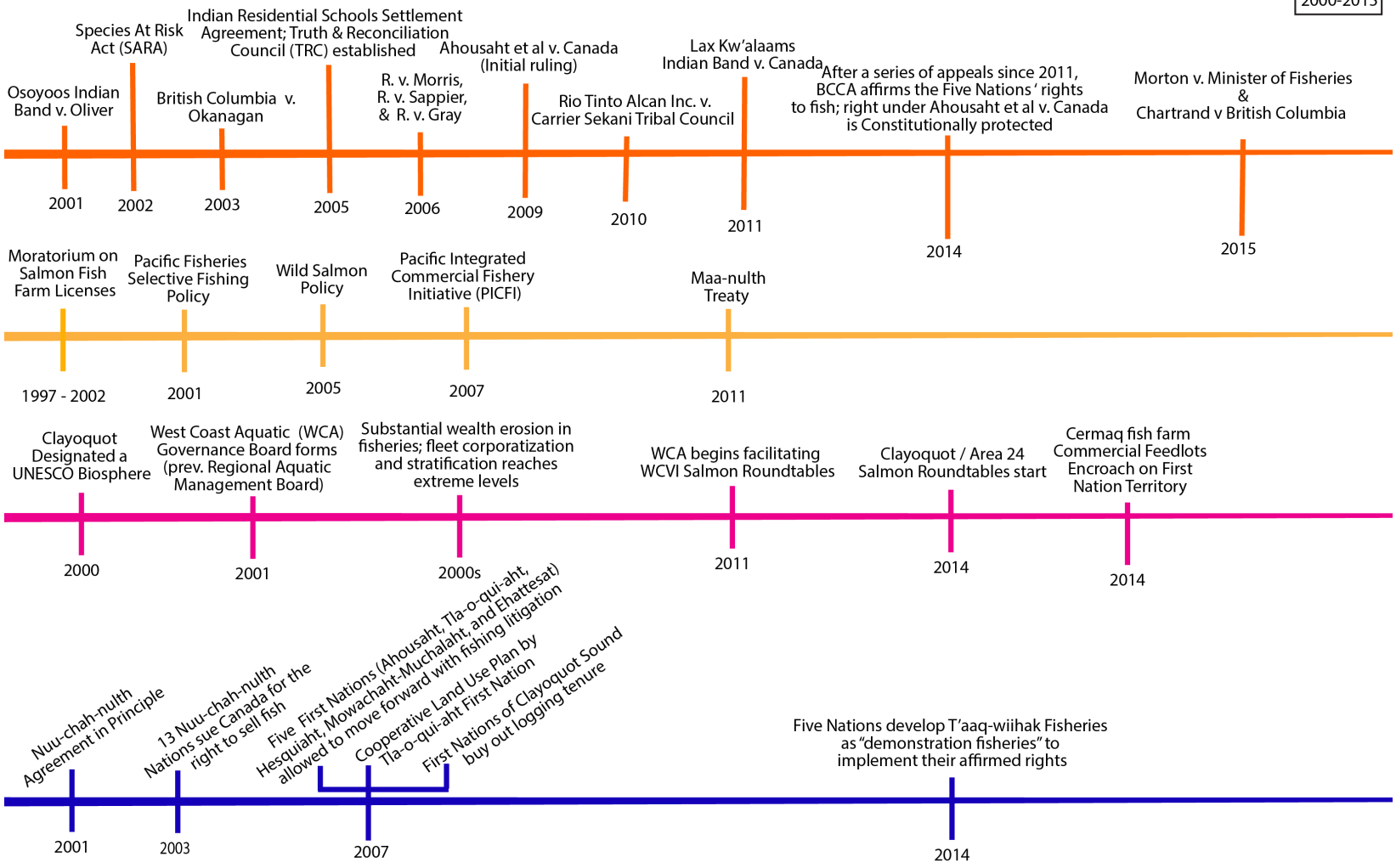
Figure 18: Historical Timeline contextualizing the sociopolitical dynamics of Clayoquot Sound

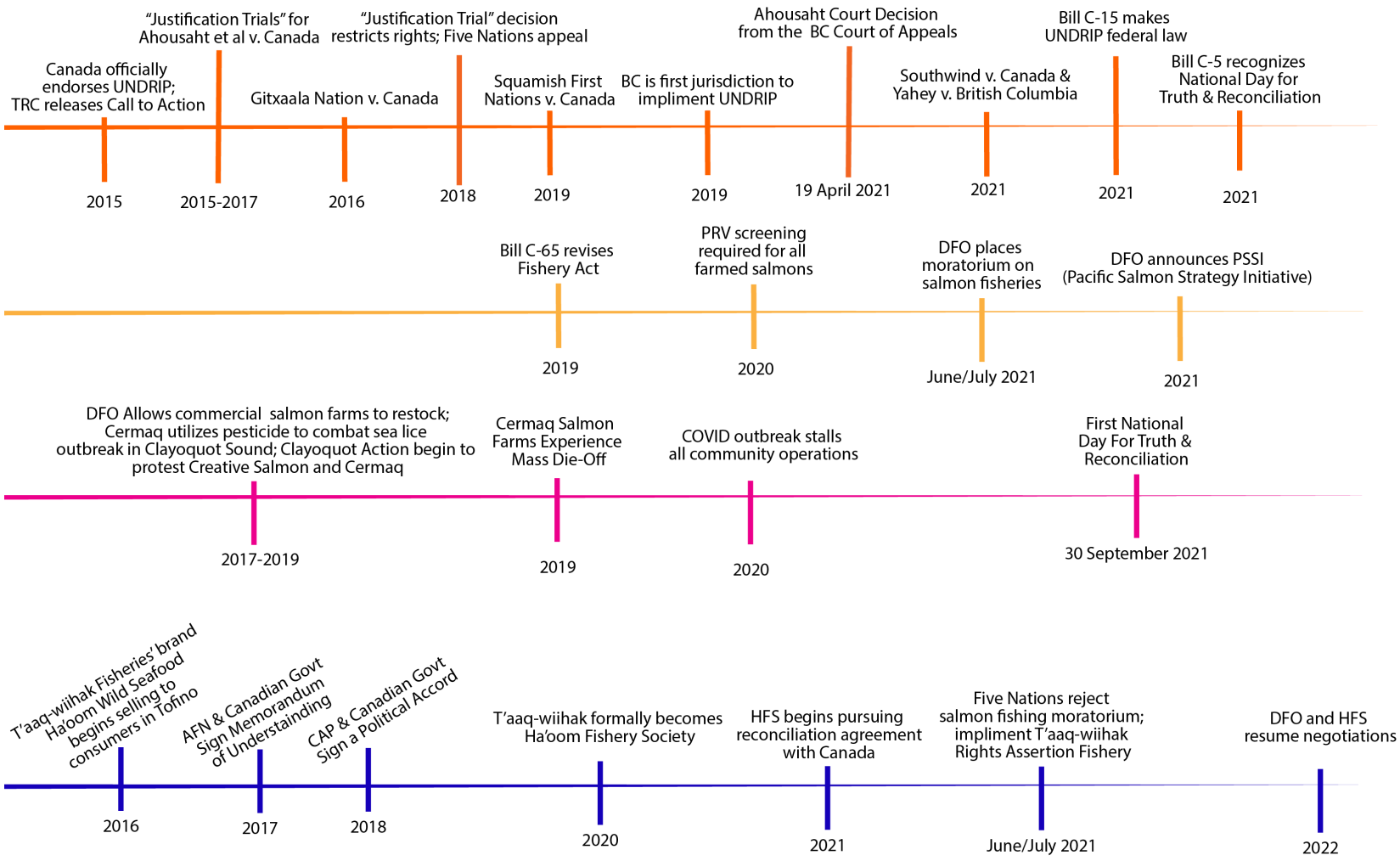

1922 Commission
1922
Formation of Special Joint Committee of the Senate & the House of the Commons
1926
Universal Suffrage
1960
Whitfoot v. United States
1965
The White Paper on Indigenous Policy
1969
The White Paper is Withdrawn
1971
Fraser River Treaty
1957
Davis Plan
1968
Early industrialization & centralization of Pacific fishing fleets
1920s-1930s
Fishermen Cooperatives Develop
1930s
Fisheries Research Board of Canada Formed
1937
Loan & Insurance Support for Fishermen
1950s
License limitations and fleet reductions begin
1968
Canneries become sites of Inter-tribalRelations
1920s
Seine Licenses Made Available to Native Fishers
1924
Land Claim Activities Outlawed
1927
Native Brotherhood of British Columbia (NBBC)
1931
Increased Funding for Native Political Organizations
1950s - 1960s
Creation of the Allied Tribes of the West Coast
1958
Federal Govt. Commissioned Investigation of the Socio-economic Conditions of Native People
1963
Kamloops Conference
Formation of the Union of British Columbia Indian Chiefs
1969
UBCIC Releases the "Brown Paper"
1970
Native Congress of Canada (NCC) established
1971
UBCIC Submits BC Claim on Native Title
1972
Indigenous demonstrations at Parliament
1974

Timeline of Canadian fishery development, colonial legislation, and Indigenous organizing and rights affirmation. Emphasis on WCVI (BC), Pacific salmon fisheries, Nuuchahnulth First Nations, and the Five Nations' rights based fishery

1975-2000




Osoyoos Indian Band v. Oliver
2001
Species At Risk Act (SARA)
2002
British Columbia v. Okanagan
2003
Indian Residential Schools Settlement Agreement; Truth & Reconciliation Council (TRC) established
2005
R. v. Morris, R. v. Sappier, & R. v. Gray
2006
Ahousaht et al v. Canada (Initial ruling)
2009
Rio Tinto Alcan Inc. v. Carrier Sekani Tribal Council
2010
Lax Kw'alaams Indian Band v. Canada
2011
After a series of appeals since 2011, BCCA affirms the Five Nations' rights to fish; right under Ahousaht et al v. Canada is Constitutionally protected
2014
Morton v. Minister of Fisheries & Chartrand v British Columbia
2015
Moratorium on Salmon Fish Farm Licenses
1997 - 2002
Pacific Fisheries Selective Fishing Policy
2001
Wild Salmon Policy
2005
Pacific Integrated Commercial Fishery Initiative (PICFI)
2007
Maa-nulth Treaty
2011
Clayoquot Designated a UNESCO Biosphere
2000
West Coast Aquatic (WCA) Governance Board forms (prev. Regional Aquatic Management Board)
2001
Substantial wealth erosion in fisheries; fleet corporatization and stratification reaches extreme levels
2000s
WCA begins facilitating WCVI Salmon Roundtables
2011
Clayoquot / Area 24 Salmon Roundtables start
2014
Cermaq fish farm Commercial Feedlots Encroach on First Nation Territory
2014
Nuu-chah-nulth Agreement in Principle
2001
13 Nuu-chah-nulth Nations sue Canada for the right to sell fish
2003
Five First Nations (Ahousaht, Tla-o-qui-aht, Hesquiaht, Mowachaht-Muchalaht, and Ehattesat) allowed to move forward with fishing litigation
Cooperative Land Use Plan by Tla-o-qui-aht First Nation
First Nations of Clayoquot Sound buy out logging tenure
2007
Five Nations develop T'aaq-wiihak Fisheries as "demonstration fisheries" to implement their affirmed rights
2014


Canada officially endorses UNDRIP; TRC releases Call to Action
2015
"Justification Trials" for Ahousaht et al v. Canada
2015-2017
Gitxaala Nation v. Canada
2016
"Justification Trial" decision restricts rights; Five Nations appeal
2018
Squamish First Nations v. Canada
2019
BC is first jurisdiction to impliment UNDRIP
2019
Ahousaht Court Decision from the BC Court of Appeals
19 April 2021
Southwind v. Canada & Yahey v. British Columbia
2021
Bill C-15 makes UNDRIP federal law
2021
Bill C-5 recognizes National Day for Truth & Reconciliation
2021
Bill C-65 revises Fishery Act
2019
PRV screening required for all farmed salmons
2020
DFO places moratorium on salmon fisheries
June/July 2021
DFO announces PSSI (Pacific Salmon Strategy Initiative)
2021
DFO Allows commercial salmon farms to restock; Cermaq utilizes pesticide to combat sea lice outbreak in Clayoquot Sound; Clayoquot Action begin to protest Creative Salmon and Cermaq
2017-2019
Cermaq Salmon Farms Experience Mass Die-Off
2019
COVID outbreak stalls all community operations
2020
First National Day For Truth & Reconciliation
30 September 2021
T'aaq-wiihak Fisheries' brand Ha'oom Wild Seafood begins selling to consumers in Tofino
2016
AFN & Canadian Govt Sign Memorandum of Understainding
2017
CAP & Canadian Govt Sign a Political Accord
2018
T'aaq-wiihak formally becomes Ha'oom Fishery Society
2020
HFS begins pursuing reconciliation agreement with Canada
2021
Five Nations reject salmon fishing moratorium; impliment T'aaq-wiihak Rights Assertion Fishery
June/July 2021
DFO and HFS resume negotiations
2022

Appendix B

This dissertation is only one research product of several to come from this research. The research agreements my collaborators and I built prioritized outcomes that would benefit my research partners, who generously welcomed me in to their *hahouthli*. This was core to our protocols regarding a reciprocal research practice. Below is a list of the research related products and support that came from this dissertation with direction from and intended benefit to my research collaborators.

Completion of EPIC4 project and summary reports

As a part of the research scoping process, I assisted Dr. Grant Murray and Dr. Saul Milne, in partnership with Tla-o-qui-aht, in the final stages of the EPIC4 (Enhancing Production in Coho: Culture, Community, Catch) project. The broader project, funded by Genome BC and Genome Canada, sought to develop pathways for reviving and monitoring Coho salmon through genomics. The specific project chapter with TFN informed recommended priorities and practices for practitioners seeking to partner with Indigenous communities in future efforts. I led the writing process for a full length summary research report of the work with TFN, which was provided to Tla-o-qui-aht in 2020. A condensed version of this report was included in the broader EPIC4 report for practitioners (Koop et al. 2021).

TFN decision-making support tool

As a part of the research scoping and partnership developing process, I assisted Tla-o-qui-aht First Nations Lands and Resources Department in creating a written version of their decision-making protocols for the enhancement, restoration, and harvest of *suuhaa* (Coho

salmon). It contributes to a growing collection of written versions of traditional protocols and administrative practices that are legible to non-Nuu-chah-nulth actors, including industry or NGO partners contracted to support management efforts and Canadian institutions such as Fisheries and Oceans, to whom TFN wishes to demonstrate independent capacity and ability to appropriately and effectively manage their own resources within their efforts towards self-determination. In collaborating with TFN to product the written protocol, we were able to develop a precedent of collaborative practice with demonstrated intent and follow through to prioritize products that benefit Tla-o-qui-aht, which contributed to TFN's approval of our research agreement for the dissertation work. Finally, this protocol document additionally served as a means to support my own learning of Tla-o-qui-aht governance and salmon management structures. TFN retains ownership of this document.

Digital archival support for TFN

As a part of remote methods adjustments during COVID-19, Dr. Murray and myself provided six months of financial and logistical support to a TFN staff member for digitally archiving TFN records and documents related to governance and management of fish, ricers, and home fisheries.

TFN Strategic Plan

Between fall 2021 and fall 2022, I provided logistical and technical assistance with Dr. Saul Milne in Tla-o-qui-aht's revisions and formalizations of their draft Fisheries Strategic Plan. I assisted in making editorial notes during meetings, editing text according to TFN directions, and formatting the document.

Protocol co-development with HFS

The process of research and protocol co-development with Ha'oom Fisheries Society helped HFS's development of a standardized protocol process and format acceptable to all Five Nations. The protocol was originally based on formats similar to that of Tla-o-qui-aht, Ahousaht, and Mowachaht/Muchalaht, and then adjusted to best fit HFS's responsibilities to the Five Nations. This protocol has since been further refined in developing multiple other research partnerships for HFS.

Buyback impacts literature review for HFS

In February 2022, I provided a comprehensive literature review and executive summary of the review to the HFS Board of Directors and Leads. The review covered reports and assessments of the impacts of all past "buyback" policies implemented by DFO on B.C. salmon fisheries, and critically considered these impacts to reflect concerns regarding risks of the most recent Pacific Salmon Strategy Initiative (PSSI). This review provided strategic talking points with multiple sources of evidence to support the Five Nations' concerns regarding PSSI for communications with DFO, the FNFC, and other fishing sectors.

Support of 2023 IFMP revisions

In February 2023, I supported HFS staff in critically reviewing the draft 2023 IFMP from DFO. Staff led the review and response, and I assisted in identifying language issues, gaps, and recommendations where appropriate to avoid research conflicts of interest.

Timeline visual and text archive

The visual and archival timeline included in the dissertation supplementary materials is offered to Indigenous partners and the FNFC for their use and distribution. It is intended to be a publicly accessible archive, collating information from a wide variety of sources, to illustrate the multiple avenues of legislative, political, and social dispossession and marginalization of First Nations communities, especially in the context of B.C. salmon fisheries, and to detail responsive pathways of resistance, rights and sovereignty assertion, and resource empowerment by First Nations, especially Nuu-chah-nulth fishing communities, with explicit attention to the *Ahousaht et al. vs Canada* lawsuit and resulting and ongoing development of the Five Nations' rights-based fisheries.

Appendix C

This Appendix presents the supplementary material for Chapter 2 including justification of the methods and the design of the PISOQ search strings used in searching for literature.

I. Design of PISOQ Search String

We divided the search string components across Population (coastal, marine, or inshore fisheries), Intervention (fishery governance and management), Strategy (knowledge integration or comparable framings such as 'bridging,' 'mobilizing,' 'including,' or 'combining' multiple knowledges), Outcomes (impacts of the knowledge integration efforts), and Qualifier (focus on IK/TEK). We then built search strings using keywords that would likely occur in the title, abstract, or text of literature matching our search parameters. We tested a total of 252 search string combinations in SCOPUS, building from one component at a time, to maximize both sensitivity and specificity. We had a pre-selected list of five texts that we knew matched our intended review scope and ten papers that we knew did not. We aimed to make a string as sensitive (picking up as many papers as possible) and specific (including all of the identified desired texts and few or none of the identified non desired texts) as possible using these pre-selected texts. We aimed for a final search string that returned relatively consistent numbers of hits with any adjustment to the search terms, which maximized number of hits (sensitivity) while meeting the specificity parameters based on the test texts (specificity). The final search string returned 379 results from SCOPUS, 414 results from Web of Science, and 257 results from the three ProQuest databases when we ran it in November 2020. After eliminating duplicates from the collated results, there were a total of 584 texts, which we sorted in Colandr by title and abstract and then again by full text, resulting in a total of 72 papers for the review.

Table 6: Finalized search string components. PISOQ components were combined within a single search - string using the Boolean operator AND to search for literature in Web of Science, SCOPUS, and three ProQuest databases (Aquatic Sciences and Fisheries Abstracts (ASFA) database, the Earth, Atmospheric, and Aquatic Science collection, and the Social Science Database)

Population	Intervention	Strategy	Outcome	Qualifier
fish OR fisher* OR coast* OR inshore OR marine	governance OR govern OR governing OR management OR manage OR managing OR decision-making OR policy-making OR enforcement OR implement* OR co-management OR ((manag* OR govern*) AND (participat* OR collaborat*)	knowledge NEAR (integration OR coproduc* OR mobiliz* OR inclusion OR incorporat* OR move* OR pluralism OR bridge OR consult* OR traditional OR indigenous OR ecological OR artisenal) OR tek OR ik OR "ways of knowing" OR "two-eyed seeing" OR etuaptmumk	policy OR rights OR "management plan" OR plan OR "policy plan" OR agency OR self-determination OR equity OR decision* OR sovereignty OR stewardship OR "resource allocation" OR "resource management" OR sustainab* OR restoration OR resilience OR "well-being" OR "well being" OR decoloniz*	indigenous OR tribal OR tribe* OR "First Nations" OR native OR inuit OR maori OR aboriginal OR "Native American" OR "American Indian" OR mi'kmaw OR eskimo OR nunavut OR aboriginal

I. Justification of the methods: Sensitivity and specificity of the search tool

We designed the PISOQ search string to maximize both sensitivity and specificity of the literature search. Highly sensitive search tools are unlikely to miss relevant papers in the initial search, though they may also capture more irrelevant papers. Highly specific search tools are more likely to quickly identify the most relevant articles, with a lower proportion of irrelevant articles to sort. This improves the efficiency of the literature review. It is therefore advantageous to have both better sensitivity and better specificity in a search tool to maximize accuracy, theoretical saturation, scope, and efficiency, though it is difficult to maximize both; highly sensitive searches may return more irrelevant texts (lower specificity) and highly specific searches might be less equipped to capture all relevant texts possible (lower sensitivity). Methley

et al. (2014) note that PICO (Population, Intervention, Comparator, Outcome) tools are the most sensitive (return the greatest number of relevant texts out of relevant hits) but are not very specific (greatest proportion of irrelevant texts out of all search results). By comparison, SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research Type) tools are highly specific (greatest proportion of relevant texts out of all results; fewer irrelevant texts) but have diminished sensitivity (more likely to miss relevant texts). Modified PICO tools such as PICOS are similarly or less specific, as additional search strings help refine specificity of the search, while also more sensitive than SPIDER tools (Methley et al. 2014). SPIDER and modified PICOS tools are noted to be more appropriate than PICO for reviews conducted in qualitative social sciences where research methodologies and theoretical reviews are more variable in structure and may not cleanly match an intervention-comparator-outcome model (Methley et al. 2014).

For this review, we were most concerned with the theoretical saturation of a qualitative review of key texts, with limited time and resources, and so necessitated a highly specific search string. We also sought to minimize the risk of missing relevant articles in the search by developing a relatively sensitive search tool. We therefore developed a modified PICOS search string which we anticipated to be more specific than PICOS and more sensitive than SPIDER, and better fit than PICO to a qualitative review including social science papers; PISOQ (Population, Intervention, Strategy, Outcome, Qualifier). Given the nature of this review, a "Comparator" string was less useful than a "Strategy" string for refining the search, and the sixth string was specified as a "Qualifier" to ensure the text focused on Indigenous communities.

Using PISOQ, the proportion of texts we identified as relevant to the study from all search results (72 of 584 total results, 12.32%) reflects a comparable or higher level of specificity compared to that identified by Methley et al. (2014) for the SPIDER and PICOS or other modified PICO tools. This is a substantially higher level of specificity compared to the PICO tool

typically used for larger quantitative literature reviews, and is appropriate for qualitative synthesis reviews seeking theoretical saturation, such as ours. (Methley et al., 2014). Our search also returned a higher level of sensitivity (72 of 145 relevant hits, 49.65%) compared to SPIDER and PICOS, more comparable to the level of specificity of PICO found by Methley et al. (2014), which suggests that our PISOQ tool was less likely to miss relevant texts than a SPIDER or other modified PICO tool, despite its high specificity. We are therefore confident in the appropriateness of the PISOQ search strategy in successfully and efficiently identifying relevant texts for in-depth review within a reasonably comprehensive search return for qualitative synthesis.

Appendix D

Table 7: Extended list of actors involved in WCVI salmon governance and management including harvest allocations, planning, and monitoring, and population and habitat restoration, enhancement, assessment, and monitoring. This is a concentrated list of the most relevant and involved actors in Clayoquot Sound salmon governance. Descriptions are based on interviews with actor representatives and supplemented by public web profiles and mission statements published by the included organizations.

Actor	Type	Primary Responsibilities and Objectives
***ƛaʔuukʷ iʔatḥ* (Tla-o-qui-aht) First Nation**		One of fifteen Nuu-chah-nulth First Nations on the west coast of Vancouver Island. The Tla-o-qui-aht *hahouthli* includes much of the southern portion of Clayoquot Sound and its watersheds. The primary communities are on Meares Island and the southern peninsula of Clayoquot.
Ha'wiih	Nuu-chah-nulth Governance	The *Ha'wiih* (hereditary chiefs) govern the Tla-o-qui-aht people and *hahouthli* including its lands and recourses. The hereditary system and its principles guide all Tla-o-qui-aht operations.
Chief and Council	Nuu-chah-nulth Governance	An elected governing body with 4 year terms, coordinating decision-making for administrative policies and procedures and for Tla-o-qui-aht strategic planning (TFN 2016). This government system was put in to place following the provisions of the 1876 Indian Act and is the Tla-o-qui-aht governing body formally recognized by Canada.
TFN Natural Resources and Fisheries Departments	Nuu-chah-nulth Resource Management	Implements and operates decisions from Chief and Council. The Fisheries Department, with support of the Natural Resources Department and including the Aboriginal Fisheries Strategies Department, manages Tla-o-qui-aht home use and commercial fishing participation, hatchery salmon enhancement programs, and restoration, conservation, and planning efforts in the Tla-o-qui-aht *hahouthli* to support stewardship of salmon and other species and important habitats (TFN 2016). Managers are well versed in Western scientific management practices and Tla-o-wui-aht knowledge and stewardship practices and help to fill the traditional role of Tla-o-qui-aht river guardians.
ʕaḥuusʔatḥ (Ahousaht) Nation		One of fifteen Nuu-chah-nulth First Nations on the west coast of Vancouver Island. The Ahousaht *hahouthli* includes much of the central portions of Clayoquot Sound and its watersheds. The primary community is located on Flores Island. As in Tla-o-qui-aht, Ahousaht has two governing systems; the traditional *Ha'wiih* and the elected Chief and Council system in recognized by Canada.

Maaqutusiss Hahoulthee Stewardship Society (MHSS)	Nuu-chah-nulth Resource Management and Economic Development	With the Ahous Business Corporation (ABC), coordinates economic development and sustainability within the hahouthli benefiting Ahousaht people and reflecting Ahousaht values and principles. Habitat restoration, ecosystem monitoring, research and knowledge production through both Ahousaht traditional knowledge and western sciences are among the stewardship priorities of MHSS Stewardship Guardians. Ahousaht Administration also has a Fisheries Department with management responsibilities specific to home use and commercial fisheries and hatchery production, coordinating operations with MHSS.
***hiʃkʷiːʔath* (Hesquiaht) First Nation**		One of fifteen Nuu-chah-nulth First Nations on the west coast of Vancouver Island. The Hesquiaht *hahouthli* includes the northern reaches of Clayoquot Sound, and is the most remote of the three Nations in Clayoquot. As in Ahousaht and Tla-o-qui-aht, Hesquiaht has two governing systems; the traditional *ha'wiih* and the elected Chief and Council system in recognized by Canada. Hesquiaht also has an administrative system coordinating management of fisheries and other resources.
Nuu-chah-nulth Tribal Council (NTC)	Nuu-chah-nulth Governance	NTC provides centralized organizational and administrative support and political advocacy for 14 allied Nuu-chah-nulth First Nations. Among the support services are health care, education, language regeneration, economic development, resource management and others to protect the *hahahouthli* of the *ha'wiih*, support Nuu-chah-nulth well-being, and support Nuu-chah-nulth pursuit of self determination (NTC, 2023). A Council of *Ha'wiih* facilitates coordination of decision-making from the *ha'wiih* of the 14 Nations to guide priorities of NTC programs such as Uu-a-thluk.
Uu-a-thluk (Taking care of) Fisheries	Nuu-chah-nulth Fisheries Management	Uu-a-thluk, named from the Nuu-chah-nulth word *uuaɬuk* ("taking care of"), manages Nuu-chah-nulth aquatic resources through Nuu-chah-nulth practices and principles, supports Nations' fisheries programs, and aims to increase Nuu-chah-nulth participation in fishing and harvesting (Uu-a-thluk, 2020). It is administered through the NTC.
Ha'oom Fisheries Society (HFS)	Nuu-chah-nulth Fishing Rights Implementation and Management	Implement the multispecies Five Nations Fishery based on the five Nations' inherent and constitutionally protected right to fish and to sell fish. Build the Nations' self management capacity, and support traditional knowledge and authority of the Nations and their leaderships in fisheries management. Facilitate members' livelihood opportunities for fishing, processing and marketing fisheries resources, fisheries management and monitoring, and habitat restoration to revitalize the Nations' fishing cultures and rebuild prosperous fishing communities. Uphold *hishukish tsa'walk* and *isaak* in all operations, with goals reflecting *omeek, uuathluk*, and reconciliation (HFS Strategic Plan 2022).
Fisheries and Oceans Canada (DFO)	Canadian Fisheries Management	Under Canada's Fisheries Act, DFO manages the harvest and protection of Canada's marine fisheries resources. DFO implements limits on commercial, recreational, FSC, and Aboriginal fishing allocations in their fishery management plans. Departments within DFO oversee BC salmon fisheries monitoring, stock assessments, and support various research and enhancement efforts.

West Coast Aquatic (WCA)	ENGO	WCA supports collaborative efforts to coordinate aquatic and marine resource management, especially salmon, by providing third party facilitation, organization, technical and logistical support on various multi-stakeholder strategic initiatives, policy advocacy, knowledge sharing and coproduction, and co-management coordination (WCA, 2023). Among WCA's primary services include facilitation of Salmon Roundtables across various areas in WCVI, and of Salmon focused risk assessment and rebuilding.
Ecotrust Canada	ENGO	Works with Indigenous communities in "building an economy that provides for life," an approach focused on social and ecological sustainability and resilience. HFS coordinates with Ecotrust for fisheries monitoring; Ecotrust - employed dockside samplers conduct dockside monitoring to provide catch and sampling data to DFO.
Redd Fish Restoration Society	ENGO	Redd Fish is focused on restoration of wild salmon habitat and wild salmon fish stocks through a holistic approach connecting ecosystem health to social well-being. It was founded in 1995 by a collection of foresters, biologists, loggers, and Nuu-chah-nulth First Nations to address logging related habitat destruction and declining salmon stocks by supporting local efforts of ecosystem and habitat restoration, scientific research, stewardship, and education (Redd Fish, 2022).
Cedar Coast Field Station (CCFS)	ENGO	CCFS is based on Vargas Island in Clayoquot Sound and supports place-based research, monitoring, and education focused on Clayoquot Sound and especially prioritizing juvenile wild salmon monitoring.
Coastal Restoration Society (CRS)	ENGO	CRS leads local environmental restoration and remediation projects with the aim to shift marine and aquatic restoration into an industry by prioritizing mutually beneficial partnerships. CRS follows a "First Nations First" approach, which prioritizes offering employment and training opportunities to Indigenous peoples before offering them to Canadians (CRS, 2022).
Clayoquot Biosphere Trust (CBT)	ENGO	The CBT aims to support conservation, sustainable development, and community well-being in the Clayoquot Sound UNESCO Biosphere Region by facilitating knowledge exchange and providing funding and logistical support for research, training, and education efforts (Clayoquot Biosphere Reserve, 2019).
Various Industry Actors	Industry	Fish buyers, sport fishers and sport fishing advisory groups, industrial fish farms, among other local industries also have interest in local salmon management and participate in advisory boards, roundtables, advocacy efforts, and restoration projects.

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Biography

Julia Anastasia Bingham received an Honors Bachelor of Science in Biology and an Honors Bachelor of the Arts in International Studies from Oregon State University in 2016, graduating *summa cum laude* as a Research Fellow. Julia then worked as a research assistant at the University of Oregon Institute for Marine Science, leading gooseneck barnacle research partnered with collaborators at Port Orford Sustainable Seafood and Oregon State University. Julia began doctoral studies in Marine Science and Conservation at Duke University in 2017. During her studies, Julia also completed a Certificate in College Teaching and received the 2023 Dean's Award for Excellence in Teaching from the Duke University Graduate School. Julia's academic accolades awarded by the Duke University Graduate School include a Bass Instructional Fellowship as Instructor of Record (2022-2023), two International Dissertation Research Travel Awards (2021, 2023), two Summer Research Fellowships (2021, 2022), and the James B. Duke International Research Travel Fellowship (2020). Julia also received two Graduate Awards for Research & Training from the Duke University Center for International & Global Studies (2020, 2022), the Anne Firor Scott Public Scholars Fellowship from the Duke Forum for Scholars and Publics (2021-2022), two Grants-in-Aid of Research Awards from the Sigma Xi Honors Society (2015, 2022), and a Program Development Grant from Oregon Sea Grant (2016). Julia's published academic works include the journal articles, technical reports, and thesis listed below.

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