

**Sockeye at the Boundary:
Controversial and Contested Salmon in the Cohen Commission, 2009-2012**

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Abstract

Controversies have been the focus of considerable attention in the STS literature. As past studies have shown, the processes of closure are closely related to the production of technoscientific knowledges and artifacts. In this STS dissertation, I build on these studies by opening the black box that is the Cohen Report, thereby illuminating the various forms taken by, and contestations associated with, controversial salmon in the Cohen Commission, 2009-2012, a federal inquiry into the decline of sockeye salmon in the Fraser River of British Columbia, Canada.

In this empirical study, I ask: (i) What are the primary sources of controversy in the Fraser River fishery? (ii) What salmon controversies are revealed through the social-life of sockeye, and how do they compare to those depicted in the Cohen Report's overview of the life-cycle of sockeye? (iii) What factors contributed to the (de)legitimation of particular understandings of controversial salmon during the Cohen Commission?

To address these questions, I employed a three-phase, multi-method approach which involved (I) collecting qualitative data in the field; (II) creating a map from these data; and (III) using this map to analyze the 'social lives' of various human and non-human actors.

My primary research findings (1-9) shed new light on various salmon controversies, including those arising from (1) Indigenous responses to the ongoing experience of colonial violence and dispossession, (2) an ethic of exploitation oriented towards establishing and maintaining dominion over nature, (3) the prevailing view that fish (and fishing) are principally vehicles for economic growth and financial profit, and (4) the local effects of anthropogenic climate change. I also found that (5) these controversies are largely minimized by the Cohen Report's life-cycle overview, which reduces the sockeye life-cycle to a series of physiological transformations loosely connected to the particulars of place. During the Cohen Commission, salmon controversies were (de)legitimated through (6) the boundary work of expertise, (7) the Commission's emphasis on efficiently neutralizing contention, and (8) differing assessments concerning the importance of place. This resulted in the production of a controversial blueprint for closure—i.e., the Cohen Report—which (9) called for the production of knowledge and ignorance in relation to the impacts of salmon farming, accentuating the importance of attending to generative symmetry, this dissertation's foremost contribution to the STS controversy studies literature.

Dedication

This dissertation is dedicated to the memory of Dr. Rich Jarrell (1946-2013) and Chief Slá'hólt Ernie George (1940-2020).

Acknowledgements

The ethnographic fieldwork underpinning this dissertation was conducted on the traditional territories of the Katzie, Kwantlen, Nlha7káp̓mx, Skwxwú7mesh, Stó:lō, Stz'uminus, Tsawwassen, Tsleil-Waututh, and xʷməθkʷəy̓əm peoples. This dissertation was written on the traditional territories of the Anishnabeg, Chippewa, Haudenosaunee, Mississaugas of the Credit, and Wendat peoples.

Western academic conventions are such that I am listed as the sole author of this dissertation, but an undertaking of this sort would simply not have been possible were it not for the kind, helpful and invaluable assistance of many others. While the people who helped me along this journey are far too numerous to list here, I would nevertheless be remiss if I did not at least try.

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Concerning my use of Footnotes and Citations

Throughout this dissertation, I employ footnotes to (i) reference ethnographic or interview data, (ii) reference documents produced by the Cohen Commission, and (iii) to make parenthetical remarks and/or to reference additional secondary sources. In-text citations are employed for other sources of evidence.

Concerning my use of Colonizer Terms

Throughout this dissertation, I have avoided using terms like “Indian” or “Aboriginal” to refer to Indigenous peoples. In the interest of clarity and historical specificity, however, I have opted not to change historical place names (e.g., St. Paul’s Indian Residential School). Additionally, when initially referring to a First Nations community which refers to itself by a name which differs from its official band government name, I used the community’s preferred name with the band government name in parentheses. For example: Skwxwú7mesh Úxwumixw (Squamish Nation).

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Table of Abbreviations

AQUA	Aquaculture Coalition (Cohen Commission participant-coalition)
BC	British Columbia (Canadian province)
BCSFA	British Columbia Salmon Farmers Association (Cohen Commission participant-coalition)
Cohen Commission	Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River
Cohen Report	The Uncertain Future of Fraser River Sockeye (the Cohen Commission's final report)
CONSERV	Conservation Coalition (Cohen Commission participant-coalition)
CU	Conservation Unit (unit of biological diversity)
DFO	Department of Fisheries and Oceans / Fisheries and Oceans Canada
FRP	Fraser River Panel (Pacific Salmon Commission panel)
FSC	Food, Social, and Ceremonial (Indigenous fishery in B.C.)
PPR	Policy and Practice Report (prepared by Cohen Commission Counsel)
PSC	Pacific Salmon Commission (Canada-U.S. Pacific Salmon Treaty)
RPP	Rules for Procedure and Practice (Cohen Commission document)
SAP	Science Advisory Panel (Cohen Commission advisory panel)
SEP	Salmonid Enhancement Program (DFO program)
ToR	Terms of Reference (Cohen Commission mandate)

CHAPTER 1 – INTRODUCTION: INTERMINABLE CONTROVERSY

“Justice Bruce Cohen is all lawyered up and ready to embark on his quest for millions of missing Fraser River sockeye salmon. The story so far has the makings of an intriguing mystery. The experts estimated 10 million salmon would be heading for the river system last year, but only about a million showed up. That prompted the fishery’s closure for the third straight year. For all the finger pointing and controversy over the collapse, nobody really knows exactly why it happened. Since most of the arguments centre around the Department of Fisheries and Oceans, the federal government’s response last November was to strike an inquiry commission to find out what happened to the salmon. [...]

So far the storyline is a familiar one for most Canadians. A problem emerges. Perplexed government orders inquiry. Wise men gather to ponder the issue. Citizens await their deliberations. But what’s striking is that this is the fifth time in 18 years some kind of urgent study has been commissioned by the government in response to a salmon emergency. Not only that, it’s the fifth study of one specific run: The Fraser sockeye. That’s a remarkable number of studies into the same problem.”

—Les Leyne (2010) for the *Times Colonist*

1.1 – Research Problem: A Seemingly Endless Cycle of Salmon Inquiries

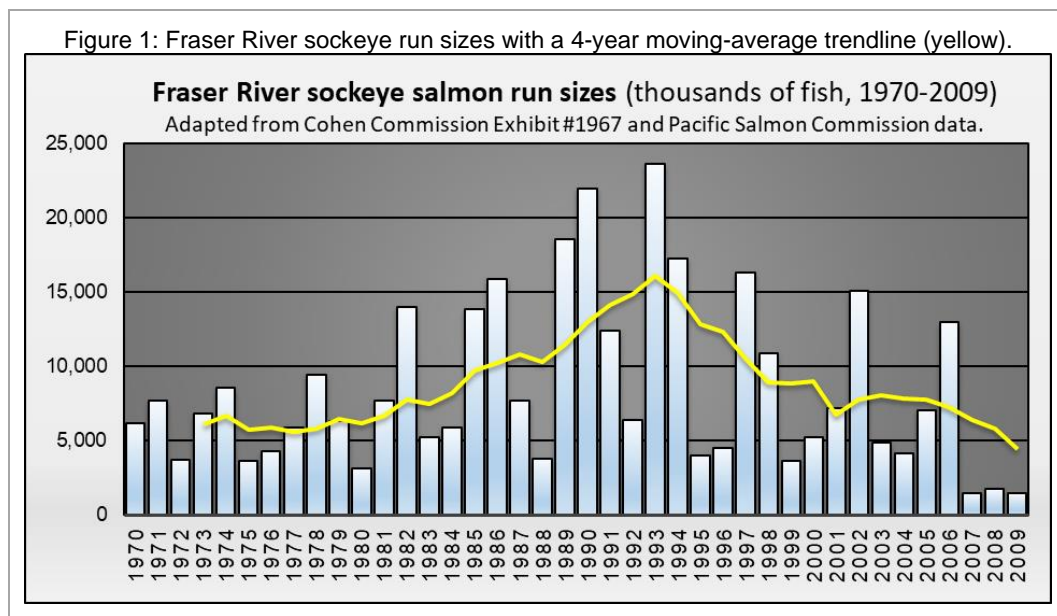
For more than a century, the Fraser River sockeye salmon fishery has been associated with, embroiled in, and affected by, myriad salmon controversies. These controversies are not, however, simply the products of declining salmon populations. I suggest, instead, that the decline of sockeye brought a plurality of longstanding salmon controversies to the fore, as Indigenous, commercial, and recreational fishers pressed competing claims to an increasingly scarce resource.¹ After all, during periods of considerable abundance, salmon controversies are easier to overlook. As sockeye populations have declined, however, so too has the number of fisheries openings available, making it more difficult to ignore controversies like those associated with the Indigenous FSC fishery. First Nations in British Columbia have a constitutionally-protected right to fish for food, social, and ceremonial (FSC) purposes, which means that the Indigenous FSC fishery takes priority over the commercial and recreational fisheries. Consequently, in years of middling abundance, commercial and recreational fishing vessels may be forced to remain anchored to their home ports while the Indigenous FSC fishery—which may still be restricted in years of low abundance—proceeds as normal. This has led some commercial and recreational fishers to erroneously describe the Fraser River fishery as one characterized by racial divisions.²

Prime Minister Stephen Harper legitimated these erroneous characterizations by pledging, in July of 2006, that the Government of Canada would “strike a judicial inquiry into the collapse of

¹ This is not to suggest, of course, that these fisheries are neatly-demarcated monoliths populated by a homogenous, mutually-exclusive group of fishers. Indeed, many Indigenous fishers participate in the commercial and recreational fisheries. Those participating in the Indigenous food, social, and ceremonial (FSC) fishery are, likewise, not a monolith, as fishers are liable to disagree on a variety of issues, from fishing allotment and enforcement on the one hand, to whether or not it should be legal to sell FSC fish on the other.

² On this view, participation in the FSC fishery is solely contingent upon racial differences, rather than being a reflection of First Nations’ longstanding refusal to cede control of the fishery, despite the federal government’s repeated attempts to unilaterally extinguish Indigenous rights to the resource.

the Fraser River salmon fishery and oppose racially divided fisheries programs” (Harper S. , 2006). In the face of a strong 2006 sockeye run, however, this controversy temporarily faded from view as Indigenous, commercial, and recreational fishers sought to maximize their respective harvests. Accordingly, it was not until three years later—following a record-low 2009 sockeye run which saw the commercial fishery shuttered for the third year in a row—that Harper finally felt compelled to make good on his promise to establish a judicial inquiry into the decline of the fishery. To that end, in November 2009, the Harper Government appointed B.C. Supreme Court Justice Bruce Cohen to lead a federal commission of inquiry into the decline of Fraser River sockeye salmon (the Cohen Commission).



It should be noted that the Cohen Commission was just the latest in a long line of commissions, panels, standing committees, and task forces established in response to, and with the apparent aim of resolving, controversies in the Fraser River fishery. Indeed, as part of its initial investigation, the Cohen Commission reviewed 26 such reports, 25 of which were penned between 1992 and 2010.³ Why, then, did I opt in carrying out this study to focus on the Cohen Commission rather than one of the many inquiries which preceded it?

The Cohen Commission is distinct, I suggest, for several reasons. First, the Cohen Commission’s mandate and scope was much broader than those of the inquiries which preceded it. These inquiries were, with one exception,⁴ scope-limited undertakings established to examine

³ Interim Cohen Report (29-Oct-2010), pp. 33-35

⁴ Of the various inquiries which preceded the Cohen Commission, only the Pearse Commission (Pearse, 1982) had a comparable scope and mandate.

a particular issue,⁵ fishing season,⁶ or controversy.⁷ Commissioner Cohen was tasked, by contrast, with examining anything that might be related to the decline of Fraser River sockeye, and he was provided an unprecedented \$26 million budget for that purpose. Second, the Cohen Commission was the first inquiry into the fishery since the 1982 Pearse Commission to be granted special powers under the federal *Inquiries Act*, granting Commissioner Cohen the legal authority to compel witnesses to testify, and to order the production of documents. Third, the proceedings of the Cohen Commission generated a vast digital archive which consists of 2,000+ evidentiary exhibits (including many previously confidential documents), 14,000+ pages of transcripts, and a variety of additional forms of evidence.⁸ Fourth, though the Harper Government barely acknowledged the Cohen Commission's final report (Sutherland, 2015), Justin Trudeau's Liberals rose to power in 2015 on a platform (Liberal Party of Canada, 2015) which included a promise to implement Commissioner Cohen's recommendations. Three years later, the DFO announced that it had "taken actions to address" all 75 of these recommendations (DFO, 2018b).

In spite of all this, the Fraser River fishery continues to be associated with myriad salmon controversies. How, then, does one make sense of the stubborn persistence of salmon controversies amidst this seemingly "[e]ndless cycle of Fraser salmon inquiries" (Leyne, 2010)? In this dissertation, I explore the contours of this research problem by revisiting the controversy studies literature.

Controversies have been the focus of considerable attention in the science and technology studies (STS) literature. As past studies have shown, controversies are drawn to a close through processes that are closely related to the production of technoscientific knowledges and artifacts. I build on these studies by conceiving of the Cohen Commission's three-volume final report—i.e., the 2012 Cohen Report—as a technoscientific artifact which seeks to address salmon controversies by (de)legitimizing particular understandings of, and (re)producing particular ways

⁵ Between 2000 and 2007, for instance, the aquaculture industry in B.C. was the subject of at least six inquiries (Auditor General of Canada, 2000, 2004; Leggatt, 2001; Bastien, 2004; Auditor General of British Columbia, 2005; Legislative Assembly of British Columbia, 2007).

⁶ Between 1992 and 2005, for example, at least six reports (Pearse & Larkin, 1992; Fraser, 1995; Wappel, 2003, 2005; Chamut, 2004; Williams, 2005) were commissioned to examine controversial fishing seasons.

⁷ In 2003, by way of an additional example, the governments of Canada and British Columbia commissioned a report on fisheries management in the 'post-treaty era' (McRae & Pearse, 2004). Citing a lack of Indigenous involvement in the federal-provincial task force, the B.C. First Nations Summit commissioned its own report into this issue in 2004 (Jones, Shepert, & Sterritt, 2004).

⁸ As Matthew Hull (2012) has noted, however, bureaucratic documents are not "natural purveyors of discourse", but rather "mediators that shape the significance of the signs inscribed on them and their relations with the objects they refer to" (p. 253). Documents, in other words, are "not simply instruments of bureaucratic organizations, but rather are constitutive of bureaucratic rules, ideologies, knowledge, practices, subjectivities, objects, outcomes, and even the organizations themselves" (p. 253). In relying so heavily on documents produced through the Cohen Commission, then, this dissertation may have inadvertently reproduced sanitized accounts of the discussions, interactions, or events these documents ostensibly depict. In seeking to mitigate this possibility, I consulted additional sources of evidence wherever possible.

of knowing, controversial salmon in British Columbia, Canada. By opening the 'black box' that is the Cohen Report, in other words, I aim to illuminate the various forms taken by, and contestations associated with, controversial salmon in the Cohen Commission, 2009-2012.

1.2 – Research Context and Significance

1.2.1 – Controversy Studies, Symmetry, and Normative Political Commitments

As a genre of STS scholarship, controversy studies centre around the act of opening a black box symmetrically. This emphasis on symmetry in controversy studies is rooted in David Bloor's (1976) proposal for a strong programme in the sociology of scientific knowledge (SSK). In calling for the symmetrical treatment of 'true' and 'false' beliefs, SSK paved the way for a variety of approaches to studying scientific and technological controversies. The differences in these approaches, I suggest, are principally rooted in differing interpretations of what it means to examine controversies symmetrically. By the mid-1990s, however, this debate gave way to a broader, more contentious dispute in the STS literature concerning the politics of SSK, the potential for controversy studies to be 'captured', the validity of explicit political commitments, and the desirability of neutrality.⁹ Ultimately, this dispute failed to produce consensus concerning ways forward for controversy studies, precipitating the decline of this once-prominent genre of STS scholarship, and the rise of several new approaches¹⁰ to studying science, technology, and society. As a result of this shift away from the study of controversies, however, gaps remain in the STS controversy studies literature concerning the processes through which controversies are opened and drawn to a close.¹¹

Insofar as controversy studies have persisted as a genre of STS scholarship, I suggest that unresolved tensions concerning the politics of SSK have contributed to an inversion of their principal focus. Today, controversy analysts are typically concerned not with explaining how controversies are brought to a close, but with making sense of the persistence of politically-contentious technoscientific controversies – like those concerning the health effects of tobacco smoke (e.g., Proctor, 2006), the need to take action to address anthropogenic climate change (e.g., Edwards, 2010), or both (e.g., Oreskes & Conway, 2010). Thus, whereas more traditional controversy studies endeavoured to explain the production of knowledge with reference to the closure of controversies, the controversy studies of today aim to explain the persistence of controversies with reference to the production of ignorance or agnotology.¹² Though I agree that

⁹ See Evelleen Richards & Malcolm Ashmore (1996), Ashmore (1996), Harry Collins (1996), Sheila Jasanoff (1996), Brian Martin (1996), Dick Pels (1996), Richards (1996), Vicky Singleton (1996), and Brian Wynne (1996).

¹⁰ Including co-production (e.g., Jasanoff, 2005) and third-wave STS (e.g., Collins & Evans, 2002).

¹¹ The mechanisms identified by Sergio Sismondo (2010), for instance, are only capable of explaining how closure is achieved in the context of what might be described as a strictly internalist framing of scientific controversies.

¹² See Robert Proctor & Londa Schiebinger (eds.) (2008).

controversy analysts must attend to the production of ignorance, I suggest that an exclusive focus on impediments to closure lends itself to normative accounts which may, in certain contexts, uncritically and problematically reproduce the claims of a given ‘core set’ of experts,¹³ in addition to casting those with alternative viewpoints as villainous purveyors of pseudoscience.¹⁴ Thus, in calling for a return to controversy studies, I am not merely advocating for a closer examination of the closing of controversies, but for a pairing of this approach with those concerned with the forces impeding closure. I aim in this dissertation, in other words, to bring generative symmetry to bear on controversy studies in STS.

The above is not to suggest, however, that controversy studies ought not to be associated with explicit normative commitments. I contend, on the contrary, that prohibitions against political commitments reinforce the status quo, in addition to dissuading controversy analysts from examining crucial features of the controversy under study. I do not, however, position this dissertation as a product of the politically-engaged Low Church of STS as set against the theoretically-inclined High Church (Fuller, 1993). Nor, for that matter, do I conceive of this dissertation as a work of activist-oriented STS as set against scholar- and policymaker-oriented scholarship (e.g., Woodhouse et al., 2002). In order to make sense of the nuanced complexities which characterize twenty-first century technoscientific controversies, I suggest, controversy analysts must confront both the political and theoretical dimensions of the controversy under study. Accordingly, I follow Sergio Sismondo (2008) in conceiving of the engaged program in STS as a congregational bridge.

In line with the above, I follow feminist STS scholars Donna Haraway (1988; 1989) and Sandra Harding (1986; 1993; 1998) in privileging ‘views from below’, and postcolonial scholars Edward Said (1978; 1983; 1993; 1994) and Warwick Anderson & Vincanne Adams (2008) in privileging ‘views from elsewhere’. It would be erroneous, after all, to study salmon controversies in the absence of these perspectives. Indeed, as Harding (1993) has suggested, a “maximally critical study of scientists and their communities can be done only from the perspective of those whose lives have been marginalized by such communities” (p. 69). By privileging Indigenous perspectives on controversial salmon, my proposal for an engaged controversy study attends to the political dimensions of the controversy under study.

¹³ Consider, for instance, the subtitle of an edited collection of essays recently published by MIT Press: “Science and the Production of Ignorance: When the Quest for Knowledge is Thwarted” (Kourany & Carrier, 2020).

¹⁴ Though I am sympathetic to projects aiming to push back against the deliberate production of ignorance in the ‘post-truth’ era (e.g., Baker & Oreskes, 2017; Carrier, 2018; Weinel, 2019), I contend that—in the absence of a corresponding emphasis on the contingent processes involved in the production of knowledges—these projects are liable to overstate the certainty associated with particular technoscientific facts. Consequently, these interventions may have the unintended effect of exacerbating the conditions which gave rise to the ‘post-truth’ era to begin with.

This dovetails with my commitment, in keeping with the Truth and Reconciliation Commission's calls to action, to identifying and addressing "gaps in historical knowledge that perpetuate ignorance and racism" (2015, p. 234) against Indigenous peoples in B.C. As noted above, for instance, the rights-based Indigenous FSC fishery is often described in a manner which falsely and misleadingly intimates that FSC fish are allotted solely on the basis of biological race. Worse still, despite the myriad restrictions and limitations placed on the FSC fishery,¹⁵ Indigenous fishers are often blamed for overfishing, and thereby for precipitating the decline of Fraser River sockeye. I aim in this dissertation to address some of the historical gaps partially responsible for perpetuating this problematic and mistaken belief.

In addition, as very few First Nations in B.C. signed historic treaties,¹⁶ the Cohen Commission unfolded against the contentious backdrop of modern treaty negotiations.¹⁷ Beyond the Nisga'a, Tsawwassen, and Maa-nulth First Nations, each of whom signed modern treaties, more than half of the untreated First Nations in B.C. remained engaged in the B.C. Treaty Process during the Cohen Commission. Many First Nations have since withdrawn from this process, while still others rejected it from the outset (B.C. Treaty Commission, 2020b). This is reflective, perhaps, of First Nations' "condition of mistrust" (Anaya, 2013) in the face of official government processes. It is vitally important, in this context, to consider how Indigenous claims to controversy were foregrounded or backgrounded, legitimized or delegitimized, in the Cohen Commission.

1.2.2 – Fish Controversies, Human-Fish Relations, and Indigenous Political Strategies

The Cohen Commission was tasked with investigating the decline of Fraser River sockeye salmon (*Oncorhynchus nerka*), an iconic and controversial fish whose "pluralities"—that is, "differing understandings and conceptualizations of fish" that are "sometimes complementary and sometimes contradictory" (Todd, 2014, p. 219)—have yet to be explored in detail. Accordingly, in carrying out this study, I followed Zoe Todd (2014; 2018) by conceiving of human-fish relations (plural) as sites of active engagement.¹⁸ In doing so, this dissertation seeks to contribute to a growing body of research in STS (and related fields) on fish controversies (e.g., Bocking, 2012;

¹⁵ The FSC fishery is only permitted to open, for instance, once a sufficient number of fish are deemed to be safely *en route* to their spawning grounds

¹⁶ In the 1850s, Governor James Douglas oversaw the signing of 14 treaties, later dubbed the Douglas Treaties, with Indigenous communities on Vancouver Island. Then, in 1899, an additional eight First Nations communities in northeast B.C. were among the signatories to Treaty No. 8, which also included Indigenous communities in neighbouring provinces and territories.

¹⁷ These negotiations are contentious for a variety of reasons, the complexities of which are beyond the scope of this dissertation. For additional information, see Taiaiake Alfred (2001); Carole Blackburn (2005; 2007; 2019), Tony Penikett (2006), Brian Thom (2009; 2014; 2020), Paul Nadasdy (2012), and Christopher Turner & Gail Fondahl (2015).

¹⁸ For additional information concerning Todd's (2014; 2018) active sites of engagement, see Ann Fienup-Riordan (2000). For relationality and human-animal sociality, see Eduardo Viveiros de Castro (1998) and Paul Nadasdy (2007). For working across difference and Indigenous métissage, see Dwayne Donald (2009; 2012).

Breslow, 2014; Harrison & Loring, 2014; Joks & Law, 2017), controversial fish (e.g., Law & Lien, 2012; Brown, 2016; Swanson, 2017), and human-fish relations (e.g., Todd, 2014; 2018; Cullon, 2017; Latulippe, 2017; Satizábal & Dressler, 2019; Schiefer, 2019). In many of these studies, the myriad ways in which human-fish relations factor into the dynamic political strategies of Indigenous peoples and communities is made manifest.

Figure 2: A sockeye salmon sculpture at the Gulf of Georgia Cannery in Richmond, B.C.



By engaging directly with the global discourse concerning Indigenous rights (e.g., United Nations, 2007), many Indigenous peoples and communities have bolstered the legitimacy of their claims to place (albeit with varying degrees of success) in exchange for a more limited set of political possibilities at the local level. Tensions of this sort are generated, Isabel Altamirano-Jiménez (2013) suggests, not just by broader understandings of indigeneity and the rights associated with the same, but also by the local particularities which inform how “power is exercised throughout sites and networks of articulation on different scales and throughout different geo-political regions” (p. 54).¹⁹ At the local level, the strategies employed by Indigenous communities and peoples are not uniform, but “complex and contradictory [...] precisely because of the contested terrains in which indigeneity is constituted and because of the specific contexts in which it is deployed” (p. 50). To facilitate these strategies, Indigenous peoples and communities have launched legal challenges, forged alliances with non-Indigenous environmental groups and researchers, hired non-Indigenous technical staff, and secured funding to train community members in a variety of technical fields. In each instance, the resulting tensions are shaped by the particulars of the context in which the associated strategy was deployed.

¹⁹ See also Stuart Hall (1986), James Clifford (2001), and Kim Tallbear (2013b).

In the country known today as Norway, for instance, fisheries biologists have called for the imposition of fishing restrictions on the Deantu (Tana River), citing declining salmon populations, which they observed in biological models, as justification for those restrictions (Joks & Law, 2017). According to Solveig Joks and John Law (2017), the Sámi peoples pushed back against these restrictions, not because they do not care for the fish but precisely because of Sámi modes of caring. When fishing is restricted, on this view, Sámi peoples are “driven from the river to seek other forms of livelihood”, and are therefore no longer in a position to watch over, relate to, and care for the Deantu and its fish (p. 163). By resisting fishing restrictions, then, Sámi fishers are safeguarding their traditional practices and ways of being, even as they potentially contribute to the long-term erosion of the same by continuing to fish in spite of the apparent decline of salmon populations in the Deantu.

In the Skagit River Valley—located in what is now called Washington state, U.S.A.—on the other hand, the Swinomish Tribe sought to preserve traditional ways of being not by “resisting the interventions of a technocratic bureaucracy”, but by strategically re-orienting this bureaucracy towards “cultural revitalization, economic development, and political sovereignty” (Breslow, 2014, pp. 731-732). In the early-twentieth century, as Sara Jo Breslow (2014) explains, in-river tribal fisheries were banned “under the guise of conservation” while the commercial fishery continued unabated (p. 734). In 1974, after decades of legal challenges, tribes in western Washington state won a court ruling which saw them regain access to the fishery, in addition to becoming “official co-managers of the state’s fisheries” (pp. 734-735). By the late-twentieth century, however, salmon populations in the Skagit River had declined significantly due to decades of overfishing combined with the destruction of fish habitat (pp. 735-736). Accordingly, each of the Sauk-Suiattle, Upper Skagit, and Swinomish tribes secured funding to hire non-Indigenous technical staff, whom they commissioned to produce “scientific research in support of fisheries management and salmon recovery” (p. 737). The resulting habitat-restoration strategy, which evolved to include “wide [...] vegetated buffers on all fish-bearing streams running through farmland”, brought the Swinomish Tribe and its technical staff into conflict with Skagit County farmers (p. 738). In the resulting dispute, Skagit County farmers “primarily relied on social, economic, and cultural counter-arguments”, whereas the Swinomish Tribe “predominantly employed scientific arguments in technical, legal, and public contexts” (p. 739). In this way, the Swinomish Tribe could be said to have unsettled “the local-global dualism by deliberately employing strategies commonly associated with globalization in order to protect a local and traditional way of life” (p. 733).

In Paulatuuq, an Inuvialuit community in what is now known as Arctic Canada, the Paulatuuqmiut (i.e., people from Paulatuuq) employ what Zoe Todd (2014) describes as “a

pragmatic, dynamic, and strategic set of tools, which incorporate multiple ways of knowing fish, ‘principled pragmatism’ and ‘Indigenous métissage’ to navigate the complexity of contemporary human-fish relationships as they exist across Indigenous and non-Indigenous logics and cosmologies” (pp. 225-226). In an effort to “promote local economic development”, government officials opened a commercial char fishery on the Hornaday River in 1968, despite not having a clear sense of whether the river could possibly sustain such a fishery (pp. 226-227). This led, of course, to over-fishing. When the community expressed concerns about the impacts of the commercial fishery in the early 1980s, however, “government officials in turn claimed that the problem was not the commercial fishery *per se* but rather that local fishermen were overfishing and violating existing quotas” (p. 227). When the Inuvialuit Final Agreement was signed in 1984, it led to the establishment of “a host of co-management bodies”, through which the Paulatuuqmiut were then able to “mobilize scientific responses as one prong of a dynamic and pragmatic local strategy to shut down the commercial fishery” (p. 227). Though this obliged “local harvesters to invite scientific study and co-management”, Todd notes, “it also paradoxically enabled local actors to challenge colonial impulses to turn local fish into economic outputs” (p. 228). This also made it possible for the Paulatuuqmiut to make strategic use of “bureaucratic rules and bodies, as well as kinship relationships and local legal orders [...] to assert local views of fish-as-persons whom non-local people must treat with respect and reciprocity, to strictly enforce access of non-Inuvialuit people to fish” (pp. 228-229). By enrolling fish in the act of asserting Indigenous legal orders, Todd (2018) explains, the Paulatuuqmiut engage in “the conscious and strategic *refraction* of colonial imaginaries”, opening up new possibilities for fish-futures in Paulatuuq, and making it possible to “re-imagine [...] Edmonton and Alberta (and other places of Canada) as fish-places, bound up with legal-ethical responsibilities to and with fish” (p. 71).

In the British Columbia context, Kimberly Linkous Brown (2005) explores how different Stó:lō fishers have responded to the various regulations imposed on their traditional in-river fisheries. These responses, though varied, point to the existence of “a shared ideology”, as well as a “common material and meaningful framework rooted in tradition for living through, talking about, and acting upon social orders characterized by domination” (p. 204). Reflected in the variability of these responses is not only “varying expressions of identity”, but also “the varying ways by which Stó:lō fishers wish to be identified” (p. 205).²⁰ Cheam fishers drew equally on the

²⁰ For a detailed historical account of, and exploration of the various tensions underlying, the emergence of Stó:lō supratribal identities, and the formulation of a broader ‘Coast Salish’ identity, see Keith Thor Carlson (2010). For discussions concerning resurgent formulations of Indigenous identities, see Taiaiake Alfred & Jeff Corntassel (2005), Corntassel (2012), and Leanne Betasamosake Simpson (2008; 2011; 2017). For a broader examination of the complexities and power relations implicated by the formation of Indigenous identities on multiple scales in response to encounters with neoliberalism, see Isabel Altamirano-Jiménez (2013).

past and present in cultivating their identities as “Warriors on the Water” (p. 144). Similarly, in seeking a justice protocol agreement to “remove the adjudication of fisheries offenses from the [courtroom] and relocate them into a system based on a Stó:lō worldview [...] that focuses on restoring balance and harmony”, Seabird Island First Nation sought to establish themselves as “the ultimate guardians of their salmon resource” (p. 172). Finally, commercial Stó:lō fishers operating within the confines of Canadian law “challenge the notion that participation in sales agreements should be viewed as less than traditional” (pp. 218-219). On the contrary, many Stó:lō fishers maintain that they were “the first commercial fishers”, a status they describe as being “rooted in tradition and one they did not give up in the face of a century of regulation that worked to separate Stó:lō fishers from the economics of fishing” (p. 218).

Stó:lō fishing knowledges, Caroline Butler (2006) suggests, cannot be separated from the numerous political struggles, unfolding on multiple scales, in which they have been enrolled. At the national level, these knowledges are tied to broader questions concerning the rights and self-determining authority of Indigenous peoples in Canada; provincially, they are bound up with the B.C. Treaty Process; and, at the local level, Stó:lō knowledges are “embedded in highly politicized and competitive circumstances” which sees the rights of Stó:lō fishers routinely challenged by commercial and sports fishers (p. 119).²¹ The fishing knowledge of a particular Stó:lō fisher, community, or tribe cannot, in other words, be understood apart from the various political strategies, land claims, and claims to the fishery with which they are associated.

In a similar vein, I refer throughout this study to ‘traditional ecological knowledge(s)’ even as I acknowledge the numerous problems associated with this concept. Fikret Berkes (1999) defines traditional ecological knowledge as a “cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment” (p. 8). Traditional ecological knowledges, Charles Menzies and Caroline Butler (2006) explain, are not merely “locally developed”, they are also deeply embedded in a “matrix of [...] local culture, history, and traditions” (p. 9). Consequently, the underlying practical insights are frequently inseparable from “traditional structures of territory and resource ownership, cultural rules regarding resource use and waste, and even issues such as the traditional gendered division of labor within a community” (p. 10). Traditional ecological knowledges are bound up, in other words, not just with particular Indigenous territories, but also with a variety of dynamic, ambivalent, and occasionally contradictory political strategies formulated in response to the ongoing

²¹ This is not to suggest, of course, that Indigenous fishers co-exist in perfect harmony during fisheries openings. Indeed, Stó:lō fishers have seen their right to fish in the Fraser Canyon challenged by Indigenous fishers as well (Brown K. L., 2005, pp. 105-107).

experience of colonial violence and dispossession among First Nations in B.C. In referencing traditional ecological knowledges throughout this study, then, I am referring not to unproblematic, discrete information which exists ‘out there’, but to place-based knowledges that are embedded in, and entangled with, ambivalent Indigenous political strategies unfolding on multiple scales.²²

In line with the above, I foregrounded human-fish relations over the course of this study, in addition to privileging Indigenous perspectives on those relations. In doing so, this dissertation aims to illuminate the diversity of political strategies enacted by Indigenous peoples and communities in the Cohen Commission and beyond.

1.2.3 – The Violence and Violent Indifference of the Harper Government

While Indigenous political strategies of the sort described in the preceding subsection obviously pre-dated the 2006 rise of, and persisted following the 2015 demise of, the Harper Government, the strategies described in this dissertation must be understood in the context of this government’s extraordinarily antagonistic and violent approach to relating to Indigenous peoples and communities in Canada. Despite apologizing to the victims of Canada’s Indian Residential School system on behalf of the Government of Canada in 2008, for instance, Prime Minister Stephen Harper claimed, just one year later, that Canada has “no history of colonialism” (qtd. in Ljunggren, 2009). The Harper Government also sought to “liberate dead capital” on First Nations reserves by proposing a *First Nations Property Ownership Act* (Gutstein, 2014, pp. 106-135), despite considerable opposition from First Nations leaders across Canada (e.g., Assembly of First Nations, 2010).²³ No matter how seemingly “empathetic, remorseful, and *fleeting*ly sorrowful” Harper’s 2008 apology may have seemed, in other words, the Harper Government’s overall approach to relating with Indigenous peoples and communities in Canada was an overwhelmingly violent one (Simpson A., 2016, p. 4). The violence inherent in this approach was evident, Audra Simpson (2016) suggests, not only in Harper’s “relentless drive to extract from land”, but also through a sort of “violent indifference” as evidenced by the Harper Government’s refusal to establish an inquiry into Missing and Murdered Indigenous Women and Girls (MMIWG) in Canada (p. 4). In seeking so brazenly to commit acts of colonial violence, Glen Sean Coulthard (2014) suggests, the Harper Government unwittingly “invigorated a struggle for Indigenous self-determination” across Canada (p. 173). This resulted in the emergence of the Idle No More²⁴ movement in late 2012, in addition to paving the way for subsequent protests, including the early-

²² For additional information concerning the problems associated with traditional ecological knowledges as a concept in general, and those associated with the ‘integration’ of these knowledges into existing resource management regimes, or as part of ‘co-management’ arrangements, see Julie Cruikshank (1998) Paul Nadasdy (1999; 2003; 2005), and Graham White (2006). For more on the complexities and tensions associated with ‘TEK work’, see Tom Özden-Schilling (2016; 2019).

²³ See also Kanatase Horn (2013), Shiri Pasternak (2010; 2015), and Timothy Mitchell (2009).

²⁴ See Kino-nda-niimi Collective (2014) and Glen Sean Coulthard (2014, pp. 151-179).

2020 rail blockade which saw Indigenous activists and allies halt rail traffic across Canada in solidarity with the Wet'suwet'en hereditary chiefs opposed to the Coastal GasLink pipeline.

The Harper Government's unique approach to governance has been described using a variety of terms, including "market populism" (Sawer & Laycock, 2009), "party of one" (Harris M., 2014), "Harperism" (Gutstein, 2014), and "racial extractivism" (Preston, 2017). This proliferation of labels is reflective of the Harper Government's unprecedented (in the history of Canada, at least) approach to governance, which ushered in a "political culture fundamentally different from those of the governments that have preceded it" (Turner C., 2013, pp. 108-109). The essence of this political culture, Chris Turner (2013) suggests, is reflected in the Harper Government's position that the purpose of research is "to create economic opportunities for industry", and that the purpose of government is "to assist in that process in whatever way it can" (p. 112). In seeking to make it easier for corporations to extract and export bitumen from Alberta's oil sands, for instance, the Harper Government withdrew Canada's support for the Kyoto Protocol (Gutstein, 2014, pp. 140-141), in addition to dramatically weakening federal environmental assessment laws (Stacey, 2016), thereby paving the way for increased oil sands production and an expanded network of pipelines to export diluted bitumen to international markets. In effect, the Harper Government engaged in a persistent, full-scale legislative "attack on the environment [which] simultaneously diminished the federal government's role in environmental protection and sought to increase federal influence over resource development" (Stacey, 2016, p. 166).

In addition to the above, the Harper Government enacted strategic, targeted budget cuts designed to reduce its capacity to "gather basic data" about the environment, while simultaneously "seizing control of the communications channels" through which this information is conveyed to the public (Turner C., 2013, p. 31). In doing so, Chris Turner (2013) suggests, the Harper Government successfully reduced the ability of federal researchers, bureaucrats, and administrators to "see and respond to the impacts of its policies, especially those related to resource extraction" (p. 31). When federal researchers nevertheless managed to observe these impacts, the Harper Government's communications protocol prevented them from directly communicating their findings to the Canadian news-media. For the Harper Government, all federal employees (including researchers) ought to "speak with a single voice" (p. 22). Under this policy, researchers receiving media inquiries were required to consult with media relations staff, who would advise them "on how best to deal with the call", and may also have obliged them to "respond with approved lines" (p. 22). When a researcher's findings failed to accord with the Harper Government's policy agenda, media relations staff "sat in on interviews and even banned government scientists from talking to the press about their work" (p. 23). Researchers at Fisheries

and Oceans Canada (DFO), the federal department responsible for the Fraser River fishery, were not exempt from these protocols.²⁵ It was in this particular context that Commissioner Cohen placed the DFO and its ‘muzzled’ scientists ‘on trial’ during the Commission’s proceedings.²⁶

1.3 – Primary Research Questions

My aim in carrying out this study was to address three primary research questions. When considered together, and in their intended order, these questions can be understood as a three-step process to successfully opening the black box that is the Cohen Report, as outlined below.

First: What are the primary sources of controversy in the Fraser River fishery? In line with my assertion that the Fraser River fishery is associated with myriad salmon controversies, and that these controversies are not mere products of the decline of Fraser River sockeye, I devised this first question with the aim of permitting me to develop a sensitivity to particular understandings of controversial salmon. An STS analysis which privileges situated, partial, and subjugated perspectives is particularly well suited, I suggest, to the task of identifying sources of controversy that are otherwise obscured by prevailing ways of knowing Fraser River sockeye and engaging with the fishery. For this reason, the process of identifying sources of controversy forms the basis for my exploration of the proceeding research questions. Together, these sources of controversy constitute a key capable of opening the black box that is the Cohen Report.

Second: What salmon controversies are revealed through the social-life of sockeye, and how do they compare to those depicted in the Cohen Report’s overview of the life-cycle of sockeye? If the first research question, outlined above, directs me to create a key, this second question is concerned with the act of using that key to open the black box that is the Cohen Report. In keeping with this metaphor, I suggest that the particular arrangement and distribution of the key’s ridges and notches affects how this box is opened, thereby shaping the potential insights contained within.²⁷ By using this particular key as the basis for my analysis of the Cohen Report’s

²⁵ This is not to suggest, of course, that the Harper Government is solely to blame for the controversies in which the DFO found itself during this period. Indeed, the DFO was involved in myriad controversies prior to the rise of the Harper Government (e.g., the collapse of the Atlantic cod fishery), and continues to be involved in controversies today (e.g., the ongoing controversy over open-net pen salmon farming in British Columbia).

²⁶ Though a broader historical survey is not offered here, a number of additional texts are worth considering. For histories of the B.C. fishery, see Geoff Meggs (1991), Dianne Newell (1993), Matthew Evenden (2000; 2004a; 2004b) Douglas Harris (2001; 2008), and Lissa Wadewitz (2012). For histories of, and reflections on, the decline of the Atlantic cod fishery, see Bonnie McCay & Alan Christopher Finlayson (1995), Ransom Myers, Jeffrey Hutchings, & Nicholas Barrowman (1997), Jeffrey Hutchings (1999), Sean Cadigan & Jeffrey Hutchings (2001), and Dean Bavington (2010). For histories of Canadian fisheries science more broadly, see Joseph Gough (2008), Jennifer Hubbard (2006; 2014a; 2014b; 2018), and Rowshyra Castañeda et al. (2020). For a history of Canadian environmental sciences, see Philip Enros (2013). See also Joseph Taylor (1999) and Carmel Finley (2011).

²⁷ To extend this metaphor further, keys shaped by situated, partial, and subjugated perspectives grant only partial access to the contents of the black box. This is not, however, a defect in their design, as these keys function in a manner which reveals the existence of hidden compartments (which I imagine might look something like an M.C. Escher painting), even if they do not reveal the full extent of the black box’s interior. A master or skeleton key, by contrast, offers the controversy analyst little more than a ‘god trick’, providing only the illusion of total access to the black box and its contents.

depiction of the life-cycle of sockeye salmon, in other words, I aim to assess whether the Cohen Report accounts for the various sources of controversy to emerge from my exploration of the first research question. In the process, I seek to highlight the extent to which the Cohen Commission foregrounded or backgrounded various forms of evidence, providing the basis for the third and final research question, in which I explore the black box's interior.

Third: What factors contributed to the (de)legitimation of particular understandings of controversial salmon during the Cohen Commission? If my exploration of the first research question led me to create a key, and my examination of the second question involved using that key to open the black box that is the Cohen Report, this third and final question tasks me with exploring the insights thus revealed, with the ultimate aim of accounting for their presence (or absence) in the Cohen Report. To that end, I explore the contours of the Cohen Commission's proceedings (i.e., the black box's interior) from multiple perspectives. Upon identifying the apparent rationale for the (de)legitimation of the controversial salmon revealed through these perspectives, I endeavour to assess whether the Cohen Report offers a blueprint for closure which adequately accounts for the underlying sources of controversy.

1.4 – Theoretical Framework and Methodology

1.4.1 – An Engaged Controversy Study

Controversies, Bruno Latour (1987) suggests, represent “a way in” to understanding science, technology, and society (p. 2). Accordingly, Latour proposes seven “rules of method” designed to permit controversy analysts to “consider all of the empirical facts” in the controversy under study (p. 17). These rules offer important advice and guidance which, in my view, every controversy analyst should carefully consider. For the purposes of this study, however, some modifications to Latour's network-based approach to studying technoscientific controversies were necessary. To that end, in addition to conceiving of the engaged program as a congregational bridge, and bringing generative symmetry, feminist STS, and postcolonial technoscience to bear on controversy studies in STS, as described above, I propose in this dissertation a suite of theoretical and conceptual solutions to adapt Latour's approach to this study. The end result of this process is a theoretical framework which takes the form not of seven rules of method for studying science in action, but seven *commitments* for an engaged study of controversies in action.²⁸

First, an engaged controversy analyst commits to studying active technoscientific controversies by opening black boxes symmetrically (Latour, 1987). Second, just as controversies

²⁸ Rather than simply offering revisions to Latour's 'rules', I opted instead to outline a series of 'commitments', primarily to reflect my decision to 'commit to commitment' (see Section 2.1.2 – The Politics of SSK: Capture, Commitment, and Neutrality). In addition, a framework consisting solely of 'rules' struck me as unnecessarily rigid and unidirectional. By speaking of 'commitments', however, I felt better equipped to maintain the kind of openness and flexibility needed to study technoscientific controversies in the twenty-first century.

represent ‘a way in’ to understanding science, technology, and society (Latour, 1987), an engaged controversy analyst commits to conceiving of ‘views from below’ (Haraway, 1988; 1989; Harding, 1986; 1993; 1998) and ‘views from elsewhere’ (Said, 1978; 1983; 1993; 1994; Anderson & Adams, 2008; Todd, 2014) as ‘a way in’ to understanding controversies. Third, an engaged controversy analyst commits to attending not only to how the relevant human and non-human (Appadurai, 1986; Kopytoff, 1986; Dumit, 2004) actors travel from place to place (Heath, 1998), but also to the local particularities of each individual site (Henke & Gieryn, 2008), and everything in between (Green, 1999). Fourth, an engaged controversy analyst commits to attending to symmetry (Bloor, 1976), supersymmetry (Callon, 1984; Latour, 1987; Law, 1987), and generative symmetry – that is, in the last instance, by attending both to the mechanisms of closure (Sismondo, 2010) and impediments to the same (Proctor, 2008). Fifth, an engaged controversy analyst commits to questioning distinctions such as social/scientific, expert/non-expert, activist/theorist, domination/submission – i.e., oppositions which represent discursive effects of power (Foucault, 1972; 1977; 1980; Hall, 1992; Lemke, 2002), and not states of nature. Sixth, an engaged controversy analyst commits to practicing reflexivity and making responsible knowledge claims (Haraway, 1988). Seventh, and finally, an engaged controversy analyst commits to conducting research as praxis (Lather, 1986).

1.4.2 – The Social Life of Things

To bridge the gap between my theoretical framework (summarized above),²⁹ and my methodological approach (outlined below),³⁰ I built on existing approaches to exploring ‘the social life of things’. To make sense of the “concrete, historical circulation of things”, Arjun Appadurai (1986) contends, one must “follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories” (p. 5). To offer a “biography of a thing”, Igor Kopytoff (1986) adds, is to “ask questions similar to those one asks about people” (p. 66). Thus, while Appadurai and Kopytoff specifically applied ‘the social life of things’ to commodities, this approach was at least partially rooted in biographical study of human actors. Building on these approaches, Joe Dumit (2004) asserted that meaning is “a lived relation among cultural actors”, and that “to the extent that things such as images and technologies are attributed agency, they, too, participate in cultural exchange” (p. 10). Following Dumit, I expanded on Appadurai and Kopytoff’s conception of ‘things’ so as to include anything—human or nonhuman, biological or otherwise—with agency. This move is in keeping with my theoretical commitment to opening black boxes with an eye

²⁹ For a more detailed overview, see Section 2.2 – Towards a Theoretical Framework for an Engaged Controversy Study.

³⁰ For a more detailed overview, see Section 3.2 – Conducting Research as Praxis.

towards three related forms of symmetry, including supersymmetry.³¹ The relational materialism of the supersymmetric approach, John Law (1992) explains, challenges controversy analysts to “treat different materials – people, machines, ‘ideas’ and all the rest – as interactional effects rather than primitive causes” (p. 389). In carrying out this study, then, I endeavoured to offer a symmetrical analysis of the ‘social lives’ of a variety of actors, including fish, humans, and a document.

In keeping with my theoretical commitment to actively questioning discursive constructs like expert/non-expert or social/scientific, I use the term ‘social’ not just to refer that which is social, cultural, or extra-scientific, but also with reference to the interactive processes through which meaning is generated, altered, and contested. Similarly, in line with my theoretical commitment to attending to the particulars of place, I understand the term ‘life’ in ‘social life’ to refer to the particular manner with which a given actor inhabits, moves through, or otherwise relates to particular lands or waters. After all, life cannot be lived apart from the particulars of place. Accordingly, I use the term ‘social life’ to refer to the interactive processes through which meaning is generated, altered, and contested by virtue of the particular manner with which a given actor inhabits, moves through, or otherwise relates to particular lands and waters. Thus, to analyze the social lives of a variety of actors is not merely to chart their respective movements on a map, but also to offer a situated, ecological account of the interactive processes through which meaning is generated, altered, and contested on, across, and throughout particular landscapes and waterscapes.

My aim in seeking an ecological account of this sort was not, of course, to achieve a ‘view from nowhere’, but to combine numerous situated, partial perspectives so that they might be brought to bear on the study of salmon controversies and controversial salmon. This underscores the significance of my decision to follow some actors but not others, as all such determinations shaped the course of my research. Accordingly, in deciding which actors to follow over the course of this study, I considered a variety of factors, including whether it was possible to construct an itinerary for the movements of prospective actors for the period under study, and whether each choice was consistent with my theoretical commitments.

First, in line with my theoretical commitment to study active controversies, I chose to follow B.C. Supreme Court Justice Bruce Cohen through the Cohen Commission, beginning with his 2009 appointment as Commissioner and culminating in the completion of the Cohen Report. Given that Commissioner Cohen’s perspective is better described as a ‘view from above’ than it is a view

³¹ For an in-depth discussion concerning differing interpretations of the symmetry requirement in the history of controversy studies in STS, see Section 2.1.1 – Interpreting Symmetry: SSK, ANT, and EPOR.

from 'below' or 'elsewhere', this might seem like an odd choice. As the prime mover in the black-boxing process under study, however, Commissioner Cohen's social life could not simply be ignored. In a more traditional controversy study,³² Commissioner Cohen's perspective might have been deemed sufficient on its own. In this study, Commissioner Cohen's social life is considered in conjunction with a variety of additional social lives.

Second, in keeping with my theoretical commitment to attend not just to how actors travel from place to place, but also to the local particularities of each individual site, and everything in between, I decided to follow each conservation unit³³ of Fraser River sockeye salmon as it travels—over the course of a single life-cycle—from its spawning grounds to the Pacific Ocean and back again. An analysis of the social life of these migratory, anadromous fish, promises not just to shed new light on controversial and contested salmon in the Cohen Commission, but also to generate novel insights about how Fraser River sockeye move throughout, and interact with, the B.C. landscape more generally.

Third, in seeking to view the Cohen Commission from 'elsewhere', I opted to follow the 2009 pre-season forecast for Fraser River sockeye and pinks beginning with its creation, and culminating in its journey through the Cohen Commission as an evidentiary exhibit. This document—a product of Fisheries and Oceans Canada (DFO)—attracted considerable controversy in late 2009, when a record-low number of sockeye salmon returned to the Fraser River. This controversy raised serious questions concerning the DFO's management of the fishery, making the social life of this document an appealing avenue of inquiry for this study.

Fourth, in keeping with my theoretical commitment to privileging 'views from below', I followed biologist Alexandra Morton through the Cohen Commission. Morton—an outspoken critic of open-net pen salmon farming in general, and the DFO's management of the B.C. aquaculture industry in particular—appeared before the Cohen Commission as a non-expert witness. In addition, Morton participated in the Commission's proceedings through a participant-coalition called the Aquaculture Coalition. Morton is a divisive, controversial figure whose research into the effects of open-net pen salmon farming produced findings which did not accord with the DFO's own research, resulting in a protracted, acrimonious public dispute which persists to this day.

³² See, for instance, Bruno Latour's (1983) framing of Louis Pasteur.

³³ As discussed in Chapter 5 – The Social Life of Sockeye, a conservation unit (CU) is a unit of biological diversity. Under the DFO's (2005) *Wild Salmon Policy*, each sockeye CU consists of one or more spawning populations, and each population consists of multiple localized demes. Sockeye salmon are adapted to local spawning habitats to such a degree that, if all the fish, demes, and populations which together constitute a given CU are wiped out, it is highly unlikely that their respective spawning grounds will be "recolonize[d] naturally [...] within a human lifetime" (p. 10). The CU, as a concept, is not without its problems (see, for instance, the use of colonial language in its definition), but an in-depth analysis of these problems is beyond the scope of this study.

Where Morton goes, in other words, salmon controversies are sure to follow, underscoring the value of her perspective in the context of this study.

It should be noted that, throughout this dissertation, the DFO is discussed by such a wide variety of actors in such a broad range of contexts that, on occasion, ‘the DFO’ may appear to be monolithic. This is not the case. Instead, this is a consequence of my theoretical commitment to privileging views from below and elsewhere – i.e., standpoints from which the DFO’s behaviour may very well appear monolithic. It is doubtless, of course, that many within the DFO—whether in science or management—care a great deal about conserving Fraser River sockeye salmon. The DFO is not, to put it in another way, universally staffed by unreflexive, pro-industry scientists and managers. It must also be said, however, that the DFO presided over the late-twentieth century collapse of northwest Atlantic cod (*Gadus morhua*) stocks,³⁴ a crisis which pointed not only to “difficulties within the Canadian practice of fisheries science”, but also to “problems endemic within the entire fisheries biology community” (Hubbard, 2006, p. 227).³⁵ Though the DFO is not a monolith, in other words, it is apparent that systemic issues have long undermined its ability to fulfill its constitutional mandate to conserve wild fish populations. By privileging situated and partial perspectives throughout this dissertation, I aim to shed light on systemic issues of this sort, even as I acknowledge that my situated, partial understanding of the DFO is—by its very nature— incomplete.

Fifth, in line with my theoretical commitment to making responsible and reflexive knowledge claims, I subjected myself to this same ‘social life’ analysis by re-tracing my steps through the lower B.C. mainland, where I studied salmon controversies and controversial salmon in 2017. By describing the interactive processes through which I generated meaning along the way, in other words, I offer in this dissertation an analysis of the social life of an engaged controversy analyst.

Finally, it must also be noted that none of the actors described above are Indigenous. This was not an accident, but an ethnographic refusal (Simpson, 2007; Tallbear, 2013a). As Linda Tuhiwai Smith (1999) has argued, the gaze of Western intellectuals has long targeted, objectified, dehumanized, and othered Indigenous peoples the world over.³⁶ Accordingly, in line with my theoretical commitment to conducting research as praxis, I consciously refused to surveil, follow,

³⁴ See Bonnie McCay & Alan Christopher Finlayson (1995), Ransom Myers, Jeffrey Hutchings, & Nicholas Barrowman (1997), Jeffrey Hutchings (1999), Sean Cadigan & Jeffrey Hutchings (2001), and Dean Bavington (2010).

³⁵ In recent years, I should note, steps are being taken to address some of these problems. According to Stephenson et al. (2016), for instance, a variety of initiatives are currently underway to better integrate local fishers’ knowledge in fisheries science and management processes in Canada, Australia, and Europe.

³⁶ For an overview of the steps I took to safeguard against the reproduction these problematic, exploitative research practices, and a discussion concerning how I understand my role as an ally, please see Section 3.1.3 – Empirical Strategies, Responsible Knowledge Claims, and Research as Praxis.

or analyze the social lives of Indigenous actors. Instead, I privileged Indigenous perspectives whenever they were encountered over the course of my analysis of the social lives of the various actors identified above.

1.4.3 – A Three-Phase, Multi-Method Approach

This study was conducted in three overlapping phases, each of which entailed the application of a distinct methodological approach.

During phase one,³⁷ the ethnographic fieldwork component of this study, I travelled to the lower B.C. mainland during the 2017 sockeye run with the aim of better understanding how salmon controversies emerge and why they are so persistent. To that end, I conducted open-ended interviews with four Indigenous interlocutors (Latash Maurice Nahanee, Grand Chief Ken Malloway, Chief Slá'hólt Ernie George, and David Kirk), attended regulatory meetings of the Pacific Salmon Commission's bilateral Fraser River Panel, and visited several historically significant sites. Over the course of my time in the field, I captured 1,200+ photos or videos and compiled more than 40 pages of handwritten field notes. After returning to York University, I actively monitored a number of ongoing salmon controversies, in addition to interviewing Alexandra Morton over Skype to discuss her role in one such controversy.

In phase two,³⁸ the contrapuntal cartography³⁹ or counter-mapping⁴⁰ component of this study, I used Google My Maps in conjunction with Google Earth Pro to create a custom map⁴¹ capable of facilitating the social-life analyses to be undertaken during the third phase of this study (Figure 3). To that end, I used my field notes in conjunction with the corresponding photos and videos to construct an itinerary covering the duration of my time in the field. Using this itinerary, I added photos, videos, and other points of interest to the map in chronological order. Then, I connected each of these points with interpolated routes of travel (purple lines). After analyzing this social life in phase three, I added four additional layers to the map, one for each of the sources of controversy thus identified, and populated them based on the results of my analysis. To construct itineraries for each of the remaining social lives, I employed a similar approach. For Fraser River sockeye, I mapped all known spawning streams (dark-blue lines) and rearing lakes (light-blue polygons) utilized by sockeye salmon in the Fraser River watershed. Then, after mapping the known distribution of sockeye salmon in the Pacific Ocean (gray polygon), I connected each of these points using a combination of interpolation and information from secondary sources (red

³⁷ For a more detailed overview, see Section 3.2.1 – Phase One: Ethnographic Fieldwork.

³⁸ For a more detailed overview, see Section 3.2.2 – Phase Two: Counter Mapping.

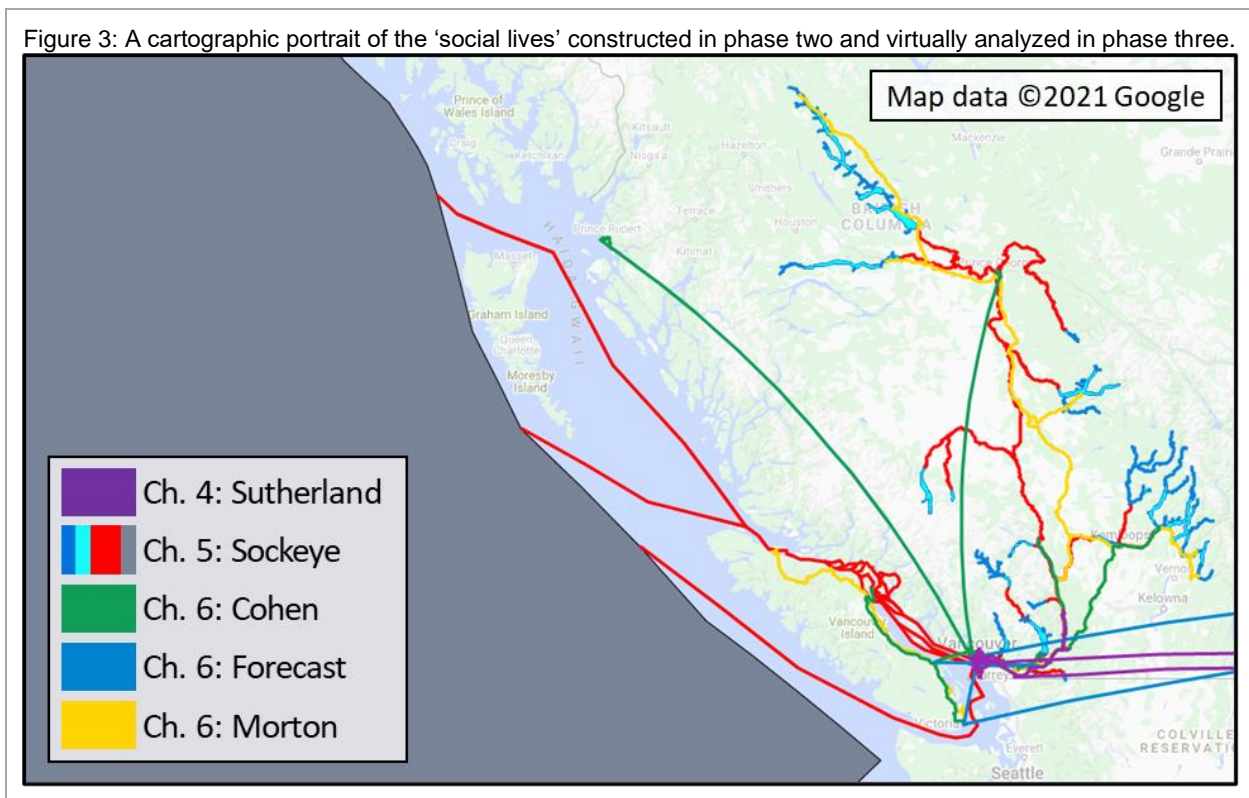
³⁹ See Jane Jacobs (1996) and Matthew Sparke (1998).

⁴⁰ See Nancy Lee Peluso (1995); Renee Louis, Jay Johnson, & Albertus Pramono (2012); and Dallas Hunt & Shaun Stevenson (2017).

⁴¹ Readers are encouraged to explore this map in greater detail by visiting the following link (not compatible with mobile devices): <https://bit.ly/3jLi66M>

lines). For Commissioner Bruce Cohen, I added the Commission's office space and courthouse to the map, followed—in chronological order—by each of the public forums and site visits attended by Commissioner Cohen. Then, I connected each of these points with interpolated routes of travel (green lines). For the DFO's 2009 pre-season forecast, I chronologically mapped the various physical locations associated with its initial production and subsequent circulation, before directly and linearly connecting each of these points (blue lines). Finally, I used Alexandra Morton's blog in conjunction with Cohen Commission documents to chronologically map her physical location at various points in the lead up to, and throughout her participation in, the Commission's proceedings. Then, I connected each of these points with interpolated routes of travel (yellow lines).

Figure 3: A cartographic portrait of the 'social lives' constructed in phase two and virtually analyzed in phase three.



Finally, in the virtual⁴² analysis phase of this study,⁴³ I used the map and itineraries constructed in phase two to analyze the 'social lives' of the five actors identified above: Callum Sutherland (i.e., myself, the author, as an 'engaged controversy analyst'), Fraser River sockeye salmon, Commissioner Bruce Cohen, the DFO's 2009 pre-season forecast, and Alexandra

⁴² I use the term 'virtual' not just to refer to computer-mediated digital reconstructions, but also as a reference to Robert Boyle's "literary technology of virtual witnessing" (Shapin & Schaffer, 1985, p. 61). It is important to note, however, that I do not conceive of the social-life analyses offered in this dissertation as "undistorted mirrors" (p. 64) of reality, but as problematic reconstructions that are necessarily incomplete.

⁴³ For a more detailed overview, including flowcharts which illustrate my approach to analyzing all five social lives, see Section 3.2.3 – Phase Three: Virtual Analysis.

Morton. In analyzing each of these social lives, I employed the same basic approach. That is, I used the map to follow each actor from the beginning to the end of their respective itineraries, pausing at numerous junctures and intersections along the way to ask a series of probing questions and to consider additional sources of evidence. In each instance, I tailored the specific questions asked, and the additional sources of evidence considered, to the particular research question being addressed and the situatedness of the actor whose social life is being explored. My aim in analyzing the social life of an engaged controversy analyst, for instance, was to identify the primary sources of controversy in the Fraser River fishery. I analyzed the social life of Fraser River sockeye, on the other hand, to determine whether the Cohen Report adequately accounted for these sources of controversy. Consequently, the former analysis is animated by broader questions than those raised by the latter. In a similar vein, given that the social life of sockeye was designed to assess the Cohen Report's portrayal of controversial salmon, this social-life analysis specifically foregrounds Cohen Commission documents. The social life of an engaged controversy analyst, by contrast, does not engage directly with Cohen Commission documents, and is centred largely around ethnographic and interview data instead. After completing each virtual social-life analysis, I discussed my empirical findings, which I then brought to bear on a holistic analysis of the particular research question being addressed.

1.5 – Dissertation Overview

In Chapter 2 – Literature Review: Revisiting Controversy Studies, I review the STS controversy studies literature with the aim of constructing a theoretical framework to guide my research. To that end, I explore the different meanings associated with opening a black box symmetrically, and how the meanings associated with this act have shifted over time. Then, after exploring how controversy analysts responded to concerns about capture and the politics of SSK, I outline my proposal to bring generative symmetry to bear on controversy studies in STS. Finally, I build on Latour's (1987) rules of method for studying science in action to construct a theoretical framework in the form of seven commitments for an engaged controversy study.

In Chapter 3 – Methodology: Research as Praxis, I describe in detail my three-phase, multi-method approach to carrying out this study. I begin by explaining how my methodology brings itinerant-ethnographic and counter-mapping techniques to bear on a virtual analysis of the social life of things. I also explain how Foucauldian notions of discourse and governmentality informed my particular approach to analyzing social lives. Then, I describe the empirical strategies employed throughout this study, and explain how they functioned to facilitate responsible knowledge claims. I also speak to my approach to allyship in the process of outlining my understanding of what it means to conduct research as praxis. Finally, I describe in detail the three

distinct yet overlapping phases which together constitute this study: (1) ethnographic fieldwork, (2) counter mapping, and (3) virtual analysis.

In Chapter 4 – Salmon Controversies in British Columbia, I look to address the following research question: What are the primary sources of controversy in the Fraser River fishery? To address this question, I explore the social life of an engaged controversy analyst by retracing my steps through the field, from York University to the lower B.C. mainland and back again, as I collected ethnographic and interview data in relation to the 2017 sockeye run and a number of subsequent events. Then, after identifying four sources of controversy, I describe the process through which I sought to represent each source cartographically. Finally, I combine each of these layers to produce a cartographic portrait of controversial salmon in B.C.

In Chapter 5 – The Social Life of Sockeye, I explore the following research question: What salmon controversies are revealed through the social life of sockeye, and how do they compare to those depicted in the Cohen Report's overview of the life cycle of sockeye? To examine this question, I (de)construct the social life (cycle) of sockeye by following each conservation unit (CU) of Fraser River sockeye from their spawning grounds to the Pacific Ocean and back again, pausing at numerous intersections along the way to consider what the Cohen Report's life-cycle overview has to say, if anything, about these encounters. Thus, in the process of constructing a portrait of the social life of sockeye, I also identify gaps in the Cohen Report's depiction of the life-cycle of Fraser River sockeye. Then, after following each CU back to its spawning grounds, I compare and contrast cartographic portraits associated with the social life of sockeye on the one hand, and the life cycle of sockeye on the other.

In Chapter 6 – Cohen's Black Box, I aim to address the following research question: What factors contributed to the (de)legitimation of particular understandings of controversial salmon during the Cohen Commission? To that end, I explore the social life of a commission of inquiry by following Commissioner Bruce Cohen, the DFO's 2009 pre-season forecast, and Alexandra Morton through the Cohen Commission. Then, after exploring the blueprint for closure offered by the Cohen Report, I combine each of these perspectives in order to identify and explore the central themes which emerged from these data.

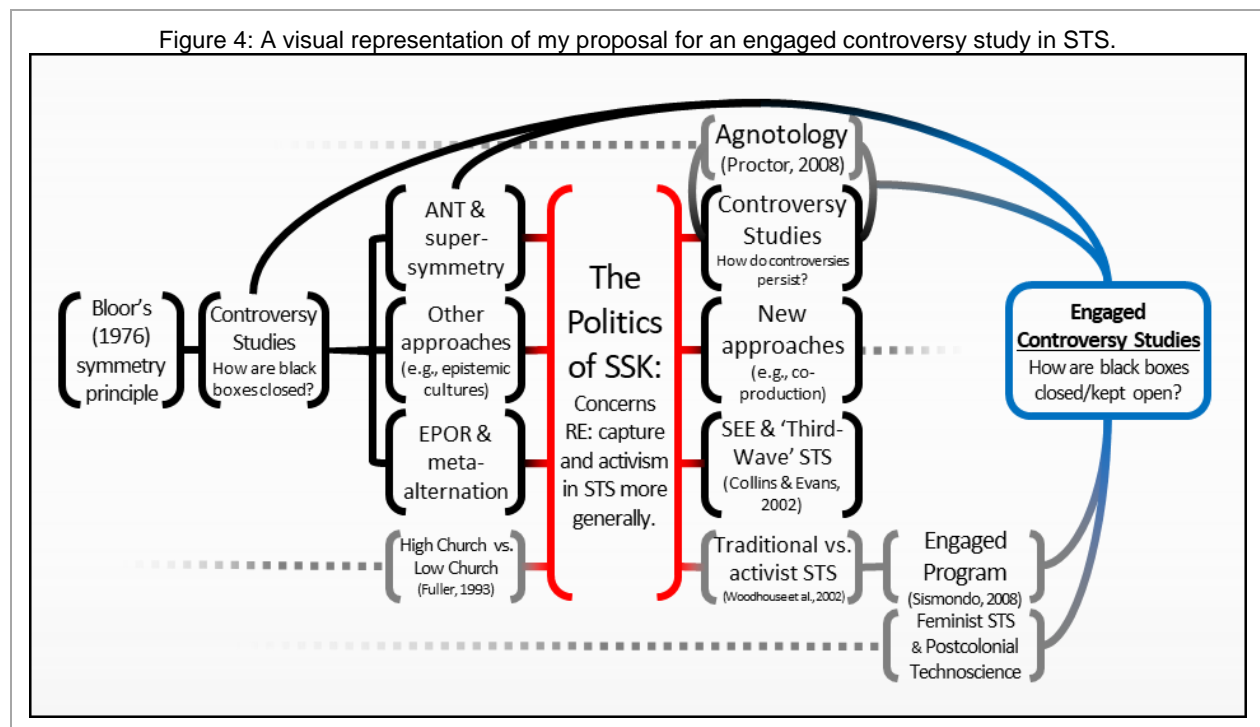
Finally, in Chapter 7 – Conclusion: Colonialism by Other Means, I conclude by summarizing and reviewing the results of this study, describing the significance of my findings, identifying opportunities for additional research, and establishing this project's theoretical, methodological, and empirical contributions to the field of STS.

CHAPTER 2 – LITERATURE REVIEW: REVISITING CONTROVERSY STUDIES

“While controversy studies may be symmetrical, they are rarely neutral. By showing the mechanisms of closure, controversy studies tend to be viewed as supporting the less orthodox positions. Therefore, the results of the studies can themselves become part of the controversy, picked up by one or more sides, probably by the underdogs. Controversy studies, and the researchers who perform them, run the risk of being ‘captured’ by participants.”

—Sergio Sismondo (2010, p. 133)

In this chapter, which contains three sections, I outline my proposal for an engaged controversy study in STS. To that end, in section 2.1, I explore what it means to open a black box symmetrically. Then, in section 2.2, I build on Bruno Latour’s (1987) rules of method for studying science-in-action to construct a theoretical framework for an engaged controversy study. Finally, in section 2.3, I summarize and review the preceding sections.



2.1 – Opening Black Boxes Symmetrically

To study a technoscientific controversy in STS is also to open a black box symmetrically. Though the term “black box” is typically used to describe “a predictable input-output device, something the inner workings of which need not be known for it to be used”, it refers in STS to “facts and artifacts that are taken for granted” and whose “histories are usually seen as irrelevant after good facts and successful artifacts are established” (Sismondo, 2010, p. 120). Having been black-boxed, Sergio Sismondo (2010) explains, the fact or artifact thus obscured “acquires an air of inevitability” (p. 120).

It looks as though it is the best or only possible solution to its set of problems. However, this tends to obscure its history behind a teleological story. [...] The truth has no causal power that draws scientific

beliefs toward it. Instead, consensus develops out of persuasive arguments, social pressures, and the like. (p. 120)

In order to demystify this air of inevitability, controversy analysts study technoscientific controversies with an eye towards symmetry.

2.1.1 – Interpreting Symmetry: SSK, ANT, and EPOR

Rather fittingly, the question of what it means to open black boxes symmetrically has long been the subject of controversy in the STS literature.

The emphasis on symmetry in controversy studies is rooted in David Bloor's (1976) proposal for a 'strong programme' in the sociology of scientific knowledge (SSK).⁴⁴ Prior to the strong programme in SSK, it was possible to pursue a 'sociology of error', but not a 'sociology of truth.' Bloor addressed this issue by challenging sociologists to employ a symmetrical style of explanation in which "[t]he same types of cause would explain [...] true and false beliefs" (p. 7). If one rejects teleological explanations for the closure of scientific controversies, in other words, it follows that social explanations apply not only to those who 'lost' the underlying dispute, but also to those who 'won' this debate. In calling for the symmetrical treatment of 'true' and 'false' beliefs, SSK created important space for social analyses of scientific controversies. For more than a decade, this space would come to be dominated by two approaches to studying controversies: the empirical programme of relativism⁴⁵ and actor-network theory.⁴⁶

Though it predates the first explicit articulation of actor-network theory by many years, Bruno Latour and Steve Woolgar's (1979) influential examination of the TRF(H) controversy clearly established the groundwork for Latour's network-based approach to studying technoscientific controversies. Latour and Woolgar suggest that scientific facts "cannot jump out of the very network of social practice which makes possible [their] existence" (p. 183). Facts appear real, Latour and Woolgar suggest, precisely because they "are constructed in such a way that, once the controversy settles, they are taken for granted" (p. 183). Despite Latour and Woolgar's insistence that their approach was not a relativistic one, the success of this text helped to generate an apparent sense of anxiety concerning the role of relativism in STS. The strong programme, Woolgar (1981) later suggested, empowered many analysts to explain the closure of scientific controversies by simply referencing to internalist, interest-based explanations. Interest-based explanations, Woolgar contended, violate the first tenet of the strong programme, which calls on controversy analysts to pursue causal explanations. This kind of "overly enthusiastic

⁴⁴ See also Barry Barnes (1974) and Barnes & Bloor (1982). While controversy studies undoubtedly predate the strong programme (e.g., Dorothy Nelkin, 1971; 1975), I focus only on those controversy studies concerned with opening black boxes symmetrically.

⁴⁵ See Harry Collins (1981).

⁴⁶ See Michel Callon (1984); Bruno Latour (1987); and John Law (1987).

sociologizing in the social study of science”, Woolgar suggests, distracts analysts from attending to “the very content of scientific knowledge” (p. 389).

According to Latour (1983), however, this debate “misses the fundamental point” (p. 144). In debating how best to understand technoscience, Latour suggests, STS analysts have only reproduced “on slightly different grounds the age-old polemic between ‘internalist’ and ‘externalist’ in the study of science and technology” (p. 142). The only way to overcome this problem, Latour contends, is to reject entirely any distinctions between inside and outside, micro and macro. For Latour, there is no ‘inside’ or ‘outside’ in technoscience. There are only “long, narrow networks that make possible the circulation of scientific facts” (p. 167). It follows, for Latour, that Louis Pasteur was not necessarily a brilliant scientist – he was, above all else, successful in translating the interests and needs of others to suit his own ambitions.

Michel Callon (1984) builds on these ideas with his proposal to extend Bloor’s principle of symmetry into one of “generalized symmetry” according to which analysts must not “change registers when we move from the technical to the social aspects of the problem studied” (p. 200). In addition, Callon calls on analysts to “abandon all a priori distinctions between natural and social events” (p. 200). In using this approach to describe the ‘domestication’ of the scallops and fishers of St. Brieuc Bay, Callon identifies four crucial moments of translation: problematization, interessement, enrolment, and mobilization. To successfully complete all four steps in this translation process, Callon argues, is also to become the “sole and ultimate spokesman” charged with representing the interests of “chains of intermediaries” – that is, to speak for a particular grouping of human and nonhuman actors (p. 216). Callon’s proposed framework would, along with Latour (1987) and John Law (1987), provide the basis for what is known today as actor-network theory (ANT). According to Law (1992), ANT’s most radical feature is to be found in its commitment to relational materialism. In addition to rejecting “analytical divisions between agency and structure, and the macro- and the micro-social”, Law explains, ANT challenges analysts to “treat different materials – people, machines, ‘ideas’ and all the rest – as interactional effects rather than primitive causes” (p. 389).

This approach contrasts sharply with the empirical programme of relativism (EPOR), which maintains strict distinctions between humans and nonhumans, theory and practice, social and scientific. It was in this context that Harry Collins and Steven Yearley (1992) criticized the “radical symmetrism” of ANT for maintaining not only that “the boundary between true and false” is constructed, but also that “from now on, so are all dichotomies” (p. 303). EPOR, on this view, is “essentially human-centered”, whereas ANT proposes that there is “no center” (p. 310). According to Collins and Yearley, however, “[s]ymmetry of treatment between the true and the false requires

a human-centered approach” (p. 311). In the absence of a human-centred approach, Collins and Yearley contend, analysts must depend on “routine methods of scientific research for that part of its evidence concerned with the nonhuman actants” (p. 317). It is for this reason that Collins and Yearley characterize ANT’s generalized symmetry as a “backward step” for STS (p. 322). Collins and Yearley conclude by intimating that Callon and Latour are playing a “destructive” game of “epistemological chicken” (p. 323).

In their response, Callon and Latour (1992) suggest that Collins and Yearley’s mischaracterization of ANT is rooted in their belief that STS is a field torn “between two extreme positions, one which they label ‘natural realism’ which starts with the existence of objects to explain why we humans agree about them; and the other, which they label ‘social realism,’ which starts, on the contrary, from the firm foundation of society in order to account for why we collectively settle on matters of fact” (p. 345). On this view, Collins and Yearley maintain that “we should switch from natural realism when we are scientists to social realism when we play the role of sociologists explaining science” (pp. 345-346). This process of ‘meta-alternation’ between natural and social realism is fundamental to Collins and Yearley’s conception of symmetry. As Callon and Latour go on to argue, however, this conception of symmetry, resting as it does on the fundamental distinction between “what is natural and what is social and the fixed allocation of ontological status that goes with it”—i.e., the very distinction from which scientists derive their power—is itself asymmetrical (p. 348).

Callon and Latour’s conception of symmetry⁴⁷ aims, by contrast, to “obtain nature and society as twin results of another activity” – that is, through “network building, or collective things, or quasi-objects, or trials of force” (p. 348). In extending the principle of symmetry so that it encompasses the vocabulary used to describe human and nonhuman actors, however, Callon and Latour are not also extending “intentionality to things, or mechanisms to humans” (p. 353). In “crisscrossing” this divide, Callon and Latour “hope to overcome the difficulty of siding with one, and only one, of the camps” (p. 354). None of this matters for Collins and Yearley, however, because “they believe they possess the right metalanguage to talk about science making” (p. 354). As a consequence, though Collins is particularly adept at “showing the opening of controversies, the indefinite negotiability of facts, the skill necessary to transport any matter of facts, [and] the infinite regress of underdetermination”, he is unable to say anything meaningful about how scientific controversies are brought to a close (p. 355).

⁴⁷ Or “supersymmetry”, as Sergio Sismondo would later describe it (2010, p. 54).

2.1.2 – The Politics of SSK: Capture, Commitment, and Neutrality

Differing interpretations of symmetry led, I suggest, not only to a divergence in approaches to studying controversies, but also to a range of responses concerning the potential for a given controversy study to be ‘captured’ by those party to the controversy under examination.

According to Pam Scott, Evelleen Richards, and Brian Martin (1990), for instance, the strong programme requires controversy analysts to maintain “epistemological and social neutrality” (p. 476). If a given study is captured, on this view, its authors are “deemed to have failed to maintain a symmetrical approach” (p. 476). Scott et al. raise several examples of studies that have been captured in this manner, including Harry Collins and Trevor Pinch’s study⁴⁸ of parapsychologists’ attempts to legitimate the field of parapsychology in the face of opposition from those within established scientific disciplines. Despite appealing to their status as professional sociologists, and thus to their apparent disinterestedness concerning the subject at hand, Collins and Pinch were criticized⁴⁹ for having “uncritically adopted the parapsychologists’ perspectives and terminology” (p. 476). Accordingly, “partisans on both sides” concluded that Collins and Pinch had sided in this controversy with the parapsychologists (p. 476). It follows, for Scott et al., that while this “methodological demand for a separation between researcher and researched may appear to work for historical studies and for disputes contained within the scientific community”, this approach “breaks down in current controversies that involve matters of public policy or some other link to the broader community” (p. 477). There are fewer problems associated with historical controversy studies, or those firmly situated within traditional disciplinary boundaries, Scott et al. explain, as “historical subjects, being dead, cannot bite back, and social scientists have little perceived status in technical disputes between scientific experts” (p. 477). In support of these claims, each of Scott, Martin, and Richards explain how their own controversy studies⁵⁰ came to be captured⁵¹ by participants (pp. 477-489).

Controversy studies, Scott et al. contend, “must be viewed as potential resources in social struggles over scientific or technical knowledge claims” (p. 489). Symmetrical analyses, Scott et al. go on to argue, are “almost always more useful to the side with less scientific credibility or cognitive authority” (p. 490). Accordingly, the intervention of a controversy analyst often “perturbs the dispute” under study, and may even “significantly [...] change the course of the controversy” (p. 491). It follows, for Scott et al., that “symmetrical analysis is an illusion”, and that “neutral social analysis” is likewise “a myth” (p. 491). The “guise of neutrality”, they contend,

⁴⁸ See Collins and Pinch (1979).

⁴⁹ See Michael Mulkay, Jonathan Potter, and Steven Yearley (1983).

⁵⁰ See Scott (1989); Martin (1988); and Richards (1988).

⁵¹ Brian Martin (1996) later suggested that ‘capture’ is “perhaps the wrong word since it connotes unwillingness on the part of the captured” (p. 265). It may be more accurate, Martin suggests, to speak of “[m]utual enrolment” or “joining forces” (p. 265).

is one of the best ways to be an effective partisan. The positivist controversy analyst, employing a 'sociology of error,' is an effective supporter of scientific orthodoxy through stigmatizing its critics; the relativist analyst, through ostensible symmetry, is an effective supporter of the critics of orthodoxy by giving them unusual credence. An active partisan who undertakes either form of analysis has less credibility than an apparently independent and neutral person. This is precisely why partisans on one side point to the analyst, as independent authority, as support for their cause, while those on the other side try to paint the analyst as not being independent. (p. 491)

Thus, Scott et al. call on controversy analysts to embrace partisanship, suggesting in the process that they "should be critically involved" in the controversies they study (p. 491).

To embrace partisanship in this manner, Collins (1991) suggests, is also to "reduce the legitimacy and potency of [...] the discipline as a whole" (p. 249). For controversy analysts to voluntarily assume a partisan posture is, on this view, also to "reduce the legitimacy of their own work" (p. 249). While Collins acknowledges that "all science is in a broad sense 'political'", he suggests that "researchers [...] need to keep this knowledge in a separate compartment" (p. 249). Controversy analysts, Collins goes on to argue, "need [...] to distinguish between how we do our work and its impact" (p. 250). Neutrality, on this view, "is a methodological prescription" (p. 250). Collins contends that to "leave no room for methodological neutrality" is also to "make a mistake about the logic of the social sciences while accepting the politics of the dominant ideology of science" (p. 250).

This controversy came to a head in 1996, when *Social Studies of Science* published a special issue on the politics of SSK in which contributors debated issues of "neutrality versus commitment" and "politics and policy", in addition to exploring "new directions/places/people/things" (Richards & Ashmore, 1996, pp. 222-226). In his contribution to this special issue, Collins (1996) argues that to commit to commitment "seems to imply commitment to some cause or other, even before a cause has been evaluated" (p. 231). This is, he argues, "not something we should endorse" (p. 231). Even if methodological neutrality is unachievable in practice, Collins continues, "it does not follow that neutrality must be abandoned as a goal" (p. 232). In the same way that the existence of class bias in the judicial system does not preclude talk of justice, Collins maintains, the ideal of neutrality should not be abandoned on account of the practical difficulties invariably associated with methodological neutrality (p. 232). Commitment is not "bad", according to Collins, but it is also "not inevitable" (p. 234). Citing his gravity wave study, Collins notes that a "very powerful [...] establishment" figure furthering an orthodox position received his work warmly, whereas a "professional friend" of the "underdog" figure berated him for painting an unflattering portrait of the latter's role in this controversy (pp. 235-236). It follows, for Collins, that "one cannot be sure by whom one will be 'captured'", and that "preference for the underdog [...] should not be disguised in a general argument about inevitability" (p. 237).

In a similar vein, Malcolm Ashmore (1996) outlines two hypothetical case studies in which a would-be, captive controversy analyst becomes an unwitting Trojan horse. In the process, Ashmore raises the “tragic possibility” that, “[d]espite all well-meaning attempts to abandon symmetry and embrace the right side – the underdogs, the powerless, the marginal, the losers”, controversy analysts may find themselves “ending up on the wrong side after all” (p. 309). The “indeterminacy of actors and ‘sides’”, Brian Wynne (1996) suggests, is especially apparent in the case of technoscientific controversies concerning environmental issues (p. 363). Given that computer simulation models provide “the only scientific basis for belief in global warming and its related policies”, Wynne explains, “it would appear politically incorrect to subject it to typical SSK deconstruction” (pp. 367-368). It is “far from clear who is the underdog here”, Wynne contends, “since the poor of the developing world may not appreciate being coerced into environmental controls to avoid something as abstract and distant as global warming” (p. 368). Sheila Jasanoff (1996) also takes aim at the controversy framework, with its “stripped-down, binary distinction between ‘winners’ and ‘losers’” (p. 397). Though it may have been well suited to “the well-defined context of laboratory studies of science”, Jasanoff suggests, the controversy framework is maladapted to the “complex and shifting terrain of social and political disputes involving science and technology” (p. 397).

Despite raising concerns about having one’s work end up on the wrong ‘side’ in a controversy, Ashmore (1996) maintains that neutrality and commitment are not competing approaches, but complementary radicalisms (p. 316). Commitment, on this view, is “not an endorsement”, but a “critique of dominance”, as well as a “refusal to accept the ruling relations” (p. 316). After all, radical practice is supposed to be neither “centred nor comfortable nor secure nor expert nor respected nor honoured” (p. 316). Brian Martin (1996), meanwhile, characterizes Collins’s insistence on methodological neutrality as “misleading”, suggesting in the process that to claim a position of detachment is itself “a value choice” (p. 268). Evelleen Richards (1996) asserts that Collins’s approach is not “human-centred” as much as it is “science-centred” (p. 329). In order to maintain the centrality of science, Richards contends, Collins refuses to engage “with wider social institutions”, preferring instead to limit his analyses to “core-sets [...] of conflicting or competing experts and those they ostensibly enrol; and primarily to those areas of science or those controversies that permit this kind of caging” (p. 337).

In sum, though virtually all contributors to this special issue agreed that the status quo in SSK was largely untenable, this did not also lead to a consensus concerning the way forward. Accordingly, Collins would go on to effectively repackage EPOR without actually addressing any

of its fundamental issues.⁵² Jasanoff went on to develop and refine her framework for the co-production of science and social order.⁵³ Latour, meanwhile, had already shifted his focus away from the study of controversies.⁵⁴ Accordingly, by the late 1990s, the controversy study—i.e., as a genre of STS scholarship dedicated to opening black boxes symmetrically with a view towards explaining how closure is achieved—would no longer command the attention of the most prominent STS analysts, nor that of the discipline as a whole.

2.1.3 – Controversy Studies Today: Closure, Continuance, and Agnotology

Insofar as the controversy study has persisted as a genre of STS scholarship, I suggest, the unresolved tensions identified above have contributed to an inversion of their principal focus.

Historically, controversy analysts have endeavoured to explain how controversies are brought to an end. Sismondo (2010) identifies five such mechanisms of closure,⁵⁵ the first and “most straightforward” of which is through “criticisms and questions about such things as the consistency and plausibility of positions, the solidity of experimental systems, and the appropriateness of experimental or observational procedures” (p. 130). In light of the underdetermination thesis, Sismondo notes, all experiments are susceptible to these challenges, the effectiveness of which will depend on its plausibility, as well as that of its response (p. 130). The second mechanism suggests that closure can be achieved by carrying out new tests, and (or) challenging (appealing to) the validity of the calibration of instruments and (or) procedures. Even in the absence of new data, Sismondo suggests, “calibration can help decide among results” (p. 131). The more complex the instrument, however, the more susceptible it is to challenges. In line with the impossibility of perfectly replicating an experiment, Sismondo continues, “there can be no perfect calibrations of an instrument” (p. 131).

Whereas the first two mechanisms involve legitimating or delegitimizing a particular experimental arrangement, the third mechanism identified by Sismondo concerns legitimation and delegitimation as “a more general category for resolving scientific and technical conflicts” (p. 131). It is especially important, Sismondo continues...

[...] to solidify agreement among members of the core-set, the densely connected group of researchers whose opinions count most. Public consensus in the core-set can officially end a controversy even when peripheral or external researchers maintain deviant views. If the networks are strong enough that everybody who matters understands the consensus, people holding minority positions may find themselves entirely ignored if they continue publishing their views. (p. 131)

⁵² See Collins & Evans (2002) and Collins (2014).

⁵³ See Jasanoff (2005).

⁵⁴ Following Latour (1987), this shift is partially apparent in Latour (1993), and fully apparent by Latour (2004).

⁵⁵ These mechanisms are not, of course, mutually exclusive (save, perhaps, for the fifth mechanism, described below). Instead, depending on the particulars of a given controversy, closure may only be achieved through some combination of these factors.

Those occupying minority positions, Sismondo explains, “can relent, accept their marginalized status, or become dissident scientists, adopting alternative strategies for promoting their views and alternative views of science and its politics” (p. 131). The fourth mechanism, meanwhile, concerns not “validity” or “legitimacy” but “pragmatics” (p. 131). That is, an idea may become widely accepted not because of its perceived validity, but rather “because many researchers can see how to use it” and “how to build on it” (p. 131).

The fifth mechanism described by Sismondo is perhaps the most perfunctory, as it entails ignoring “deviant viewpoints and data” (p. 132). To the extent that a given position “contradicts or runs against the grain of established scientific understandings”, Sismondo explains, “then its proponents usually have to do substantial amounts of work before anybody will treat it seriously enough to bother engaging [with] it” (p. 132). In this sense, this is a mechanism of avoidance as much as it is one of closure. After all, “disputes about deviant ideas or results” may in fact “never arise, or are quickly forgotten, while most people in the field go about their own business” (p. 132).

In my view, however, these five mechanisms, whether operating in tandem or independently of one another, are only capable of explaining how closure is achieved in the context of what might be described as an internalist or strictly compartmentalized framing of scientific controversies.⁵⁶ It could be suggested, of course, that this is indicative of the controversy framework’s ill-suitedness to studying technoscience “in the arenas of the ‘real world’” (Jasanoff, 1996, p. 409). It is my contention, however, that this points to the need to revisit controversy studies with a view towards developing a more nuanced understanding of the mechanisms through which technoscientific controversies are brought to an end (or not).

Today, controversy studies are principally concerned not with the mechanisms of closure, but the means of continuance – that is, with measures intended to artificially prolong, or indefinitely extend, the closure process. Far from an inevitable outcome, this development emerged organically out of concerns in STS regarding relativism in general, and capture in particular. This point was even made explicit by Paul Edwards (2010) in his study of the models, data, and politics of climate change:

Today, an Enlightenment ideal of knowledge as perfect certainty still holds us back from this acceptance [i.e., that climate knowledge is valid, despite being socially constructed]. Oddly enough, so too does a widespread relativism—promoted not least by some of my colleagues in science and technology studies (STS)—that elevates virtually any skeptical view to the same status as the expert consensus. (p. 436)

In Edwards’s estimation, in other words, STS analysts took symmetry to its extreme, and then took it further still. All too often, Edwards claims—albeit, without referencing any specific

⁵⁶ It is particularly telling that the first two mechanisms described above are principally concerned with the design of laboratory experiments, while the third mechanism explicitly privileges Collins’s ‘core set’ of researchers. See also Evelleen Richards’s (1996) critique of Collins’s approach.

examples—“STS scholars characterized all sides in a scientific controversy as equally plausible, and saw knowledge simply as the outcome of struggles for dominance among social groups” (p. 437).⁵⁷

Edwards was, of course, neither the first nor the last to cite the climate change controversy as a means of illustrating the potentially problematic political consequences associated with highlighting the contingent nature of technoscientific knowledge. Wynne (1996), as noted above, suggested that a controversy study of global climate models may, in fact, serve the interests of those opposed to government-mandated controls on greenhouse-gas emissions. Ashmore (1996), meanwhile, proposed a hypothetical scenario in which an SSK-informed analysis could find that tobacco companies “cannot legitimately be blamed for ‘wilful ignorance’ or ‘deliberate refusal’ of the truth about smoking and health” (p. 313). The ‘underdogs’ in this scenario, according to Ashmore, would not be dying smokers, but tobacco companies. These two case studies would later be brought together by Naomi Oreskes and Erik Conway (2010), who describe how a small group of scientists—i.e., the titular “merchants of doubt”—aligned themselves with “think tanks and private corporations to challenge scientific evidence on a host of contemporary issues” (p. 6). In challenging—at the behest of tobacco companies—emerging evidence which linked cigarettes to cancer, these merchants of doubt developed “the Tobacco Strategy”, an obscurantist strategy designed to “attack science and scientists, and to confuse us about major, important issues affecting our lives—and the planet we live on” (p. 7). This “tobacco road”, Oreskes and Conway contend, would eventually “lead through Star Wars [i.e., the Strategic Defense Initiative], nuclear winter, acid rain, and the ozone hole, all the way to global warming” (p. 35).

It was by following the tobacco road that Robert Proctor (2008) first became interested in studying “agnogenesis” – that is, “the deliberate production of ignorance in the form of strategies to deceive” (p. 8). The tobacco road was paved, according to Proctor, on the basis of the idea that

people would continue to smoke so long as they could be reassured that “no one really knows” the true cause of cancer. The strategy was to question all assertions to the contrary, all efforts to “close” the controversy, as if closure itself were a mark of dogma, the enemy of inquiry. The point was to keep the question of health harms open, for decades if possible. (p. 12)

“Interminable controversy”, Proctor explains, “had an immediate value in keeping smokers smoking and legislators pliable” (p. 12). In this context, then, the controversy analyst is tasked not with explaining the mechanisms through which closure is achieved, but rather with identifying the forces responsible for impeding these processes. It follows from this inversion that, insofar as the

⁵⁷ More recently, Erik Baker and Naomi Oreskes (2017) argue that, in today’s “post-truth” world, STS has an obligation not only to “become more comfortable using concepts like truth, facts, and reality outside of the scare quotes to which they are currently relegated”, but also to accept that “the evaluation of knowledge claims must necessarily entail normative judgments” (p. 2). Similarly, in an interview published in the October 2017 edition of *Science*, Latour argues that STS “created a basis for antiscientific thinking and had paved the way for the denial of climate change”, leading him to suggest that there exists a dire need to “rebuild confidence in science” (de Vrieze, 2017).

closure of a controversy results in the production of knowledge, the deliberate prevention of closure entails the production of ignorance.

Proctor refers to the study of ignorance and its production as agnotology.⁵⁸ Ignorance, Proctor explains, “can be made or unmade”, and science may be “complicit in either process” (p. 3). With that in mind, Proctor proposes three “somewhat arbitrary” types of ignorance: first, as a “native state” or “resource”; second, as a “lost realm”, “selective choice”, or “passive construct”; and, third, as a “deliberately engineered and strategic ploy” or “active construct” (pp. 3-10). The first category is, according to Proctor, that which “keep[s] the wheels of science turning” (p. 5). On this view, ignorance as a native state or resource is that which compels those party to a particular controversy to seek closure.

In describing the second category of ignorance—that is, ignorance as a selective choice, lost realm, or passive construct—Proctor explains that “ignorance, like knowledge, has a political geography” (p. 6). In other words, this category is concerned with the processes shaping the distribution of ignorance. After all, research is necessarily selective, which means that to choose a research subject is also to shape the landscape of ignorance, and not just the landscape of knowledge. Ignorance is, as Proctor puts it, the “product of inattention, and since we cannot study all things, some [...] must be left out” (p. 7). Even in science, Proctor notes, “errors often [...] languish, projects go unfunded, opportunities are lost, the dead do not spring back to life, and justice does not always prevail” (p. 7). It follows that “[r]esearch lost is not just research delayed; it can also be forever marked or never recovered” (p. 7). It is also possible, as Proctor goes on to explain, for this type of ignorance to emerge without connection to any conscious choice.

It may well be that no *decision* was ever made to ignore or destroy such knowledge. It is not hard to imagine an “overdetermined” mix of deliberate and inadvertent neglect, though the boundary between these two is not always clear. (p. 8)

The processes through which ignorance is produced or maintained are liable to change over time, Proctor continues, “and once things are made unknown—by suppression or by apathy—they can often remain unknown without further effort” (p. 8).

Proctor’s third category refers to ignorance that is “made, maintained, and manipulated by means of certain arts or sciences” (p. 8). The tobacco road was paved with this particular brand of ignorance.

The idea is one that easily lends itself to paranoia: namely, that certain people don’t want you to know certain things, or will actively work to organize doubt or uncertainty or misinformation to help maintain (your) ignorance. They know, and may or may not want you to know they know, but you are not to be privy to the secret. This is an idea insufficiently explored by philosophers, that ignorance should not be viewed as a simple omission or gap, but rather as an active production. (pp. 8-9)

⁵⁸ See also Robert Proctor & Londa Schiebinger (eds.) (2008).

Ignorance, Proctor explains, “can be actively engineered as part of a deliberate plan” (p. 9). Proctor goes on to cite a number of examples in addition to “the black arts of tobacco manufacturers”, including trade secrets, confidential peer review, and military secrecy (pp. 9-10). While all three forms of ignorance can impede closure, controversy studies have tended in recent years to focus on the deliberate production of ignorance as a means of manufacturing, or artificially prolonging, politically-contentious technoscientific controversies.

In many such cases, controversy analysts have taken a normative stance against what they perceive to be illegitimate attempts to prolong the closure process. Not simply content to expose what she calls “manufactured scientific controversies”, for instance, Leah Ceccarelli (2011) looks to equip “readers and their students” with the tools they need to “confute deceptive arguments about science” (p. 195). In a similar vein, Martin Carrier (2018) offers advice on how to identify “agnotological ploys” and “stay clear of unjustified dissent” (p. 155). Martin Weinel, on the other hand, takes aim at “counterfeit” (2008), “bogus” (2009), and “inauthentic” (2012) scientific controversies. In my view, however, this shift in focus—i.e., away from closure, and towards impediments to closure—lends itself to normative accounts which run the risk of uncritically reproducing the claims of a given ‘core set’ of experts, in addition to breathing new life into long-discredited tropes which conflate scientific expertise with heroism, and those who oppose the established order as villainous purveyors of pseudoscience.

In revisiting controversy studies, then, I am not merely calling for a return to the controversy studies of yesteryear. I am proposing, instead, to revisit controversy studies with a view towards symmetrically examining the mechanisms of closure and continuance, as well as the production of ignorance and knowledge. This new form of symmetry—which I have called generative symmetry—is an integral part of my broader proposal for an engaged controversy study.

2.2 – Towards a Theoretical Framework for an Engaged Controversy Study

2.2.1 – Latour’s Rules of Method for Studying Science in Action

In his 1987 book *Science in Action: How to Follow Scientists and Engineers Through Society*, Bruno Latour describes controversies “a way in” to understanding science, technology, and society (1987, p. 2). If you take two photographs, Latour explains, “one of the black boxes and the other of the open controversies, they are utterly different” (p. 4). While, under normal circumstances, it is impossible to open a black box, this task is rendered “feasible (if not easy) by moving in time and space until one finds the controversial topic on which scientists and engineers are busy at work” (p. 4). To access a black box “before the box closes and becomes black”, then, a controversy analyst needs only to “follow the best of all guides, scientists themselves” (p. 21). It is all well and good “to choose controversies as a way in”, Latour cautions, but controversy

analysts must follow through by attending closely to “the closure of [...] controversies” (p. 7). The closer one gets to a controversy, the more contentious the underlying dispute appears. On this view, to follow a controversy from “man in the street to the men in the laboratory” is not also to go “from noise to quiet, from passion to reason, from heat to cold” (p. 30). The longer a controversy persists, Latour contends, the more technical it becomes, as those most intimately involved actively work to strengthen their claims with reference to existing texts in the literature (pp. 30-37).

In light of these complexities, Latour (1987) proposes seven “rules of method” – i.e., “a priori decisions” which permit STS analysts to “consider all of the empirical facts” in a given controversy (p. 17). I have briefly summarized these rules below:

Rule 1: By examining “facts and machines while they are in the making”, Latour suggests, controversy analysts are better able to avoid “preconceptions of what constitutes knowledge”, permitting them to “watch the closure of the black boxes” while taking care to “distinguish between two contradictory explanations of this closure, one uttered when it is finished, the other while it is being attempted” (pp. 13-15).

Rule 2: Controversy analysts, Latour asserts, must attend not to “the intrinsic qualities” of any given statement, claim, artifact, or mechanism, but rather to “the transformations it undergoes later in other hands” (p. 59).

Rule 3: Given that “the settlement of a controversy is *the cause* of Nature’s representation not the consequence”, Latour contends, “*we can never use the outcome – Nature – to explain how and why a controversy has been settled*” (p. 99).

Rule 4: Given that “the settlement of a controversy is the *cause* of Society’s stability, we cannot use Society to explain how and why a controversy has been settled” (p. 144). “We should consider *symmetrically*”, Latour adds, “the efforts to enrol human and non-human resources” (p. 144).

Rule 5: Controversy analysts, Latour suggests, should remain undecided “as to what technoscience is made of; to do so, every time an inside/outside division is built, we should follow the two sides simultaneously, making up a list, no matter how long and heterogeneous, of all those who do the work” (p. 176). What matters, in other words, is not whether something pertains to the ‘natural’ or the ‘social’, but how it functions in relation to the rest of the network.

Rule 6: Rather than classifying individuals as “irrational”, or looking to identify instances in which some “rule of logic has been broken”, controversy analysts should instead “consider the angle, direction, movement and *scale* of the observer’s displacement” (p. 213).

Rule 7: Rather than “attributing any special quality to the mind or to the method of people”, controversy analysts should “examine first the many ways through which inscriptions are gathered,

combined, tied together and sent back” (p. 258). STS analysts should only “speak of cognitive factors”, Latour explains, “if there is something unexplained once the networks have been studied” (p. 258).

Together, these rules form a framework which, in its current form, would not be appropriate for use in this study. Thus, I aim in the next section to devise a series of theoretical and conceptual solutions capable of permitting me to adapt this framework for the purposes of this study.

2.2.2 – Outstanding Problems with Latour’s Rules of Method

In this subsection, I aim to identify and address the most significant problems embedded in, or otherwise unaddressed by, Latour’s rules of method, and to address these issues with a combination of theoretical and conceptual solutions.

First, Latour’s network-based approach to studying controversies (ANT) does not oblige, or even encourage, controversy analysts to attend to the particulars of place. ANT folds entire landscapes into “non-geographic networks”, engendering an approach to studying controversies which obscures the particularities of the local landscape, in addition to overlooking “important features useful for explaining *how* science travels” (Henke & Gieryn, 2008, p. 355). ANT, Warwick Anderson and Vincanne Adams (2008) contend, conceives of the local in a manner that is not only “quite abstract”, but also “depleted of historical and social specificity” (p. 190).

In order to address this issue, I conceive of the controversy study as that which entails the act of opening not just a single black box, but a multi-sited, geographically-situated black box. This means attending not just to ‘centres of calculation’, but also to the other sites which together constitute the black box, as well as to the particularities which characterize the local landscapes situated in between these points.

Second, despite extending agency to nonhuman actors, ANT makes problematic assumptions concerning the stability of objects. Networks, Latour (1987) suggests, function in a manner which produces “immutable and combinable mobiles” – that is, charts, tables, and other representations which collapse space and time, reducing distant phenomena to mere inscriptions on a page (p. 227). The production of immutable mobiles, according to Latour, makes “domination at a distance feasible” (p. 223). In suggesting that, “[o]nce an object has been defined and characterized, it can be trusted to behave similarly in all similar situations” (Sismondo, 2010, p. 91), however, Latour effectively black boxes nonhuman actors.

In order to address this issue, I suggest conceiving of the controversy study as that which obliges controversy analysts not to examine immutable mobiles, but to follow itinerant boundary objects. Itinerant boundary objects inhabit multiple social worlds at any given point in time, and are thus associated with meanings that are not static but contingent – shifting not only as they

travel through borderlands,⁵⁹ but also as a consequence of multilateral negotiations between those occupying the various social worlds they inhabit. This conception of itinerant⁶⁰ boundary objects⁶¹ acknowledges the agency of nonhuman actors, while also highlighting their inability to “change themselves reflexively” or “voluntarily manage membership problems” in response to questions of identity and meaning (Star & Griesemer, 1989, p. 412). On this view, networks are stabilized not as a result of the direct intervention of a network-building, would-be scientific-managerial-entrepreneurial hero, but indirectly as a product of the coherence generated through boundary work.⁶²

Third, Latour’s networks function in a manner which funnels all actors towards a single, narrow obligatory passage point. This results in a narrow network map characterized by a series of one-to-many interactions in which the individual scientist-manager-entrepreneur reframes, mediates, and translates the interests of myriad actors in accordance with his own ends. Consequently, the network maps thus produced are unlikely to reflect the complexities which typically characterize technoscientific controversies.

In order to address this issue, I conceive of the controversy study not as an exercise in charting the flow of actors through a single obligatory passage point, but as an ecological analysis in which the contours of the controversy under study are mapped from multiple perspectives. In so doing, I build on Susan Leigh Star and James Griesemer’s (1989) rejection of the single-perspective, one-to-many network maps of ANT in favour of the “many-to-many mapping” permitted by an ecological approach in which “several obligatory points of passage are negotiated with several kinds of allies” (p. 390). As Star and Griesemer go on to concede, however, it is simply “not possible” to consider symmetrically all relevant perspectives in a given institutional context (p. 396). Ultimately, controversy analysts are constrained by the particular characteristics of the archive, which is itself asymmetrical in the sense that it privileges particular perspectives and has nothing to say about others.⁶³ Star and Griesemer propose to address this issue by conducting a re-mapping of the network from multiple “starting points”, including a number of “peripheral” or “subsidiary” perspectives (p. 396), an approach I have adopted in turn.

Fourth, Latour’s network-based approach tends to privilege the perspectives of individual scientists, managers, or entrepreneurs – that is, those individuals thought to be building networks,

⁵⁹ See Edward Said (1978; 1983; 1993; 1994); Gloria Anzaldúa (1987); Warwick Anderson & Vincanne Adams (2008); and Zoe Todd (2014).

⁶⁰ See Deborah Heath (1998) and Joe Dumit (2004; 2012).

⁶¹ See Susan Leigh Star & James Griesemer (1989).

⁶² See Thomas Gieryn (1983; 1995; 1999; 2008).

⁶³ In this essay, for instance, Star and Griesemer admit to being “forced to consider most fully” the entrepreneurial perspectives of Joseph Grinnell, director of the Museum of Vertebrate Zoology, and Annie Montague Alexander, the museum’s founder (p. 396).

translating interests, enlisting allies, and constructing obligatory passage points with a view towards bringing about the closure of a particular controversy. By encouraging STS analysts to follow network-building, would-be scientific-managerial-entrepreneurial heroes, in other words, ANT distributes agency asymmetrically. This perspectival asymmetry may, among other potential issues, obscure important characteristics of the controversy under study. Indeed, according to Susan Leigh Star and James Griesemer (1989), the “*n*-way nature of *interessement* [...] cannot be understood from a single viewpoint” (p. 389). While this leads Star and Griesemer to call for the inclusion of “peripheral” or “subsidiary” perspectives, this is only recommended as a means of “test[ing] the robustness of the network” (p. 396). In order to properly address this perspectival asymmetry, controversy analysts must go beyond the mere inclusion of peripheral perspectives.

In order to address this issue, I follow feminist STS scholars Donna Haraway (1988; 1989) and Sandra Harding (1986; 1993; 1998) in privileging ‘views from below.’ Just as controversies represent ‘a way in’ to understanding science, technology, and society, I conceive of partial, situated, and subjugated perspectives as ‘a way in’ to understanding controversies. Following Haraway (1988), I suggest that both natural and social realism are “god tricks” which offer “vision from everywhere and nowhere equally and fully” (p. 584). The alternative to relativism, on this view, is not the totalizing ‘view from nowhere’ of positivist technoscience, but “partial, locatable, critical knowledges” (p. 584). Similarly, following Harding (1993), I aim in this study to “start thought from marginalized lives”, and to “take everyday life as problematic” (p. 50). Critical studies of scientists and their communities, Harding suggests, “can be done only from the perspective of those whose lives have been marginalized by such communities” (p. 69).

Fifth, seeing from below, as Haraway (1988) warns, is “neither easily learned nor unproblematic” (p. 584). How, then, can a controversy analyst derive unique insights from subjugated perspectives without also reproducing the processes which gave rise to the underlying subjugation to begin with?

In order to address this issue, I follow Warwick Anderson and Vincanne Adams (2008) in privileging “views from elsewhere” (p. 183). Anderson and Adams’s approach to postcolonial studies of technoscience is rooted in Edward Said’s travelling theory,⁶⁴ which they characterize not just as a critical consciousness, but also as a “spatial sense, an awareness of differences between situations and an appreciation of resistances” (p. 183).

[Said’s] orientation is postcolonial primarily in the sense that it relentlessly insists on revealing the geographical predicates of Western cultural forms, the theoretical mapping and charting of territories that are otherwise hidden. As the imperialist model [...] is disassembled, “its incorporative, universalizing, and totalizing codes [are] rendered ineffective and inapplicable.” (p. 183)

⁶⁴ See Edward Said (1978; 1983; 1993; 1994).

To privilege views from elsewhere, in other words, is not only to multiply sites of technoscience, but also to acknowledge and reveal “hidden geographical notations and power relations”, as well as to examine “mechanisms and forms of travel between sites” (pp. 183-184). This requires controversy analysts to be “sensitive to dislocation, transformation, and resistance; to the proliferation of partially purified and hybrid forms and identities; to the contestation and renegotiation of boundaries; and to recognizing that practices of science are always multi-sited” (p. 184). The postcolonial critical consciousness, Anderson and Adams suggest, “possesses the advantages of historical and geographical complexity and of political realism” (p. 184).

Finally, to privilege ‘views from below’ and ‘views from elsewhere’ is also to raise the problem of activism. The field of STS has long been divided on the question of activism – that is, whether outwardly political research ought to be permitted or encouraged, celebrated or disavowed. This is not just about capture, but also about broader questions concerning explicit political commitments, and whether they have a deleterious impact on the quality of STS research. Does tolerance for activist research projects undermine the credibility of STS as a whole?

In reflecting on these questions, Steve Fuller (1993) proposed to separate the field into two distinct sects, with the theoretically-inclined High Church at one end of the field, and the politically-engaged Low Church at the other. The High Church, according to Fuller, “tends to be interested in the special epistemic status that science enjoys vis-à-vis other forms of knowledge” (p. xii). The “Low Church”, by contrast, “focuses more on the problems that science has caused and solved in modern society” (p. xii). Fuller originally proposed this distinction in order to critique what he characterizes as the High Church “tendency to become a version of the thing it studies” (p. xii). In the process of investigating “how science organizes itself internally and projects itself externally”, Fuller argues, the High Church came to uncritically mimic “those very processes to acquire academic respectability and expert authority” (p. xii). From the perspective of the Low Church, then, the High Church was not only “preoccupied with proliferating jargon, establishing self-contained citation networks, and solidifying a canon”, it was also “losing sight of the most important reason for its pursuit—the patent contradiction that science is a universal form of knowledge, yet its production and distribution remains in the hands of an elite” (p. xii). Fuller further distinguishes these sects on the basis of how they interpret the radicalism of STS. The High Church, Fuller contends, is radical because of its commitment to “reflexivity”, whereas the radicalism of the Low Church is rooted in its commitment to “emancipatory” politics (p. xii).

Edward Woodhouse, David Hess, Steve Breyman, and Brian Martin (2002) describe this divide in slightly different terms, placing the ostensibly “politically neutral” academic wing in opposition to the “politically engaged” activist wing (p. 298). Despite indicating that they do not

wish to “contribute to an ongoing divide in the field” (p. 298), Woodhouse et al. reproduce various assumptions concerning the types of research and researchers occupying these wings. According to Woodhouse et al., in other words, activist-oriented research projects may have “practical utility”, but they are less likely to be held out as an example of “scholarly excellence” (p. 298). That the activist wing of STS is the intended target of this provocation is later made even more apparent, when it is suggested that activist-oriented researchers “need to admit their own partiality and fallibility, and devise ways of proceeding in a world more multifaceted than those committed to social causes sometimes have acknowledged” (p. 311). Accordingly, they propose to expand Fuller’s bifurcation of the field into a tripartite division of sects: (1) scholar-oriented STS, (2) policymaker-oriented STS, and (3) activist-oriented STS. Woodhouse et al. refuse to provide a clear justification for their proposal to divide the field even further, opting only to describe it “merely as a heuristic for future discussions and interventions into our own research practices” (p. 311). In my view, however, Woodhouse et al.’s motivation seems clear: to isolate activist-oriented researchers so that the rest of the field—i.e., scholar- and policymaker-oriented STS—can get on with the work of catering to the needs of the “classical audiences of STS research” (p. 311).

In proposing to divide the history of STS into three distinct ‘waves’, Harry Collins and Robert Evans (2002) propose a different kind of tripartite division of the field. First-wave STS, on this view, was concerned with “understanding, explaining and effectively reinforcing the success of the sciences, rather than questioning their basis” (p. 239). In its second wave, STS aimed to show that “it is necessary to draw on ‘extra-scientific factors’ to bring about the closure of scientific and technical debates” (p. 239). The success of the second wave, Collins and Evans suggest, has left STS analysts without the ability to “distinguish between experts and non-experts” (p. 239). It is on this basis that Collins and Evans call on STS analysts to “*build* categories having to do with knowledge [...] to develop a ‘knowledge science’ using knowledge and expertise as *analysts’ categories*” (p. 240). To that end, Collins and Evans outline their vision for a third wave in STS, which they call Studies of Expertise and Experience (SEE). Whereas Woodhouse et al.’s proposal divides the field into three sects, thereby isolating activist researchers but otherwise permitting them to continue their work, Collins and Evans’s proposal to divide the history of the field into three waves would, in effect, render activist research in STS anachronistic.

SEE, as Collins and Evans describe it, is about seeking “a special rationale for science and technology even while we accept the findings of Wave Two”, and it aims to accomplish this by raising “the same kind of questions about what makes science special as [those raised by] sociologist Robert Merton” (pp. 240-241). In effect, then, SEE aims to establish a new, more durable set of Mertonian norms. To that end, Collins and Evans propose to resurrect and

reconfigure the “old distinction between the political sphere and the sphere of expertise” (p. 270). Scientists, on this view, must be understood not as “generalists” whose expertise knows no bounds, but as “specialists” (p. 270). It follows, for Collins and Evans, that the opinions of the “core-set” of experts—i.e., those “deeply involved in experimentation or theorization which is directly relevant to a scientific controversy or debate”—should be privileged over those of the contributory and interactional experts occupying the outer rings of the target diagram (p. 242). Despite conceding that “it is not always easy to define the boundaries of a core-set, because disputes within core-sets often involve the ‘boundary-work’ of trying to define people [...] as legitimate or illegitimate commentators” (p. 242), Collins and Evans insist that it makes sense “to categorize experts [...] in spite of the boundary problems” (p. 255). “The trick”, they suggest, “is not to become paralysed by these problems, but to proceed with an imperfect set of classifications, just as other experts [read: scientists] proceed” (p. 255). More than a decade later, Collins (2014) is still resorting to “trick[s]” to justify his desire to “treat science as special” (p. 81).⁶⁵

It is my contention that, just as scientists derive power from their right to determine the boundary between the natural and the social,⁶⁶ those who advocate for politically ‘neutral’ (read: conservative) research in STS derive power from the compartmentalization of theory and method, commitment and rigor, activism and excellence, expertise and politics. Indeed, Collins’s work is rooted in a sort of soft foundationalism in which he concedes that science is imperfect but nevertheless insists that it provides an ideal model for STS to follow. This is why, despite readily conceding that the “relativist’s world is a world without foundations” (Collins & Yearley, 1992, p. 324), Collins is able to gloss over theoretical contradictions by appealing to the structures, rhetorics, and methods of science.⁶⁷ In this context, divisions between science and the social, nature and culture, politics and expertise, are revealed to be discursive effects of power⁶⁸ and not pre-existing states of nature.⁶⁹ Past attempts to divide the field of STS, I contend, must be understood along similar lines.

To conceive of STS as a field of study characterized by divisions is, as Sismondo (2008) suggests, also to ignore “the numerous bridges between the Churches” (p. 13). So numerous are these bridges that “they form another terrain in which the politics of science and technology are explored” (p. 13). This is a space, Sismondo contends, where “theoretically sophisticated analyses

⁶⁵ Indeed, Collins has been calling for “an end to the history of the field” (Callon & Latour, 1992, p. 344) since the early 1990s.

⁶⁶ See Latour (1987; 1993) and Callon & Latour (1992).

⁶⁷ Collins (1996) argues, for instance, that a “scientific” approach should be brought to bear on the problems arising out of the politics of SSK, even if “science is not what we once thought it to be” (p. 241).

⁶⁸ See Michel Foucault (1972; 1977; 1980), Stuart Hall (1992), and Thomas Lemke (2002).

⁶⁹ See Latour (1987; 1993) and Callon & Latour (1992).

of science and technology in explicitly political contexts” are, in fact, possible (p. 13). Sismondo situates the research projects proposing to occupy this space by way of two questions:

First, do they aim at results of theoretical or fundamental or wide importance for understanding the construction of science and technology? Second, do they aim at results of political or practical value for promoting democratic control of and participation in science and technology? If we ask these two questions simultaneously, the result is a space defined by two axes: high and low levels of ‘fundamentality’ and high or low levels of ‘political value.’ (p. 20)

Sismondo refers to the resulting “region of intellectual space” as the “engaged program” of STS (p. 20). From this region, one observes that there exists “not a conflict between the goals of theoretical interest and activism but a potential overlap” (p. 21). It is here, Sismondo argues, where the engaged program of STS permits theoretically-rigorous and activist-oriented examinations of “public sites, with a focus on interactions at the interface of science, technology, law, and government” (p. 21).

In order to address the problem of activism, then, I follow Sismondo (2008) in conceiving of the engaged program as a congregational bridge, even though I do not believe he goes far enough in characterizing the divisions thus bridged as “increasingly irrelevant” (p. 21). These divisions are discursive effects of power, not states of nature. Accordingly, they may dissuade STS analysts from examining crucial features of the controversy under study, lest such an examination be deemed an overtly political act. In order to make sense of the nuanced complexities which characterize twenty-first century technoscientific controversies, I suggest, controversy analysts must attend to politics and theory in equal measure.

2.2.3 – Commitments for an Engaged Controversy Study

In this subsection, I aim to bring the insights generated in the preceding sections to bear on a theoretical framework appropriate for use in this study. To that end, I propose a framework based not on rules of method, but commitments for an engaged controversy study.

Commitment 1: Active controversies represent ‘a way in’ to understanding science, technology, and society. The study of active controversies generates crucial insights into the messiness of technoscientific practice that would otherwise be obscured by the black-boxing process which typically marks the end of controversies. Accordingly, an engaged controversy analyst studies active technoscientific controversies by opening black boxes symmetrically.

Commitment 2: Just as controversies represent ‘a way in’ to understanding science, technology, and society, ‘views from below’ and ‘views from elsewhere’ represent ‘a way in’ to understanding controversies. By multiplying these perspectives, and mapping the contours of the controversy thus revealed, an engaged controversy analyst examines complex, contingent, geographically-situated ecologies rather than one-to-many networks built by would-be scientific-managerial-entrepreneurial heroes.

Commitment 3: Black boxes are always multi-sited, obliging the engaged controversy analyst to attend not only to how the relevant actors and/or objects travel from site to site, but also to the local particularities of each individual site, and everything in between. In mapping the controversy under study, in other words, an engaged controversy analyst must take great care to attend to the particularities of place.

Commitment 4: An engaged controversy analyst must attend to three related forms of symmetry: symmetry,⁷⁰ supersymmetry,⁷¹ and generative symmetry.⁷² First, given that the settlement of controversies produces representations of, and stabilizes divisions between, nature and society, closure cannot be explained with reference to social⁷³ or scientific factors alone. This means that an engaged controversy analyst must subject all ‘sides’ in the controversy under study to the same analyses, in addition to rejecting cognitive explanations entirely. Second, the engaged controversy analyst must consider the actions of both human and, to the greatest extent possible without resorting to ‘God tricks’, nonhuman actors. Nonhuman actors are, on this view, understood to be mobile, and—like human actors—they may occupy multiple social/cultural/natural worlds at any one time. The meanings associated with nonhuman actors are therefore contingent upon processes of negotiation. Unlike human actors, however, nonhuman actors cannot reflexively react to these negotiations or voluntarily resolve issues of identity. Third, the engaged controversy analyst must attend both to the mechanisms of closure and the impediments to the same. This means attending not only to the production of knowledge, but also to the production of ignorance, with a view towards providing a more nuanced account of how controversies are brought to a close or remain open.

Commitment 5: In addition to rejecting a priori distinctions between nature and culture, social and scientific, inside and outside, an engaged controversy analyst should refuse to take for granted that distinctions such as expert/non-expert, activist/theorist, domination/submission, and so on, represent states of nature as opposed to the discursive effects of power. In addition to representing a key requirement for employing a postcolonial critical consciousness, this move safeguards against the reproduction of simple binary relationships, while encouraging a more contingent approach in which conditions of possibility are continually renegotiated in relation to a versatile equilibrium.

⁷⁰ See David Bloor (1976).

⁷¹ See Michel Callon (1984); Bruno Latour (1987); and John Law (1987).

⁷² See 2.1.3 – Controversy Studies Today: Closure, Continuance, and Agnotology.

⁷³ I use the term ‘social’ in this dissertation to refer to something more than mere social or extra-scientific factors. My exploration of ‘the social life of sockeye’, for instance, combines perspectives on sockeye rooted in both local knowledges and fisheries biology on the one hand, with insights derived from my exploration of controversial salmon in B.C. on the other.

Commitment 6: An engaged controversy analyst should practice reflexivity at every stage in her study. In relying on ‘views from below’ and ‘views from elsewhere’, for instance, an engaged controversy analyst privileges perspectives that are situated, embodied, and—by extension—accountable, in addition to backgrounding those that are ostensibly everywhere and nowhere, and—by extension—unaccountable. It is vital that an engaged controversy analyst makes clear to the reader how her own situated, embodied perspective relates to the controversy under study, in addition to identifying any instances in which her own active intervention produced an impact on research findings.

Commitment 7: In light of the potential for research to be captured, and given the impossibility of compartmentalization or neutrality, an engaged controversy analyst must not only take great care in choosing her research topic, adopting a theoretical framework, and devising a methodological approach, she must also consider how each of these choices bear on the others. In other words, an engaged controversy analyst must approach research as praxis, taking great care at every step along the way to maintain both theoretical fundamentality and political value. If the engaged controversy analyst satisfies this rule, together with the preceding six, capture is not something to be feared. On the contrary, capture is indicative of a study that is not only theoretically sound and politically engaged, but which also speaks to audiences both within the academy and beyond.

2.3 – Summary and Review

In this chapter, I revisited controversy studies with the aim of situating and developing my proposal for an engaged controversy study. Along the way, I brought generative symmetry to bear on existing articulations of symmetry, devised theoretical and conceptual solutions to address outstanding tensions, and combined the insights thus generated to articulate a series of commitments which, together, serve as the theoretical basis for this dissertation.

In section 2.1, I surveyed the history of controversy studies in STS by exploring how the meanings associated with the act of opening a black box symmetrically have changed over time. I suggested that Bloor’s (1976) proposal for a strong programme in the sociology of scientific knowledge gave rise to two dominant approaches to studying technoscientific controversies: actor-network theory (ANT) and the empirical programme of relativism (EPOR). The differences in these approaches, I suggested, are rooted principally in divergent interpretations of the symmetry requirement. By the mid-1990s, however, the symmetry debate gave way to a broader, more contentious one concerning the politics of SSK, the potential for controversy studies to be captured, the validity of explicit political commitments, and the desirability of neutrality. Ultimately, this debate failed to produce a consensus concerning the way forward for controversy studies,

contributing to the subsequent decline of this once-prominent genre of STS scholarship. Insofar as controversy studies persist today, I suggested, unresolved tensions have inverted their primary focus. Today, controversy studies are principally concerned not with describing the production of knowledge through the mechanisms of closure, but rather with the production of ignorance through the means of continuance. In this dissertation, I propose to unite these approaches, bringing generative symmetry to bear on controversy studies in STS.

In section 2.2, I built on Latour's (1987) rules of method to develop a theoretical framework for an engaged controversy study. To that end, I identified a number of outstanding issues embedded in, or unaddressed by, Latour's network-based approach to studying controversies, and proposed to address these problems with a combination of conceptual (i.e., multi-sited black boxes and itinerant boundary objects) and theoretical solutions (i.e., replacing networks with ecologies, seeing from below with feminist STS, and seeing from elsewhere with postcolonial technoscience). In positioning this dissertation as an example of what is possible under the engaged program in STS, I suggested that historical divisions in the field over activist scholarship represent discursive effects of power rather than pre-existing states of nature. In addition, I argued that to shy away from political engagement is also to potentially obscure important features of the controversy under study. Accordingly, I asserted that political engagement and theoretical fundamentality are both needed to make sense of the nuanced complexities which typically characterize twenty-first century technoscientific controversies. Finally, I outlined seven commitments for an engaged controversy study which, together, provide this dissertation with its theoretical basis.

CHAPTER 3 – METHODOLOGY: RESEARCH AS PRAXIS

“From the vantage point of the colonized, a position from which I write, and choose to privilege, the term ‘research’ is inextricably linked to European imperialism and colonialism. The word itself, ‘research’, is probably one of the dirtiest words in the indigenous world’s vocabulary.”

—Linda Tuhiwai Smith (1999, p. 1)

In this chapter, I describe my three-phase, multi-method approach to conducting research as praxis. In section 3.1, I explain how my methodology brings itinerant-ethnographic and counter-mapping techniques to bear on the virtual analysis of the social life of things. In section 3.2, I describe in detail the three overlapping phases which together constitute this study. In section 3.3, I provide a brief summary and review of the preceding sections.

3.1 – Designing Research as Praxis

3.1.1 – Itinerant Ethnography, The Social Life of Things, and Contrapuntal Cartography

The ethnographic field, conventionally understood as “a physical location (or multiple locations)”, may also be considered a “habitus” – that is, “a set of embodied practices [...] that involves both ‘dwelling’ and ‘traveling’” (Heath, 1998, p. 72). Itinerant ethnographies, Deborah Heath (1998) suggests, are especially valuable in studies featuring “quasi subjects” and “quasi objects” which refuse to “stay put” (p. 71). For Heath, this involves following “the products of visualization technologies including photography, autoradiography, video, and computer-assisted graphics” (p. 72). “Revealing things happen”, Heath asserts, when following “interlocutors and their practices across various frontiers”, or monitoring “the traffic from elsewhere in and out of a given locale” (p. 71).

In order to make sense of the “concrete, historical circulation of things”, Arjun Appadurai (1986) suggests, one must “follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories” (p. 5). To offer a “biography of a thing”, Igor Kopytoff (1986) argues, is to “ask questions similar to those one asks about people” (p. 66). Joe Dumit (2004) builds on these approaches to make sense of the multiple meanings assigned to brain images produced through positron emission tomography (PET) scans (p. 10). Dumit follows these images around in order to “account both for the multiplicity of PET’s meanings and practices and for the powerful circulation of images into different social arenas” (p. 11). In the process, Dumit foregrounds both “biographies” of brain images and the virtual communities of which they are a part (p. 11).

Zoe Todd (2014) challenges anthropologists to conceive of human-fish relationships as sites of active engagement. By attending to “fish pluralities” and “human-fish relationships”, Todd contends, a more nuanced view emerges of “the dynamic strategies that northern Indigenous people [...] use to navigate shifting environmental, political, legal, social, cultural, and economic

realities in Canada's North" (pp. 217-218). By foregrounding human-fish relationships, Todd pushes back against the "anthropocentrism of contemporary Euro-Western political discourses", offering in the process "an alternative view of humans and animals engaged in relationships that transcend dualistic notions of nature/culture and human/animal" (p. 218).

Nicola Green (1999) calls on ethnographic researchers to reconsider "conventional constructions of the field and fieldwork" (p. 409). These conventions are increasingly ill-suited, Green suggests, to contending with the "geographical, social, technical, and conceptual uncertainties" (p. 409) characterizing technoscience at the turn of the century. These studies demand not merely a multi-sited approach, but one that allows for greater flexibility⁷⁴ in conceiving of the ethnographic field more generally. In this dissertation, I answer Green's challenge by bringing itinerant-ethnographic and contrapuntal-cartographic or counter-mapping techniques to bear on a virtual analysis of the social life of things and fish pluralities.

Matthew Sparke (1998) developed his notion of contrapuntal cartography by building on existing approaches⁷⁵ to conceiving of "cartography as an ambivalent (post)colonial mode of spatial representation" that is susceptible to "cartographic destabilization through remapping" (p. 467). This idea, that "a contrapuntal *reading* of cartography" is possible, builds on Edward Said's⁷⁶ use of the "musical metaphor to break down singularized and unidirectional understandings of the culture of imperialism" (p. 467). Contrapuntal reading, Sparke explains, "involves a strategic revoicing of the subdominant to make it equal to the dominant and thus to orchestrate a balance that can potentially edify and educate an audience about the power relations of culture" (p. 467). In *Delgamuukw v British Columbia*, as Sparke goes on to explain, "cartographic tools and arguments" were not only employed by the provincial and federal governments, they also formed "a key component of the Wet'suwet'en and Gitksan people's own attempts to outline their sovereignty in a way the Canadian court might understand" (p. 468). In producing maps of their traditional, unceded territories to support their claims to sovereignty before the Supreme Court of Canada, the Wet'suwet'en and Gitksan peoples demonstrated that cartographic representations have the potential to destabilize colonial power and authority.⁷⁷

Indeed, as Dallas Hunt and Shaun Stevenson (2017) explain, counter-mapping techniques can be used to "contest the colonizing work of dominant mapping practices, and to assert

⁷⁴ Emily Martin's (2010) study of "brain-based accounts of subjectivity" (p. 366) draws on ethnographic data collected through conventional fieldwork, academic conferences, and online discussion groups, exemplifying this more flexible approach to conceiving of the ethnographic field.

⁷⁵ See Jane Jacobs (1996).

⁷⁶ See Edward Said (1993).

⁷⁷ First Nations in B.C. have since continued to produce use maps not just to support treaty negotiations (e.g., Te'mexw Treaty Association, 2013), but also to facilitate environmental assessments (e.g., Tsleil-Waututh Nation: Treaty, Lands & Resources Department, 2015).

alternative, potentially decolonizing geographies” (p. 2). Hunt and Stevenson caution, however, that “the very strategies used to resist dominant mapping techniques may also circumscribe the kinds of interventions that are possible”, and that, in some instances, counter-mapping practices may even “reinscribe elements of settler colonial cartography” (p. 2). In light of this possibility, I follow Audra Simpson (2007) and Kim Tallbear (2013a) by refusing to subject Indigenous peoples to the social-life analyses facilitated by counter-mapping techniques. In order to further contend with the “power-laden ambivalences” (Sparke, 1998, p. 464) which characterize the application of contrapuntal-cartographic or counter-mapping techniques, I attend in this dissertation to Foucauldian notions of discourse.

3.1.2 – Foucauldian Discourse, Governmentality, and Colonial Violence

In the “most general” and “vague” sense, Michel Foucault (1972) explains, discourse is not just “a group of verbal performances” which is itself the product of a “group of signs”, but also “a group of acts of formulation, a series of sentences or propositions” (pp. 120-121). This conception of discourse is “constituted by a group of sequences of signs, in so far as they are statements, that is, in so far as they can be assigned to particular modalities of existence” (p. 121). It is possible, on this view, to identify “in the conditions of emergence of statements, exclusions, limits, or gaps that [...] validate only one series of modalities, enclose groups of co-existence, and prevent certain forms of use” (p. 124). Discourse, it follows for Foucault, “is made up of a limited number of statements for which a group of conditions of existence can be defined” (p. 131). This understanding of discourse, Stuart Hall (1992) explains, entails the rejection of conventional distinctions between “thought and action, language and practice” (p. 201). The “discursive field” which results from this “undermines the distinction between true and false statements – between science and ideology” (p. 205). When power facilitates the discursive reproduction of truth, in other words, a “regime of truth” is the result (p. 205). On this view, discourse and its relation to knowledge must be understood “not in terms of types of consciousness, modes of perception and forms of ideology, but in terms of tactics and strategies of power [...] deployed through implantations, distributions, demarcations, control of territories and organisations of domains” (Foucault, 1980, p. 77).

Foucault’s notion of governmentality, as Thomas Lemke (2002) articulates it, rests on his conception of “government” as “conduct” in general, and the “conduct of conduct” in particular (p. 50). For Foucault, in other words, “government” refers not just to the act of “governing others”, but also to “governing the self” and everything in between (pp. 50-51). The problem of government, on this view, refers to “governing [...] forms of self-government” and, in so doing, “structuring and shaping the field of possible action of subjects” (p. 52). Foucault suggests that “[g]overning people

is not a way to force people to do what the governor wants”, but rather that “it is always a versatile equilibrium with complementarity and conflicts between techniques which assure coercion and processes through which the self is constructed or modified by himself” (qtd. in, p. 53). Foucault maintains that power is not something that can be unproblematically possessed, exercised, or traced to a single source. Instead, Foucault frames states of domination as “the effects of technologies of government” – that which accounts for the “systematization, stabilization and regulation of power relationships”, and which may therefore “lead to a state of domination” (p. 53).

Traditionally, Foucault (1977) suggests, “the right to punish” was one and the same as “the personal power of the sovereign” (p. 80). Beginning in the late-eighteenth and early-nineteenth century, however, this monarchical “super-power” gradually gave way to a series of reforms designed to rearrange “the power to punish, according to modalities that render it more regular, more effective, more constant and more detailed in its effects” while simultaneously “diminishing its economic cost [...] and its political cost” (pp. 80-81). This meant not only the end of “torture as a public spectacle” (p. 7), but also that punishment had left “the domain of [...] everyday perception” and entered “that of abstract consciousness”, thus becoming “the most hidden part of the penal process” (p. 9). As a result of this shift, Foucault contends, punishment went from being inflicted directly on the body, as part of an explicit, public spectacle, to being imperceptibly—that is, discursively—inflicted through the body. This parallels, I suggest, the Government of Canada’s shift away from its explicit policy of assimilation—that which openly provided justification for myriad acts of violence, inflicted directly on Indigenous bodies⁷⁸—towards a recognition-based approach to reconciliation⁷⁹ which generates discursive—that is, not immediately perceptible—acts of colonial violence.⁸⁰

To perceive these acts of violence is also to have a sense of how power functions discursively. This conception of power, it should be noted, is not inherently ‘bad’ or ‘good’, ‘ethical’ or ‘unethical.’ Instead, it functions in a manner which establishes “the limits of tolerance, [...] giving free rein to some, putting pressure on others, [...] excluding a particular section, or making another useful, [...] neutralizing certain individuals and [...] profiting from others” (p. 272). In short, Foucault’s notion of discourse is concerned with the processes through which conditions of possibility are established and re-established in perpetuity. This opens up space for more nuanced

⁷⁸ See J. R. Miller (1996) and John Milloy (1999).

⁷⁹ See Glen Sean Coulthard (2007; 2014)

⁸⁰ This is not to suggest that Indigenous peoples were simply passive victims of this policy, or that the legacies associated with this policy do not persist in justifying explicit acts of violence (whether physical, sexual, emotional, or otherwise) against Indigenous peoples. Today, however, colonial violence is meted out in a fundamentally different manner than in the past. Accordingly, a new methodological approach is needed to both perceive and study these acts.

analyses of discourse – that is, analyses characterized not by simplistic binaries like domination and submission, but by complex, multi-directional relationships and entangled geographies.

As Michael Arribas-Ayllon and Valerie Walkerdine (2008) point out, however, a number of difficulties arise when attempting to convert Foucault's understanding of discourse into a method of analysis (p. 110). Discourse, for Foucault, refers not merely to "a particular instance of language use – a piece of text, an utterance or linguistic performance", but rather to the "rules, divisions and systems of a particular body of knowledge" (p. 114). Foucault was interested, more specifically, "in the rules that govern the possibility of true and false statements rather than speculating on the collective meaning of such statements" (p. 115). Arribas-Ayllon and Walkerdine note that though his "explanation of the 'statements of discourse' eludes precise definition", Foucault nevertheless emphasizes the distinction "between formal structures of meaning and historically contingent rules that render an expression (a phrase, a proposition or a speech act) discursively meaningful" (p. 115). Meaning, on this view, "is not tied to the internal structure of language (signification) but the external conditions of its expression (the rules that govern a way of speaking)" (p. 115).

How, then, does one analyze discourse in line with Foucauldian understandings of the same? According to Arribas-Ayllon and Walkerdine, the act of "doing Foucauldian discourse analysis" begins by selecting a "corpus of statements" – that is, "a selection of discourse samples about an *object* relevant to one's inquiry" (p. 115).

Discourse samples can be intellectual theories or discussions, governmental reports, policy statements, news articles, and interview transcripts. A criteria for selecting discourse samples depends on whether they *constitute* or *problematize* an object. Given the historical dimension of Foucault's analyses, a corpus of statements should also include examples of how the construction of objects varies over time. This temporal variability is important to show how power/knowledge relations operate within different historical periods and within different disciplinary regimes. [...] How do different ways of describing a problem demand different solutions? Statements are not only historical and institutional in character, but they reveal the epistemological antecedents for our present inquiry. (p. 115)

The "historical variability of statements", as Arribas-Ayllon and Walkerdine go on to suggest, should establish "the *conditions of possibility* for the studied phenomenon", in addition to highlighting "evidence of *discontinuity* where objects undergo abrupt historical transformation" (p. 115). According to Arribas-Ayllon and Walkerdine, Foucauldian discourse analysis is useful in analyzing the contents of a wide variety of 'texts' so as to assess how they engender (or preclude) particular kinds of social practices. This includes ethnographic texts (e.g., spatial arrangements and architectural designs); political discourses (e.g., government documents and official reports); expert discourses (e.g., scholarly publications and empirical findings); social interactions (e.g., research interviews, "naturally occurring talk", and other "speech activities"); as well as autobiographical narratives (p. 115). This corpus of texts is then analyzed with an eye towards

identifying and exploring instances of problematization and subjectification, types of technologies (of government, of power, of the self), and formations of subject positions (pp. 116-118).

In the context of this study, however, Foucauldian discourse analysis is not sufficient on its own to permit me to detect shifts in conditions of possibility. Accordingly, I developed the empirical strategies outlined below not just to facilitate responsible knowledge claims, but also to bolster my ability to perceive acts of colonial violence.

3.1.3 – Empirical Strategies, Responsible Knowledge Claims, and Research as Praxis

First, while collecting and analyzing empirical data over the course of this study, I followed Sandra Harding (1993) in seeking to take “everyday life as problematic” (p. 50) with a particular emphasis on continually problematizing and grappling with my own settler identity, and how this might impact my approach to this study.

Second, I kept Annie Ned’s advice to ‘listen for different stories’ at the fore of my mind. At a 1982 conference in southern Yukon, as Julie Cruikshank (2005) recalls, Ned “unexpectedly rose from her seat”, asking:

“Where do these people come from? [...] Outside? You people talk from paper. I want to talk from Grandpa.” She then proceeded to speak about human and environmental history from her own experience of hunting, trapping, and living there for almost a century. Her advice to “listen for different stories” has stayed with me [...]. (p. 76)

“Listening *for* stories”, as Cruikshank goes on to suggest, “is something more acute than listening *to* them” (p. 76).

Third, in order to supplement my ability to listen for different stories, I sought to develop a postcolonial critical consciousness. That is, following, Anderson and Adams (2008),⁸¹ I aimed to develop a sensitivity not only to “dislocation, transformation, and resistance”, but also to “the proliferation of partially purified and hybrid forms and identities”, as well as to “the contestation and renegotiation of boundaries” (p. 184). The importance of this point is made apparent by Cruikshank’s (2005) treatment of the question *Do Glaciers Listen?* While, to the English-speaking reader, this proposition seems absurd on its face, Cruikshank suggests that this question is “less straightforward than it may at first seem” (p. 4). After all, the English language is “rich in nouns but lacking verb forms that distinguish animate from inanimate subjects” (p. 3). Athapaskan and Tlingit languages, on the other hand, “have comparatively fewer nouns but are verb-rich and hence often define landscape in terms of its actions” (p. 3). These languages—those spoken by Cruikshank’s informants—“emphasize activity and motion, making no distinction between animate and inanimate” (pp. 3-4). It is hardly surprising, in this context, that “we now find it difficult to believe that rocks, mountains, and other landscape features like glaciers might listen, when the very

⁸¹ See also Edward Said (1978; 1983; 1993; 1994).

conditions of the Western material and cultural world are underpinned by language that rejects that possibility” (p. 4). By listening for different stories, in other words, Cruikshank found that sentient glaciers are not only “good to think with”, they also “continue to resonate with contemporary debates about history, science, and colonial practices” (pp. 8-9). Today, Cruikshank concludes, glacier stories are well suited not only to “provide alternatives to normalized values that now constrain debates”, but also to “contribute to new interpretations of the past and present” (pp. 258-259).

These empirical strategies cannot, of course, be employed unproblematically. To proceed in the absence of this awareness, Cruikshank (2005) cautions, is also to run the risk of producing a postcolonial metanarrative which tends “increasingly to theoretical concerns that seem ever more distant from detailed knowledge of local practices and power relations on the ground” (p. 9). Accounts of this sort, Cruikshank suggests, “can be interpreted as refuelling an intellectual imperialism that once again presents Europe as the key historical agent, as though no other actors existed” (p. 9). Donna Haraway (1988) warns, in a similar vein, that the act of seeing from below “is neither easily learned nor unproblematic” (p. 584). According to Haraway, “unlocatable” knowledge claims are “irresponsible” because they cannot be “called into account” (p. 583). In order to make knowledge claims on the basis of evidence collected ‘from below’ or ‘from elsewhere’, on this view, I need to properly situate myself as a researcher, and to make myself accountable to my informants. There is a fine line, however, between situated analyses which privilege subjugated perspectives on the one hand, and “alienating and exploitative inquiry methods” which might be termed the “rape model of research” on the other (Lather, 1986, p. 261). How, then, do I propose to strike this balance?

In this study, I follow Patti Lather (1986) in conceiving of research as praxis. Praxis, Lather explains, refers to “the dialectical tension, the interactive, reciprocal shaping of theory and practice [...] at the centre of emancipatory social science” (p. 258). To conduct “empirical research in the name of emancipatory politics”, Lather contends, researchers in the social sciences “must discover ways to connect our research methodology to our theoretical concerns and commitments” (p. 258). The ultimate aim of Lather’s approach is not to produce “the illusory “value-free” knowledge of the positivists”, but rather emancipatory knowledge – that which “increases awareness of the contradictions hidden or distorted by everyday understandings” in order to reveal “the possibilities for social transformation inherent in the present configuration of social processes” (p. 259). Here too, however, there exists a very real possibility that, in the name of “emancipation”,

researchers may unintentionally “impose meanings on situations rather than constructing meaning through negotiation with research participants” (p. 265).⁸²

This is among the central insights associated with Paulo Freire’s (1970) emancipatory project, his ‘pedagogy of the oppressed.’ This is a pedagogy, Freire argues, which...

[...] must be forged *with*, not *for*, the oppressed (whether individuals or peoples) in the incessant struggle to regain their humanity. This pedagogy makes oppression and its causes objects of reflection by the oppressed, and from that reflection will come their necessary engagement in the struggle for their liberation. (p. 48)

Freire’s emancipatory project, it must be noted, has two distinct phases. Under the first phase, “the oppressed unveil the world of oppression and through the praxis commit themselves to its transformation” (p. 54). Prior to this unveiling process, Freire suggests, the oppressed have “no consciousness of themselves as persons or as members of an oppressed class” (p. 46). It can scarcely be denied, however, that the Indigenous peoples and communities discussed in this study are keenly aware of the injustices that have been, and continue to be, committed against them. Consequently, this study proceeds under the assumption that its participants “perceive the reality of oppression not as a closed world from which there is no exit, but as a limiting situation which they can transform” (p. 49). In short, this dissertation does not claim to represent the first chapter of a new emancipatory project with me at its centre. It must be understood, instead, as my contribution to an emancipatory project that has been underway for many decades.

Whereas the first phase of Freire’s emancipatory project is aimed at changing “the way the oppressed perceive the world of oppression”, the second is concerned principally with “the expulsion of the myths created and developed in the old order” (p. 55). It is these myths, and the oppressive realities they help to sustain, which together constitute what Freire calls the “oppressor-oppressed contradiction” (pp. 51-52). This contradiction, Freire suggests, legitimates and facilitates the dehumanization of the oppressed, as well as that of their oppressors – who, in oppressing others, become less than human themselves. The oppressed and their oppressors are both, as Freire puts it, “manifestations of dehumanization” (p. 48). If the aim of the oppressed is to “become fully human”, then this goal cannot be achieved by “merely reversing the terms of the contradiction, by simply changing poles” (p. 56). To resolve this contradiction, in other words, is also to bring into existence a new being – one that is “no longer oppressor nor [...] oppressed, but human in the process of achieving freedom” (p. 49).

If, however, the process of becoming fully human must be principally animated by the oppressed themselves, where does that leave me? After all, as a white, cis-man born in Toronto,

⁸² Rather disconcertingly, the ultimate aim of Canada’s Residential School system was to bring about “the intellectual emancipation of the Indian” (qtd. in Milloy, 1999, p. 7). This accentuates, among other things, the urgent need to take steps to address this possibility.

Canada to a lawyer and a nurse, I am the image of privilege in the Western world. In other words, what of those who, like myself, have not only become aware of the existence of this oppressor-oppressed contradiction, but have also realized that they belong on the oppressor side of this pole? While realizations of this sort “may cause considerable anguish”, Freire cautions that this “does not necessarily lead to solidarity with the oppressed” (p. 49). The oppressor stands in solidarity with the oppressed, Freire explains, “only when he stops regarding the oppressed as an abstract category and sees them as persons who have been unjustly dealt with, deprived of their voice, cheated in the sale of their labor—when he stops making pious, sentimental, and individualistic gestures and risks an act of love” (pp. 49-50). “True solidarity”, Freire adds, “is found only in the plenitude of this act of love, in its existentiality, in its praxis” (p. 50). Following Freire, then, I conceive of this dissertation as an act of love – that is, as a gesture of true solidarity in support of those whose perspectives have imbued it with meaning and value.

3.2 – Conducting Research as Praxis

3.2.1 – Phase One: Ethnographic Fieldwork

In the first phase of this study, I travelled to the lower B.C. mainland during the 2017 sockeye run to collect ethnographic and interview data with the aim of better understanding how salmon controversies emerge, and why they are so persistent.

In advance of my fieldwork, I looked to recruit research participants willing to share unique, local perspectives concerning the Cohen Commission in particular or salmon controversies in B.C. more broadly. To that end, I used three criteria to compile a list of prospective research participants,⁸³ to whom I then mailed a package containing information about my research project, as well as a personalized letter in which I inquired about their willingness to participate in the study. Despite a low response rate, I conducted a total of five interviews over the course of this study.⁸⁴

During my time in the field, I compiled more than 40 pages of handwritten field notes, detailing my experiences attending meetings of the Fraser River Panel, conducting interviews, and visiting historically significant sites like Hell’s Gate. Each morning, I started a new page in my notebook with a header to indicate the current day of the week, fieldwork day number, date, and my current location (e.g., “Sunday, Day #17: 20-Aug-2017, Richmond”). Immediately beneath this header, I created a list of goals, tasks, and reminders for that particular day. Several times each day, I updated this list to mark items as complete, defer them to another day, or to otherwise

⁸³ (1) Did the prospective interviewee participate in the Cohen Commission? If not, do they have a unique, local perspective to offer concerning salmon controversies in B.C.? (2) Is the prospective interviewee Indigenous? If not, is their perspective at odds with that of the DFO or the Cohen Report’s findings and recommendations? (3) Does the prospective interviewee live reasonably close to Vancouver? If not, are they willing to be interviewed remotely?

⁸⁴ Four of these interviews were conducted in B.C. during the 2017 sockeye run, while the fifth was conducted remotely (i.e., via Skype) in June of 2019.

explain why I could not complete a particular item on that day. Below this daily checklist, I recorded my unfiltered reflections, observations, thoughts, or feelings arising out of whatever transpired on that particular day. Additionally, I captured photos and videos of virtually anything that might constitute relevant ethnographic data for the purposes of this study. Over the course of 31 days in the field, I captured over 1,200 photos or videos using the integrated camera on my personal iPhone.

In preparation for interviews, I developed open-ended questionnaires tailored specifically to each research participant. Though each questionnaire was designed to provoke a discussion concerning the Cohen Commission in particular, and controversial salmon in B.C. more generally, I endeavoured to structure each questionnaire according to the unique circumstances of each interview, as well as the individual situatedness of each interviewee. This also meant that the process of preparing for each interview was unique.⁸⁵ In short, though each questionnaire was designed to generate insights concerning the same general topics, I made an effort to ensure that they also reflected the unique, situated, embodied perspectives of each individual interviewee. My intent in preparing these questionnaires was not to generate a rigid, linear, non-negotiable list of interview questions, but rather to facilitate an open-ended, semi-structured discussion. Each of these questionnaires were foregrounded a disclaimer intended to make this point clear. These questionnaires, along with a sample of the informed consent form, were provided to participants at least 24 hours in advance of the interview itself. In so doing, I hoped not only to provide research participants with an opportunity to review my suggested discussion points in advance of the interview itself, but also to demonstrate that I made an effort to familiarize myself with some of the issues that matter to their respective communities. In the process, I hoped to build trust with participants, in addition to providing them with ample opportunity to reflect on my proposed discussion points, and to propose alternative topics of discussion, or withdraw their participation entirely, if they deemed it necessary to do so.

On the day of the interviews, I provided each participant with a printed copy of the interview questionnaire as well as the informed consent form, and reviewed each section of the latter together with the participant. This meant reviewing with the participant (a) the purpose of the research project; (b) what is being asked of them as a participant; (c) any risks or discomforts associated with their participation; (d) the benefits potentially arising out of the research; (e) that they may choose to withdraw from the study at any time, for any reason; (f) that they have the

⁸⁵ In preparing to interview Latash Maurice Nahanee and Chief Ernie George, for instance, I tried to get a sense of the issues currently facing their respective First Nations communities, and tailored their respective questionnaires accordingly. In a similar vein, prior to interviewing Grand Chief Ken Malloway and Alexandra Morton, I reviewed transcripts of their witness testimonies before the Cohen Commission, conducted additional research into the issues raised therein, and incorporated any insights thus produced into their respective questionnaires.

option of contacting my supervisor, or the Office of Research Ethics at York University, should they have any additional questions; and (g) that they may also elect to waive their right to remain anonymous⁸⁶ as a participant in this study. Following this review, I looked to address any questions raised by the participant before asking them to indicate their informed consent by signing the provided form.

At the outset of each interview, I reminded the participant that I would be recording our interview using an Olympus VN-541 handheld voice recorder, and that they retained the right to withdraw their participation from this study at any time, or for any reason. I also reiterated that the list of questions provided represented only suggested discussion points, and encouraged the participant to steer our discussion in any direction they saw fit. Then, unless the participant had a particular topic in mind with which to begin our discussion, I started the interview by raising the first discussion point on the provided questionnaire. After the interview, I thanked the interviewee for participating, and explained that I would be providing them with a transcript of our interview as soon as one was available. I encouraged each participant to review the provided transcript, and invited them to offer any corrections or clarifications they deem necessary.

Following each interview, I uploaded audio recordings to a secure, password-protected Dropbox server to which only I had access. When transcribing these audio recordings, I made a number of important methodological decisions.⁸⁷ First, in the interest of clarity and readability, I omitted 'filler words' (e.g., 'um' and 'you know'). Second, I used paragraph breaks both to enhance readability as well as to indicate a shift in the discussion towards a new topic or idea, in addition to denoting an exchange between the participant and myself. Third, I used yellow highlights to denote transcribed text which could potentially be inaccurate, whether due to the presence of background noise in my audio recording, my lack of familiarity with the people, places, or things being mentioned, or my inability to understand non-English terms or phrases.⁸⁸ Though I attempted to resolve these issues with the online resources available to me,⁸⁹ some level of uncertainty may nevertheless persist in the data. In order to ensure data credibility,⁹⁰ however, each participant was given the opportunity to review a transcript of our interview, and to offer any corrections or clarifications they might deem necessary.⁹¹

⁸⁶ All five participants elected to waive their right to anonymity.

⁸⁷ See Sabine Kowal & Daniel O'Connell (2014).

⁸⁸ I sought clarification wherever possible during interviews, but it was not always practical or appropriate to interject for that purpose, and the need for such clarifications was not always apparent to me prior to the transcription process.

⁸⁹ Including, for example, Google Maps, Google Earth Pro, First Voices, Native-Land.ca, First Peoples' Map of B.C., and the Endangered Languages Project.

⁹⁰ See Handoyo Puji Widodo (2014).

⁹¹ Transcripts were provided to research participants at the earliest possible opportunity. The only interviewee to take me up on this offer was Latash Maurice Nahanee, though he approved the provided transcript as is.

3.2.2 – Phase Two: Counter Mapping

In phase two, I created a map to facilitate the virtual social-life analyses to be undertaken in the third phase of this study.

To that end, after returning to York University in the fall of 2017, I used Google My Maps in conjunction with Google Earth Pro to create a custom map. By using my field notes in conjunction with the corresponding photos and videos, I constructed an itinerary covering the duration of my time in the field, which placed me in various locations at various points in time. Using this itinerary as my guide, I added photos,⁹² videos,⁹³ and other points of interest⁹⁴ to the map in chronological order.⁹⁵ Then, using Google Maps navigation data, I interpolated the transit routes between each of these points, which I then connected with purple lines.

To construct an itinerary of the Fraser River sockeye salmon life-cycle, I considered the sockeye rearing lakes⁹⁶ and spawning grounds⁹⁷ in the Fraser River watershed in conjunction with insights concerning the movements of these fish in the Salish Sea and Pacific Ocean derived from traditional ecological knowledges⁹⁸ and tagging data,⁹⁹ respectively. I connected each of these points by interpolating the migratory routes of each conservation unit (CU) from their spawning grounds to the Pacific Ocean, and back again. To that end, I added a red line down the centre of the channel(s) lying between the spawning grounds utilized by each CU of Fraser River sockeye on the one hand, and the associated rearing lake on the other. From the rearing lakes, I added a red line down the centre of the channel(s) leading downstream to the mouth of the Fraser River. For any areas not covered by tagging data or traditional ecological knowledges,¹⁰⁰ I added a red line down the centre of the channel(s) between the last known point on the one hand, and the next known point on the other. I repeated this process until the migratory routes for all 24 CUs of Fraser River sockeye had been completed.

⁹² As indicated by purple, circular photo-camera icons. Unfortunately, no more than 10 photos can be embedded in these icons. Accordingly, some locations (e.g., Hell's Gate) contain many such icons, each with its own unique collection of photos.

⁹³ As indicated by purple, circular video-camera icons. Unfortunately, only one video can be embedded in these icons. Accordingly, I used video-editing software to edit these videos into short compilations for each location, which I then uploaded to my personal YouTube account, and later embedded on the map.

⁹⁴ As indicated by purple, circular star icons.

⁹⁵ While my personal iPhone's geotagging capabilities were disabled for the duration of my time in the field, the process of geographically situating photos and videos was made relatively uncomplicated by considering the remaining metadata (e.g., date photo taken) in conjunction with my field notes.

⁹⁶ I added rearing lakes (derived from Cohen Commission Exhibit #1, "Presentation Of Mr. Mike Lapointe", slide 37) to the map in the form of light blue polygons.

⁹⁷ I added spawning streams (derived from Cohen Commission Exhibit #1915, "Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version", pp. 119-122) to the map in the form of dark blue lines.

⁹⁸ Cohen Commission Exhibit #1563, "Map of Salmon Farms and Migration Routes, Jun 2009 [Living Oceans Society]", p. 1

⁹⁹ Cohen Commission Exhibit #2, "Presentation of Dr. David Welch", p. 5

¹⁰⁰ For example, the region of the Salish Sea lying between the mouth of the Fraser on the one hand, and the Discovery Islands on the other.

In constructing an itinerary for Commissioner Cohen, I considered the site-visit and public-forum itineraries provided in the Cohen Report¹⁰¹ in conjunction with the Commission's other activities.¹⁰² When interpolating the routes between each of these points, I considered factors such as the number of days between each stop, the length of the trip on various modes of transit per Google Maps navigation data, as well as the Commission's guiding principles.¹⁰³ I then added Cohen's interpolated routes of travel to the map in the form of dark green lines.

To construct an itinerary for Alexandra Morton, I considered the entries on her Typepad blog¹⁰⁴ in conjunction with documents produced in relation to her participation in the Cohen Commission. I connected these points using interpolated routes based on Google Maps navigation data, opting in each case for the most direct route for travelling between them via automobile. I then added Morton's interpolated routes of travel to the map in the form of yellow lines.

In constructing an itinerary for the DFO's 2009 pre-season forecast, I considered the process through which these forecasts typically circulate in conjunction with the particular trajectory of the 2009 forecast. Accordingly, this itinerary included the forecast's typical circulation (from the DFO to the Fraser River Panel), in addition to its circulation in the news-media (from the DFO to various news-media outlets), and its circulation among different levels of government (from the provincial government to the DFO, Prime Minister's Office, and Privy Council Office). Given that this circulation occurs in abstract, digital space, however, these points were interpolated in a direct, linear manner. I then added these interpolated routes of travel to the map in the form of blue lines.

Finally, after virtually analyzing the social life of an engaged controversy analyst, as outlined in the next subsection, I added an additional four layers to my custom map. I populated each of these layers as follows.

I populated Layer 4.2.1 with B.C.'s Indian Residential Schools and First Nations reserves. In order to plot the approximate, historic locations for all Indian Residential Schools known to have

¹⁰¹ Cohen Report, Vol. 3, pp. 124-125

¹⁰² In determining whether Cohen drove or flew to Prince George for the 23-Sept-2010 public forum, for instance, I noted that he presided over an application hearing one day prior at the federal courthouse in downtown Vancouver. On this basis, I determined that Cohen almost certainly travelled to Prince George by plane rather than attempting the 9-hour (non-stop) drive there. Lillooet, on the other hand, is approximately four hours away by automobile, and the nearest major airport is in Kamloops, some 200 km away. Given that the Commission also had no scheduled activities the day prior, I determined that Cohen likely drove to the Lillooet public forum.

¹⁰³ In determining whether Cohen drove or flew to Prince Rupert on September 1, 2010, to take another example, I considered how Cohen's stated commitment to conducting his investigation efficiently might have affected such a decision. Given that it would have taken more than 16 hours (non-stop) to reach Prince Rupert via automobile from downtown Vancouver, I determined that this would likely have been deemed an inefficient use of the Commissioner's time. Thus, even though a two-hour flight from Vancouver to Prince Rupert would have been more costly, the flight would likely have been deemed the better value proposition.

¹⁰⁴ See Alexandra Morton (2020a).

operated in B.C., I used data from the National Centre for Truth and Reconciliation at the University of Manitoba (2016) and the Indian Residential School History & Dialogue Centre at the University of British Columbia (2018). In order to add the approximate locations of, and boundaries for, all First Nations reserves in B.C. to the map, I consulted the list of reserves on the Indigenous and Northern Affairs Canada (2020) website¹⁰⁵ in conjunction with the reserve boundaries embedded in Google Maps map data. Using these data, I manually traced the approximate boundaries for each reserve, which I then labelled and added to the map in the form of neon-green polygons.

I populated Layer 4.2.2 with hydroelectric dams, extirpated Fraser River sockeye conservation units (CUs), obstructions in the river at Hell's Gate and Big Bar, as well as the DFO's hatcheries, spawning channels, and laboratories. I plotted the approximate locations of hydroelectric dams in B.C. with a capacity of 1 megawatt or greater by consulting EnergyBC's (2016) energy maps in conjunction with Google Maps navigation data. I added the approximate locations of extirpated Fraser River sockeye CUs (DFO, 2018a) to the map in the form of circular red 'X' icons.¹⁰⁶ I plotted the approximate location of obstructions in the Fraser River at Hell's Gate and Big Bar¹⁰⁷ in the form of circular, brown landslide icons. I plotted the approximate locations of the DFO's hatcheries, spawning channels, and laboratories in B.C. by consulting the DFO's (2017a) salmonid enhancement program website in conjunction with Google Maps navigation data.

I populated Layer 4.2.3 with open-net pen salmon farms in B.C. waters (as well as one in Washington waters), commercial fishing zones, the Pacific Salmon Commission, the Fraser River Panel (FRP), as well as the FRP's hydroacoustic monitoring stations and test fisheries. I plotted the approximate locations of salmon farms in B.C. waters by consulting Google Maps satellite imagery in conjunction with the DFO's (2016b) map of marine finfish aquaculture facilities licensed to operate in B.C. Then, I added each salmon farm to the map in the form of gold, circular fish icons facing east, towards the Atlantic.¹⁰⁸ Alongside the salmon farms, I interpolated the sampling routes used by Alexandra Morton during her sea lice studies. To that end, I considered the maps provided along with each study, which provide the approximate locations of the sampling sites used by Morton, in conjunction with the accompanying descriptions of the methods employed in

¹⁰⁵ This list does not include reserves extinguished through modern treaties. As a consequence, neither does my map.

¹⁰⁶ Given that it was not always possible to situate an extirpated CU on a map, however, my approach to this addition varied from one CU to the next. In the case of the Coquitlam-ES CU, for instance, I simply added an 'X' icon to the mouth of the Coquitlam River, where these fish would have ascended to their spawning grounds prior to the construction of the Coquitlam Dam. In cases where the cause of extirpation was less clear (e.g., Momich-ES and Adams-ES), I added an 'X' icon to the end of a spawning stream used by that CU.

¹⁰⁷ I also added a circular turquoise icon for the Big Bar hydroacoustic monitoring station installed a short distance upstream from the obstruction.

¹⁰⁸ Hatcheries producing Pacific salmon, on the other hand, appear on the map as circular fish icons facing the Pacific.

each study.¹⁰⁹ Then, I connected these points by interpolating Morton's sampling route,¹¹⁰ following the centre of the channel(s) between sampling sites wherever possible, which I then added to the map in the form of yellow lines. I also plotted the approximate location of the Cooke Aquaculture salmon farm near Cypress Island, which I located using Google Maps satellite imagery, and added to the map in the form of an orange, circular fish icon which faces east. I added commercial fishing zones to the map in the form of circular ship icons—coloured red for Canadian fishing zones, light blue for American zones, and dark blue for FRP test fishing zones—which I plotted near the centre of each zone as it appears on the DFO's (2019c) map of its commercial licence areas (pp. 494-498). Using Google Maps data, I added the Pacific Salmon Commission and FRP meeting space to the map in the form of dark-blue circular icons. The approximate location of the FRP's hydroacoustic station at Mission was added to the map in the form of a dark-blue beam icon.

Finally, I populated Layer 4.2.4 with the Pacific Blob, the largest 2017 wildfires, the Trans Mountain Pipeline, Westridge Marine Terminal, and its associated oil tanker route. I plotted the approximate location of the Pacific Blob, as it appeared in early 2015, by consulting a sea surface temperature contour map produced for this period by the National Oceanic and Atmospheric Administration (2015). Using the graphic coordinate system embedded in this contour map, I plotted the approximate location of 39 vertices surrounding the Blob's most anomalous region,¹¹¹ which I then connected manually on my map to create an orange polygon. I added the 2017 wildfires to my map by importing a geographic dataset produced by the B.C. Wildfire Service (2020) which contained all historical wildfire perimeters on record. Owing to limitations associated with Google My Maps,¹¹² however, I was only able to include the largest wildfires from 2017. I added the Trans Mountain Pipeline and Westridge Marine Terminal to the map by consulting the pipeline route maps on the Canada Energy Regulator (2020) website in conjunction with Google Maps data. I added the associated oil tanker route to my map by consulting Tsleil-Waututh Nation's (2015) environmental assessment of the proposed Trans Mountain Pipeline and oil tanker expansion.

3.2.3 – Phase Three: Virtual Analysis

Finally, in the virtual analysis phase of this study, I used the map and itineraries constructed in phase two to analyze the 'social lives' of five actors: Callum Sutherland (i.e., myself, the author, as an 'engaged controversy analyst'), Fraser River sockeye salmon, Commissioner Bruce Cohen,

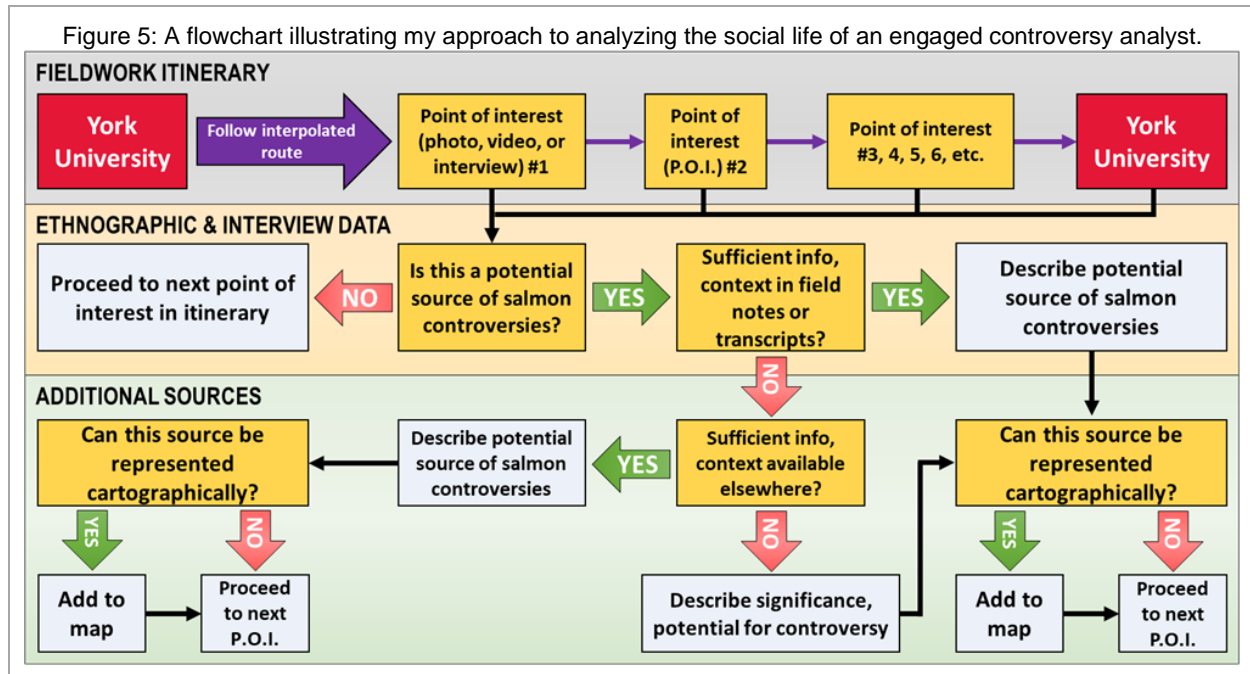
¹⁰⁹ See Morton, Routledge, Peet, & Ladwig (2004, pp. 148-151) and Morton, Routledge, & Krkošek (2008, pp. 524-525).

¹¹⁰ In each case, I added a yellow line to the map from Echo Bay to the nearest sampling site, and then the sampling site nearest to that one, and so on, following the centre of the intervening channel(s) along the way.

¹¹¹ i.e., the region 2°C in excess of historical averages.

¹¹² i.e., the file size of the data set far exceeded the maximum size for imported KML or KMZ files.

the DFO's 2009 pre-season forecast, and Alexandra Morton. In analyzing each of these social lives, I employed the same basic approach by using the map to follow each actor from the beginning to the end of their respective itineraries, pausing at numerous junctures and intersections along the way to ask a series of probing questions, and to consider additional sources of evidence. In each instance, I tailored the specific questions asked, and the additional sources of evidence considered, to the actor whose social life is being explored, and the particular research question being addressed.

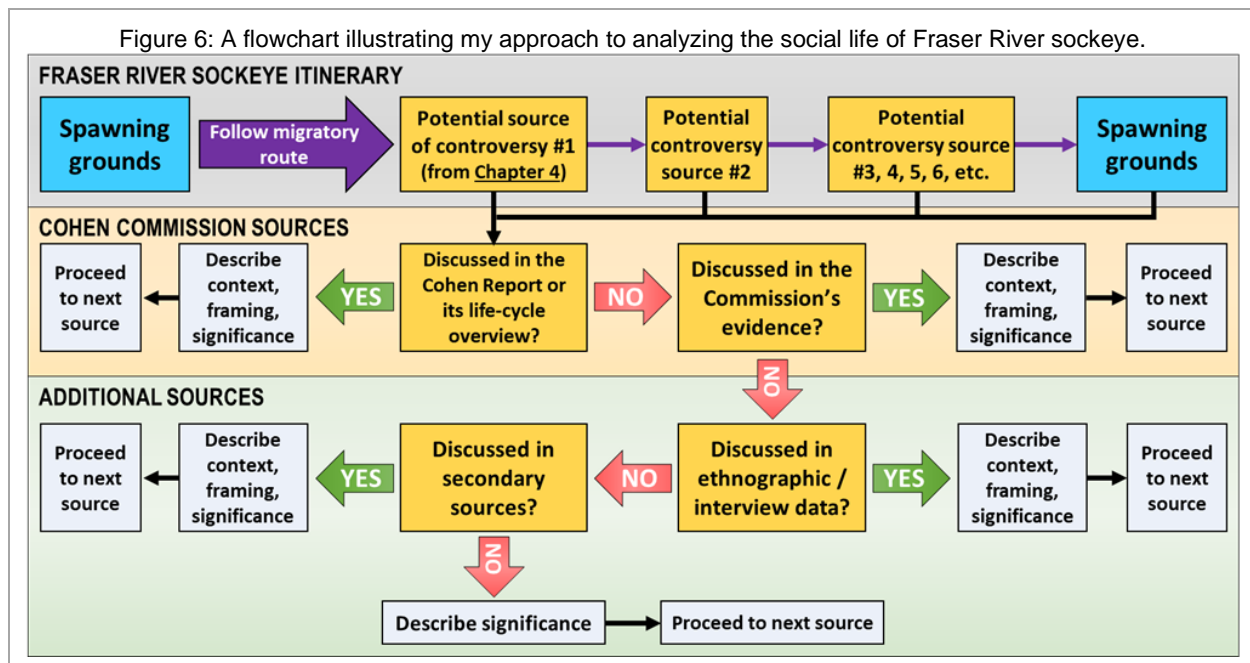


First, my aim in analyzing the social life of an engaged controversy analyst was to identify the primary sources of controversy in the Fraser River fishery. To that end, I re-traced my steps through the field, from York University to the lower B.C. mainland and back again. At each intersection or stop on the itinerary, I paused to ask a series of probing questions,¹¹³ in addition to considering whether the data collected there reflects, represents, or otherwise points to the existence of, a potential source of salmon controversies. Upon identifying a potential source of controversy, I considered whether my field notes or interview transcripts contained sufficient information or context to assess its potential to generate salmon controversies. Where necessary, I supplemented ethnographic and interview data with secondary sources of evidence. Finally, I considered how (or whether) this source might be represented cartographically, before proceeding

¹¹³ Do these data take anything for granted? Do these data preclude alternative viewpoints? What does this suggest, if anything, about more conventional perspectives on this particular issue? Whose perspectives do these data privilege? Do these data provide evidence of boundary work? Do these data suggest anything about the land and its importance, whether in its own right or in relation to the landscape more broadly? Do these data offer, engender, provoke, or other point to the need for additional reflection?

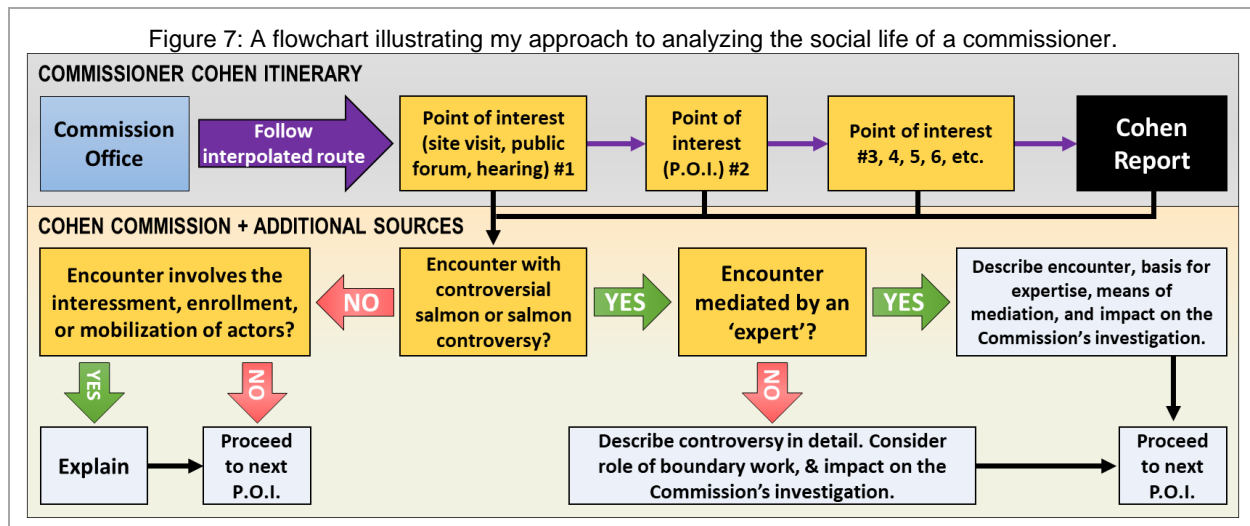
to the next intersection. Then, I repeated these steps at each remaining stop on the itinerary (Figure 5).

Second, my goal in analyzing the social life of Fraser River sockeye was to bring the sources of controversy identified above to bear on an exploration of salmon controversies in the Cohen Report and beyond. Accordingly, I followed each conservation unit (CU) of Fraser River sockeye from their spawning grounds to the Pacific Ocean and back again. Along the way, I paused at each juncture, intersection, and source of controversy to consider what, if anything, the Cohen Report has to say about the salmon controversies encountered there. To explore the salmon controversies neither identified in the Cohen Report nor discussed in the Commission's broader base of evidence, I relied on my ethnographic and interview data, and several additional sources of evidence. Then, I repeated these steps at each remaining stop on the itinerary (Figure 6) before considering this analysis as a whole, and examining how my cartographic portrait of the social life of sockeye differed from those associated with the Cohen Report's overview of the life-cycle of sockeye.



Third, my aim in analyzing the social life of a commissioner was to shed light on the processes through which Commissioner Cohen attempted to draw various salmon controversies to a close. To that end, I followed Commissioner Cohen to site visits, public forums, and evidentiary

hearings. At each stop along the way, I paused to ask a series of probing questions,¹¹⁴ in addition to considering encounters in which Commissioner Cohen engaged with salmon controversies and controversial salmon, whether these encounters were mediated by an expert or experts, and the impact of these encounters on the Commission's overall investigation. I also considered encounters in which Commissioner Cohen engaged in network-building activities or boundary work more generally (Figure 7).



In view of the length (in temporal terms) of Commissioner Cohen's itinerary and the number of evidentiary hearings over which he presided, however, I determined that it was necessary to abbreviate some portion of this social-life analysis. Accordingly, I devised a quantitative approach¹¹⁵ to summarizing these evidentiary hearings according not just to the central theme of each hearing, but also to whether Commissioner Cohen's engagement with these salmon controversies was mediated by an expert, and on what basis.

To facilitate this quantitative analysis, I created a Microsoft Excel spreadsheet to store, organize, and manipulate data relating to the Commission's evidentiary hearings and the witnesses called to testify at each hearing. I populated this spreadsheet by using the list of evidentiary hearings provided in the third volume of the Cohen Report, as well as the list of expert witnesses appended to the same volume.¹¹⁶ In addition to tallying the days of hearings dedicated

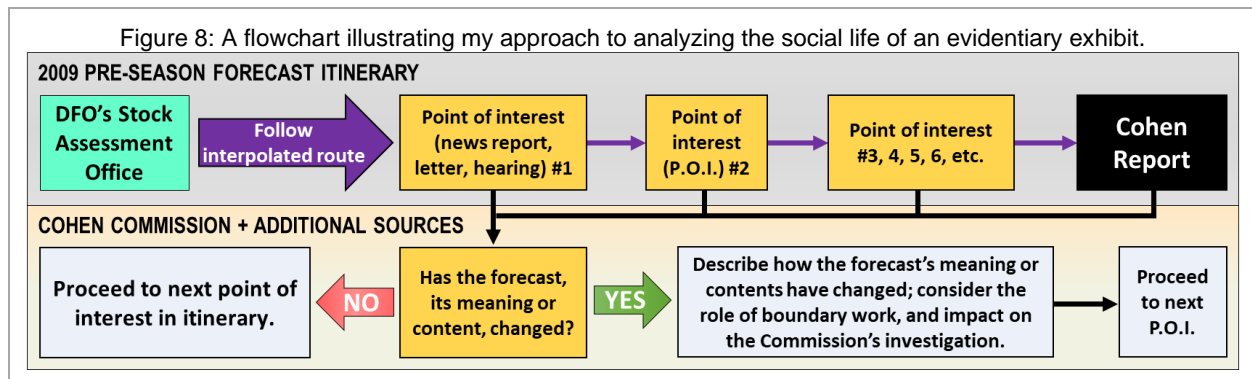
¹¹⁴ In addition to the probing questions outlined above, I asked: Whose perspectives (do not) matter in determining the meanings associated with relevant nonhuman actors in this particular context/discussion/discourse/hearing? Where do these actors stand with respect to this controversy? Can this position be described as a challenge to/defense of the status quo? Is this actor aiming to bring this controversy to a close, or to keep it open? What might closure or continuance look like from this perspective? What strategies does this actor employ in aiming to bring about this outcome?

¹¹⁵ In this study, I treat all quantitative data not just as inherently problematic, but as essentially meaningless in a vacuum. When appropriately contextualized by qualitative data, however, these quantitative data (though still problematic) are better capable of being brought to bear on this social-life analysis.

¹¹⁶ Cohen Report, Vol. 3, p. 128; pp. 168-183

to each theme, I populated this spreadsheet with the names, titles, and affiliations provided for all 179 witnesses called to testify before the Cohen Commission. Using information from this same appendix, I added to each entry a column to indicate whether or not that witness was qualified as an expert. After filtering out rows containing non-expert witnesses, I added columns to each entry for (a) highest degree attained, (b) specialization of highest degree, and (c) basis for expert witness designation. I populated columns A and B by consulting the curricula vitae entered into evidence for each witness. In cases where the CV consulted was unclear concerning highest degree or specialization, I consulted the transcript for the hearing in which the subject was qualified as an expert. Finally, I populated column C using information collected from the transcripts for each hearing in which an expert witness was qualified.¹¹⁷ Using these data, I created three horizontal bar charts,¹¹⁸ each of which I sorted from highest to lowest prevalence, and then alphabetically.

Fourth, my goal in analyzing the social life of an evidentiary exhibit was to test the actor-network theory assumption that “[o]nce an object has been defined and characterized, it can be trusted to behave similarly in all similar situations” (Sismondo, 2010, p. 91). To that end, I followed the DFO’s 2009 pre-season forecast as it circulated following its publication. Along the way, I examined encounters in which the forecast acquired new meaning, generated controversy, or was the subject of boundary work (Figure 8).

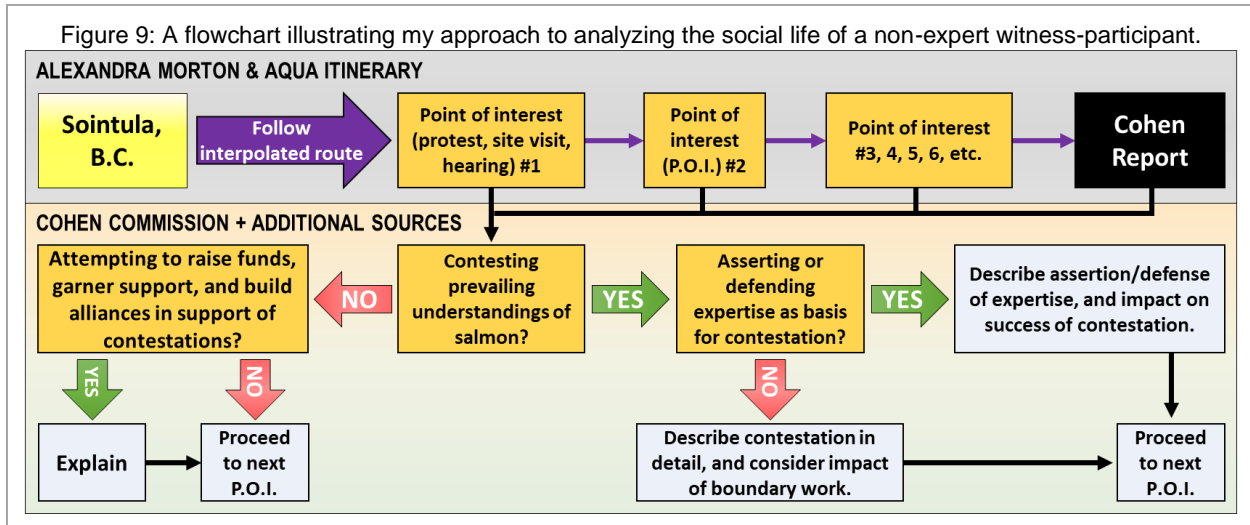


Fifth, my intent in analyzing the social life of a non-expert witness-participant was to highlight the contestations which characterized much of the Commission’s proceedings, but which otherwise might have been less apparent. Accordingly, I followed Alexandra Morton to protests and site visits in the lead up to, and over the course of her participation in, the Commission and its evidentiary hearings. At each stop along the way, I paused to consider encounters in which Morton contests official understandings of controversial salmon, cultivates alliances in support of

¹¹⁷ On August 24, 2011, for instance, Kyle Garver was qualified by Commission Counsel as “an expert in molecular virology with a specialty in viruses affecting salmon.”

¹¹⁸ See Figure 52, Figure 53, and Figure 54 in Section 6.1.1 – The Social Life of a Commissioner.

these contestations, asserts or defends her expertise as a biologist, or otherwise engages in boundary work (Figure 9).



Together, these perspectives (i.e., Commissioner Cohen, his black box, the DFO’s 2009 pre-season forecast, and Alexandra Morton) constitute what I call the social life of a commission of inquiry, which I then brought to bear on an analysis of the Cohen Report, its findings, and recommendations.

It must be noted, however, that my exploration of the social life of a commission of inquiry relies principally on official documents produced by, or submitted to, the Cohen Commission, including rulings, transcripts of hearings, witness summaries, summaries of public forums, and evidentiary exhibits. In some cases, these documents offer a sanitized account of the messy, contentious, and complex discussions, interactions, or events they claim to depict. Accordingly, whenever I identified potential gaps in the accounts offered by official documents, I consulted additional sources of evidence¹¹⁹ to confirm and address those gaps. In many cases, however, my suspicions were either unfounded or could not be corroborated and addressed using the evidence available to me. In other cases, however, the existence of gaps only became apparent after consulting additional sources of evidence.¹²⁰ Thus, it is doubtless that many such gaps remain in my account of the social life of a commission of inquiry. Accordingly, future studies¹²¹

¹¹⁹ Including Mark Hume’s (2009b; 2010; 2011a; 2011b; 2011c; 2011d) reporting on the Cohen Commission, my interview with Alexandra Morton, and the entries on Alexandra Morton’s Typepad blog.

¹²⁰ As discussed in Section 6.1.3 – The Social Life of a (Non-Expert) Witness-Participant, for instance, the official transcript for the Commission’s October 26, 2010 evidentiary hearing provides no indication that this hearing was interrupted at any point. According to Alexandra Morton’s account of that day, she interrupted this hearing when she entered the hearing room alongside Chief Bob Chamberlin to present Commissioner Cohen with a large piece of parchment covered with handwritten messages, the most prominent of which read, in large capital letters, “SALMON ARE SACRED.”

¹²¹ See Section 7.4 – Research Limitations, Constraints, and Opportunities.

should seek to incorporate additional perspectives (particularly those of Indigenous witnesses and participants) capable of further problematizing official accounts of the Commission's proceedings.

3.3 – Summary and Review

In this chapter, I described my three-phase, multi-method approach to conducting research as praxis. In designing this methodology, I brought itinerant-ethnographic and counter-mapping techniques to bear on a virtual analysis of the social life of things. I carried out the ensuing study in three overlapping phases: (1) ethnographic fieldwork, (2) counter-mapping, and (3) virtual analysis.

In section 3.1, I described my approach to designing research as praxis. To that end, I explained how my methodology brings itinerant-ethnographic (Heath, 1998) and contrapuntal-cartographic (Sparke, 1998) or counter-mapping (Hunt & Stevenson, 2017) techniques to bear on a virtual analysis of the social life of things (Appadurai, 1986; Kopytoff, 1986; Dumit, 2004) and fish pluralities (Todd, 2014). To account for the power-laden ambivalences embedded in counter-mapping techniques, I attended throughout this study to Foucauldian notions of discourse and governmentality. I also employed ethnographic refusals (Simpson, 2007; Tallbear, 2013a) and empirical strategies to facilitate responsible knowledge claims (Haraway, 1988) and safeguard my ability to conduct research as praxis (Lather, 1986).

In section 3.2, I detailed my three-phase approach to conducting research as praxis. In the first phase, I travelled to the lower B.C. mainland during the 2017 sockeye run to conduct ethnographic fieldwork. In this chapter, I detailed the processes through which I recruited research participants, conducted interviews, generated transcripts, and reported back to participants. I also explained in detail how I collected, recorded, and compiled ethnographic data across various media. In phase two, I arrayed these data onto a custom map created with Google My Maps and Google Earth Pro, charting my movements through the field in the process. Mirroring this approach, I also charted the movements of Fraser River sockeye salmon, Commissioner Bruce Cohen, Alexandra Morton, and the DFO's 2009 pre-season forecast. In the third and final phase of this study, I virtually analyzed these 'social lives' by using the map to follow each actor from the beginning to the end of their respective itineraries. Along the way, I paused at numerous junctures and intersections to ask a series of probing questions, and to consider additional sources of evidence. In each instance, I tailored the specific questions asked, and the additional sources of evidence considered, to the actor whose social life is being explored, and the particular research question being addressed.

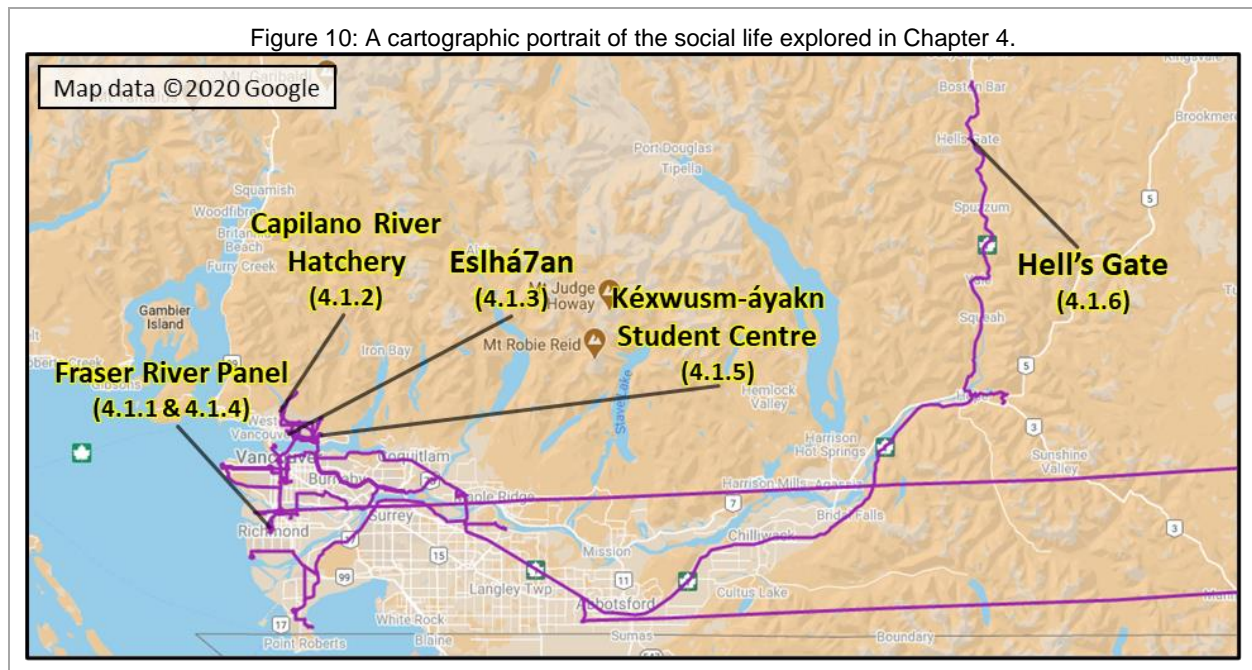
CHAPTER 4 – SALMON CONTROVERSIES IN BRITISH COLUMBIA

“We are fishers. Fish is not just a noun. It’s not just food. It’s a way of life. We fish therefore we are.”

—Grand Chief Ken Malloway

I aim in this chapter to address the following research question: What are the primary sources of controversy in the Fraser River fishery?

In order to address this question, I travelled to the lower B.C. mainland to collect ethnographic and interview data during the 2017 sockeye run. In this chapter, which contains three sections, I re-trace my steps through the field (Figure 10), exploring the social life of an engaged controversy analyst in the process.



4.1 – The Social Life of an Engaged Controversy Analyst

On August 4, 2017, I flew from Pearson International Airport in Mississauga, Ontario, to Vancouver International Airport in Richmond, British Columbia. For my first 10 days in the field, I rented a small basement apartment in Vancouver, the traditional, unceded territory of the xʷməθkʷəy̓əm (Musqueam), Stó:lō, Skwxwú7mesh (Squamish), Tsleil-Waututh, and Stz'uminus peoples. Immediately following my arrival, I set about preparing for interviews, and arranging to visit a variety of field sites in the lower B.C. mainland.

In this section, I describe my movements through just a fraction of these field sites. Accordingly, readers are invited to examine the custom map I created using Google My Maps,¹²²

¹²² See Layer 4.1 - The Social Life of an Engaged Controversy Analyst (link not compatible with mobile devices): <https://bit.ly/3jLi66M>

which provides a fuller sense of my movements through the field which includes hundreds of photos and videos captured along the way.

4.1.1 – Fraser River Panel

On August 8, at the invitation of Grand Chief Ken Malloway, I attended a meeting of the Fraser River Panel (FRP). The FRP is a bilateral Pacific Salmon Commission (PSC) panel which meets regularly during the fishing season to make regulatory decisions concerning the Fraser River sockeye and pink salmon fisheries. The PSC is the institutional manifestation of the Canada-U.S. Pacific Salmon Treaty, an agreement originally signed in 1985.¹²³ Per the terms of the Treaty,¹²⁴ the PSC is jointly governed by four Canadian commissioners and four American commissioners. Together, the commissioners are charged with bilaterally managing the fisheries under the PSC's jurisdiction. In practice, these fisheries are managed through various bilateral, geographically-oriented panels—of which the FRP is only one—whose members are advised by PSC technical staff and report to PSC commissioners.

Each fishing season, the FRP takes as its starting point the pre-season forecast for Fraser River sockeye and pink salmon prepared by Fisheries and Oceans Canada (DFO). The FRP meets regularly to assess this estimate, and to consider revisions to “estimates of timing, abundance, diversion, and agreed management adjustments as well as concerns for other co-migrating species” (Pacific Salmon Commission, 2017c, p. 3). Changes to in-season estimates are considered whenever the abundance of returning fish, or the timing of their return, fails to accord with expectations. The number and distribution of returning fish are estimated on the basis of a combination of in-river and marine gillnet test fisheries, stock-identification analyses, and hydroacoustic estimates. In assessing the migration conditions faced by sockeye and pinks, the FRP also considers changes in the water temperature and discharge level of the Fraser River.

In 2017, the DFO's (2017b) pre-season forecast called for 4.4 million sockeye to return at the 50% probability level, which is said to be “close to half of the 2017 cycle average” (p. 1). In its first weekly report of the 2017 fishing season, the FRP explains that this forecast represents “a dominant factor in the development of pre-season fishing plans” (Pacific Salmon Commission, 2017c, p. 2). Thus, the FRP entered the 2017 season with the expectation that “both Canada and the United States will be challenged to fully harvest their shares of the total allowable catches (TAC) of both Fraser River sockeye and pink salmon” (p. 3). The FRP nevertheless expected that “low impact fisheries” would commence in mid-to-late July, provided that “in-season conditions are consistent with pre-season expectations” (p. 3). Following its July 21 meeting, however, the FRP

¹²³ See Michael Shepard and A.W. Argue (2005).

¹²⁴ See Pacific Salmon Commission (2019b).

announced that “no sockeye directed fisheries are being planned by either country” as a result of test fishing catches which “continue to track below the pre-season median forecast level of abundance” (Pacific Salmon Commission, 2017d). When I arrived in B.C. late in the evening of August 4, commercial fisheries remained closed on both sides of the Canada-U.S. border, as sockeye returns continued to “track below the pre-season median forecast level of abundance” (Pacific Salmon Commission, 2017e).

On August 8, I arrived at the Sheraton Hotel in downtown Richmond—where the FRP held its weekly meetings in 2017—at around 10:00, just as the closed, in-camera meetings of the Canadian and American caucuses drew to a close. The bilateral portion of the meeting, which is open to the public, was scheduled to begin at 10:30. Shortly after my arrival, I located the FRP’s conference room, and found that it consisted of a series of rectangular tables arrayed in a ‘U’ shape. The members of the U.S. caucus lined the tables on the side of the room closest to the door, while the Canadian caucus lined the tables on the opposing side. The PSC’s technical and administrative staff, meanwhile, sat at the table situated along the bottom of the ‘U’ table arrangement. A number of seats lined the outer walls of the room, where I sat, along with a small handful of other guests.

At the start of the bilateral meeting—which was chaired by Mike Griswold, a commercial salmon troller, and member of the Canadian caucus—PSC staff distributed a 13-page meeting package which included not only a meeting agenda, but also a series of charts, graphs, and tables intended to provide panel members with information on the status of the run, catch-to-date, test fishing results, hydroacoustic data, migration conditions, and so on.¹²⁵ In the process of presenting these data to panel members, PSC staff expressed concern about the wildfires that had been spreading across the province since early July. Given the Fraser River’s low discharge level, which is thought to make the river “very sensitive to temperature fluctuations”, PSC staff warned that wildfire smoke could have a warming effect on the river, producing problematic migration conditions for returning sockeye and pinks.¹²⁶ Citing sockeye test-fishing catches and hydroacoustic escapement¹²⁷ estimates which continued to fall below expectations, PSC staff recommended reducing the run-size estimate for Early Summer sockeye salmon. Ultimately, the panel members from both caucuses agreed, reducing the estimated run-size for the Early Summer run-timing group from 343,000 to 125,000.

¹²⁵ Interestingly, the PSC does not publish all of these charts, graphs, and tables alongside the regulatory announcements that are made following these meetings.

¹²⁶ Fraser River Panel Meeting Agenda, 8-Aug-2017, p. 7

¹²⁷ Escapement refers to the number of fish that are permitted to ‘escape’ fishers *en route* to their spawning grounds.

After the meeting, I had lunch with Grand Chief Ken Malloway. Over lunch, we discussed the FRP, the current fishing season, my research project, his passion for fishing, and a number of other topics. Before we parted ways, Grand Chief Malloway agreed to meet with me again—this time for a formal interview—following the August 22 meeting of the FRP.

4.1.2 – Capilano River Hatchery

On August 14, I vacated my rented room in Vancouver and headed north, across the Burrard Inlet, to the municipality of North Vancouver, a region which encompasses the traditional territory of the Skwxwú7mesh, Stó:lō, Tsleil-Waututh, and xʷməθkʷəy̓əm peoples. While boarding the SeaBus ferry *en route* to North Vancouver, I thought about each of my upcoming interviews. When the ferry was underway, I found myself taken aback by the size of the Port of Vancouver, which undoubtedly serves as a hub for global trade, and the scope of its operations. This brought to mind my upcoming interview with Chief Ernie George, a Tsleil-Waututh hereditary chief. In the downriver Hən̓qəmin̓əm̓ language, Tsleil-Waututh means “people of the Inlet” (Tsleil-Waututh Nation, n.d.). What did the Inlet mean to Chief George, I wondered, and how did he feel about the current state of it?

The following day, August 15, I visited the Capilano River Hatchery. On the way to the hatchery, I visited Capilano Lake, a picturesque body of water nestled between several tree-covered mountains. As I approached the lake, however, I realized that it was not a ‘natural’ lake, but one that was impounded by the Cleveland Dam. Though almost 90% of B.C.’s electricity is generated by large-scale hydroelectric facilities (Helston & Farris, 2016), the Cleveland Dam was built not to generate hydroelectricity, but to “create a dependable source of clean drinking water.”¹²⁸ Today, Metro Vancouver is also supplied drinking water from reservoirs impounded by the Coquitlam and Seymour Falls dams.¹²⁹ It was this concrete and steel dam, I realized, which made the Capilano River Hatchery necessary. Indeed, as the DFO explains on its website, the Capilano River Hatchery was opened in 1971 to “strengthen declining Capilano salmon stocks that were affected by the construction of the Cleveland Dam.”

Today, the hatchery receives 238,000 visitors annually and is widely recognized for its contribution of coho and steelhead to the sport fishery in Burrard Inlet. The hatchery’s work has also introduced chinook to the system in an attempt to establish a self-sustaining run in the Capilano River fishery and in the Vancouver Harbour tidal sport fishery. (DFO, 2020b)

In the fall, the DFO adds, “salmon returning to the Capilano River provide an important food, social and ceremonial fishery for the Squamish First Nation” (DFO, 2020b).

Interestingly, the Capilano River Hatchery is not just a DFO facility, operating as part of its Salmonid Enhancement Program (SEP), it is also an “interpretive centre” that is “open for public

¹²⁸ “Cleveland Dam: Meeting the Need”, Cleveland Dam display, visited 15-August-2017.

¹²⁹ “Water: The Source of Life”, Cleveland Dam display, visited 15-August-2017.

viewing daily”, providing “locals and visitors from around the world a chance to learn more about the salmon life cycle” (DFO, 2020b). Curiously, however, none of the on-site exhibits provide a clear explanation as to why this particular hatchery was built. Instead, these exhibits speak only in vague, general terms of the factors which gave rise to SEP facilities, suggesting only that “[m]any times both nature and man have blocked access to spawning grounds (sic) so different kinds of fishways are used to help the salmonids around the obstructions.”¹³⁰ In addition to eliding the human agency involved in creating the obstruction which gave rise to this hatchery, several of these exhibits suggest that SEP facilities represent an improvement over nature. For example (sic):

As well as hatcheries, such as Capilano, salmonids also spawn in man-made spawning channels which have carefully controlled water flow rates and temperatures, and contain the best gravel.¹³¹

Salmonids “raised in a hatchery”, the next panel in this exhibit boasts, are five times more likely to reach maturity than are those “born into nature.”¹³²

Figure 11: The author examining the fish-ladder observation gallery at Capilano River Hatchery.



Beyond this exhibit lies an “observation gallery” (Figure 11), where visitors are invited to observe returning chinook and coho salmon as they traverse the hatchery’s fishway, or climb its salmon ladder, by “jumping from one pool to the next,” *en route* to holding ponds, where they must wait for human intervention.¹³³ From there, an on-site exhibit explains, “[b]iologists give nature a

¹³⁰ Untitled exhibit, Capilano River Hatchery interpretive centre, visited 15-August-2017.

¹³¹ Untitled exhibit, Capilano River Hatchery interpretive centre, visited 15-August-2017.

¹³² Untitled exhibit, Capilano River Hatchery interpretive centre, visited 15-August-2017.

¹³³ “Fishway”, Capilano River Hatchery interpretive centre, visited 15-August-2017.

hand” by capturing female salmon from the holding pond, “stripping the eggs from the female and mixing in the male sperm.”¹³⁴ Fertilized eggs are then stored in an incubation room, where they hatch into alevin after approximately 70 days, and where they remain until they develop into fry. These fry are then transferred to juvenile rearing troughs, where they are subjected to controlled conditions and fed a “high-protein diet many times each day.”¹³⁵ Once they reach a certain size, fry are moved to concrete rearing ponds (Figure 12), where they are shielded from predators, fed a special diet, and eventually become smolts. These fish—about 25% of which are marked with a clipped fin, and tagged with a “tiny coded wire” injected into their snouts—are later released downstream.¹³⁶

Figure 12: Concrete rearing ponds (lower left) and juvenile rearing troughs (upper right).



4.1.3 – Eslhá7an

On August 17, I visited Eslhá7an (Ustlawm) to interview Latash Maurice Nahanee, a Skwxwú7mesh Elder. The Skwxwú7mesh are Coast Salish peoples whose unceded traditional territory spans 6,732 square kilometers, stretching from what is now known as Clendinning Provincial Park in the north to the city now known as Vancouver in the south. Today, the reserve lands assigned to Skwxwú7mesh Úxwumixw (Squamish Nation) span a combined total of just 28 square kilometers (Skwxwú7mesh Úxwumixw, 2013a). In the eighteenth century, the Skwxwú7mesh stelmexw (Squamish people) numbered over 100,000.¹³⁷ Today, there are only

¹³⁴ Untitled exhibit, Capilano River Hatchery interpretive centre, visited 15-August-2017.

¹³⁵ “Capilano Troughs / Rearing Ponds”, Capilano River Hatchery interpretive centre, visited 15-August-2017.

¹³⁶ Untitled exhibit, Capilano River Hatchery interpretive centre, visited 15-August-2017.

¹³⁷ Interview with Latash (Maurice Nahanee), 17-August-2017

4,500,¹³⁸ more than half of whom live on the Skwxwú7mesh reserves that are scattered across the lower B.C. mainland (Skwxwú7mesh Úxwumixw, 2013b). Since 1993, when its statement of intent to negotiate was accepted, Skwxwú7mesh Úxwumixw has been negotiating the terms of a framework agreement with the B.C. government, stage three of six in the B.C. treaty process (Skwxwú7mesh Úxwumixw, 2013b).

Latash's home is located in the Skwxwú7mesh village community of Eslhá7an, a small urban reserve (officially known as Mission Indian Reserve #1) in what is today known as North Vancouver. In addition to serving as an Elder in residence at Capilano University's Kéxwusm-áyakn Student Centre, Latash is an artist, as well as a retired journalist. As a journalist, Latash participated in the national discussion concerning Indigenous rights which accompanied the early 1980s patriation of the Constitution of Canada. As Latash¹³⁹ explained:

I got to travel all over Canada and meet people. I knew, and interviewed, the main politicians of the era [...]. So, I was involved in these big discussions about Native rights. I had access to the Chiefs who were at the negotiating table, sitting across from the Prime Minister and all the Ministers of Canada. So, I got a really great education on Native rights.¹⁴⁰

During this period, Latash was known only as Maurice Nahanee. It was not until the late 1990s, Latash explained, that he had the opportunity to "indulge" in his culture by putting on a naming ceremony. Jim Nahanee, he learned, had been saving the name Latash—a "very ancient" name with roots in a war between the Skwxwú7mesh and Tšilhqot'in peoples—for him.¹⁴¹ With the permission of the Nahanee family matriarch, then, he started going by the name Latash, becoming the only member of his immediate family to bear an ancestral name in the process. Ancestral names, Latash explained, carry more weight than those created in modern times.

For the duration of my interview with Latash, we sat on the patio in front of his home, where he was in the process of building a new smokehouse. In speaking to the importance of salmon for the Skwxwú7mesh stelmexw, Latash spoke of a time when no salmon came to the rivers in Skwxwú7mesh territory:

People, for some years, would go very hungry because of the scarcity of food. So, they prayed, and they tried to find an answer, and they heard about these four supernatural brothers, called the Transformer Brothers. And, they thought, "maybe they can help us?" So, they prayed, and they asked for help. Until, one day, they looked out on the horizon and there was this gigantic canoe, and four giants were in the canoe, paddling. They came closer and closer, and eventually they began singing a song. The song is important in this story, because it indicates that people are coming in peace. If they weren't singing a song, they were coming in war, with bad intentions. So, they arrived, and they spoke to the Skwxwú7mesh people, and they said, "why did you summon us here?" They said, "we're asking for your help, to tell us where the Salmon People live, so that we can go and talk to them, and ask them if they can please visit our waters and provide us with food." And, the Transformers said,

¹³⁸ Interview with Latash (Maurice Nahanee), 17-August-2017

¹³⁹ For information concerning my approach to transcribing interview data, please see Section 3.2.3 – Phase One: Ethnographic Fieldwork

¹⁴⁰ Interview with Latash (Maurice Nahanee), 17-August-2017

¹⁴¹ Interview with Latash (Maurice Nahanee), 17-August-2017

“we don’t actually know where they live, but Snookum the Sun Eagle, he will probably know, as he’s high up in the sky and he sees everything.”

So, they decided to play a trick, to entice the Sun Eagle to come down into the world, and they transformed the younger brother into a big salmon, and they tied a rope to him. And the Sun Eagle looked at the salmon, got hungry, and flew down into the world. He’s circling around, and he saw the Transformer Brothers hiding in the bushes. So, he put his wing out, put them into a trance – they fell asleep, so the Sun Eagle flew over, grabbed the salmon, flew back to the Sun, and fed all his relatives. The Transformers woke up and went: “Oh, okay, he’s pretty powerful, and he’s smart too! So, we’ll transform the next brother into a Killer Whale, because that’s bigger. We’ll use a cedar bark rope this time, and tie it to the biggest cedar tree we can find.” Again, the Sun Eagle got really hungry and he flew down, started circling, and saw the Transformers again, and again he put them into a trance, and he flew over and grabbed the Killer Whale. But the Killer Whale was very strong and very big, so they fought for quite a while.

And, while all of this is going on, the Transformers woke up, and saw what was happening. They grabbed that rope, and pulled it in, and because an eagle cannot unlock its claws when it grips, he was trapped. So, they brought him to the shore, took out a magical rope, and lassoed the eagle, and made him very weak because the magical powers weakened the eagle. The eagle was really mad, really angry about being caught, and being tricked as well. “What do you want? Why did you do this to me?” “Well, it’s very simple, the Skwxwu7mesh people here are hungry a lot of the times, and they’re asking if you knew where the Salmon People lived so that we can go visit them, and ask them to come to our waters”. The eagle said, “that’s very simple, go to the west, and you’ll have to travel for many weeks, but eventually you’ll come to the sea of burnt logs, and you’ll also see smoke from their longhouse. It’ll be rainbow coloured, not smoke coloured, but the colour of the rainbow, so you’ll know that you’re in the right place.

The Skwxwu7mesh people and the Transformers made the journey. They carried food, they carried medicine, and they arrived in the Land of the Salmon People. When they arrived there, they sang their song, to let them know that they were coming peacefully. The Salmon People welcomed them ashore and said, “let us feed you – we’ll go to the river, and get salmon for you.” So, a procession walked to the river, and the King of the Salmon People pointed at two young people, a male and a female, and directed them to go into the river, which they did. When they went into the water, they leaped forward, and when they jumped back up, they were in the shape of salmon. Then they swam upriver into the fish weir, were caught, and barbequed, and they had a big meal. Everyone is enjoying themselves, and the King of the Salmon People said, “save all the bones, and return them to the river.”

So, after dinner, they took all the bones, put them into the river, and the young man and the young woman transformed back into their human form again. The Salmon People said: “What do you want? Why did you come to visit us?” They said: “We would like your people to come help us. We’re often starving, and we need food.” The Salmon People said: “Okay, we will do that. We’ll visit every year, in the springtime the Chinook salmon will arrive, followed [in the] early summer by the Sockeye, Coho later in the summer, and then the Pink and the Chum will arrive in your waters. But we ask that you return the bones of the first fish that you catch to the river, so that all the salmon family knows that the Skwxwu7mesh remember that they made a promise to make use of the salmon. To take what they need, but to let the rest go.”¹⁴²

In keeping with this pact, Latash explained, the Skwxwú7mesh stelmexw perform first salmon ceremonies annually, in which the first salmon caught each year is cooked, and shared with everyone in the community. The bones of this fish are then returned to the water.

According to Latash, the Skwxwú7mesh believe in taking only what they need, and nothing more. This contrasts sharply, in his view, with the worldview underlying the commercial fishery:

¹⁴² Interview with Latash (Maurice Nahanee), 17-August-2017

We take what we need for our consumption, while the rest is allowed to go to the next tribe, for their benefit. The bounty is shared all along the river by our people, but in the commercial industry a company will capture as much salmon as they can for its own benefit, and they don't care about the people who live upstream. They let very little go.

For example, in the early 1900s, the commercial fleet on the Fraser River would harvest a lot of salmon, because in pre-contact times, the Fraser River in a good year—not a great year, but a good year—a hundred million salmon would return to the Fraser River. But when the settlers started to harvest salmon, they would bring the salmon to the cannery to be processed, but they had no refrigeration back then. So, at the end of the day, if there was too much fish, the cannery would say, “we can't take anymore, dump what you have.” And they would dump tons of salmon into the river, and they would be sent out the next day, to harvest more salmon. So, that one action alone depleted the salmon to the point where only a few million salmon returned to the Fraser River, where more than a hundred million used to return in a year, sometimes more. So, we really lost out on that because of the commercial fleet.

But, there's a lot of other factors, like forestry. Forestry, taking all the trees right to the edge of the river, which caused erosion of the soil. More silting the river, less oxygen for the salmon, so that really hurts them as well. In farming, the pesticides, the run-off from the rain will go right into the river. So, now poison is added into the mix as well as pollution. All those factors, coming from a different worldview: “we'll harvest, we'll use as much as we can, and we don't really care,” not in the same way that we do.¹⁴³

The Skwxwú7mesh also hold ceremonies in which they serve food to their ancestors. Rather than “putting beef and potatoes on the plate to give to our ancestors”, Latash explained, he prefers to “serve salmon and our natural foods that our ancestors knew when they were living here.”¹⁴⁴ Salmon, Latash noted, provide the Skwxwú7mesh with both physical and spiritual nourishment.

Latash believes that First Nations “should be able to benefit commercially” from the fish they catch.¹⁴⁵ Generally speaking, however, First Nations are not permitted to sell fish caught under the Indigenous FSC (i.e., “food, social, and ceremonial”) fishery. According to Latash, however, this does not reflect the economic dimensions of pre-contact Indigenous fisheries:

There's always been trade here. Some places in the interior get more meat, but they don't get salmon. We could trade with them. There are plants that could be grown and harvested on the coast that aren't available in the interior. So, there was always this trade. But a scientist might say, ‘No, you lived on this rock here, and that's all you ever did. You're lucky to get fish.’ Well, no, we weren't lucky – we were smart about it. We had limited agriculture, but still some agriculture. We grew potatoes, carrots, onions, and we made sure that those places were safe. The Western model in which you have an area where you're growing something, but another field was left fallow to regenerate – we did that as well. We didn't write papers about it, but we knew.¹⁴⁶

Traditional ecological knowledges, as Latash went on to explain, are a lot like Western modern science in that both are rooted in “experiment and observation.”¹⁴⁷

Latash can only remember as far back as when he was a six-year-old, but he distinctly remembers spending time with his family on the Squamish River each summer as a child.

Every summer, our family would spend time there, fishing, harvesting – and, you know, playing and just enjoying life, having that opportunity to be in nature and to be with family. So, from a very early

¹⁴³ Interview with Latash (Maurice Nahanee), 17-August-2017

¹⁴⁴ Interview with Latash (Maurice Nahanee), 17-August-2017

¹⁴⁵ Interview with Latash (Maurice Nahanee), 17-August-2017.

¹⁴⁶ Interview with Latash (Maurice Nahanee), 17-August-2017.

¹⁴⁷ Interview with Latash (Maurice Nahanee), 17-August-2017.

age, I was on the boat, helping to harvest the salmon. There's so much to learn about harvesting, so we tend to start training at a very, very young age. By the time I was twelve-years old, I could handle the boat, I could bring it out onto the river, set it, and catch salmon. But we generally travelled as a team because it's more safe to do it that way.¹⁴⁸

Today, Latash no longer fishes. Skwxwú7mesh Úxwumixw relies on the A-Tlegay Fisheries Society¹⁴⁹ to catch its annual allocation of food, social, and ceremonial (FSC) fish.

Declining stocks, for one thing, led to a lot of Skwxwú7mesh fisherman having to give up their fishing licenses to pursue a different career – so, the economy changed quite a bit for us, and we weren't able to participate in it. And, then there were very narrow openings [for FSC fishing]. And, in terms of technology: larger boats can catch more fish, so the smaller gillnet fishing boats started to vanish.

"We became marginalized once again", Latash continued, "by declining stocks."¹⁵⁰

As the federal government "supports farmed fish [more] than it does the wild stocks", Latash suggested, "they tend to put their resources towards that, and not to protect the rights of First Nations fishermen against those of the commercial fleet."

It's easier to harvest the farmed fish, but it creates a lot of issues. They are more voracious and predatory type of animal – farmed fish tend to be Atlantic salmon. A lot of them have escaped, and they're killing off young wild salmon in the rivers and streams. They're like cannibals, with very, very big appetites. So, that's a big threat to our already weak species of salmon.¹⁵¹

Latash also went on to suggest that "a lot of disease is spread among farmed fish because they're contained in a small area", and that waste from salmon farms "sinks to the bottom along with the food that's not eaten", affecting the food chain in the process.¹⁵²

The following day, August 18, I left North Vancouver for the municipality known today as Richmond, where I rented a room for the week. Richmond, bounded by the north and south arms of the Fraser River, was built on the traditional territories of the Katzie, Kwantlen, Stó:lō, Stz'uminus, Tsawwassen, and xʷməθkʷəy̓əm peoples. After checking in to my room at River Dr. and No 4 Rd., I sat by the north arm of the Fraser River and reflected on my fieldwork up to that point. In so doing, I was surprised to see the surface of the water was partially covered in log booms (Figure 13). Though I had noted this previously, I was taken aback to see that log booms were effectively a permanent feature on the surface of the Fraser River. While sitting by the river, I observed tug-boats passing by on the river in front of me, SkyTrains passing over the water on a nearby bridge, and planes passing overhead as they prepare to land at the nearby Vancouver International Airport.

One day later, on August 19, a 10-cage open-net pen salmon farm located near Cypress Island, off the coast of Washington state, collapsed. At the time of its collapse, this salmon farm

¹⁴⁸ Interview with Latash (Maurice Nahanee), 17-August-2017.

¹⁴⁹ The A-Tlegay Fisheries Society, founded in 1999 by the We Wai Kai, Wei Wai Kum, K'omoks, Tlowitsis and Kwiakah First Nations, catches FSC fish for several Indigenous communities (A-Tlegay Fisheries Society, n.d.).

¹⁵⁰ Interview with Latash (Maurice Nahanee), 17-August-2017.

¹⁵¹ Interview with Latash (Maurice Nahanee), 17-August-2017.

¹⁵² Interview with Latash (Maurice Nahanee), 17-August-2017.

contained 305,000 farmed Atlantic salmon. In the days which followed, the majority of these fish escaped into the Salish Sea as Cooke Aquaculture failed to contain the collapse.¹⁵³

Figure 13: Log booms on the Fraser River at River Dr. and No 4 Rd in Richmond.



4.1.4 – Fraser River Panel

A few days later, on August 22, I returned to the Sheraton Hotel in downtown Richmond to attend another meeting of the FRP, as well as to interview Grand Chief Ken Malloway. On the way to the meeting, I was handed a copy of the August 22, 2017 edition of the free *Vancouver Metro* newspaper at the Richmond-Brighouse SkyTrain station. The front page of this paper featured a large photo of a single, red sockeye salmon along with the headline “HISTORIC LOW: Some B.C. salmon could be completely wiped out – and we wouldn’t even be aware due to lack of data, says researcher.” This is a reference to a study by Michael Price et al. (2017) which concluded that the DFO continues to fall short in its efforts to monitor the health of wild salmon populations, and that there exists “inadequate information to determine the biological status of roughly one-half of all [conservation units]” (p. 1517).

This study was not, as best as I could gather, a topic of conversation among the panel members or PSC staff in attendance at the FRP meeting. This is not to suggest, however, that those in attendance simply took for granted the accuracy of escapement estimates. During the bilateral portion of the meeting, Grand Chief Ken Malloway raised concerns regarding the potential

¹⁵³ See Dennis Clark, Kessina Lee, Kyle Murphy, Windrope, AmyClark et al. (2018).

for sockeye and pinks to be conflated in the escapement estimates generated by the Mission hydroacoustic monitoring station. This season, Grand Chief Malloway explained, sockeye are smaller than normal, whereas the pinks migrating alongside them appeared to be larger than normal. This kind of variation, he noted, can prove problematic when interpreting hydroacoustic data. Grand Chief Malloway also questioned something he witnessed days earlier at Hell's Gate, where he observed someone standing on a rock by the water counting fish as they passed by. Given the problematic river conditions at Hell's Gate, and the problems associated with distinguishing sockeye from pinks during this season in particular, he explained, this arrangement did not seem conducive to producing accurate escapement figures. Though it was suggested that the fish counter at Hell's Gate was tasked only with ensuring that fish were making it through the fishways, and not with producing escapement estimates, other panel members echoed Grand Chief Malloway's concerns regarding the variation in the relative proportions of sockeye and pinks. This also fed into later discussions concerning the adequacy of existing test fisheries, and whether it was necessary to re-locate or augment existing test fisheries in order to improve run-size estimates.

Interestingly, the collapse of Cooke Aquaculture's Cypress Island salmon farm (Figure 14) was not a topic of discussion during the bilateral portion of the FRP meeting. This is likely because, at this point in time, the severity of the incident was not yet apparent. In a press release dated August 21, Cooke Aquaculture blamed "[e]xceptionally high tides and currents" for causing damage to its Cypress Island facility, leading to the escape of "several thousand" fish (Cooke Aquaculture, 2017). In a report prepared for the Washington Department of Natural Resources, however, Clark et al. (2018) concluded that the collapse was caused not by abnormally strong tides or currents, but by Cooke Aquaculture's failure "to adequately clean the nets containing the fish", leading to "excessive biofouling by mussels and other marine organisms" (p. 6). The "increased drag" which resulted from this "exceeded the holding power" of the facility's "mooring system", leading to the collapse of the net pen (p. 6). Clark et al. estimates that between 243,000 to 263,000 fish escaped following the collapse, exceeding Cooke Aquaculture's estimate of 160,000 (p. 8). Ultimately, only 57,000 of the escapees would be recovered (p. 8), as recovery efforts were undoubtedly made more difficult by the fisheries closures which arose out of poor sockeye returns.

In the overall, this meeting of the FRP proved to be considerably more contentious than my last, as panel members were initially divided on the question of how many pinks had returned, how fast they were moving, and whether pink-directed fisheries should be permitted in panel area waters. Ultimately, the FRP decided that pink-directed fisheries would be permitted only on the

American side of the panel area waters—in Areas 6, 7, and 7A—where the potential for incidental sockeye mortality was deemed to be at its lowest. By August 31, however, the FRP noted that these were not so much pink salmon-directed fisheries as they were Atlantic salmon-directed, as many U.S. fishers sought to aid in the recovery of salmon farm escapees (Pacific Salmon Commission, 2018b). Canadian commercial fishing vessels, meanwhile, remained anchored to their home ports for the remainder of the season.

Figure 14: Satellite images of Cooke Aquaculture's Cypress Island salmon farm before and after its collapse.



When the FRP meeting finally adjourned, Grand Chief Malloway and I walked to the hotel restaurant, where I interviewed him over lunch. Grand Chief Malloway is a hereditary chief of the Ts'elxwéyeqw (Chilliwack) Tribe, an elected councillor of the Ch'íyáqtel (Tzeachten) band government, and a prolific Stó:lō fisher. Stó:lō is the Halq'eméylem word for river, which means that the Stó:lō people are literally “River People” (Carlson, 2010, p. 13). S'ólh Téméxw, the traditional territory of the Stó:lō people,¹⁵⁴ spans much of the lower B.C. mainland, from the Salish Sea in the west to the Three Brothers Mountain in the east, and from the Canada-U.S. border in

¹⁵⁴ For a variety of complex reasons, not all First Nations whose reserve lands are situated on S'ólh Téméxw identify as Stó:lō (Carlson, 2010).

the south to Speke Peak in the north. Ch'íyáqtel—which means “fish weir” in Halq'eméylem (Tzeachten First Nation, 2018)—is one of six Stó:lō communities represented by the Stó:lō Xwexwilmexw Treaty Association. In October 2018, the Stó:lō Xwexwilmexw Treaty Association signed a memorandum of understanding with the federal and provincial governments, thereby advancing to stage five of six in the B.C. treaty process (B.C. Treaty Commission, 2018).

In addition to representing Canada on the FRP, Grand Chief Malloway is involved with a wide variety of intertribal fisheries organizations, including the Fraser River Aboriginal Fisheries Secretariat, the Fraser Salmon Management Council, the Lower Fraser Fisheries Alliance, and the First Nations Fisheries Council. Though Grand Chief Malloway is comfortable in conference rooms and meetings, it is evident that fishing is his true passion. Unsurprisingly, then, Grand Chief Malloway's earliest memories are of watching his father fish on the Fraser River near the town of Yale in the Fraser Canyon.

We had a camp way up in the rocks and we had a tent there, and I would lean over the cliff, and you could see my dad way down there fishing, and my sister was always going “get away from there”, because I was hanging over the edge watching him, and she would drag me away. That's the earliest thing I can remember, is my dad—watching him fish. And, then, when we got bigger, he started teaching us how to fish, and my dad was probably the best fisherman alive, and he was also the best hunter. And, one of my uncles that I talked with, he talked about my dad, he said, we call him The Hunter. Some of the folks that I know, they call me The Fisherman. I can't hunt as good as my dad, but nobody can beat me fishing. If there's a way to catch fish, I'll figure it out.¹⁵⁵

“I'm not content to just be a fisherman”, Grand Chief Malloway continued, “I want to be the best there is.”¹⁵⁶

When he was six- or seven-years old, Grand Chief Malloway explained, he noticed that he was being groomed for a leadership role.

My grandpa and my grandfather's brothers started to take me aside and talk to me about the Ts'elxwéyeqw Tribe and about the Stó:lō people, and they talked to me about hunting and fishing, they talked to me about our territory. I didn't know why they were bothering me with all this stuff because I had two brothers that were older than me, and they never talked to them. I had no idea what they were up to, or why they were doing it, but when I was eighteen-years old, I went to the longhouse—there's a society in the longhouse, Spirit Dancers, and it's kind of a secret society—when I was initiated into that, they thought “okay, he's eighteen-years old, he's a new dancer, now we're going to put this name on him.”

And, my grandpa's brother, Bob, had died not too long before that, so it was time to pass the name on. So, they stood me up in front of about 1,500 witnesses, and they said, “this is your name, Wileleq – it's your Uncle Bob's name, it's a hereditary name. You're a hereditary chief of the Ts'elxwéyeqw Tribe.” And, they explained to me that they thought long and hard about who they were going to give the name to, and they said that, “we think that you're worthy to carry the name, but if it turns out that you're not worthy, we'll take the name away from you and we'll give it to someone who is worthy.”

So, all through those years they were getting me ready. They would always pull me aside, and talk to me about our people, talk about our territory, talk about our rights. They would always be telling me who my family is too, eh, because that's important. So, all these years, they were getting

¹⁵⁵ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁵⁶ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

me ready for this. But that was just the beginning, because after that, all of a sudden, I've got this responsibility, and that was always in the back of my mind – I'm supposed to be a leader.¹⁵⁷

The name Wileleq, Grand Chief Malloway went on to explain, is approximately 1,000-years old, and it means “always careful, always aware.”¹⁵⁸

Even before the name Wileleq was bestowed upon him, Grand Chief Malloway was not shy about speaking out at fisheries meetings. For many years, Grand Chief Malloway explained, Indigenous fishers in B.C. were required to remove the noses and fins from any fish caught under the Indian food fishery.¹⁵⁹ Fish marked in this way could not legally be sold. As a fifteen-year-old, Grand Chief Malloway spoke out against this practice at a meeting with fisheries officials.

That was the thing that really pissed me off, having to mark them. [...] So, I got up and I said, “you’re violating my human rights – I’m not going to cut anymore noses or fins off until you show me how the commercial and the sporties are marking their fish. What you’re doing is that you’re discriminating against me because I’m a Native Indian.” He said, “that’s a very compelling argument. I’m going to take another look at this.” We never ever had to cut another fish after that.

But they tried an experiment, do you know what they did for the next year? They gave us these little tags, like a plastic tie, and they were green, and they said, “you only have to mark your Chinook, and that’s how we’ll know it’s a food fish.”¹⁶⁰

This experiment only lasted a single year, Grand Chief Malloway explained as he chuckled, because commercial and sports fishers were less than enthusiastic about marking their own fish.

This enmity is not “something that just happened”, Grand Chief Malloway explained, rather it has been happening “for a hundred years.”

The commercial fishermen actually talked the government into stopping us from fishing in the 1800s. They said, “the Indians should not be allowed to catch fish, they’re fishing on the spawning grounds.” So, they actually outlawed fishing, so we protested and raised hell about it, and the Superintendent of Indian Affairs actually went to bat for us. He went to the government and said, “What you’re doing is wrong. Stopping these Indians from fishing is like killing all the buffalo for the Prairie Indians. That’s what they do, they fish, they’re fishermen – they’re not farmers, they’re fishermen. Leave them alone, let them go out there and catch the fish.” And, so, they finally backed off and let us fish [...] but they changed it so we’re not allowed to sell them anymore – they’re all ‘food fish’, and that’s where the food fish came into being. So, when Ron Sparrow won the *Sparrow* decision, they said that he had an Aboriginal right to fish for “food, social, and ceremonial fish.” [...]

My friends Ernie Crey and Lynne Nahini both worked at DFO at the time, and the mentality at the DFO was horrible [...]. They had a secret room where they had meetings to talk about what they were going to do about Sparrow – it was called ‘the war room,’ and what they were doing in there was trying to figure out what they were going to do about the Sparrow decision, which meant that they had to monitor us more closely, they had to enforce regulations, they needed more nighttime equipment to watch us at night, they needed more officers, more boats, more gear. And, for a time,

¹⁵⁷ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁵⁸ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁵⁹ Even though, as Dianne Newell (1993) explains, First Nations in B.C. “never surrendered their rights to the fisheries and repeatedly sought protection for their fishing customs and hereditary fishing territories, they eventually became marginalized within one branch of the fishery after the other” (p. 4). These efforts to marginalize Indigenous fishers culminated in 1888 with the introduction of a new regulatory framework which ushered in “a new era in which management and use of salmon would move from [Indigenous] hands to state control” (p. 65). This led to the invention of the Indian food fishery, which prohibited Indigenous fishers from using certain kinds of equipment, in addition to outlawing the sale of ‘food fish.’

¹⁶⁰ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

they had fish ministers that agreed with them, and started handing them money, tons and tons of money.¹⁶¹

Though the relationship between Indigenous fishers and DFO enforcement officers has since improved, Grand Chief Malloway noted, it was “really, really bad” in the years which followed the 1990 *Sparrow* decision.¹⁶²

While Grand Chief Malloway admits that “some people don’t like [him]” because he catches so many fish, he also beams with pride as he describes sharing his catch with upriver First Nations communities.

I don’t just share fish with folks from my village, or from the Stó:lō people, but I sometimes carry tons of fish to the folks upriver who can’t get any. I’ve brought fish to Dead Man’s Creek, I’ve brought fish to Kamloops, Williams Lake, Prince George, Lillooet, people up north of Prince George, I brought them two totes full of Early Stuart sockeye, and that’s the sockeye that’s going back to them, but they weren’t making it upriver because it was too hot, the water was warm, and low, and the fish weren’t getting by.

I knew they were suffering up there, and I knew that they needed fish, so I got two totes full of fish, a couple thousand pounds, and I brought it to them, to share with them. They were so happy to get them, but this lady came to me, and she said, “Kenny, I know who you are, and I know what you do but, I just want you to understand something that I teach my kids. I’m a fisherwoman, and I fish when I can, when there’s fish to fish, I teach my kids how to fish.” And, she said, “we really love you for what you do, but I don’t want my kids to think that fish come up here in a truck ... they’re supposed to swim up here!”¹⁶³

To an outside observer, this might seem like an odd way of expressing gratitude for such an undeniably generous act, but Grand Chief Malloway understood this sentiment very well.

I’m a fisherman, and I’ve had people come to me and say, “how about if we just fish for you, gave fish to you, and you quit fishing.” I said, “no, fish is a verb and a noun, fish is the act of fishing, and it’s something you eat, but that’s who we are – we fish therefore we are.”¹⁶⁴

“I’m not going to sit there”, Grand Chief Malloway stated firmly, “and wait for someone to bring me fish.”¹⁶⁵

When Grand Chief Malloway takes people fishing, he explained, he does so with the explicit intention of teaching others about the Stó:lō people:

Every opportunity I get, I take people out fishing. It’s a chance for me to teach as much as I can about my people. One of my daughter’s boyfriends—ex-boyfriend now—but at the time she was going out with this guy, and he asked her, “can you ask your dad if I can go fishing with him?” And, I said, “yeah, I’ll take him out.” We only had a 24-hour opening, so I said, “well, we’ll set out tonight, and we have to pull out by 6 o’clock tomorrow night.”

So, he spent one day with me, and after we were done, he said, “I really, really want to thank you for this.” And, I said, “for what?” He said, “I learned more about fishing, and I learned more about my family, and more about Stó:lō Nation, in one day with you than I learned in my entire life I’ve never been able to get out and fish like that, and I’ve never ever had the opportunity to sit down and talk to someone about fishing, and to talk to someone about my family, and about Stó:lō Nation... nobody’s

¹⁶¹ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶² Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶³ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶⁴ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶⁵ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

ever thought enough of me to even bother. I know more about my family now than I did before we went fishing.”¹⁶⁶

Throughout my interview with Grand Chief Malloway, he spoke about fishing, his family, and the Stó:lō people in the same breath, underscoring the extent to which all three are inextricably connected.

In speaking to the impact the decline of sockeye has had on First Nations communities upriver and down, Grand Chief Malloway explained that

for sockeye, once every four years there’s a big run, and in between the runs are smaller. And, so this year, we were expecting 4.5 million sockeye, but we pegged it today at 1,050,000 – so, it’s about a quarter of what we thought. So, that means a lot of people are going without, and some people are completely going without because of all these bloody forest fires, some people didn’t even get a chance to fish because they were evacuated. They had to leave their homes, a lot of them live in Chilliwack and Abbotsford for five, six weeks, because they weren’t allowed to go home. So, them poor buggers are going without fish altogether, eh. We fed some of them—I brought fish over to my uncle’s Longhouse, and we fed some of them, and my cousins brought fish to the Chumash Longhouse, and fed some of those people over there, because they weren’t getting any fish or anything, and they had to stay down here, they can’t go home.¹⁶⁷

As a result, Grand Chief Malloway explained, “a lot of people are going without fish.”¹⁶⁸

Climate change, Grand Chief Malloway went on to suggest, represents perhaps the most significant challenge facing Fraser River sockeye today:

[Grand Chief Malloway]: The zooplankton, that our fish eat, like cold water, they don’t like warm water. And, so, the water’s warm, kind of like a desert, eh, it’s empty. Sometimes our fish go out there, and they mill around out there in the ocean, and if it’s warm they got to try and find food. Sometimes they come back smaller than other years because there’s not enough food.

[Sutherland]: Do you think that’s why the sockeye returning this year are so small compared to the pinks?

[Grand Chief Malloway]: Yeah, because there’s not enough food for them because there’s that big, warm blob out there. Not only that, but Alaska produces more pink salmon than anybody through their hatcheries. The pink salmon are out to eat stuff too, so you put a hundred million pinks in the water, and they’re out there eating up everything that [sockeye eat].¹⁶⁹

“Our fish share the ocean with Alaskan salmon and Washington salmon”, Grand Chief Malloway noted, pointing out in the process that “there’s only so much to go around.”¹⁷⁰

Two days later, on August 24, I left Richmond for the municipality known today as Pitt Meadows, where I stayed for the remainder of my time in the field. Pitt Meadows is situated on the unceded traditional territories of the Katzie, Kwantlen, Stó:lō, and Stz’uminus peoples, just northeast of the point at which the Fraser River meets the Pitt River.

Meanwhile, in the Broughton Archipelago, Chief Ernest Alexander Alfred, a ‘Namgis hereditary chief, was in the process of occupying a Marine Harvest salmon farm near Swanson

¹⁶⁶ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶⁷ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶⁸ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁶⁹ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

¹⁷⁰ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

Island. The Broughton Archipelago forms part of the unceded traditional territory of the Kwakwaka'wakw peoples, which stretches from Smith Sound in the north to the middle of Vancouver Island in the south (U'mista Cultural Society, 2020). With the support of activists from several coastal Indigenous communities, along with Alexandra Morton and the Sea Shepherd Conservation Society, Chief Alfred pledged not to leave the salmon farm until it had permanently ceased operations.¹⁷¹ Chief Alfred referred to this protest as the Swanson Occupation, and created a Facebook page under the same name.¹⁷²

4.1.5 – Kéxwusm-áyakn Student Centre

On August 29, I returned to North Vancouver to interview Chief Ernie George, a Tsleil-Waututh hereditary chief. Tsleil-Waututh's unceded¹⁷³ traditional territory spans 1,865 square kilometers, bounded by Mamquam Lake to the north, the Canada-U.S. border to the south, Howe Sound to the west, and Coquitlam Lake to the east (Tsleil-Waututh Nation, n.d.). In the downriver Hən̓qəmin̓əm̓ language, Tsleil-Waututh means "people of the Inlet." Today, most of the 500+ Tsleil-Waututh people, Chief George included, live on a small reserve, barely over 1 square kilometer in size, sited on the Burrard Inlet (Tsleil-Waututh Nation, n.d.). Chief George spent the last 35 years of his pre-retirement career at the Seymour Golf and Country Club, located next to the reserve. Today, Chief George spends much of his time at Capilano University, some 5 kilometers west of the reserve, where he is an Elder in residence at the Kéxwusm-áyakn Student Centre.¹⁷⁴

At the outset of our discussion, Chief George raised an issue I had not thought to include in the questionnaire I developed for our interview.

[Sutherland]: Just to briefly reiterate what I said before: If at any point you want to shift the discussion in another direction, by all means, I'm totally open to talking about whatever you want to talk about—

[Chief George]: I usually start out by saying who I am. I usually say, [speaking in Hən̓qəmin̓əm̓]. My name is Slá'hólt, and I am the Hereditary Chief of the Tsleil-Waututh Nation. It was given to me in 1997 by the then-Chief Slá'hólt, and he said that I could accept the name after he passed away, and he passed away in 2009, so that's when I received the name. In modern history, I'm the fourth hereditary Slá'hólt. It gives me more pride to say that I am Tsleil-Waututh, and this is our Inlet.

[Sutherland]: Would you mind saying a little bit about what your name means?

[Chief George]: Slá'hólt, it's one of the oldest names, that we know of, in our entire history. And, our history tells us that we've been here for at least 10,000 years, and it's one of the oldest names. It's hard to put it into an English term. But it means a high important person. Some say "most intelligent" and stuff like that, but we just say "one of the most high." Our Hereditary Chieftainship is generally

¹⁷¹ See Baker (2017), Gilpin (2017), Kane (2017), Petersen (2017), Hamelin (2018), Prystupa (2018), and Thomas (2018).

¹⁷² See Ernest Alfred (2017).

¹⁷³ Tsleil-Waututh Nation is currently in stage four of six in the B.C. treaty process, in which the parties negotiate the terms of an agreement-in-principle, after having signed a framework agreement in 1997.

¹⁷⁴ Kéxwusm-áyakn means "a place to meet" in the Skwxwú7mesh language. Fittingly, then, this is where Chief George and I met in advance of our interview.

handed down by the then-Hereditary Chief. He just looks at the families, his family and other families, and he knows which one will carry that name with an open heart and an open mind¹⁷⁵

Earning the hereditary chieftainship, Chief George explained, was the culmination of a healing process that began in 2008, when the federal government apologized to the victims of its Indian Residential School system. As Chief George went on to explain, he is a Survivor of the St. Paul's Indian Residential School in North Vancouver.

It is important to note that colonial violence neither started with, nor ended following the closure of, Indian Residential Schools in Canada. Residential Schools represented just one component of the federal government's broader policy of forcibly and violently assimilating Indigenous peoples into Canadian society. Despite the complex and sensitive nature of this subject—the adequate treatment of which is beyond the scope of this dissertation—I opted to include the below discussion, which is concerned with the uneven impact of residential schooling on Indigenous communities in the lower B.C. mainland, because this issue was raised by more than one of the Indigenous people interviewed for this study. In keeping with my commitment to privilege Indigenous perspectives and conduct research as praxis, in other words, I felt obliged to raise this issue, despite my inability to attend to its myriad complexities.¹⁷⁶

After his first year away, Chief George's grandmother sensed that "something terrible" happened to him, and insisted that he be pulled out of the system as a result.¹⁷⁷ In the years which followed, Chief George harboured feelings of guilt about having remained on reserve while his friends continued to attend St. Paul's. After returning home, Chief George found himself in an awkward liminal position. Despite having spent a year in the system, Chief George still managed to hold on to his Tsleil-Waututh identity. For his peers who remained in the system, on the other hand, Indigeneity was more problematic.

All the ones that were the same age as me on the reserve, they were all in school, and there were nine houses on the reserve at that time. I could go into any house, and they'd always have bread and jam for me, or fruit or something, or pie. It was basically—I was their surrogate child. All them families just loved us, because their kids were away, and we were there – so we were there for them, not realizing that—when we were that young, what we were actually doing. And that saying is that, 'it takes a village to raise a child.' They basically raised us, eh.

When they'd come home from Residential School for the summer, I couldn't figure out why they were always picking on me. I was really small when I was younger. I didn't really sprout until I was about fourteen. I often wondered why they always picked on me, and I had to be the grunt of the game, and I had to do all the dirty stuff. Now, I realize that they were basically jealous of me because of the way their parents talked about us all the time. You know, my nickname then was Ignatius and Glacious, because a lot of the older people couldn't say Ignatius. I found out later on, from talking to

¹⁷⁵ Interview with Chief Slá'hólt Ernie George, 29-August-2017

¹⁷⁶ According to Dian Million (2013), for instance, the medicalization of trauma and discourses of healing may not be compatible with Indigenous self-determination in the context of a neoliberal settler society like Canada.

¹⁷⁷ Interview with Chief Slá'hólt Ernie George, 29-August-2017

some of my cousins, that it was always “Glacious this and Glacious that, he can do this and he can do that.”¹⁷⁸

“I basically learned how to do all the things young Indian kids generally learn from their parents”, Chief George explained, “which they didn’t learn because they were in Residential School.”¹⁷⁹

In Residential School, by contrast, Chief George recalls being warned not to share with others, and being told that “if you got that, that’s yours—you don’t give any of that way.”

The only thing we have left is when we do a funeral now—if you ever go to a First Nations funeral around here—at the end, we have a big dinner. In the old days, they’d be giving arrows, or bows, or paddles, or smoked fish—whatever they could give—wool blankets, they would give to the family of the deceased. Nowadays, it’s just money. So, they stand up there, and they’ll announce your name and how much you’re given, and that’s to go to the family, or to the coffin, or to the work that’s done. That’s the way First Nations used to—the wealth was handed around. Whatever you received there, one day you’re going to be giving it back to someone else. So, it’s always going around. If you wanted to be the biggest man around, you’d give the biggest Potlatch. If you gave the biggest one, you were it—the more you gave away, you were it.¹⁸⁰

This mindset became inverted “with Residential Schools and contact”, Chief George continued, at which point it became “the more you got, the bigger man you were – so, that’s where we started losing it.”¹⁸¹

In reflecting on how six years away at Residential School affected his brother, Chief George illustrated the differential impacts produced by these cultural, linguistic, and epistemic discontinuities, explaining in the process how these effects stretched across generations.

My older brother and I, we paddled a canoe together. He was a single-paddle champ before me, he took over from our dad, and when our dad died, I took over from my older brother. He was only 5’5, 115 lbs., but nobody could beat him off the starting line. We lived next door. Our kids grew up together. And... he’s gone... his three sons are gone, and one of his daughters is gone. I’ve got one biological niece left, but I do have some great-nephews and nieces, but I have no nephews or nieces left. They were all gone before—well, Charlie was the oldest, he would have been fifty-two, I guess, when he went. Basically his whole family is gone, except for the great-grandnephews and nieces. He was only there [in Residential School] for six years.

The way he raised his kids, and the way I raised my kids, right next door to each other, growing up together—it was just like night and day. His family life, I don’t know what it was like. I just knew him. He never talked about it. He was like me, when they first brought reconciliation to light, that—you know—I said it didn’t affect me because I only went one year. He said it didn’t affect him either. So, you know, he was hiding something, and I didn’t realize I was hiding something too.¹⁸²

“I really wish I could know more about what happened to my parents and my brother”, Chief George explained, expressing in the process his desire to “understand it a little bit more.”¹⁸³

Colonialism, as Chief George went on to explain, impacted not just the Tsleil-Waututh people—i.e., the people of the Inlet—but also the Inlet itself. Chief George can recall a time, for instance, when freighters were permitted to dump their wastewater in the Inlet. “Whatever they

¹⁷⁸ Interview with Chief Slá'hólt Ernie George, 29-August-2017

¹⁷⁹ Interview with Chief Slá'hólt Ernie George, 29-August-2017

¹⁸⁰ Interview with Chief Slá'hólt Ernie George, 29-August-2017

¹⁸¹ Interview with Chief Slá'hólt Ernie George, 29-August-2017

¹⁸² Interview with Chief Slá'hólt Ernie George, 29-August-2017

¹⁸³ Interview with Chief Slá'hólt Ernie George, 29-August-2017

were bringing in and dropping in here”, Chief George explained, “that led to the decline of our oyster beds in the Inlet.”¹⁸⁴ Chief George also recalls a time when massive kelp beds proliferated the Inlet. Today, the Inlet’s massive kelp beds “are all gone.”¹⁸⁵ The Inlet’s seaweed beds used to be so thick that, “at low tide, you couldn’t paddle.”¹⁸⁶ Today, “the seaweed beds are sparse here, sparse there.”¹⁸⁷ On the south side of the Inlet, across from the Tsleil-Waututh reserve, lies the Burnaby Refinery – which, until recently, had been steadily leaking oil into the Inlet for “the last 60 years or so.”¹⁸⁸ Until the early 2000s, moreover, one of the outfalls on this same shore “had raw sewage coming out of it [...] if there was heavy rain.”¹⁸⁹ These are some of the factors, Chief George suggested, responsible for bringing about the decline of marine wildlife in the Inlet, including the pink salmon¹⁹⁰ he used to catch with his grandmother on the Indian River each summer. More recently, Chief George and the Tsleil-Waututh people have mounted fierce opposition to Kinder Morgan’s 2013 proposal to expand its Trans Mountain pipeline (TMX). In assessing this proposal, Tsleil-Waututh’s Treaty, Lands & Resources Department (2015) concluded that the TMX, if approved, would result in a “sevenfold increase” in oil-tanker traffic in the Inlet, increasing the likelihood of a catastrophic oil spill in turn (p. 44). Citing the Tsleil-Waututh Stewardship Policy,¹⁹¹ Tsleil-Waututh rejected Kinder Morgan’s proposal in 2014, when Leah George-Wilson explained to the National Energy Board that “this project represents a risk that [...] the Tsleil-Waututh people are not willing to take” (p. 2).

Two days later, on August 31, I returned to Capilano University to interview David Kirk, the First Nations Advisor at the Kéxwusm-áyakn Student Centre. Kirk, who shares a bloodline with Grand Chief Ken Malloway, was raised by his aunt and uncle off-reserve in the municipality known today as Burnaby. It was Kirk’s grandparents, Survivors of the Coqualeetza Industrial Institute Indian Residential School¹⁹² in the city known today as Chilliwack, who insisted that he needed to “learn the white man’s way.”¹⁹³ Their motivations for choosing to raise him in this way were complex, Kirk explained, and so too was the impact this would have on his upbringing:

¹⁸⁴ Interview with Chief Slá’hólt Ernie George, 29-August-2017

¹⁸⁵ Interview with Chief Slá’hólt Ernie George, 29-August-2017

¹⁸⁶ Interview with Chief Slá’hólt Ernie George, 29-August-2017

¹⁸⁷ Interview with Chief Slá’hólt Ernie George, 29-August-2017

¹⁸⁸ Interview with Chief Slá’hólt Ernie George, 29-August-2017

¹⁸⁹ Interview with Chief Slá’hólt Ernie George, 29-August-2017

¹⁹⁰ Though sockeye were not typically abundant in their rivers and streams, Chief George explained, the Tsleil-Waututh people used to travel to the Fraser River, just west of the Pitt River, where they secured a steady supply of sockeye through trade with other nations.

¹⁹¹ Adopted in 2009, the Tsleil-Waututh Stewardship Policy was developed to bring Coast Salish legal principles and Tsleil-Waututh ancestral law (or *snəwəyət*) to bear on present-day consultation processes.

¹⁹² Following a major tuberculosis outbreak affecting Indigenous communities in the Fraser Valley, Kirk explained, the Coqualeetza Industrial Institute was converted into a TB hospital in 1940. Had the Coqualeetza Industrial Institute remained open, Kirk suspects that he would have been sent there.

¹⁹³ Interview with David Kirk, 31-August-2017

My grandparents were both fluent speakers in Halq'eméylem, which is the largest Coast Salish dialect. And, my grandfather knew all of the stories, all of the history, the culture, and the language. He was a firm believer—and this was the impact of Residential School—that his children and grandchildren had to learn the white man's way. He refused to teach us any of the language, any of the culture. It was a trade-off. He insisted that his children—my mum and her siblings—would be the first to actually go to public school in Chilliwack. So, in our family, we're all—we're not that big of a family now, but there's 10 of us that have degrees, but it's been a lifelong struggle to figure out who we are as Aboriginal people, and in particular who we are as Stó:lō people.¹⁹⁴

During this period, Kirk explained, Indigenous people faced even more “racism, shame, and discrimination” than they do today.¹⁹⁵ Kirk's grandparents, he now understands, were simply trying to “shield [him] from the racism and discrimination they faced.”¹⁹⁶

As a consequence, however, Kirk was raised in Stó:lō territory, but felt no connection to the land, and had no sense of his culture.

You had the chance of meeting Kenny Malloway a couple of weeks ago. He is one of my relatives – he carries the name Wileleq. So, that is my bloodline, we come from the same bloodline. From my understanding, there's four or five names that our family carried – none of those got passed down within my side of the family because of my grandparents having been influenced and corrupted by Residential School. That whole part of our culture was taken away from us.¹⁹⁷

Kirk also suspects that he was “probably the only Aboriginal student” at his school, and though he did not know what to make of that, he always knew that he was “different.”¹⁹⁸ As he grew older, Kirk would admit to others that he was “anything but Aboriginal”, because of the “dirty stigma” associated with Indigeneity.¹⁹⁹

It was not until the 1990s that Kirk—now working, along with Latash, at a local school district—would embark on a cultural journey to figure out who he really is.

This has been an ongoing struggle for our people for a long time is that loss of connection to our culture, and to our land, and those teachings. In our school district days, my role was as a youth worker, while Latash was our cultural worker. So, he would make sure that he was in there sharing those cultural teachings. I'm a firm believer that if we don't know who we are as a people, we're just going to be spinning our wheels, and be lost forever.²⁰⁰

In the hopes of helping others to re-establish contact with their own Indigenous roots, Kirk went on to earn a bachelor's degree in social work, as well as a master's degree in education.

Interestingly, as Kirk went on to point out, it was only by earning a master's degree that he found himself in a position to affect positive change for Indigenous people.

Having a master's degree, it allows you to have that voice... which is kind of silly. How is it that we place so much strong emphasis on the notion that, if you want to succeed, you have to have a degree, two degrees, three degrees? And yet, I think of some of the people I know, like Carmen [a Stó:lō cultural teacher], he has a wealth of knowledge of history, and teachings, and culture. *He* should be the one up there teaching a course on Indigenous history!

¹⁹⁴ Interview with David Kirk, 31-August-2017

¹⁹⁵ Interview with David Kirk, 31-August-2017

¹⁹⁶ Interview with David Kirk, 31-August-2017

¹⁹⁷ Interview with David Kirk, 31-August-2017

¹⁹⁸ Interview with David Kirk, 31-August-2017

¹⁹⁹ Interview with David Kirk, 31-August-2017

²⁰⁰ Interview with David Kirk, 31-August-2017

So, it's ironic that, here we are, 150 years or so after Residential Schools first started. We were imposed a Western academic education back then—although that was a minor piece of what Residential Schools were about—but, we're in 2017, and we're still saying you've got to go get a degree. I mean, I'm just as guilty of that! I wouldn't be in the position where I am today, doing this work, if I didn't have a master's degree.²⁰¹

“What do the two degrees behind my name really mean?”, Kirk later asked rhetorically.²⁰² “I struggle to know who I am as a Stó:lō man”, he added, “and that’s a journey I’ve been on for 35 years.”²⁰³

4.1.6 – Hell’s Gate

On September 1, I visited Hell’s Gate in the Fraser Canyon, the traditional territory of the Nlha7káp̓mx, Stó:lō, and Stz’uminus peoples. Hell’s Gate can only be reached via the Trans Canada Highway, the route for which runs parallel to, and occasionally crosses over, the Fraser River. After passing through a series of tunnels carved into the Fraser Canyon, I arrived at Hell’s Gate.

Hell’s Gate is situated on the unceded traditional territory of the Nlha7káp̓mx (Nlaka’pamux) people. In the Nlha7káp̓mx oral tradition,²⁰⁴ Hell’s Gate was created, along with the Fraser Canyon, when a transformer named Coyote decided to break a dam that had been built to imprison salmon at the mouth of the Fraser River (Evenden, 2007, pp. 22-23). After breaking the dam, freeing the salmon, and guiding them to “tributaries and lakes in the interior”, Coyote “forged rocks” from what remained of the dam and used them to create the Fraser Canyon (p. 23). In so doing, Coyote created ideal conditions in the Fraser Canyon for catching (p. 21) and wind-drying (Carlson, 2010, pp. 41-42) sockeye salmon. For thousands of years, Hell’s Gate served as “a focusing point of ecological and social power”, access to which was governed by “complex systems of social regulation [which] emerged in native societies” (Evenden, 2007, p. 51).

In 1912 and 1913, Canadian Northern Railway (CNOR) construction crews blasted a tremendous volume of rocks and other debris into the Fraser River at Hell’s Gate. Eager to take advantage of time-sensitive provincial subsidies, rail promoters directed construction crews to employ risky, illegal construction techniques in carving a path through the Fraser Canyon for the CNOR (Meggs, 1991, pp. 90-92). This created the conditions for “hurried construction work”, as CNOR contractors failed to “exercise due caution to prevent major rock and mud slides” (Regehr, 1976, p. 391). This resulted in major landslides at Hell’s Gate in 1913 and 1914 which effectively dammed the river, preventing millions of sockeye from reaching their natal spawning grounds in the process. In order to protect the commercial fishery, the federal government moved quickly to

²⁰¹ Interview with David Kirk, 31-August-2017

²⁰² Interview with David Kirk, 31-August-2017

²⁰³ Interview with David Kirk, 31-August-2017

²⁰⁴ See Darwin Hannah & Mamie Henry (2011); and James Alexander Teit (1900).

prohibit food fishing in the Fraser Canyon, and later extended this ban “throughout the Fraser system” (Newell, 1993, p. 95).²⁰⁵ After initial efforts to clear this blockade proved unsuccessful, the International Pacific Salmon Fisheries Commission (IPSFC) was established in 1937 with a mandate to build fishways at Hell’s Gate,²⁰⁶ in addition to facilitating the bilateral management of the Fraser River fishery more broadly.²⁰⁷

Today, ‘Hell’s Gate’ refers not just to the narrowest portion of the Fraser River and the most treacherous point of passage for salmon migrating upstream, but also to Hell’s Gate Airtram, a private business operating an aerial tramway which ferries customers between the TCH on the left bank, and the exhibits, gift shops, and other amenities situated on the right bank, some 150 meters below the TCH. After paying the \$24 fee, I boarded the aerial tramway. During its descent to the right bank, the aerial tramway operator recited a tour-guide speech which begins as follows:

[We have begun] our 500-foot vertical descent, starting off on the Cascade mountains, and working our way over to the Coast mountain range, straight ahead, home to the Canadian Pacific Railway. Down in the middle, separating the Cascades from the Coast, is the Fraser River, as well as the raging white water you’re about to see down below bearing to the left, towards the bridge, otherwise known as Hell’s Gate. And, that area, getting its name back in 1808, from early explorer Simon Fraser, when he was unable to paddle through in his canoe. As a result, he wrote in his journal, “this is an area no human being should venture through, for surely we have encountered the gates of hell.”²⁰⁸

“That”, the aerial tramway operator added, “is how we got our name.”²⁰⁹ According to W. Kaye Lamb (2007), however, the idea that Simon Fraser and his associates “made a sort of triumphal progress through the country, naming lakes and rivers and trading posts after themselves as they went” is not supported by the documentary evidence (pp. 47-48). Indeed, Fraser’s journal does contain a reference to having “had to pass where no human being should venture” (2007, p. 117), but he does not follow this point by suggesting that “surely these are the gates of Hell.” Instead, Fraser goes on to describe how the Nlha7kápmx people constructed for themselves “a safe and convenient passage” with a series of ladders “fastened at both ends to stones and trees” (p. 117). Lacking “the advantages of their experience”, Fraser added, “[we] were often in imminent danger, when obliged to follow their example” (p. 117). After all, in the Nl̓eʔkepmxcín language, Nlha7kápmx translates to people who pass through the canyon (Hannah & Henry, 2011, p. 3).

As the Hell’s Gate fishways came into view, the aerial tramway operator proceeded to explain why the fishways were built.

Along the left-hand side, you’re going to notice the Canadian National Railway heading into the CN Tunnel, and that tunnel directly below you covered with trees [...] is what caused a major rockslide

²⁰⁵ While framed as a conservation measure, Geoff Meggs (1991) suggests that this “amounted to a straight reallocation of fish from [...] native people to [...] canners” (p. 103). By 1919, fisheries officials were engaged in an “all-out campaign” to put an end to in-river fishing, despite the ongoing famine in the Fraser Canyon (p. 104).

²⁰⁶ See Evenden (2000; 2004b; 2007).

²⁰⁷ See Michael Shepard and A.W. Argue (2005).

²⁰⁸ Aerial tramway operator at Hell’s Gate Airtram, visited 01-September-2017

²⁰⁹ Aerial tramway operator at Hell’s Gate Airtram, visited 01-September-2017

due to an undetected fault in the mountain range directly behind it. As a result of that rockslide, salmon were unable to get through for 30 years besides the help given from local First Nations that were netting and releasing them. But even that, as helpful as it was, still wasn't enough.

As a result, in 1947, these concrete-steel structures, that you see down below by the bridge, were built, known as the international fishways. Those structures right beside the bridge are where the salmon enter, and they slow down the flow of water for them, so they can follow those structures along the mountain range and exit down below here [...] getting them to the calmer, safer areas that way, all the while helping them to avoid 'the gates of Hell.' Keep in mind, even today, salmon heavily rely on these structures – they will not get through without them.²¹⁰

I noted that, despite mentioning “an undetected fault in the mountain range”, the aerial tramway operator did not explain precisely what caused the rockslide.

Figure 15: The Hell's Gate fishways as seen from the right bank of the Fraser River.



After stepping off the aerial tramway, I gazed at the turbulent rapids and fishways below (Figure 15), and marveled at the massive walls of rock above, before proceeding to the “Hell’s Gate Fishways Exhibit”, a large room containing a series of displays “presented by” the DFO,²¹¹ in addition to a number of older exhibits whose authorship is not specified. The DFO exhibits aim to illustrate “the wonder of the Fraser River system salmon runs, the hazards that face the migrating fish, and the measures taken by man to increase the runs.”²¹² Interestingly, I observed, “man” is credited by this exhibit for having taken “measures” to “increase the runs” of migrating

²¹⁰ Aerial tramway operator at Hell’s Gate Airtram, visited 01-September-2017

²¹¹ “Welcome to the Hell’s Gate Fishways Exhibit”, Hell’s Gate exhibit, visited 01-September-2017

²¹² “Welcome to the Hell’s Gate Fishways Exhibit”, Hell’s Gate exhibit, visited 01-September-2017

salmon. And, though it is acknowledged that “migrating fish” face many “hazards”, this exhibit does not mention that “man” is directly or indirectly responsible for many of these hazards.

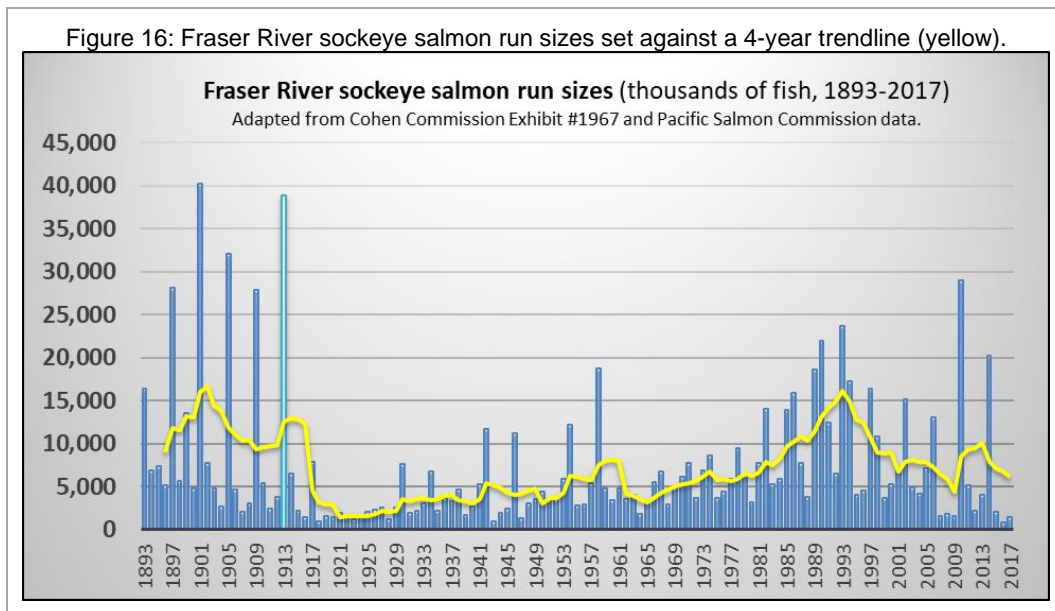
A few steps from this first placard stands another, seemingly part of the same series, titled “Hell’s Gate: Man Meets Nature’s Challenge”, which reads in part:

You are at Hell’s Gate, the awesome granite gorge in the Fraser River that has challenged man and the salmon runs throughout British Columbia’s history.

It was an obstacle to the early explorers, fur traders and gold miners, who had to divert via the Harrison and Lillooet river systems when the Cariboo gold rush began in 1857. However, salmon managed to swim up the thundering rapids until rockslides blocked the passage in 1913 and 1914, during the construction of the Canadian Northern Railway.

The fishways, completed in stages between 1946 and 1965, restored sockeye and pink salmon runs to pre-slide abundance.²¹³

These “rockslides”, I observed, are described here not as having been caused by the risky and illegal blasting techniques employed by CNOR contractors, but as having simply occurred “during” CNOR construction. I was also taken aback by this exhibit’s claim that the fishways “restored sockeye [...] runs to pre-slide abundance”, which I understood not to be the case. According to the PSC’s run-size data, at least, I understood that 1913 was the last time a sockeye run exceeded 30 million (Figure 16). How, I wondered, did this exhibit get it so wrong?



The next placard, titled “Rail and Ruin: CNR Rockslides Block the Fraser”, more accurately describes these rockslides as having been “caused by blasting for the Canadian Northern Railway”, in addition to conceding that this “decimated” salmon runs, rendering some of them “extinct” while others “are still being rehabilitated.”²¹⁴ This left me still more confused, however, as both placards appear to have been produced as part of the same series of exhibits—i.e., those

²¹³ “Hell’s Gate: Man Meets Nature’s Challenge”, Hell’s Gate exhibit, visited 01-September-2017

²¹⁴ “Rail and Ruin: CNR Rockslides Block the Fraser”, Hell’s Gate exhibit, visited 01-September-2017

“presented by” the DFO—given that they shared the same overall design, colour scheme, formatting, and so on. How, I wondered, did these exhibits come to contradict one another?

Alongside these placards are a number of older, untitled exhibits, each consisting of unlabeled photos and simple, plain-text, black-and-white printouts affixed to a blue background. These exhibits, many of which had obvious signs of water damage, were in varying states of disrepair. I was nevertheless struck by the printout affixed to one such display, which read:

In 1913, construction of the Canadian Northern Railway on the east bank caused a rock slide that blocked part of the river. Work crews excavated much of the rock but all of the slide material could not be removed. The passage for salmon through Hell's Gate became extremely difficult and incredible numbers of sockeye failed to pass through in 1913. The runs still have not fully recovered from this catastrophe.²¹⁵

In conceding that sockeye runs “have still not fully recovered from this catastrophe”, I observed, this untitled exhibit—like “Rail and Ruin: CNR Rockslides Block the Fraser”—contradicts the claims made by “Hell’s Gate: Man Meets Nature’s Challenge.”

Figure 17: Looking upstream from the left-bank side of the suspension bridge at Hell's Gate.



After taking in the remaining exhibits, I decided to reflect on these contradictions while taking a closer look at the fishways. I walked back outside, past the aerial tramway loading area, and across the suspension bridge. From the left-bank side of the suspension bridge, I took a number of additional photographs looking upstream at the concrete-and-steel fishways (Figure 17).

²¹⁵ Untitled placard, Hell's Gate exhibit, visited 01-September-2017, emphasis added

When I returned to the right bank, I found myself taken aback by another exhibit. This time, it was a plaque that was dated 1966—presumably to commemorate the completion of what was then the most recent addition to the fishways—in which the provincial government declared:

This awesome gorge has always been an obstacle to transportation. Indians used ladders and road builders hung shelves to skirt its cliffs. Canoes rarely dared its whirlpools; only one sternwheeler fought it successfully. Railroads and highways challenged it with tunnels and bridges, but today man and nature still battle here for supremacy.²¹⁶

Given that it was “man” who made the fishways necessary to begin with, I wondered, were “man” and “nature” truly engaged in an antagonistic “battle [...] for supremacy” here at Hell’s Gate? Would it not be more accurate, I asked myself, to understand the fishways as “man[’s]” attempt to correct his past mistakes? Why, moreover, do so many of these exhibits insist that “man” and “nature” are separate, antagonistic entities, when nature and culture are so clearly entangled here?

4.1.7 – York University

Following my return to York University, I observed that the commercial sockeye fishery remained closed for the rest of the season as returns continued to fall below expectations. The FRP conducted its final meeting of the 2017 season on September 12 (Pacific Salmon Commission, 2017h).

In addition, I noted that it was not until September 15 that the B.C. government lifted the state of emergency it declared 70 days earlier, on July 7, in response to an “unprecedented” outbreak of wildfires in the Cariboo region (BC Wildfire Service, n.d.). It was not until the fall that “cooler, wetter conditions” prevailed, permitting fire suppression crews to gain “the upper hand on the fire situation” (BC Wildfire Service, n.d.). Ultimately, the 2017 B.C. wildfires saw a record (that is, until the following year) 1.2-million hectares of land burn, displacing 65,000 people in the process (BC Wildfire Service, n.d.). According to Kirchmeier-Young et al. (2019), the “risk factors affecting the event, and the area burned [...], were made substantially greater by anthropogenic climate change” (p. 2).

The Swanson Occupation, I also observed, persisted until May 2018, when the B.C. Supreme Court granted Marine Harvest an injunction against Chief Ernest Alexander Alfred and his niece Karissa Glendale, compelling them to vacate the facility some nine months after the initial occupation (Hamelin, 2018). Then, in December, following months of negotiations, the ‘Namgis, Mamalilikulla, and Kwikwasut’inuxw Haxwa’mis First Nations signed an agreement with the B.C. government which could see 17 salmon farms removed from the Broughton Archipelago by 2023 (Thomas, 2018).

²¹⁶ “Fraser Canyon”, Hell’s Gate plaque, visited 01-September-2017, emphasis added

Though Alexandra Morton had agreed to participate in this study prior to my fieldwork, I was not able to interview her in person on account of her involvement on the Swanson Occupation. Accordingly, I interviewed Morton in June of 2019 over Skype. In reflecting on her role in the Swanson Occupation, Morton suggested that many First Nations have been “pushed [...] into becoming activists” by official processes that are effectively broken.

[Morton]: Clearly, they were not properly consulted on the new siting regulations because they just wanted those farms out. And, this demonstrates the big problem – that, now, the province of British Columbia is moving those farms out, but it required illegal activity to get to that point! It required this very dangerous and sustained effort that a lot of us were involved in. So, that suggests that the government process is not working. If you have First Nations, who go to those lengths and they are successful, it tells you that the government mechanisms were unsuccessful. Because, obviously, they tried those things first. It's strong evidence that whatever was implemented didn't work.²¹⁷

“That is not”, Morton added, “a symptom of a functioning government.”²¹⁸

When Morton first moved to B.C. in 1979, she was a newly-minted, American University-trained professional biologist intent on studying orcas. To that end, Morton founded the Raincoast Research Society in 1981, and settled in Echo Bay in 1984.²¹⁹ Echo Bay is a remote, unincorporated municipality on Gilford Island in the Broughton Archipelago. In 1989, Morton grew concerned about the siting of salmon farms that had begun to proliferate the nearby channels, inlets, and straits. Several of these salmon farms, she observed, were sited along migratory routes used by wild Pacific salmon. Consequently, little more than a net would separate these wild fish on the one hand, from the farmed Atlantic salmon reared within these facilities on the other, raising the spectre of disease transfer from farmed to wild fish, among other issues (Figure 18). In the years which followed, Morton wrote to the DFO to express her concerns, but ultimately found its responses wanting.²²⁰

In 2001, when the owner of a nearby fishing lodge came to her with a fish specimen infested with sea lice, Morton started investigating this issue more closely.²²¹ When she later confronted the DFO with evidence that juvenile pink salmon had contracted sea lice from salmon farms, Morton felt that their response was, once again, inadequate.²²² This convinced Morton—who was previously “quite determined not to become an environmentalist”—to abandon her whale research in favour of studying the impacts of salmon farming.²²³ Accordingly, Morton set out from Echo Bay on her boat, dip-net in hand, intent on determining whether wild fish were, in fact, contracting sea lice from nearby salmon farms. In the two-month, guerilla-style study which

²¹⁷ Interview with Alexandra Morton, 14-June-2019

²¹⁸ Interview with Alexandra Morton, 14-June-2019

²¹⁹ Cohen Commission Exhibit #1798: Alexandra Morton's curriculum vitae

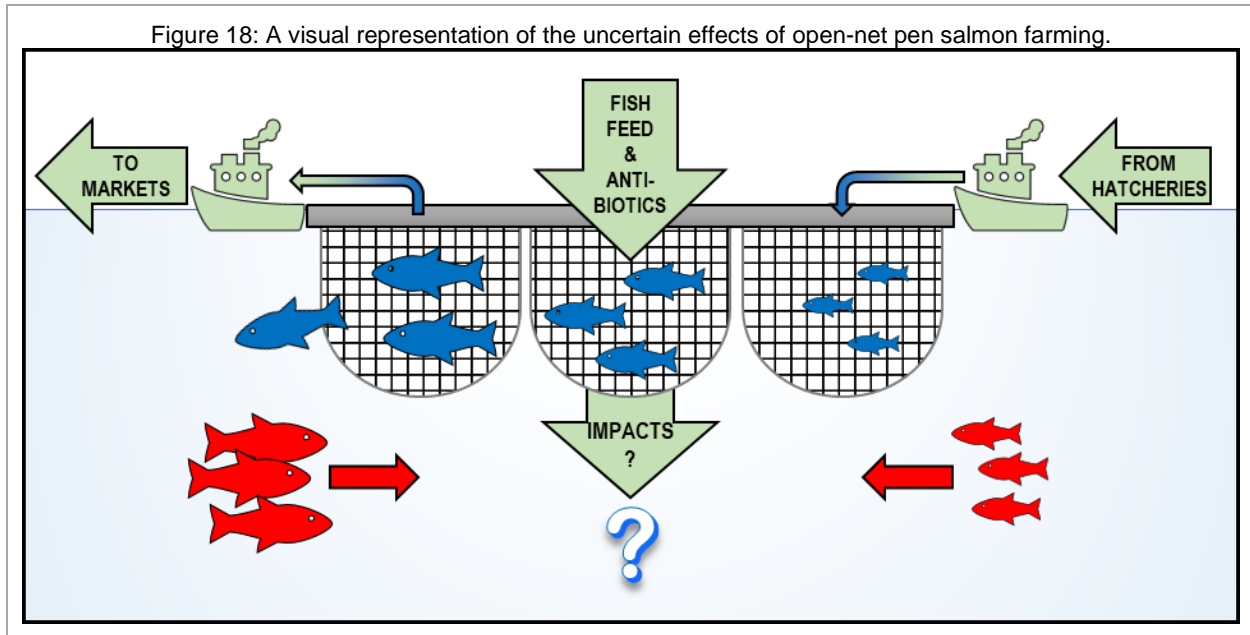
²²⁰ Interview with Alexandra Morton, 14-June-2019

²²¹ Interview with Alexandra Morton, 14-June-2019

²²² Interview with Alexandra Morton, 14-June-2019

²²³ Interview with Alexandra Morton, 14-June-2019

followed, Morton sampled a total of 751 pink salmon from 46 sites in the Broughton Archipelago (Morton & Williams, 2003, pp. 635-636). On the basis of this “spontaneously organized survey”, Morton and Rob Williams (2003) concluded that sea-lice infestations were “significantly higher in juvenile Pink Salmon in close proximity to salmon farms, than in Pink Salmon distant from salmon farms” (pp. 634-635).



A short time later, as Stephen Bocking (2012) explains, the DFO conducted a spontaneous sea-lice survey of its own, generating “contrary results” in the process (p. 689). Interestingly, whereas some criticized the DFO’s sea-lice survey for failing “to appropriately relate to local conditions”, still others panned Morton’s survey for attending too closely to the particulars of place (p. 689). These divergent “evaluations of credibility” were ultimately tied to differing assessments concerning the importance of place – whereas “some saw as more credible those methods that were specific to the Broughton, others favored those able to produce results that could be mobilized and compared to situations elsewhere” (pp. 689-690). In an effort to bolster the credibility of subsequent sea-lice studies, Morton forged alliances with statistical ecologist Richard Routledge, mathematical ecologist Martin Krkošek, and behavioural ecologist Lawrence Dill, among many others. It was thought that, by striking an appropriate balance between research design, modeling techniques, and statistical tests, results produced in the Broughton Archipelago “could attain the persuasiveness and mobility more usually associated with laboratory work” (p. 700).

For years, Morton believed that if she “just lined up [her] words in the right order, [the DFO] would understand the truth of what was happening.”²²⁴ Accordingly, Morton and her colleagues carried out a number of additional sea-lice studies. In Morton et al. (2004), sea-lice infections were observed on “90% of juvenile pink and chum salmon sampled near salmon farms in the Broughton Archipelago”, whereas “[s]ea lice abundance was near zero in all areas without salmon farms” (p. 147). Krkošek, et al. (2007) argued that “recurrent louse infestations of wild juvenile pink salmon [...], all associated with salmon farms, have depressed wild pink salmon populations”, suggesting in the process that “salmon farms can cause parasite outbreaks that erode the capacity of a coastal ecosystem to support wild salmon populations” (p. 1772). Morton et al. (2008) concluded that, of the juvenile pink and chum salmon sampled over a two-year period in the Discovery Islands, “farm exposure was the only consistently significant predictor of sea lice abundance” (p. 523). Despite mounting evidence to the contrary, the DFO remained seemingly unconvinced that salmon farms posed an existential threat to wild Pacific salmon.

Accordingly, Morton turned her attention to the legislative framework responsible for placing salmon farms in a liminal regulatory space. During this period, salmon farms in B.C. waters were regulated not by the federal government through the DFO, but by the Government of British Columbia through its Ministry of Agriculture and Lands. This frustrated Morton’s early efforts to hold the DFO to account for its apparent failure to safeguard the wild salmon populations under its jurisdiction from the impacts arising out of open-net pen salmon farming. Because these aquaculture facilities had been reframed as farms, Morton suggested to me, “nobody was in charge of the impact of the farm on the wild fish.”²²⁵ Accordingly, in May 2008, Morton—together with the Wilderness Tourism Association, Southern Area (E) Gillnetters Association, and Fishing Vessel Owners’ Association of British Columbia—filed a petition with the B.C. Supreme Court alleging that the provincial regulation of salmon farms was unconstitutional (Hume, 2008). From September 29 to October 2, 2008, Morton and her fellow petitioners appeared before B.C. Supreme Court Justice Christopher Hinkson in Vancouver to plead their case.²²⁶ In February 2009, Justice Hinkson ruled that salmon farms cannot be “considered to be agriculture for jurisdictional purposes.”²²⁷ Instead, Hinkson concluded, “the fish which are reared in finfish farms on the coast of British Columbia are either a part of the overall British Columbia Fishery or are a fishery unto themselves.”²²⁸ “In either case”, Hinkson added, farmed fish “fall under the jurisdiction of

²²⁴ Interview with Alexandra Morton, 14-June-2019

²²⁵ Interview with Alexandra Morton, 14-June-2019

²²⁶ Morton v. British Columbia (Agriculture and Lands), [2009] BCSC 136

²²⁷ Morton v. British Columbia (Agriculture and Lands), [2009] BCSC 136

²²⁸ Morton v. British Columbia (Agriculture and Lands), [2009] BCSC 136

Parliament under s. 91(12) of the Constitution Act, 1867.”²²⁹ As a result of this ruling, the DFO was soon forced to assume responsibility for regulating open-net pen salmon farms in B.C. water, while the provincial government would continue to be responsible for issuing fish farm tenures to aquaculture corporations.

In recognition of her efforts “linking sea-lice infestation in wild salmon to fish farming in the Broughton Archipelago”, as well as for drawing “international attention” to the issue and challenging “the salmon farm industry and the government officials who regulate it”, Morton was awarded an honorary doctorate by Simon Fraser University in 2010 (Simon Fraser University, 2010). In addition, the Kwikwasut’inuxw Haxwa’mis of Guildford Island and Dzawada’enuxw of Kingcome bestowed upon Morton the name Gwayum’dzi, or Big Whale, an ancestral name that was previously reserved²³⁰ for powerful chiefs.

Taken together, these experiences led Morton to view the DFO “as an arm of the aquaculture industry.”²³¹ This is the only way, Morton explained to me, to “reconcile their behaviour.”²³²

It fits perfectly. Everything they do is in service to the industry, and downplaying the impact on wild salmon. They are part of the aquaculture industry.²³³

The federal government, Morton went on to suggest, “can only hear other voices – international trade voices, industry voices.”²³⁴ It follows, for Morton, that “if we have wild salmon in the next 20 years, it is only going to be because First Nations took the lead on this, [...] allies learned how to assist them effectively, and [...] management was removed from Ottawa.”²³⁵

On June 23, a little more than a week after my interview with Morton, the DFO received reports that salmon were struggling to make it past an apparent landslide at Big Bar, approximately 60 kilometers upstream from Lillooet, in Secwépemc and Tšilhqot’in territory. In the aftermath of this landslide, which is believed to have occurred in late 2018, “when this isolated part of the river would not have been actively monitored”, salmon have not been able to ascend the river past this obstruction without human intervention (Government of BC, 2019).

4.2 – Discussion and Analysis

On the basis of the ethnographic and interview data described above, I identified four related sources of controversy in the Fraser River fishery: (1) First Nations in B.C. continue to experience various forms of colonial violence and dispossession, provoking a variety of complex responses;

²²⁹ Morton v. British Columbia (Agriculture and Lands), [2009] BCSC 136

²³⁰ For this reason, Morton admits that this was a controversial decision.

²³¹ Interview with Alexandra Morton, 14-June-2019

²³² Interview with Alexandra Morton, 14-June-2019

²³³ Interview with Alexandra Morton, 14-June-2019

²³⁴ Interview with Alexandra Morton, 14-June-2019

²³⁵ Interview with Alexandra Morton, 14-June-2019

(2) unintended consequences arising from a longstanding ethic of exploitation aimed at establishing and maintaining dominion over nature; (3) the effects associated with the prevailing view that fish, and fishing, are principally vehicles for the pursuit of economic growth and financial profit; and (4) the local effects of anthropogenic climate change. In what follows, I describe each of these sources of controversy, and explain how I endeavoured to represent them cartographically.²³⁶

4.2.1 – Dispossession and Colonial Violence

First, the Fraser River fishery is prone to controversies in part because Indigenous peoples in B.C. continue to experience various forms of colonial violence and dispossession, provoking First Nations to respond in a variety of complex ways.

Despite the Supreme Court of Canada's 1990 acknowledgement that First Nations in B.C. have the right to fish for food, social, and ceremonial (FSC) purposes,²³⁷ the FSC fishery is subject to a number of limitations, forcing some communities to rely on others to catch their annual allotment of fish. Accordingly, Skwxwú7mesh Úxwumixw relies on the A-Tlegay Fisheries Society to catch their allotment of FSC fish, whereas Tsleil-Waututh relies on xʷməθkʷəy̓əm.²³⁸ Similarly, despite his tremendous abilities as a fisher, Grand Chief Ken Malloway can only catch his allotment of fish if there are fish to catch, and he can only sell the fish he catches if his community reaches a sales agreement with the DFO for that particular fishing season. If there "aren't fish to share", Grand Chief Malloway added during our interview, "any conservation concerns will be borne [...] by the commercial and sports fishery, but that's not the way it is, because we found [...], through DNA work, that up to 58% of the chinook [salmon] that we're conserving are being caught in Victoria."²³⁹ In this way, the FSC fishery can be interpreted as an improvement over, but nevertheless a continuation of, the Indian food fishery in that it functions in a manner which continues to dispossess Indigenous communities of their pre-contact fisheries.

Today, each of the Skwxwú7mesh, Ch'íyáqtel, and Tsleil-Waututh communities are stalled at various points in the B.C. treaty process. Consequently, these communities are relegated to small parcels of land which comprise a miniscule portion of their respective traditional territories. The small plots of land set aside for Indian reserves were justified, as Douglas Harris (2008) notes,

²³⁶ My aim in representing themes cartographically is not to claim a 'view from nowhere' (Haraway, 1988) of the salmon controversies in B.C., but to produce a multi-layered, cartographic representation of this landscape that is informed by the very particular combination of perspectives established throughout this chapter. As a result, these portraits are necessarily incomplete. In a similar vein, these portraits do not aim to depict the sources of salmon controversies in B.C. at a fixed point in time. On the contrary, this map intentionally plays with notions of temporality.

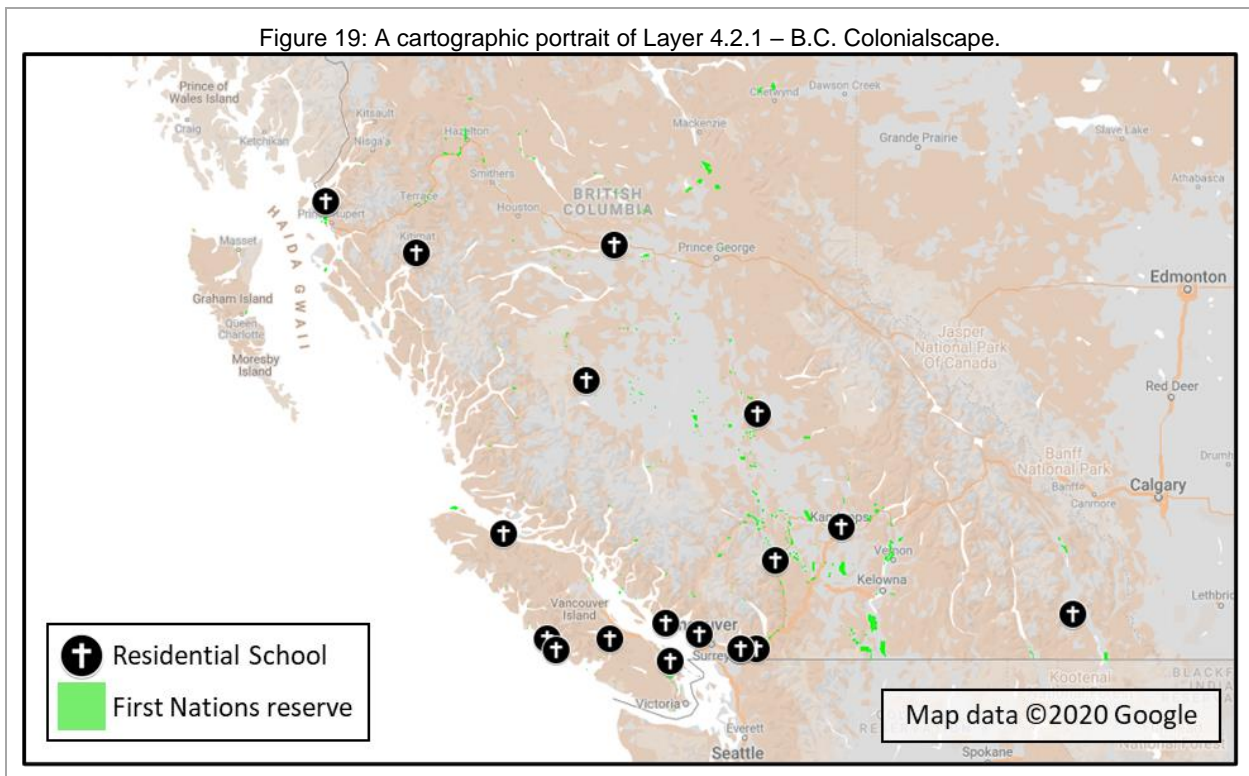
²³⁷ *R v. Sparrow*, [1990] 1 S.C.R. 1075, p. 1101

²³⁸ As Chief Ernie George pointed out during our interview, however, Tsleil-Waututh does not catch its full allotment in years of low abundance, as they don't want to be "the ones to take the last salmon."

²³⁹ Interview with Grand Chief Ken "Wileleq" Malloway, 22-August-2017

“on the grounds that Native peoples on the Pacific coast were primarily fishing peoples who did not need a large land base” (p. 6). The “intent and effect” of the Indian reserves was the same as that of the Indian food fishery – that is, “to set aside fragments of traditional territories and fisheries for Native peoples, opening the remainder to immigrants” (p. 4). These instruments, “[c]onstructed together and operating in tandem [...] consigned Native peoples to small parcels of land with inadequate protection for the fisheries that were to be their primary means of support” (p. 4). Understood in this context, the dispossession of the fishery is one “characterized by the colonial state’s failure to honour its limited attempts to provide space for Native peoples and their livelihoods” (p. 4).

Figure 19: A cartographic portrait of Layer 4.2.1 – B.C. Colonialscape.



In addition to these less visible forms of colonial violence, many Indigenous communities and people in B.C. continue to be affected by Residential Schooling. This is true not only for those who attended Indian Residential School, but also for their descendants. Chief Ernie George, for instance, described being deeply affected by his one year at St. Paul’s Indian Residential School. Latash, meanwhile, did not feel comfortable enough indulging in his own culture to put on a naming ceremony until the 1990s. David Kirk, whose parents survived the Coqualeetza Industrial Institute, still struggles with his identity as a Stó:lō man. Thus, the colonial violence of dispossession refers in B.C. not just to resources and territories, but also to cultures, languages, and identities. Canada’s Indian Residential School system may no longer exist, but its influence over the landscape persists to this day.

I represented this source of controversy cartographically by adding a new layer to my map containing the historic locations for all Indian Residential Schools in B.C., along with the current boundaries for all First Nations reserves in the province. I refer to the resulting cartographic portrait, following Sarah Elizabeth Hunt (2014), as the “B.C. Colonialscape” (Figure 19).

4.2.2 – Dominion over Nature

Second, the Fraser River fishery is prone to controversies in part because the Fraser River watershed bears the cumulative effects of a longstanding ethic of exploitation in which ‘man’ is set apart from ‘nature’ so that ‘he’ might establish and maintain dominion over nature.

At the Hell’s Gate fishways in the Fraser Canyon, for instance, “man” is said to be facing off against “nature” in a “battle [...] for supremacy”,²⁴⁰ glossing over the fact that it was “man” that made the fishways necessary to begin with. This brought to mind Bruno Latour’s (1993) notion of the Great Divide, which describes the artificial separation of nature and society under Western modernity, as well as the denial of that separation. This also brought to mind Carolyn Merchant’s (1980) assertion that the Scientific Revolution gave rise to an ethic of exploitation, fashioned by Francis Bacon, which encouraged scientists (coded masculine) not just to establish and maintain dominion over nature (coded feminine), but also to exploit ‘her’ natural resources to the greatest extent possible. Bacon, Merchant suggests, successfully advocated for “the control of nature for human benefit” (p. 164).

This ethic is also reflected in the decision to build the Cleveland Dam in the mid-twentieth century, despite the devastating impact this would have on Capilano River salmon populations. This led, in turn, to the 1971 establishment of the Capilano River Hatchery in North Vancouver, where biologists are said to be giving “nature a hand” by “stripping the eggs from [...] female [salmon] and mixing in [...] male sperm”²⁴¹ with the ultimate aim of “contribut[ing] to the commercial, sport and native food fisheries.”²⁴²

Similarly, the route for the Canadian Northern Railway (CNOR) was hurriedly carved through the Fraser Canyon through the use of dynamite, resulting in landslides at Hell’s Gate which devastated many sockeye populations. These early-twentieth century projects—along with the men who ordered, financed, and stood to benefit from them—“typified the spirit of the age”, which is to say that they were driven by a sense of “optimism which verged on recklessness” (Regehr, 1976, p. 291). Today, the B.C. landscape is replete with evidence of the recklessness of

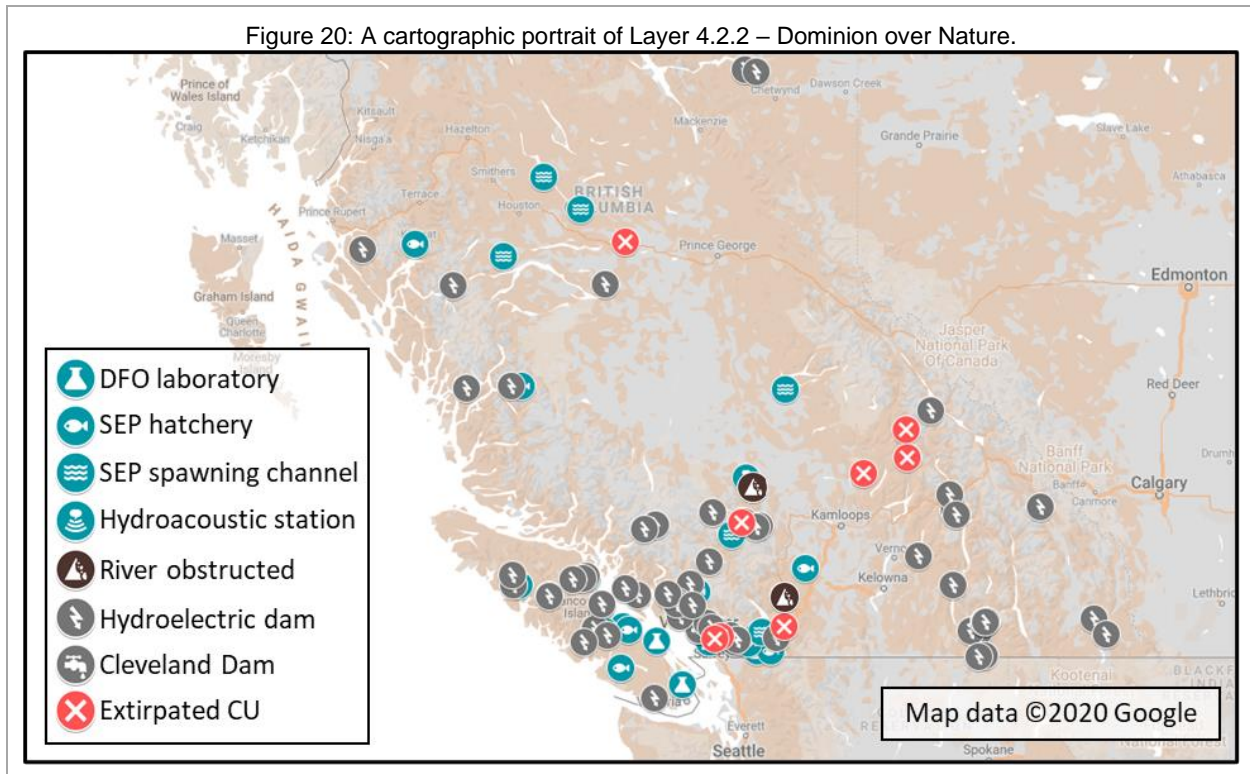
²⁴⁰ “Fraser Canyon”, Hell’s Gate plaque, visited 01-September-2017

²⁴¹ Untitled exhibit, Capilano River Hatchery interpretive centre, visited 15-August-2017. This also brought to mind Emily Martin’s (1991) “The Egg and the Sperm”: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles.”

²⁴² “Annual Fish Production”, Capilano River Hatchery interpretive centre, visited 15-August-2017.

this mindset, as well as the accompanying overconfidence in the potential for technoscience to improve upon nature.

I represented this source of controversy cartographically by adding a new layer to my custom map which includes (a) DFO laboratories, hatcheries, and spawning channels, (b) obstructions at Hell's Gate and Big Bar, (c) extirpated sockeye conservation units, and (d) hydroelectric dams. Together, these representations form a cartographic portrait of the technoscientific drive to establish and maintain "Dominion over Nature" (Figure 20).



4.2.3 – Fish(ing) for Growth

Third, the Fraser River fishery is prone to controversies in part because it has long been managed by a network of political, economic, and technoscientific institutions historically mandated to conceive of fish, and fishing, principally as vehicles for the pursuit of economic growth and financial profit.

According to Latash, for instance, the decline of Fraser River salmon populations started not with the landslides at Hell's Gate of 1913 and 1914, but with the excesses of the fast-growing commercial fishery in the late-nineteenth and early-twentieth century. Operating in tandem with a

growing network of canneries and railways, the early commercial fleet overfished²⁴³ salmon populations as a matter of course. Prior to the widespread availability of refrigeration, however, this meant that commercial fishing vessels were often turned away by canneries that were already operating at full capacity. As a result, Latash explained, “they would dump tons of salmon into the river, and they would be sent out the next day to harvest more salmon.”²⁴⁴ Then, as fishing technologies grew increasingly more effective over time, perpetually overfished salmon populations were offered little reprieve. Following the advent of fishfinder sonar in the mid-twentieth century, Chief Ernie George noted, the salmon “never really had a chance.”²⁴⁵

Though fishing quotas like maximum sustainable yield (MSY) are “usually described as a step forward in fisheries conservation”, Carmel Finley (2011) argues that MSY was “a political and an economic construction before it was a scientific one” (p. 6). MSY is a creation of the U.S. State Department that was originally intended to facilitate the “transfer of Western knowledge and technology to other countries”, in addition to providing a scientific guise for the creation of “institutional structures that benefited American interests” (p. 1). Indeed, the Fraser River fishery is managed bilaterally—i.e., by Canada and the U.S. through the Pacific Salmon Commission—in a manner which benefits American interests. During the annual sockeye run, the Fraser River Panel meets regularly to determine whether the number of returning fish is sufficient to permit the allocation of TAC (total allowable catch) to Canadian or American commercial fishers.

In 1977, the DFO, citing a decline in B.C. salmonid populations, launched its salmonid enhancement program (SEP) with the explicit aim to “arrest” and “reverse” this decline (DFO, 2017a). Today, the DFO operates more than 20 SEP facilities in B.C., including hatcheries like the Capilano River Hatchery and human-made spawning channels like the Horsefly River Spawning Channel. In addition, the DFO issues licences to privately-owned hatcheries that specialize in rearing Atlantic salmon smolts. Unlike the smolts reared in SEP facilities, however, these fish are not ultimately released into nearby rivers or streams. Instead, they are transferred to open-net pen salmon farms situated along the B.C. coast, where they remain until they have grown large enough to be harvested and sold. Each of Latash, Chief Ernie George, David Kirk, and Alexandra Morton expressed to me grave concern regarding the impacts associated with

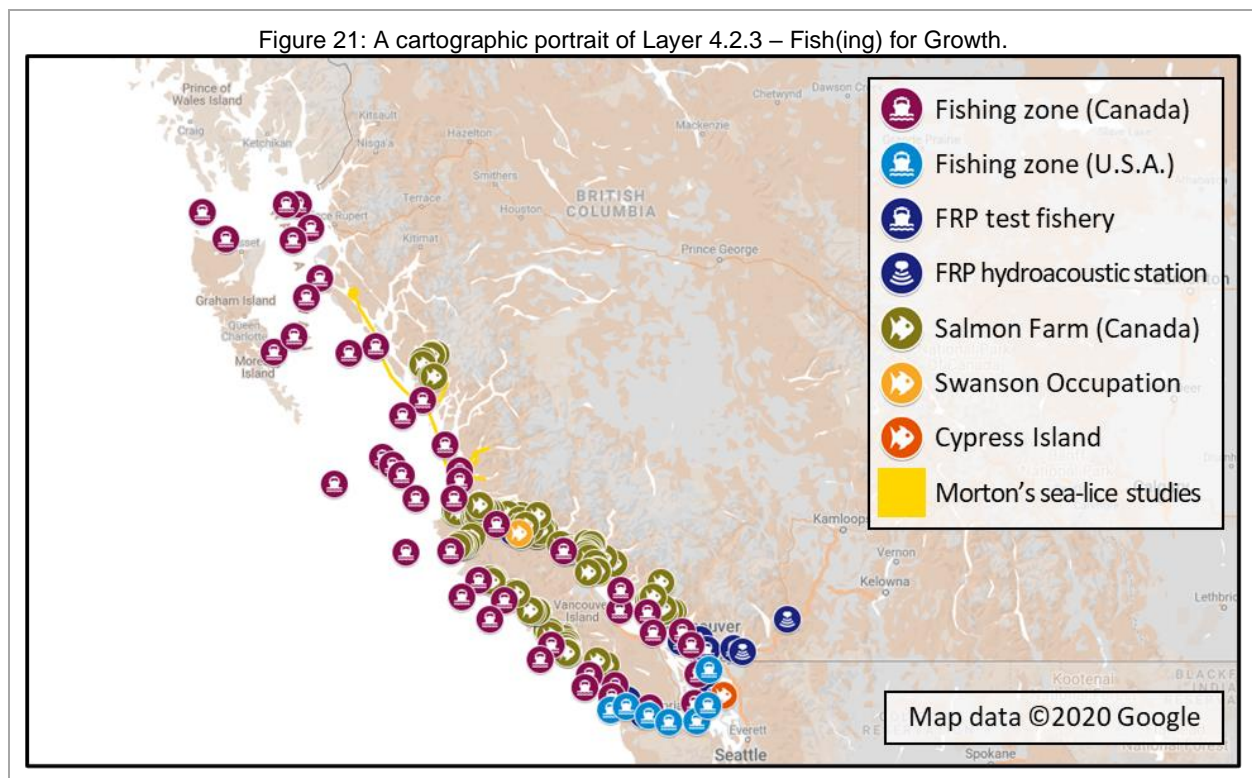
²⁴³ As Jennifer Hubbard (2006) has argued, it was not until the mid-twentieth century that a consensus would begin to emerge among Canadian fisheries biologists on the issue of overfishing. This was due in part to Thomas Huxley’s pathological influence on the development of fisheries science in Canada (2006, p. 149). Huxley believed the world’s fisheries were inexhaustible, and opposed the regulation of commercial fishing on this basis. This proved especially problematic in the Canadian context, where “deference shown [...] to leading scientists from the Old Country meant that there was little opposition to Huxley’s views in Canada” (p. 160).

²⁴⁴ Interview with Latash (Maurice Nahanee), 17-August-2017.

²⁴⁵ Interview with Chief Slá'hólt Ernie George, 29-August-2017

open-net pen salmon farms, in addition to raising important questions regarding the economics of salmon farming.

I represented this source of controversy cartographically by adding a new layer to my custom map which includes (a) the Pacific Salmon Commission and Fraser River Panel, (b) test fisheries, hydroacoustic monitoring stations, and commercial fishing zones, and (c) open-net pen salmon farms licensed to operate in B.C. waters, along with interpolated sampling routes derived from two of Alexandra Morton's sea-lice studies. Together, these representations form a cartographic portrait of the prevailing institutional impetus to conceive of fish (and fishing) principally as vehicles for economic growth (Figure 21).

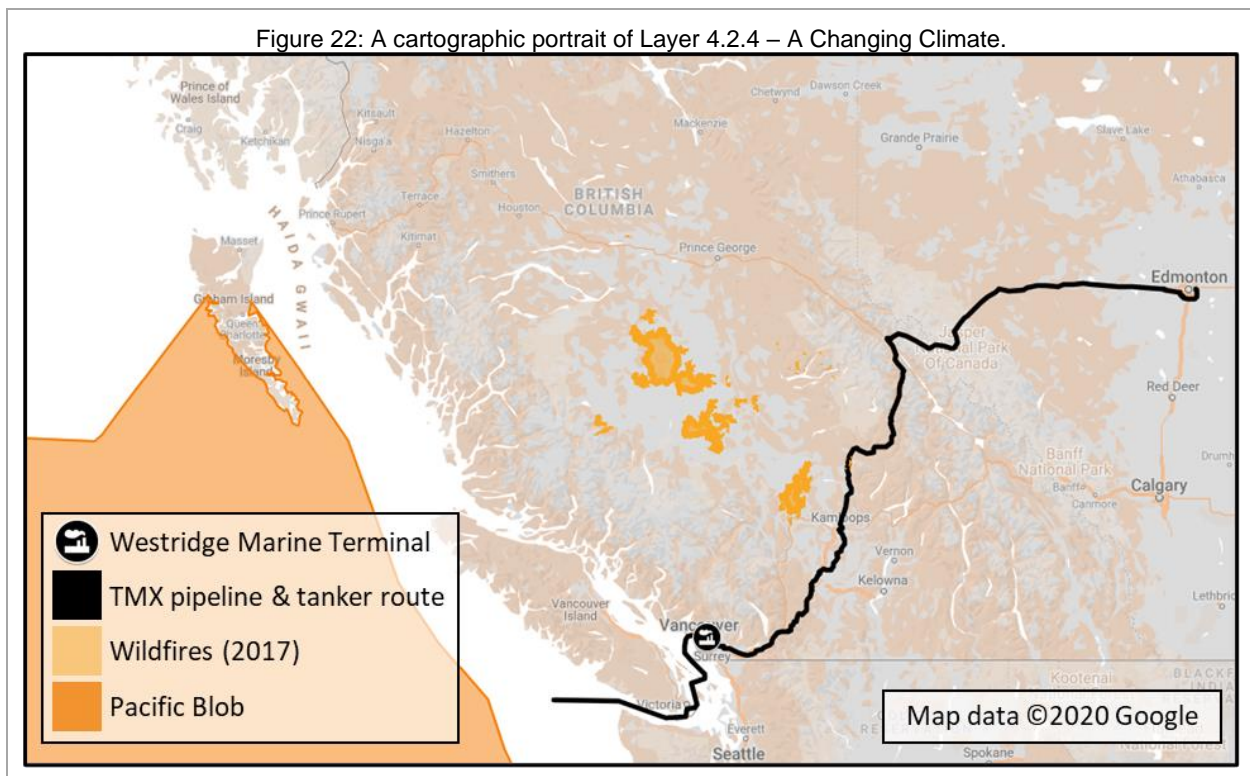


4.2.4 – A Changing Climate

Finally, the Fraser River fishery is prone to controversies in part because of the effects of anthropogenic climate change on the many ecosystems upon which Fraser River sockeye depend.

In the summer of 2017, concerns regarding anthropogenic climate change were stoked by a record-breaking wildfire season which forced tens of thousands of Indigenous and non-Indigenous people in B.C. to evacuate their homes, in addition to warming the Fraser River and its tributaries, producing difficult conditions for the relatively modest number of sockeye salmon returning to the Fraser River. Grand Chief Ken Malloway suggested that the low sockeye returns, and the abnormally small size of those that did return, may have been caused by the so-called

Pacific Blob, an anomalously warm patch of water which persisted in the Pacific Ocean from 2013 to 2016 . This may have had an adverse impact on the 2017 cohort of sockeye, given that these fish would have entered the Pacific Ocean in search of food in mid-to-late-2015, in the midst of what was effectively a prolonged marine heatwave. In addition to raising concerns regarding the impacts of anthropogenic climate change on Fraser River sockeye, the Pacific Blob accentuated the broader need to “consider ecological processes in fisheries decision-making” (Gewin, 2015). Indeed, though anthropogenic climate change is undoubtedly a global problem, it produces direct and indirect effects on local ecosystems.



The importance of ecological considerations was made especially apparent to me in discussing the Burrard Inlet with Chief Ernie George, a Tsleil-Waututh hereditary chief. Indeed, Chief George takes very seriously his role as a steward of the Burrard Inlet, and so too does Tsleil-Waututh Nation more broadly. After rejecting Kinder Morgan’s 2014 proposal, Tsleil-Waututh has remained steadfast in its opposition to the subsequent proposals to expand the Trans Mountain pipeline (TMX). The existing pipeline, which has since been purchased by the federal government, carries oil from Alberta to the Westridge Marine Terminal on the south shore of the Burrard Inlet. From there, oil is loaded onto tankers and exported through the Juan de Fuca Strait. In rejecting Kinder Morgan’s 2014 proposal to expand the existing pipeline by twinning it with one that would carry diluted bitumen, Tsleil-Waututh raised concerns regarding the possibility of an oil spill in the Burrard Inlet or Salish Sea, an incident that could have catastrophic ecological results. The

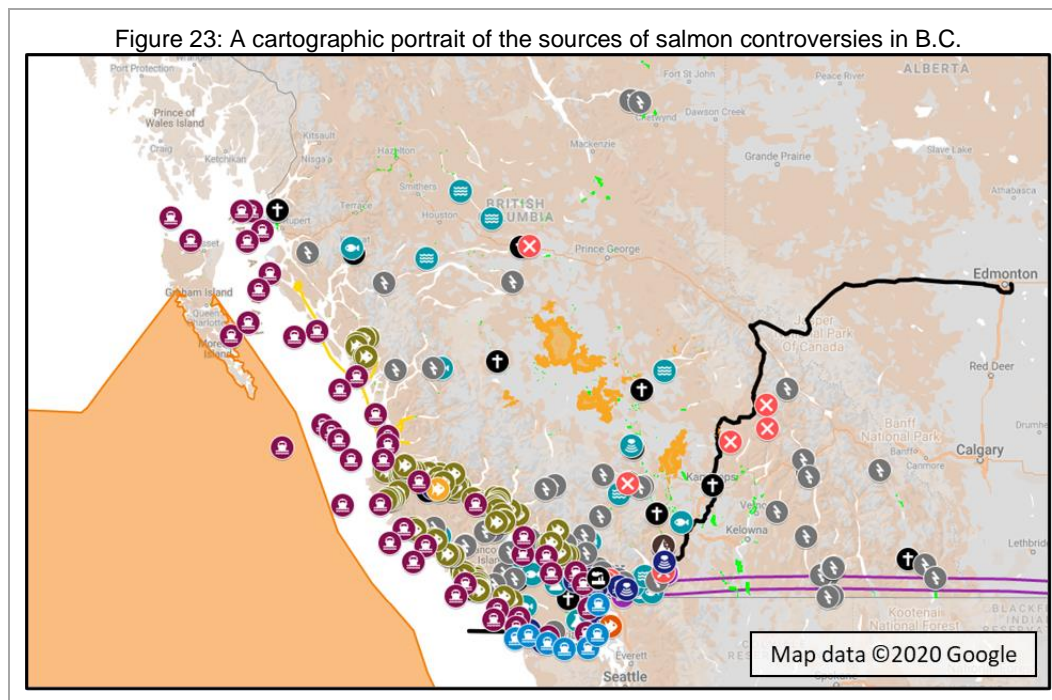
existing pipeline, which crosses the Fraser River at several points, has leaked more than 80 times since its completion in the 1950s (Union of B.C. Indian Chiefs, 2020).

I represented this source of controversy cartographically by adding a new layer to my custom map which includes (a) the Pacific Blob, (b) the largest 2017 wildfires, and (c) the Westridge Marine Terminal, Trans Mountain Pipeline, and the associated oil tanker route. Together, these representations form a cartographic portrait of a changing climate (Figure 22).

4.3 – Summary and Conclusion

My aim in this chapter was to address the following question: What are the primary sources of controversy in the Fraser River fishery?

In order to address this question, I retraced my steps through the field during the 2017 sockeye run, from Toronto to the lower B.C. mainland and back again, pausing at numerous junctures along the way to consider the ethnographic and interview data collected there.



Upon considering these data, I identified, and offered cartographic portraits of, four related sources of controversy: (1) Indigenous responses to colonial violence and dispossession; (2) unintended consequences arising from the drive to establish and maintain dominion over nature; (3) the prevailing view that fish, and fishing, are principally vehicles for economic growth; and (4) the local effects of anthropogenic climate change. In the next chapter, I combine these cartographic portraits (Figure 23), and bring them to bear on the social life (cycle) of sockeye.

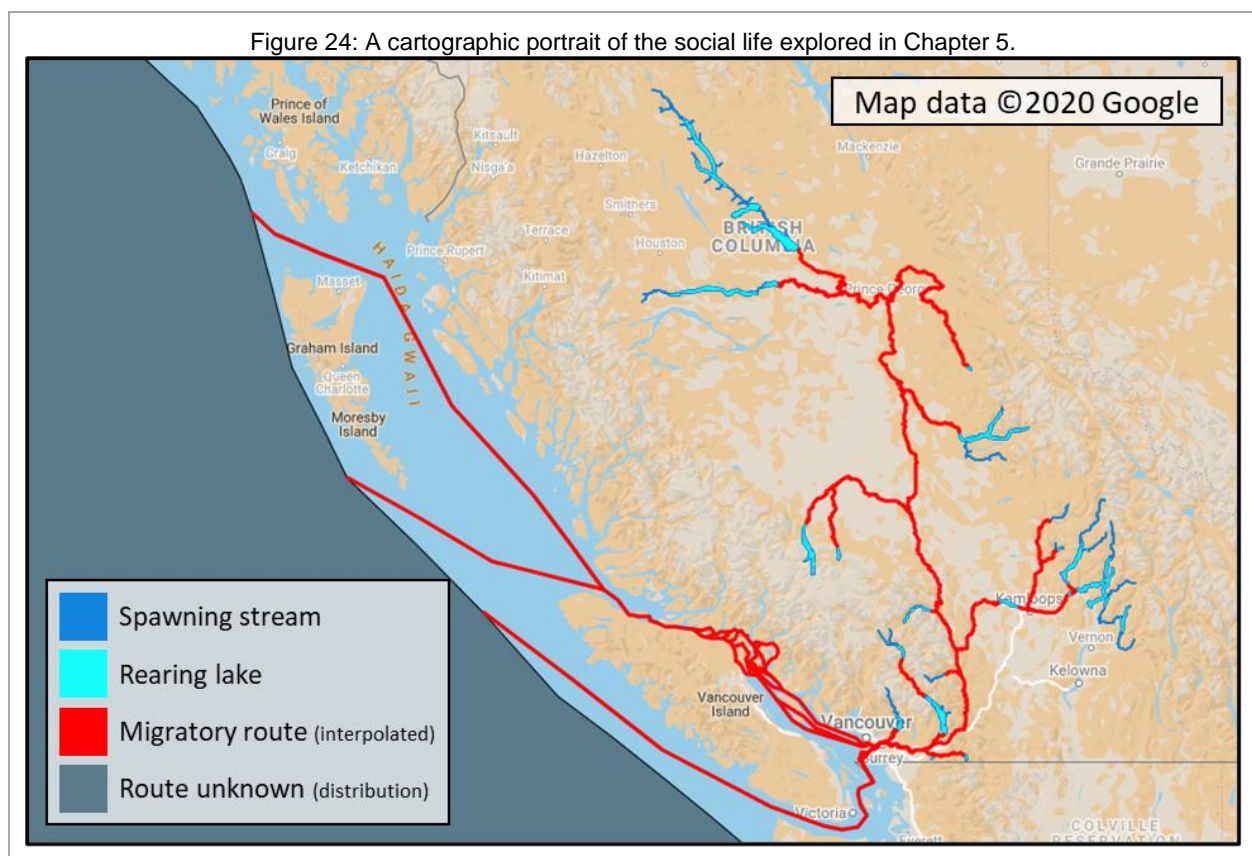
CHAPTER 5 – THE SOCIAL LIFE OF SOCKEYE

“Revealing things happen when we follow our interlocutors and their practices across various frontiers.”

—Deborah Heath (1998, p. 71)

I aim in this chapter to address the following two-part research question: What salmon controversies are revealed through the social-life of sockeye, and how do they compare to those depicted in the Cohen Report’s overview of the life-cycle of sockeye?

To address this question, I follow Fraser River sockeye from their spawning grounds to the Pacific Ocean and back again, exploring the social life of sockeye along the way, and—by extension—identifying gaps in the Cohen Report’s overview of the life-cycle of sockeye.



5.1 – (De)Constructing the Social Life (Cycle) of Sockeye

The Cohen Report, it should be noted, is a three-volume, 21-chapter, 1,191-page report detailing the findings and recommendations of the Cohen Commission, a three-year inquiry into the decline of Fraser River sockeye led by Commissioner Bruce Cohen. The first volume of the Cohen Report begins with an eight-page introductory chapter²⁴⁶ in which Cohen recounts the events which led to the establishment of the Commission, describes his mandate as Commissioner, and briefly

²⁴⁶ Cohen Report, Vol. 1, pp. 1-8

introduces the Fraser River fishery. In the second chapter,²⁴⁷ which is also eight pages in length, Commissioner Cohen endeavours to “summarize the extraordinary life cycle of [...] Fraser River sockeye.”²⁴⁸ This second chapter is significant because, despite its brevity, it is the first chapter in the Cohen Report to offer a sustained engagement with the evidence gathered by the Commission. Thus, by following each conservation unit of Fraser River sockeye from their spawning grounds to the Pacific Ocean and back again, and pausing at numerous intersections along the way to consider what the Cohen Report’s life-cycle overview, and the Commission’s broader base of evidence, has to say about these encounters, I aim in this chapter not just to identify gaps in the Cohen Report’s overview of the life-cycle of sockeye, but also to shed light on the Cohen Report’s foregrounding or backgrounding particular forms of evidence.

A conservation unit (CU), it should also be noted, is a unit of biological diversity. According to the DFO’s (2005) *Wild Salmon Policy*, each sockeye CU consists of at least one spawning population, and each population consists of multiple localized demes. Sockeye salmon are adapted to local spawning habitats to such a degree that, if all the fish, demes, and populations which together constitute a given CU are wiped out, it is highly unlikely that their respective spawning grounds will be “recolonize[d] naturally [...] within a human lifetime” (p. 10).²⁴⁹ Though I occasionally refer in this chapter to sockeye populations and (in quoted text) to sockeye stocks, sockeye CUs are my primary unit of analysis. This is not to suggest, however, that I take for granted the validity of the CU as a concept. Nor, for that matter, do I take for granted the genetic, biological, or geographical data used to determine the boundaries for each individual CU. Nevertheless, when compared to the closest alternative unit of analysis—i.e., sockeye ‘stocks’—sockeye CUs are both more definitionally²⁵⁰ and geographically²⁵¹ consistent. An analysis centred on populations or demes, on the other hand, would likely have proven too granular. As a unit of analysis, in other words, the CU is not unproblematic. For the purposes of this study, however, the CU proved to be more suitable as a unit of analysis than the alternatives.

5.1.1 – Eggs and Alevin in Spawning Streams

Typically, the life-cycle of Fraser River sockeye begins and ends in freshwater spawning streams during the late-summer or early-fall. “During the spawning process”, as Commissioner Cohen

²⁴⁷ Cohen Report, Vol. 1, pp. 9-16

²⁴⁸ Cohen Report, Vol. 1, p. 9

²⁴⁹ As the colonial language embedded in this definition makes clear, the CU is a concept that is not without its problems. However, an in-depth analysis of these problems would require a sustained engagement with the DFO’s *Wild Salmon Policy*, which is beyond the scope of this study.

²⁵⁰ The term “stock” is not a “genetic construct”, but a “semi-discrete group of fish with some definable attributes of interest to [fisheries] managers” (Begg & Waldman, 1999, p. 39).

²⁵¹ Though both units of analysis are aggregate categories, sockeye CUs better permit me to attend to the particulars of place because they are anchored by particular rearing lakes (or, in the case of river-type CUs, the absence of one), whereas some sockeye stocks (e.g., Miscellaneous Early Summer) consist of many small populations, some of which are separated by hundreds of kilometers.

explains near the outset of the chapter, “the female is the dominant partner and interacts with both the gravel environment and the courting male in a specific sequence of activities.”²⁵²

The activities include nest site selection, nest construction, courtship display, release of eggs, fertilization, covering of the nest, and defending against intruders. The female selects a site for the deposit of her eggs (“redd”); digs a depression (“nest”) in the gravel substrate; and deposits 500 to 1,100 eggs, which are simultaneously fertilized by an accompanying male or males.²⁵³

Upon securing her redd in the gravel, the female sockeye guards it until her death, which typically occurs a few days later. Provided that the redd remains safely embedded in the gravel, the eggs nested therein will develop over the course of the coming winter.

What Cohen does not mention in this overview is that many Fraser River sockeye spawn not in their natural spawning habitats, but in human-made spawning channels and hatcheries. It is not until over 300 pages later, in a chapter dedicated to habitat management issues, that Cohen makes this point apparent. In the Fraser River watershed, Cohen explains, “there are four spawning channels [...] and two hatcheries that produce sockeye.”²⁵⁴ From 2006 to 2009, an annual average of 40 million “enhanced sockeye” were released from these facilities.²⁵⁵ At the time of the Commission’s inquiry, however, the DFO had studied neither “the risk of over-exploitation of wild Fraser River sockeye salmon in mixed-stock fisheries with co-migrating enhanced populations”, nor “the effects of competition between wild and hatchery salmon in the marine environment.”²⁵⁶ The DFO even lacked a “biological risk assessment framework” with which to assess “the risks of hatchery production to wild salmon.”²⁵⁷

Cohen also does not mention the various CUs that have been “extirpated”, in the parlance of the DFO’s Wild Salmon Policy,²⁵⁸ as a consequence of a variety of human activities and technoscientific interventions. In a much later discussion, Cohen notes that multiple initiatives are underway to “re-anadromize” extirpated CUs.²⁵⁹ Cohen concedes that efforts to re-anadromize Coquitlam River sockeye have proven unsuccessful, but suggests that the Alouette River sockeye re-anadromization project has shown “good potential”²⁶⁰ The Alouette and Coquitlam runs are just two of eight CUs classified as “extirpated” by the DFO in its most recent assessment of the

²⁵² Cohen Report, Vol. 1, p. 10. This contrasts sharply with antiquated portrayals of reproductive biological processes in which the egg appears as a passive “damsel in distress, shielded only by her sacred garments” while the sperm assumes the active role of “heroic warrior to the rescue” (Martin E. , 1991, p. 491).

²⁵³ Cohen Report, Vol. 1, p. 10

²⁵⁴ Cohen Report, Vol. 1, p. 326

²⁵⁵ Cohen Report, Vol. 1, p. 326. This figure jumps to 170 million when including *all* enhanced B.C. sockeye, and not just enhanced *Fraser River* sockeye, and 348 million when including all species of Pacific salmon.

²⁵⁶ Cohen Report, Vol. 1, p. 329

²⁵⁷ Cohen Report, Vol. 1, p. 329

²⁵⁸ Cohen Commission Exhibit #8, “Canada’s Policy For Conservation Of Wild Pacific Salmon (The Wild Salmon Policy)”, p. 38

²⁵⁹ Cohen Report, Vol. 1, pp. 279-280

²⁶⁰ Cohen Report, Vol. 1, p. 280. At the time of writing, however, this initiative has yet to result in the successful restoration of a self-sustaining stock (Alouette River Management Society, 2018).

“biological status” of Fraser River sockeye (DFO, 2018a, p. 9). In this same assessment, the DFO evaluated each of the 24 “current” CUs using a five-point scale, from red (“poor”) at one end, to green (“healthy”) at the other, with amber in the middle and gradations in between. At the time of the Cohen Commission, however, the DFO was still in the process of developing an approach to conducting these assessments.²⁶¹

In the spring, some five months after being secured in the gravel, the eggs hatch into alevin. Nourished by a small yolk sack which hangs from its body, alevin will remain in the gravel for upwards of 10 weeks.²⁶²

5.1.2 – Fry and Smolts in Nursery Lakes

Approximately eight months after spawning, most alevin will have absorbed their yolk sacs, becoming fry.²⁶³ These fish, now about 3 centimeters in length, leave their spawning grounds for their respective nursery lakes.²⁶⁴ For most fry, this means heading downstream, though some head upstream, while others do not utilize a rearing lake at all (Figure 25).²⁶⁵ For up to two years, fry remain in these lakes, where they feed on zooplankton at night and descend to a greater depth during the day in order to avoid predators.²⁶⁶ Many fry will fall victim to predators, while others will die because of a “lack of food, [...] diseases, and environmental stressors such as water temperature.”²⁶⁷ For most fry, the “smoltification” process begins some 20 months after spawning, or 12 months after becoming fry, when they are about eight centimeters in length.²⁶⁸ Smoltification, Cohen explains, entails a series of physiological changes which facilitate “the transition from life in freshwater to life in seawater.”²⁶⁹ As a result of these changes, these fish “cease their movement between shallower and deeper parts of the lake”, begin the process of gathering “into schools of fish”, acquire “compass orientation” an ability which “aids their navigation out of the lake and downstream”, and assume a “silvery body colouration.”²⁷⁰

The length, timing, and speed with which sockeye migrate to the Salish Sea varies considerably. Chilko sockeye will reach the Salish Sea, a distance of approximately 600 kilometers, in just over one week.²⁷¹ Harrison River river-type sockeye, on the other hand, migrate

²⁶¹ Cohen Report, Vol. 1, pp. 496-499

²⁶² Cohen Report, Vol. 1, p. 10

²⁶³ Cohen Report, Vol. 1, p. 11

²⁶⁴ Cohen Report, Vol. 1, p. 11

²⁶⁵ Cohen Report, Vol. 1, pp. 11-12

²⁶⁶ Cohen Report, Vol. 1, p. 12

²⁶⁷ Cohen Report, Vol. 1, p. 12

²⁶⁸ Cohen Report, Vol. 1, p. 12

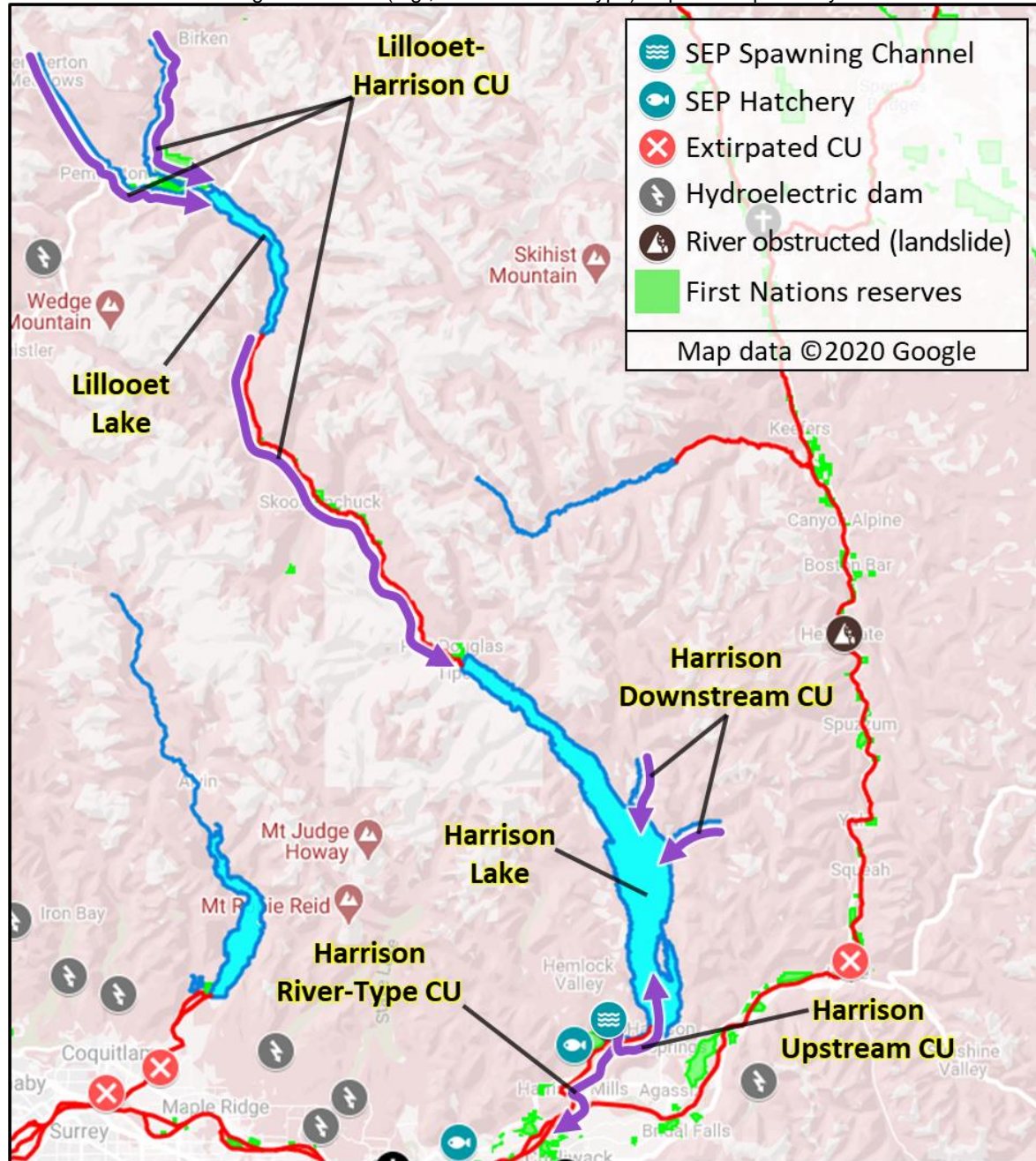
²⁶⁹ Cohen Report, Vol. 1, p. 12

²⁷⁰ Cohen Report, Vol. 1, p. 12

²⁷¹ Cohen Report, Vol. 1, p. 12

downstream immediately, entering the Salish Sea within a year of spawning.²⁷² During their downstream migration, Cohen notes, predation represents “a major source of smolt mortality.”²⁷³

Figure 25: CUs may travel upstream (e.g., Harrison U/S) or downstream (e.g., Harrison D/S) to rearing lakes, though some CUs (e.g., Harrison River-Type) skip this step entirely.



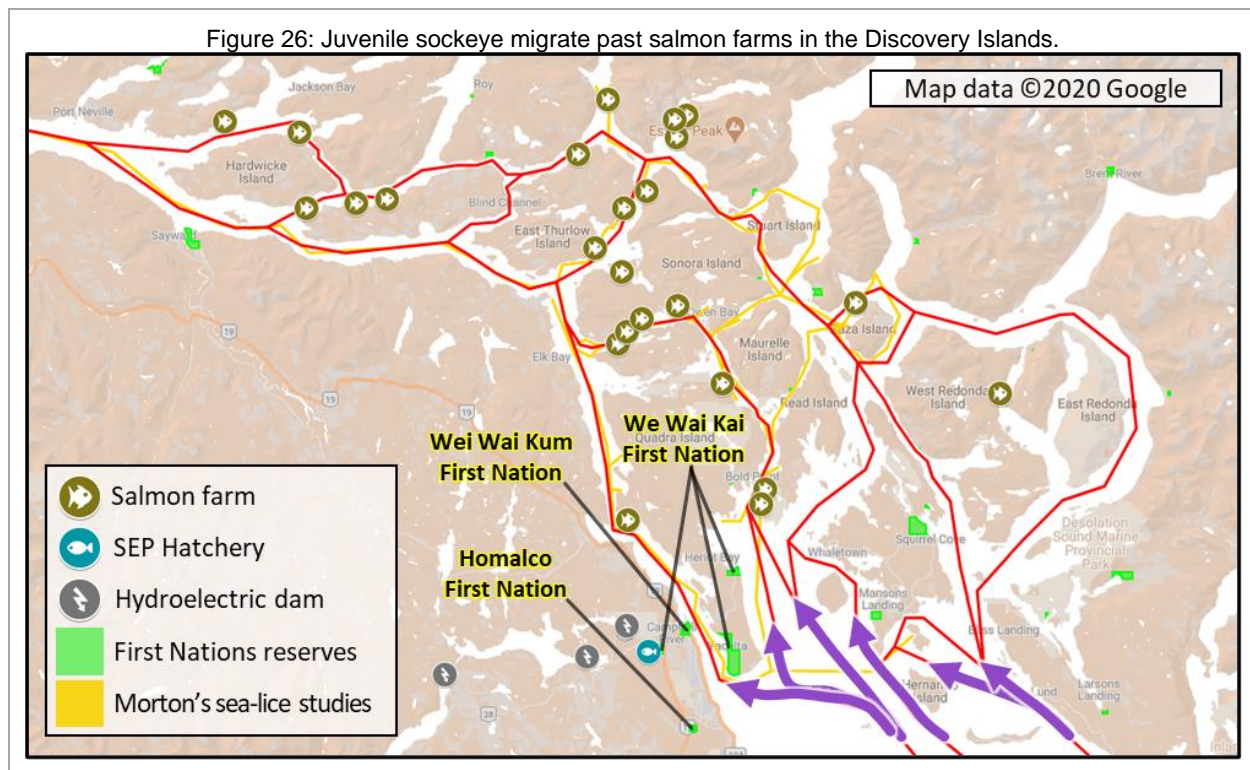
5.1.3 – Juveniles in the Salish Sea

By the time they enter the Salish Sea, these fish have become postsmolts, or juvenile sockeye. Most juveniles, it is believed, “turn north and migrate through the Strait of Georgia, Johnstone

²⁷² Cohen Report, Vol. 1, p. 12

²⁷³ Cohen Report, Vol. 1, p. 12

Strait, and Queen Charlotte Strait and into Queen Charlotte Sound.”²⁷⁴ Harrison River river-type sockeye, on the other hand, are thought to spend a few months in the Strait of Georgia before migrating south, through the Juan de Fuca Strait, following the Vancouver Island coast *en route* to the open ocean.²⁷⁵ Save for this one wrinkle, Cohen offers in this overview an image of the movements of juvenile sockeye in the Salish Sea that is essentially unproblematic. Cohen does not mention that, before they can reach the Pacific Ocean, most juveniles have to traverse a number of small islands, situated between Vancouver Island to the west, and the B.C. mainland to the east, that are known today as the Discovery Islands (Figure 26).



After traversing the Discovery Islands, these fish must also swim through the Broughton Archipelago, where a number of additional open-net pen salmon farms are sited (Figure 27). Beginning in 1987, Métis biologist Gary Ducommun served as the vice president and general manager of IBEC Aquaculture Corporation. In 1992, however, Ducommun resigned from his position because of his “disillusionment with the inability of fish farms to operate in an environmentally sound manner.”²⁷⁶

During this same period, Chief Robert Mountain—a Mamalilikulla hereditary chief who retired from the commercial fishery in 1989—started working for the DFO as an Aboriginal

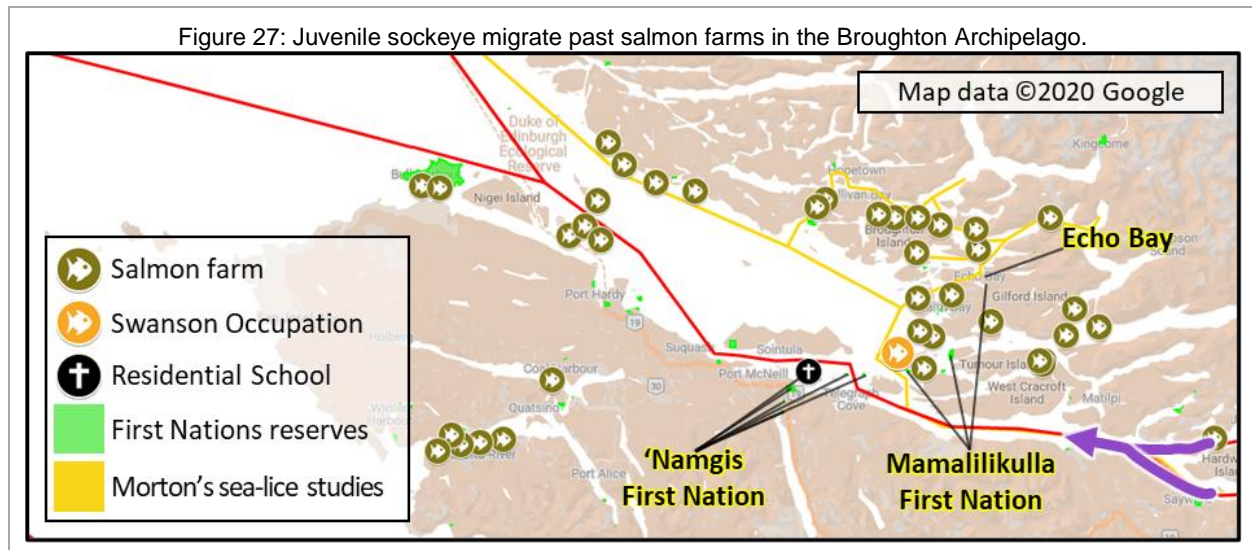
²⁷⁴ Cohen Report, Vol. 1, p. 12

²⁷⁵ Cohen Report, Vol. 1, p. 12

²⁷⁶ Cohen Commission Exhibit #298, “Witness Summary of Gary Ducommun”, p. 1

Fisheries Guardian.²⁷⁷ In this role, Chief Mountain spent many hours on his boat observing juveniles as they migrated past salmon farms.²⁷⁸ Chief Mountain testified before the Cohen Commission that, with each passing year, there was a gradual decline in the number of juveniles on this migratory route.²⁷⁹ When returning to the Broughton as adults, Chief Mountain added, sockeye were now being infected with far more sea lice than he had previously observed during his time as a commercial fisher.²⁸⁰

Similarly, beginning in 2001, many fish have found themselves caught in the dip-net of biologist Alexandra Morton.²⁸¹ In an effort to convince the DFO of the need to take seriously the threat posed to wild salmon by the present siting guidelines, Morton has spent countless hours on her boat, sampling fish near salmon farms, inspecting them for signs of disease, and counting the number of sea louse attached to them.



Today, the majority of salmon farms in B.C. waters are owned by Norwegian corporations, and they specialize in rearing Atlantic salmon (*Salmo salar*). These fish are the product of an extensive process of breeding and domestication which, according to Mart Gross (1998), began in the 1970s. This process was aimed at generating a number of “economic benefits”, including “reduced production costs, more rapid turnover time, better quality product, and thus greater market acceptance” (p. 132). Norwegian aquaculture companies proved especially adept at domesticating Atlantic salmon, producing “increased growth rate, decreased early maturity, and increased disease resistance” *en route* to becoming the preferred provider of egg stock for salmon farms the world over (p. 132).

²⁷⁷ Aboriginal Fisheries Guardians are quasi-enforcement officers who provide oversight over the FSC fishery.

²⁷⁸ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 72

²⁷⁹ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, pp. 72-73

280 Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 73

²⁸¹ See Chapter 4 – Salmon Controversies in British Columbia.

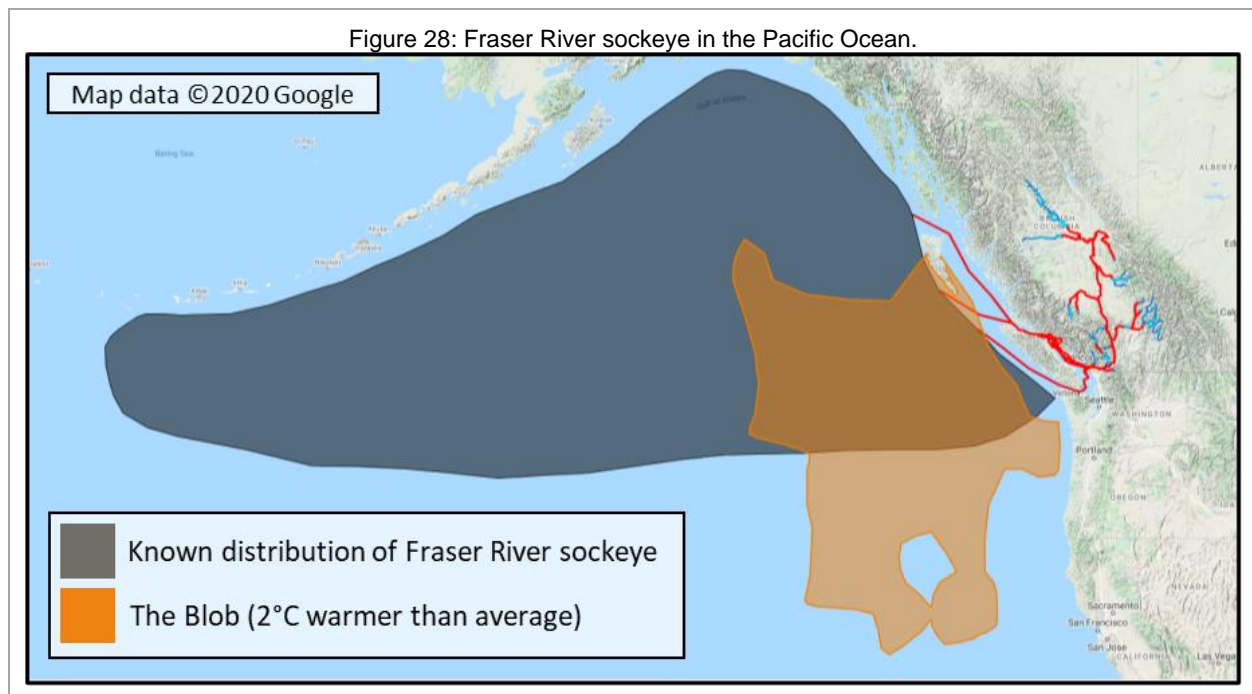
After a decade of “meteoric growth”, John Volpe and Karena Shaw (2008) suggest, the “effects of the industry began to be seen in Norwegian wild salmon populations” (Volpe & Shaw, 2008, p. 5). In the early 1980s, “farm-borne epidemics of the potentially fatal parasite *Gyrodactylus* devastated wild fish populations” (p. 5), resulting in a more stringent regulatory environment for salmon farms operating in Norwegian waters. Meanwhile, the Government of Canada was in the process of repealing a law which restricted foreign ownership of Canadian corporations, effectively setting the stage for Norwegian aquaculture corporations to “operate unfettered in Canada” (p. 5). The migration of Norwegian salmon farms to the B.C. coast precipitated tremendous growth in the production of farmed Atlantic salmon in B.C. waters from 1988 to 2006, leading to a dramatic decrease in the price of both farmed and wild salmon. In order to “preserve a stable profit margin in a market of diminishing unit value”, aquaculture corporations must endeavour to “produce more units, as cheaply as possible” (p. 7). Thus, aquaculture corporations have increasingly looked to “[externalize] the costs of production, forcing natural or social systems to bear these costs” (pp. 7-8). Consequently, the “globalization of salmon production” has led to “serious localized environmental impacts”, including the amplification of sea lice (p. 8).

Sea lice, as Stephen Bocking (2012) explains, “refers to several species of corepods”, two of which are of particular concern in the B.C. context: *Lepeophtheirus salmonis*, a salmon specialist, and *Caligus clemensi*, a generalist which targets salmonid and non-salmonid fish (p. 685). Both naturally-occurring species are, in the latter portion of their life histories, parasitic on wild and farmed salmon, “feeding on mucous, blood and skin, creating surface wounds that can also provide a pathway for other infections” (p. 685). Under normal conditions, Volpe and Shaw suggest, the odds that a louse, “free-floating in the Pacific Ocean”, will attach itself to migrating juvenile sockeye “are extraordinarily slim” (p. 8). This calculus is drastically altered, however, by the presence of open-net pen salmon farms, where “as many as 1.5 million salmon [are] restricted to cages in a 1-hectare (surface area) site” (p. 8). Any sea louse which manages to find its way into a net pen is far more likely to find a suitable host. In the Broughton Archipelago, “an average farm can amplify local sea lice abundance 33,000 times over ambient levels resulting in an infection rate of more than 70 times what would normally occur” – a “lice footprint” which extended some “30 kilometers from the salmon farm under investigation” (pp. 8-9).

5.1.4 – Juveniles and Sub-Adults in the Pacific Ocean

After traversing the Broughton Archipelago, ocean-bound juvenile sockeye enter the Queen Charlotte Sound. From there, it is believed that they migrate north, towards the North Pacific Ocean and Haida Gwaii.

For the Haida people, Haida Nation President Guujaaw testified before the Cohen Commission, sockeye salmon are known as “sGwaagan.”²⁸² Prior to contact with Europeans, the Haida employed “specialized trolling gear to catch salmon offshore”, as subsequently confirmed by archaeological digs.²⁸³ Some of these fish would later be traded with “mainland First Nations and early explorers” for “specialty items” and other goods.²⁸⁴ President Guujaaw believes the DFO has mismanaged the fishery, and suggests that the management of the fishery will only improve if “First Nations become involved because they live with the consequences of management decisions.”²⁸⁵



From the North Pacific Ocean, Cohen explains, there exists “some evidence” that juvenile sockeye “migrate north and westward within 35 km of the coasts of British Columbia and central Alaska until they reach the overwintering grounds south of Alaska during late autumn and early December.”²⁸⁶ Cohen then directs the reader’s attention to an illustration which appears to depict the precise movements of juveniles “along the continental shelf” before going on to concede that “[t]he distribution and movement of immature Fraser River sockeye salmon at sea is the least understood of the fish’s life history phases.”²⁸⁷ At best, biologists can claim to know approximately how far sockeye from B.C. travel in the ocean. Using tagging data collected from 1956 to 1989,

²⁸² Cohen Commission Exhibit #299, “Witness Summary of President Guujaaw”, p. 4

²⁸³ Cohen Commission Exhibit #299, “Witness Summary of President Guujaaw”, p. 1

²⁸⁴ Cohen Commission Exhibit #299, “Witness Summary of President Guujaaw”, p. 1

²⁸⁵ Cohen Commission Exhibit #299, “Witness Summary of President Guujaaw”, p. 5

²⁸⁶ Cohen Report, Vol. 1, p. 12

²⁸⁷ Cohen Report, Vol. 1, p. 12

biologists at the DFO's Pacific Biological Station in Nanaimo have mapped the known distribution of all B.C. sockeye in the Pacific Ocean (Figure 28).²⁸⁸ Beneath this shroud of uncertainty, the movements and behaviour of Fraser River sockeye are largely a mystery. Nevertheless, Cohen goes on to cite oceanographer David Welch, one of the Commission's expert witnesses, in explaining that "when sockeye salmon are small they eat plankton, but as they grow larger they eat other fish and squid."²⁸⁹ Though Welch testified that the question of what sockeye eat is a "very complicated" one, he also went on to suggest that "the short answer is that sockeye eat just about everything."²⁹⁰

5.1.5 – Adults in the Salish Sea

In their "fourth (or, in some cases, fifth) year of life [...], and after spending two (in some cases, three) years in the Gulf of Alaska", Fraser River sockeye prepare to return to the Salish Sea *en route* to their natal spawning grounds in the Fraser River watershed.²⁹¹ There are two known migratory routes for Fraser River sockeye re-entering the Salish Sea (Figure 29), the first of which sees them migrating south, along the west coast of Vancouver Island, and through the Juan de Fuca Strait. The second, so-called "northern diversion route" sees sockeye re-entering the Salish Sea through the Broughton Archipelago, Johnstone Strait, Discovery Passage, and Strait of Georgia. When the ocean temperature is 10°C, Cohen explains, sockeye re-enter the Salish Sea "almost entirely through Juan de Fuca Strait."²⁹² When the ocean temperature increases by 2-3°C, however, "80-90 percent of returning sockeye come through the northern diversion route."²⁹³ From 2013 to 2016, the Blob, a patch of water approximately 2°C warmer than average which persisted in the Pacific Ocean from 2013 to 2016, may have led a greater proportion of sockeye to utilize the northern diversion when returning to the Salish Sea.

The northern diversion route is problematic for another reason, which Cohen does not mention. That is, in using the northern diversion route, many sockeye will be exposed to open-net pen salmon farms for a second time in their lives. Thus, in modifying their behaviour to account for the threat posed by warming waters, sockeye may be unwittingly subjecting themselves to yet another. This is not to suggest, of course, that sockeye re-entering the Salish Sea via the Juan de Fuca Strait do not face any threats. These fish are thought to approach the mouth of the Fraser River along the same route used by the tankers charged with exporting Alberta oil to international markets, raising the spectre of a catastrophic oil spill in the Salish Sea. In 2017, moreover, late-

²⁸⁸ Cohen Commission Exhibit #2, Presentation of Dr. David Welch, slide 5. I used these data on my map to represent the movements of Fraser River sockeye in the Pacific Ocean without overstating what is known about the same.

²⁸⁹ Cohen Report, Vol. 1, p. 13

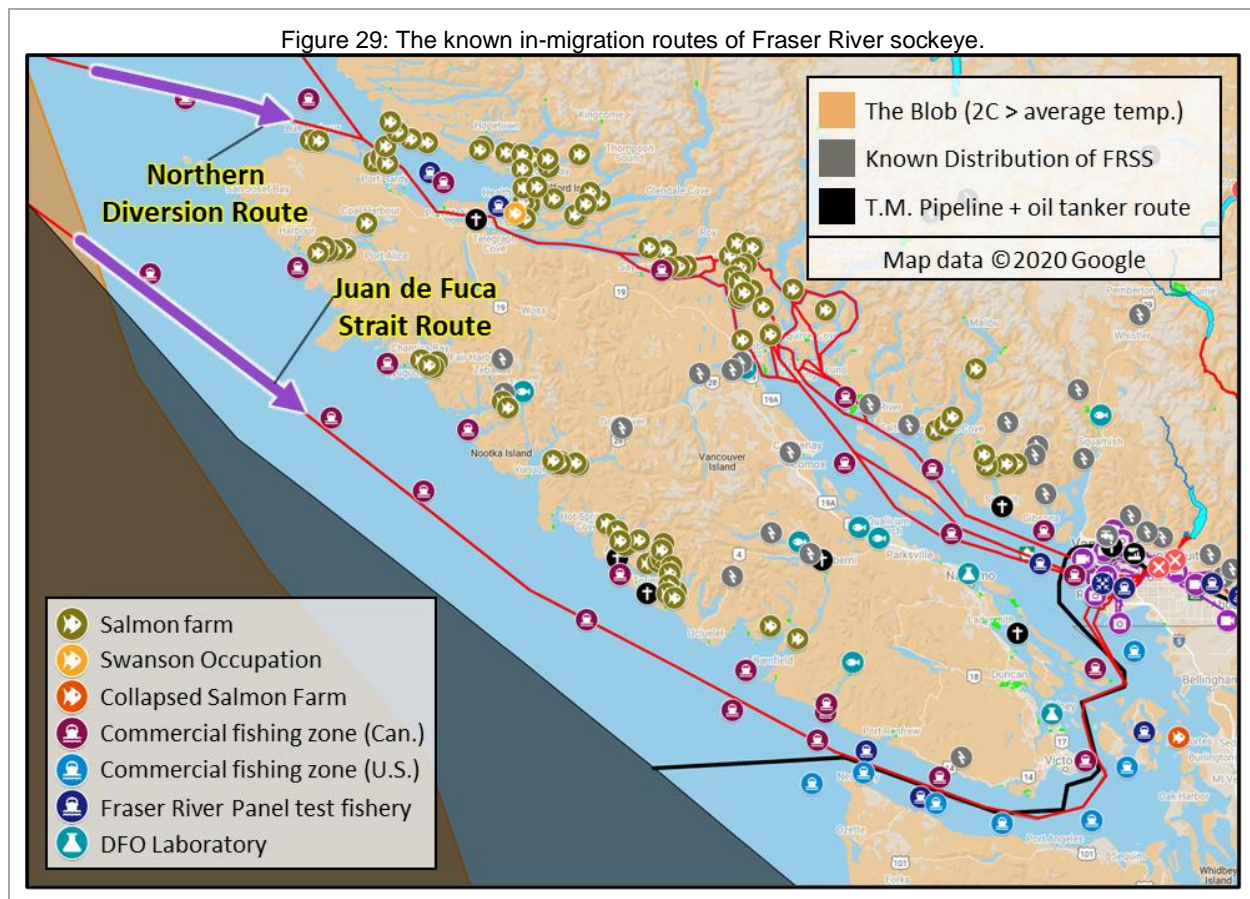
²⁹⁰ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 43

²⁹¹ Cohen Report, Vol. 1, p. 13

²⁹² Cohen Report, Vol. 1, p. 13

²⁹³ Cohen Report, Vol. 1, p. 13

run sockeye may have been exposed to the farmed Atlantic salmon which escaped from the Cooke Aquaculture salmon farm near Cypress Island, off the coast of Washington state, following its August 19 collapse.²⁹⁴



Regardless of their point of entry into the Salish Sea, many Fraser River sockeye will be caught by test fishing vessels employing a variety of net types, and sited along both migratory routes. Each season, these catches provide data input for the statistical models which provide the basis for the Fraser River Panel’s (FRP) regulatory decisions – including whether to adopt changes in run-size estimates, and whether this estimate is large enough to permit the opening of the commercial fishery. If the FRP opts to open the fishery, many more sockeye will be caught by commercial fishers before they reach the mouth of the Fraser River.

The impacts associated with commercial fisheries closures, it should be noted, are not just felt by non-Indigenous fishers. Indeed, Gary Ducommun testified before the Cohen Commission that Métis “have always participated in the fishery for sustenance.”²⁹⁵ Fishing was once “a social

²⁹⁴ Volpe et al. (2000) reports having observed the “repeated successful spawning of exotic Atlantic salmon in a Vancouver Island river” (p. 902). On this basis, Volpe et al. suggest that “Atlantic salmon may constitute an invading species [in the Pacific Ocean]” (p. 902).

²⁹⁵ Cohen Commission Exhibit #298, “Witness Summary of Gary Ducommun”, p. 2

practice for Métis people”, Ducommun added, but “social fishing is subdued now because of uncertainty surrounding [Métis] legal rights.”²⁹⁶ Today, as Métis people do not receive an allotment of FSC fish, they must rely on “family connections in First Nations [...] for opportunities to fish.”²⁹⁷ Ducommun testified that the DFO has refused to even discuss this issue with the Métis Nation of B.C., which Ducommun serves as Director of Natural Resources.²⁹⁸

For the Haítzaqv (Heiltsuk)—whose reserve lands are sited on what is known today as Campbell Island, located across from the southern tip of Haida Gwaii—the decline of sockeye has led to “serious social problems.”²⁹⁹ According to Chief Edwin Newman—a Haítzaqv Elder, hereditary chief—the decline of sockeye led not only to the closure of their fish processing plant, it also “wiped out” their trolling fleet and reduced the “earning power” of their gillnet fleet by 75%.³⁰⁰ In his testimony before the Cohen Commission, Chief Newman described the resulting social problems in this way:

After they closed Milbanke [...] and mismanaged our stocks [...], our people [became] [...] totally dependent on the government to do things for us. It was devastating for our community. We have the highest suicide rate. Any communities on the coast have a [...] very high suicide rate amongst the young people because of that. And it also created [...] an epidemic in sugar diabetes for our people. We [...] now have a high rate of cancer, heart problems, strokes among our young people.³⁰¹

These problems are principally rooted, Chief Newman argued, in the loss of “economic opportunities in the fishery”, as well as in the loss of the “food that [the Haítzaqv] eat.”³⁰² Chief Newman later added that the Haítzaqv “have a firm position on not wanting any fish farms in their territory”, citing concerns about “the damage it will do to the resource that [they] depend on.”³⁰³ Chief Newman also alleged that, in an effort to “cut down on the cost of the feed for their product”, fish farms use a technique called “pit-lamping” which involves using lights and fish feed to lure wild Pacific fry into net pens, where they are then subject to predation by farmed Atlantic salmon.³⁰⁴

Laich-Kwil-Tach fishers, Rod Naknakim testified before the Cohen Commission, “still [rely] on the [commercial] fishery for their livelihoods today.”³⁰⁵ Naknakim—a We Wai Kai fisher and chief negotiator for the Laich-Kwil-Tach Treaty Society who grew up on Quadra Island—added that “7 of the 11 reserves [assigned to Laich-Kwil-Tach member nations] were originally allotted

²⁹⁶ Cohen Commission Exhibit #298, p. 2

²⁹⁷ Cohen Commission Exhibit #298, p. 2

²⁹⁸ Cohen Commission Exhibit #298, p. 3

²⁹⁹ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 29

³⁰⁰ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, pp. 29-30

³⁰¹ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 30

³⁰² Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 30

³⁰³ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 74

³⁰⁴ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 74

³⁰⁵ Cohen Commission Exhibit #297, “Witness Summary of Rod Naknakim”, pp. 2-3

by Canada specifically for fishing purposes.”³⁰⁶ These member nations do share an annual allocation of FSC fish—administered through the A-Tlegay Fisheries Society—but Naknakim is of the belief that “food fish should not be sold.”³⁰⁷ Given that the FRP’s run-size estimates are generated using data from both marine and in-river test fisheries, however, by the time “the fish get down to the Fraser River [...] it is too late and [Laich-Kwil-Tach commercial fishers] get nothing.”³⁰⁸ Naknakim is not opposed to in-river fisheries, but he contends that Laich-Kwil-Tach fishers should be “allowed to make a living as well.”³⁰⁹ In contrast to the Haítzaqv, some Laich-Kwil-Tach fishers responded to the decline of the fishery by turning to aquaculture in order to “diversify and keep their boats active.”³¹⁰ Understood in this context, First Nations’ positions and policies on salmon farming must be understood as “the outcome of interactions and responses that cannot be categorized as simple acceptance (understood as forward-looking, or modern) or opposition (understood as clinging to the past, or traditional)” (Schreiber & Newell, 2006, p. 87).

5.1.6 – Adults and Spawners in the Fraser River

Interestingly, not all Fraser River sockeye CUs enter the river immediately upon arrival. There exists “some variation” among sockeye CUs, Cohen explains, in “how promptly they move into the river and begin their upstream migration.”³¹¹

This variation is based on the four run-timing groups – Early Stuart, Early Summer, Summer, and Late-run. The Early Stuarts (which return in June and July) and the Early Summers and Summers (which return in July and August) enter the Fraser River with little or no delay – perhaps within one day.³¹²

Many factors are thought to “influence river-entry timing”, including “fish maturity, tides, river flow, and water temperature.”³¹³ In recent decades, however, “an increasing overlap of the different run-timing groups has been observed.”³¹⁴ The late-run timing group, for instance, went from arriving at the Mission hydroacoustic site in late-August during the 1990s to late-July in the 2000s.³¹⁵ Late-run sockeye entering the river before mid-August, Cohen explains, “[experience] a very low probability of survival” when compared to those entering the river after this point.³¹⁶

In addition to feeding in the ocean, and building up substantial stores of fat in the process, sockeye salmon continue to feed until they re-enter the Fraser River, at which point their digestive tracts shut down, marking the beginning of their final transformation. From that point onwards,

³⁰⁶ Cohen Commission Exhibit #297, p. 3

³⁰⁷ Cohen Commission Exhibit #297, p. 6

³⁰⁸ Cohen Commission Exhibit #297, p. 5

³⁰⁹ Cohen Commission Exhibit #297, p. 3

³¹⁰ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 8

³¹¹ Cohen Report, Vol. 1, p. 14

³¹² Cohen Report, Vol. 1, p. 14

³¹³ Cohen Report, Vol. 1, p. 14

³¹⁴ Cohen Report, Vol. 1, p. 14

³¹⁵ Cohen Report, Vol. 1, p. 14

³¹⁶ Cohen Report, Vol. 1, p. 14

Cohen explains, sockeye derive energy from this store of fat, which is burned and replaced with water as they migrate upstream to their natal spawning grounds.³¹⁷ Shortly after they enter the Fraser River, some sockeye will be caught and tagged with radio transmitters in order to provide biologists with some indication as to the speed of their upstream movements, as well as their ability to traverse “challenging areas such as Hell’s Gate canyon and the Bridge River rapids.”³¹⁸

In-river water temperatures are thought to play a major role in determining how quickly sockeye travel upstream. When water temperatures are high, Cohen suggests, “[t]here is some evidence that sockeye will interrupt their migration by remaining in cooler lakes for a week or longer to bring their temperature back down before pressing upstream to their spawning area.”³¹⁹ This has proven especially problematic since the late 1990s, as Cohen goes on to explain—by drawing on the expert-witness testimony of Michael Lapointe, the Pacific Salmon Commission’s chief biologist—as “eight of the 10 warmest summer river temperatures on record have occurred in the 15 years from 1996 to 2011.”³²⁰

This is where Cohen’s overview of the life-cycle of Fraser River sockeye effectively ends, as he concludes not by following each sockeye CU to their spawning grounds, but by describing their migrations as “an enduring puzzle.”³²¹ Cohen—citing a marine ecology technical report prepared for the Commission by Stewart McKinnell, Enrique Curchitser, Cornelius Groot, Masahide Kaeriyama, and Katherine Myers—goes on to suggest dividing the life-cycle of Fraser River sockeye into “12 sequential habitats” and conceiving of each as “a bead in a chain linked by migrations.”³²² The accompanying map, excerpted from the marine ecology technical report, uses 12 numbered arrows to depict the migration of a “typical” Fraser River sockeye through each of these habitats.³²³

Upon re-entering the Fraser River, sockeye may find the surface of the river partially covered by logs. Logging operations on the Fraser River, Cohen suggests in a later chapter, are often justified with reference to the “economic realities of moving wood products in British Columbia.”³²⁴ Cohen does not explain what this means, but he does concede in a later chapter that he “heard some evidence that disturbance because of log storage on the Fraser River estuary has the potential to affect Fraser River sockeye.”³²⁵

³¹⁷ Cohen Report, Vol. 1, p. 14

³¹⁸ Cohen Report, Vol. 1, p. 14

³¹⁹ Cohen Report, Vol. 1, p. 14

³²⁰ Cohen Report, Vol. 1, p. 14

³²¹ Cohen Report, Vol. 1, p. 15

³²² Cohen Report, Vol. 1, p. 15

³²³ Cohen Commission Exhibit #1291, “Cohen Commission Technical Report 4 - Marine Ecology - Feb 2011 - CCI001134”, p. 10

³²⁴ Cohen Report, Vol. 1, p. 289

³²⁵ Cohen Report, Vol. 1, p. 289

In addition to encountering log booms, sockeye re-entering the north arm of the Fraser River will pass Musqueam 2, a xʷməθkʷəy̓əm (Musqueam) reserve, and may find themselves caught in the drift net of a xʷməθkʷəy̓əm fisher. The xʷməθkʷəy̓əm people have lived near the mouth of the Fraser River for thousands of years, and fishing has “always been central” to their way of life (Musqueam Indian Band, 2006, p. 10). For the xʷməθkʷəy̓əm people, sockeye salmon are revered as “a giver of life” (p. 21). The fishery, it follows, is the “lifeblood” of the xʷməθkʷəy̓əm people (p. 21). Provided that the DFO approves the requisite ceremonial fishing licence, the xʷməθkʷəy̓əm people observe an annual ceremony to honour the first salmon returning to the Fraser River (p. 43).

In 1984, a xʷməθkʷəy̓əm fisher named Ronald Edward Sparrow was charged, and later convicted, for using a drift net which exceeded the maximum size permitted by his fishing license. In his defense, Sparrow invoked section 35 of the *Constitution Act*, arguing that the charges brought against him infringed upon his pre-existing Indigenous right to fish. Sparrow successfully appealed his case all the way to the Supreme Court of Canada, which affirmed in 1990 the existence of an Indigenous right to fish for “food and social and ceremonial [FSC] purposes.”³²⁶ Two decades after the *Sparrow* ruling, xʷməθkʷəy̓əm fisheries commissioner Joe Becker testified before the Cohen Commission that the DFO had not yet defined the “social” in “food and social and ceremonial purposes.”³²⁷ Becker also argued that “it is not right that First Nations are told that if they go FSC fishing, then they cannot sell the fish to satisfy other needs.”³²⁸ At this same evidentiary hearing, Chief Kimberly Baird of Tsawwassen First Nation—which also fishes near the mouth of the Fraser River—called the prohibition against the sale of FSC fish as “paternalistic.”³²⁹ Given that “sustenance [...] has evolved over time”, Chief Baird explained, it makes little sense to treat Indigenous rights as though “they were frozen in time.”³³⁰

From the mouth of the Fraser River to the Port Mann Bridge, drift nets may also be employed by fishers from the Tsleil-Waututh and Qayqayt First Nations. kwikwəłəm (Kwikwetlem or Coquitlam) fishers, meanwhile, are permitted to fish from the Patullo Bridge to Douglas Island (DFO, 2020a). Indigenous fishers in this area are monitored by “Aboriginal Fishery Officers” and “fishery observers” who “conduct boat and vehicle patrols during [...] fishery openings to obtain catch and effort data” (DFO, 2020a). In addition, Indigenous fishers are “interviewed multiple times throughout each fishery” (DFO, 2020a).

³²⁶ *R v. Sparrow*, [1990] 1 S.C.R. 1075, p. 1101

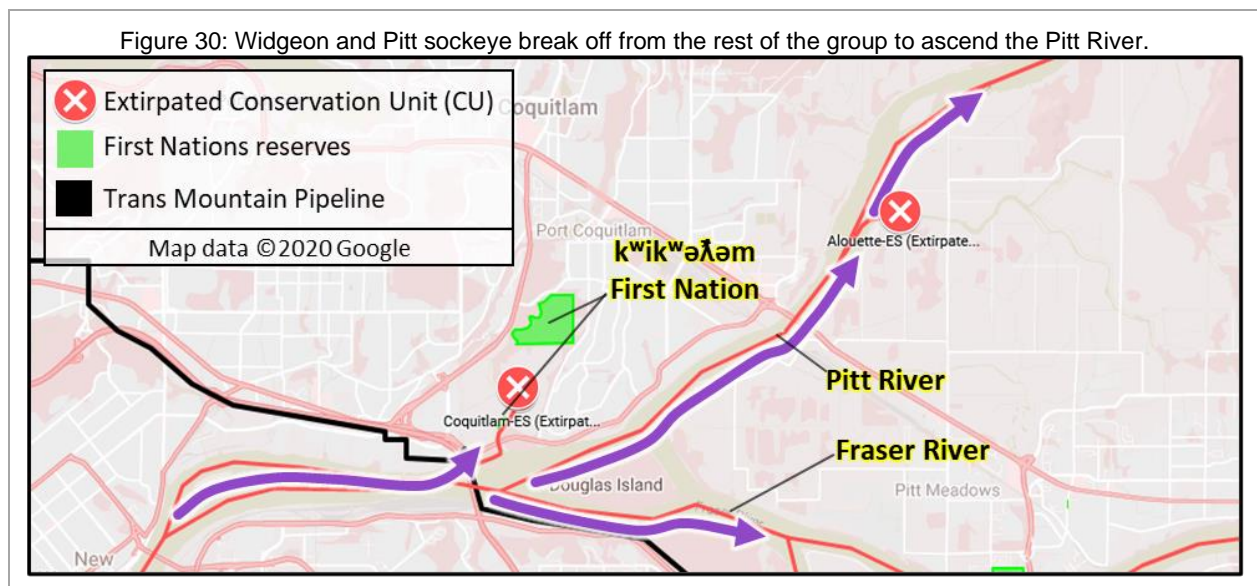
³²⁷ Cohen Commission Exhibit #282, “Witness Summary of Joe Becker”, p. 4

³²⁸ Cohen Commission Exhibit #282, “Witness Summary of Joe Becker”, p. 4

³²⁹ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, p. 91

³³⁰ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, p. 91

Approximately 30 kilometers from the mouth of the Fraser River, sockeye will pass under the Port Mann Bridge, as well as the Trans Mountain Pipeline which runs parallel to it. A few hundred meters past this point, the sockeye belonging to the now-extirpated Coquitlam-ES CU would have turned left to ascend the Coquitlam River. A few kilometers past the mouth of the Coquitlam River, Pitt River sockeye, including both 'wild' and 'enhanced' varieties, and Widgeon river-type sockeye will turn left to begin their ascent of Pitt River (Figure 30). Prior to the construction of the Alouette Dam, these fish might have been joined by sockeye from the Alouette River, a Pitt River tributary. Today, the Alouette-ES CU is considered extirpated. Any remaining Alouette River sockeye must rely on human intervention to make it past the Alouette Dam. Approximately 15 kilometers from the mouth of the Pitt River, the Widgeon river-type sockeye will split off from the rest of the group to spawn in Widgeon Creek. Some 50 kilometers from the mouth of the Pitt River, some of the remaining fish will spawn in the Pitt River. Because the Pitt River is prone to flash flooding, still others will be caught so that their eggs can be extracted and taken to the Inch Creek Hatchery. In spite of this, the Pitt CU is today considered "healthy" (green zone) (DFO, 2018a, p. 10). The Widgeon CU, meanwhile, has never been assessed as anything other than "poor" (red zone) owing to its "small [spawning] distribution" (DFO, 2018a, p. 10).³³¹



As the remaining sockeye continue their ascent of the Fraser River, many will be caught by Stó:lō fishers from the Katzie, Kwantlen, and Matsqui First Nations. These fishers, who employ drift and set nets from the Port Mann Bridge to Mission, are regularly surveilled by "fishery

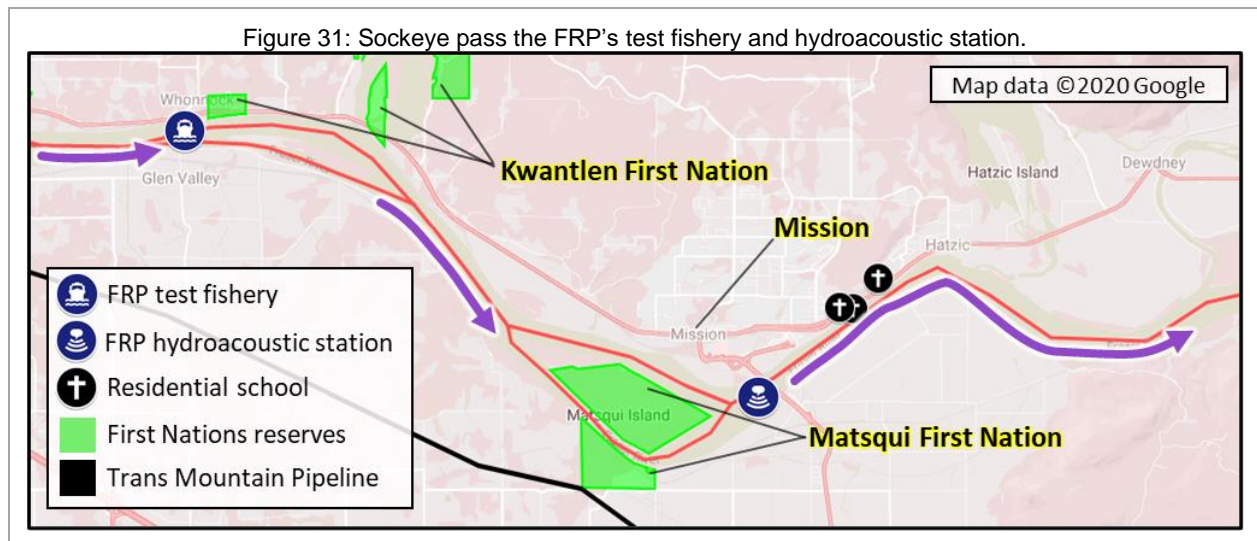
³³¹ This is not necessarily a reflection of the actual health of the stock, however, as much as it is a by-product of the assessment model's inability to account for the diverse biological characteristics of each Fraser River sockeye stocks. As a consequence of the limitations of the assessment model, in other words, the Widgeon CU "will be a consistently Red status CU" (DFO, 2018a, p. 5).

observers [...] stationed at the area's 3 main access points at a minimum; Katzie Reserve, Barnston Island, and Kwantlen Reserve.”

The observers conduct interviews with fishers to obtain effort and catch data. A charter patrolman also conducts boat patrols during fishery openings to obtain catch and effort data on the water. The number of participants is recorded for each day of the fishery and catch is recorded by species. (DFO, 2020a)

Notwithstanding their constitutionally-protected right to fish for food, social, and ceremonial (FSC) purposes, Indigenous fishers up and downriver are subject to a strict regulatory regime. In addition to needing to seek approval from the DFO prior to fishing, Indigenous fishers must submit to surveillance measures designed to ensure that their catches do not exceed their respective allotments – a maximum catch negotiated in advance of each season.

Approximately 25 kilometers upstream from the Port Mann Bridge, many sockeye and pinks will be caught in the gillnets of Fraser River Panel (FRP) test fishers. Some 15 kilometers later, these fish will encounter the Mission hydroacoustic station, where “approximately 10-15 percent”³³² of them will pass through one of its beams (Figure 31). In a nearby data-processing trailer, PSC staff estimate the abundance of passing fish by counting smears on a monochromatic image. These data are entered into statistical models, alongside the test-fishing data already collected, in order to generate updated run-size estimates which serve as the basis for the FRP's regulatory decisions.

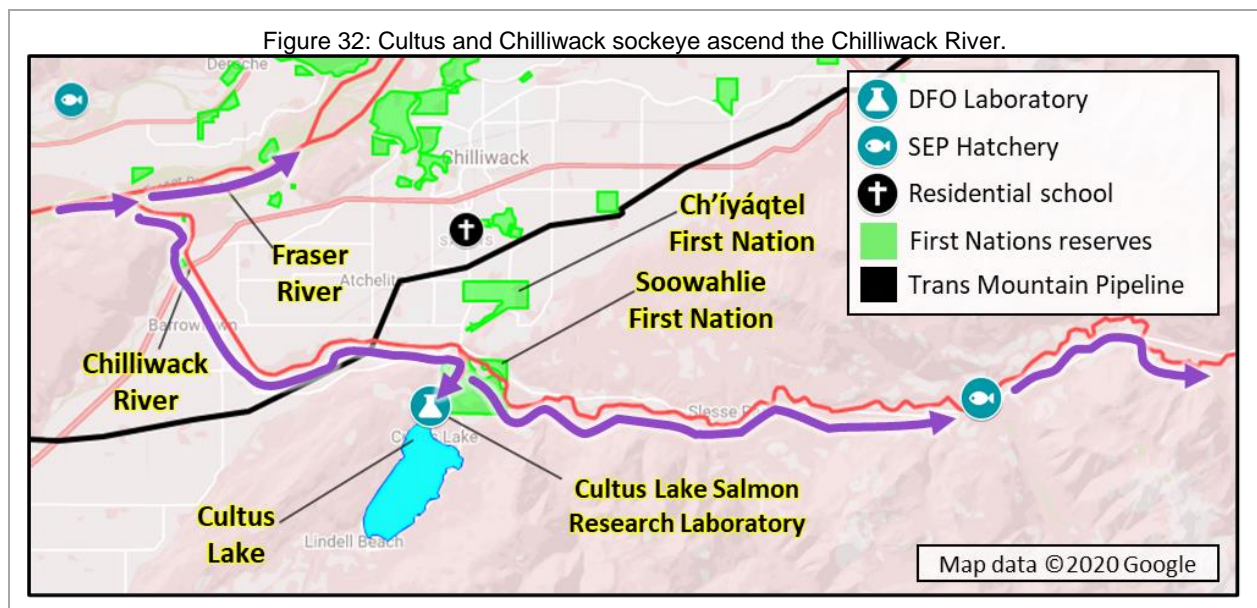


15 kilometers later, Chilliwack River and Cultus Lake sockeye turn right to begin their ascent of the Chilliwack River (Figure 32). In the 1920s, Cultus Lake was selected as the site for a large-scale study which proved influential in shaping the development of B.C. fisheries science.³³³ Cohen does not mention Cultus Lake in his life-cycle overview, but the Cohen Report

³³² Cohen Report, Vol. 1, p. 152

³³³ See Joseph Taylor (1998) and Matthew Evenden (2004a).

devotes an entire chapter to examining “Cultus Lake sockeye as a case study of DFO’s practices and procedures relating to the management of a vulnerable Fraser River sockeye salmon population.”³³⁴ This is a case study, Cohen suggests, which reflects the “challenges” associated with “managing the mixed-stock fishery.”³³⁵ Cultus sockeye have been at risk of “imminent extinction” since the late 1990s, after half a century of direct and indirect over-exploitation.³³⁶ Cultus sockeye is a modestly-sized CU which is “dwarfed by those of larger, more productive lakes in the Fraser River basin.”³³⁷ Faced with an apparent trade-off “between biodiversity and exploitation”, the DFO opted for the latter when it advised the federal environment minister “not to recommend emergency listing of Cultus Lake sockeye under the *Species at Risk Act* (SARA).”³³⁸ By adding Cultus sockeye to the SARA list, the DFO reasoned, it would be obliged to close the commercial fishery for three of the next four years, resulting in an estimated \$125 million loss in revenue.³³⁹ The DFO erred, in Cohen’s estimation, not only in its failure to account for “critical biological factors” and “biological uncertainty”, but also in focusing too narrowly on “short-term financial costs” and “giving little consideration to long-term benefits, social implications, or alternative fishing strategies.”³⁴⁰ Today, the Cultus CU remains in “poor” (red zone) shape. The Chilliwack-ES CU, meanwhile, is bordering (amber/green) on “healthy” (DFO, 2018a, pp. 9-10).



Continuing some 15 kilometers upriver, still more sockeye will find themselves caught in the set nets, drift nets, or beach seines of Stó:lō fishers from the Leq'á:mel, Aitchelitz, Kwaw-

³³⁴ Cohen Report, Vol. 1, p. 552

³³⁵ Cohen Report, Vol. 1, p. 552

³³⁶ Cohen Report, Vol. 1, p. 552

³³⁷ Cohen Report, Vol. 1, pp. 551-552

³³⁸ Cohen Report, Vol. 1, p. 570

³³⁹ Cohen Report, Vol. 1, pp. 555-556

³⁴⁰ Cohen Report, Vol. 1, p. 571

kwaw-Apilt, Shxwhá:y (Skway) Village, Skwah, Squiala, Skowkale, Soowahlie, Sumas, Tzeachten, Yakweakwoose, Sq'ewlets (Scowlitz), and Sts'ailes (Chehalis) First Nations. Chief William Charlie of Sts'ailes First Nation can recall a time when he “would fish and by the end of the week, be tired of fishing.”³⁴¹ In recent years, however, declining abundance combined with “the pressures of other fishers” has meant that Chief Charlie does “more waiting than fishing.”³⁴² In 2009, after waiting several hours to cast his drift net, Chief Charlie found that a group of sports fishers had anchored their boat in the path of his drift net. When the sports fishers refused to move their boat, Chief Charlie cast his drift net, which then became tangled in the anchor line of the sports fishers’ boat. In the ensuing conflict, Chief Charlie was shot in the face with a pellet gun, and his boat was rammed.³⁴³

When the FSC fishery is open, Stó:lō fishers like Chief Charlie may face discriminatory treatment of this sort at the hands of sports fishers, in addition to being subjected to comprehensive surveillance measures. Adding to the surveillance measures identified above, the FSC fishery on this stretch of the river is subject to “[o]verflights” which aim to “capture instantaneous total set net fishing effort a minimum of once per opening”, as well as “roving surveys conducted from Yale Beach to Sawmill Creek and in the Hope area.” In addition, a “a charter patrol vessel also conducts boat patrols during fishery openings to obtain catch and effort data on the water.” Finally, during beach seine fisheries, “an observer is present with each crew and records catch and release on a set-by-set basis” (DFO, 2020a). It should be noted, however, that not all Stó:lō people have access to an ancestral fishing spot. Whereas Stó:lō youth traditionally learned about “the importance of fish [...] from grandparents and parents”³⁴⁴, Grand Chief Clarence Pennier of Sq'ewlets First Nation did not become directly involved in the fishery until later in life, when he became chief of the Stó:lō Tribal Council.³⁴⁵ Grand Chief Pennier’s family “did not have their own fishing site”,³⁴⁶ and he “didn’t have the opportunity to learn from [his] parents or grandparents” because he “went to residential school for eleven years.”³⁴⁷

When the remaining fish reach a fork in the river, most of them will hang a right, while the Lillooet-Harrison, Harrison upstream, downstream, and river-type CUs will turn left to ascend the Harrison River. Lillooet-Harrison sockeye spawn principally in the Birkenhead River above Lillooet Lake. In the mid-twentieth century, however, the “course of the Birkenhead River was manually changed to flow directly into the Lillooet-Harrison Lake [...] for the purpose of flood control”, a

³⁴¹ Cohen Commission Exhibit #279, “Witness Summary of Chief William Charlie”, p. 5

³⁴² Cohen Commission Exhibit #279, p. 5

³⁴³ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, pp. 35-37

³⁴⁴ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, p. 19

³⁴⁵ Cohen Commission Exhibit #280, “Witness Summary of Grand Chief Clarence Pennier”, p. 1

³⁴⁶ Cohen Commission Exhibit #280, p. 1

³⁴⁷ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, p. 19

decision which “likely reduced the potential spawning area” available to Lillooet-Harrison sockeye.³⁴⁸ Today, this CU is considered neither “healthy” nor “poor” (DFO, 2018a, pp. 9-10). Harrison downstream and river-type sockeye, meanwhile, were most recently assessed as bordering on healthy (amber/green) and healthy (green zone) respectively (DFO, 2018a, p. 10).

Upstream Harrison sockeye, on the other hand, are considered to be in “poor” (red zone) health (DFO, 2018a, pp. 9-10). In the early 1960s, “extensive logging [...] caused considerable flooding and scouring of [...] spawning habitat”, threatening to extirpate the sockeye populations which together constitute this CU.³⁴⁹ Spawning habitat was further reduced in the 1960s and 1970s by “erosion and sediment input” caused not only by logging, but also by “road and trail clearing associated with the development of a ski resort.”³⁵⁰ During this same period, the Weaver Creek spawning channel and diversion weir were constructed to “re-build production from the Weaver stock” so as to “allow for increased harvest opportunities.”³⁵¹ Beginning in the 1970s, sockeye were “preferentially diverted into the [spawning] channel over the creek”, their ‘natural’ spawning habitat.³⁵² In the 2000s, these sockeye experienced high levels of pre-spawn mortality, which the DFO attributed to outbreaks of “the *Parvicapsula* parasite.”³⁵³ This same parasite has been observed in farmed Atlantic salmon in Norway.³⁵⁴

After passing the Harrison River, sockeye from the remaining CUs may find themselves caught by Stó:lō fishers from the Popkum, Seabird Island, Peters, Shxw'ow'hamel, Sq'ewá:lxw (Skawahlook), Chawathil, and Cheam First Nations. Councillor June Quipp of Cheam First Nation, who also goes by the name Sioliya, was taught how to fish at “a very young age”, and has since “passed on those skills to her children and grandchildren.”³⁵⁵ In 2009, Councillor Quipp was overcome with feelings of “devastation” and “shock”, when a record-low sockeye run forced her community to make do with just “one opening for sockeye salmon.”³⁵⁶ Councillor Quipp added in her testimony that that, because the DFO would not even approve “a ceremonial permit for one fish”, Cheam could not hold a First Salmon Ceremony.³⁵⁷ The DFO, it follows for Councillor Quipp,

³⁴⁸ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version [DFO Working Paper 2010-P14; further update to Exh 184]”, p. 61

³⁴⁹ Cohen Commission Exhibit #1915, p. 54

³⁵⁰ Cohen Commission Exhibit #1915, p. 54

³⁵¹ Cohen Commission Exhibit #1915, pp. 54-55

³⁵² Cohen Commission Exhibit #1915, p. 55

³⁵³ Cohen Commission Exhibit #1915, p. 55

³⁵⁴ See Karlsbakk et al. (2002) and Sterud et al. (2003).

³⁵⁵ Cohen Commission Exhibit #278, “Witness Summary of Councillor June Quipp”, p. 3

³⁵⁶ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, p. 41

³⁵⁷ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, pp. 44-45

has effectively taken it “upon themselves to define [Cheam’s] ceremonies”, and the only ceremonies they recognize as legitimate are funerals.³⁵⁸

At the town of Hope, the Fraser River bends northward and intersects with the Coquihalla River. Here, the now-extirpated Kawkawa sockeye would have broken off from the rest of the group to ascend the Coquihalla River on the way to Kawkawa Lake. In the late-nineteenth or early-twentieth century, however, the Kawkawa Lake was dammed, resulting in the extirpation of this CU.³⁵⁹

As the remaining sockeye begin their final approach to the Fraser Canyon, they may be caught in set nets or drift nets cast by fishers from the Union Bar and Yale First Nations. During FSC fisheries openings, Yale First Nation plays an active enforcement role in the area. In addition to having observers situated on Strawberry Island, Yale First Nation collects “catch and effort data” from Yale fishers stationed elsewhere (DFO, 2020a). Since 1992, the first year in which Stó:lō fishers were permitted, under certain conditions, to sell a portion of their FSC catch, Yale First Nation has actively opposed Stó:lō fishing in the Fraser Canyon (Brown K. L., 2005, pp. 105-107).

Approximately 5 kilometers from the mouth of the Fraser Canyon, many of these fish will be pinged by the Qualark hydroacoustic monitoring station. The Qualark station is not just equipped with a dual-frequency identification sonar (DIDSON) system which produces higher-resolution images than those generated at Mission, it is also situated along a narrower stretch of the river, permitting fewer fish to evade detection. In addition, several populations of pink salmon have since broken away from the rest of the group, resulting in run-size estimates that are thought to be less noisy and more accurate than are those produced at Mission.³⁶⁰ The Qualark station—which was first used in 1993—is considered costly to run, and the DFO has wavered in its commitment to funding its operations.³⁶¹

After passing Qualark, the remaining sockeye CUs follow the river as it passes Yale and becomes enveloped by the Fraser Canyon. Many of these fish will find their way into the nets of the various Stó:lō fishers whose fishing spots line the river above Yale. Grand Chief Ken Malloway, whose earliest memory is of watching his father fish in Yale, often camped with his family in one of these spots during his youth.³⁶² Many years later, Grand Chief Malloway would also meet his wife here, after teaching her how to fish with a set net.³⁶³ Today, Grand Chief Malloway is among

³⁵⁸ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, p. 45

³⁵⁹ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version [DFO Working Paper 2010-P14; further update to Exh 184]”, p. 91

³⁶⁰ Cohen Report, Vol. 1, pp. 152-153

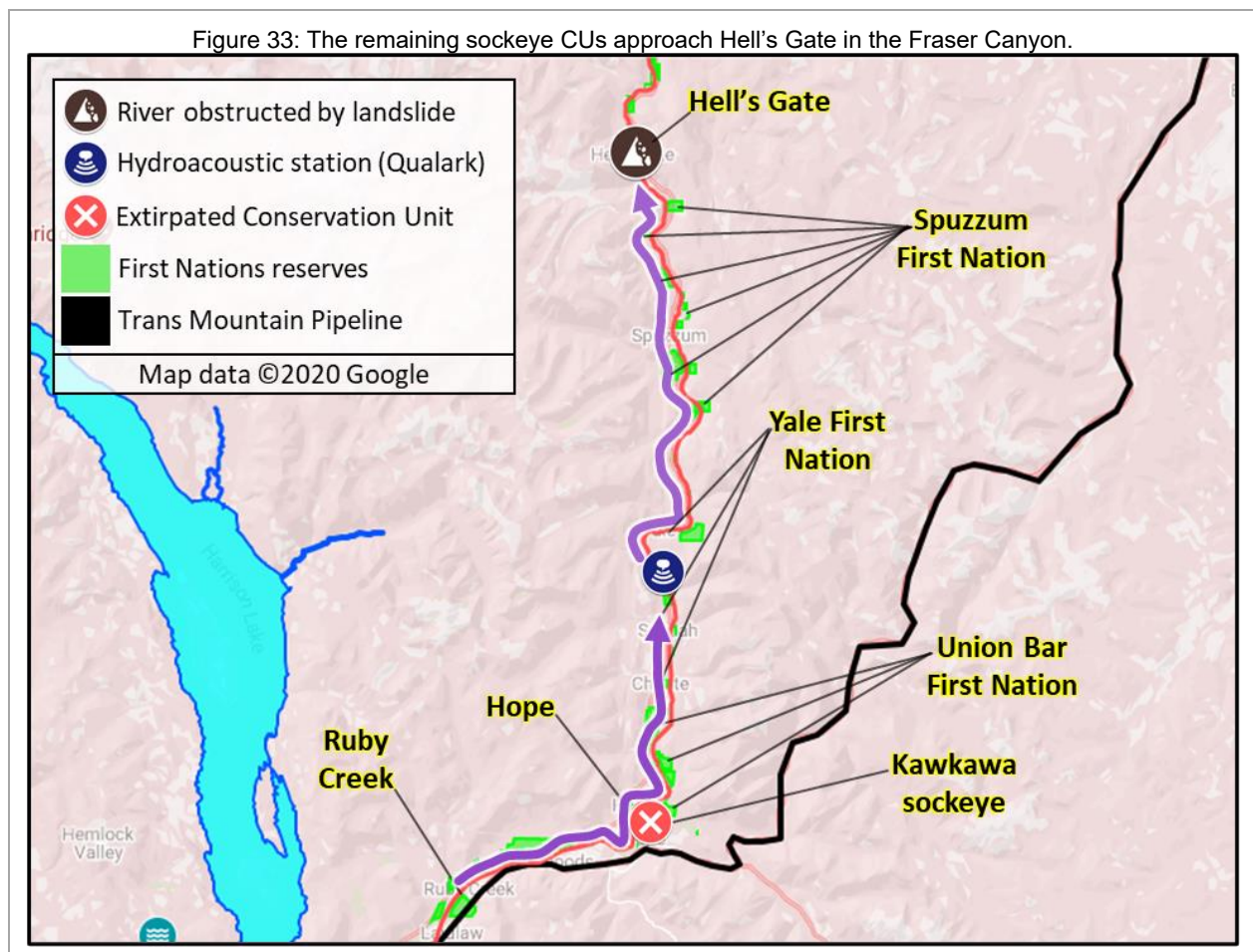
³⁶¹ Cohen Report, Vol. 1, pp. 152-154

³⁶² Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

³⁶³ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

the most prolific Stó:lō fishers, and the eight-kilometer stretch of the Fraser River above Yale is where he does most of his fishing (Brown K. L., 2005, pp. 184-185).

In August 1913, after “immense masses of rock” slid into the river at Hell’s Gate (British Columbia, 1914, p. 22), the remaining sockeye CUs would have eventually run into a wall of flesh comprised of fish from earlier timing groups. Whereas, historically, Hell’s Gate has always been a difficult hurdle for migrating salmon, CNOR construction crews transformed it into an impassable barrier. Without human intervention, few sockeye proved capable of traversing the new obstruction. When provincial fisheries commissioner J. P. Babcock surveyed the situation in late August, he observed that the water had been “darkened with a milling mass of sockeye”, and that “[i]mmediately below Hell’s Gate, and for ten miles [16 kilometers] down-stream, sockeye were massed in incredible numbers” (British Columbia, 1914, pp. 21-22). Many sockeye were caught below the obstruction and released above it, but the vast majority eventually died without spawning. In late September, Babcock observed that as far south as Ruby Creek, some 60 kilometers downstream from Hell’s Gate (Figure 33), “the air was foul with the stench arising from the dead fish that covered the exposed parts of the river” (British Columbia, 1914, p. 28).



Today, when sockeye approach Hell's Gate, they may still encounter a migratory bottleneck, but they are unlikely to encounter a wall of flesh of the sort which greeted late-run salmon in 1913. That is, thanks to the various fishways installed here throughout the mid-twentieth century, sockeye are now able to bypass the obstruction by entering one of several fishways, a choice determined by the current water level, lining the left and right banks of the river. Inside the fishways, sockeye encounter "a series of vertical baffles" designed to "cut the speed of the river flow from 7.6 metres [...] per second to .45 metres [...] per second", as well as a "succession of pools, each stepped 25 cm [...] higher [than the last], giving the salmon easy leaps and a chance to rest during the climb to higher water above."³⁶⁴ Each year, many sockeye will die before making it into a fishway, and still others may fail to make it through the fishway itself. The sockeye that do successfully traverse the fishway will be funneled back into the river, permitting them to continue their journey upstream.

As they continue upstream, sockeye from the remaining CUs may find themselves caught in the dip nets of Nlha7kápmx (Nlaka'pamux) fishers from the Boston Bar, Boothroyd, T'eqt'aqtn'mux (Kanaka Bar), Skuppah, Spuzzum, Lytton, and Siska First Nations. In the Nl̓eʔkepmxcín language, which is today considered "severely endangered" (Endangered Languages Project, n.d.) sockeye are called "s̓x̓wáʔes" (First Peoples' Cultural Council, 2020). Chief Fred Sampson, Siska's elected chief, testified before the Cohen Commission that salmon were once so abundant here that "one could cross the river on their backs."³⁶⁵ Today, Chief Sampson fishes from a riverside rock indented with the footprints of his ancestors. When fishing from this rock, Chief Sampson not only feels connected to his ancestors, he also "feels a bond with the fish that is difficult to describe."³⁶⁶ During his lifetime, however, Chief Sampson has observed a "gradual yet drastic decline" in the number of sockeye available for harvest.³⁶⁷ In the years leading up to his testimony, moreover, Chief Sampson observed an increase in the number of lesions on the fish caught here, a phenomenon he suggests may have been caused by sea lice.³⁶⁸ Given the importance of sockeye fishing to preserving Nlha7kápmx culture and the Nl̓eʔkepmxcín language, Chief Sampson testified, the decline of sockeye has led not only to "a cultural loss", but also to "a loss in language as well, and most certainly a huge loss in the transferring of that knowledge to our children."³⁶⁹

³⁶⁴ "How do Fishways Work? A Ladder for Fish", Hell's Gate exhibit, visited 01-September-2017

³⁶⁵ Cohen Commission Exhibit #291, "Witness Summary of Chief Fred Sampson", p. 2

³⁶⁶ Cohen Commission Exhibit #291, p. 1

³⁶⁷ Cohen Commission Exhibit #291, p. 1

³⁶⁸ Cohen Commission Exhibit #291, p. 2

³⁶⁹ Cohen Commission Evidentiary Hearing Transcript, 14-Dec-2010, pp. 9-10

Some 25 kilometers after exiting the fishways at Hell's Gate, Nahatlatch sockeye turn left to begin their ascent of the Nahatlatch River. Nahatlatch sockeye were most recently assessed as being in the amber zone, indicating that the fish which together constitute this CU are in neither "healthy" nor "poor" shape (DFO, 2018a, p. 10).

Some 30 kms later, the remaining CUs will reach a fork in the river, with the Fraser River on the left, and the Thompson River on the right. At the Fraser-Thompson fork, the Kamloops, North Barriere, Shuswap, and Shuswap Complex CUs will turn right to ascend the Thompson River. On the way to their spawning grounds, these fish may encounter Nlha7káp̓mx fishers from the Lytton, Nicomen, Cook's Ferry, Oregon Jack Creek, and Ashcroft First Nations; or Secwépemc fishers from the Bonaparte, Tk'emlúps (Kamloops), Pellt'iq't (Whispering Pines/Clinton), Simpcw (North Thompson), Neskonlith, Adams Lake, Little Shuswap Lake, Splatsh, and Skeetchestn First Nations. Chief Ron Ignace of Skeetchestn First Nation testified before the Cohen Commission that, in the Secwepemctsin language,³⁷⁰ sockeye are called "sqlelten7úw̓i", which means "the original salmon."³⁷¹ The Secwépemc people, Chief Ignace explained, have been the "producers and caretakers of great runs of salmon for thousands of years."³⁷² According to the Secwépemc law of reciprocity—which holds that "if you honour someone, they will honour you back"—the decline of sockeye is rooted in the fact that "we have disrespected the salmon with all sorts of harms to our environment."³⁷³ With the "depletion of the salmon", Chief Ignace added, "comes the depletion of [Secwépemc] culture" as well as "the loss of knowledge."³⁷⁴ In this way, Chief Ignace suggested, the DFO's mismanagement of the fishery reflects Canada's mistreatment of Indigenous children in Residential Schools. Whereas the principal aim of Residential Schools was to "take the Indian out of the child", the fishery has been managed in order to "take the fish out of the Indian."³⁷⁵

And yet, the geographic distribution of First Nations reserves in B.C. (Figure 34) strongly hints at the existence of an Indigenous right to carry on fisheries as formerly. As Douglas Harris argues in an essay he prepared for the Cohen Commission, these reserves "were allotted to support either the catching or the processing of fish."³⁷⁶ These reserves did not, however, safeguard the fisheries from "a common-law and legislated fisheries regime" which "opened the resource to immigrants and to Anglo-American capital."³⁷⁷ Today, the "unusual Indian-reserve

³⁷⁰ The Secwepemctsin language is today considered "critically endangered" (Endangered Languages Project, n.d.).

³⁷¹ Cohen Commission Exhibit #291, "Witness Summary of Chief Fred Sampson", p. 2

³⁷² Cohen Commission Exhibit #294, "Witness Summary of Dr Ron Ignace", p. 1

³⁷³ Cohen Commission Exhibit #294, p. 3

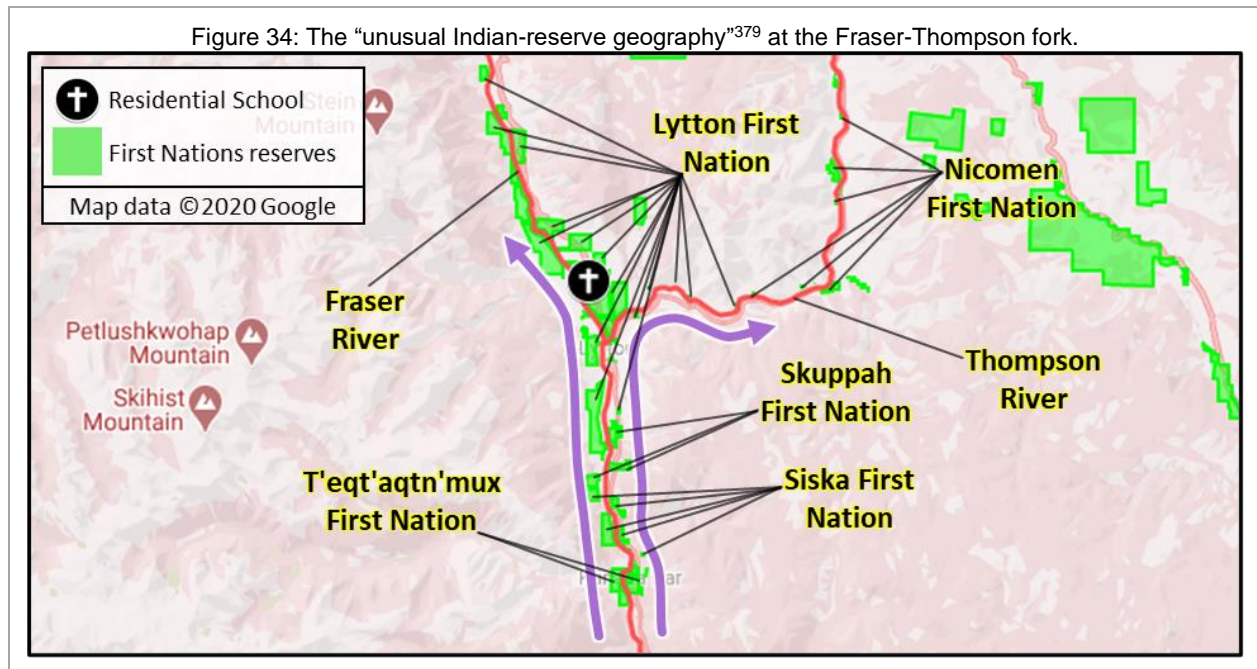
³⁷⁴ Cohen Commission Exhibit #294, pp. 3-4

³⁷⁵ Cohen Commission Evidentiary Hearing Transcript, 14-Dec-2010, p. 30

³⁷⁶ Cohen Commission Exhibit #1135, p. 3

³⁷⁷ Cohen Commission Exhibit #1135, p. 3

geography” in B.C. is a remnant of a broken promise that First Nations would be permitted to carry on their fisheries as formerly.³⁷⁸



In 2017, some 30 kilometers downstream from Kamloops Lake, these fish would have passed an Ashcroft First Nation community devastated by the 1,917 km² Elephant Hill fire (Figure 35). This fire was thought to have warmed the river, producing problematic migratory conditions in the process. Approximately 10 kilometers after passing through Kamloops Lake, the remaining sockeye will reach another fork in the river. The North Barriere and Kamloops CUs turn left at the Thompson fork to ascend the North Thompson River *en route* to their spawning grounds above. In the process, these fish may have to contend with leaks, spills, or other complications arising from the operations or expansion of the Trans Mountain Pipeline, the route for which crosses over the Thompson River, in the city known today as Kamloops, before running roughly parallel to, and occasionally crossing over, the North Thompson River.

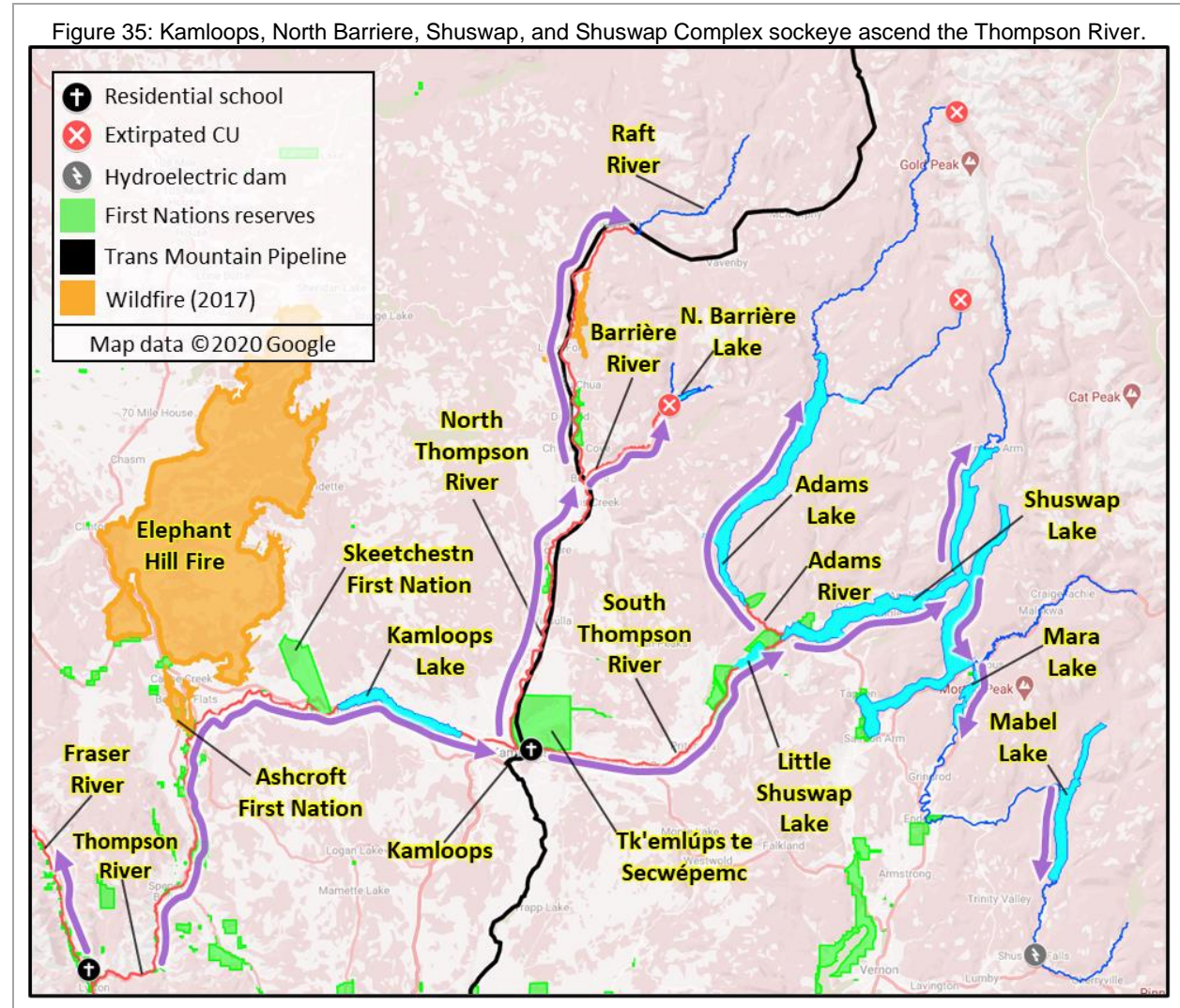
Some 50 kilometers from the mouth of the North Thompson River, North Barriere sockeye will turn right to ascend the Barriere River *en route* to their spawning grounds in Fennell Creek or Harper Creek. These are not, however, the original North Barriere sockeye. In 1952, the Barriere River was dammed, resulting in the extirpation of the original North Barriere sockeye populations.³⁸⁰ Following the dam's removal, hatchery transplants from the Raft River were used

³⁷⁸ Cohen Commission Exhibit #1135, p. 26

³⁷⁹ Cohen Commission Exhibit #1135, “Harris, The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982, Jan 12 2011”, p. 26

³⁸⁰ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version”, p. 66

in an attempt to restore North Barriere sockeye. As a result, this “*de novo*” CU is only a fraction as abundant as the extirpated North Barriere CU.³⁸¹ The DFO recently assessed this CU as being in neither “healthy” nor “poor” shape (DFO, 2018a, p. 10). The Kamloops CU was likewise assessed as being in the amber zone (DFO, 2018a, p. 10).



Meanwhile, the sockeye which together constitute the Shuswap and Shuswap Complex CUs turned right at the Thompson fork to continue their ascent of the (South) Thompson River. Originally included in the Shuswap CU—a “cyclic” CU recently assessed as amber (DFO, 2018a, p. 10)—are several sockeye CUs which “disappeared after the Hells Gate landslide.”³⁸² The Shuswap Complex CU—most recently assessed as amber/green, or bordering on “healthy” (DFO, 2018a, p. 10)—included populations devastated not just by the 1913 landslide at Hell’s Gate, but

³⁸¹ Cohen Commission Exhibit #1915, pp. 66-67

³⁸² Cohen Commission Exhibit #1915, p. 74

also by the installation of a “splash dam on the Adams River.”³⁸³ These populations were later moved to separate CUs, Adams-ES and Momich-ES, which were then classified as extirpated.³⁸⁴

After turning left at the Fraser-Thompson fork, the remaining CUs may encounter Dakelh (Carrier) peoples from Lhtako Dené First Nation; T̓s̓ilhqot'in peoples from the ʔEsdilagh (Alexandria), Tl'esqox (Toosey), Yunesit'in (Stone), Tl'etinqox-t'in, and Xení Gwet'in First Nations; Secwépemc peoples from the Esk'etemc (Alkali), Stswecem'c Xgat'tem (Canoe/Dog Creek), T'exelcemc (Williams Lake), High Bar, and Xat'súll (Soda Creek) First Nations; and St'át'imc peoples from the Sek'wel'was (Cayoose Creek), Ts'kw'aylaxw (Pavilion), Tsal'alh (Seton Lake), Xaxli'p (Fountain), N'Quatqua (Anderson Lake), T'it'q'et (Lillooet) and Xwísten (Bridge River) First Nations. Grand Chief Saul Terry testified before the Cohen Commission that fishing is a “way of life” which “permeates the wholeness of [Xwísten] culture.”³⁸⁵ As a result, St'át'imc and Dakelh Elders are struggling to “pass on the customs, traditions, the practices to the younger people.”³⁸⁶ Grand Chief Terry, who represents Canada as a commissioner on the Pacific Salmon Commission (PSC), also suggested that traditional ecological knowledges are often unfairly “cast aside in favour of ‘science’”.³⁸⁷ The status quo in fisheries management, he argued, is too narrowly focused on “harvest management deliberations” centred around “one specific stock of fish”, an emphasis which often leaves spawning habitat issues unaddressed, in addition to jeopardizing biological diversity.³⁸⁸ Grand Chief Terry asserted that “First Nations’ involvement is paramount to preserving and conserving the fish stocks”, that First Nations should form intertribal organizations to facilitate the co-management of the fishery with the DFO, and that First Nations want to be “part of the actions required to make [their] futures more meaningful.”³⁸⁹

Approximately 50 kilometers after the Fraser-Thompson fork, Seton and Anderson-Seton sockeye will sense the water from their home streams discharging into the Fraser River. In the past, this would have signalled for these fish to turn left in order to begin their ascent of the Seton River. Today, however, these fish will sense their home-stream water approximately 1 kilometer downstream from the mouth of the Seton River, where it is discharged from the Seton Dam's tailrace. Accordingly, these sockeye may congregate at the tailrace for extended periods of time, owing either to their attraction to “home-stream water”, or perhaps because they find it useful as “a cold-water refuge.”³⁹⁰ These fish may be injured directly by interacting with the tailrace, or

³⁸³ Cohen Commission Exhibit #1915, p. 77

³⁸⁴ Cohen Commission Exhibit #1915, pp. 89-91

³⁸⁵ Cohen Commission Evidentiary Hearing Transcript, 14-Dec-2010, p. 17

³⁸⁶ Cohen Commission Evidentiary Hearing Transcript, 14-Dec-2010, pp. 17-18

³⁸⁷ Cohen Commission Evidentiary Hearing Transcript, 28-June-2011, p. 21

³⁸⁸ Cohen Commission Evidentiary Hearing Transcript, 28-June-2011, p. 21

³⁸⁹ Cohen Commission Exhibit #293, “Witness Summary of Grand Chief Saul Terry”, p. 4

³⁹⁰ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version”, p. 41

indirectly by virtue of the resulting “delay in migration from stalling at the tailrace.”³⁹¹ The fish that do break free of the tailrace must migrate approximately 1 kilometer upstream to enter the Seton River, which they must then climb for an additional 5 kilometers before reaching the Seton Dam fishway. Many sockeye will struggle to locate the fishway entrance, which may lead to their death.³⁹²

After successfully traversing the Seton Dam fishway, the remaining fish must swim through Seton Lake, a distance of approximately 20 kilometers, before they enter Portage Creek. This is where Seton sockeye, a “*de novo*” population of hatchery transplants, will stop to spawn. This *de novo* population replaced Portage Creek sockeye, a now-extirpated population that was “decimated” not just by the 1913 landslide at Hell’s Gate, but also by “poor husbandry techniques” at the former Portage Creek hatchery, as well as the construction of the Bridge River Powerhouse, which reduced the rearing capacity of Seton Lake.³⁹³ In the DFO’s most recent assessment, the *de novo* Seton CU was placed in the red zone, indicating that the underlying population is in “poor” shape (DFO, 2018a, p. 10). Anderson-Seton sockeye, meanwhile, must swim an additional 20 kilometers through Anderson Lake before they are directed by a diversion weir to spawn in either Gates Creek or the N’Quatqua First Nation-operated Gates Spawning Channel. This CU was most recently assessed as bordering (amber/green) on “healthy” (DFO, 2018a, p. 10).

Approximately 70 kilometers upstream from the Seton-Fraser fork, sockeye may encounter another migratory bottleneck as they approach Big Bar, the site of a major 2018 landslide that was not discovered until June 2019, well after early-returning sockeye arrived at the obstruction. As many as 99% of Early Stuart sockeye may have died before spawning as a result (Owen, 2020). The prospects were better for late-arriving fish, approximately 60,000 of which were “captured using beach seining [...] as well as a fishwheel” before being “transferred to oxygenated holding tanks and relocated upstream, past the obstruction, via helicopter” (Government of BC, 2019). In addition, 177 sockeye “were transported to a rearing facility at the Cultus Lake Salmon Lab [...] to preserve some portion of this year’s class for the Early Stuart population” (Government of BC, 2019). In an effort to restore “natural passage”, a team of “engineers, geologists, and scaling personnel performed controlled blasts and [...] manipulate[ed] boulders on the edge of the river” (Government of BC, 2019). In order to assess these efforts, fish were tagged below the obstruction, and a hydroacoustic monitoring station was established above. While an estimated 220,000 fish made it past the obstruction once the water in the river dropped to a more favourable level, their ‘natural passage’ has yet to be restored (Owen, 2020). Accordingly, sockeye returning

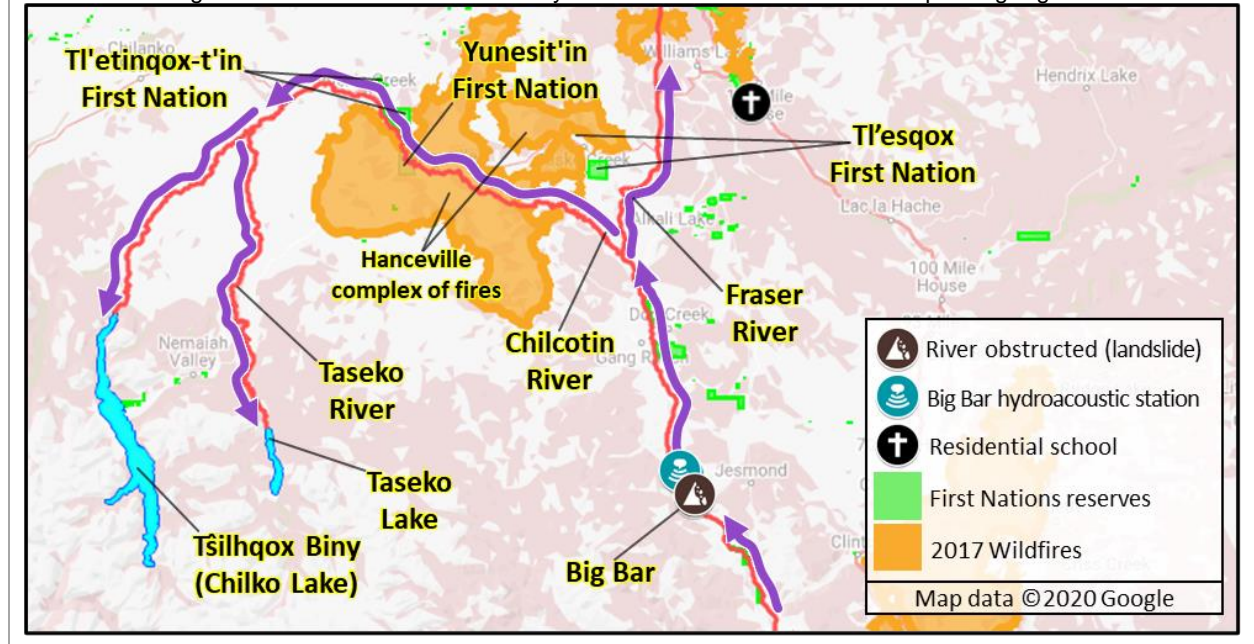
³⁹¹ Cohen Commission Exhibit #1915, p. 41

³⁹² Cohen Commission Exhibit #1915, pp. 41-42

³⁹³ Cohen Commission Exhibit #1915, pp. 72-73

in 2020 are more likely to traverse the obstruction via helicopter, or through the newly-constructed, on-site “pneumatic fish pump” or “salmon cannon” than they are to simply swim past it (Owen, 2020).

Figure 36: Chilko and Taseko sockeye ascend the Chilcotin River after passing Big Bar.



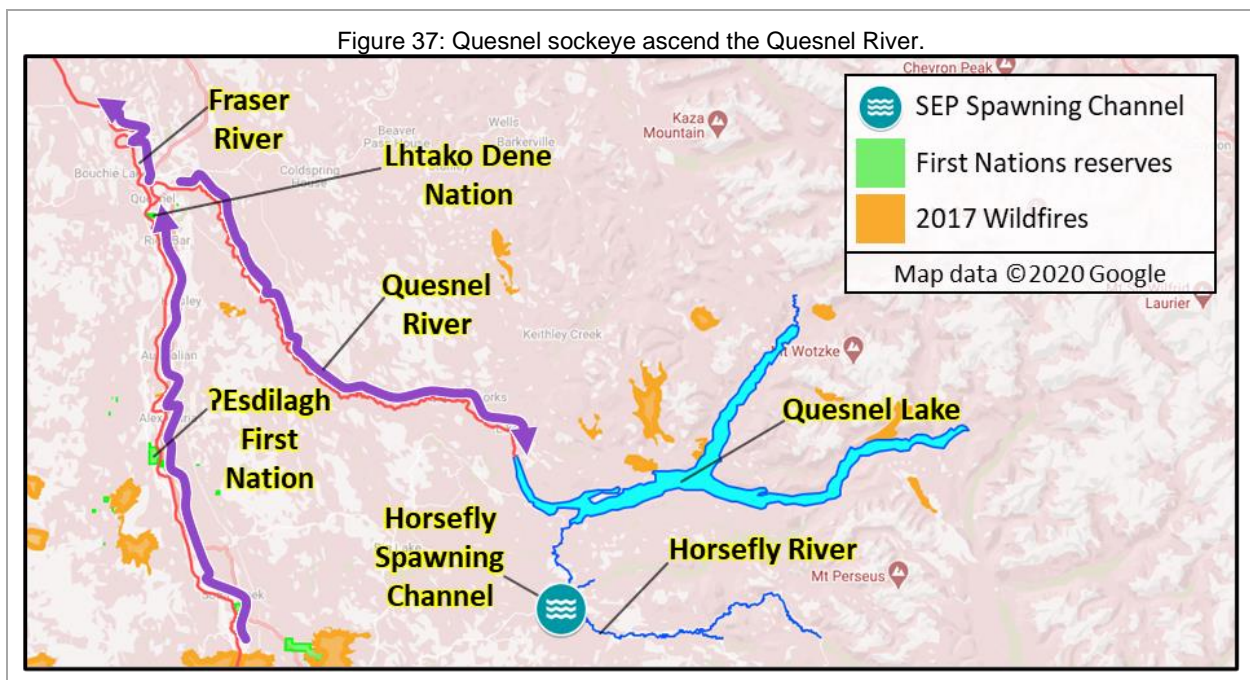
Approximately 60 kilometers upstream from the Big Bar landslide, Taseko and Chilko sockeye will turn left to climb the Chilcotin River (Figure 36). In 2017, these fish would have been forced to contend with a Chilcotin River warmed by the 2,390 km² Hanceville complex of fires. Some 150 kilometers from the mouth of the Chilcotin River, Taseko sockeye turn left again to climb the Taseko River. These fish must then travel an additional 100 kilometers to their spawning grounds in Taseko Lake. The Taseko CU was recently assessed as being in “poor” (red-zone) shape (DFO, 2018a, p. 10). The Chilko CUs, meanwhile, must travel an additional 60 kilometers from the mouth of the Taseko River to reach their spawning grounds in Tâilhqox Biny (Chilko Lake), a cool, remote lake “surrounded by glaciated mountains” and far removed from “any significant human development.”³⁹⁴ Chilko sockeye are considered “superoptimal migrants” whose “greater stride lengths, higher ground speed per tail beat, and lower energy usage” may have helped them to adapt to the post-1913 migratory conditions at Hell’s Gate better than other middle- and upper-Fraser CUs.³⁹⁵ The Chilko aggregate CU was recently assessed as being “healthy”, whereas the Chilko-Early Summer CU was deemed “data deficient” (DFO, 2018a, p. 10).

³⁹⁴ Cohen Commission Exhibit #1915, p. 45

³⁹⁵ Cohen Commission Exhibit #1915, p. 45

In his expert-witness testimony, Michael Lapointe used Chilko sockeye mortality data to illustrate how mortality rates differ from one phase of the sockeye life-cycle to the next.³⁹⁶ Though Cohen concedes in his overview that “there clearly are variations among the different populations” of Fraser River sockeye, he nevertheless goes on to apply these Chilko-specific mortality estimates to Fraser River sockeye as a whole.³⁹⁷ The resulting chart, titled “Fraser Sockeye Life Cycle Survival”,³⁹⁸ may therefore give the false impression that all Fraser River sockeye populations are as robust as those reared in T̓sílhqox Biny (Chilko Lake). On the basis of these data, Cohen suggests that female spawners lay an average of 3,000 eggs, and that only 12 of these fish will survive to adulthood. Despite an egg-to-adult mortality rate of 99.6%, eight of these fish will be made available for harvest, leaving just four fish to perpetuate the next cycle.³⁹⁹

From the Chilcotin-Fraser fork, the remaining sockeye must travel another 150 kilometers upriver before they reach the mouth of the Quesnel River. In 2017, this would have meant swimming through the 132 km² White Lake fire, passing west of the 127 km² Wildwood fire, and east of the 56.4 km² Castle Rock fire. Upon reaching the Fraser-Quesnel fork, Quesnel sockeye turn right to ascend the Quesnel River. After swimming an additional 110 kilometers, these fish arrive at Quesnel Lake (Figure 37).



Until the late-nineteenth century, Quesnel sockeye were so abundant that, once every four-year cycle, the number of fish returning to Quesnel Lake alone would likely have exceeded

³⁹⁶ Cohen Commission Exhibit #1, “Presentation of Mr. Mike Lapointe”, slide 21

³⁹⁷ Cohen Report, Vol. 1, p. 15

³⁹⁸ Cohen Report, Vol. 1, p. 15

³⁹⁹ Cohen Report, Vol. 1, p. 15

10 million.⁴⁰⁰ Beginning in 1871, however, tailings generated by placer-mining operations were routinely dumped into the Horsefly River, a practice which continued until 1945, drastically reducing the natural spawning habitat available to Quesnel sockeye.⁴⁰¹ In 1898, a dam was constructed at the outlet of the Quesnel Lake in order to “hold back high water freshets for mining operations, allowing no fish to migrate past the dam into Quesnel Lake or the Horsefly River.”⁴⁰² In 1905, a fishway was added which remained in operation until the dam was ultimately decommissioned in 1921.⁴⁰³ In contrast to the Chilko CUs, which successfully adapted to the post-1913 migratory conditions at Hell’s Gate, Quesnel sockeye “were more highly affected by the landslide [...] because they have smaller energy reserves, and because of their spawn timing.”⁴⁰⁴ Today, many Quesnel sockeye rely on the controlled conditions in the Horsefly Spawning Channel when spawning, while still others spawn in the Horsefly River, Little Horsefly River, and Mitchell River, among others. The DFO most recently assessed health of the “cyclic” Quesnel CU as red/amber, or bordering on “poor” (DFO, 2018a, p. 10).

From the Fraser-Quesnel fork, the five remaining CUs must travel another 120 kilometers upstream before reaching the confluence of the Nechako and Fraser rivers. Along the way, these fish may encounter Dakelh people from the Lheidli T'enneh (Fort George), Saik'uz, Stellat'en, Cheslatta Carrier, Binche Whut'en, Nadleh Whut'en, Nak'azdli Whut'en, Wet'suwet'en, Nee-Tahi-Buhn, Skin Tyee, Takla, Yekooche, and Tl'azt'en First Nations. Thomas Alexis, a former Tl'azt'en chief, testified before the Cohen Commission that minor streams in the Stuart-Takla-Trembleur system used to carry “100,000 fish”, while the main streams would “carry over a million fish.”⁴⁰⁵ Of the “over 100 [salmon spawning] streams” which comprise the Stuart-Takla-Trembleur system, however, more than 50 “have been decimated through development” to the point where “fish no longer return.”⁴⁰⁶ In addition to affecting “the health of the whole ecosystem”, the decline of sockeye led to an increase in “rates of diabetes and other diseases” in his community, and forced some in his community to retire following the closure of nearby recreational fishing lodges.⁴⁰⁷ Alexis also suggested that, in order to ensure the “sustainability of the whole ecosystem”, biologists need to take a more holistic approach to managing the fishery.⁴⁰⁸ The federal

⁴⁰⁰ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version”, p. 69

⁴⁰¹ Cohen Commission Exhibit #1915, p. 69

⁴⁰² Cohen Commission Exhibit #1915, p. 69

⁴⁰³ Cohen Commission Exhibit #1915, p. 69

⁴⁰⁴ Cohen Commission Exhibit #1915, p. 69

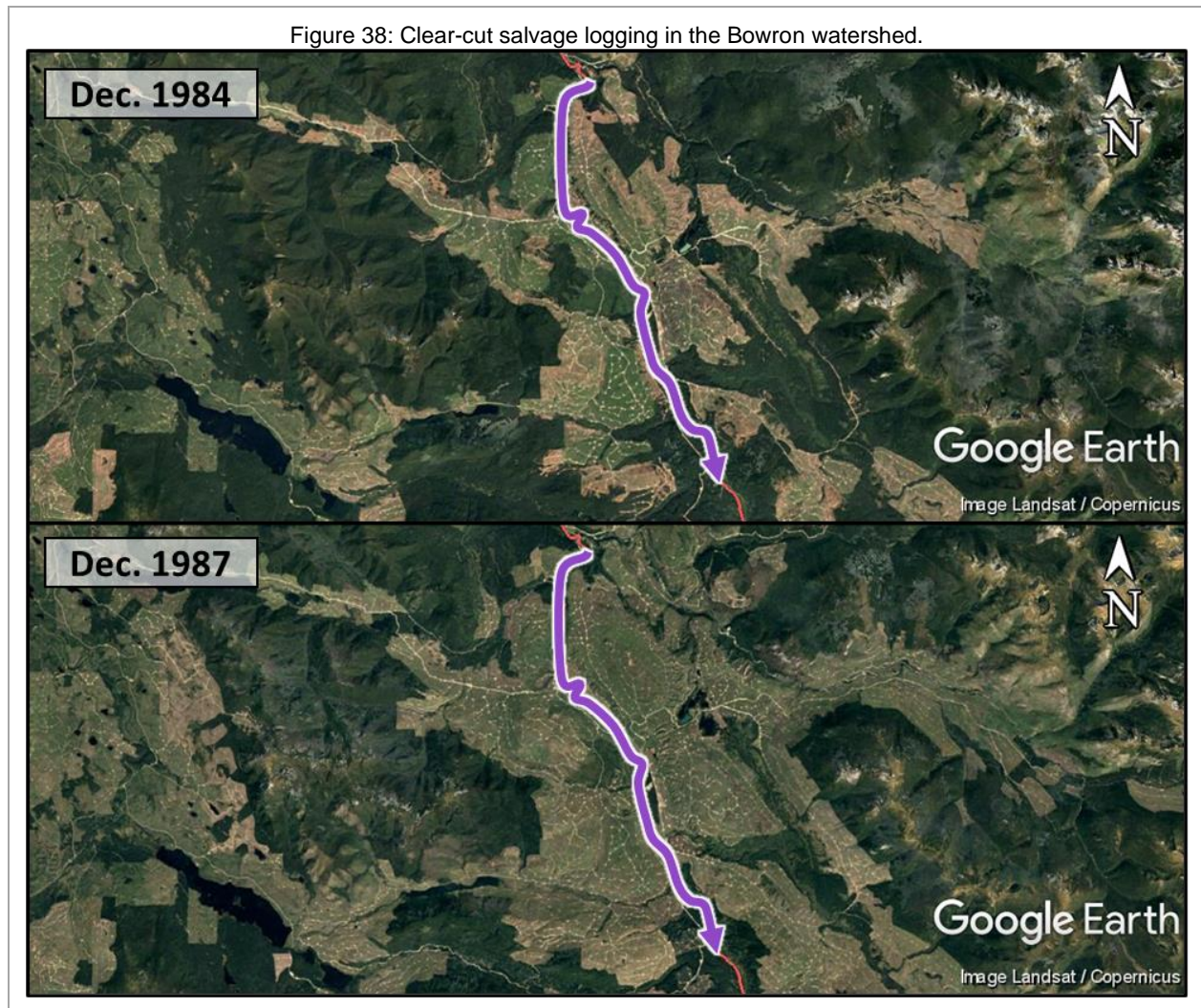
⁴⁰⁵ Cohen Commission Exhibit #292, “Witness Summary of Thomas Alexis”, p. 2

⁴⁰⁶ Cohen Commission Exhibit #292, p. 2

⁴⁰⁷ Cohen Commission Exhibit #292, p. 3

⁴⁰⁸ Cohen Commission Exhibit #292, p. 4

government needs to “change [...] the way [it] manages sockeye”, Alexis added, “not just for profit, but for sustainability.”⁴⁰⁹



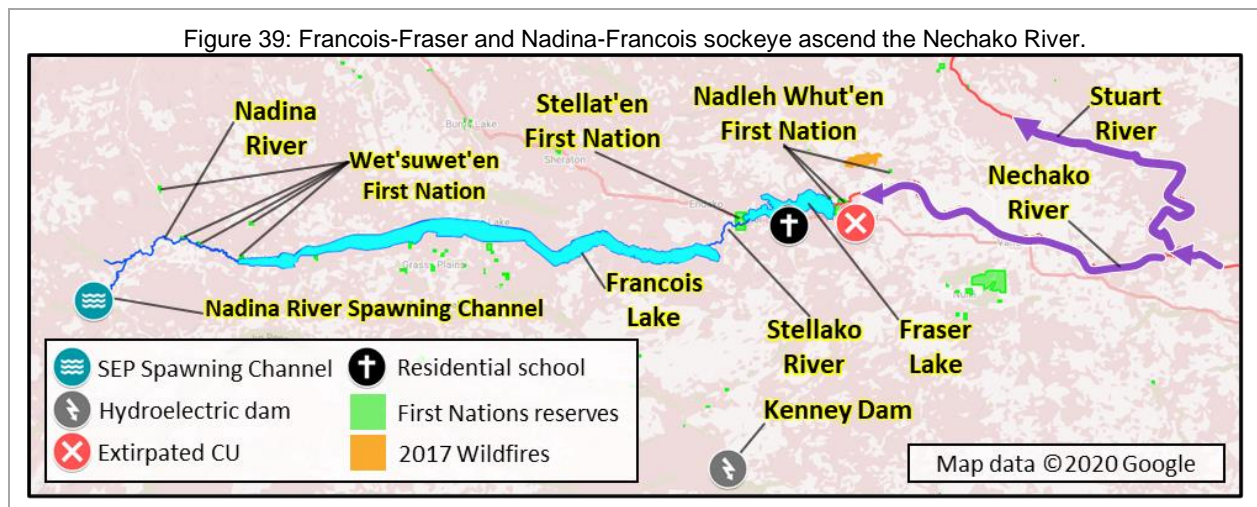
The sockeye which together constitute the Bowron CU turn right to follow the Fraser River until, more than 100 kilometers later, they reach the Bowron River. In the 1980s, the Bowron watershed was subject to a “significant [...] outbreak” of Mountain Pine Beetles which officials failed to contain.⁴¹⁰ Forestry officials responded by engaging in large-scale “salvage logging (clear cut) operations” (Figure 38) with the aim of capturing “as much of the economic value of dead timber as possible before the wood deteriorated” while also trying to “slow the spread of beetles to other areas” (Dhar, Parrott, & Hawkins, 2016). Consequently, Bowron sockeye return to spawn in streams embedded in ecosystems which may not be as “ecologically resilient” as they once

⁴⁰⁹ Cohen Commission Exhibit #292, p. 7

⁴¹⁰ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version”, p. 43

were (Dhar, Parrott, & Hawkins, 2016). The health of the Bowron CU was, perhaps not coincidentally, most recently assessed as “poor” (red zone) (DFO, 2018a, p. 10).

The four remaining sockeye CUs, meanwhile, turn left to climb the Nechako River (Figure 39). From the Stuart-Nechako fork, the upstream climb to Fraser Lake is approximately 200 kilometers long. Until the 1970s, the Fraser Lake served as a rearing lake for the now-extirpated Fraser CU. It is not clear what led to the extirpation of this CU, which included populations that spawned in the Endako River and Ormonde Creek,⁴¹¹ though it may have had something to do with the “[s]ignificant hydro-electric infrastructure”⁴¹² installed on the Nechako River in the latter half of the twentieth century. This may have also affected Francois-Fraser sockeye, the majority of which spawn in the Stellako River. From 1964 to 1968, splash dams were employed on the Stellako River to facilitate log-driving operations. During this period, log drivers employed splash dams to release “large volumes of water” into the Stellako River, transporting logs downstream but degrading the river and its spawning habitats in the process.⁴¹³ In spite of this, the Francois-Fraser CU was recently assessed as bordering on “healthy” (amber/green) (DFO, 2018a, p. 10).



Nadina-Francois sockeye, meanwhile, swim past the Stellako River, through Francois Lake, and look to spawn in Glacier Creek, Tagetochlain Creek, or the Nadina River. These fish may also be diverted into the Nadina River Spawning Channel, an SEP facility built in 1973 to take advantage of Francois Lake’s unused juvenile-rearing capacity.⁴¹⁴ Historically, this CU consisted of two distinct run-timing groups. When the spawning channel was built, however, these fish started behaving in unexpected ways, suggesting that the “original populations” may have been “lost and replaced by a new single population.”⁴¹⁵ In 1978, 1987, and 1995, spikes in pre-spawning

⁴¹¹ Cohen Commission Exhibit #1915, p. 90

⁴¹² Cohen Commission Exhibit #1915, p. 51

⁴¹³ Cohen Commission Exhibit #1915, p. 51

⁴¹⁴ Cohen Commission Exhibit #1915, p. 63

⁴¹⁵ Cohen Commission Exhibit #1915, p. 63

mortality were observed among sockeye in the spawning channel which have since been attributed to the parasite *Ichthyophthirius multifiliis*. Though it is believed that this “typically does not cause disease” in sockeye, “‘ich’ or ‘white spot disease’ can occur if numbers of this pathogen are high due to conditions such as warm water, reduced flows and adult crowding.”⁴¹⁶ Nevertheless, Nadina-Francois sockeye were recently assessed as bordering on “healthy” (amber/green) (DFO, 2018a, p. 10).

Meanwhile, after travelling upstream on the Nechako River for almost 100 kilometers, Takla-Trembleur and Takla-Trembleur-Stuart sockeye turn right to climb the Stuart River. After climbing the Stuart River for an additional 100 kilometers, these fish will have travelled a distance of approximately 1,000 kilometers since re-entering the Fraser River. The Takla-Trembleur CU, which re-enters the Fraser River earlier than the Takla-Trembleur-Stuart CU, may find their migrations interrupted or delayed by elevated water levels brought about by spring freshets. This is thought to have contributed to the decline of the underlying populations, as the potential for pre-spawn mortality arising out of migratory delays—e.g., traversing the fishways at Hell’s Gate—is only magnified by the length of their migratory route.⁴¹⁷ Decreases in “marine productivity” and “increased (more extreme) water temperatures in the Fraser River post-1990” have also been implicated in this decline.⁴¹⁸ The Takla-Trembleur CU was most recently assessed as being in “poor” (red zone) health (DFO, 2018a, p. 10).

Most Takla-Trembleur-Stuart sockeye will look to spawn in the Tachie and Middle rivers. Beginning in the 1960s, however, log driving on the Tachie River led to a reduction in suitable spawning habitat. Whereas log-driving operations on the Stellako River were ceased in 1968, these practices persisted on the Tachie River until the early 1990s, or possibly later.⁴¹⁹ The spawning capacity of Middle River, meanwhile, is limited by the combined effects of “pulpwood and sawlog harvesting” as well as railroad construction.⁴²⁰ The health of the Takla-Trembleur-Stuart CU was most recently assessed as red/amber, or bordering on “poor” (DFO, 2018a, p. 10).

5.2 – Discussion and Analysis

On the basis of the foregoing (de)construction of the social life (cycle) of Fraser River sockeye, I suggest that the social life of sockeye reveals the existence of a plurality of salmon controversies, accentuating in the process the near-absence of the same in the Cohen Report’s depiction of the life-cycle of sockeye. In what follows, I highlight the most significant of these divergences, in

⁴¹⁶ Cohen Commission Exhibit #1915, p. 63

⁴¹⁷ Cohen Commission Exhibit #1915, p. 63

⁴¹⁸ Cohen Commission Exhibit #1915, p. 63

⁴¹⁹ Cohen Commission Exhibit #1915, p. 84

⁴²⁰ Cohen Commission Exhibit #1915, “Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version”, p. 69

addition to comparing and contrasting the cartographic portraits associated with each of these approaches.

5.2.1 – Divergent Approaches to Understanding Sockeye

Whereas the social life of sockeye attends to the unique challenges which face each CU as a result of the sources of controversies identified in the previous chapter, the Cohen Report's depiction of the life-cycle of sockeye conceives of the life histories of these fish largely in isolation from these controversies. I say "largely in isolation" because the Cohen Report's depiction of the life-cycle of sockeye does attend to some of these challenges, albeit indirectly. In consistently attending to the influence that water temperature has on the various stages of the sockeye life-cycle,⁴²¹ for instance, Cohen hints at the impacts associated with anthropogenic climate change, though he never confronts this issue directly. In effect, then, the life-cycle approach intimates that Fraser River sockeye continue to inhabit their unaltered natural habitats.

In a similar vein, Cohen speaks throughout his overview of the various "sources of mortality" to which sockeye are subjected over the course of their life cycles, culminating in a section on "[l]ife cycle survival" in which these mortality data are summarized for each stage in the life cycle.⁴²² In this section, Cohen lays out in a table the "[e]gg-to-fry", "[f]ry-to-smolt", and "[s]molt-to-adult" mortality rates.⁴²³ When considering the fishery as a source of mortality, however, Cohen refers not to a "mortality rate", but a "fishery harvest rate."⁴²⁴ This suggests, among other things, that mortality is only something to be avoided if it does not coincide with a successful commercial harvest. It would seem, then, that Cohen's life-cycle approach to understanding sockeye takes for granted the primacy of the commercial fishing perspective. This would explain why Cohen's life-cycle overview ends at the mouth of the Fraser River, where the reach of the commercial fishery ends. This would also explain why Cohen provides no mortality rate for spawners—noting instead only that a total of four fish remain for spawning—despite the various challenges still facing adult sockeye when they re-enter the Fraser River. Rather than addressing the particular challenges faced by each CU as they migrate from freshwater to saltwater and back again, Cohen focuses instead on describing the life-cycle of Fraser River sockeye as a series of physiological transformations that are only loosely connected to the particulars of place. When Cohen does describe the movements of adult sockeye in the Fraser River, he does so principally with reference to the timing and speed of their migrations, both critical metrics for determining whether

⁴²¹ Cohen Report, Vol. 1, pp. 10, 12-14.

⁴²² Cohen Report, Vol. 1, p. 15

⁴²³ Cohen Report, Vol. 1, p. 15

⁴²⁴ Cohen Report, Vol. 1, p. 15

escapement targets have been met, and—by extension—whether the commercial fishery can be opened.

This is not necessarily to suggest, however, that Cohen consciously opted to privilege the commercial fishing perspective over those of First Nations and stakeholders in the fishery. This may, instead, reflect an underlying assumption that only those possessing the requisite expertise in fisheries biology are capable of speaking authoritatively about Fraser River sockeye. This would explain why the Cohen Report's depiction of the life-cycle of sockeye is informed by the expert-witness testimonies of three biologists, and a technical report in marine ecology prepared by five additional biologists.⁴²⁵ The social life of sockeye, by contrast, is informed not just by fisheries biologists, but also by those bearing local or traditional ecological knowledges throughout both the Salish Sea and the Fraser River watershed. From the vantage point afforded by this particular combination of perspectives, the social life of sockeye demonstrates that the work of fisheries biologists in B.C. has always been entangled with, responsive to, and supported by, the commercial fishery, its needs, priorities, and interests, as well as those of the provincial and federal governments more broadly. In this context, the centrality of the commercial fishing perspective in Cohen's life-cycle overview was not so much a conscious choice as it was a reflection of more widely-held beliefs concerning the nature of the relationship between technoscience and place – namely, that technoscientific expertise is capable of rendering moot the particulars of place.

While Cohen concludes his life-cycle overview by citing McKinnell et al.'s technical report in proposing to divide the Fraser River sockeye life-cycle into "12 sequential habitats", and in highlighting the importance of ensuring that "migration routes between habitats are not hindered, blocked, or made unsuitable",⁴²⁶ this approach likewise understates the various complexities and complications, anthropogenic or otherwise, which characterize the unique upstream journey of each CU. For example, according to the accompanying map,⁴²⁷ Takla-Trembleur-Stuart sockeye pass through just two distinct habitats (i.e., 11 and 12) over the course of their 1,000+ km in-river journey to their spawning grounds. This suggests that the typical upriver journey of Fraser River sockeye is largely continuous and uninterrupted. Habitat 5, meanwhile, is represented by the juvenile outmigration route – depicted on the accompanying map as a large, continuous, curved arrow beginning at the mouth of the Fraser River and ending at Haida Gwaii. This gives no indication that juvenile sockeye must swim through a gauntlet of open-net pen salmon farms *en route* to the Pacific Ocean. It could be argued, perhaps, that this reflects the uncertainty

⁴²⁵ Cohen Report, Vol. 1, p. 9

⁴²⁶ Cohen Report, Vol. 1, p. 15

⁴²⁷ Cohen Commission Exhibit #1291, "Cohen Commission Technical Report 4 - Marine Ecology - Feb 2011 - CCI001134", p. 10. This technical report contains a higher-resolution version of this map than the reproduction which appears in Cohen's life-cycle overview.

surrounding the interactions between wild and enhanced Pacific salmon on the one hand, and farmed Atlantic salmon on the other. No such caution is in evidence, however, in the depictions of Habitats 6 through 9 in the accompanying map, which presents an image of the movements of Fraser River sockeye salmon in the Pacific Ocean which overstates what is known about the same.

In stark contrast, the social life of sockeye—a mosaic that was partially constructed using Cohen’s own sources—shows that humans have wiped out some sockeye populations and ‘enhanced’ several others, in addition to drastically altering many of the habitats through which these fish move over the course of their lives. This journey, which the life-cycle approach largely ignores, is as heterogeneous as it is perilous. Over the course of their migrations, Fraser River sockeye traverse a variety of habitats, almost none of which can be unproblematically described as ‘natural’ or ‘human-made’. In traversing the obstacles strewn throughout these habitats, some sockeye cooperate with humans—e.g., by traversing the Big Bar landslide via helicopter—while others—e.g., those behaving unexpectedly in the Nadina River Spawning Channel, or using the Seton Dam tailrace to cool down—may not. In this way, the social life of sockeye is not only reflective of the agency of a given CU, population, deme, or fish, it also reflects the collective agency of the humans responsible for making decisions which affect, however indirectly, these fish and the habitats they frequent.

In other words, Fraser River sockeye are affected by the cumulative impacts arising out of decisions that are not only direct, immediate, and delineable—such as damming the Coquitlam and Alouette rivers for hydroelectric power, or not listing Cultus sockeye under the *Species at Risk Act*—but also those that are indirect, distant, and hopelessly entangled, such as the decisions which are together responsible for bringing about anthropogenic climate change. Decisions of this sort are not self-evident or inevitable, of course, but instead represent the outcome of uneven political processes which disproportionately privilege some perspectives while minimizing others. The social life of sockeye consciously aims to bring these contingencies and inequities to the fore. Cohen’s life-cycle approach, by contrast, relegates these contingencies and inequities to peripheral discussions and supplementary materials, suggesting in the process that the sources of controversy identified in the previous chapter constitute background noise which precludes an adequate understanding of the decline of sockeye, rather than representing fundamental prerequisites to acquiring such an understanding.

Finally, if Cohen’s life-cycle approach is defined by a handful of physiological transformations that are only loosely connected to the particulars of place, the social life of sockeye is characterized by myriad social transformations which derive meaning from the

particulars of the places through which these fish travel. For coastal Indigenous communities like the Haítzaqv of Campbell Island, for instance, the ability to fish commercially for Fraser River sockeye means independence from a federal government responsible for committing grave injustices against them, and with whom they are frequently at odds. For Gary Ducommun, being unable to fish for sockeye serves as a reminder of his uncertain, liminal legal status as a Métis person. For Grand Chief Ken Malloway, fishing for sockeye is not just a way of life, it also permits him to teach about the Stó:lō people and the Ts'elxwéyeqw tribe.⁴²⁸ Chief Fred Sampson of Siska First Nation sees sockeye as his “relatives”, a bond that is strengthened by fishing for sockeye.⁴²⁹ For Chief William Charlie of Sts'ailes First Nation, sockeye represent “peace of mind”, and the act of fishing for sockeye is “medicine” which helps him to manage the stresses associated with being chief.⁴³⁰ In short, Fraser River sockeye can also be understood as itinerant boundary objects, controversial salmon, or—following Zoe Todd (2014; 2018)—as sockeye pluralities whose value, meaning, and significance shifts as they travel from one place to the next, engaging with humans along the way.

5.2.2 – Contrasting Cartographic Portraits

In addition to the differences discussed above, the social life of sockeye and the life-cycle of sockeye are both associated with cartographic portraits which differ in several important ways.

The social life of sockeye is associated with a cartographic portrait (Figure 40) that is not only messy, flawed, and incomplete, but also difficult to read, and—from this vantage point, especially—harder still to understand. This is a cartographic portrait which consists of so many overlapping layers, unique icons, hand-drawn lines and polygons that, even with the aid of a comprehensive legend, it would still appear intimidatingly complex. This map depicts the migratory routes of Fraser River sockeye as being embedded in, and occasionally obscured by, a complex political-economic landscape. This map also intentionally plays with notions of temporality.⁴³¹ This blurring of temporalities reflects not only the four- or five-year lifespan of most Fraser River sockeye, but also the great distances they travel during that period, in addition to highlighting the enduring effects of ecological catastrophes. This does, however, also result in the loss of some measure of complexity, as temporal blurring flattens out the differences between run-timing groups, in addition to smoothing out the cyclic variations exhibited by some sockeye populations. Nevertheless, the resulting cartographic portrait, with its various features, flaws, and

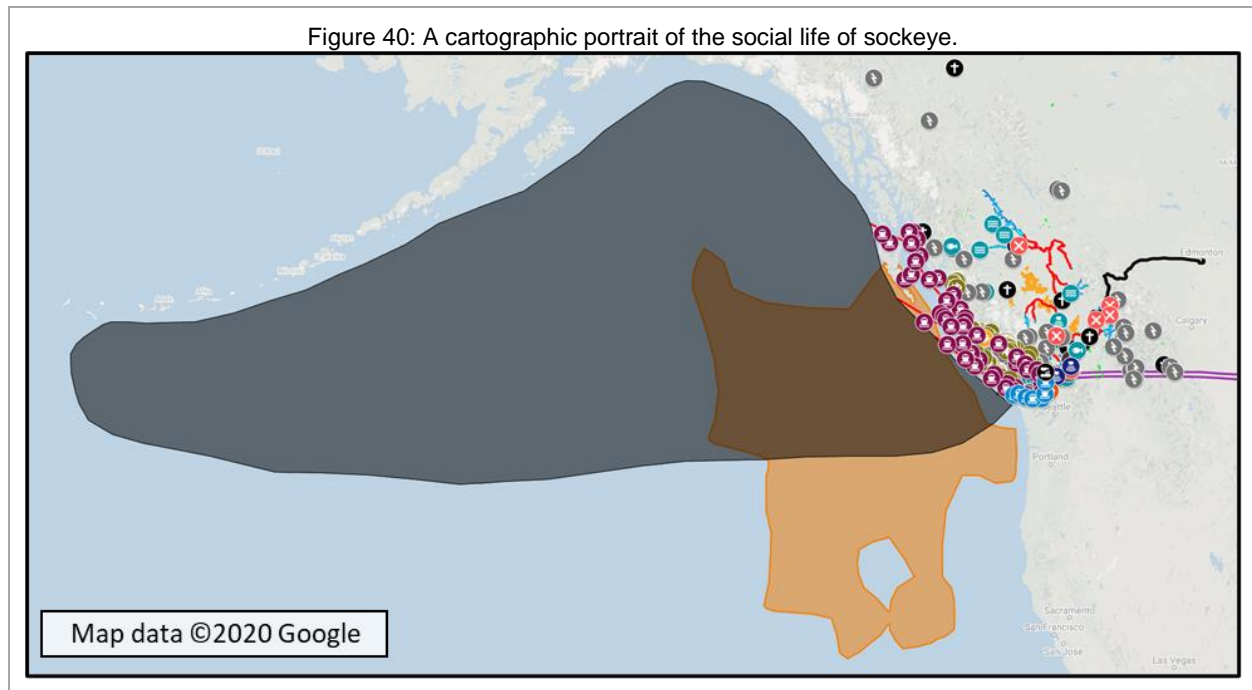
⁴²⁸ Interview with Grand Chief Ken “Wileleq” Malloway, 22-August-2017

⁴²⁹ Cohen Commission Evidentiary Hearing Transcript, 14-Dec-2010, pp. 7-8

⁴³⁰ Cohen Commission Evidentiary Hearing Transcript, 13-Dec-2010, pp. 35-37

⁴³¹ For example, Indian Residential Schools appear in their historic locations, reflecting their continued influence over the B.C. Colonialscape. The Blob, meanwhile, is represented as it appeared in early 2015. Salmon farms are situated based on their 2016 locations, and the wildfires depicted are from 2017.

complications, is also one which reflects the messiness and complexities which characterize the social life of sockeye underlying it.



Cohen’s life-cycle approach is associated with two cartographic portraits (Figure 41) that, in addition to being featured in his life-cycle overview, also appear immediately following the front matter in all three volumes of the Cohen Report. The first life-cycle portrait appears to situate the various rearing lakes utilized by sockeye salmon in the Fraser River watershed. In contrast to the social-life portrait, which only depicts the parts of the river frequented by sockeye, this map appears to reveal the full extent of the Fraser River and its many tributaries. This portrait does not, however, include depictions of dammed tributaries like the Coquitlam or Alouette rivers. Similarly, this portrait does not indicate where sockeye actually spawn prior to travelling to rearing lakes. Interestingly, moreover, many sockeye rearing lakes are missing. Included in this portrait are the eight largest rearing lakes,⁴³² which together “account for about 80 percent of the rearing capacity for Fraser sockeye”,⁴³³ as well as the Fraser, Bowron, Seton, Anderson, Lillooet, and Cultus lakes. Inexplicably, the Raft and Horsefly rivers are listed here as rearing lakes, while 11 lakes⁴³⁴ with middling juvenile-rearing capacities are not even identified as sockeye rearing lakes. This would seem, once more, to reflect the primacy of the commercial fishing perspective – or, perhaps a broader sense of importance attached to notions of productivity and efficiency.

⁴³² That is, the Stuart, Shuswap, Quesnel, Francois, Takla, Harrison, T̓silhqox Biny (Chilko), and Adams lakes.

⁴³³ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 29

⁴³⁴ That is, the Pitt, Chilliwack, Nahatlatch, Kamloops, North Barriere, Momich, Mara, Mabel, Little Shuswap, Taseko, and Trembleur lakes.

Figure 41: Cartographic portraits associated with the life-cycle of sockeye.

[Copyrighted images removed]

See Cohen Report Vols 1-3, pp. 3-4 (PDF pagination)

Cohen's second life-cycle portrait, a modified version of the map included with McKinnell et al.'s technical report, indicates that compartmentalization and simplification are key to understanding Fraser River sockeye. After all, even though Cohen's first portrait provides no indication as to where sockeye spawn or how they reach their respective rearing lakes, it does offer a detailed depiction of the Fraser River and its many tributaries. Cohen's second life-cycle portrait appears to address this issue by taking a broader perspective in depicting the life-cycle of Fraser River sockeye as a series of migrations, but this comes at the cost of a less detailed rendering of the Fraser River and its watershed. This second portrait also exaggerates what is known about the movements of Fraser River sockeye in the Pacific Ocean by simplifying the map on which it was based. McKinnell et al.'s original map,⁴³⁵ flawed and incomplete though it may be (as discussed above), suggests that sockeye travel through 12 distinct, sequential habitats over the course of their life cycles. Thus, the numbered arrows on McKinnell et al.'s original map are supposed to represent habitat changes. In the second life-cycle portrait, however, these numbers have been removed, along with the accompanying reference to habitat changes. What remains is an oversimplified cartographic portrait which reduces the complexities, contingencies, and uncertainties which characterize the life-cycle of Fraser River sockeye to a circuit of 15 arrows.

It could be argued, perhaps, that oversimplifications of this sort were necessary in producing the Cohen Report, the audience for which surely included many non-experts who may have been unfamiliar with the life-cycle of Fraser River sockeye. The experts, on this view, would surely recognize this second life-cycle portrait for what it is – “a lovely work of fiction”, as David

⁴³⁵ Cohen Commission Exhibit #1291, “Cohen Commission Technical Report 4 - Marine Ecology - Feb 2011 - CCI001134”, p. 10

Welch put it during his expert-witness testimony.⁴³⁶ Interestingly, however, the DFO would later reproduce this map in a Canadian Science Advisory Secretariat (CSAS) research document, citing “Cohen 2012” in doing so (Grant, et al., 2018, p. 10). In this context, the Cohen Report appears to be a black box. That is, the completion of the Cohen Report would seem to have generated technoscientific knowledge—i.e., in the form of Cohen’s second cartographic portrait—detached from the messy, uncertain negotiations which gave rise to it.

Mirroring the two cartographic portraits which appear at the fore of all three volumes of the Cohen Report are two additional cartographic portraits appearing before the back cover.⁴³⁷ The first of these peripheral cartographic portraits situates the Fraser River basin in the province of B.C. more broadly, in addition to providing the locations of a number of municipalities. Appearing alongside these municipalities are a smattering of unlabelled purple marks, indicating the locations of First Nations reserves in B.C. That many First Nations have special relationships with, and unique perspectives on, Fraser River sockeye is nowhere in evidence here. In fact, sockeye salmon are depicted nowhere on this map. Instead, this cartographic portrait simply casts First Nations as residents of the Fraser River basin, along with the various municipalities situated therein.

The second of these peripheral cartographic portraits simply provides a more detailed look at the Fraser River basin, as well as the municipalities and First Nations reserves located therein. And, while both portraits illustrate that many First Nations reserves are situated along the Fraser River, especially downstream of Lillooet, this is meaningless in the absence of the requisite context. Thus, whereas the cartographic portraits appearing at the fore of the Cohen Report depict Fraser River sockeye from the perspective of fisheries biology, those appearing at the end of the Cohen Report merely acknowledge the existence of First Nations reserves. Simply put, Indigenous perspectives on sockeye are nowhere in evidence in the cartographic portraits sandwiching all three volumes of the Cohen Report.

5.3 – Summary and Conclusion

My aim in this chapter was to address the following question: What salmon controversies are revealed through the social-life of sockeye, and how do they compare to those depicted in the Cohen Report’s overview of the life-cycle of sockeye?

In order to address this question, I followed each CU of Fraser River sockeye from their spawning grounds to the Pacific Ocean and back again, pausing at numerous junctures along the way to consider what Cohen’s life-cycle overview has to say, if anything, about the various

⁴³⁶ Cohen Report, Vol. 1, p. 13

⁴³⁷ Cohen Report, Vol. 1, PDF pp. 719-720; Vol. 2, PDF pp. 233-234; and Vol. 3, PDF pp. 230-231

encounters which characterize the lives of these controversial fish. For encounters not addressed in the Cohen Report's life-cycle overview, I considered Commissioner Cohen's own sources of evidence, as well as a number of additional primary and secondary sources. Thus, in the process of constructing a portrait of the social life of sockeye, I identified a number of critical gaps in the Cohen Report's overview of the life-cycle of sockeye.

Upon considering these gaps, I suggested that whereas the social life of sockeye reveals the existence of a plurality of controversial salmon, the Cohen Report's depiction of the life-cycle of sockeye minimizes or glosses over the vast majority of these controversies. In addition, upon comparing and contrasting the cartographic portraits associated with both the social-life and life-cycle of sockeye, I suggested that the Cohen Report appears to be a black box. In the next chapter, I endeavour to open this black box.

CHAPTER 6 – COHEN'S BLACK BOX

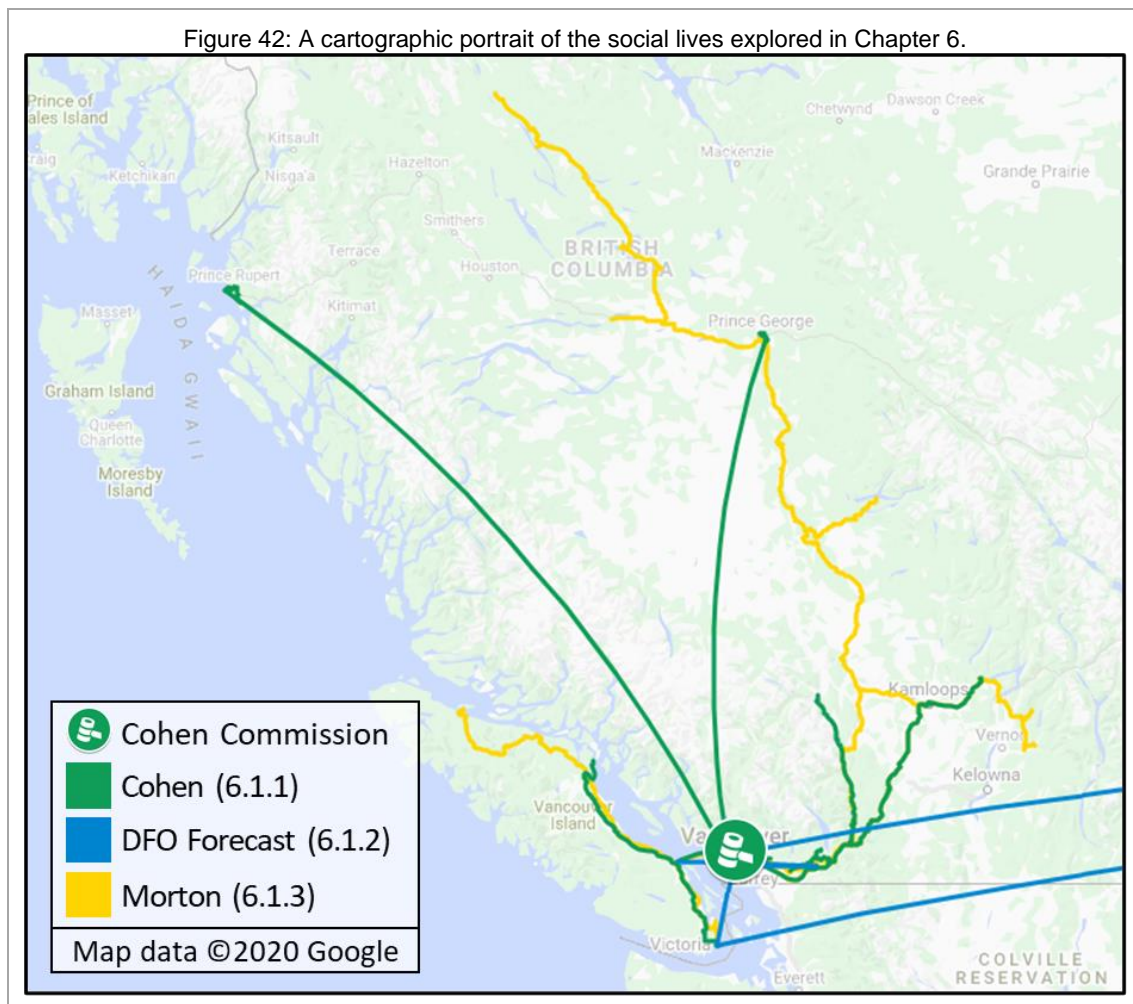
"In a spacious room in Federal Court in downtown Vancouver, the commission Prime Minister Stephen Harper appointed to inquire into the decline of sockeye salmon proceeds with judicial decorum. Often, 20 or more lawyers are present, but the proceedings unfold with remarkably little legal conflict. Although there are occasional objections, for the most part the lawyers don't argue, even though they are representing groups that are at odds over fisheries management. This is in keeping with the collegial approach that British Columbia Supreme Court Justice Bruce Cohen urged at the start of the hearings. But behind the scenes things have not been nearly so congenial."

—Mark Hume (2011b) for the *Globe and Mail*

I aim in this chapter to address the following research question: What factors contributed to the (de)legitimation of particular understandings of controversial salmon during the Cohen Commission?

In order to address this question, I follow Commissioner Bruce Cohen, the DFO's 2009 pre-season sockeye forecast, and Alexandra Morton through the Cohen Commission. In this chapter, which contains three sections, I combine these perspectives to explore the contours of the sockeye controversy before examining the Cohen Report's blueprint for closure.

Figure 42: A cartographic portrait of the social lives explored in Chapter 6.



6.1 – The Social Life of a Commission of Inquiry

In November 2009, the Government of Canada issued Order in Council 2009-1860, establishing the Cohen Commission, and appointing B.C. Supreme Court Justice Bruce Cohen as its commissioner. This Order in Council also included Terms of Reference (ToR) outlining Cohen's mandate. The ToR, as Cohen explains near the outset of his final report, directed him, first, to conduct his investigation "with the overall aim of respecting conservation of the sockeye salmon stock and encouraging broad cooperation among stakeholders."⁴³⁸ Second, the ToR directed Cohen to "consider the policies and practices of the [DFO] with respect to the sockeye salmon fishery in the Fraser River."⁴³⁹ Third, the ToR tasked Cohen with making "independent findings of fact" regarding "the causes for the decline of Fraser River sockeye", as well as the "current state of Fraser River sockeye salmon stocks and the long term projections for those stocks."⁴⁴⁰ Fourth, and finally, the ToR directed Cohen to "develop recommendations for improving the future sustainability of the sockeye salmon fishery in the Fraser River."⁴⁴¹

6.1.1 – The Social Life of a Commissioner

6.1.1.1 – Cohen Builds a Network

Immediately following his appointment, Cohen set about constructing a network. To that end, Cohen hired Brian Wallace as Senior Commission Counsel, Keith Hamilton as policy counsel, Leo Perra as executive director, and Cathy Stooshnov as director of finance and administration. Cohen also hired a communications director, office staff, and a team of lawyers.⁴⁴² Cohen depended on Brian Wallace and his team (Commission Counsel) not just to manage "the substantive work of the Commission", but also to "handle all aspects of the Inquiry."⁴⁴³ In effect, Commission Counsel functions as "an extension of the commissioner" (Ratushny, 2009, p. 220). Accordingly, Cohen created a set of Rules for Procedure and Practice (RPP). The RPP establishes, among other things, that Counsel "have the primary responsibility for representing the public interest."⁴⁴⁴ The RPP does not, however, offer a definition of 'the public interest.'

In looking to establish a physical office space for the Commission, Cohen directed his staff to target vacant office suites in downtown Vancouver which offered "easy access to transportation corridors", in addition to being situated "close to suitable hearing-room facilities."⁴⁴⁵ On February 1, 2010, Cohen and his staff moved into an office on the 28th floor of the Scotia Tower in downtown Vancouver. Located at 650 West Georgia Street in downtown Vancouver, Scotia Tower is

⁴³⁸ Cohen Report, Vol. 1, p. 3

⁴³⁹ Cohen Report, Vol. 1, p. 3

⁴⁴⁰ Cohen Report, Vol. 1, p. 3

⁴⁴¹ Cohen Report, Vol. 1, p. 3

⁴⁴² Cohen Report, Vol. 3, p. 115

⁴⁴³ Cohen Report, Vol. 3, p. 119

⁴⁴⁴ Cohen Commission Rules for Procedure and Practice (as amended 20-Apr-2011), p. 2

⁴⁴⁵ Cohen Report, Vol. 3, p. 117

connected via an underground concourse to the nearby CF Pacific Centre, an upscale mall which houses the federal courthouse where the vast majority of the Commission's evidentiary hearings would be held.

To guide the Commission's early work, Cohen adopted a set of principles designed for the Walkerton Inquiry, a commission of inquiry tasked in the early 2000s with investigating the contamination of the drinking water supply of a small Ontario town.⁴⁴⁶ In seeking to emulate the Walkerton Inquiry's approach, Cohen hired David Levy, a fisheries biologist, to serve as the Commission's fisheries research consultant. In his role, Levy was tasked with "coordinat[ing], review[ing], and interpret[ing] relevant and current research; manag[ing] the Commission's research projects; and provid[ing] briefings for [Cohen] and Commission counsel."⁴⁴⁷ On Levy's advice, Cohen also appointed "six prominent fisheries experts [...] and two practitioners"⁴⁴⁸ with extensive experience in fisheries-related and science research" to serve as the Commission's Science Advisory Panel (SAP).⁴⁴⁹ Levy and the SAP defined for Cohen and his Counsel the various fisheries science issues implicated by the decline of sockeye,⁴⁵⁰ in addition to identifying those considered to be experts on these issues. Cohen and his Counsel commissioned many of these experts to write technical reports for, and/or to offer expert-witness testimony to, the Commission. Thus, even though Cohen went on to abandon the SAP—citing concerns, raised by "some participants", that it was advising him "behind closed doors"⁴⁵¹—it had already shaped the Commission's approach in two crucial respects – that is, by identifying key issues to be investigated, and associating those issues with particular experts.

As 'expert' is defined neither in the text of the Cohen Report, nor in the glossary of terms provided along with its first volume,⁴⁵² it is not immediately apparent how Cohen or his Counsel qualified the term. Accordingly, I looked to Ed Ratushny's 2009 book *The Conduct of Public Inquiries*, a book consulted by Cohen and his Counsel throughout the Commission's proceedings.⁴⁵³ In speaking to the role played by witnesses in general, Ratushny (2009) explains that "[a] witness is expected to testify as to facts and not to draw inferences, opinions, or beliefs from those facts", as that is "the role of the commissioner" (p. 322). Only expert witnesses—i.e.,

⁴⁴⁶ Cohen Report, Vol. 3, p. 118

⁴⁴⁷ Cohen Report, Vol. 3, p. 121

⁴⁴⁸ In a discussion paper dated 3-June-2010, Cohen identifies the "six prominent fisheries experts" as Carl Walters, Brian Riddell, Paul LeBlond, John Reynolds, Patricia Gallagher, and Thomas Quinn. He does not, however, identify the two practitioners (Cohen Commission Discussion Paper, 3-June-2010, p. 13).

⁴⁴⁹ Cohen Report, Vol. 3, p. 121

⁴⁵⁰ Cohen Commission Discussion Paper, 3-June-2010, pp. 6-13

⁴⁵¹ Cohen Report, Vol. 3, p. 121

⁴⁵² Cohen Report, Vol. 1, pp. 679-685

⁴⁵³ Cohen Report, Vol. 3, p. 139. In his acknowledgements, Cohen noted that Commission Counsel "benefited from conversations with Professor Ratushny", suggesting that Ratushny also played a direct role in guiding Cohen and his Counsel over the course of their investigation.

those “qualified by some special skill, training, or experience” (p. 323)—are exempt from this prohibition. Commissions of inquiry should only seek expert opinions, however, when the underlying subject matter “truly requires expertise” (p. 323). In such cases, expert opinions must be rooted in “a recognized discipline, and not within the ‘common stock of knowledge’ of the public.” (p. 323). In other words, the Commission’s treatment of technoscientific expertise is largely consistent with Harry Collins & Robert Evans’s (2002) taxonomic model of the same.

Having defined the boundaries of expertise in relation to a number of fisheries-related issues, then, Cohen and his Counsel set about enrolling peripheral actors, and situating them in relation to the core-set of experts. To that end, in February 2010, Cohen and his Counsel invited “individuals and organizations with an interest in the mandate of the Commission [...] to apply for standing in the inquiry.”⁴⁵⁴ Upon receiving 50 applications for standing, Cohen and his Counsel grew concerned that “the hearings process could become unwieldy.”⁴⁵⁵ In aiming to render the Commission’s work “more manageable and efficient”, Cohen and his Counsel encouraged applicants to consider sharing “a grant of standing” or forming a “participant coalition” with others.⁴⁵⁶ In later seeking to justify this approach, Cohen suggested that “the public interest favours an efficient and workable process.”⁴⁵⁷

In keeping with this conception of the public interest, Counsel invited select applicants to attend an application hearing on March 23, where they would be given an opportunity to “provide [Cohen] with more information on the nature of their direct and substantial interest in the issues within [the Commission’s] terms of reference.”⁴⁵⁸ On March 26, the second day of application hearings, Senior Counsel Brian Wallace lamented that the Commission’s work would prove too “lengthy, unwieldy and costly” with so many participants.⁴⁵⁹ Wallace implored applicants to form coalitions “solely for the purpose of representing their interests at this inquiry.”⁴⁶⁰

On April 14, Cohen granted standing to 20 participants or participant coalitions, including several industry groups along with the Pacific Salmon Commission, the Government of Canada, and the Government of B.C., each of whom were each granted individual standing on account of their “direct and substantial interest” in the Commission’s inquiry.⁴⁶¹ Indigenous communities and intertribal organizations, meanwhile, were forced to form participant coalitions. For the Haíłzaqv (Heiltsuk), the Commission’s emphasis on combining applicants into participant coalitions proved

⁴⁵⁴ Cohen Report, Vol. 3, p. 132

⁴⁵⁵ Cohen Report, Vol. 3, p. 132

⁴⁵⁶ Cohen Report, Vol. 3, p. 132

⁴⁵⁷ Cohen Commission Ruling, 10-May-2010, p. 2

⁴⁵⁸ Cohen Commission Application Hearing Transcript, 23-Mar-2010, p. 1

⁴⁵⁹ Cohen Commission Application Hearing Transcript, 26-Mar-2010, p. 1

⁴⁶⁰ Cohen Commission Application Hearing Transcript, 26-Mar-2010, p. 3

⁴⁶¹ Cohen Commission Ruling, 14-Apr-2010, p. 3. For a full list of participants and participant coalitions, see Cohen Report, Vol. 3, p. 196.

to be problematic. The Haítzaqv Tribal Council (HTC) was placed into a participant coalition with commercial, Indigenous fishers James Walkus and Chief Harold Sewid, as well as the Laich-Kwil-Tach Treaty Society (LKTS) and the Aboriginal Aquaculture Association (AAA). Though Cohen acknowledged the HTC's opposition to the proposed participant coalition in his Ruling on Standing, this did not ultimately impact his decision:

Notwithstanding the fact that the Heiltsuk have not yet agreed, I am satisfied that the interests of these applicants align to such an extent that it is appropriate to direct that they share in a single grant of standing. In so directing, I am mindful of the position taken by the Heiltsuk.⁴⁶²

"If a joint participant concludes it is necessary to seek to participate differently", Cohen added, "that joint participant may apply for directions."⁴⁶³

Rather than applying for directions, the HTC petitioned for "full participant status in the commission", citing the existence of "a direct conflict between themselves and other members of their participant group on the topic of aquaculture."⁴⁶⁴ Chief Harold Sewid, the AAA, and the LKTS each expressed support for the HTC's application, noting in the process that "separate standing would make good practical sense and would avoid existing and potential conflicts within the standing group."⁴⁶⁵ In describing the rationale for his initial ruling, however, Cohen claimed that he was "unaware of the Heiltsuk's present concern until after [his] Ruling", as the HTC "did not mention their opposition to aquaculture in their detailed original application for standing."⁴⁶⁶ Despite going on to concede that "the Heiltsuk now find themselves in a situation where there is a conflict" with respect to aquaculture that is neither "hypothetical, contingent, or unrealized" and which "must be addressed," Cohen was "not persuaded" that this extended to "stewardship issues."⁴⁶⁷ Even if the HTC's traditional ecological knowledges are "distinct and different from those of their joint participants", Cohen added, this is not sufficient to justify granting them individual standing.⁴⁶⁸ Cohen treated this problem principally as a technical, legal one, focusing largely on the potential that the HTC's lawyer might be "asked to cross-examine and make submissions on two sides of an issue."⁴⁶⁹ Accordingly, though Cohen ruled that the HTC would be permitted to "participate by way of separate counsel specifically for evidentiary hearings pertaining to aquaculture", he stopped short of granting them individual standing.⁴⁷⁰ Similarly, despite

⁴⁶² Cohen Commission Ruling, 14-Apr-2010, p. 26

⁴⁶³ Cohen Commission Ruling, 14-Apr-2010, p. 26

⁴⁶⁴ Cohen Commission Ruling, 10-May-2010, pp. 1-2

⁴⁶⁵ Cohen Commission Ruling, 10-May-2010, p. 2

⁴⁶⁶ Cohen Commission Ruling, 10-May-2010, p. 2

⁴⁶⁷ Cohen Commission Ruling, 10-May-2010, p. 3

⁴⁶⁸ Cohen Commission Ruling, 10-May-2010, p. 3

⁴⁶⁹ Cohen Commission Ruling, 10-May-2010, p. 3

⁴⁷⁰ Cohen Commission Ruling, 10-May-2010, p. 4

conceding on May 31 that he was, in fact, aware of the HTC's conflict with the AAA prior to issuing his ruling on standing, Cohen refused—for a third time—to grant the HTC full standing.⁴⁷¹

Finally, in a ruling dated August 23, Cohen explained that this conflict had become “a distraction from the substantive issues arising in this inquiry”, leading him to “[r]eluctantly” concede that this participant-coalition was “not working.”⁴⁷² As a result, Cohen finally agreed to “sever the Heiltsuk from this participant group”, and to grant them “individual standing as a participant.”⁴⁷³ Cohen went on to lament having to “impair the efficiency of the commission by adding a further participant” before reiterating his expectation that “all participants [will] pursue the issues of significance to them efficiently, working with other participants wherever possible.”⁴⁷⁴

Having finally succeeded in drawing a boundary to contain each of these participant-coalitions, Commission Counsel set about enrolling witnesses to serve as the Commission's core and contributory experts. To that end, building on the list of fisheries-related issues identified by the ToR, David Levy, and the SAP,⁴⁷⁵ Commission Counsel compiled a list of central themes and “developed a hearing schedule for examining them.”⁴⁷⁶ For each of these hearings, Counsel identified prospective expert- and non-expert witnesses, and invited participants to suggest additional candidates.⁴⁷⁷ Prior to being selected, potential witnesses were interviewed by “a Commission counsel team.”⁴⁷⁸ Though most of these interviews were held in the Commission's office in downtown Vancouver, Counsel met some “interviewees in their home community” and interviewed others through “video-conferencing facilities.”⁴⁷⁹ Of the 380 prospective witnesses interviewed by Counsel, only 179 would ultimately be called to testify before the Commission. Of those called to testify before the Commission, only 56 were ultimately qualified as “experts in a field of study or work” at one or more hearings.⁴⁸⁰ The remaining 123 witnesses were either called to testify on an issue which does not “truly [require] expertise” (Ratushny, 2009, p. 323), or they were deemed to have “contributory expertise” (Collins & Evans, 2002, p. 254) with respect to the subject of the hearing.

6.1.1.2 – Cohen Surveys the ‘Common Stock of Knowledge’

As Commission Counsel recruited experts to populate the inner regions of the Commission's target-diagram, Cohen and a small contingent of Commission staff prepared to host a series of

⁴⁷¹ Cohen Commission Ruling, 31-May-2010, p. 1

⁴⁷² Cohen Commission Ruling, 23-August-2010, p. 1

⁴⁷³ Cohen Commission Ruling, 23-August-2010, p. 1

⁴⁷⁴ Cohen Commission Ruling, 23-August-2010, p. 1

⁴⁷⁵ Cohen Commission Discussion Paper, 3-June-2010, pp. 6-13

⁴⁷⁶ Cohen Report, Vol. 3, p. 127

⁴⁷⁷ Cohen Report, Vol. 3, p. 129

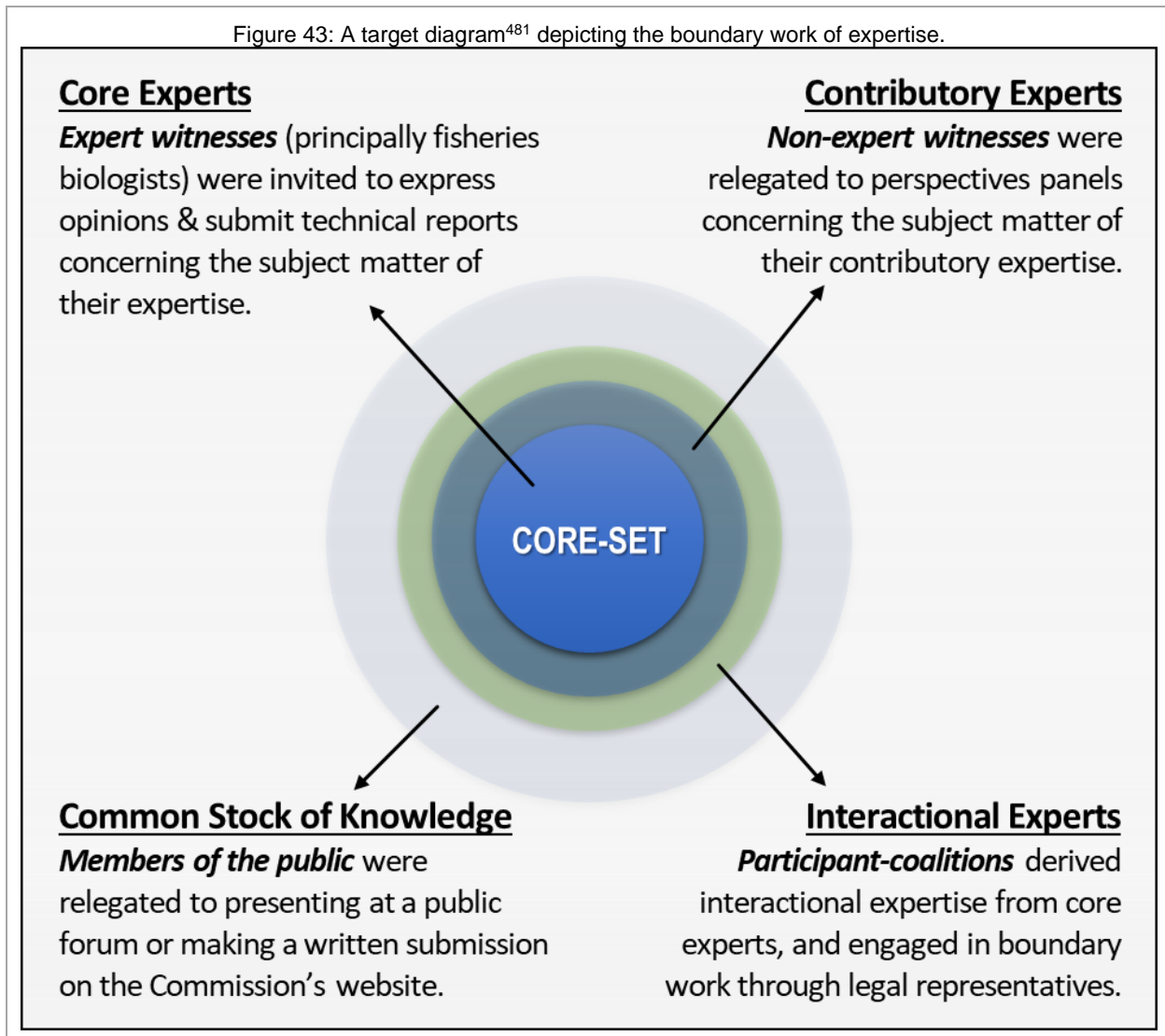
⁴⁷⁸ Cohen Report, Vol. 3, p. 129

⁴⁷⁹ Cohen Report, Vol. 3, pp. 129-130

⁴⁸⁰ Cohen Report, Vol. 3, pp. 129-131

public forums, while conducting site visits along the way, with the aim of securing the cooperation of those situated in the outer-most ring (Figure 43).

Figure 43: A target diagram⁴⁸¹ depicting the boundary work of expertise.



In March 2010, the Cohen Commission invited “members of the public” to “express their views” on the decline of sockeye via the Commission’s website.⁴⁸² This was in keeping with the Commission’s RPP, which stipulated that “[a]ny member of the public [...] may make a submission, in writing, to the commission dealing with any matter related to the commission’s mandate.”⁴⁸³ In April, when Cohen issued his ruling on standing, he suggested that unsuccessful applicants might “more appropriately” express their “comments and views [...] through a written public submission.”⁴⁸⁴ Interestingly, however, Commissioner Cohen was not obliged to consider any of

⁴⁸¹ Adapted from Collins & Evans (2002) and Collins (2014).

⁴⁸² Cohen Report, Vol. 1, p. 5

⁴⁸³ Cohen Commission Rules for Procedure and Practice (as amended 20-Apr-2011), p. 6

⁴⁸⁴ Cohen Commission Ruling, 14-Apr-2010, p. 31

these submissions. Indeed, the RPP only stipulates that Cohen “may consider” public submissions in formulating his findings and recommendations.⁴⁸⁵ This suggests, among other things, that the principal aim of the Commission’s engagement with the ‘common stock of knowledge’ of the public was not to collect evidence concerning the decline of sockeye, but to neutralize contention and manage controversy.

It was in this context that, on August 12, Cohen—along with “one or two Commission staff, one media representative, and two video-recording personnel”⁴⁸⁶—headed to the Fraser Valley to conduct his first four site visits. First, Cohen visited a “[t]raditional native fishery” at Cheam Beach,⁴⁸⁷ where Councillor June Quipp of Cheam First Nation presented him with an eagle feather, which represents “the importance of speaking the truth.”⁴⁸⁸ Second, Cohen headed north to Agassiz, where he visited a closed-containment salmon farm operated by Swift Aquaculture. Third, Cohen crossed the Harrison River and Nicomen Slough *en route* to the Inch Creek Hatchery. Fourth, and finally, Cohen visited the FRP’s hydroacoustic station at Mission. Interestingly, though photographs taken from these site visits appear throughout the Cohen Report,⁴⁸⁹ the visits themselves are not described in any level of detail. Videos recorded during these visits were “made available to any participant who wanted a copy”, but not to members of the public.⁴⁹⁰

During this same period, Cohen and his staff prepared to host the Commission’s first public forum. As with the Commission’s site visits, these public forums are not described in detail in the Cohen Report. Cohen does, however, describe these public forums in broad, general terms. In preparation for each public forum, Commission staff arranged the available seats in a circle. Inside the circle, Commission staff placed a small desk from which Cohen would chair the meeting, and a podium from which the majority of speakers would deliver their presentations.⁴⁹¹ Each public forum started with “a welcome from an elder from the local First Nations community”, followed by a screening of “a short video [...] which explained [the Commission’s] mandate.”⁴⁹² After the video, Cohen invited speakers to deliver their presentations “in the order in which their materials had been received by the Commission.”⁴⁹³ Each presentation was limited to 10 minutes, though Cohen notes that some of the more “extensive presentations” were allotted additional time.⁴⁹⁴ Unlike the

⁴⁸⁵ Cohen Commission Rules for Procedure and Practice (as amended 20-Apr-2011), p. 7

⁴⁸⁶ Cohen Report, Vol. 3, p. 125

⁴⁸⁷ Cohen Report, Vol. 3, p. 125

⁴⁸⁸ Chilliwack Public Forum Summary, 29-Sept-2010, p. 1

⁴⁸⁹ Cohen Report, Vol. 1, p. 21, 86, 91, 151, 152, 182, 325, 326, 378; Vol. 2, p. 39, 41; Vol. 3, p. 125. In addition, a photo of spawning sockeye from Cohen’s Adams River site visit graces the cover of the Cohen Report.

⁴⁹⁰ Cohen Report, Vol. 3, p. 125

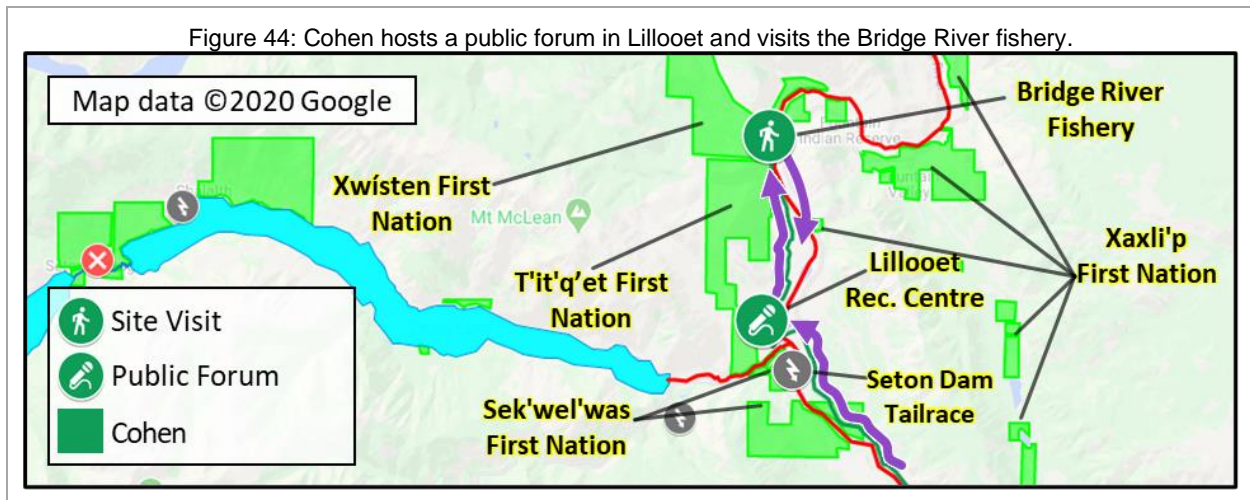
⁴⁹¹ Cohen Report, Vol. 3, p. 124

⁴⁹² Cohen Report, Vol. 3, p. 124

⁴⁹³ Cohen Report, Vol. 3, p. 124

⁴⁹⁴ Cohen Report, Vol. 3, p. 124

Commission's evidentiary hearings—which were transcribed in full—Commission staff compiled a brief summary document for each public forum, containing only the “key points” from each presentation.⁴⁹⁵



On August 18, the Commission held its first public forum in the Lillooet Recreation, Education, & Cultural Centre gymnasium. Cohen and his staff were welcomed to St'át'imc territory by Grand Chief Desmond Peters Sr. and Chief Perry Redan of Sek'wel'was (Cayoose Creek) First Nation. Then, as Chief Art Adolph of Xaxli'p (Fountain) First Nation took to the podium to deliver the first presentation of the evening, it would have been apparent that the Commission's approach to public forums was ill-suited to facilitating an appreciation for local or traditional ecological knowledges. In aiming to persuade Cohen of the “importance of salmon to St'at'imc culture”, Chief Adolph was limited by the Commission's chosen format to merely “identif[ying] important sites”⁴⁹⁶ on a PowerPoint slide, from behind a podium, in the middle of a gymnasium. In the absence of the ability to actually show Cohen how traditional ecological knowledges are connected to the particulars of place, rather than just telling him about these connections, traditional knowledge holders like Chief Adolph were placed at a considerable disadvantage by the Commission's chosen format for these public forums. In spite of these limitations, Chief Adolph explained to Cohen that “the transmission of fishing knowledge from elders to youth is an important method of enculturation for the St'at'imc.”⁴⁹⁷ Chief Adolph added that whereas commercial interests are “permitted to negatively affect salmon and their habitat on an industrial scale, First Nations are often arrested for fishing to feed their family.”⁴⁹⁸ Chief Redan later suggested in his presentation

⁴⁹⁵ Cohen Report, Vol. 3, p. 124

⁴⁹⁶ Lillooet Public Forum Summary, 18-Aug-2010, p. 1

⁴⁹⁷ Lillooet Public Forum Summary, 18-Aug-2010, p. 1

⁴⁹⁸ Lillooet Public Forum Summary, 18-Aug-2010, p. 1

that “First Nations wish to share [...] management responsibilities with DFO”,⁴⁹⁹ a sentiment echoed by most speakers at this public forum.⁵⁰⁰

The following day, Cohen visited a “First Nations fishery on the Bridge River”,⁵⁰¹ where he observed “dip net and gillnet fishing” as well as “fish drying.”⁵⁰² It could be argued, perhaps, that site visits of this sort permitted Cohen to address the issues identified above. As Cohen has nothing to say about this particular site visit in the Cohen Report, however, it is difficult to assess whether this site visit enhanced his appreciation for the inescapably local nature of traditional ecological knowledges. On the way back to Vancouver, Cohen also visited the FRP’s hydroacoustic station at Qualark.

On August 25, Cohen and his staff headed to Campbell River on Vancouver Island to preside over the Commission’s second public forum. After being welcomed to Campbell River by Sophia Hansen, Cohen heard from a total of 11 speakers in the Coast Discovery Inn’s Quadra/Cortes meeting room. Among these speakers was Wei Wai Kum Chief Russell Kwakseestahla, who suggested that “corporate ownership of the commercial fishery” and “corporate influence over the federal government” have rendered Fraser River sockeye vulnerable.⁵⁰³ Chief Kwakseestahla also expressed skepticism concerning the potential for the Cohen Commission to bring about meaningful change, noting that he has “presented to numerous past commissions, most of which [...] have been ignored by government.”⁵⁰⁴ Chief Darren Blaney of Homalco First Nation argued that First Nations must be “consulted on issues that may affect the health of wild salmon”, and called on Cohen to recommend that “the aquaculture industry transfer to closed containment technology to reduce impacts on wild stocks.”⁵⁰⁵ Fred Speck argued that wild salmon populations have been under threat ever since “the arrival of Norwegian salmon farms” in B.C.⁵⁰⁶ By sacrificing Fraser River sockeye for Norwegian farmed Atlantic salmon, Speck suggested, “Canada would be adding to its poor legacy with First Nations.”⁵⁰⁷ Cohen also heard from a number of pro-industry speakers, including Brad Boyce and Greg Gibson of Marine Harvest, Barry Milligan of Grieg Seafood, and Kevin Onclin of Badinotti Net Services, each of whom suggested that, as the industry’s fish-health experts actively manage issues like sea lice, open-net pen salmon farms pose minimal risk to Fraser River sockeye.⁵⁰⁸

⁴⁹⁹ Lillooet Public Forum Summary, 18-Aug-2010, pp. 3-4

⁵⁰⁰ Lillooet Public Forum Summary, 18-Aug-2010, pp. 1-3

⁵⁰¹ Cohen Report, Vol. 3, p. 125

⁵⁰² Interim Cohen Report (29-Oct-2010), p. 24

⁵⁰³ Campbell River Public Forum Summary, 25-Aug-2010, p. 1

⁵⁰⁴ Campbell River Public Forum Summary, 25-Aug-2010, p. 1

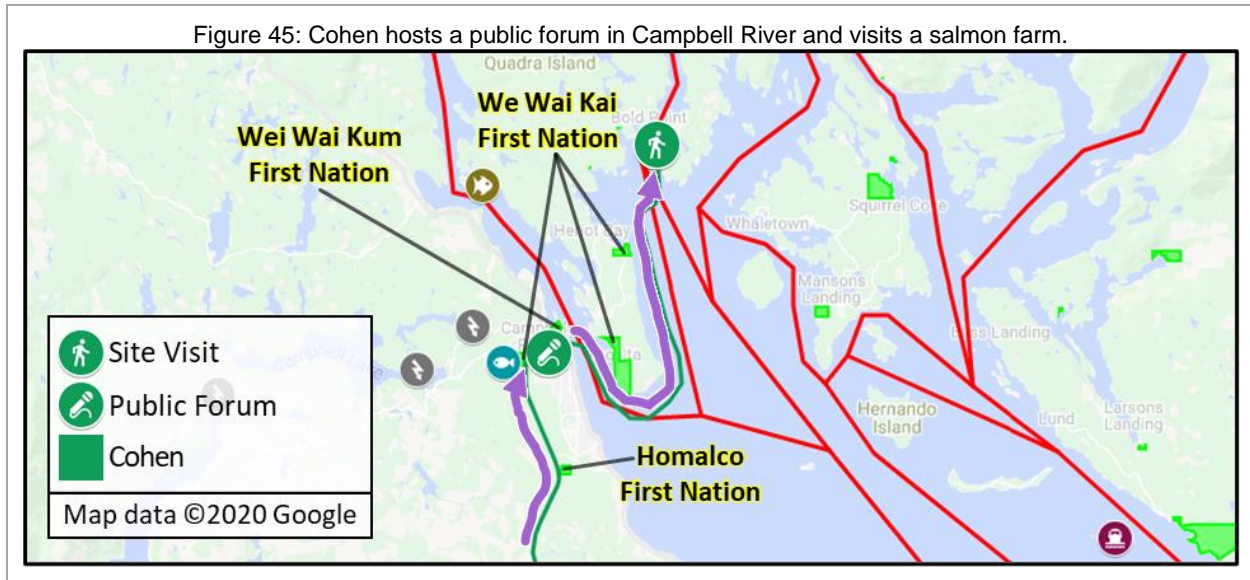
⁵⁰⁵ Campbell River Public Forum Summary, 25-Aug-2010, p. 1

⁵⁰⁶ Campbell River Public Forum Summary, 25-Aug-2010, p. 4

⁵⁰⁷ Campbell River Public Forum Summary, 25-Aug-2010, p. 4

⁵⁰⁸ Campbell River Public Forum Summary, 25-Aug-2010, pp. 2-4

The following day, Cohen visited a Marine Harvest salmon farm near Quadra Island before returning to Vancouver.



In the early morning of September 1, it is likely that Cohen headed to the Vancouver International Airport in Richmond to board a flight bound for Prince Rupert. Not long after he arrived in Prince Rupert, Cohen visited the North Pacific Cannery National Historic Site. Later that evening, Cohen and his staff hosted the Commission's third public forum in the Orca room of the North Coast Meeting and Convention Centre, where they were welcomed to Tsimshian territory by Chief Alec Campbell. In all but three of the 15 presentations which followed, it was suggested that the DFO's mismanagement of the fishery has led to the decline of sockeye in the Fraser, Skeena, and Nass rivers. These speakers criticized the DFO for its forecasting methods,⁵⁰⁹ its failure to adequately consult with First Nations, its centralized management structure,⁵¹⁰ its overdependence on Western science at the expense of due consideration for traditional ecological knowledges,⁵¹¹ and its "misguided" quota policy.⁵¹² Lax Kw'alaams fisher Stan Denis argued that the DFO's approach to "area fishing has disrupted his people's ability to fish."⁵¹³ In addition, Lax Kw'alaams councillor Stan Denis Jr. suggested that the DFO's policies favour southern fishers at the expense of those licenced to operate in northern fishing zones.⁵¹⁴

The next day, September 2, Cohen visited a Canadian Fishing Company cannery before returning to Vancouver.

⁵⁰⁹ Prince Rupert Public Forum Summary, 01-Sept-2010, p. 2

⁵¹⁰ Prince Rupert Public Forum Summary, 01-Sept-2010, p. 3

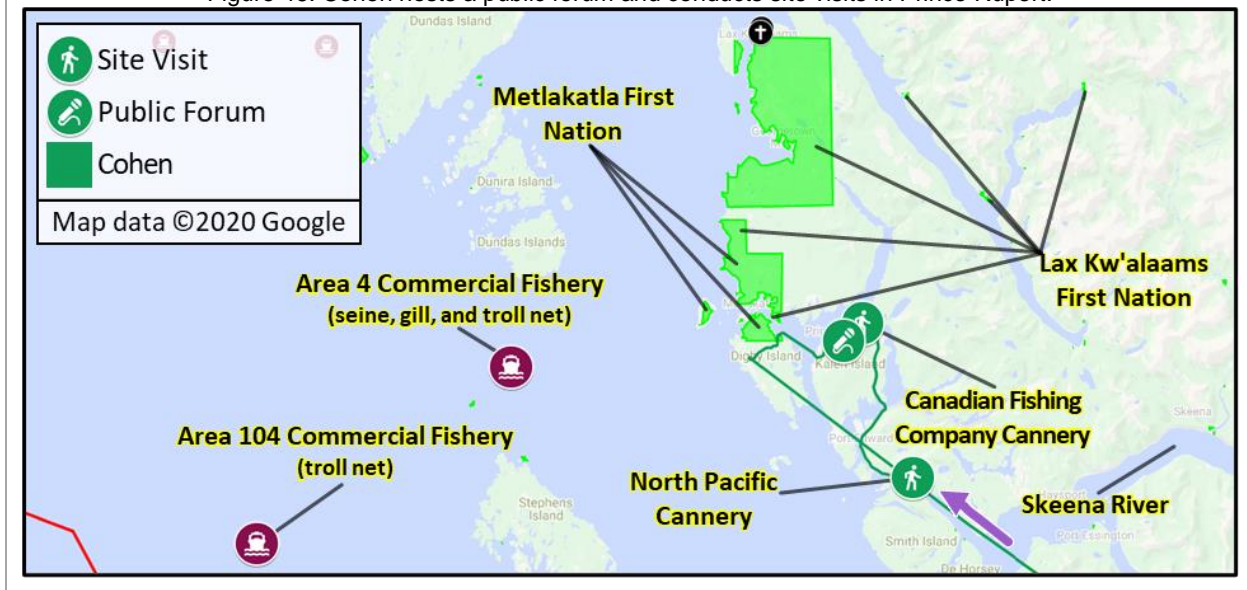
⁵¹¹ Prince Rupert Public Forum Summary, 01-Sept-2010, p. 4

⁵¹² Prince Rupert Public Forum Summary, 01-Sept-2010, p. 5

⁵¹³ Prince Rupert Public Forum Summary, 01-Sept-2010, p. 1

⁵¹⁴ Prince Rupert Public Forum Summary, 01-Sept-2010, pp. 1-2

Figure 46: Cohen hosts a public forum and conducts site visits in Prince Rupert.



On September 13, Cohen traveled to the Steveston Harbour in Richmond to visit the Gulf of Georgia Cannery museum, where he hoped to “learn about sockeye fishing gear, technology, and equipment.”⁵¹⁵ After touring the museum, Cohen visited the Steveston dock, where he observed “commercial fishers heading out for [their] openings and returning with their catches”, and noted the “joyful atmosphere [...] as the fishers and public came together to celebrate the large return of Fraser sockeye.”⁵¹⁶ Later that evening, Cohen made the short trip from Steveston Harbour to Steveston-London Secondary School, where the Commission held its fourth public forum. Cohen and his staff were welcomed to xʷməθkʷəy̓əm (Musqueam) territory by Henry Charles, who “emphasized the extent of the decline of Fraser sockeye by describing how salmon no longer jump from the water when Musqueam children walk along the Fraser River.”⁵¹⁷ Among the five presentations which followed was that of Robert Karliner, a commercial fisher, who suggested that the DFO’s 2010 pre-season forecast was “inaccurate”, leading to “chaos” among “commercial fishers at the beginning of the season.”⁵¹⁸ Karliner also suggested that “the DFO’s policies favour First Nations fishers over commercial fishers.”⁵¹⁹

On September 14, Cohen crossed the Salish Sea, likely by ferry, *en route* to the Vancouver Island Convention Centre in Nanaimo, where the Commission held its fifth public forum. Cohen and his staff were welcomed to Snuneymuxw territory by Jeff Thomas, who explained that he “grew up in the Nanaimo fishing industry” until “declining salmon returns” forced him to “find new

⁵¹⁵ Interim Cohen Report (29-Oct-2010), p. 24

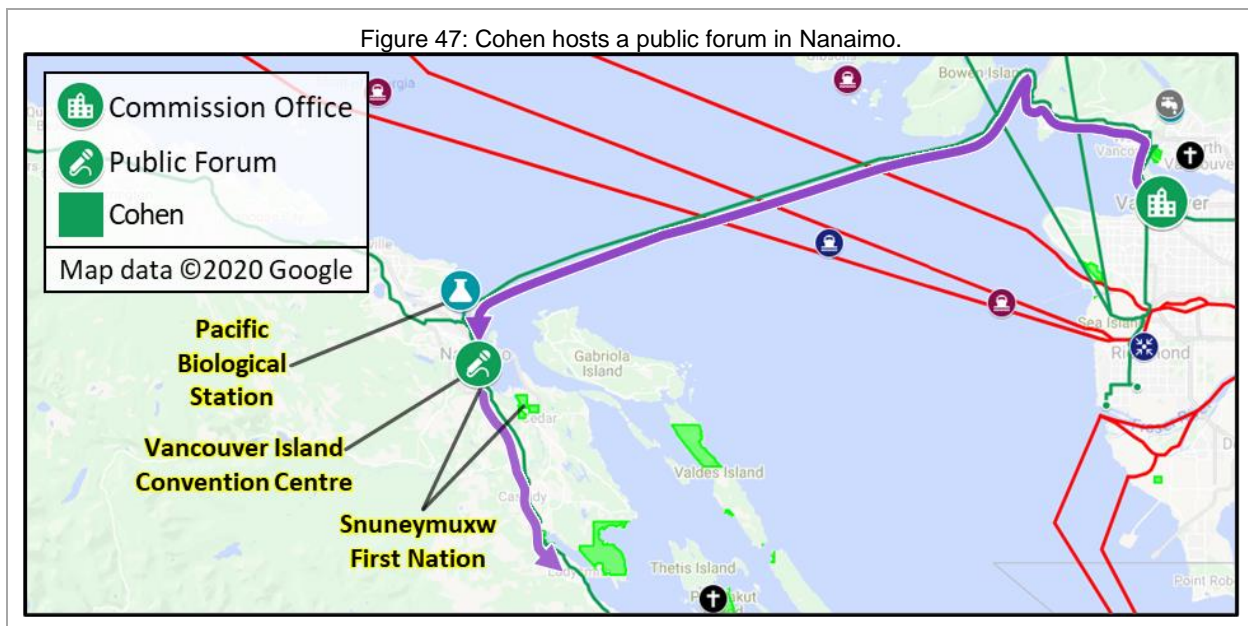
⁵¹⁶ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, pp. 3-4

⁵¹⁷ Steveston Public Forum Summary, 13-Sept-2010, p. 1

⁵¹⁸ Steveston Public Forum Summary, 13-Sept-2010, p. 1

⁵¹⁹ Steveston Public Forum Summary, 13-Sept-2010, p. 1

employment.”⁵²⁰ Fishing nevertheless remains “a way of life” for the Snuneymuxw, Thomas added, “and they wish to continue that way of life into the future.”⁵²¹ Darrell Campbell, Ahousaht First Nation’s fisheries manager, criticized the DFO for “continu[ing] to increase [fish] allocations for sport fishers [...] at the expense of First Nations, including the Ahousaht.”⁵²² Campbell went on to explain that Ahousaht First Nation “carefully monitors the fish farms operating in its territory”, and though “fish farming provides an economic benefit” for his community, he insists that “the protocol permitting its operation would be rescinded” were they to find that “it is harmful to the environment.”⁵²³



Two days later, on September 16, the Commission held its sixth public forum in the Hotel Grand Pacific in Victoria, the capital of British Columbia. Cohen and his staff were welcomed to Ləkʷəŋən territory by Elder Bob, who explained that “he belongs to the Cowichan tribe of the Coast Salish people, a people whose territory stretches south into the United States and who consider salmon to be sacred.”⁵²⁴ Included among the 13 presentations which followed was that of Chris Marks, who argued that “credible science shows a connection between open-net pen aquaculture and the decline of wild salmon stocks”, and called on the DFO “to apply the precautionary principle and mandate that fish farms be moved to closed containment systems.”⁵²⁵ Qwe'Qwa'Sot'Em Chief Harold Sewid, on the other hand, explained that he is “thankful for the arrival of aquaculture, which

⁵²⁰ Nanaimo Public Forum Summary, 14-Sept-2010, p. 1

⁵²¹ Nanaimo Public Forum Summary, 14-Sept-2010, p. 1

⁵²² Nanaimo Public Forum Summary, 14-Sept-2010, p. 1

⁵²³ Nanaimo Public Forum Summary, 14-Sept-2010, p. 2

⁵²⁴ Victoria Public Forum Summary, 16-Sept-2010, p. 1

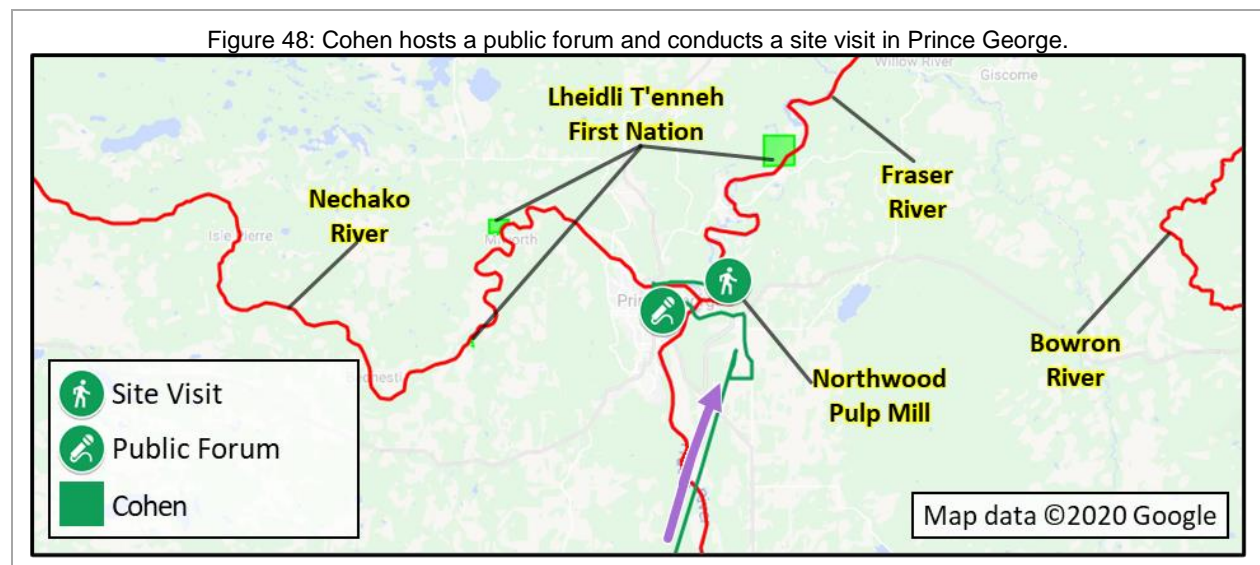
⁵²⁵ Victoria Public Forum Summary, 16-Sept-2010, p. 1

[...] faces the same environmental challenges as other coastal industries, including logging, mining, and commercial fishing.”⁵²⁶

On September 20, Cohen and his staff hosted a public forum in New Westminster’s Inn at the Quay – a hotel sited at the point where the Fraser River’s north and south arms meet. While many speakers at this public forum expressed concern regarding the impacts of open-net pen salmon farming on wild fish,⁵²⁷ some focused principally on pollution- and habitat-related issues,⁵²⁸ while still others alleged—whether directly or by implication—that Indigenous fishers regularly engage in illegal overfishing.⁵²⁹

On September 22, Cohen returned to the federal courthouse in downtown Vancouver to preside over an application hearing concerning Stan Proboszcz and Alexandra Morton’s request for Cohen to compel the production of a number of documents “relating to fish health, pathogens and disease, as well as stocking data in farmed salmon.”⁵³⁰

The next morning, September 23, Cohen boarded a plane bound for Prince George, a municipality situated at the confluence of the Fraser and Nechako rivers. After landing at the Prince George Airport, Cohen visited a pulp mill to learn about “effluent treatment.”⁵³¹



Later that evening, at the nearby Ramada Hotel, Cohen and his staff were welcomed to Lheidli T'enneh territory by Elder Carl Frederick.⁵³² The first speaker, David Loewen—whose application for standing was rejected by Cohen months earlier⁵³³—argued that the DFO needs to

⁵²⁶ Victoria Public Forum Summary, 16-Sept-2010, p. 4

⁵²⁷ New Westminster Public Forum Summary, 20-Sept-2010, pp. 1-5

⁵²⁸ New Westminster Public Forum Summary, 20-Sept-2010, pp. 2-4

⁵²⁹ New Westminster Public Forum Summary, 20-Sept-2010, pp. 1, 3-5

⁵³⁰ Cohen Commission Ruling, 8-Dec-2010

⁵³¹ Interim Cohen Report (29-Oct-2010), p. 24

⁵³² Prince George Public Forum Summary, 23-Sept-2010, p. 1

⁵³³ Cohen Commission Ruling, 14-Apr-2010, pp. 30-31

adopt an “ecosystem-based” and “precautionary” approach to managing the fishery.⁵³⁴ Peter Erickson suggested that the DFO is “unwilling” to allow First Nations’ experiences to inform its management of the fishery.⁵³⁵ Tannis Reynolds pointed to “salmon farms and the Enbridge pipeline project” as the primary threats facing sockeye, suggested that the fishery “must be managed cooperatively to ensure proper harvesting methods”, and explained that “First Nations [...] want to be part of the solution.”⁵³⁶ Geraldine Thomas-Flurer warned that the freshwater upon which Fraser River sockeye depend “is threatened by [...] tar sands development and infrastructure.”⁵³⁷ Marcel Shepert contended that Cohen and the DFO must consider not just the “scientific perspective”, but also “First Nations’ traditional ecological knowledge.”⁵³⁸ In suggesting that “communication is a serious issue in DFO management”, Anne Ketto explained that “two years ago a tailings-pond wall collapsed releasing toxins and that last spring over three million salmon smolts were found dead in the Stellako River, but DFO never reported what had happened to the local First Nations.”⁵³⁹ George M. George Sr. explained that his people were promised food fish, but they “starved”, as well as a school, but they “got a residential school.”⁵⁴⁰ George Sr. used to “boil river-water for tea, but no longer dares to do so” given the high level of pollutants in the river.⁵⁴¹

On September 29, Cohen visited the “Alouette sockeye re-anadromization project” in Maple Ridge before heading to the Coast Chilliwack Hotel in Chilliwack for the Commission’s ninth public forum (Figure 49). Cohen and his staff were welcomed to Chilliwack by Cheam Councillor June Quipp, who reminded Cohen of the eagle feather she presented to him at Cheam Beach in early-August, explaining in the process that “it represents the importance of speaking the truth.”⁵⁴² Councillor Quipp criticized the DFO for closing the 2010 FSC fishery even though many Cheam fishers had “not yet reached their sustenance requirements”, in addition to expressing concern “about the impact of fish farming on wild stocks.”⁵⁴³ Then, Councillor Quipp introduced Justin Pettis and Bill Davies, who “performed a song of welcome” for Cohen.⁵⁴⁴ Included among the 11 speakers which followed was Tim Tyler, who suggested that the DFO “refuses to prosecute individuals who dump deleterious substances into the Coquitlam River”, in addition to ignoring “the

⁵³⁴ Prince George Public Forum Summary, 23-Sept-2010, p. 1

⁵³⁵ Prince George Public Forum Summary, 23-Sept-2010, p. 1

⁵³⁶ Prince George Public Forum Summary, 23-Sept-2010, p. 2

⁵³⁷ Prince George Public Forum Summary, 23-Sept-2010, p. 2

⁵³⁸ Prince George Public Forum Summary, 23-Sept-2010, p. 2

⁵³⁹ Prince George Public Forum Summary, 23-Sept-2010, p. 3

⁵⁴⁰ Prince George Public Forum Summary, 23-Sept-2010, p. 3

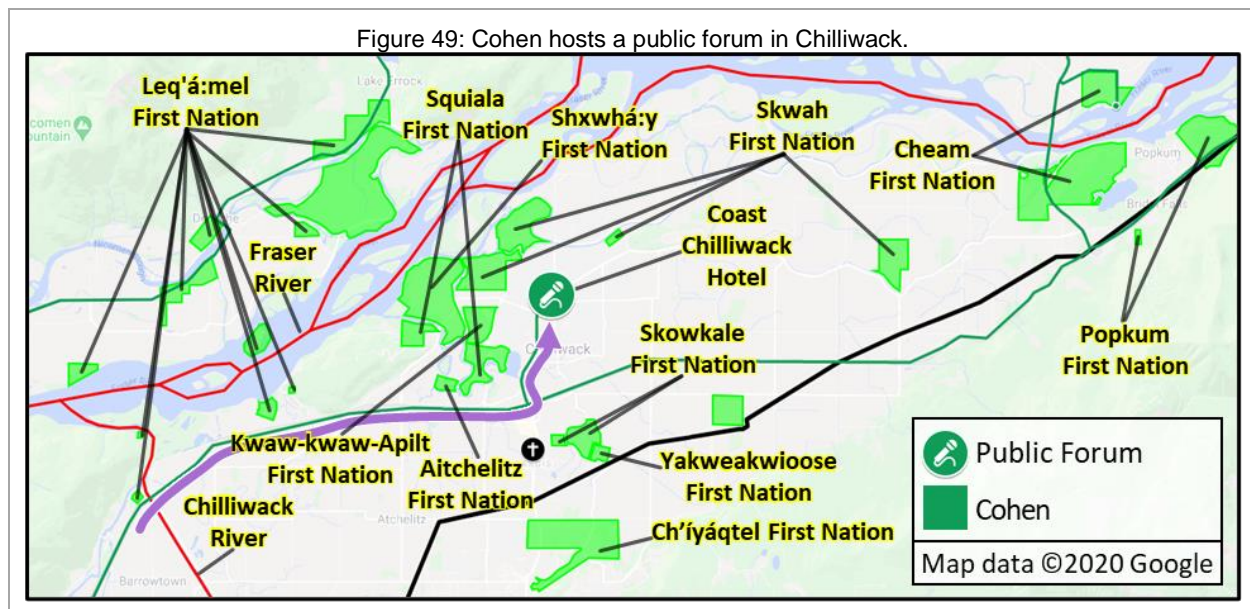
⁵⁴¹ Prince George Public Forum Summary, 23-Sept-2010, p. 3

⁵⁴² Chilliwack Public Forum Summary, 29-Sept-2010, p. 1

⁵⁴³ Chilliwack Public Forum Summary, 29-Sept-2010, p. 1

⁵⁴⁴ Chilliwack Public Forum Summary, 29-Sept-2010, p. 1

obvious threat posed by fish farms to wild stocks.”⁵⁴⁵ Elena Edwards suggested that “salmon habitat in the Fraser River is regularly compromised to permit industrial activity”, and that anti-Indigenous “racism persists in the fishery.”⁵⁴⁶ Rick Quipp explained that the DFO and Cheam First Nation “disagree on many topics, including the meaning of ‘conservation’”, as well as the definition of FSC fish.⁵⁴⁷ Quipp, who has been arrested “numerous times for unlicensed fishing to feed his family”, suggested that the DFO operates “primarily on an economic basis”, alleging in the process that the DFO considers First Nations’ FSC needs “only after addressing commercial and conservation priorities.”⁵⁴⁸



In the early morning of October 21, Cohen visited the Weaver Creek Spawning Channel, where he observed sockeye spawning alongside “scores of young children on school field trips.”⁵⁴⁹ From there, Cohen headed to Hotel 540 in Kamloops for the Commission’s final public forum. That evening, Cohen and his staff were welcomed to Secwépemc territory by Adams Lake First Nation Councillor Cliff Arnouse, who “emphasized the central role of salmon to First Nations history and culture.”⁵⁵⁰ In most of the 12 presentations which followed, the impact of urbanization on salmon habitat was framed as a major issue. Chief Judy Wilson of Neskonlith First Nation noted that “salmon are critical to her people”, and suggested that “the Salmon River delta (near Salmon Arm) is threatened by a shopping centre proposed by SmartCentres, a real estate development

⁵⁴⁵ Chilliwack Public Forum Summary, 29-Sept-2010, p. 2

⁵⁴⁶ Chilliwack Public Forum Summary, 29-Sept-2010, p. 2

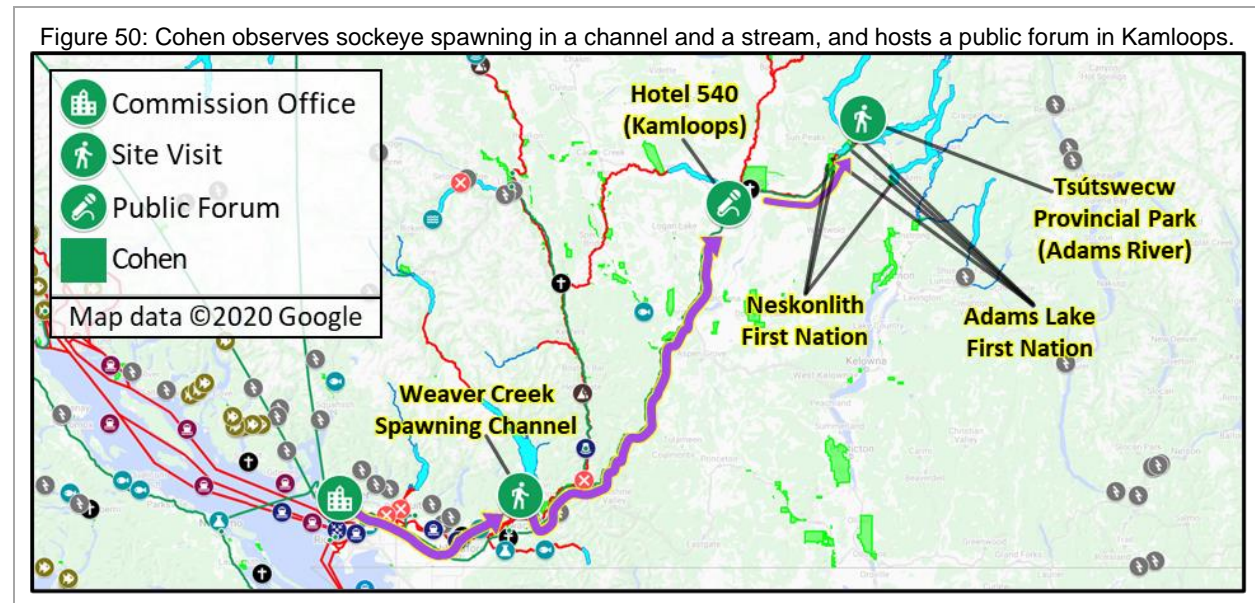
⁵⁴⁷ Chilliwack Public Forum Summary, 29-Sept-2010, p. 3

⁵⁴⁸ Chilliwack Public Forum Summary, 29-Sept-2010, p. 4

⁵⁴⁹ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 3

⁵⁵⁰ Kamloops Public Forum Summary, 21-Oct-2010, p. 1

company.”⁵⁵¹ Wilfred Robbins of Esk’etemc (Alkali) First Nation expressed concern regarding “the proposed Prosperity Mine project” in T̓silhqot’in territory, citing concerns that “the mine’s tailings pond will leak into the Chilko River, harming Chilko sockeye stocks” in the process.⁵⁵² It is “only after the last tree is cut down and the last lake poisoned”, Robbins concluded, that “people will realize [...] money cannot be eaten.”⁵⁵³



The following day, October 22, Cohen visited Tsútswecw (Roderick Haig-Brown) Provincial Park, where he observed sockeye spawning in the Adams River, and toured the nearby interpretive centre.⁵⁵⁴ For the second day in a row, Cohen found himself “moved” by the “scores of young children” who “watched in awe the spawning habits of thousands of Fraser sockeye.”⁵⁵⁵

6.1.1.3 – Cohen Facilitates the Transfer of Interactional Expertise

Having firmly established the Commission’s boundaries, populated the resulting regions of expertise, and secured the cooperation of the outer-most region, Cohen and his Counsel endeavoured to equip the Commission’s various participant-coalitions with interactional expertise. To that end, on October 25—just three days after witnessing the return of Adams River sockeye—Cohen and his Counsel called on Michael Lapointe, David Welch, and Karl English to take to the witness stand in room 801 of the federal courthouse at 701 West Georgia Street in downtown Vancouver. Following Cohen’s introductory remarks, Senior Commission Counsel Brian Wallace described this evidentiary hearing—the Commission’s first—as “a primer on the lifecycle of the

⁵⁵¹ Kamloops Public Forum Summary, 21-Oct-2010, p. 1

⁵⁵² Kamloops Public Forum Summary, 21-Oct-2010, p. 5

⁵⁵³ Kamloops Public Forum Summary, 21-Oct-2010, p. 5

⁵⁵⁴ Interim Cohen Report (29-Oct-2010), p. 24

⁵⁵⁵ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 3

Fraser sockeye” that would serve as “the first building block” in the Commission’s investigation.⁵⁵⁶ Wallace then turned the floor over to Associate Commission Counsel Wendy Baker. After introducing Lapointe, Welch, and English, Baker asked them to confirm their qualifications, before qualifying them as “experts in fisheries biology.”⁵⁵⁷

Despite this vague qualification, the Commission only qualified witnesses as experts with respect to specific issues in the context of particular evidentiary hearings. Accordingly, though Lapointe—the Pacific Salmon Commission’s chief biologist—appeared as a witness on eight days to testify on four issues, he was only qualified as an expert witness at this first hearing.⁵⁵⁸ At this first hearing, Lapointe was not considered an expert on the Fraser River sockeye salmon life cycle, full stop. Instead, Lapointe—who holds an MSc in zoology—was only qualified as an expert with respect to the freshwater phase of the sockeye life cycle.⁵⁵⁹ David Welch, who holds a PhD in oceanography, provided expert witness testimony on the marine phase of the sockeye life cycle.⁵⁶⁰ Karl English, who holds an MSc in zoology, only spoke as an expert with reference to the migration of sockeye “from Alaska to their spawning destinations.”⁵⁶¹ Thus, while Lapointe was considered a core expert with respect to the freshwater phase of the sockeye life-cycle, he was considered a contributory expert with respect to the marine and ocean-to-spawning-grounds phases.

In a similar vein, this first evidentiary hearing can be understood as an attempt to facilitate the transfer of interactional expertise⁵⁶² – from the experts at the core of the Commission’s boundary to the participant-coalitions sandwiched between contributory experts on the one hand, and the public’s common stock of knowledge on the other.⁵⁶³ Indeed, Lapointe explicitly framed this first evidentiary hearing as an attempt to “empower” the Commission’s participants “with a common set of information that will hopefully help us communicate better.”⁵⁶⁴ The success of these hearings, Lapointe added, “is going to largely rest on our ability to communicate with each other.”⁵⁶⁵

In going on to explain that this hearing was rooted in a “science perspective”, acquired by spending the requisite number of years “in the university, in classrooms and labs, [and] some time

⁵⁵⁶ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 5

⁵⁵⁷ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, pp. 6-10

⁵⁵⁸ Cohen Report, Vol. 3, p. 175

⁵⁵⁹ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, pp. 10-11

⁵⁶⁰ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 31

⁵⁶¹ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 51.

⁵⁶² In addition to facilitating the transfer of interactional expertise, this first evidentiary hearing would—along with Technical Report 4: Marine Ecology—serve as the basis for Cohen’s understanding of the life cycle of Fraser River sockeye, as explored in the previous chapter.

⁵⁶³ In writing this dissertation, of course, it was likewise necessary for me to develop interactional expertise with respect to a variety of issues.

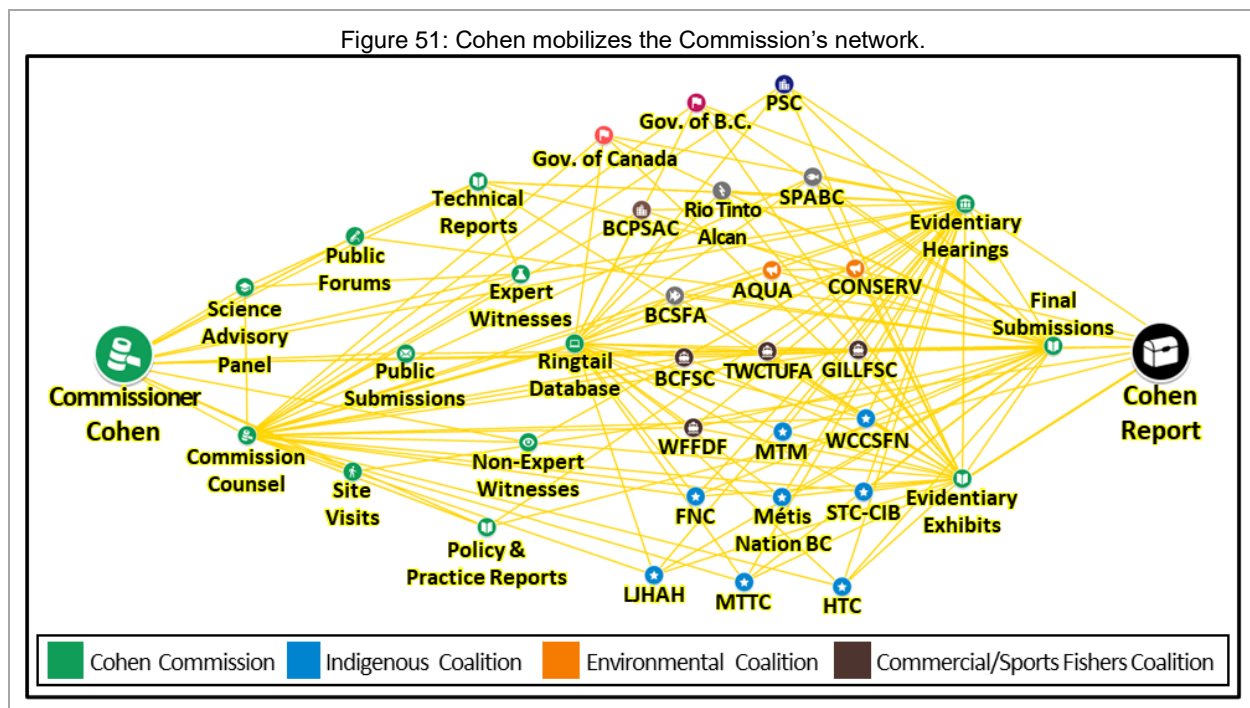
⁵⁶⁴ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 11

⁵⁶⁵ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 11

in the field”,⁵⁶⁶ Lapointe hints at some of the prerequisites which must be satisfied before one can join the core-set of experts on a given issue. Lapointe goes on to acknowledge the traditional ecological knowledges of First Nations in B.C., as well as to concede that neither he nor Welch or English are “qualified to speak from that perspective”, before ultimately suggesting that “there will be an opportunity at some point in the future for that perspective to be brought to bear on this important issue.”⁵⁶⁷ In the overwhelming majority of cases, however, Indigenous witnesses were asked to testify not as experts, but as part of perspectives panels. In a similar vein, Karl English later credited “First Nations leaders and their fisheries people” for “generating a lot of the information” that he was about to present.⁵⁶⁸ This suggests that though traditional ecological knowledges are capable of informing the work of core experts, these knowledges are insufficient on their own to provide entry into the core-set.

6.1.1.4 – Cohen Mobilizes the Commission’s Network

Having facilitated the transfer of interactional expertise from core experts to participants and participant-coalitions, Cohen mobilized the Commission’s network (Figure 51).



For the most part, Cohen oversaw this mobilization effort from the judge’s bench in room 801 of the federal courthouse at 701 West Georgia Street in downtown Vancouver, where the vast majority of the Commission’s evidentiary hearings took place. As with the first hearing, discussed above—in which the Fraser River sockeye life cycle was discussed at length—all subsequent

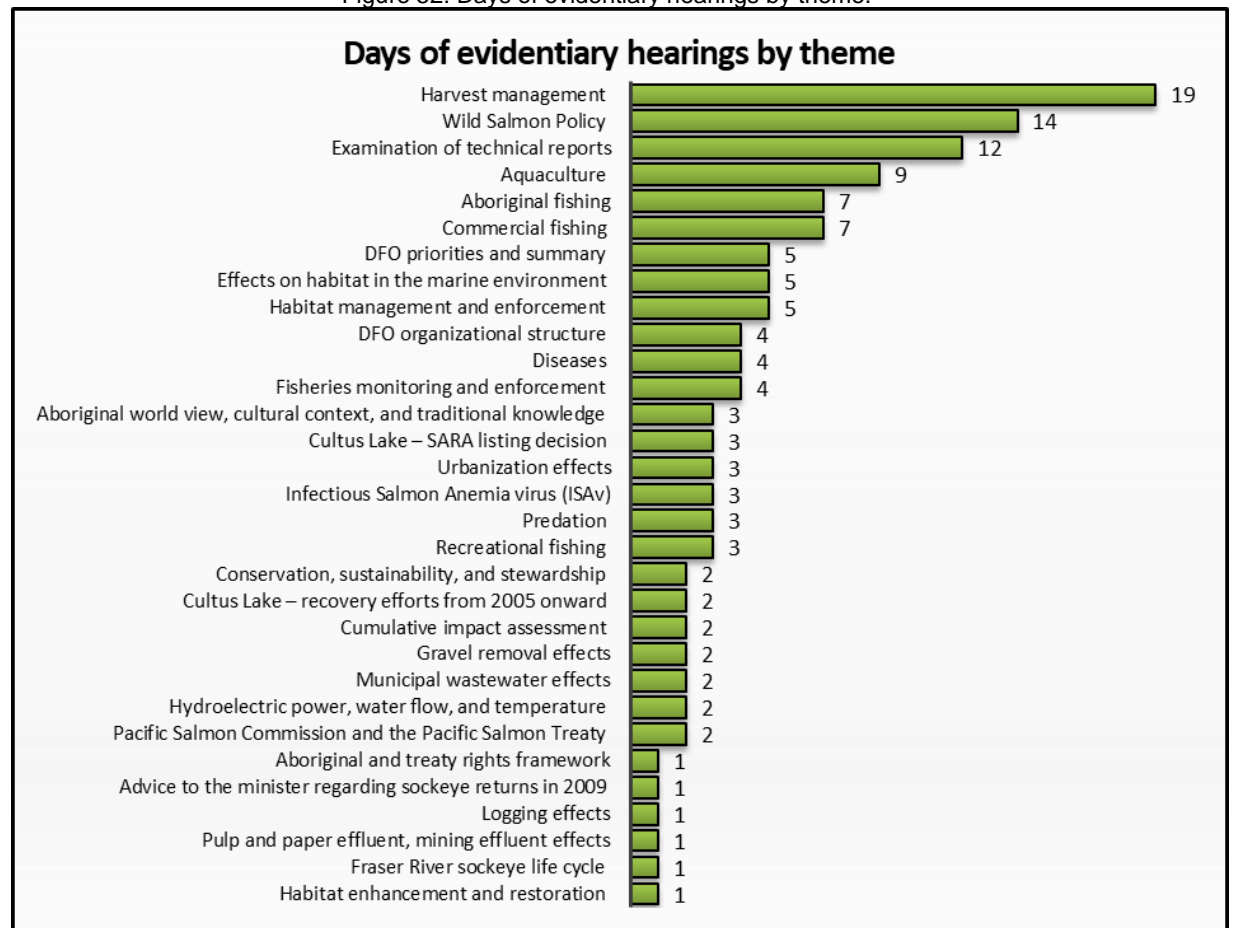
⁵⁶⁶ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 11

⁵⁶⁷ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 11

⁵⁶⁸ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 51

evidentiary hearings were dedicated to exploring a specific theme. Though the majority of these themes were identified by Commission Counsel in concert with the SAP, several themes were explored at the suggestion of one or more participants.⁵⁶⁹ Not all of these themes would be examined with equal rigor, however, as a number of issues were only discussed over the course of a one-day hearing. At the other end of this spectrum, a total of 19 days of evidentiary hearings were dedicated to the issue of harvest management. Ultimately, from October 2010 to December 2011, the Commission explored 31 distinct themes over the course of 133 days (or partial days) of evidentiary hearings (Figure 52).

Figure 52: Days of evidentiary hearings by theme.⁵⁷⁰



For each of these hearings, Cohen tasked Commission Counsel with “presenting all material evidence [...] without advancing any particular interest.”⁵⁷¹ On this view, Counsel are situated—along with Cohen—somewhere beyond the Commission’s boundaries of expertise,

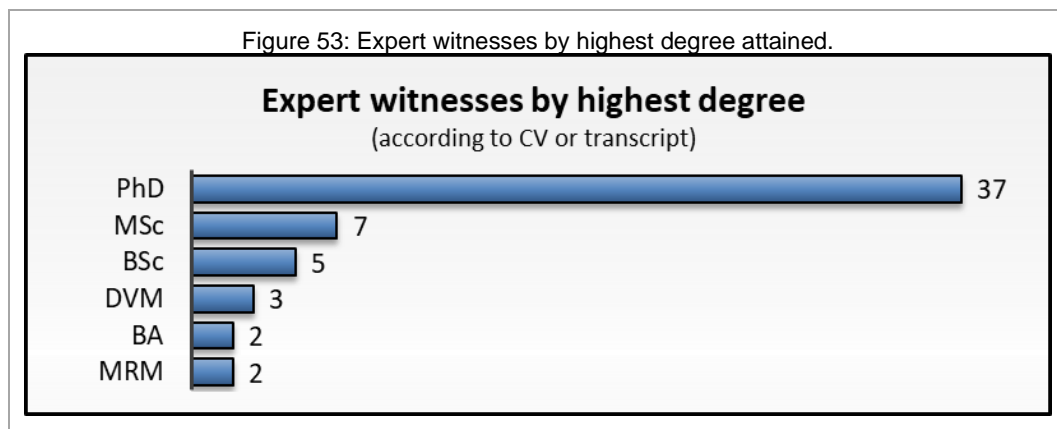
⁵⁶⁹ For example, it was not until Brenda Gaertner suggested, on behalf of the First Nations Coalition, that “an understanding of the constitutionally-protected aboriginal and treaty rights and title is important to the Commission’s work” (Cohen Commission Evidentiary Hearing Transcript, 26-Oct-2010, p. 1) that an evidentiary hearing was set aside for this purpose.

⁵⁷⁰ Adapted from Cohen Report, Vol. 3, p. 128

⁵⁷¹ Cohen Report, Vol. 3, p. 129

even as they form part of its network, as illustrated above. Accordingly, Counsel were entitled to qualify witnesses as experts (or not), whereas participants—i.e., those deemed by Cohen to have a “direct and substantial interest” in the Commission’s inquiry⁵⁷²—could only cross-examine witnesses through appointed legal representatives. These legal representatives were permitted to employ interactional expertise to “test the strength and scope of [an expert-witnesses’] expertise” (Ratushny, 2009, p. 323), but not to question its technoscientific basis. Put more simply, whereas Cohen and his Counsel reserved the right to draw or re-draw these boundaries of expertise at any time, the Commission’s participants and participant-coalitions were obliged to strictly adhere to the boundaries thus established.

According to these boundaries, 123 of the 179 witnesses called to testify before the Commission were either considered contributory experts with respect to the theme of the hearing in which they were called, or it was determined that the theme on which they were called to testify was not one that “truly requires expertise” (Ratushny, 2009, p. 323). The remaining 56 witnesses were qualified as (core) experts at one or more evidentiary hearing. Approximately two-thirds (37/56 or 66.07%) of expert witnesses held a PhD at the time of their appearance before the Commission (Figure 53).



According to the field of study or specialization listed on the highest degrees of these experts, those specializing in zoology, biology, aquatic ecology, ecology, fisheries science, oceanography, and resource management constituted more than half (33/56 or 58.93%) of all expert witnesses (Figure 54).

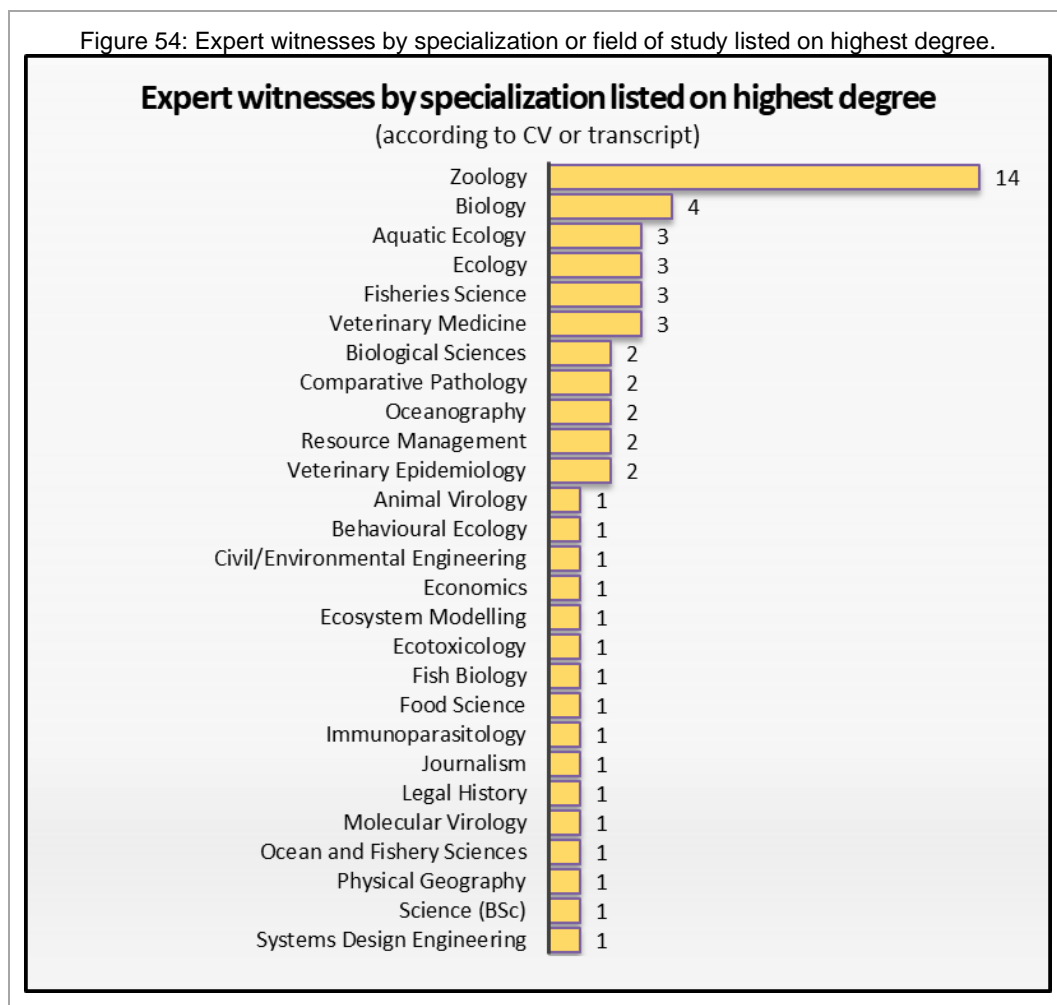
On the advice of the SAP, Cohen and his Counsel commissioned a number of these witnesses to prepare technical reports on a range of fisheries science issues.⁵⁷³ Despite being framed as together constituting the Commission’s “Fisheries Research Program”, the authors of

⁵⁷² Cohen Commission Ruling, 14-Apr-2010, p. 3. For a full list of participants and participant coalitions, see Cohen Report, Vol. 3, p. 196.

⁵⁷³ For a full list of technical reports, see Cohen Report, Vol. 2, p. 2.

these technical reports were, with one notable exception,⁵⁷⁴ tasked not with engaging in “primary research” but rather with reporting on “the best available existing research.”⁵⁷⁵ Upon completion, each technical report was subject to peer review “by three experts in the field of investigation”, a record of which was then “appended to the final technical reports.”⁵⁷⁶ Ultimately, a total of 15 technical reports were entered into evidence at evidentiary hearings set aside for this purpose along with the expert-witness testimonies of their respective authors. On average, Cohen afforded these 15 technical reports considerably more weight and credibility than the other 2,000+ exhibits entered into evidence over the course of the Commission’s evidentiary hearings. Indeed, Cohen frames these reports as having been entered into evidence “not [...] to support a particular interest but, rather, to provide [him] with the authors’ technical expertise.”⁵⁷⁷

Figure 54: Expert witnesses by specialization or field of study listed on highest degree.



⁵⁷⁴ Cohen tasked the authors of technical reports 5A, 5B, 5C, and 5D with performing statistical analyses on data provided by the B.C. Ministry of Agriculture and Lands (BCMAL) and the B.C. Salmon Farmers Association. For a variety of reasons, however, these reports failed to produce a consensus concerning the effects of salmon farming on Fraser River sockeye.

⁵⁷⁵ Cohen Report, Vol. 3, p. 121

⁵⁷⁶ Cohen Report, Vol. 3, p. 121

⁵⁷⁷ Cohen Report, Vol. 3, p. 130

In a similar vein, Cohen tasked Commission Counsel with preparing a total of 21 Policy and Practice Reports (PPRs). Counsel produced these reports—which covered a diverse range of topics,⁵⁷⁸ from “The Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery”⁵⁷⁹ to “Regulation of Water Uses in the Fraser River Watershed”⁵⁸⁰—with the aim of providing Cohen with background information on “uncontroversial matters.”⁵⁸¹ Initially, participants were invited “to make submissions on the content of the PPRs”, but Cohen quickly deemed this process “unwieldy”, asking participants to “include any submissions on the PPRs as part of their final submissions” instead.⁵⁸² Evidently, the underlying topics proved to be more controversial than Cohen or his Counsel had anticipated. In spite of this, all 21 PPRs would ultimately be entered into evidence over the course of the Commission’s evidentiary hearings.

As the evidentiary hearings drew to a close in September of 2011, Cohen set about completing the Commission’s network. To that end, Cohen and his Counsel called on all participants to tender final submissions. In keeping, once more, with the Commission’s commitment to process efficiency, Counsel hosted a two-day roundtable discussion designed to encourage participants to consolidate their final submissions, whether in whole or in part.⁵⁸³ Ultimately, however, these efforts proved to be futile, as all 21 participants tendered a final submission. In addition, a total of 13 participants tendered reply submissions, in which they responded to claims made in the final submissions of other participants. Then, following two significant additional developments,⁵⁸⁴ Cohen invited participants to submit addendums to their earlier submissions.⁵⁸⁵ As a result, Cohen received an additional 17 final submissions along with three reply submissions. Together, these submissions constituted the final intermediate node in the Commission’s network.

After receiving this last batch of final submissions and replies, Cohen endeavoured to bring the entirety of the Commission’s network (see Figure 51 above) to bear on the production of the Cohen Report. In formulating his findings and recommendations, Cohen considered the evidentiary hearings—in which he heard 56 expert-witness and 123 non-expert-witness testimonies, and presided over the submission into evidence of 15 technical reports, 21 PPRs,

⁵⁷⁸ For a full list of PPRs, see Cohen Report, Vol. 2, p. 2.

⁵⁷⁹ Cohen Commission Policy and Practice Report #01, 1-Oct-2010

⁵⁸⁰ Cohen Commission Policy and Practice Report #21, 18-Aug-2011

⁵⁸¹ Cohen Report, Vol. 3, p. 130

⁵⁸² Cohen Report, Vol. 3, p. 130

⁵⁸³ Cohen Report, Vol. 3, p. 133

⁵⁸⁴ In October 2011, the European strain of the Infectious Salmon Anemia virus (ISAv) was detected in B.C. sockeye. Then, in early-to-mid 2012, the Government of Canada passed Bill C-38, an omnibus budget bill which triggered a number of legislative amendments, affecting several laws, policies, and procedures examined over the course of the Commission’s inquiry.

⁵⁸⁵ Cohen Report, Vol. 3, p. 81

and 2,000+ additional exhibits—as his “primary source of evidence.”⁵⁸⁶ Though Cohen did not include site visits, public forums, or public submissions among his primary sources of evidence,⁵⁸⁷ he evidently understood that the Commission’s network would have been incomplete in the absence of these particular nodes. Indeed, by virtue of their inclusion, Cohen could claim to speak not only for those with a “direct and substantial interest”⁵⁸⁸ in the fishery, but also for a wide range of experts – from those found at the cutting edge of fisheries science at one end, to those who possess seldom more than the “common stock of knowledge” on the other (Ratushny, 2009, p. 323). The Cohen Commission, on this view, was not so much about seeking the ‘truth’ concerning the decline of Fraser River sockeye, as much as it was about efficiently managing controversy and neutralizing contention.

A conventional controversy study might have ended here – with Cohen having managed, against all odds, to produce a technoscientific artifact (i.e., the Cohen Report) capable of containing, and thereby ending, this controversy. I contend, however, that a single perspective is insufficient to permit me to address the question raised at the outset of this chapter.⁵⁸⁹ Accordingly, I endeavour in what follows to provide a more nuanced account of this controversy (these controversies) by exploring the Cohen Commission from two additional perspectives.

6.1.2 – The Social Life of an Evidentiary Exhibit

6.1.2.1 – A Forecast “Associated with Relatively High Uncertainty”

In June 2009, the DFO released its 2009 pre-season forecast for Fraser River sockeye and pinks. Generated by Sue Grant at the DFO’s Fraser River Stock Assessment office in Delta, B.C., this forecast ultimately took the form of an 18-page document that is foregrounded with a six-point summary. The first of these bullet-points notes that the 2009 forecast for sockeye returns “at the 50% probability level for all 19 stocks plus miscellaneous stocks is 10.6 million fish.”⁵⁹⁰ The fourth bullet-point, listed on the following page, cautions that “forecasts are associated with relatively high uncertainty.”⁵⁹¹ Nevertheless, the next bullet-point cites “positive ocean productivity signals” in recommending that emphasis should be placed “on median probability levels (50%) [...] for 2009 sockeye return forecasts with the exception of Early Stuart.”⁵⁹²

The process through which the DFO generates these forecasts, it must be noted, involves a fair amount of subjective judgement, as well as some retrospective tweaking:

⁵⁸⁶ Cohen Report, Vol. 3, p. 127

⁵⁸⁷ Cohen Report, Vol. 3, p. 125

⁵⁸⁸ Cohen Commission Ruling, 14-Apr-2010, p. 3

⁵⁸⁹ See Chapter 2 – Literature Review: Revisiting Controversy Studies.

⁵⁹⁰ Cohen Commission Exhibit #340, “Pre-Season Run Size Forecasts for Fraser River Sockeye and Pink Salmon in 2009”, p. 1

⁵⁹¹ Cohen Commission Exhibit #340, p. 2

⁵⁹² Cohen Commission Exhibit #340, p. 2

Forecasts of sockeye returns for the 19 stocks are typically made using a variety of methods that include naïve and biological models. Model selection for each stock depends on data availability and model performance using retrospective analysis. Uncertainty in sockeye forecasts for 2009 is captured using Bayesian statistical inference.⁵⁹³

In addition, the DFO looks to Chilko sockeye to provide an “indicator of marine survival for Fraser sockeye”, citing the “relatively high accuracy & precision assessments” of the data collected in relation to the sockeye returning to Chilko River.⁵⁹⁴ Put simply, the DFO’s 2009 pre-season forecast is the product of a series of value-driven estimates, assumptions, and decisions.

It is important, nevertheless, to understand the full range of potential outcomes envisaged by this forecast. These outcomes are laid out in a table⁵⁹⁵ which the DFO describes in this way:

Pre-season sockeye and pink forecasts for 2009 by stock/timing group and probability. Biological model predictor variable indicated (i.e. fry, smolt, or effective female spawners: eff). The Wild Salmon Policy (WSP) conservation units (CU’s) that each forecasted stock comprises is numerically referenced below (1 to 32), with corresponding CU name and index listed in Table 2.⁵⁹⁶

The first column, “Sockeye stock/timing group”, categorizes sockeye, first, by their run-timing groups, and, second, by their stocks. The second column, “CU’s”, identifies the conservation units⁵⁹⁷ associated with each stock. The third column, “Forecast Model”, identifies the model employed, as well as the variable used, in generating the range of possible outcomes for that stock. This column, in particular, illustrates that this forecast is not only comprised of a number of potential outcomes as opposed to a single point estimate, but also that each of these outcomes is itself the product of a variety of predictive methods and data inputs. The fourth and fifth columns, grouped under the heading “Mean Run Size”, indicates the average run size, using historical data for sockeye returns from 1980 to 2005, for (a) all cycles, and (b) the 2009 cycle in particular. In other words, the fourth column shows how many sockeye returned, on average, for all years from 1980 to 2005. The fifth column, on the other hand, only includes return data for the forebears of the 2009 cycle.⁵⁹⁸ The five remaining columns, all grouped under the heading “Probability of Achieving Specified Run Sizes”, provide estimates at five different points along the forecasted probability distribution. These columns represent not mutually-exclusive outcomes, but rather the probability that a given run-size will be exceeded.⁵⁹⁹

⁵⁹³ Cohen Commission Exhibit #340, p. 3

⁵⁹⁴ Cohen Commission Exhibit #340, p. 3

⁵⁹⁵ Cohen Commission Exhibit #340, p. 6

⁵⁹⁶ Cohen Commission Exhibit #340, p. 6

⁵⁹⁷ At this point in time, the DFO was still in the process of converting its categorization of sockeye from stocks to CUs. Accordingly, these CUs do not align on a 1:1 basis with those identified in Chapter 5 – The Social Life of Sockeye.

⁵⁹⁸ That is, the 1981, 1985, 1989, 1993, 1997, 2001, and 2005 sockeye runs

⁵⁹⁹ According to the rightmost column, for example, this forecast projects that there is a 90% chance that the 2009 sockeye run will exceed 3,556,000. This is effectively, though not literally, the worst-case scenario according to this forecast. Per the remaining columns, there is a 75% probability that the run size will exceed 6,039,000; a 50% probability of exceeding 10,547,000; a 25% probability of exceeding 19,451,000; and, finally, a 10% probability of exceeding 37,617,000.

6.1.2.2 – A “Grossly Optimistic” Forecast

In the June 24 edition of the *Vancouver Sun*, Larry Pynn reported, under the headline “Fraser forecast optimistic”, that “all sectors [...] are expected to participate in the fishery based on a projected return of between six and 10.6 million sockeye” (Pynn, 2009). Interestingly, though the DFO’s forecast suggested that anywhere from 3.6 million (90% probability) to 37.6 million (10% probability) sockeye could return to the Fraser River in 2009, Pynn reports here a range of six (75% probability) to 10.6 million (50% probability) fish.

In the July 4 edition of the *Chilliwack Progress*, Jeff Nagel reported, under the headline “Fishing hopes high as salmon swim for shore”, that “[f]ishermen of all stripes are gearing up for what’s predicted to be a big run of Fraser River salmon this summer” (Nagel, 2009a). While 10.6 million sockeye is not a large run “by historic standards”, Nagel explained, a run that large would “turn the page on two dismal years in which the commercial fleet has been sidelined and only aboriginal food fishing has been allowed” (Nagel, 2009a). Fisheries biologists will be “closely watching” sockeye returning to Chilko River, Nagel added, as Chilko sockeye are “expected to deliver the bulk of the [2009] sockeye return” (Nagel, 2009a).

On July 10, the Fraser River Panel announced that it had adopted the DFO’s “75% probability level pre-season forecast for Early Stuart sockeye (165,000 fish)” and the 50% probability level forecast for the remaining run-timing groups (Pacific Salmon Commission, 2009). This adjustment meant that the FRP were expecting a total of 10,488,000 sockeye to return in 2009, a decrease of 112,000 fish from the DFO’s 50% probability level estimate.

On July 15, Nelson Bennett reported for *Richmond News* that fishers were waiting with “baited breath” for “10.5 million of the West Coast’s favourite salmon” to return (Bennett, 2009).

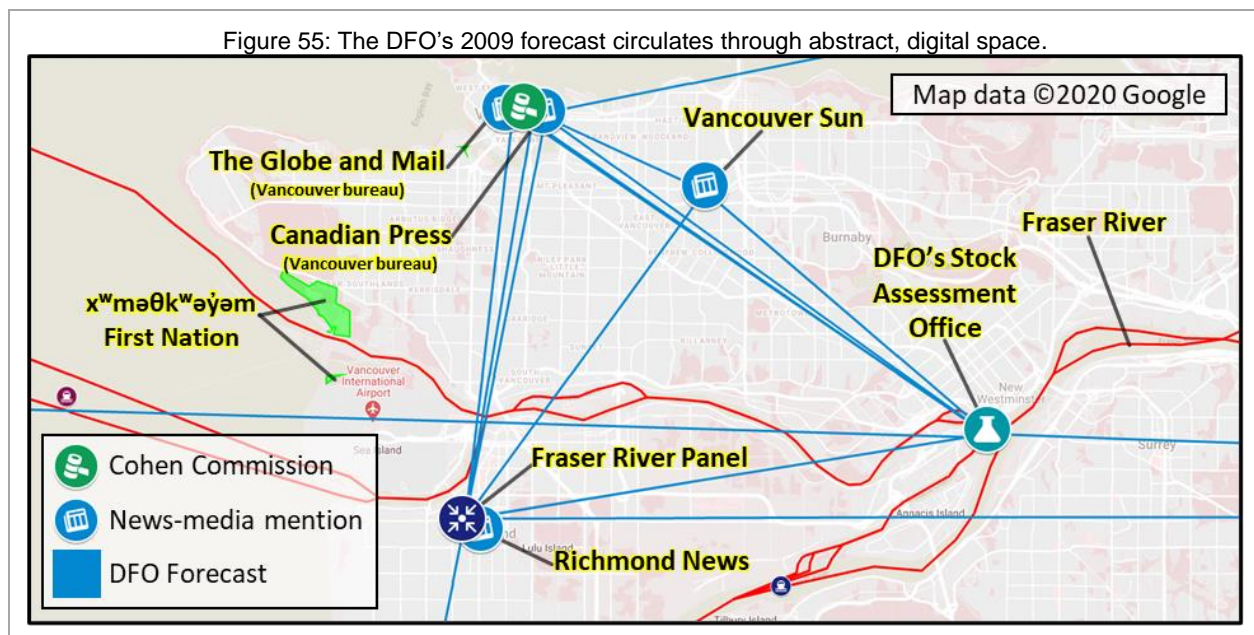
On July 21, Jeff Nagel reported that “[d]oubts are beginning to surface as to whether the Fraser River salmon run will be as big and bountiful as predicted”, citing lower than expected returns for Early Stuart sockeye as cause for concern (Nagel, 2009b). Biologists, Nagel suggested, had predicted that “up to 10.6 million sockeye would return to the Fraser system this summer” (Nagel, 2009b).

On July 23, Brian Lewis reported for *The Progress* that the sockeye forecast remained “bright, but changeable”, citing “poor” early returns despite the 10.5-million forecast (Lewis, 2009). In the July 27 edition of the *Vancouver Sun*, David Karp reported that “[w]hat was supposed to be a bountiful year for the Fraser River sockeye salmon fishery”, with 10.5 million sockeye expected to return, “is beginning to look like a bust” (Karp, 2009).

On August 7, the Canadian Press reported that “[t]he prospects for sockeye salmon fishing in B.C. are so bad this year that some fishermen have already given up and gone home” (The

Canadian Press, 2009). The DFO's 2009 pre-season forecast, the Canadian Press suggested, called for "more than eight million" sockeye to return, an estimate that has since been "substantially downgraded" (The Canadian Press, 2009). In the August 13 edition of the *Globe and Mail*, Mark Hume reported that a new run-size estimate of 1.7 million sockeye had been adopted, a far cry from the DFO's pre-season forecast, which called for "between 10.6 million and 13 million sockeye [...] to return" (Hume, 2009a). Scott Simpson, writing in the August 15 edition of the *Vancouver Sun*, commented on this change in run-size estimate by suggesting that it revealed the DFO's "pre-season estimate of 10.4 million fish" to be "grossly optimistic" (Simpson S., 2009).

In sum, though some reporters described the DFO's pre-season forecast as a range of potential outcomes (Hume M., 2009a; Pynn, 2009),⁶⁰⁰ others cited expected returns of "more than eight million" (The Canadian Press, 2009), 10.4 million (Simpson, 2009), 10.5 million (Bennett, 2009; Lewis, 2009; Karp, 2009), or 10.6 million (Nagel, 2009a; 2009b). As the DFO's 2009 pre-season forecast circulated through the Canadian news-media (Figure 55), in other words, it became subject to varying degrees of reduced uncertainty. Consequently, questions started to emerge about the apparent disappearance of millions of sockeye salmon.



6.1.2.3 – A “Very Concerning” Forecast

In an August 26 letter to federal fisheries minister Gail Shea, B.C. Environment Minister Barry Penner cited the “wide disparity between the forecasted and actual returns of Fraser River sockeye” in calling for an investigation into the DFO's apparent mismanagement of the fishery

⁶⁰⁰ Even where the forecasted returns were described as a range, it should be noted, the full range of potential outcomes was not provided, nor was the extent of the underlying uncertainty made clear.

(qtd. in Hunter, 2009). Though Penner demanded a “comprehensive review of the 2009 sockeye returns, the adequacy of scientific data and the capacity of forecasting techniques”, Shea would only commit to examining “all aspects of DFO’s 2009 postseason review, which involves counting the numbers of spawning salmon on spawning grounds, looking at environmental impacts, catch numbers, forecasted and actual returns” (qtd. in Hunter, 2009).

By early September, a growing number of critics were demanding a public inquiry. In the September 10, 2009 edition of the *Vancouver Sun*, for instance, Craig Orr and Vicky Husband of the Watershed Watch Salmon Society argued that the DFO “enormously overestimated” the 2009 sockeye returns (Orr & Husband, 2009). “Why”, Orr and Husband asked, were the DFO’s “predictions so out of touch with reality?” (Orr & Husband, 2009). Orr and Husband conclude their editorial by suggesting that the people and salmon of B.C. “deserve some answers” (Orr & Husband, 2009).

In early November, federal cabinet minister Stockwell Day announced that B.C. Supreme Court Justice Bruce Cohen had been selected to lead a federal inquiry into the decline of sockeye salmon in the Fraser River. In speaking to why the inquiry was needed, Day pointed to the “very concerning” discrepancy between forecasted and actual returns in 2009 (qtd. in Hume M., 2009b). Thus, while the DFO’s 2009 pre-season forecast was certainly not the only reason for the establishment of the Cohen Commission, it was consistently cited as an example of the DFO’s apparent mismanagement of the fishery.



6.1.2.4 – A “Very Useful” Forecast Characterized by Boundless Uncertainty

On January 21, 2011, 14 months after the establishment of the Cohen Commission, the DFO’s 2009 pre-season forecast was marked for identification as an exhibit at an evidentiary hearing

concerning harvest management. The forecast was introduced into evidence by Hugh MacAulay—legal counsel for the federal government—during his cross examination of Barry Rosenberger, then the DFO’s area director for the B.C. interior and chair of the Canadian caucus of the Fraser River Panel. At the outset of his cross examination, MacAulay conceded that the DFO’s 2009 pre-season forecast is foregrounded with “the median forecast for Fraser sockeye in 2009 [...] at 10.6 million fish”, a number which “attracted considerable attention through the 2009 fishing season”, but points to the caveat, offered on the following page, which highlights “the high uncertainty associated with these forecasts.”⁶⁰¹

Five days later, on January 26, Associate Commission Counsel Wendy Baker called Sue Grant to the Commission’s witness stand. Grant, the DFO’s forecasting lead for Fraser River sockeye, took to the witness stand seemingly intent on resituating her forecast within the probabilistic framework from which it emerged. Accordingly, from the outset of her testimony, Grant went to great lengths to highlight the various uncertainties associated with the DFO’s approach to run-size forecasting.⁶⁰² Grant explained that, as the DFO’s forecasting lead for Fraser River sockeye, her work is characterized by the ever-present need to account for, and manage the impacts associated with, various forms of uncertainty.

When Baker pointed out that the Commission “heard at public hearings that the 2010 forecast was inaccurate and that caused various problems”, Grant responded defensively, taking exception to Baker’s use of the word “inaccurate.”⁶⁰³ Grant noted that some stocks overperformed while others underperformed, even if these variances failed to balance each other out. This does not mean that the forecast was ‘accurate’, of course, but Grant is technically correct in suggesting that it cannot be considered ‘inaccurate’ either. When later asked to speak to the usefulness of such a forecast—i.e., one which offers a range of estimates that can neither be considered accurate nor inaccurate—Grant lamented that the news-media places undue emphasis “on 50 percent probability levels” and “deterministic single point estimates” rather than framing the DFO’s forecasts as a range of potential outcomes which aims to capture uncertainties in both “process observation error” and varying “assumptions about future survival.”⁶⁰⁴ Even though it was the DFO itself which foregrounded the 10.6-million figure in the 2009 pre-season forecast, Grant went on to attribute this to the public’s apparent inability to grasp the “nuances of the forecast tables amongst all the stocks and the probability distribution.”⁶⁰⁵ It is important, Grant later reiterated, “to

⁶⁰¹ Cohen Commission Evidentiary Hearing Transcript, 21-Jan-2011, p. 43

⁶⁰² Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, pp. 5-10

⁶⁰³ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, pp. 27-28

⁶⁰⁴ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, p. 40

⁶⁰⁵ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, p. 41

really focus on the complexity of the forecast tables, not default to just a single number like 10.6 million.”⁶⁰⁶

Baker, seemingly unconvinced by the preceding exchange, pressed Grant further on the usefulness of these forecasts:

[Baker]: There are uncertainties, as you’ve described, with pre-season forecasts and then there’s differences between the pre-season forecasts and what’s observed in season. So given those uncertainties and the differences that are observed when the runs return, are these forecasts valuable? Are they worth generating?

[Grant]: Well, when you say differences, we should clarify that [...] in most years the returns fall within the forecast distribution. So they’re not different. They’re just falling within the forecast distribution at a different probability level.

[Baker]: Okay.

[Grant]: And your question was...?

[Baker]: [A]re they a useful thing to do? Are they providing useful information or do they just create confusion [...] ‘cause we certainly hear a lot of people stating that the forecasts are unreliable, that they’re inaccurate [...] is that a problem with the communication or is that a problem with the forecasting information you’re providing?

[Grant]: I would say it’s a problem with communication. Even the terminology “inaccurate” is inaccurate. You wouldn’t say that the forecast is inaccurate. You would [say that] the return is just falling within the probability distribution lower or higher than the 50 percent probability level. But people are often fixated [on the 10.6 million number] because it is complicated. I can’t remember all these numbers in this table, so it’s much easier to remember 10.6 million than the complexity of this table.

So [...] yeah, it becomes a problem with communication. [...] DFO never expects the 50 percent probability level to be what will return. That’s a mid-point in the probability distribution and we actually have a one-in-two chance that the run will come in above or below that actual value. So that value isn’t a deterministic DFO expects 10.6 [million] to come back. We actually expected a range from 3.6 to 36.6 [...] to come back, and that’s our probability distribution.⁶⁰⁷

Despite later conceding that the actual catch in 2009 was 1.3 million⁶⁰⁸—well below the tail-end, 90% confidence-interval estimate of 3.6 million—Grant maintains that it is inaccurate to describe the forecast as inaccurate.

Evidently, Grant took to the witness stand aiming not merely to resituate her forecast within the probabilistic framework from which it emerged, but also to submerge it in an ocean of boundless uncertainty. The DFO’s pre-season forecasts, on this view, can never be incorrect. At worst, actual returns can only be described as “falling at the extreme end of [the] probability distribution”, indicating that in-season returns lie “outside of our historical range of understanding.”⁶⁰⁹ According to Grant, in other words, the DFO’s 2009 pre-season forecast was a

⁶⁰⁶ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, pp. 42-43

⁶⁰⁷ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, pp. 44-45

⁶⁰⁸ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, p. 47

⁶⁰⁹ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, pp. 47-48

“very useful tool” whose underlying message was misunderstood, miscommunicated, and unfairly misconstrued as being “wrong.”⁶¹⁰

The DFO’s approach to pre-season forecasting, Cohen would later conclude, “serves a useful purpose in the management of the fishery, as it provides information which assists the [DFO] and the [FRP] to set fishing plans.”⁶¹¹ The DFO, he added, has taken steps “to improve both the methodology of the pre-season forecasts and its communication of these forecasts to those involved and/or interested in the fishery.”⁶¹² With that, the DFO’s 2009 pre-season forecast underwent yet another transformation.

Despite going on to form part of the Commission’s network, the DFO’s 2009 pre-season forecast can hardly be characterized as a stable, immutable technoscientific object. This forecast is nothing, in other words, like the “immutable and combinable mobiles” proposed by Latour (1987, p. 227). While the DFO’s forecasts collapse time(s), space(s), and place(s) into inscriptions on a page, this process produces technoscientific artifacts that are anything but stable or immutable. Indeed, though the controversy concerning the DFO’s 2009 pre-season forecast could be said to have ended, the same cannot not be said of forecasts generated in subsequent years. At the Steveston public forum, for instance, Cohen heard that the DFO’s 2010 pre-season forecast was “inaccurate”, leading to “chaos” among “commercial fishers at the beginning of the season.”⁶¹³ Similarly, though the DFO (2017b) called in 2017 for 4.4 million sockeye to return at the 50% probability level, only 1.4 million fish would ultimately return (Pacific Salmon Commission, 2018b, p. 2). Thus, despite Cohen’s suggestion that the DFO has taken adequate steps to improve “the methodology of the pre-season forecasts and its communication of these forecasts”,⁶¹⁴ the DFO’s approach to forecasting remains controversial today. Rather than conceiving of these forecasts as immutable mobiles, in other words, I suggest that they more closely resemble itinerant boundary objects – that is, technoscientific artifacts whose value, meaning, and significance shifts as they travel. Far from stable or immutable, itinerant boundary objects are pluralities which actively resist closure.

If, however, the stability of evidentiary exhibits like the DFO’s 2009 pre-season forecast cannot be taken for granted, what does that say about the Commission’s network, and its ability to bring about closure? What, moreover, does this suggest about the enrollment and mobilization of participant-coalitions like Alexandra Morton’s Aquaculture Coalition? In what follows, I explore the latter question in greater detail.

⁶¹⁰ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, p. 47

⁶¹¹ Cohen Report, Vol. 1, p. 121

⁶¹² Cohen Report, Vol. 1, p. 121

⁶¹³ Steveston Public Forum Summary, 13-Sept-2010, p. 1

⁶¹⁴ Cohen Report, Vol. 1, p. 121

6.1.3 – The Social Life of a (Non-Expert) Witness-Participant

6.1.3.1 – Morton Builds a (Participant-)Coalition

In February 2010, Alexandra Morton answered the Cohen Commission’s call for applications by requesting “limited standing for the parts of the inquiry related to aquaculture.”⁶¹⁵

On March 26, Morton appeared at the Commission’s application hearing along with her lawyer, Gregory McDade. At the behest of Commission Counsel, Morton endeavoured to form participant-coalitions with other applicants. Following the noon recess, Krista Robertson announced that her clients, the Musgamagw Tsawataineuk Tribal Council, planned to form a coalition with “Alex Morton’s group” around “their common experience, and attitude towards salmon aquaculture.”⁶¹⁶



Not content to simply wait for Commissioner Cohen’s ruling on standing, Morton set about organizing and mobilizing opposition to the B.C. aquaculture industry. To that end, on March 26, Morton announced on her Typepad blog⁶¹⁷ that she was preparing to march from Sointula to Victoria to call for an end to salmon farming in B.C. waters. On April 22, Morton and her supporters left Sointula on foot, embarking on what they called the “Get Out Migration” in the process.⁶¹⁸ Later that same day, when Morton reached the Nimpkish River, she was greeted by a group of ‘Namgis First Nations, who wished her good fortune by performing a salmon dance and presenting her with

⁶¹⁵ Cohen Commission Ruling, 14-Apr-2010, p. 14

⁶¹⁶ Cohen Commission Application Hearing Transcript, 26-Mar-2010, p. 42

⁶¹⁷ See Morton (2020a).

⁶¹⁸ Alexandra Morton Blog Entry, 14-March-2010, “The Migration”

a medicine pouch.⁶¹⁹ During her 17-day march, Morton hosted a series of rallies and raised funds to facilitate her participation in the Cohen Commission (Figure 57).

On April 14, 2010, Morton was granted “limited standing” in the Cohen Commission along with the Raincoast Research Society and the Pacific Coast Wild Salmon Society.⁶²⁰ Together, this participant-coalition was called the Aquaculture Coalition (AQUA).⁶²¹ Though he acknowledged the Musgagmagw Tsawataineuk Tribal Council’s (MTTC) “strong intention to work in conjunction with Alexandra Morton, the Raincoast Research Society, and the Pacific Coast Wild Salmon Society, and to participate with them through one counsel for hearings pertaining to aquaculture”, Cohen ultimately approved limited, individual grants of standing for both the MTTC and AQUA.⁶²²

In June 2010, Morton openly questioned the Cohen Commission’s decision to “[hire] people connected to DFO to investigate DFO”, in addition to suggesting that “scientists who have worked on [the] impact of aquaculture” were not chosen for these positions because of their connection to her.⁶²³ In this same blog entry, Morton appealed to her supporters for donations. While the Commission makes “scant” funding available to its participants, Morton explained, AQUA requires additional resources to review “an avalanche of documents.”⁶²⁴ Through AQUA, Morton now had access to more than 500,000 federal government documents, many of them confidential, “including more than 242,000 emails.”⁶²⁵ In order to access these documents, however, Morton—like all the Commission’s participants—had to agree that they would be “kept confidential and used only for the purposes of [the Commission], unless and until the documents [...] become part of the public record” as evidentiary exhibits.⁶²⁶

On July 5, 2010, AQUA joined the Conservation Coalition (CONSERV) in petitioning Commission Counsel to “request [...] certain documents” concerning aquaculture.⁶²⁷ Initially, Commission Counsel asked the B.C. Salmon Farmers Association (BCSFA) to produce documents “relating to fish health, pathogens and disease, as well as stocking data in farmed salmon [...] dating from 1980 to the present.”⁶²⁸ When the BCSFA characterized this request as “overreaching in its scope”, however, Counsel settled for “documents from the period 2004-2009 [...] from 21 identified fish farms.”⁶²⁹ In seeking the disclosure of additional documents, AQUA and CONSERV criticized Counsel for limiting the temporal and geographic scope of its request,

⁶¹⁹ Alexandra Morton Vimeo Upload, 24-April-2010, “Migration Day 1 – Nimpkish River, ‘Namgis Send off Ceremony”

⁶²⁰ Cohen Commission Ruling, 14-Apr-2010, p. 14

⁶²¹ Cohen Commission Ruling, 14-Apr-2010, p. 33

⁶²² Cohen Commission Ruling, 14-Apr-2010, pp. 26-67

⁶²³ Alexandra Morton Blog Entry, 20-June-2010, “June 20 Update”

⁶²⁴ Alexandra Morton Blog Entry, 20-June-2010, “June 20 Update”

⁶²⁵ Cohen Report, Vol. 3, p. 123

⁶²⁶ Cohen Commission Rules for Procedure and Practice (as amended 20-Apr-2011), p. 3

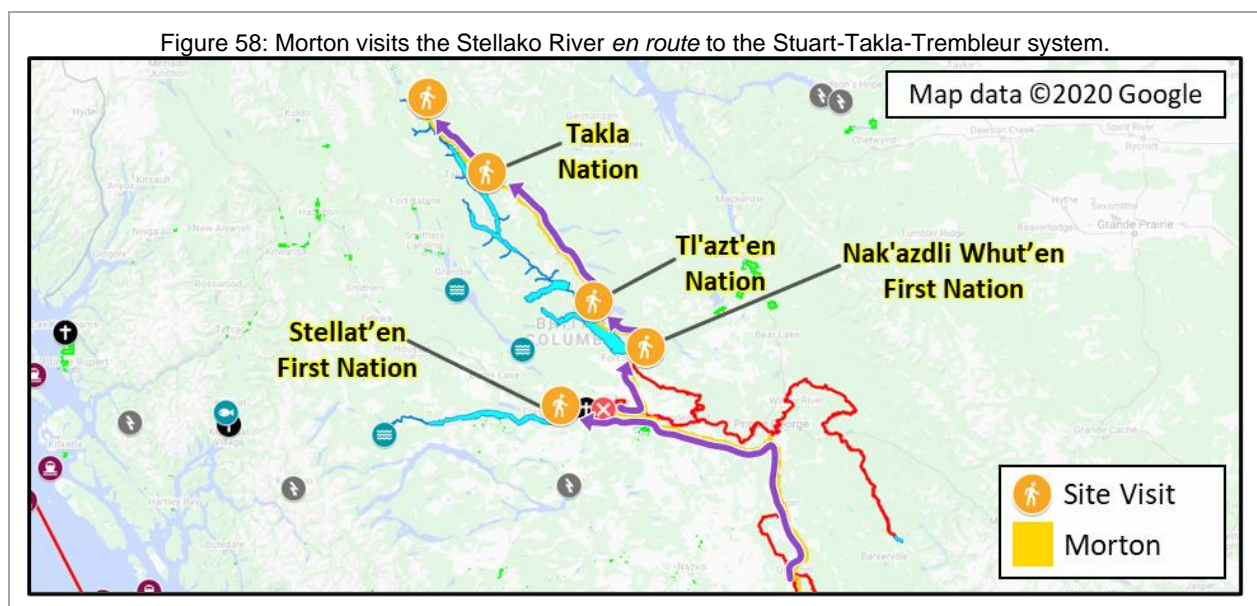
⁶²⁷ Cohen Commission Ruling, 8-Dec-2010, p. 1

⁶²⁸ Cohen Commission Ruling, 8-Dec-2010, p. 1

⁶²⁹ Cohen Commission Ruling, 8-Dec-2010, pp. 1-3

arguing in the process that there exists “no biological or scientific basis” for limiting “the examination of fish health data to a five-year time frame.”⁶³⁰ The Cohen Commission, Morton noted on her blog, was fast becoming “a massive undertaking.”⁶³¹

On September 25, 2010, as millions of sockeye climbed the Fraser, Morton announced she was heading upriver “to see what has not been seen in 100 years!”⁶³² On October 2, Morton joined the “thousands of people” lining the Adam River to witness sockeye spawning.⁶³³ Shortly thereafter, Morton headed north to the Stellako River, where she met with Sharolise Baker, fisheries manager for Stellat'en First Nation.⁶³⁴ Morton then visited Nak'azdli Whut'en First Nation on Stuart Lake, where she met with fisheries manager Clara Jack and Elder Betsy Leon, before driving to the Tachie River, where she met with Tl'azt'en fisheries manager Kirby Johnnie.⁶³⁵ Morton's next blog entry placed her further north still, on Takla Lake, where she visited the Takla Nation community hall “to hear from the elders.”⁶³⁶ Suw-thlote Margo French then accompanied Morton on the 200 km drive north to the Driftwood River (Figure 58).⁶³⁷



On October 10, Morton headed south again, visiting Horsefly River⁶³⁸ and Quesnel Lake along the way.⁶³⁹ Morton then visited the Adams River *en route* to Shuswap Falls in Lumby, where

⁶³⁰ Cohen Commission Ruling, 8-Dec-2010, p. 5

⁶³¹ Alexandra Morton Blog Entry, 13-July-2010, “Salmon Feedlot Disease Secrets”

⁶³² Alexandra Morton Blog Entry, 25-Sept-2010, “Going Upriver!!!”

⁶³³ Alexandra Morton Blog Entry, 3-Oct-2010, “I’m On the River...”

⁶³⁴ Alexandra Morton Blog Entry, 6-Oct-2010, “On the shores of the Stellaquo River”

⁶³⁵ Alexandra Morton Blog Entry, 8-Oct-2010, “Fort St. James and Tachie”

⁶³⁶ Alexandra Morton Blog Entry, 8-Oct-2010, “Fort St. James and Tachie”

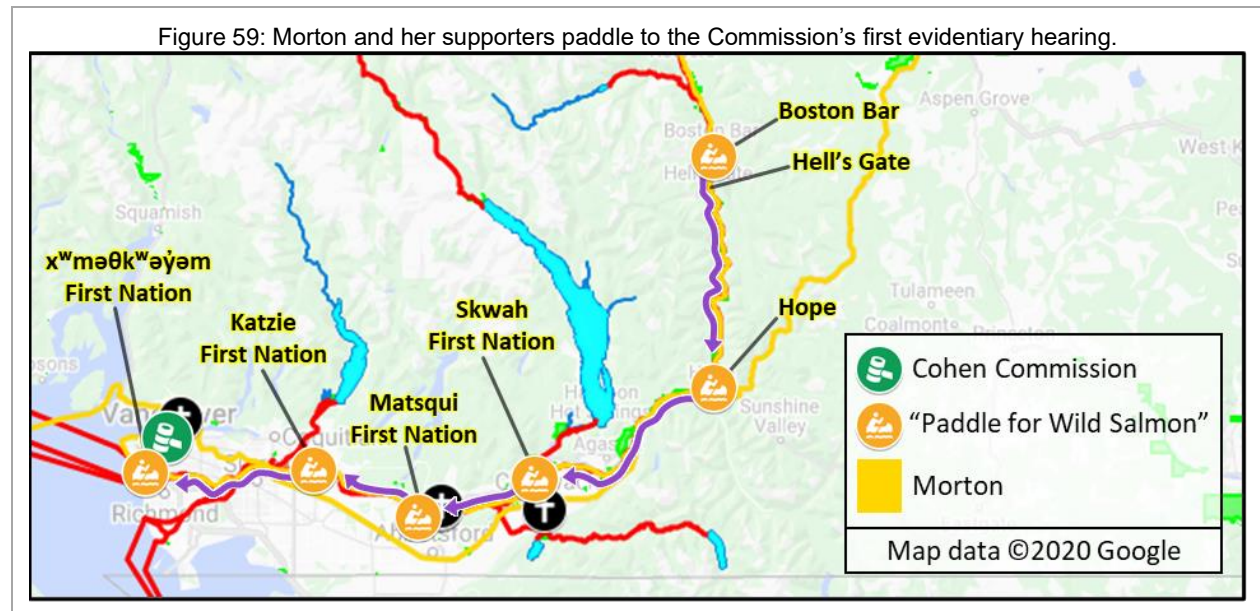
⁶³⁷ Alexandra Morton Blog Entry, 8-Oct-2010, “Fort St. James and Tachie”

⁶³⁸ Alexandra Morton Blog Entry, 12-Oct-2010, “Horsefly”

⁶³⁹ Alexandra Morton Blog Entry, 12-Oct-2010, “Quesnel”

she “watched sockeye try to get up the falls created by the 1929 Wilsey hydroelectric dam”, walked the Lumby Salmon Trail,⁶⁴⁰ and visited the Kingfisher Interpretive Centre on the Shuswap River.⁶⁴¹

On October 19, Xeni Gwet'in Chief Marilyn Baptiste joined Morton as she paddled through Hell's Gate on a whitewater raft, and landed in Hope. This marked the start of the “Paddle for Wild Salmon” (Figure 59), a seven-day event organized by Elena Edwards.⁶⁴²



On October 20, as Morton and her allies left Hope, A-in-chut Shawn Atleo “drummed and sang” to send them off.⁶⁴³ When Morton’s flotilla arrived in Chillwack later that evening, they were greeted by members of Skwah First Nation.⁶⁴⁴ On October 21, when Morton landed in Mission, she was greeted by Matsqui Chief Alice McKay and “a very welcoming group” of Matsqui First Nations.⁶⁴⁵ The next morning, Morton’s group was joined by Aaron Williams of Sk̓wx̓wú7mesh Úxwumixw, who explained the importance of raising their paddles as they approached the Katzie reserve in Pitt Meadows, so as to “signify [they] were not attacking.”⁶⁴⁶ On October 23, xʷməθkʷəy̓əm fisheries officers escorted Morton’s flotilla to the xʷməθkʷəy̓əm reserve situated near the mouth of the river.⁶⁴⁷

On October 24, Morton’s flotilla paddled around Point Grey to Jericho Beach, where they were greeted by more than 400 people.⁶⁴⁸ On her blog, Morton explained that her organization is

⁶⁴⁰ Alexandra Morton Blog Entry, 13-Oct-2010, “Shuswap”

⁶⁴¹ Alexandra Morton Blog Entry, 16-Oct-2010, “Enderby”

⁶⁴² Alexandra Morton Blog Entry, 20-Oct-2010, “From Hell to Hope”

⁶⁴³ Alexandra Morton Blog Entry, 21-Oct-2010, “The Paddle Begins”

⁶⁴⁴ Alexandra Morton Blog Entry, 21-Oct-2010, “The Paddle Begins”

⁶⁴⁵ Alexandra Morton Blog Entry, 21-Oct-2010, “On To Abbotsford”

⁶⁴⁶ Alexandra Morton Blog Entry, 23-Oct-2010, “Matsqui To Katzie”

⁶⁴⁷ Alexandra Morton Blog Entry, 24-Oct-2010, “Katzi to Musqueam”

⁶⁴⁸ Alexandra Morton Blog Entry, 25-Oct-2010, “Musqueam to Jericho Beach”

“struggling to make ends meet”, and appealed to her supporters for donations.⁶⁴⁹ The next morning, Morton and her allies prepared amidst heavy rainfall to embark on the last leg of their seven-day paddle (Figure 60).⁶⁵⁰



After landing at Vanier Park, Morton and her supporters marched across the Burrard Street Bridge and continued northeast until they entered the downtown core.⁶⁵¹ When Morton reached the federal courthouse at 701 West Georgia Street, she was greeted by Kwikwasut'inuxw Haxwa'mis Chief Bob Chamberlin, who accompanied her inside.⁶⁵² Morton and Chief Chamberlin then entered room 801, where the Cohen Commission's first hearing was underway. Once inside, they presented Cohen with a large piece of parchment covered with dozens of handwritten messages, collected by Morton and her supporters in the preceding weeks, the most prominent of which read, in large capital letters, "SALMON ARE SACRED."⁶⁵³

6.1.3.2 – Morton Uncovers Evidence that the DFO is Producing Agnotological Uncertainty

On November 3, 2010, Mark Hume reported that *The Globe and Mail* had obtained an internal DFO memo in which three of the “most likely” causes of the 2009 collapse were identified, including “a mysterious disease that causes brain lesions in fish” (Hume, 2010). At the request of Gregory McDade, AQUA's lawyer, Cohen and his Counsel scheduled an evidentiary hearing for March 2011 to allow participants to examine this document.⁶⁵⁴ In the meantime, Morton combed

⁶⁴⁹ Alexandra Morton Blog Entry, 25-Oct-2010, “Musqueam to Jericho Beach”

⁶⁵⁰ Alexandra Morton Blog Entry, 26-Oct-2010, “We Arrive At The Cohen Commission”

⁶⁵¹ Alexandra Morton Blog Entry, 26-Oct-2010, “We Arrive At The Cohen Commission”

⁶⁵² Alexandra Morton Blog Entry, 26-Oct-2010, “We Arrive At The Cohen Commission”

⁶⁵³ Alexandra Morton Blog Entry, 26-Oct-2010, “We Arrive At The Cohen Commission”

⁶⁵⁴ Alexandra Morton Blog Entry, 19-Mar-2011, “DFO - In The Business Of Truth?”

through thousands of internal DFO documents in Ringtail Legal, a document management software package licensed by the Cohen Commission. Through Ringtail, participants were permitted remote access to hundreds of thousands of confidential documents disclosed to the Commission by the Government of Canada, the Government of B.C., and the BCSFA, among others.⁶⁵⁵ By opening the black box that is Ringtail, Morton found evidence that the DFO was actively engaged in the production of agnotological⁶⁵⁶ uncertainty.

On December 8, 2010, Cohen ruled that the BCSFA must produce the documents requested months earlier by AQUA and CONSERV not just for “the 21 farms originally identified by commission counsel”, but also for an “additional 99 farms.”⁶⁵⁷ Cohen also ruled that the original five-year disclosure timeframe should be expanded to almost 10 years,⁶⁵⁸ though this fell short of AQUA and CONSERV’s initial (29 years) and revised (22 years) document-disclosure requests.⁶⁵⁹

On March 17, 2011, Commission Counsel called Laura Richards as a witness. Richards, a University of British Columbia-trained zoologist and the Director of Science for the DFO’s Pacific Region,⁶⁶⁰ was called before the Commission to speak to the internal DFO memo leaked by *The Globe and Mail* months earlier. The three “most likely” causes outlined in that memo, as Richards explained on the witness stand, were identified in a “science workshop” she convened with the aim of “bring[ing] staff together to really exchange views and begin to try to understand what might have happened” in 2009.⁶⁶¹ According to Morton,⁶⁶² however, the DFO failed to follow up on the potential causes raised at this workshop by Kristi Miller, the molecular genetics lead at the DFO’s Pacific Biological Station.⁶⁶³

Indeed, in an email dated November 4, 2009, Miller lamented that “Laura [Richards] does not want [her] to attend any of the sockeye salmon workshops that are not run by DFO for fear that we will not be able to control the way the disease issue could be construed in the press.”⁶⁶⁴ In a follow up email sent later that same afternoon, Miller suggested that Richards “clearly does not want to indicate to the [Pacific Salmon Commission] that the disease research is of strategic importance.”⁶⁶⁵ Miller also complained that Richards would only commit to “com[ing] up with some

⁶⁵⁵ Cohen Report, Vol. 3, pp. 122-124.

⁶⁵⁶ See Robert Proctor & Londa Schiebinger (eds.) (2008).

⁶⁵⁷ Cohen Commission Ruling, 8-Dec-2010, pp. 20-21

⁶⁵⁸ Cohen Commission Ruling, 8-Dec-2010, p. 20

⁶⁵⁹ Cohen Commission Ruling, 8-Dec-2010, pp. 1-2

⁶⁶⁰ Cohen Commission Exhibit #610, “Curriculum Vitae of Dr. Laura Richards”

⁶⁶¹ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 4

⁶⁶² Interview with Alexandra Morton, 14-June-2019

⁶⁶³ Cohen Commission Exhibit #1510, “Curriculum Vitae for Kristina Miller”

⁶⁶⁴ Cohen Commission Exhibit #628, “Email thread from K Miller-Saunders to M Saunders re Version 2, ending Nov 4 2009”, p. 1

⁶⁶⁵ Cohen Commission Exhibit #628, p. 1

funds to hire a student” to perform the required brain dissections.⁶⁶⁶ When questioned about these emails by Senior Commission Counsel Brian Wallace, Richards suggested that Miller’s remarks were “very much a misrepresentation.”⁶⁶⁷ Richards’s only concern, she went on to suggest, was that her superiors needed to “be informed” about Miller’s research before the DFO could “[speak] publicly about it.”⁶⁶⁸ When cross-examined by McDade for AQUA, Richards conceded that the DFO was “certainly aware” of Miller’s working hypothesis—that “plasmocytoid leukemia or a similar retrovirus” may be “the primary cause of river entry timing shifts and higher susceptibilities of salmon to temperature stress”⁶⁶⁹—as far back as June 2008.⁶⁷⁰ In spite of this admission, Richards maintained that the DFO simply “wanted to get more information and to try to encourage her to do some more work so that we could actually get some more substance behind this.”⁶⁷¹

When questioned about a November 2008 briefing detailing Miller’s request for an additional \$60,000 in funding to pursue this research, however, Richards claimed that she could not “recall precisely what the amount was.”⁶⁷² When pressed further on this point, Richards stated that “this was [Miller’s] personal point of view at that time” and that DFO “wanted to confirm that and try to get as much additional information as we could.”⁶⁷³ McDade later submitted into evidence another funding requests, from April 2010, in which Miller requested between \$50,000 and \$100,000, depending on the approach taken and the number of samples analyzed.⁶⁷⁴ Miller even offered a bargain-basement funding option, suggesting that, for “around 19K”, she might be able to “establish the potential that Atlantic salmon may be carriers [of the disease in question].”⁶⁷⁵ When asked whether Miller received this funding, Richards only stated that she “can’t confirm that exactly.”⁶⁷⁶

Richards later conceded that, given the potentially “controversial” implications of Miller’s research, the DFO feared that discussing the matter could elicit an “overreaction” among members of the public.⁶⁷⁷ Despite McDade’s best efforts, however, Richards could not or would not provide any additional details concerning the DFO’s pursuit of this line of inquiry.

⁶⁶⁶ Cohen Commission Exhibit #628, p. 1

⁶⁶⁷ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 29

⁶⁶⁸ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 30

⁶⁶⁹ Cohen Commission Exhibit #635, “BN re Funding Requested for Research on Links btw Plasmacytoid Leukemia and Shifts in Migration Timing and High Mortality of FRSS, Nov 13 2008”, p. 2

⁶⁷⁰ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 54

⁶⁷¹ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 54

⁶⁷² Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 57

⁶⁷³ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 59

⁶⁷⁴ Cohen Commission Exhibit #639, “K Miller, Proposed 2010 DFO Funded Genomic Research relating to Sockeye Declines, Apr 2010”, p. 2

⁶⁷⁵ Cohen Commission Exhibit #639, p. 2

⁶⁷⁶ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 72

⁶⁷⁷ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 66

[McDade]: At this point, you have no information as to whether fish farms are the cause of this disease or not, do you? None at all?

[Richards]: I think we have no particular reason to suspect at this point that there is any link, as was said. Nor do we have -- as I mentioned, we're still trying to confirm what we've actually got in terms of what's causing the [mortality-related genomic] signature.⁶⁷⁸

For the DFO, it would seem, the absence of evidence concerning the impact of salmon farms represents evidence of absence.

When McDade's allotted time expired, he asked Tim Leadem, the lawyer for CONSERV, to submit additional documents into evidence on behalf of AQUA.⁶⁷⁹ Accordingly, Leadem later submitted into evidence a memo prepared for the fisheries minister by Richards and her colleagues concerning the DFO's strategy for addressing "the issue of sea lice and salmon farms in [the] Pacific region."⁶⁸⁰ The 'issue', as it is framed in this memo, is not that salmon farms are adversely impacting wild fish, but that this perception "is undermining public confidence in the BC salmon farming industry and [...] impeding the growth of the industry", in addition to "negatively affecting public and policymaker impressions of the aquaculture sector [...] regionally and nationally."⁶⁸¹

Leadem then submitted into evidence an email from January 2008 in which communications director Terry Davis asked Brian Riddell—previously the salmon and freshwater ecosystems lead at the DFO's Pacific Biological Station, as well as a member of the Commission's SAP—whether DFO scientists had "done any sampling that would counteract the findings of Alexandra's sockeye research near the Discovery Islands".⁶⁸² Richards, who was copied on this email, claimed not to recall this specific request, but did admit to hearing discussions concerning "what [DFO] could get in terms of various evidence from our own work on this particular topic."⁶⁸³ This led to the following exchange:

[Leadem]: I'm curious about the first sentence: ["Have we done any sampling that would counteract the findings of Alexandra's sockeye research near the Discovery Islands?"] That would be Dr. Alexandra Morton's work; is that right?

[Richards]: Yes.

[Leadem]: Is DFO in the business of trying to counteract the work of other scientists?⁶⁸⁴

The DFO, Richards responded, "is in the business of trying objectively to get to the truth."⁶⁸⁵

⁶⁷⁸ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 73

⁶⁷⁹ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 84

⁶⁸⁰ Cohen Commission Exhibit #640, "Memo for the Minister (Info Only) - Strategy to Address the Issue of Sea Lice and Salmon Farms in Pacific Region (undated)", p. 1

⁶⁸¹ Cohen Commission Exhibit #640, p. 1

⁶⁸² Cohen Commission Exhibit #641, "Email from T Davis to B Riddell, L Richards et al re Sea Lice Data, Jan 28 2008", p. 1

⁶⁸³ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 85

⁶⁸⁴ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 85

⁶⁸⁵ Cohen Commission Evidentiary Hearing Transcript, 17-Mar-2011, p. 85

Miller's August 2011 appearance before the Commission came eight months after *Science* published the study in which the mortality-related genomic signature (MRS) was first identified. Miller, et al. (2011) details the results of three "[f]unctional genomic studies on biopsied gill tissues" from tagged sockeye salmon which appeared to reveal the existence of a "mortality-related genomic signature" associated with increased *en route* mortality (p. 214). Though Miller and her co-authors acknowledged that, in recent years, "elevated river [temperatures]" have had a considerable impact on the mortality levels of migrating sockeye, they nevertheless contended that "some fish are stressed before they reach the river", a fact which serves to "further [impair] their survival" (p. 214). Despite going on to concede that the "correlative data set" collected as part of this study "cannot be used to assign cause to the association between a preexisting signature and subsequent mortality", Miller and her co-authors concluded by hypothesizing that "the genomic signal associated with elevated mortality is in response to a virus infecting fish before river entry and that persists to the spawning areas" (p. 216). When this study was initially published, the DFO's media relations staff reportedly suppressed a press release announcing its findings, in addition to refusing to allow Miller to be interviewed (Turner C. , 2013, p. 23).

When she appeared before the Commission on August 24, 2011, Miller was qualified by Junior Commission Counsel Jennifer Chan as an expert in "molecular genetics, immunogenetics and functional genomics, with a specialty in salmon."⁶⁸⁶ After some preliminary questions,⁶⁸⁷ Chan asked Miller whether the mortality-related genomic signature (MRS) had been detected in the Atlantic salmon being farmed in B.C. waters. Given that the DFO was engaged in "large-scale surveys" intended to assess the prevalence of the MRS in sockeye, chinook, and coho, Miller explained, she thought it prudent to expand this survey to include "aquaculture and, specifically, Atlantic salmon, as well."⁶⁸⁸ However, the BCSFA's veterinarians "weren't comfortable [...] testing for a signature", and Miller's colleagues at the DFO were similarly unenthusiastic about the prospect of testing farmed fish for the MRS.⁶⁸⁹ Miller was denied the opportunity, in other words, to test farmed Atlantic salmon for the MRS. There was some discussion within the DFO, Miller added, about "whether or not this was the time to test [Atlantic salmon] because [DFO] haven't demonstrated in a laboratory that this virus can cause disease, that it can cause mortality."⁶⁹⁰

When asked whether it would be accurate to characterize her work as "proof that a virus was killing sockeye salmon", Miller explained that it was only "proof that river conditions alone are

⁶⁸⁶ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 1

⁶⁸⁷ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, pp. 4-8

⁶⁸⁸ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 14

⁶⁸⁹ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, pp. 13-14

⁶⁹⁰ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 14

not probably the only indicators or only exacerbating factors in terms of salmon mortalities.”⁶⁹¹ Typically, Miller continued, researchers only examine “the river environment, [...] the temperatures in the river, [and] the pathogens that they pick up when they enter the river.”⁶⁹² Miller’s study, by contrast, raised the possibility that “this could be a pathogen that they carry [...] into the river, not simply something that’s picked up in the river.”⁶⁹³ What they found, Miller explained, is that these fish “were already compromised before they enter[ed] the river.”⁶⁹⁴

When it was McDade’s turn to cross examine Miller, he started by establishing that parvovirus was presently Miller’s “candidate virus.”⁶⁹⁵ McDade then established that though the salmon leukemia virus (SLV) had not been “isolated in sequence”, Miller had not ruled it out either.⁶⁹⁶ Or, as Miller put it, she does not “have any evidence that it’s not that”, but she also does not “have any evidence that it is.”⁶⁹⁷ Is it possible, McDade asked, that parvovirus had been identified in the 1990s? “That is definitely possible”, Miller responded, before going on to outline some of the difficulties associated with confirming such a hypothesis.

The difficulty with trying to relate that disease or that syndrome with the parvovirus is that there don’t appear to be tissue samples of fish that carry marine anemia available to compare to the samples that we have. And because there is no one studying that particular syndrome or disease [...] it makes it difficult. And [...] if we can’t find someone who’s actually studying that and diagnosing marine anemia, it will be very difficult to determine whether or not they are the same thing. Perhaps with histology, if we can do the challenge work and find disease and mortality, perhaps one can look at the histological signatures from the parvovirus and determine if they’re anything like what’s been observed in marine anemia.⁶⁹⁸

Though she went on to express confidence in her team’s ability to identify the virus associated with the MRS, Miller added that they need to “do the work” first.⁶⁹⁹

To ‘do the work’, however, Miller needed to convince others that ‘the work’ was worth doing, a task which proved problematic. In September 2009, for instance, Miller penned a briefing note in which she described the state of SLV and plasmacytoid leukemia (PL) research in this way:

There are several elements of the history and timing of descriptions of PL/SLV that potentially implicate this virus in the large-scale declines of coho and Chinook salmon in BC, and may be suggestive of a role of hatcheries and aquaculture in this decline. Below is a timeline of viral observations and potential linkages (by date) with major events in coho, Chinook and sockeye. Note that the scientists involved in PL/SLV research left the province in the late 1990’s, and no significant direct study of this disease has been pursued since their departure.⁷⁰⁰

⁶⁹¹ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 17

⁶⁹² Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 17

⁶⁹³ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 17

⁶⁹⁴ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, pp. 17-18

⁶⁹⁵ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 87

⁶⁹⁶ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, pp. 87-88

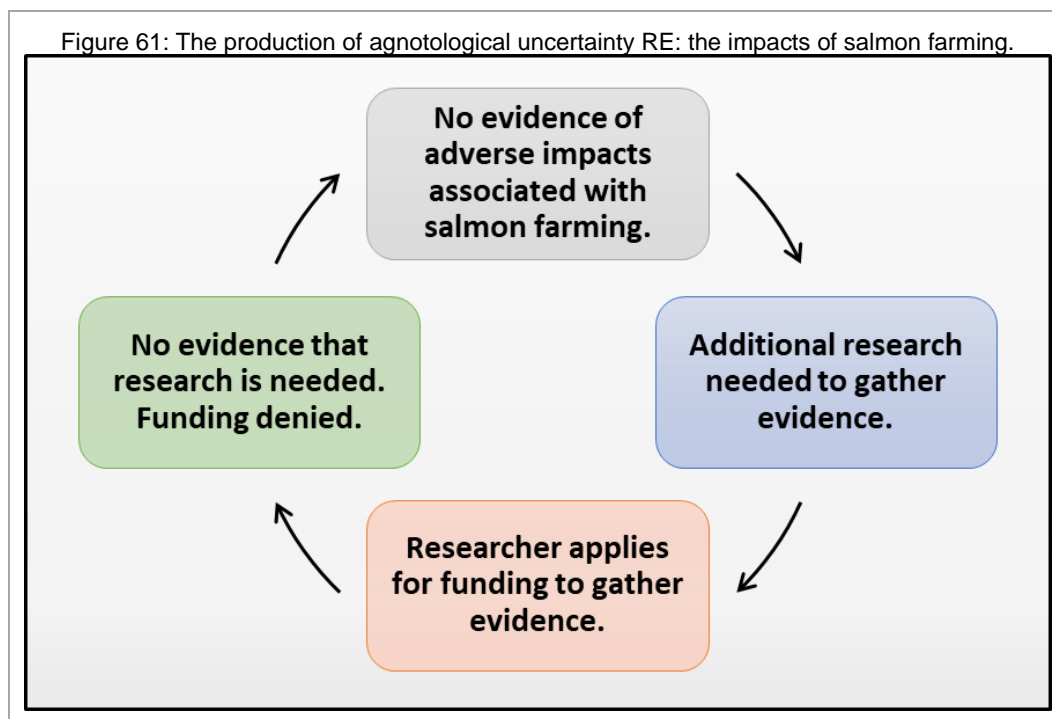
⁶⁹⁷ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 88

⁶⁹⁸ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 91

⁶⁹⁹ Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 95

⁷⁰⁰ Cohen Commission Exhibit #1524, “Miller, Epidemic of a Novel, Cancer Causing Viral Disease, Sep 27 2009”, p. 3

In the second draft of this same briefing note, this excerpt was removed along with the accompanying timeline.⁷⁰¹ Apparently, many in the DFO felt that these comments were “highly speculative and not really well supported.”⁷⁰² Time and again, in other words, Miller encountered difficulties when seeking support and funding for her research, suggesting that high-level employees in the DFO’s Pacific Region were actively engaging in the production of agnotological uncertainty with respect to the impact of salmon farming on wild fish (Figure 61).



6.1.3.3 – Morton Builds a Black Box and Defends her Credibility

In the months leading up to her appearance before the Cohen Commission, Morton and her team continued to comb through confidential documents in Ringtail. In the process, Morton found documents which suggested that “provincial inspectors [had] found signs of [...] infectious salmon anemia [...] in British Columbia” (Hume, 2011b). Accordingly, AQUA petitioned the Cohen Commission on April 13, 2011 to relieve Morton “of her undertaking of confidentiality” in relation to 35 documents so that she might “make a report to a federal government agency”⁷⁰³ – i.e., the Canadian Food Inspection Agency (Hume, 2011a). British Columbia and the BCSFA opposed this application, and requested that Cohen adjudicate it “confidentially,”⁷⁰⁴ leading Morton to express concern in the press “about the extent to which important aspects of the Cohen Commission are operating in secret” (Hume, 2011a).

⁷⁰¹ Cohen Commission Exhibit #1523, “Miller, Epidemic of a Novel, Cancer-causing Viral Disease, Oct 7 2009”, p. 3

⁷⁰² Cohen Commission Evidentiary Hearing Transcript, 24-Aug-2011, p. 100

⁷⁰³ Cohen Commission Ruling, 23-June-2011, p. 1

⁷⁰⁴ Cohen Commission Ruling, 23-June-2011, p. 1

On April 29, after withdrawing the above petition,⁷⁰⁵ AQUA filed another, which was again opposed by British Columbia and the BCSFA.⁷⁰⁶ This second petition called for changes to “the scope of documents that are caught by the confidentiality undertaking.”⁷⁰⁷ Though Cohen ultimately ruled that “participants and their counsel should be released from their [confidentiality] undertakings in relation to [...] written submissions”, he tasked Commission Counsel with reviewing all such submissions in order to redact “any references to information drawn from compelled documents.”⁷⁰⁸ If Morton wanted these documents to be made public, in other words, she needed to enter each of them into evidence during the Commission’s hearings. Accordingly, Morton placed these documents in a binder, which she then studied. That way, Morton explained to me, she would be “prepared for questions from the fish farmers and the government on the issue of the sockeye collapse.”⁷⁰⁹ Morton and McDade determined that this was “the best way to get the whole story into evidence, through his questioning.”⁷¹⁰ At some point, however, Morton went beyond simply adding as-is documents to a binder. Morton excerpted parts of these documents, added commentary to stitch these excerpts together as well as to provide additional context, organized these excerpts and her commentary into sections, and arranged the final package according to her understanding of “[w]hat is happening to the Fraser sockeye?”, the title of the resulting document which is dated August 14, 2011.⁷¹¹ I have referred to this document below as the Morton Report.

The Morton Report does not, it should be noted, follow any established style guide, and the line between Morton’s commentary and referenced material is not always apparent. When referencing confidential documents, for instance, Morton typically (though not always) included a brief description of the document, followed by the alphanumeric identifier associated with that document in Ringtail.⁷¹² Morton also uses parenthetical citations to reference secondary sources, though these are occasionally unclear, and no bibliography is provided. As a result, it is not clear precisely how many primary or secondary documents Morton referenced in compiling this document. In spite of these issues, which likely contributed to its vulnerability in a courtroom setting, the Morton Report offers a suggestive look at the DFO’s internal response to the decline

⁷⁰⁵ Cohen Commission Ruling, 23-June-2011, p. 1

⁷⁰⁶ Cohen Commission Ruling, 23-June-2011, p. 1

⁷⁰⁷ Cohen Commission Ruling, 23-June-2011, p. 18

⁷⁰⁸ Cohen Commission Ruling, 23-June-2011, pp. 19-20

⁷⁰⁹ Interview with Alexandra Morton, 14-June-2019

⁷¹⁰ Interview with Alexandra Morton, 14-June-2019

⁷¹¹ Cohen Commission Exhibit #1976, “[Formerly For ID DDD] - Morton, What is Happening to the Fraser Sockeye?, Aug 14 2011”, p. 1

⁷¹² The vast majority of confidential documents disclosed to the Cohen Commission came from the federal government. The alphanumeric identifier for these documents always begins with CAN (e.g., CANxxxxxx, where “xxxxxx” equals the document number in question). BCP refers to documents submitted by the provincial government, whereas BCS denotes documents disclosed by the B.C. Salmon Farmers Association, etc.

of Fraser River sockeye which indicates, among other things, that high-level employees in the DFO's Pacific Region were actively engaged in the production of agnotological uncertainty concerning the impact of salmon farms on Fraser River sockeye.

"After reviewing the documents submitted to the Cohen Inquiry", Morton writes in the preamble to the Morton Report, "it is clear something has been increasingly negatively impacting the Fraser sockeye since the early 1990s."⁷¹³ In the sections which follow, Morton draws on her own research and experience, as well as confidential documents and secondary sources, in an attempt to explain the decline of Fraser River sockeye. In a section concerning increases in pre-spawn mortality among Fraser River sockeye, for instance, Morton draws on internal emails to suggest that though DFO pathologists had made every effort to make sense of what was happening, their efforts were "critically hampered by [a] lack of funds" as well as an apparent lack of interest in the subject among those responsible for making funding decisions.⁷¹⁴ In a quoted exchange concerning "why the majority of the Nadina Channel population died" before spawning, for instance, one DFO employee lamented that "[o]ur system to try and solve these problems [...] appears to be very broken."⁷¹⁵ Morton also goes on to quote additional emails involving Kristi Miller, which together suggest that DFO management was not eager to fund her research.⁷¹⁶

Morton also goes on to raise questions concerning the provincial government's role in regulating the health of farmed fish. By drawing on secondary sources, Morton characterizes the Infectious Salmon Anaemia virus (ISAv) as one for which "[t]here is no gold standard test."⁷¹⁷ Then, Morton quotes a number of audit reports prepared by Gary Marty—the provincial government's fish pathologist—in which he repeatedly identifies the "classic signs" of ISAv, but stops short of identifying the virus because it "has never been isolated from fish in BC", "identified in British Columbia", or "identified in BC."⁷¹⁸ These documents may have been the subject of AQUA's application to relieve Morton of her undertaking of confidentiality, as discussed above.

Morton later explains how her sea-lice studies differed from those conducted by DFO researchers, using maps to differentiate them on the basis of how well they accounted for local factors.⁷¹⁹ Morton notes that she invited DFO researchers to observe her sea lice research in the Broughton Archipelago, before recounting her visit to the Pacific Biological Station to observe Simon Jones's laboratory study concerning the impact of sea lice on pink salmon. Morton arrived "at about 3:30 in the afternoon" only to find that "the lights were off in the lab" because Jones was

⁷¹³ Cohen Commission Exhibit #1976, p. 1

⁷¹⁴ Cohen Commission Exhibit #1976, p. 9

⁷¹⁵ Cohen Commission Exhibit #1976, p. 9

⁷¹⁶ Cohen Commission Exhibit #1976, p. 17

⁷¹⁷ Cohen Commission Exhibit #1976, p. 31

⁷¹⁸ Cohen Commission Exhibit #1976, pp. 30-31

⁷¹⁹ Cohen Commission Exhibit #1976, pp. 42-44

apparently “manipulating the daylight hours”, denying her the chance to observe the experiment.⁷²⁰

Finally, Morton draws on internal DFO correspondence to illustrate how the DFO’s “media lines” evolved during the 2009 sockeye run.⁷²¹ In early August, the DFO started working on “a letter to the editor on the sea lice aspects of” the decline of sockeye.⁷²² On August 19, this letter stated that sea lice are not likely the cause of the collapse, leading Andrew Thomson to suggest that, if this is the most definitive statement the DFO can make, they “may not want to publicize the letter at all.”⁷²³ Later that same day, Terry Davis recommends stating that sea lice “cannot explain the lower-than-expected sockeye runs this year”, despite Thomson’s admission that he had “no data [...] on what the [sea-lice] levels on the farm were.”⁷²⁴ Laura Richards then cautioned against citing Simon Jones’s sea-lice laboratory study as the “the field situation could be quite different with, for example, multiple infection periods, and with sockeye.”⁷²⁵ “The stronger message”, Richards added, “would be [to point to] poor returns elsewhere on the coast”, where sockeye do not encounter salmon farms.⁷²⁶ By September 1, however, all caveats and qualifiers were removed, and Paul Sprout—the DFO’s Regional Director General—claims in a letter to the editor that it is “clear that sea lice from fish farms are not the explanation for the extremely poor marine survival of Fraser River sockeye.”⁷²⁷

On September 7, 2011, Morton was called to testify before the Commission not as an expert witness, but as part of a perspectives panel titled “Perspectives on Management, Risks and Finfish Aquaculture.”⁷²⁸ Morton was joined on this panel by Catherine Stewart—campaign manager for the Living Oceans Society and its Coastal Alliance for Aquaculture Reform (CAAR) program⁷²⁹—as well as Clare Backman—the Director of Sustainability for Marine Harvest Canada⁷³⁰—and Mia Parker, a manager with the DFO’s aquaculture directorate.

Interestingly, Mia Parker was asked to participate in this hearing not because of her role with the DFO, but because of her prior work experience in the aquaculture industry. This transition had occurred so recently that it was not reflected on the curriculum vitae submitted into evidence along with Parker’s testimony.⁷³¹ Consequently, Parker—a DFO employee—effectively

⁷²⁰ Cohen Commission Exhibit #1976, p. 44

⁷²¹ Cohen Commission Exhibit #1976, p. 45

⁷²² Cohen Commission Exhibit #1976, p. 45

⁷²³ Cohen Commission Exhibit #1976, p. 45

⁷²⁴ Cohen Commission Exhibit #1976, p. 46

⁷²⁵ Cohen Commission Exhibit #1976, p. 46

⁷²⁶ Cohen Commission Exhibit #1976, p. 46

⁷²⁷ Cohen Commission Exhibit #1976, p. 46

⁷²⁸ Cohen Commission Evidentiary Hearing Transcript, 07-Sept-2011, p. 1

⁷²⁹ Cohen Commission Exhibit #1799, “Curriculum vitae of Catherine Stewart”, p. 1

⁷³⁰ Cohen Commission Exhibit #1800, “Curriculum vitae of Clare Backman”, p. 1

⁷³¹ Cohen Commission Exhibit #1801, “Curriculum vitae of Mia Parker”, p. 1

participated in this hearing as a pro-aquaculture witness. Whereas Parker jumped from the aquaculture industry to the DFO, Backman's career trajectory took him in the opposite direction. Backman, a biologist, worked for the DFO as both a manager and director from 1985 to 1987.⁷³² Then, in 1991, after spending three years as an operations manager for Royal Pacific Sea Farms Ltd., Backman joined the B.C. Ministry of Agriculture, Food and Fisheries, where he would remain until the year 2000.⁷³³ During his tenure with the provincial government, Backman was tasked with engaging in "salmon farming policy development", assessing the "operational compliance of all marine and freshwater finfish aquaculture facilities in British Columbia", and providing "[t]echnical specialist advice to [the] ministry executive."⁷³⁴ In other words, Backman helped to develop the regulatory framework with which he would later interface in his roles at Stolt Sea Farm Inc. (from 2000 to 2004), and Marine Harvest (beginning in 2005). Though Martland would ask each witness to speak to the broader question of whether the DFO can "both promote and regulate the aquaculture industry",⁷³⁵ he did not make a point of questioning the movement of labour between the industry and its regulators.

According to Backman, however, there exists no such conflict. Though he did concede that, to an outside observer, the DFO may appear conflicted, Backman also argued that "in a modern world, in the modern system of governance, it's quite common that you have an agency that actually plays dual roles."⁷³⁶ By way of an example, Backman points to the "operation of health and safety officers working within a particular industry where they're promoting the compliance with operation of health and safety" while also "bringing forward the regulations."⁷³⁷ Seizing upon Justice Hinkson's redefinition of salmon farms as a "part of the overall British Columbia Fishery" or as "a fishery unto themselves",⁷³⁸ Parker argued that the present regulatory arrangement is "consistent with how other commercial fisheries are managed in Canada", as the DFO has long "both promoted Canadian capture fisheries while, at the same time, making sure they meet national and international regulations."⁷³⁹

As Catherine Stewart pointed out, however, the DFO's "constitutional mandate to protect ocean and ecosystem health [and] wild stocks" undoubtedly conflicts with its "political mandate [...] to be a promoter and an advocate for the aquaculture industry."⁷⁴⁰ In order to address this conflict, Stewart argued, the DFO's "promotional responsibility [should] be shifted to another

⁷³² Cohen Commission Exhibit #1800, "Curriculum vitae of Clare Backman", p. 1

⁷³³ Cohen Commission Exhibit #1800, p. 1

⁷³⁴ Cohen Commission Exhibit #1800, p. 1

⁷³⁵ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 7

⁷³⁶ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 11

⁷³⁷ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 11

⁷³⁸ *Morton v. British Columbia (Agriculture and Lands)*, [2009] BCSC 136

⁷³⁹ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, pp. 11-12

⁷⁴⁰ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 7

department” so that they can “effectively perform their primary mandate.”⁷⁴¹ Morton agreed with Stewart on this point, but took it a step further in arguing that “[no one] can regulate this industry correctly in the ocean”, suggesting a wholesale shift to closed-containment facilities instead.⁷⁴² In addition to generating “big gaps” in the DFO’s “regulatory regime”, Stewart later added, this conflict of interest has resulted in “misaligned” funding priorities.⁷⁴³ On this view, the aquaculture industry derives direct benefits from hidden subsidies, and indirect benefits arising out of its embeddedness in a regulatory framework which ignores the existence of, and potential impact on, wild salmon. Though Stewart went on to concede that existing regulations stipulate “what the farmers can administer and the impact on their fish stocks, what is shipped into the marketplace, [and] residues in product being delivered to the marketplace”, she also suggested that all such regulations are solely concerned with farmed fish.⁷⁴⁴ These regulations have nothing to say, in other words, about the potential for parasiticides administered to farmed fish to affect “wild salmon and [...] other species in that surrounding environment.”⁷⁴⁵

When it was Alan Blair’s opportunity to cross examine the panel on behalf of the BCSFA, he sought to turn this discussion on its head with the aid of the precautionary principle. First articulated as part of the 1992 Rio Declaration,⁷⁴⁶ the precautionary principle states that “[w]here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”⁷⁴⁷ When Blair asked Parker to explain how the precautionary principle informs “the regulation and management of salmon farming”,⁷⁴⁸ she responded in this way:

The precautionary principle [...] doesn’t say when in doubt, don’t. It says in the absence of scientific certainty of risk, proceed cautiously and put measures in place as though those risks exist and deal with them. [...] We can’t guarantee there’s risk, we definitely can’t guarantee there isn’t risk. So let’s put measures in place as though the risk exists. Let’s collect information, let’s do more research, and then let’s adapt those measures that we put in place.⁷⁴⁹

As an example of this approach, Parker points to the requirement that salmon farms be sited in accordance with a “one-kilometre setback from a fish-bearing stream.”⁷⁵⁰ This restriction was

⁷⁴¹ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 8

⁷⁴² Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 10

⁷⁴³ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 19

⁷⁴⁴ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 23

⁷⁴⁵ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, pp. 23-24

⁷⁴⁶ See United Nations (1992). For analyses of the precautionary principle in a variety of non-salmon farming contexts, see Les Levidow (2001); Henk Van den Belt and Bart Gremmen (2002); Herbert Gottweis (2005); David Michaels (2006); and Linsey McGoey (2009).

⁷⁴⁷ Cohen Commission Policy and Practice Report #02, p. 9

⁷⁴⁸ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, pp. 25-26

⁷⁴⁹ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 26

⁷⁵⁰ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 26

based not on specific “knowledge that one kilometre was enough or too much, or that there was a definite risk there”, but on the precautionary principle.⁷⁵¹

Some time later, Blair asked either Morton or Stewart to speak to “the abstract nature of the lack of consensus in science.”⁷⁵² “The way I see it”, Morton offered in response, “the science that promotes salmon farming is what the salmon farmers use.”⁷⁵³ For Morton, on the other hand, the science was clear. “Where there’s fish farms”, she went on to argue, “there’s sea lice.”⁷⁵⁴ This prompted an interruption from Blair, who characterized sea lice as “a naturally occurring phenomena.”⁷⁵⁵ Then, as Morton tried to describe her findings, Blair repeatedly interrupted to object to anything he perceived to be an overreach or overgeneralization. When Blair went on to suggest that the science concerned with salmon farming is “like a ping-pong match, or a tennis match”, Morton argued that it was more like “mud slinging.”⁷⁵⁶

[Blair]: Is the mud slinging, from your opinion, only coming from one direction? Is it only the salmon farmers who are flinging mud, or a little bit of mud going both ways?

[Morton]: I’m defending myself at this point.

[Blair]: I’m sorry?

[Morton]: I’m defending myself at this point. I’m not going to just quietly take it because it needs to be argued back.

[Blair]: But the question started around diverse science and whether or not there’s a conflict in science or whether there’s a consensus. It’s clear there’s no consensus. My question of you is do you agree that on both sides of that equation, the scientific debate, parties are coming to different conclusions for different reasons? Do you agree with that?

[Morton]: Definitely for different reasons, but the biology of it, Mr. Blair, is extremely easy and whether you’re talking to a scientist in Norway, Scotland, Ireland, Chile, Eastern Canada, or British Columbia, because I talk to them all, fish farms definitely amplify sea lice, and we have got to move past that.

[Blair]: And so all of the reports that would disagree with that position of yours, you say are categorically wrong?

[Morton]: They do not disagree with that position, it’s their interpretation.⁷⁵⁷

“I see”, Blair replied, before addressing the other witnesses for the remainder of his allotted time.⁷⁵⁸

When the hearing reconvened following the noon recess, it was McDade’s turn to cross examine the witnesses on behalf of AQUA. McDade wasted little time laying the necessary groundwork for submitting the Morton Report—AQUA’s black box—into evidence. To that end, McDade established that Morton had not only spent “close to 2,000 hours” reviewing confidential DFO documents in Ringtail, but also that her earliest involvement in “aquaculture-related issues”

⁷⁵¹ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 27

⁷⁵² Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 45

⁷⁵³ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 45

⁷⁵⁴ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 46

⁷⁵⁵ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 46

⁷⁵⁶ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, p. 47

⁷⁵⁷ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, pp. 47-48

⁷⁵⁸ Cohen Commission Evidentiary Hearing Transcript, 7-Sep-2011, pp. 48-57

dated back to 1989.⁷⁵⁹ In conducting her own research on salmon farm impacts, McDade went on to note, Morton “actually work[s] with real fish in the field.”⁷⁶⁰ By her own estimation, Morton had personally examined upwards of 26,000 fish in the field since 2001.⁷⁶¹ Of those qualified as experts by the Cohen Commission in the preceding weeks, Morton went on to suggest, only “Dr. [Brendan] Connors [...] has actually looked at the fish.”⁷⁶² Thus, it was on the basis of Morton’s “research in the [Ringtail] database” as well as her “extensive investigations” in the field that AQUA attempted to submit the Morton Report into evidence.⁷⁶³ In response, the lawyers representing the federal government, provincial government, and BCSFA all rose to their feet to register objections.

Mitchell Taylor argued for the federal government that Morton was “here to give her evidence *viva voce* [i.e., orally], not to tender a written document.”⁷⁶⁴ Given that this document contains not just “Ms. Morton’s interpretation of documents”, but also “[her] commentary on other witnesses and what other witnesses say”, Taylor suggested, it does not constitute “factual evidence.”⁷⁶⁵ Alan Blair argued for the BCSFA that this is a document which “purports to be a quasi-expert report” authored by a witness who was not qualified to appear before the Commission as an expert.⁷⁶⁶ In reaching “far beyond her expertise”, Blair continued, Morton had authored a report which contained little more than “hearsay and speculation.”⁷⁶⁷ Blair even went as far as to intimate that, in failing not just to separate her “personal views from professional activities”, but also to “be impartial and factual when expressing professional opinions”, Morton had violated “the *Code of Ethics* of a registered professional biologist.”⁷⁶⁸ In this report, Clifton Prowse argued for the provincial government, Morton purports “to provide expert opinion on matters particularly of disease which are well outside of [her] realm of expertise.”⁷⁶⁹

On the other hand, Tim Leadem argued for CONSERV that this is not an issue of “admissibility so much as it is a question of probative value” before Commission Counsel stepped in to “ask members of the gallery [...] to please abstain from making noise during these proceedings.”⁷⁷⁰ Brenda Gaertner, speaking for “all the counsel of First Nations” present at this hearing, concurred with Leadem that is “a matter of weight.”⁷⁷¹ After registering these arguments,

⁷⁵⁹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 59-60

⁷⁶⁰ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 60

⁷⁶¹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 60-61

⁷⁶² Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 61

⁷⁶³ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 62-63

⁷⁶⁴ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 63

⁷⁶⁵ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 64

⁷⁶⁶ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 64

⁷⁶⁷ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 66

⁷⁶⁸ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 67

⁷⁶⁹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 67

⁷⁷⁰ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 67-68

⁷⁷¹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 68

Cohen committed to issuing “a separate ruling with respect to the admissibility of this particular document” at a later date.⁷⁷² Though Cohen would ultimately conclude that the Morton Report would be admissible as evidence, he tempered this ruling by noting that Morton was not “called to testify [...] an expert witness”,⁷⁷³ and inviting other participants to “make submissions on the weight that should be given to [it].”⁷⁷⁴

Before the Commission adjourned for the day, however, Steven Kelliher cross examined Morton and her co-panellists on behalf of the Aboriginal Aquaculture Association (AAA). Kelliher asked each of the panellists whether salmon farms and wild fish can co-exist on the B.C. coast. In the process of raising this question, however, Kelliher suggested that the majority of those qualified by the Commission as experts on the issue of aquaculture had already affirmed that “open-pen fish farming could [...] coexist with thriving wild stocks.”⁷⁷⁵ Whereas Parker and Backman responded to this proposition in the affirmative, Stewart objected to the framing of the question, noting that the expert affirmations cited by Kelliher were “very qualified.”⁷⁷⁶ Salmon farms and wild fish can only co-exist, Stewart argued, if the production levels of the former were “[s]eriously limited.”⁷⁷⁷ Morton, likewise, rejected Kelliher’s proposition, leading to the following exchange.

[Kelliher]: So you tell the First Nations, such as Kitasoo, to pull their nets out of the water and close down the processing plants; is that right?

[Morton]: If I had a choice between the wild salmon and the ability to bring them back, and an industry that brings salmon from Atlantic and feeds them on fish from Chile, in a small port town like Kitasoo and uses them as an example that all other First Nations are supposed to swallow, with the scientists that have been up here before, you have preyed on their respect for First Nations. Out of respect for First Nations, they acquiesced to you. You’re a very skilled lawyer. But what about the people of the Broughton? What about the people that are in the audience right now who have said no to the industry and are being run over as if they don’t count. What about them?

[Kelliher]: Can you [...] explain this to me, Ms. Morton, the names that I read out earlier are well-respected scientists with a very significant history and body of knowledge in this sphere. All of them carry Ph.D.s. All of them say that the wild stocks can coexist within water nets. You are the only one that says no. Why is that?

[Morton]: That’s because I don’t work for a university. I don’t work for the Government of Canada. I don’t work for the Province of B.C. I don’t work for a First Nations community. I am completely independent. I might be the only independent –

[Kelliher]: You are pure, are you? You’re the only one that isn’t corrupted by business, by government, by a university; is that correct?⁷⁷⁸

“Perhaps”, Morton responded, before the Commission adjourned for the day.⁷⁷⁹

⁷⁷² Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 69-70

⁷⁷³ Cohen Commission Ruling, 11-Oct-2011, p. 7

⁷⁷⁴ Cohen Commission Ruling, 11-Oct-2011, p. 9

⁷⁷⁵ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 103

⁷⁷⁶ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 103-105

⁷⁷⁷ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 105

⁷⁷⁸ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, pp. 105-106

⁷⁷⁹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 106

Later that evening, Morton vented her frustration by making a “scathing” post to her blog (Hume, 2011d), which she subsequently deleted. Morton also emailed Backman to ask for clarification⁷⁸⁰ concerning his claim that “[t]here are two Chinook salmon farms that continue to operate in Discovery Pass.”⁷⁸¹ When the Commission reconvened this hearing at 10:00 the next morning, Associate Commission Counsel Brock Martland admonished Morton for engaging with the evidence on her blog, and in an email she sent to Backman, despite having been told “not to speak about [her] evidence with anyone”.⁷⁸²

When it was Mitchell Taylor’s turn to cross examine the panel for the federal government, he followed Kelliher’s lead in asking each witness whether salmon farms can coexist with wild salmon anywhere on the B.C. coast.⁷⁸³ Stewart—having argued earlier in the day that open-net pen salmon farms are only profitable because they are able to externalize the costs associated with waste disposal by dumping their “food waste” and “fecal waste” into the ocean⁷⁸⁴—suggested that the aquaculture industry could co-exist with wild fish only by initiating a wholesale shift towards land-based closed-containment facilities.⁷⁸⁵ Taylor then turned his attention to Morton, who echoed Stewart’s sentiment by suggesting that there are no places where “open net pens can coexist with wild fish.”⁷⁸⁶ Taylor then raised *Morton v. British Columbia (Agriculture and Lands)*, intimating in the process that Morton lacked an appreciation for the complexities characterizing not only the regulatory framework she successfully challenged, but also the underlying subject matter.⁷⁸⁷ Taylor also intimated that Morton earned her undergraduate degree from an institution that is best known not for producing reputable biologists, but for encouraging its students to engage in “political activism.”⁷⁸⁸ As Morton’s supporters in the gallery audibly expressed their frustration with Taylor’s questioning,⁷⁸⁹ Cohen pleaded with them to “allow counsel to do their work.”⁷⁹⁰

Having portrayed Morton as a politically-motivated researcher that is devoid of credibility, Taylor then raised the issue of Morton’s blog.⁷⁹¹ Despite still being under oath, Taylor noted, Morton posted to her blog last night in addition to emailing Backman.⁷⁹² Morton then apologized,

⁷⁸⁰ Interview with Alexandra Morton, 14-June-2019

⁷⁸¹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 84

⁷⁸² Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 1

⁷⁸³ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 38-39

⁷⁸⁴ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 13-14

⁷⁸⁵ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 38-39

⁷⁸⁶ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 39

⁷⁸⁷ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 39-40

⁷⁸⁸ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 43

⁷⁸⁹ Interview with Alexandra Morton, 14-June-2019

⁷⁹⁰ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 43

⁷⁹¹ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 43-44

⁷⁹² Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 44-45

and explained that she “didn’t realize [she] was breaking the rules.”⁷⁹³ Taylor proceeded to review in detail the blog post in question, characterizing as “wrong” a number of the statements made therein.⁷⁹⁴ Taylor even went on to litigate two posts Morton made to her blog the week prior, one of which featured a satirical cartoon depicting Cohen calling for “a short break” on account of the fact that the pants of all four witnesses “might be on fire.”⁷⁹⁵ In addition to suggesting that these blog entries amount to a violation the *Code of Conduct* for registered professional biologists,⁷⁹⁶ Taylor went on to set Morton apart from “the likes of Dr. Korman, Noakes, Connors, Jones, Beamish, Hargreaves, Johnson” – that is, those recognized as experts by the Commission.⁷⁹⁷ In so doing, Taylor positioned Morton’s “belief[s]” or “perspective[s]” as being firmly opposed to those of the recognized experts,⁷⁹⁸ the only witnesses permitted to offer opinions for Cohen’s consideration. Morton, placed “on this panel as a layman”, lamented that the Commission does not “recognize that [she’s] done over 20 papers on sea lice.”⁷⁹⁹

6.1.3.4 – Morton, AQUA Offer a Blueprint for Closure

In its final submission, AQUA argued that “the primary cause of the failure of the 2009 sockeye return was disease, and that salmon farms along the path of the migrating salmon played a significant role in the origin or amplification of that disease.”⁸⁰⁰ “Direct empirical evidence of disease causation”, AQUA went on to argue, “is not feasible in salmon populations, and could not be expected here.”⁸⁰¹ AQUA also criticized the Commission’s format and approach, which it suggested “did not allow [...] participants [...] the opportunity to call evidence or prove the harms of fish farms.”⁸⁰² AQUA was forced, instead, to rely “on evidence called by the Commission counsel and on cross-examination.”⁸⁰³ On the basis of this evidence, AQUA argued that both the provincial and federal governments failed to adequately consider “the potential effects of disease on wild salmon” in making siting decisions for salmon farms.⁸⁰⁴ Calling the DFO’s “decision to ‘grandfather’” existing sites “unwise”, AQUA called on Cohen not just to “ensure that this dramatic

⁷⁹³ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 45-46

⁷⁹⁴ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, pp. 46-49

⁷⁹⁵ Cohen Commission Exhibit #1839, “Morton, Blog entitled Cohen Inquiry Aquaculture Hearings, Aug 31 2011”, p. 3.
The witnesses depicted appear to be Trevor Swerdfager, Gary Marty, Peter McKenzie, Mark Sheppard, each of whom appeared as witnesses at the 31-Aug-2011 aquaculture hearing.

⁷⁹⁶ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 52

⁷⁹⁷ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 55

⁷⁹⁸ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 55

⁷⁹⁹ Cohen Commission Evidentiary Hearing Transcript, 8-Sept-2011, p. 55

⁸⁰⁰ Final Submission (Initial), Aquaculture Coalition, p. 1 (PDF pagination)

⁸⁰¹ Final Submission (Initial), Aquaculture Coalition, p. 1 (PDF pagination)

⁸⁰² Final Submission (Initial), Aquaculture Coalition, p. 1 (PDF pagination)

⁸⁰³ Final Submission (Initial), Aquaculture Coalition, p. 1 (PDF pagination)

⁸⁰⁴ Final Submission (Initial), Aquaculture Coalition, p. 3 (PDF pagination)

oversight is corrected”, but also to call for the removal of any salmon farms situated along the migratory routes of Fraser River sockeye.⁸⁰⁵

AQUA also suggested that the DFO’s promotion of salmon farming has “frequently undermined its role in the protection of wild sockeye from the aquaculture industry”, in addition to asserting that the federal government’s “political support of the [...] aquaculture industry [...] has no place in the mandate of DFO if wild sockeye are to survive.”⁸⁰⁶ As a consequence of this conflict, the DFO has not only disproportionately funded research intended to “support the industry” while largely withdrawing its support for projects concerned with the impact of the same on wild fish, it has also routinely engaged in “‘rebuttal science’, designed only to respond to public concern [over salmon farms].”⁸⁰⁷ Finally, while the DFO “claims to administer its programs pursuant to the ‘precautionary principle’”, AQUA suggests that this is not the case.⁸⁰⁸ Accordingly, AQUA calls on Cohen to “carefully consider the application of [the precautionary] principle and the inevitable risk to wild sockeye of disease from the aquaculture industry.”⁸⁰⁹

On October 17, 2011, Morton announced on her blog that the European strain of the Infectious Salmon Anemia virus (ISAv) had been “found in two young sockeye salmon” sampled by Simon Fraser University researcher Rick Routledge as part of his Rivers Inlet study.⁸¹⁰ Three days later, Commission Counsel compelled AQUA “to identify and disclose [...] documents in its possession or control relevant to the discovery of ISAv in wild Rivers Inlet sockeye.”⁸¹¹ By November 4, Cohen determined that additional evidentiary hearings would be needed to explore the implications of Routledge’s ISAv findings.⁸¹² On the basis of the evidentiary hearings which followed, AQUA concluded on December 29 that ISAv “is present in British Columbia”, in addition to suggesting that “the federal government does not take a precautionary or responsible approach to the risk and presence of disease in salmon in British Columbia.”⁸¹³

On April 23, 2012, AQUA, together with CONSERV, the First Nations Coalition, and the Cheam Indian Band petitioned Cohen to “re-open the hearings to receive evidence on the epidemiology and impacts of piscine orthoreovirus (PRV) and heart and skeletal muscle inflammation (HSMI)” on wild B.C. salmon.⁸¹⁴ Ultimately, however, Cohen ruled that

[u]nlike a court, which has a permanent existence, a commission of inquiry is by definition temporary, and should not assume an ongoing supervision of issues arising in its hearings. I must strike a balance

⁸⁰⁵ Final Submission (Initial), Aquaculture Coalition, p. 3 (PDF pagination)

⁸⁰⁶ Final Submission (Initial), Aquaculture Coalition, p. 4 (PDF pagination)

⁸⁰⁷ Final Submission (Initial), Aquaculture Coalition, p. 4 (PDF pagination)

⁸⁰⁸ Final Submission (Initial), Aquaculture Coalition, p. 4 (PDF pagination)

⁸⁰⁹ Final Submission (Initial), Aquaculture Coalition, p. 4 (PDF pagination)

⁸¹⁰ Alexandra Morton Blog Entry, 17-October-2011, “Lethal Atlantic salmon virus found in BC sockeye”

⁸¹¹ Cohen Commission Ruling, 24-Nov-2011, p. 2

⁸¹² Cohen Commission Ruling, 24-Nov-2011, p. 5

⁸¹³ Final Submission (ISAv), Aquaculture Coalition, p. 1

⁸¹⁴ Cohen Commission Ruling, 16-May-2012, p. 1

between re-opening the hearings to consider further evidence on an issue that was considered to some degree in the earlier hearings, and the need for finality in the commission of inquiry's investigations.⁸¹⁵

Accordingly, Cohen opted not "to re-open the hearings once again to address this topic."⁸¹⁶

With that, Commissioner Cohen proceeded to draft the Cohen Report, his blueprint for closure. From the perspective of Cohen and his Counsel, Morton and AQUA formed part of, and cooperated in the mobilization of, the Commission's network. By following Morton, however, it becomes apparent that she actively resisted the Commission's attempts to neutralize contention at virtually every turn. Whereas the DFO's 2009 pre-season forecast was, as a non-human actor, unable to "change [itself] reflexively" or "voluntarily manage membership problems" (Star & Griesemer, 1989, p. 412), Morton pushed back against the Commission's attempts to relegate her to contributory expert status. Morton staked her claim to expertise on the number of fish she had examined in the field, asserting the importance of attending to the particulars of place in the process. Despite Morton and AQUA's best efforts to extend the Commission's inquiry, however, Cohen and his Counsel went ahead with the black boxing process.

6.1.4 – Cohen's Blueprint for Closure

In the Cohen Report, released in October 2012, Cohen concluded that there was no "smoking gun" or "single cause" capable of explaining the decline of Fraser River sockeye.⁸¹⁷ Cohen points, instead, to the cumulative effects of "Fraser River-specific stressors", "regionwide influences", but also by a much broader confluence of forces affecting the marine environment.⁸¹⁸ In order to assess these forces and their relative effects on Fraser River sockeye, Cohen asserted that "[k]ey knowledge gaps" must be filled.⁸¹⁹ These knowledge gaps are rooted, at least in part, in the DFO's failure to "undertake or commission research" into the stressors affecting Fraser River sockeye.⁸²⁰ Accordingly, Cohen offers a series of "recommendations for specific scientific research projects" intended to "develop important baseline data, provide better information about Fraser River sockeye and the stressors they face" as well as to "increase DFO's capacity to identify cause-effect relationships."⁸²¹ Together, these recommendations constitute Cohen's blueprint for closure, the central elements of which I have briefly reviewed below.

First, in keeping with the status quo, as expressed in "previous reports on the Fraser River salmon fishery and judgments of the Supreme Court of Canada",⁸²² Cohen argues that the

⁸¹⁵ Cohen Commission Ruling, 16-May-2012, p. 5

⁸¹⁶ Cohen Commission Ruling, 16-May-2012, p. 5

⁸¹⁷ Cohen Report, Vol. 3, p. 3

⁸¹⁸ Cohen Report, Vol. 3, p. 3

⁸¹⁹ Cohen Report, Vol. 3, p. 3

⁸²⁰ Cohen Report, Vol. 3, p. 4

⁸²¹ Cohen Report, Vol. 3, p. 5

⁸²² Cohen Report, Vol. 3, p. 10

“ultimate authority over the management of the Fraser River sockeye salmon fishery should continue to rest with the minister and that DFO ought to act in a manner that respects this authority.”⁸²³ Despite acknowledging that Indigenous witnesses and participants “expressed a desire to participate in the management of the fishery at the highest levels”, and that they have requested “stable, long-term funding” for this purpose, Cohen dismisses this possibility by stating that “many millions have already been spent for this purpose.”⁸²⁴ Cohen even goes on to admonish the DFO for having “created an expectation among some First Nations and stakeholders that a management process with shared ultimate authority over the fisheries is possible.”⁸²⁵ Though Cohen acknowledges that many First Nations have asserted their right to manage the fishery, he insists that it was never “within [his] mandate to assess the merits of such claims.”⁸²⁶

Second, in line with the above, Cohen also calls on the DFO to “articulate a clear working definition for food, social, and ceremonial (FSC) fishing.”⁸²⁷ First Nations communities, Cohen goes on to suggest, ought to “actively assist DFO in reaching appropriate FSC allocations by providing [...] information on the unique aspects of their culture that are relevant in determining their FSC needs.”⁸²⁸ By insisting that the DFO ought to have the final say on such matters, however, Cohen is calling on the department to unilaterally distinguish between the legitimate and illegitimate FSC needs for dozens of First Nations communities.

Third, Cohen calls on the federal government to relieve the DFO of its mandate to promote “salmon farming as an industry and farmed salmon as a product” by assigning this responsibility “to a different part of the Executive Branch.”⁸²⁹ Though it is inevitable, Cohen concedes, that conflicts will continue to arise “between the protection of wild stocks and the promotion of farmed salmon”, he nevertheless maintains that these conflicts can be managed “at the cabinet level.”⁸³⁰

Fourth, Cohen calls on the DFO to fully implement its 2005 Wild Salmon Policy, that which ostensibly serves as the “guiding document for the management of Fraser River sockeye and other salmon species.”⁸³¹ Rather than properly implementing the Wild Salmon Policy in its Pacific Region, Cohen argued, the DFO has focused instead on “programs such as salmonid enhancement, promotion of salmon farming, and building the management capacity of First Nations.”⁸³²

⁸²³ Cohen Report, Vol. 3, pp. 7-8

⁸²⁴ Cohen Report, Vol. 3, p. 8

⁸²⁵ Cohen Report, Vol. 3, p. 9

⁸²⁶ Cohen Report, Vol. 3, p. 10

⁸²⁷ Cohen Report, Vol. 3, p. 38

⁸²⁸ Cohen Report, Vol. 3, p. 38

⁸²⁹ Cohen Report, Vol. 3, p. 12

⁸³⁰ Cohen Report, Vol. 3, p. 12

⁸³¹ Cohen Report, Vol. 3, p. 13

⁸³² Cohen Report, Vol. 3, p. 14

Fifth, Cohen calls on the DFO to improve the “[t]ransparency and accessibility of fish health data from salmon farms” by allowing “non-government and non-industry researchers to have access to the fish health database for the purposes of original analysis.”⁸³³ Citing the difficulties faced by Kristi Miller in attempting to procure samples from salmon farms, Cohen also calls on the DFO to mandate that salmon farm operators “provide, on reasonable demand by DFO, fish samples [...] in a quantity and according to a protocol specified by DFO.”⁸³⁴ Interestingly, Cohen does not call on the DFO to extend this privilege to independent researchers like Alexandra Morton.

Finally, in order to better account for the uncertain effects of salmon farming, Cohen recommends a variety of applications of the precautionary principle. Though it is inarguable that “sockeye face some likelihood of harm occurring from diseases and pathogens on salmon farms”, Cohen explains, not enough is known about “farmed-wild fish interactions, and about how pathogens present on salmon farms affect Fraser River sockeye, to be able to quantify those risks to wild sockeye.”⁸³⁵ For Cohen, in other words, the particular manner with which the DFO applies the precautionary principle is a matter of risk tolerance. Accordingly, though he acknowledges that “British Columbians [...] generally expect a high level of protection” for Fraser River sockeye, Cohen also reasons that this is not the same thing as “accept[ing] no risk to this species.”⁸³⁶ “British Columbians”, Cohen goes on to suggest, “will not tolerate more than a minimal risk of serious harm to Fraser River sockeye from salmon farming.”⁸³⁷ It is on this basis that Cohen goes on to suggest a number of “reasonable and cost-effective measures” the DFO can take to “reduce the risk or reduce scientific uncertainty about that risk.”⁸³⁸

In order, then, to permit “eventually allow for a more statistically robust assessment” of the impact of salmon farms on Fraser River sockeye, Cohen calls on the DFO “collect fish health data from salmon farms into 2020”.⁸³⁹ Until such an assessment is possible, Cohen suggests, there should be “no increase to salmon farm production in the Discovery Islands.”⁸⁴⁰ Cohen also calls on the DFO to “explicitly consider proximity to migrating Fraser River sockeye when siting salmon farms”, in addition to requiring that “all licensed salmon farm sites [...] comply with current siting criteria.”⁸⁴¹ These siting criteria, Cohen adds, should be updated every five years so that they

⁸³³ Cohen Report, Vol. 3, pp. 18-19

⁸³⁴ Cohen Report, Vol. 3, p. 19

⁸³⁵ Cohen Report, Vol. 3, p. 21

⁸³⁶ Cohen Report, Vol. 3, p. 20

⁸³⁷ Cohen Report, Vol. 3, p. 20

⁸³⁸ Cohen Report, Vol. 3, p. 23

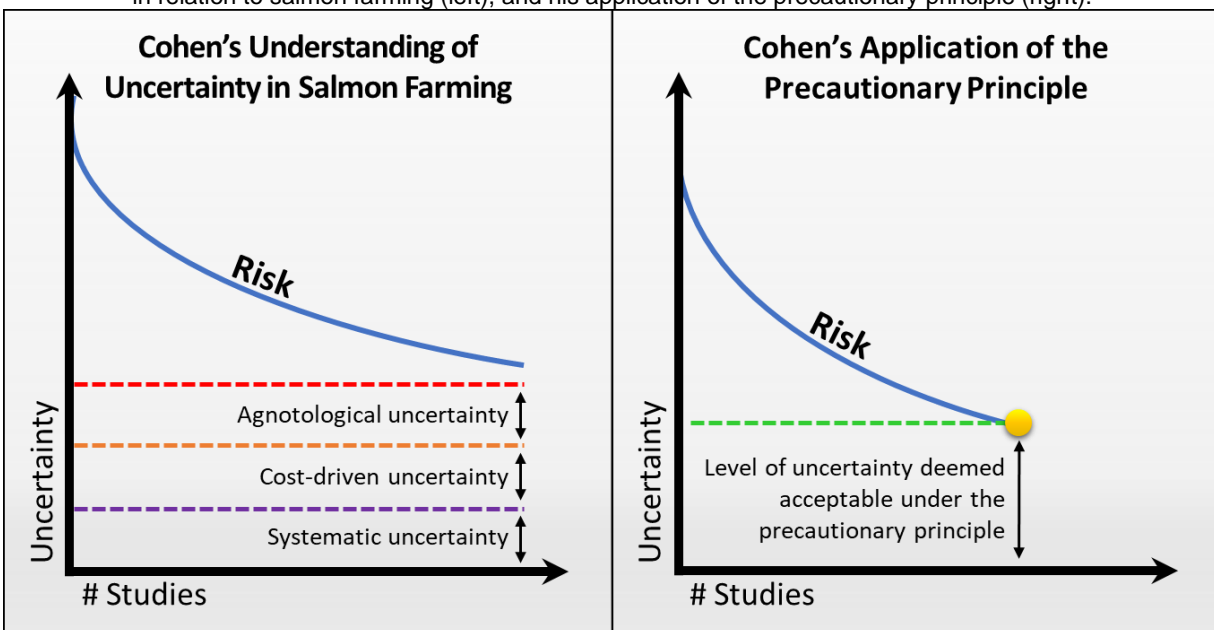
⁸³⁹ Cohen Report, Vol. 3, p. 25

⁸⁴⁰ Cohen Report, Vol. 3, p. 25

⁸⁴¹ Cohen Report, Vol. 3, p. 25

remain in line with the newest “scientific information.”⁸⁴² In addition, Cohen recommends that, “[i]f at any time between now and September 30, 2020, the minister of fisheries and oceans determines that net-pen salmon farms in the Discovery Islands [...] pose more than a minimal risk of serious harm to the health of migrating Fraser River sockeye salmon, he or she should promptly order that those salmon farms cease operations.”⁸⁴³ Unless, by this same date, the minister is satisfied that these salmon farms “pose at most a minimal risk of serious harm to the health of migrating Fraser River sockeye salmon”, the minister “should prohibit net-pen salmon farming in the Discovery Islands.”⁸⁴⁴

Figure 62: Illustrations depicting Cohen’s understanding of the relationship between risk, uncertainty, and research in relation to salmon farming (left), and his application of the precautionary principle (right).



Taken together, these recommendations suggest that even though uncertainty concerning the effects of salmon farming can never be eliminated entirely, it can be reduced to an acceptable level by merely conducting additional research. Uncertainty, on this view, is not only agnotological, but also systematic and cost-driven. Indeed, Cohen accepts that the risks associated with salmon farming can never be zero, just as he takes for granted that risk-reduction measures must be cost-effective. In forcefully asserting the minister’s ultimate authority over the fishery, moreover, Cohen accepts some level of risk arising out of agnotological uncertainty. No matter how this uncertainty is distributed, however, Cohen’s application of the precautionary principle leaves it to the minister’s discretion to ultimately determine what constitutes ‘minimal risk’ (Figure 62). In effect, then, this is

⁸⁴² Cohen Report, Vol. 3, p. 25

⁸⁴³ Cohen Report, Vol. 3, p. 26

⁸⁴⁴ Cohen Report, Vol. 3, p. 26

a blueprint for closure which entails the production of both knowledge and ignorance concerning the effects of open-net pen salmon farming on Fraser River sockeye.

6.2 – Discussion and Analysis

On the basis of the foregoing exploration of the social life of a commission of inquiry, I have identified three factors which contributed to the (de)legitimation of particular understandings of controversial salmon in the Cohen Commission: (1) the boundary work of expertise, (2) Commissioner Cohen's thoroughgoing emphasis on efficiently neutralizing contention, and (3) differing assessments concerning the importance of place.

6.2.1 – The Boundary Work of Expertise

Early in the Commission's mandate, Cohen and his Counsel engaged in the boundary work of expertise, shaping the conditions of possibility for the inquiry which followed, in addition to paving the way for additional forms of boundary work.

In seeking to create a black box capable of managing, neutralizing, and ultimately containing salmon controversies, Commissioner Cohen set about building and mobilizing a network. To that end, Commissioner Cohen—with the aid of his executive team, Counsel, and Science Advisory Panel (SAP)—categorized all those with an interest in the Commission's inquiry “as legitimate or illegitimate commentators” (Collins & Evans, 2002, p. 242). Cohen placed those he understood to be legitimate commentators in the Commission's core-set, where he tasked them with offering expert-witness testimonies and producing technical reports with the ultimate aim of making their “technical expertise” his own.⁸⁴⁵ Contributory experts—that is, commentators with marginal legitimacy—were classified as non-expert witnesses, and placed in the ring surrounding the core-set. Non-expert witnesses were relegated to testifying on perspectives panels, or asked to testify on issues which do not “truly [require] expertise” (Ratushny, 2009, p. 323). In the overall, Cohen and his Counsel leaned heavily on those classified as core-experts—and, to a lesser degree, contributory experts as well—to provide the Commission with crucial evidence for its inquiry.

The same could not be said, however, of those occupying the outer-most rings of the Commission's target diagram (see Figure 43) – that is, those possessing little more than the “common stock of knowledge” (Ratushny, 2009, p. 323). Interestingly, however, whereas Harry Collins & Robert Evans (2002) effectively conceive of the outer-most ring as an undifferentiated mass (p. 245), Cohen and his Counsel bifurcated this group by placing those with a “direct and substantial interest” in the Commission's inquiry closer to the core.⁸⁴⁶ In order to further

⁸⁴⁵ Cohen Report, Vol. 3, p. 130

⁸⁴⁶ Cohen Commission Ruling, 14-Apr-2010, p. 3

differentiate the peripheral rings, Cohen and his Counsel called on core-experts to “empower” participants (including eight Indigenous participant-coalitions, each of which was obliged to participate through a legal representative) with interactional expertise.⁸⁴⁷ Prior to “empower[ing]” the Commission’s participants and participant-coalitions with biological expertise, these core-experts made a point to acknowledge the value and importance of traditional ecological knowledges,⁸⁴⁸ even as they proceeded to provide an expert account of the life-cycle of Fraser River sockeye without the direct involvement of an Indigenous expert.

The Cohen Commission’s ambivalent treatment of traditional ecological knowledges is consistent with what Timothy Neale, Rodney Carter, Trent Nelson, and Mick Bourke (2019) have described as a “fixation” on Indigenous knowledges in settler colonial nations which “embeds our understanding of Indigenous peoples less within their lives and experiences and more within their apparent alterity” (pp. 353-354). This is illustrative of a “key problem”, they continue,

[...] of participatory governance more generally, namely their failure to reconfigure power relations. The many techniques, programmes and forums devised to include or collaborate with both Indigenous and non-Indigenous communities or publics affected by a given policy matter have often simply reconstructed the ‘dynamics of closure and control that they seek to overcome’. By deploying a participatory approach, state actors may often gain a social licence while continuing to retain the power to parse between stakeholders, excluding some and including others who will then have their demands diffused through exhausting consultative processes. (p. 354)

Indeed, by engaging with those on the peripheral regions of the Commission’s target diagram, Cohen and his Counsel were aiming not to inform the Commission’s inquiry, but to acquire the social licence to black box peripheral perspectives without affording them any evidentiary value.

Significantly, whereas the Commission’s participants and participant-coalitions are a perfect fit for the ring which sits between contributory experts at one end, and the common stock of knowledge at the other, neither Cohen nor his Counsel are so easily categorized. In fact, even though Cohen and his Counsel form part of the Commission’s network (see Figure 51), they can only be situated somewhere beyond, or outside of, the Commission’s boundaries of expertise. This is not to suggest, however, that Collins and Evans’s “knowledge science” (p. 240) is poorly suited to making sense of the role that the boundary work of expertise played in the Commission. Indeed, Collins and Evans’s taxonomy of expertise does not confront the role of the taxonomist. “The trick”, Collins and Evans (2002) suggest, is to simply “proceed with an imperfect set of classifications”, rather than to allow oneself to “become paralysed by these problems” (p. 255). Wittingly or otherwise, then, Cohen and his Counsel employed this trick by unaccountably drawing and re-drawing the Commission’s boundaries of expertise. For Cohen and his Counsel—like Collins and Evans before them—expediency was evidently more important than a meaningful,

⁸⁴⁷ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 11

⁸⁴⁸ Cohen Commission Evidentiary Hearing Transcript, 25-Oct-2010, p. 11; p. 51

thorough examination the status quo. This is not to suggest, of course, that the boundary work of expertise determined the outcome of the Commission's inquiry. I suggest, on the contrary, that the boundary work of expertise paved the way for additional forms of boundary work.

The DFO's 2009 pre-season forecast was also the subject of boundary work. The meaning, value, and significance of this forecast—an itinerant boundary object—varied considerably as it traveled from place to place, interacted with different actors, and came to be re-contextualized by the events which unfolded following its release. By late 2009, this forecast came to symbolize the DFO's mismanagement of the Fraser River fishery. This illustrates clearly that the DFO's epistemic authority over the fishery is derived not from “an omnipresent ether, but rather is enacted as people debate (and ultimately decide) where to locate the legitimate jurisdiction over natural facts” (Gieryn T. F., 1999, p. 15). Thomas Gieryn (1999) divides these “credibility contests” into three genres—protection of autonomy, expansion, and expulsion—each of which represents “an occasion for a different sort of boundary-work” (p. 15). When Sue Grant took to the witness stand to defend her work as the DFO's forecasting lead for Fraser River sockeye and pinks, she was clearly intent on protecting her professional autonomy as well as that of the DFO. By insisting that it would be inaccurate to characterize her forecast as inaccurate, Grant erected “interpretative walls” to safeguard the DFO's “professional autonomy over the [...] standards used to judge candidate claims to knowledge” (p. 17).

Throughout the Commission's proceedings, Morton both actively engaged in, and was subjected to, various forms of boundary work. First, by challenging the DFO's “exclusive right to judge truths” (pp. 16-17) with respect to the impacts of open-net pen salmon farming, Morton engaged in expansionary boundary work. Second, Morton faced expulsionary boundary work when she took to the Commission's witness stand, where she faced a barrage of questions designed to undermine her credibility as a researcher. This form of boundary work, which pits “orthodox science against heterodox, mainstream against fringe, established against revolutionary”, aims not to “challenge or attenuate the epistemic authority of science itself, but rather to deny privileges of the space to others” (p. 16). While, typically, expulsionary boundary work takes the form of a “contest between rival authorities, each of whom claims to be scientific” (pp. 15-16), Morton's credibility as a researcher was challenged not by other scientists, but by lawyers equipped with interactional expertise. In this way, it could be said that Morton found herself on the wrong end of expulsionary boundary-work by proxy.

6.2.2 – The Commission's Thoroughgoing Emphasis on Efficiently Neutralizing Contention

Citing a contingent yet undefined understanding of the public interest, Commissioner Cohen endeavoured throughout his mandate to neutralize contention in the most efficient manner

possible, thereby controversially limiting the Commission's ability to perceive alternative possibilities.

Early in his mandate, Commissioner Cohen actively sought the advice of past commissioners, in addition to relying on established conventions to inform his conduct as Commissioner. In recruiting his executive team, administrative staff, and Commission Counsel, Cohen hired many people with whom he had previously established a working relationship.⁸⁴⁹ In appointing his SAP, Cohen looked to established experts, who then directed him to a number of additional established experts. In commissioning several of these experts to write technical reports on "the best available existing research",⁸⁵⁰ Cohen privileged established knowledges and ways of knowing. In citing an understanding of the public interest which "favours an efficient and workable process",⁸⁵¹ moreover, Cohen neutralized contention by forcing First Nations communities and intertribal organizations into participant coalitions. In so doing, Cohen drastically understated the diversity of values, perspectives, priorities, interests, and concerns among, between, and even within Indigenous communities in B.C. This was particularly evident in Commissioner Cohen's handling of the Hałtzaqv Tribal Council's petition for individual standing in the Commission.

As a result of Cohen's reliance on the establishment responsible for giving rise to the controversy he was tasked with resolving, the Commission was simply not equipped to perceive a number of fundamental problems with the status quo in fisheries management. This was particularly evident in Cohen's treatment of the DFO's 2009 pre-season forecast, a controversial document which points to some of the more problematic assumptions underlying the status quo in fisheries management. Given Cohen's emphasis on rendering the Commission's work "manageable and efficient",⁸⁵² this document was subjected to minimal scrutiny. At no point did Cohen or his Counsel question whether there might exist alternative methods for forecasting Fraser River sockeye returns, despite having heard from Indigenous witnesses that traditional ecological knowledges may hold the key to generating more accurate predictions.⁸⁵³

Cohen's overriding emphasis on process efficiency proved to be problematic not just for Indigenous participants, but for Morton and AQUA as well. It is difficult, after all, to conduct a manageable and efficient investigation while effectively drowning in hundreds of thousands of documents, and Morton was intent on compelling the production of as many confidential documents as possible. Accordingly, AQUA (with CONSERV) petitioned Cohen to compel the

⁸⁴⁹ Cohen Report, Vol. 3, pp. 139-141

⁸⁵⁰ Cohen Report, Vol. 3, p. 121

⁸⁵¹ Cohen Commission Ruling, 10-May-2010, p. 2

⁸⁵² Cohen Report, Vol. 3, p. 132

⁸⁵³ Cohen Commission Evidentiary Hearing Transcript, 15-Dec-2010, p. 13

disclosure of documents pertaining to a larger sample of salmon farms over a greater period of time. In its final submission, moreover, AQUA criticized the Commission's format for not providing its participants with "the opportunity to call evidence or prove the harms of fish farms."⁸⁵⁴ Finally, despite forcing the Commission to re-open its investigation in late 2011 to explore the implications of the discovery of ISA in B.C. waters, AQUA failed to convince Cohen to re-open his investigation a second time in early 2012 to discuss PRV and HSMI. Cohen, having already failed to release his final report on time, was evidently determined to fulfill his mandate, and—by extension—to bring this controversy to an end. Throughout the Commission's proceedings, Cohen's thoroughgoing emphasis on efficiently neutralizing contention was itself the subject of considerable controversy, and I suggest that this same pattern held true for his blueprint for closure – indicating, among other things, that the underlying controversies cannot simply be compelled towards closure.

6.2.3 – The Importance (Irrelevance) of Place

Throughout the Commission's proceedings, understandings of controversial salmon were (de)legitimated by differing assessments concerning the importance of place.

Early in his mandate, for instance, Commissioner Cohen adopted an approach to his investigation that was developed for the Walkerton Inquiry – a commission of inquiry tasked with investigating the contamination of the drinking water supply of a small Ontario town. In seeking to emulate the Walkerton Inquiry's Research Advisory Panel with the Commission's own Science Advisory Panel (SAP), Cohen glossed over the distinctiveness of B.C. as a place—ignoring, for instance, the contested nature of the land itself—in addition to understating the importance of attending to the specificity of the underlying subject matter. In 2010, moreover, Cohen toured the province not because he deemed it an essential part of his investigation, but as a means of providing "context for the information [Cohen] would receive" during the Commission's evidentiary hearings.⁸⁵⁵ Furthermore, the Commission hosted public forums in community centres, school gymnasiums, and conference rooms, and not, say, on the Fraser River itself, or at important spiritual sites as identified by local First Nations. Cohen did, of course, observe Indigenous fisheries on the Bridge River and at Cheam Beach, but it is unclear whether this enhanced his appreciation for the importance of place. On the contrary, Cohen, citing capacity limitations, was accompanied by videographers to each of his site visits. These videos were then "made available to any participant who wanted a copy."⁸⁵⁶ If Cohen believed that the act of physically embodying these sites was essential to the Commission's overall investigation, he surely would have arranged

⁸⁵⁴ Final Submission (Initial), Aquaculture Coalition, p. 1 (PDF pagination)

⁸⁵⁵ Cohen Report, Vol. 3, p. 125

⁸⁵⁶ Cohen Report, Vol. 3, p. 125

for interested participants to visit these sites on their own. Instead, Cohen relied on his Counsel and the SAP to identify recognized experts who might, in turn, produce technical reports and offer expert-witness testimonies. In so doing, Cohen collapsed time, space, and place, permitting him to carry out his investigation from downtown Vancouver.

In a similar vein, the DFO's 2009 pre-season forecast aspires to collapse the time(s), space(s), and place(s) of the Fraser River watershed, Salish Sea, and Pacific Ocean, as well as the global climate more generally, by plugging thousands of variables into a statistical model. At the DFO's Fraser River Stock Assessment office on Annacis Island, this model is manipulated, subjected to retrospective analyses, and manipulated again, with the ultimate aim of producing a range of possible outcomes for the coming year. While some of these potentialities are based on observations performed at spawning grounds, others—i.e., those generated with “naïve” models⁸⁵⁷—are rooted not in observations, but pure statistics. In this way, forecasting collapses the lands and waters lying between enumerated spawning grounds and Annacis Island, while situating non-enumerated spawning grounds in abstract, statistical space. Following its publication, the DFO's 2009 pre-season forecast travelled only through abstract, digital space. As it ‘traveled’ from place to place, the forecast's meaning, value, and significance changed continually. After attracting considerable controversy, the DFO's 2009 pre-season forecast was transformed into an evidentiary exhibit at the Cohen Commission. In room 801 of the federal courthouse in downtown Vancouver, Sue Grant succeeded in convincing Cohen that this “very concerning” forecast (qtd. in Hume M., 2009b) was actually a “very useful” one.⁸⁵⁸

Consider, by contrast, the Salmon are Sacred scroll Morton presented to Cohen at the Commission's first evidentiary hearing. Weeks earlier, when Morton headed upriver to visit First Nations Elders, fisheries managers, and fishers in Indigenous and non-Indigenous communities throughout the Fraser River watershed, she brought the scroll with her. Along the way, Morton and her allies collected signatures, well wishes, and other messages on the scroll. By the time it was presented to Cohen, Morton's scroll contained dozens of handwritten messages. In contrast to the DFO's 2009 pre-season forecast, which reached the Cohen Commission through abstract, digital space, the Salmon are Sacred scroll travelled throughout the Fraser River watershed in a car, and down the Fraser River in a canoe, *en route* to the Commission's first hearing. Of course, only the former document would impact the Commission's investigation. Over the course of her participation in the Cohen Commission, Morton emphasized the importance of place time and again, but never more so than when her credibility as a researcher was questioned. When lawyers

⁸⁵⁷ Cohen Commission Exhibit #340, “Pre-Season Run Size Forecasts for Fraser River Sockeye and Pink Salmon in 2009”, p. 3

⁸⁵⁸ Cohen Commission Evidentiary Hearing Transcript, 26-Jan-2011, p. 47

for the federal government, provincial government, BCSFA, and AAA attempted to set her research in opposition to that of the established experts, for instance, Morton staked her claim to credibility as a researcher on the number of fish she has examined in the field. The Commission's core experts, Morton alleged, largely lacked this same credibility of place.⁸⁵⁹

6.3 – Summary and Conclusion

My aim in this chapter was to address the following question: What factors contributed to the (de)legitimation of particular understandings of controversial salmon during the Cohen Commission?

In order to address this question, I explored the social life of a commission of inquiry by following Commissioner Bruce Cohen, the DFO's 2009 pre-season forecast, and Alexandra Morton through the Cohen Commission, pausing at numerous junctures along the way to consider a variety of salmon controversies, in addition to examining the Cohen Report, Commissioner Cohen's blueprint for closure.

Upon considering these data, I suggested that Cohen's blueprint for closure calls for the production of knowledge and ignorance concerning the effects of salmon farming on Fraser River sockeye. In addition, I identified three factors which contributed to the (de)legitimation of particular understandings of controversial salmon in the Cohen Commission: (1) the boundary work of expertise, (2) the Cohen Commission's thoroughgoing emphasis on efficiently neutralizing contention, and (3) differing assessments concerning the importance of place. These factors combined not just to (de)legitimate particular understandings of controversial salmon in the Cohen Commission, but also to problematize Cohen's blueprint for closure. Controversial salmon, it would seem, cannot simply be crammed into a black box.

⁸⁵⁹ Cohen Commission Evidentiary Hearing Transcript, 7-Sept-2011, p. 61

CHAPTER 7 – CONCLUSION: COLONIALISM BY OTHER MEANS

“[Scientists] go beyond [...] the greatest statesmen, because instead of pursuing politics with politics, the scientists were pursuing it with *other means*.”

—Bruno Latour (1988, p. 142)

In August 2016, the DFO released a Cohen Report status update in which it claimed to have implemented 32 of Commissioner Cohen’s 75 recommendations (DFO, 2016a).⁸⁶⁰ And yet, when I visited the lower B.C. mainland in 2017, I observed that the Fraser River fishery continued to be mired in a state of interminable controversy. Indeed, it was in August of 2017, not long after I landed in Vancouver, that a ‘Namgis hereditary chief named Ernest Alexander Alfred boarded and occupied a salmon farm near Swanson Island in the Broughton Archipelago, kicking off the Swanson Occupation.⁸⁶¹ With the support of activists from the ‘Namgis, Mamalilikulla, and Kwikwasut’inuxw Haxwa’mis First Nations, along with Alexandra Morton and the Sea Shepherd Conservation Society, the Swanson Occupation persisted until May 2018, when the B.C. Supreme Court granted Marine Harvest an injunction against Chief Alfred, forcing him to vacate the facility (Hamelin, 2018). In December 2018, these First Nations reached an agreement with the government of B.C. which could see 17 salmon farms leave the Broughton Archipelago by 2023.

The DFO, meanwhile, looked to secure the future of salmon farming in the Discovery Islands.⁸⁶² On February 7, 2019, the DFO issued a press release in which it announced the results of a Canadian Science Advisory Secretariat (CSAS) review to assess “the risk to Fraser River sockeye salmon due to Piscine Orthoreovirus (PRV) transfer from Atlantic salmon farms located in the Discovery Islands area” (DFO, 2019a). The “scientific experts” participating in this CSAS review, the DFO proclaimed, had reached a “consensus that the risk to Fraser River sockeye salmon due to PRV is minimal” (DFO, 2019a). And yet, according to John Werring—one of the experts who participated in this review—there was “no possible way” to draw such a definitive conclusion “about the impacts of this pathogen on wild salmon” (qtd. in Koch, 2019).⁸⁶³ Having ostensibly demonstrated, however, that salmon farms in the Discovery Islands “pose at most a minimal risk of serious harm to the health of migrating Fraser River sockeye salmon”, the DFO could now claim that the minister was not obliged to “prohibit net-pen salmon farming in the Discovery Islands.”⁸⁶⁴

⁸⁶⁰ By the fall of 2018, the DFO was claiming to have “taken actions to address all 75 of [Commissioner Cohen’s] recommendations” (DFO, 2018b).

⁸⁶¹ See Baker (2017), Gilpin (2017), Kane (2017), Petersen (2017), Hamelin (2018), Prystupa (2018), and Thomas (2018).

⁸⁶² Interview with Alexandra Morton, 14-June-2019

⁸⁶³ Though the CSAS report itself (DFO, 2019b) concedes that “[e]xpert participants came to different conclusions on the applicability and abundance of the data to support uncertainty estimates”, it nevertheless goes on to conclude that “PRV-1 attributable to Atlantic Salmon farms in the Discovery Islands area poses minimal risk to Fraser River Sockeye Salmon abundance and diversity under the current farm practices” (p. 15).

⁸⁶⁴ Cohen Report, Vol. 3, p. 26

It would seem that, despite the persistence of myriad salmon controversies, the DFO is forging ahead with Cohen's blueprint for closure by carefully managing the distribution of knowledge and ignorance in relation to the impacts of salmon farming on wild salmon. The significance of this point cannot be overstated, especially given the existence of an Indigenous right to fish for food, social, and ceremonial purposes, as well as the Crown's obligation to consult with First Nations whenever it "contemplates conduct that might adversely affect that right or title."⁸⁶⁵ In this context, the DFO cannot know too much about the effects of open-net pen salmon farming without running the risk of triggering a duty to consult, or even being forced to put an end to the practice altogether. By carefully controlling the distribution of knowledge and ignorance in relation to the effects of salmon farming, however, the DFO is able to mitigate this risk, maintaining the status quo in the process. If open-net pen salmon farms are, in fact, adversely affecting wild B.C. salmon, and if science is, as Bruno Latour (1988) has suggested, "politics by other means" (p. 229), then it is difficult to avoid the conclusion that, for many First Nations in B.C., fisheries biology is colonialism by other means.

Furthermore, in light of my primary research findings—as detailed in the preceding chapters and summarized below—I suggest that the federal and provincial governments are, along with the aquaculture industry and commercial fishery, complicit in this process of dispossession by other means. So too is the Canadian legal system and the ostensibly neutral government processes it provides the basis for, including the Cohen Commission. It is not difficult to understand, in this context, why many First Nations in Canada have come to regard official government processes with suspicion (Anaya, 2013). Indeed, the federal government established the Cohen Commission not to address the underlying sources of controversy, but to lend legal, biological, and technoscientific legitimacy to its desire to simply move beyond the controversies arising out of them. Paradoxically, however, as these efforts to compel closure become more deliberate and forceful, the underlying controversies have only become more contentious. It is only by addressing the *sources* of controversy affecting the Fraser River fishery, I suggest, that it becomes possible to break this cycle of interminable controversy.

7.1 – Primary Research Findings

7.1.1 – Salmon Controversies in British Columbia

In Chapter 4, I address the question: What are the primary sources of controversy in the Fraser River fishery?

On the basis of my exploration of the social life of an engaged controversy analyst, I identified in section 4.2 four related sources of controversy in the Fraser River fishery. First, as

⁸⁶⁵ Cohen Commission Policy and Practice Report #01, "Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery", p. 40

Indigenous peoples in B.C. continue to experience various forms of colonial violence and dispossession, they have responded in a variety of complex, controversial ways. Second, the Fraser River watershed bears the cumulative, unintended consequences of a longstanding ethic of exploitation in which 'man' is set apart from 'nature' (coded feminine) so that 'he' might establish and maintain dominion over 'her'. Third, the Fraser River fishery has long been managed by a network of political, economic, and technoscientific institutions historically mandated to conceive of fish, and fishing, principally as vehicles for the pursuit of economic growth and financial profit. Fourth, anthropogenic climate change has produced adverse effects on many of the ecosystems upon which Fraser River sockeye depend. These sources of controversy function, whether individually or in conjunction with one another, in a manner which generates salmon controversies because they lead a diverse cast of human and non-human actors to respond in a variety of complex and contentious ways.

7.1.2 – The Social Life of Sockeye

In Chapter 5, I explored the question: What salmon controversies are revealed through the social-life of sockeye, and how do they compare to those depicted in the Cohen Report's overview of the life-cycle of sockeye?

Based on this (de)construction of the social life (cycle) of Fraser River sockeye, I argued in section 5.2 that whereas the social life of sockeye attends to the unique challenges faced by each CU as a result of the sources of controversy identified in the previous chapter, the Cohen Report's depiction of the life-cycle of sockeye conceives of the life histories of these fish largely in isolation from these challenges and their associated controversies and contestations. That is, of the four sources of controversy identified in the previous chapter, the Cohen Report's life-cycle overview only indirectly acknowledges the local effects of anthropogenic climate change.

In the absence of due consideration to these sources of controversy, the Cohen Report's life-cycle overview largely takes for granted the primacy of the commercial fishing perspective, the legitimacy of the technoscientific drive to establish and maintain dominion over nature, and the validity of the belief that colonial violence and dispossession are not contemporary but historical problems. Consequently, the Cohen Report reduces the life-cycle of sockeye to a series of physiological transformations that are only loosely connected to the particulars of place. The social life of sockeye, by contrast, is characterized by myriad social transformations which derive meaning from the particulars of the places through which they travel, and the people with whom they interact along the way. Sockeye, on this view, can be understood as controversial salmon, sockeye pluralities, or itinerant boundary objects whose value, meaning, and significance shifts as they travel from place to place.

This also explains, in retrospect, the Cohen Report's apparent blind spot with respect to various problematics and uncertainties associated with open-net pen salmon farming, as the aquaculture controversy in B.C. is situated at the intersection of these sources of controversy. This is a controversy, in other words, which emerged not just out of the technoscientific drive to establish and maintain dominion over nature, but also the prevailing view that fish (and fishing) are vehicles for economic growth and financial profit, resulting in the reproduction of dispossession and colonial violence. Thus, if Fraser River sockeye are itinerant, social fish which derive meaning from the particulars of the places through which they travel and the people with whom they interact, farmed salmon are stagnant, subjugated, and placeless fish which exist principally to generate economic growth and financial profit. Distinctions of this sort are absent in the Cohen Report, however, by virtue of its failure to attend to the sources of controversy identified above.

7.1.3 – Cohen's Black Box

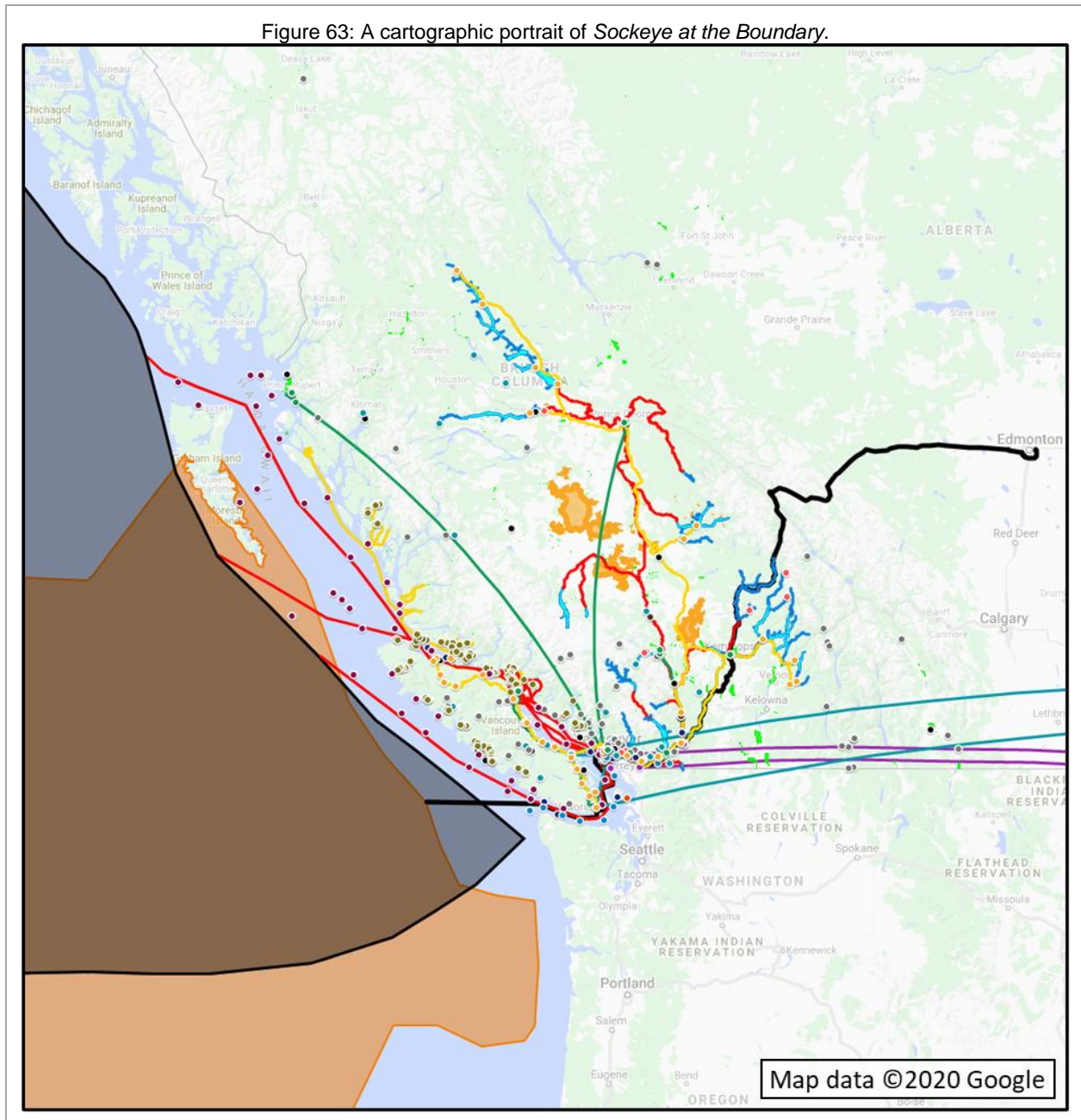
In Chapter 6, I examined the question: What factors contributed to the (de)legitimation of particular understandings of controversial salmon during the Cohen Commission?

On the basis of my exploration of the social life of a commission of inquiry, I identified in section 6.2 three factors which contributed to the (de)legitimation of particular understandings of controversial salmon in the Cohen Commission. First, Commissioner Cohen and his Counsel engaged in the boundary work of expertise, unaccountably shaping the conditions of possibility for the inquiry which followed, in addition to paving the way for additional forms of boundary work. Second, Cohen and his Counsel endeavoured throughout the Commission to neutralize contention in the most technoscientific and efficient manner possible, thereby *controversially* limiting the Commission's ability to perceive alternative possibilities. Third, throughout the Commission's proceedings, Cohen and his Counsel privileged universalized, decontextualized, ostensibly placeless knowledges and ways of knowing over those seeking to attend closely to the particulars of place.

Together, these factors shaped, and thereby problematized, Commissioner Cohen's blueprint for closure in a variety of ways. As a result of the Commission's failure to engage with the political dimensions of the boundary work of expertise, for instance, Cohen and his Counsel treated Indigenous perspectives on sockeye as potential sources of contention to be efficiently neutralized, rather than as local knowledges capable of informing fisheries management considerations at the highest levels. This proved consistent with Cohen's call for the management of the fishery to be re-centralized under the minister of fisheries in Ottawa, a recommendation that was also clearly informed by the Commission's cavalier approach to attending to the particulars of place. In calling, moreover, for the production of knowledge and ignorance concerning the

effects of open-net pen salmon farming, and leaving it up to the minister of fisheries to determine whether these effects pose more than 'minimal risk' to Fraser River sockeye, Cohen overstated the ability of experts to account for these uncertainties, in addition to understating the role that political considerations play in informing ministerial judgement. For all these reasons, a plurality of controversial salmon actively resisted the Commission's black boxing process. Accordingly, Cohen's blueprint failed to bring an end to the cycle of interminable salmon controversies.

Figure 63: A cartographic portrait of *Sockeye at the Boundary*.



7.2 – Scholarly Contributions

This dissertation makes theoretical and methodological contributions to the STS controversy studies literature, in addition to contributing to extant studies of the Fraser River fishery in general, and the Cohen Commission in particular.

First, in seeking to address gaps in the STS controversy studies literature concerning the processes through which controversies are brought to a close (or not), I brought generative symmetry to bear on the study of seemingly interminable technoscientific controversies, building on existing applications (e.g., Bloor, 1976; Callon, 1984; Latour, 1987; Law, 1987) of the symmetry principle in the process. In so doing, this dissertation offers a more complex and nuanced account of the processes through which technoscientific controversies are multiplied, transformed, (de)legitimated, or brought to an end (prolonged) – whether through the production of knowledge (agnotology), agnotology (knowledge), or some combination thereof.

While generative symmetry represents this dissertation's foremost contribution to the STS controversy studies literature, it forms just one part of my broader proposal for an engaged controversy study in STS. By conceiving of the engaged program in STS (Sismondo, 2008) as a congregational bridge, I confronted the political dimensions of the controversies under study without sacrificing theoretical fundamentality. Accordingly, I privileged 'views from below' (Haraway, 1988; 1989; Harding, 1986; 1993; 1998) and 'views from elsewhere' (Said, 1978; 1983; 1993; 1994; Anderson & Adams, 2008) in carrying out this study, bringing feminist STS and postcolonial technoscience to bear on controversy studies in STS in the process. In so doing, this dissertation moved beyond unresolved tensions in the politics of SSK, in addition to offering a novel, reflexive theoretical framework for studying politically-contentious, seemingly interminable technoscientific controversies in action.

This dissertation also offers an innovative three-phase, multi-method approach to studying technoscientific controversies which brings itinerant-ethnographic (Heath, 1998) and contrapuntal-cartographic (Sparke, 1998) or counter-mapping (Hunt & Stevenson, 2017) techniques to bear on a virtual analysis of the social life of things (Appadurai, 1986; Kopytoff, 1986; Dumit, 2004) and fish pluralities (Todd, 2014). In order to account for the "power-laden ambivalences" (Sparke, 1998, p. 464) embedded in contrapuntal-cartographic or counter-mapping techniques, I attended to Foucauldian notions of discourse and governmentality, in addition to employing empirical strategies and ethnographic refusals (Simpson, 2007; Tallbear, 2013a) to facilitate responsible knowledge claims (Haraway, 1988) and safeguard my ability to conduct research as praxis (Lather, 1986). In phase one, I engaged directly with Indigenous interlocutors and collected ethnographic data across a number of field sites. In the second phase, I arrayed

these data onto a custom map, atop which I then layered my movements, as well as those of four additional actors: Fraser River sockeye salmon, Commissioner Bruce Cohen, the DFO's 2009 pre-season forecast, and Alexandra Morton. In the third and final phase, I virtually analyzed these social lives by using the map to follow each actor from the beginning to the end of their respective itineraries. Along the way, I paused at numerous junctures and intersections to ask a series of tailored, probing questions, and to consider a variety of additional sources of evidence.

Finally, this dissertation builds on extant studies of the Cohen Commission (e.g., Clarkson, 2016), the Fraser River fishery (e.g., Meggs, 1991; Newell, 1993; Evenden, 2000; 2004a; 2004b), and salmon controversies more generally (e.g., Harris, 2001; 2008; Brown, 2005). In constructing a portrait of the social life of sockeye, for instance, I demonstrated that conventional framings of the life-cycle of sockeye are rooted in problematic assumptions concerning the relationship between knowledge and place, technoscience and politics, nature and culture, colonialism and capitalism.

7.3 – Recommendations

In offering the below recommendations, I want to be clear that I do not believe controversies are necessarily a 'bad' thing, or something to be avoided at any cost. As I have argued, however, the Fraser River fishery has been locked in a cycle of interminable controversy for more than a century as a result of various unaddressed sources of controversy. It is apparent, moreover, that this cycle is having an adverse impact on both Fraser River sockeye and those who actively engage with these fish. Accordingly, I offer these recommendations not with a view towards ridding the Fraser River fishery of controversies entirely, but with the aim of establishing the conditions of possibility necessary to break the cycle of interminable controversies in which the fishery has long been mired. This cycle cannot be broken, in other words, without first meeting each of these conditions.

First and foremost, the governments of Canada and British Columbia must go beyond the mere recognition of Indigenous rights, and confront their role—along with those of the agents of technoscience and neoliberal global capitalism—in continuing to inflict colonial violence on First Nations in B.C. (and elsewhere). Following Glen Sean Coulthard (2007), I suggest that the prevailing "recognition-based approach" to reconciliation results invariably in the infliction of colonial violence as it "remains structurally oriented around the dispossession of Indigenous peoples of their lands and self-determining authority" (p. 213). During the Cohen Commission, the problems associated with this recognition-based approach to reconciliation were manifold. As noted above, for instance, despite "respectfully acknowledg[ing]" that Indigenous peoples brought "unique perspective[s] to bear on [the Commission's] work",⁸⁶⁶ Commissioner Cohen treated these

⁸⁶⁶ Cohen Report, Vol. 1, p. 5

perspectives principally as sources of potential contention to be efficiently neutralized. This tension is also reflected in Cohen's blueprint for closure, which called for the repudiation of policies designed to cede some measure of authority over the fishery to First Nations, in addition to tasking the DFO with unilaterally policing the boundary between legitimate and illegitimate FSC needs. Ultimately, Indigenous participation in the Cohen Commission served principally to legitimate a blueprint for closure which reproduces the dispossession of the Indigenous fishery, thereby meting out colonial violence in a variety of ways. In order to prevent such outcomes, I follow Molly Clarkson (2016) in suggesting that future commissions of inquiry should be led not by a single commissioner appointed by the governments of Canada or British Columbia, but multiple commissioners, at least one of whom should be appointed by First Nations.

Second, I suggest that future commissions of inquiry must acknowledge and confront the limiting, reproductive effects associated with an overriding emphasis on value-laden concepts like efficiency. While, on the one hand, a manageable and efficient commission of inquiry is conducive to the timely production of a blueprint for closure, this is unlikely to produce durable solutions to the complex, entangled issues underlying these controversies. Though, on the other hand, a commission of inquiry led by Indigenous and non-Indigenous commissioners would surely prove less efficient, such an arrangement would be far more conducive to the sort of meaningful, critical examination needed to address the many deep-seated problems which ultimately went unaddressed by the Cohen Commission. At no point, for instance, did the Cohen Commission problematize the prevailing view that fish (and fishing) are principally vehicles for economic growth and financial profit. Nor, for that matter, did Cohen or his Counsel seriously question the technoscientific drive to establish and maintain dominion over nature, or the unintended consequences associated with this longstanding ethic of exploitation. In order to safeguard against these blind spots, future commissions of inquiry must acknowledge that an overriding emphasis on process efficiency functions in a manner which not only restricts conditions of investigative possibility, but also disproportionately favours particular conceptions of the public interest.

Third, and finally, I contend that future commissions of inquiry into the Fraser River fishery must attend to the political dimensions associated with the mandate of a commission of inquiry in general, and the associated boundary work of expertise in particular. Throughout the Commission, technoscientific expertise was situated somewhere beyond politics, thereby obscuring the extent to which fisheries biologists in B.C. have always been entangled with, responsive to, and supported by, the commercial fishery, its needs, priorities, and interests, as well as those of the provincial and federal governments more broadly. Similarly, despite recognizing that the DFO's political desire to promote salmon farming is fundamentally in conflict with its constitutional

mandate to regulate fisheries, Commissioner Cohen forcefully asserted the minister's ultimate authority to manage the fishery. In addition, as noted above, by leaving it to the minister to determine whether salmon farms in the Discovery Islands pose more than a 'minimal risk' to Fraser River sockeye, Cohen overstated the ability of experts to account for the underlying uncertainties, in addition to understating the role that political considerations play in informing such judgements. In order to prevent such contradictions, future commissions of inquiry must resist the temptation to situate their work as somehow existing beyond politics.

These recommendations are not, in and of themselves, capable of breaking this cycle of interminable controversies. Taken together, however, these recommendations provide the basis for a commission of inquiry—or some other form of collective study—that is better capable of perceiving, and thereby devising durable solutions to, the underlying sources of controversy.

7.4 – Research Limitations, Constraints, and Opportunities

In carrying out this study, I wrestled with various limitations and constraints. First, as a white, able-bodied, cis-man born in Toronto, Ontario to a lawyer and a nurse, it could be said that I am the embodiment of white, male, settler privilege. Accordingly, though I made every effort to account for this tension in carrying out this study, it is doubtless that some measure of settler bias persists in the final product. Second, though the foregoing analysis of the Cohen Commission was necessarily partial and incomplete, this analysis would nevertheless have been improved had I been able to conduct interviews with more of the Cohen Commission's Indigenous witnesses or participants. Third, in carrying out this study, I created a map that is necessarily incomplete, but would nevertheless have been improved had I been able to travel a greater distance upriver to collect additional ethnographic data and conduct additional interviews.⁸⁶⁷ Due to financial limitations, I spent most of my time in the field near the mouth of the Fraser River. This resulted in the production of a map that is likely missing features which I might otherwise have included had I been able to travel a greater distance upriver to engage directly with additional First Nations communities. Fourth, and finally, this map is not associated with a single, fixed point in time. On the contrary, this map intentionally plays with notions of temporality. This blurring of temporalities results in the loss of some measure of complexity, however, as it flattens out the differences between run-timing groups, in addition to smoothing out, and thereby obscuring, the cyclic variations exhibited by some populations of Fraser River sockeye.

In addition to contending with various limitations and constraints while carrying out this study, I identified a number of opportunities for additional research. As noted above, for instance,

⁸⁶⁷ My aim in constructing this map was not, of course, to claim a "view from nowhere" (Haraway, 1988) of salmon controversies in B.C., but rather to create a cartographic portrait of this landscape that is informed by a very particular combination of perspectives.

I created a map⁸⁶⁸ over the course of this study that is necessarily incomplete. Accordingly, the possibilities for expanding this map are virtually limitless. At present, this map only includes interpolated migratory routes for Fraser River sockeye. Accordingly, future studies may look to add colour-coded, interpolated migratory routes for Fraser River chinook, coho, chum, and pinks as well. Researchers may also choose to expand this map beyond the Fraser River watershed by including other major salmon-bearing streams in B.C. such as the Skeena and Nass rivers, providing a richer perspective on the broader B.C. fishery in the process. This map could also, in theory, support the addition of major salmon-bearing streams in Alaska, Washington, Russia, and elsewhere. This would necessitate the creation of multiple overlapping shrouds of uncertainty in the Pacific Ocean, producing a more complex yet accurate representation of the competitive ecological conditions faced by the various species of Pacific salmon in the marine environment. In addition, though this map presently includes the Trans Mountain Pipeline along with its oil tanker route, it would provide a more accurate representation of the hazards faced by the various species of Fraser River salmon with the inclusion of (a) additional pipeline routes, (b) railroad tracks, and (c) any other industrial activities which may threaten wild and enhanced Pacific salmon or the ecosystems through which they travel. Finally, this map—whether in its present or expanded form—could prove useful not only for the purposes of academic research, but also to support or facilitate environmental assessments, providing a holistic perspective on the various threats facing wild Pacific salmon along with other forms of marine wildlife.

Similarly, as the foregoing analysis of the Cohen Commission is necessarily incomplete, future studies may build on and further nuance this analysis by seeking out additional perspectives and ‘social lives’. To that end, future studies of the Cohen Commission as a site of technoscientific controversy should look to incorporate additional non-expert perspectives, with a particular emphasis on those of Indigenous witnesses and participants. Researchers may also find it worthwhile to chart the ‘social lives’ of expert witnesses who testified on controversial issues, including Kristi Miller, Larry Dill, Douglas Harris, and so on. In addition, interviews with Cohen Commission staff and junior counsel, with a particular emphasis on those who helped organize the Commission’s public forums and site visits, could also prove illuminating.

Finally, as I explored open-net pen salmon farming principally from the perspective of the social life of sockeye, future studies may look to examine the aquaculture industry more directly by constructing and exploring the social life of farmed Atlantic salmon. This would require the development of an in-depth understanding of the various components which together constitute

⁸⁶⁸ Researchers may opt instead to develop an entirely new map using a similar approach. This may be preferable, given the limitations associated with Google My Maps (e.g., Google My Maps only supports up to 10 layers). Nevertheless, in this section, I describe the various ways in which future studies can build on this particular map.

the supply chain of an aquaculture corporation which engages in open-net pen salmon farming – a challenging proposition, to be sure, given the proprietary nature of such information. Ideally, such a study would examine the social life of farmed Atlantic salmon from the perspective of a multinational aquaculture corporation operating salmon farms in multiple jurisdictions,⁸⁶⁹ highlighting, among other things, the contradictory nature of these global yet static fish.

7.5 – Final Thoughts

My intent in undertaking this study was not, of course, to stake a claim to the ‘last word’ on the Cohen Commission, the Cohen Report, or salmon controversies in B.C. more generally, but to contribute to postcolonial and environmental discourses in and around these subjects. In keeping with the spirit of this approach, I conclude this study by quoting ‘Namgis hereditary chief Ernest Alexander Alfred. In a video uploaded to the Sea Shepherd Conservation Society (2017) YouTube channel shortly after the start of the Swanson Occupation, Chief Alfred reflected on his reasons for occupying the Marine Harvest facility in this way:

My first feeling [upon occupying the salmon farm] was that of strength. I felt really powerful going [...] with a mandate and a responsibility to report and show these images to people, my people, my families, that [...] these fish are really sick. These fish are polluting the environment that we call home. The images that came out of that farm are horrifying. These fish that are being harvested out of [these] fish pens are going straight to market [...] the really gross parts are being cut off in these plants, and they're [...] wrapped in plastic and they're being sold to the public. But more shocking is that whatever's killing these fish is just sort of pouring into our environment [...] and there's no controlling it.

After I got off the [salmon] farm [...] I snuck off to the bow of the Martin Sheen, and luckily nobody was around, and I just stared up at the cliffs and I just cried. I had this incredible sadness. I couldn't keep it in anymore. I lost it. I normally don't get like that [...] but there was something [...] really, really wrong with that whole scene. I was thinking about my grandparents, and I was thinking about my grandchildren [...] I can't get over the fact that they might win if we don't do something. It really scared me, that this has been allowed, that they've allowed this to happen.

If we don't act now, we're going to miss this opportunity, this little window of opportunity to correct the mistakes of the past. You know, when I think about our peoples' history, and I think about [...] colonization, the stripping of our rights, the stripping of our identity, the fact that our language is disappearing, the potlatch ban... The fish is all we have left, and they can't take our fish. We don't exist here without our fish.

⁸⁶⁹ For example, Mowi (formerly Marine Harvest) is a Norwegian corporation with salmon farms in more than 20 countries.

BIBLIOGRAPHY

Interviews

- 17-August-2017 with Latash (Maurice Nahanee) at Esłhá7an (Mission Indian Reserve #1) in North Vancouver, B.C.
- 22-August-2017 with Grand Chief Ken Malloway (Wileleq) at the Sheraton Hotel in Richmond, B.C.
- 29-August-2017 with Chief Slá'hólt Ernie George at Capilano University's Kéxwusm-áyakn Student Centre in North Vancouver, B.C.
- 31-August-2017 with David Kirk at Capilano University's Kéxwusm-áyakn Student Centre in North Vancouver, B.C.
- 14-June-2019 with Alexandra Morton (remotely, via Skype) at York University in Toronto, ON.

Cohen Commission Documents

Cohen Commission Final Report

Commissioner Bruce Cohen: Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River. (2012). *The Uncertain Future of Fraser River Sockeye*. Ottawa: Ministry of Public Works and Government Services.

Cohen Report, Volume 1: The Sockeye Fishery

Cohen Report, Volume 2: Causes of the Decline

Cohen Report, Volume 3: Recommendations – Summary – Process

Cohen Commission Exhibits

Exhibit #1, "Presentation of Mr. Mike Lapointe"

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Exhibit #8, "Canada's Policy For Conservation Of Wild Pacific Salmon (The Wild Salmon Policy)"

Exhibit #278, "Witness Summary of Councillor June Quipp"

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Exhibit #340, "Pre-Season Run Size Forecasts for Fraser River Sockeye and Pink Salmon in 2009"

Exhibit #610, "Curriculum Vitae of Dr. Laura Richards"

Exhibit #628, "Email thread from K Miller-Saunders to M Saunders re Version 2, ending Nov 4 2009"

Exhibit #635, "BN re Funding Requested for Research on Links btw Plasmacytoid Leukemia and Shifts in Migration Timing and High Mortality of FRSS, Nov 13 2008"

Exhibit #639, "K Miller, Proposed 2010 DFO Funded Genomic Research relating to Sockeye Declines, Apr 2010"

Exhibit #640, "Memo for the Minister (Info Only) - Strategy to Address the Issue of Sea Lice and Salmon Farms in Pacific Region (undated)"

Exhibit #641, "Email from T Davis to B Riddell, L Richards et al re Sea Lice Data, Jan 28 2008"

Exhibit #1135, "Harris, The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982, Jan 12 2011"

Exhibit #1291, "Cohen Commission Technical Report 4 - Marine Ecology - Feb 2011 - CCI001134"

Exhibit #1510, "Curriculum Vitae for Kristina Miller"

Exhibit #1523, "Miller, Epidemic of a Novel, Cancer-causing Viral Disease, Oct 7 2009"

Exhibit #1524, "Miller, Epidemic of a Novel, Cancer Causing Viral Disease, Sep 27 2009"

Exhibit #1563, "Map of Salmon Farms and Migration Routes, Jun 2009 [Living Oceans Society]"

Exhibit #1798, "Alexandra Morton's curriculum vitae"

Exhibit #1799, "Curriculum vitae of Catherine Stewart"

Exhibit #1800, "Curriculum vitae of Clare Backman"

Exhibit #1801, "Curriculum vitae of Mia Parker"

Exhibit #1839, "Morton, Blog entitled Cohen Inquiry Aquaculture Hearings, Aug 31 2011"

Exhibit #1852, "Fraser River Sockeye Salmon Productivity Information Chart, 2011 - NonRT"

Exhibit #1915, "Evaluation of Uncertainty in Fraser Sockeye WSP Status Using Abundance and Trends in Abundance Metrics, Aug 25 2011 version [DFO Working Paper 2010-P14; further update to Exh 184]"

Exhibit #1967, "Affidavit #1 of Mike Lapointe, Sep 27 2011"

Exhibit #1976, "[Formerly For ID DDD] - Morton, What is Happening to the Fraser Sockeye?, Aug 14 2011"

Cohen Commission Hearing Transcripts

Application Hearing, 23-Mar-2010

Application Hearing, 26-Mar-2010

Evidentiary Hearing, 25-Oct-2010

Evidentiary Hearing, 26-Oct-2010

Evidentiary Hearing, 13-Dec-2010

Evidentiary Hearing, 14-Dec-2010

Evidentiary Hearing, 15-Dec-2010

Evidentiary Hearing, 21-Jan-2011

Evidentiary Hearing, 26-Jan-2011

Evidentiary Hearing, 17-Mar-2011

Evidentiary Hearing, 28-June-2011

Evidentiary Hearing, 24-Aug-2011

Evidentiary Hearing, 7-Sep-2011

Evidentiary Hearing, 8-Sept-2011

Cohen Commission Public Forum Summaries

Lillooet Public Forum Summary, 18-Aug-2010

Campbell River Public Forum Summary, 25-Aug-2010

Prince Rupert Public Forum Summary, 01-Sept-2010

Steveston Public Forum Summary, 13-Sept-2010

Nanaimo Public Forum Summary, 14-Sept-2010

New Westminster Public Forum Summary, 20-Sept-2010

Prince George Public Forum Summary, 23-Sept-2010

Chilliwack Public Forum Summary, 29-Sept-2010

Kamloops Public Forum Summary, 21-Oct-2010

Cohen Commission Rulings

Cohen Commission Ruling, 14-Apr-2010

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Cohen Commission Ruling, 23-June-2011

Cohen Commission Ruling, 11-Oct-2011

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Cohen Commission Interim Report, 29-Oct-2010

Cohen Commission Rules for Procedure and Practice, as amended 20-Apr-2011

Final Submission (Initial), Aquaculture Coalition

Final Submission (Reply), Aquaculture Coalition

Final Submission (ISAv), Aquaculture Coalition

Additional Sources

- Alfred, E. (2017, August 26). *Swanson Occupation*. Retrieved from Facebook: <https://www.facebook.com/GETTHEFISHFARMSOUT/>
- Alfred, T. (2001). Deconstructing the British Columbia Treaty Process. *Balayi: Culture, Law and Colonialism*, 3, 37-65.
- Alfred, T., & Corntassel, J. (2005). Being Indigenous: Resurgences Against Contemporary Colonialism. *Government and Opposition*, 40(4), 597-614.
- Alouette River Management Society. (2018). *Alouette Watershed Sockeye - Fish Passage Feasibility Project: Year 1*. Burnaby: Fish and Wildlife Compensation Program.
- Altamirano-Jiménez, I. (2013). *Indigenous Encounters with Neoliberalism: Place, Women, and the Environment in Canada and Mexico*. Vancouver: UBC Press.
- Anaya, J. (2013, October 15). *Statement upon conclusion of the Visit to Canada*. Retrieved February 4, 2020, from James Anaya: Former United Nations Special Rapporteur on the Rights of Indigenous Peoples: <http://unsr.jamesanaya.org/statements/statement-upon-conclusion-of-the-visit-to-canada>
- Anderson, W., & Adams, V. (2008). Pramoedya's Chickens: Postcolonial Studies of Technoscience. In E. J. Hackett, O. Amsterdamska, M. Lynch, & J. Wajcman (Eds.), *The Handbook of Science and Technology Studies* (3rd ed., pp. 181-204). London: The MIT Press.
- Anzaldúa, G. (1987). *Borderlands/La Frontera: The New Mestiza*. San Francisco: Aunt Lute Books.
- Appadurai, A. (1986). Introduction: Commodities and the Politics of Value. In A. Appadurai (Ed.), *The Social Life of Things: Commodities in Cultural Perspective* (pp. 3-63). Cambridge: Cambridge University Press.
- Arribas-Ayllon, M., & Walkerdine, V. (2008). Foucauldian Discourse Analysis. In C. Willig, & W. Stainton Rogers (Eds.), *The Sage Handbook of Qualitative Research in Psychology* (pp. 91-108). New York: Sage Publications.
- Ashmore, M. (1996). Ending up on the Wrong Side: Must the Two Forms of Radicalism Always Be at War? *Social Studies of Science*, 26(2), 305-322.
- Assembly of First Nations. (2010, July 22). *Resolution no. 44/2010*. Retrieved September 25, 2018, from Annual General Assembly - Resolutions: <https://www.afn.ca/uploads/files/2010-res.pdf>
- A-Tlegay Fisheries Society. (n.d.). *About Us*. Retrieved February 24, 2020, from A-Tlegay Fisheries Society: <http://www.a-tlegay.ca/about.html>
- B.C. Treaty Commission. (2018, October 13). *Signing of Memorandum of Understanding leads innovation in treaty negotiations*. Retrieved June 10, 2020, from B.C. Treaty Commission: <http://www.bctreaty.ca/signing-memorandum-understanding-leads-innovation-treaty-negotiations-0>
- B.C. Treaty Commission. (2020a). *Tsleil-Waututh Nation*. Retrieved June 9, 2020, from B.C. Treaty Commission: <http://www.bctreaty.ca/tsleil-waututh-nation>
- B.C. Treaty Commission. (2020b). *Negotiations Update*. Retrieved September 19, 2020, from BC Treaty Commission: <http://www.bctreaty.ca/negotiation-update>
- B.C. Wildfire Service. (2020). *Fire Perimeters - Historical*. Retrieved June 10, 2020, from <https://catalogue.data.gov.bc.ca/dataset/fire-perimeters-historical>

- Baker, E., & Oreskes, N. (2017). It's No Game: Post-Truth and the Obligations of Science Studies. *Social Epistemology Review and Reply Collective*, 6(8), 1-10.
- Baker, R. (2017, August 27). New video appears to show disfigured, unhealthy farmed salmon. *CBC News*. Retrieved September 27, 2019, from <https://www.cbc.ca/news/canada/british-columbia/video-appears-to-show-disfigured-farmed-salmon-1.4261637>
- Barnes, B. (1974). *Scientific Knowledge and Sociological Theory*. London: Routledge & Kegan Paul Ltd.
- Barnes, B., & Bloor, D. (1982). Relativism, Rationalism, and the Sociology of Knowledge. In M. Hollis, & S. Lukes (Eds.), *Rationality and Relativism* (pp. 21-47). Oxford: Basil Blackwell.
- Bastien, Y. (2004). *Recommendations for Change: Report of the Commissioner for Aquaculture Development to the Minister of Fisheries and Oceans Canada*. Ottawa: Office of the Commissioner for Aquaculture Development.
- Bavington, D. (2010). *Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse*. Vancouver: UBC Press.
- BC Wildfire Service. (n.d.). *2017 Wildfire Season Summary*. Retrieved June 17, 2020, from Government of British Columbia: <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary>
- Begg, G. A., & Waldman, J. R. (1999). An Holistic Approach to Fish Stock Identification. *Fisheries Research*, 43, 35-44.
- Bennett, N. (2009, July 15). Fishermen await sockeye with baited breath; 10.5 million of the West Coast's favourite salmon set to return. *Richmond News*, p. 3.
- Berkes, F. (1999). *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia: Taylor & Francis.
- Berland, J., Dalton, J., & Myers, N. (Eds.). (2015). *Canada Watch: The Politics of Evidence*. Toronto: Robarts Centre for Canadian Studies. Retrieved from http://robarts.info.yorku.ca/files/2015/09/CW_Fall2015_FINAL.pdf?x73767
- Blackburn, C. (2005). Searching for Guarantees in the Midst of Uncertainty: Negotiating Aboriginal Rights and Title in British Columbia. *American Anthropologist*, 107(4), 586-596.
- Blackburn, C. (2007). Producing Legitimacy: Reconciliation and the Negotiation of Aboriginal Rights in Canada. *Journal of the Royal Anthropological Institute*, 13(3), 621-637.
- Blackburn, C. (2019). The Treaty Relationship and Settler Colonialism in Canada. In D. Shorkowitz, I. Shroeder, & J. Chavez (Eds.), *Shifting Forms of Continental Colonialism: Unfinished Struggles and Tensions* (pp. 415-435). Singapore: Palgrave MacMillan.
- Bloor, D. (1976). *Knowledge and Social Imagery* (2nd ed.). Chicago: University of Chicago Press.
- Bocking, S. (1997). *Ecologists and Environmental Politics: A History of Contemporary Ecology*. New Haven: Yale University Press.
- Bocking, S. (2004). *Nature's Experts: Science, Politics, and the Environment*. New Brunswick: Rutgers University Press.
- Bocking, S. (2012). Science, Salmon, and Sea Lice: Constructing Practice and Place in an Environmental Controversy. *Journal of the History of Biology*, 45(4), 681-716.
- Breslow, S. J. (2014). Tribal Science and Farmers' Resistance: A Political Ecology of Salmon Habitat Restoration in the American Northwest. *Anthropological Quarterly*, 87(3), 695-726.

- British Columbia. (1914). *Report of the Commissioner of Fisheries for 1913*. Victoria: Legislative Assembly of British Columbia.
- British Columbia. (1915). *Report of the Commissioner of Fisheries for 1914*. Victoria: Legislative Assembly of British Columbia.
- Brown, D. (2016). Native, Natural, Indigenous, Indigenised? Trout in the Postcolony. *Critical African Studies*, 1-17.
- Brown, K. L. (2005). *"To Fish For Themselves": A Study of Accommodation and Resistance in the Stó:lō Fishery*. (Doctoral Thesis). Vancouver: University of British Columbia.
- Burgner, R. L. (1991). Life History of Sockeye Salmon (*Oncorhynchus nerka*). In C. Groot, & L. Margolis (Eds.), *Pacific Salmon Life Histories* (pp. 3-118). Vancouver: UBC Press.
- Butler, C. (2006). Historicizing Indigenous Knowledge: Practical and Political Issues. In C. R. Menzies (Ed.), *Traditional Ecological Knowledge and Natural Resource Management* (pp. 107-126). Lincoln: University of Nebraska Press.
- Butler, J. (1993). *Bodies that Matter: On the Discursive Limits of Sex*. New York: Routledge.
- Cadigan, S. T., & Hutchings, J. A. (2001). Nineteenth-Century Expansion of the Newfoundland Fishery for Atlantic Cod: An Exploration of Underlying Causes. In P. Holm, T. D. Smith, & D. J. Starkey (Eds.), *The Exploited Seas: New Directions for Marine Environmental History* (pp. 31-65). Liverpool: Liverpool University Press.
- Callon, M. (1984). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay. *The Sociological Review*, 32, 196-233.
- Callon, M., & Latour, B. (1992). Don't Throw the Baby Out with the Bath School! A Reply to Collins and Yearley. In A. Pickering (Ed.), *Science as Practice and Culture* (pp. 343-368). Chicago: University of Chicago Press.
- Canada Energy Regulator. (2020). *Detailed Route Maps for Trans Mountain Expansion Project Review*. Retrieved June 11, 2020, from Canada Energy Regulator: <https://www.cer-rec.gc.ca/en/applications-hearings/view-applications-projects/trans-mountain-expansion/detailed-route-maps-trans-mountain-expansion-project-review.html>
- Carlson, K. T. (2010). *The Power of Place, the Problem of Time: Aboriginal Identity and Historical Consciousness in the Cauldron of Colonialism*. Toronto: University of Toronto Press.
- Carrier, M. (2018). Identifying Agnotological Ploys: How to Stay Clear of Unjustified Dissent. In A. Christian, D. Hommen, N. Retzlaff, & G. Schurz (Eds.), *European Studies in Philosophy of Science* (Vol. 9, pp. 155-169). New York: Springer.
- Castañeda, R., Burliuk, C., Casselman, J., Cooke, S., Dunmall, K., Forbes, L., . . . Mandrak, N. (2020). A Brief History of Fisheries in Canada. *Fisheries*, 45(6), 303-318.
- Ceccarelli, L. (2011). Manufactured Scientific Controversy: Science, Rhetoric, and Public Debate. *Rhetoric and Public Affairs*, 14(2), 195-228.
- Chamut, P. S. (2003). *Review of the 2002 Fraser River Sockeye Fishery: Report by the External Steering Committee*. Ottawa: Fisheries and Oceans Canada.
- Clark, D., Lee, K., Murphy, K., & Windrope, A. (2018). *2017 Cypress Island Atlantic Salmon Net Pen Failure: An Investigation and Review*. Olympia: Washington Department of Natural Resources.
- Clarkson, M. (2016). *Speaking for Sockeye, Speaking for Themselves: First Nations Engagement in the Cohen Commission (2009-2012)*. (Master's Thesis). Vancouver: University of British Columbia.

- Clifford, J. (2001). Indigenous Articulations. *The Contemporary Pacific*, 13(2), 467-490.
- Collins, H. M. (1981). Stages in the Empirical Programme of Relativism. *Social Studies of Science*, 11(1), 3-10.
- Collins, H. M. (1991). Captives and Victims: Comment on Scott, Richards, and Martin. *Science, Technology, & Human Values*, 16(2), 249-251.
- Collins, H. M. (1996). In Praise of Futile Gestures: How Scientific is the Sociology of Scientific Knowledge? *Social Studies of Science*, 26, 229-244.
- Collins, H. M. (2014). *Are We All Scientific Experts Now?* Cambridge: Polity Press.
- Collins, H. M., & Evans, R. (2002). The Third Wave of Science Studies: Studies of Expertise and Experience. *Social Studies of Science*, 32(2), 235-296.
- Collins, H. M., & Pinch, T. J. (1979). The Construction of the Paranormal: Nothing Unscientific is Happening. *The Sociological Review*, 27(1), 237-270.
- Collins, H. M., & Pinch, T. J. (1993). *The Golem: What Everyone Should Know About Science* (2nd ed.). Cambridge: Cambridge University Press.
- Collins, H. M., & Yearley, S. (1992). Epistemological Chicken. In A. Pickering (Ed.), *Science as Practice and Culture* (pp. 301-326). Chicago: University of Chicago Press.
- Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River / Bruce I. Cohen, Commissioner. (2012). *The Uncertain Future of Fraser River Sockeye*. Ottawa: Ministry of Public Works and Government Services.
- Commissioner Dennis R. O'Connor. (2002). *Report of the Walkerton Inquiry: The Events of May 2000 and Related Issues*. Toronto: Queen's Printer for Ontario.
- Cooke Aquaculture. (2017, August 21). *Statement on Damage to Cypress Farm #2*. Retrieved February 21, 2019, from Cooke Seafood: <https://web.archive.org/web/20170908165640/http://www.cookeseafood.com/cms/wp-content/uploads/2017/08/Statement-on-damage-to-Cypress-farm-site-August-21-2017-final-1.pdf>
- Corntassel, J. (2012). Re-envisioning resurgence: Indigenous pathways to decolonization and sustainable self-determination. *Decolonization: Indigeneity, Education, & Society*, 1(1), 86-101.
- Coulthard, G. S. (2007). *Subjects of Empire? Indigenous Peoples and the "Politics of Recognition" in Canada*. (Doctoral Thesis). Victoria: University of Victoria.
- Coulthard, G. S. (2013). For Our Nations to Live, Capitalism Must Die. *Unsettling America: Decolonization in Theory & Practice*. Retrieved January 04, 2017, from <https://unsettlingamerica.wordpress.com/2013/11/05/for-our-nations-to-live-capitalism-must-die/>
- Coulthard, G. S. (2014). *Red Skin, White Masks: Rejecting the Colonial Politics of Recognition*. Minneapolis: University of Minnesota Press.
- Cruikshank, J. (1994). Oral Tradition and Oral History: Reviewing Some Issues. *The Canadian Historical Review*, 75(3), 403-418.
- Cruikshank, J. (1998). *The Social Life of Stories: Narrative and Knowledge in the Yukon Territory*. Vancouver: UBC Press.
- Cruikshank, J. (2001). Glaciers and Climate Change: Perspectives from Oral Tradition. *Arctic*, 54(4), 377-393.

- Cruikshank, J. (2005). *Do Glaciers Listen? Local Knowledge, Colonial Encounters, and Social Imagination*. Vancouver: UBC Press.
- Cullon, D. S. (2017). *Dancing Salmon: Human-fish Relationships on the Northwest Coast*. Victoria: University of Victoria.
- Daston, L. (1992). The Naturalized Female Intellect. *Science in Context*, 5, 209-235.
- de la Cadena, M., Lien, M. E., Blaser, M., Bruun Jensen, C., Lea, T., Morita, A., . . . Wiener, M. (2015). Anthropology and STS: Generative Interfaces, Multiple Locations. *HAU: Journal of Ethnographic Theory*, 5(1), 437-475.
- de Vrieze, J. (2017). 'Science Wars' Veteran has a New Mission. *Science*, 358(6360), 159.
- Delgamuukw v. British Columbia, [1997] 3 S.C.R. 1010.
- DFO. (2005). *Canada's Policy for Conservation of Wild Pacific Salmon*. Vancouver: Fisheries and Oceans Canada.
- DFO. (2009). *Pre-season run size forecasts for Fraser River sockeye and pink salmon in 2009*. Nanaimo: Canadian Science Advisory Secretariat.
- DFO. (2016a). *Fisheries and Oceans Canada's update on the implementation of the Cohen Commission's recommendations*. Retrieved September 27, 2019, from Fisheries and Oceans Canada: <https://www.dfo-mpo.gc.ca/cohen/report-rapport-eng.htm>
- DFO. (2016b). *2016 Marine Finfish Aquaculture in British Columbia*. Nanaimo: Fisheries and Oceans Canada.
- DFO. (2017a, May 17). *Salmonid Enhancement Program*. Retrieved June 24, 2020, from Fisheries and Oceans Canada: <https://www.pac.dfo-mpo.gc.ca/sep-pmvs/index-eng.html>
- DFO. (2017b). *Pre-season run size forecasts for Fraser Sockeye (Oncorhynchus nerka) and Pink (O. gorbuscha) in 2017*. Nanaimo: Fisheries and Oceans Canada.
- DFO. (2017c). *Cohen Response Status Update - September 2017*. Retrieved September 27, 2019, from Fisheries and Oceans Canada: <https://www.dfo-mpo.gc.ca/cohen/summary-sommaire-eng.htm>
- DFO. (2018a). *The 2017 Fraser Sockeye Salmon (Oncorhynchus nerka) integrated biological status re-assessment under the Wild Salmon Policy*. Nanaimo: Fisheries and Oceans Canada.
- DFO. (2018b). *Cohen Response Status Update – October 2018*. Retrieved September 27, 2019, from Fisheries and Oceans Canada: <https://www.dfo-mpo.gc.ca/cohen/report-rapport-2018-eng.htm>
- DFO. (2019a, February 7). *News release: Peer Review concludes Piscine Orthoreovirus transfer from Atlantic salmon farms poses minimal risk to wild Fraser River sockeye*. Retrieved September 27, 2019, from Government of Canada: <https://www.canada.ca/en/fisheries-oceans/news/2019/02/peer-review-concludes-piscine-orthoreovirus-transfer-from-atlantic-salmon-farms-poses-minimal-risk-to-wild-fraser-river-sockeye.html>
- DFO. (2019b). *Advice from the assessment of the risk to Fraser River Sockeye Salmon due piscine orthoreovirus (PRV) transfer from Atlantic Salmon farms in the Discovery Islands area, British Columbia*. Ottawa: Canadian Science Advisory Secretariat.
- DFO. (2019c). *Salmon Integrated Fisheries Management Plan - Southern BC*. Nanaimo: Fisheries and Oceans Canada.
- DFO. (2020a, April 22). *Fraser River Indigenous Fisheries*. Retrieved July 9, 2020, from Fisheries and Oceans Canada: <https://www.pac.dfo-mpo.gc.ca/fm-gp/fraser/abor-autoc-eng.html>

- DFO. (2020b). *Capilano River Hatchery*. Retrieved June 1, 2020, from Fisheries and Oceans Canada: <https://www.pac.dfo-mpo.gc.ca/sep-pmvs/projects-projets/capilano/capilano-eng.html>
- Dhar, A., Parrott, L., & Hawkins, C. D. (2016). Aftermath of Mountain Pine Beetle Outbreak in British Columbia: Stand Dynamics, Management Response and Ecosystem Resilience. *Forests*, 7(8), 171.
- Donald, D. T. (2009). Forts, Curriculum, and Indigenous Métissage: Imagining Decolonization of Aboriginal-Canadian Relations in Educational Contexts. *First Nations Perspectives*, 2(1), 1-24.
- Donald, D. T. (2012). Indigenous Métissage: A Decolonizing Research Sensibility. *International Journal of Qualitative Studies in Education*, 25(2), 533-555.
- Dumit, J. (2004). *Picturing Personhood: Brain Scans and Biomedical Identity*. Princeton: Princeton University Press.
- Dumit, J. (2012). *Drugs for life: how pharmaceutical companies define our health*. Durham: Duke University Press.
- Edwards, P. N. (2010). *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge: MIT Press.
- Endangered Languages Project. (n.d.). Retrieved July 31, 2019, from The Endangered Languages Project: <http://www.endangeredlanguages.com>
- EnergyBC. (2016). *B.C. Energy Maps*. Retrieved June 25, 2020, from EnergyBC: <http://energybc.ca/electricitymap.html>
- Enros, P. (2013). *Environment for Science: A History of Policy for Science in Environment Canada*. Philip Enros (self published).
- Evenden, M. D. (2000). Remaking Hells Gate: Salmon, Science, and the Fraser River, 1938-1948. *BC Studies*(127), 47-82.
- Evenden, M. D. (2004a). Locating Science, Locating Salmon: Institutions, Linkages, and Spatial Practices in Early British Columbia Fisheries Science. *Environment and Planning D: Society and Space*, 22(3), 355-372.
- Evenden, M. D. (2004b). Social and Environmental Change at Hells Gate, British Columbia. *Journal of Historical Geography*, 30, 130-153.
- Evenden, M. D. (2007). *Fish Versus Power: An Environmental History of the Fraser River*. Cambridge: Cambridge University Press.
- Fienup-Riordan, A. (2000). An Anthropologist Reassess Her Methods. In A. Fienup-Riordan (Ed.), *Hunting Tradition in a Changing World: Yup'ik Lives in Alaska Today* (pp. 29-57). New Brunswick: Rutgers University Press.
- Finley, C. (2011). *All the Fish in the Sea: Maximum Sustainable Yield and the Failure of Fisheries Management*. Chicago: University of Chicago Press.
- First Peoples' Cultural Council. (2016). *First Peoples' Map of B.C.* Retrieved from First Peoples' Cultural Council: <https://maps.fpcc.ca/>
- First Peoples' Cultural Council. (2020). *First Voices*. Retrieved from <https://www.firstvoices.com/>
- Foucault, M. (1972). *The Archaeology of Knowledge* (1989 ed.). (S. A. Smith, Trans.) London: Routledge.

- Foucault, M. (1977). *Discipline and Punish: The Birth of the Prison* (2nd ed.). (A. Sheridan, Trans.) New York: Vintage Books.
- Foucault, M. (1980). *Power/Knowledge: Selected Interviews & Other Writings, 1972-1977*. (C. Gordon, Ed., C. Gordon, L. Marshall, J. Mepham, & K. Soper, Trans.) New York: Pantheon Books.
- Fraser, J. A. (1995). *Fraser River Sockeye 1994: Problems & Discrepancies - Report of the Fraser River Sockeye Public Review Board*. Ottawa: Public Works and Government Services Canada.
- Fraser, S. (2007). *The Letters and Journals of Simon Fraser, 1806-1808*. (W. K. Lamb, Ed.) Toronto: Dundurn Press.
- Freire, P. (1970). *Pedagogy of the Oppressed* (2000 ed.). (M. B. Ramo, Trans.) New York: Continuum.
- Fuller, S. (1993). *Philosophy, Rhetoric, and the End of Knowledge: A New Beginning for Science and Technology Studies* (2nd ed.). Madison: University of Wisconsin Press.
- Galland, D. (2004). *The History and Evolution of Salmon Aquaculture Siting Policy in British Columbia*. (Master's Thesis). Vancouver: University of British Columbia.
- Gelfand, J. (2018). *2018 Spring Reports of the Commissioner of the Environment and Sustainable Development: Report 1 — Salmon Farming*. Ottawa: Office of the Auditor General of Canada.
- Gewin, V. (2015). North Pacific 'blob' stirs up fisheries management. *Nature*, 524(7566), 396.
- Gieryn, T. F. (1983). Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists. *American Sociological Association*, 48(6), 781-795.
- Gieryn, T. F. (1992). The Ballad of Pons and Fleischmann: Experiment and narrative in the (un) making of cold fusion. In E. McMullin (Ed.), *The Social Dimensions of Science* (pp. 217-243). Notre Dame: University of Notre Dame Press.
- Gieryn, T. F. (1995). Boundaries of Science. In S. Jasanoff, G. E. Markle, J. C. Peterson, & T. Pinch (Eds.), *Handbook of Science and Technology Studies* (pp. 392-443). London: Sage Publications.
- Gieryn, T. F. (1999). *Cultural Boundaries of Science: Credibility on the Line*. Chicago: University of Chicago Press.
- Gieryn, T. F. (2008). Cultural Boundaries: Settled and Unsettled. In P. Meusburger, M. Welker, & E. Wunder (Eds.), *Clashes of Knowledge: Orthodoxies and Heterodoxies in Science and Religion* (pp. 91-99). New York: Springer.
- Gilpin, E. (2017, August 31). The Fight to Protect Wild Salmon. *National Observer*. Retrieved January 21, 2020, from <https://www.nationalobserver.com/2017/08/31/first-nations-cast-line-wait-bc-government-bite>
- Gombay, N. (2014). 'Poaching' - What's in a Name? Debates about Law, Property, and Protection in the Context of Settler Colonialism. *Geoforum*, 55, 1-12.
- Google. (2020). *My Maps*. Retrieved September 29, 2020, from Google Maps: <https://www.google.com/maps/about/mymaps/>
- Gottweis, H. (2005). Governing Genomics in the 21st Century: Between Risk and Uncertainty. *New Genetics and Society*, 24(2), 175-193.

- Gough, J. (2008). *Managing Canada's Fisheries: From Early Days to the Year 2000*. Montreal: McGill-Queen's University Press.
- Government of BC. (2019, September 8). *Big Bar Landslide: Background*. Retrieved June 26, 2020, from Government of British Columbia: https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/fish-fish-habitat/fish-passage/big-bar-landslide-2019/backgrounder_-_sept_9.pdf
- Government of BC. (n.d.). *BC Geographical Names*. Retrieved July 10, 2020, from Government of British Columbia: <http://apps.gov.bc.ca/pub/bcgnws/>
- Grant, S., Holt, C., Wade, J., Mimeault, C., Burgetz, I., Johnson, S., & Trudel, M. (2018). *Summary of Fraser River Sockeye Salmon (*Oncorhynchus nerka*) ecology to inform pathogen transfer risk assessments in the Discovery Islands, BC*. Ottawa: Fisheries and Oceans Canada. Canadian Science Advisory Secretariat.
- Green, N. (1999). Disrupting the Field: Virtual Reality Technologies and "Multisited" Ethnographic Methods. *American Behavioral Scientist*, 43(3), 409-421.
- Groot, C., & Margolis, L. (Eds.). (1991). *Pacific Salmon Life Histories*. Vancouver: UBC Press.
- Groot, C., & Margolis, L. (1991). Preface. In *Pacific Salmon Life Histories* (pp. ix-xi). Vancouver: UBC Press.
- Gross, M. R. (1998). One Species with Two Biologies: Atlantic Salmon (*Salmo salar*) in the Wild and in Aquaculture. *Canadian Journal of Fisheries and Aquatic Sciences*, 55, 131-144.
- Gutstein, D. (2014). *Harperism: How Stephen Harper and his Think Tank Colleagues Have Transformed Canada*. Toronto: James Lorimer & Company.
- Haida Nation v. British Columbia (Minister of Forests), [2004] 3 SCR 511.
- Hall, S. (1986). The Problem of Ideology - Marxism without Guarantees. *Journal of Communication Inquiry*, 10(2), 28-44.
- Hall, S. (1992). The West and the Rest: Discourse and Power. In S. Hall, & B. Gieben (Eds.), *Formations of Modernity* (pp. 185-227). Cambridge: Polity Press.
- Hamelin, L. (2018, May 19). Court orders First Nation occupiers to leave B.C. fish farm, but they say 'that won't stop them'. *APTN News*. Retrieved September 27, 2019, from <https://aptnnews.ca/2018/05/19/court-orders-first-nation-occupiers-to-leave-b-c-fish-farm-but-they-say-that-wont-stop-them/>
- Hannah, D., & Henry, M. (2011). *Our Tellings: Interior Salish Stories of the Nlha7kápmx People*. Vancouver: UBC Press.
- Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies*, 14(3), 575-599.
- Haraway, D. (1989). *Primate Visions*. New York: Routledge.
- Haraway, D. (1991). *Simians, Cyborgs, and Women*. London: Free Association Books.
- Haraway, D. (1992). The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others. In L. Grossberg, C. Nelson, & P. Treichler (Eds.), *Cultural Studies* (pp. 295-337). New York: Routledge.
- Harding, S. (1986). *The Science Question in Feminism*. Ithaca: Cornell University Press.
- Harding, S. (1993). Rethinking Standpoint Epistemology: What Is "Strong Objectivity"? In L. Alcoff, & E. Potter (Eds.), *Feminist Epistemologies* (pp. 49-82). New York: Routledge.

- Harding, S. (1998). *Is Science Multicultural? Postcolonialisms, Feminisms, and Epistemologies*. Bloomington: Indiana University Press.
- Harding, S. (2006). *Science and Social Inequality: Feminist and Postcolonial Issues*. Urbana: University of Illinois Press.
- Harding, S. (2008). *Sciences From Below: Feminisms, Postcolonialities, and Modernities*. Durham: Duke University Press.
- Harding, S. (2011). Beyond Postcolonial Theory: Two Undertheorized Perspectives on Science and Technology. In S. Harding (Ed.), *The Postcolonial Science and Technology Studies Reader* (pp. 1-31). Durham: Duke University Press.
- Harper, R. H. (1998). *Inside the IMF: An Ethnography of Documents, Technology, and Organisational Action*. San Diego: Academic Press.
- Harper, S. (2006, July 7). Harper Defends His Government's Record. *Calgary Herald*, p. A23. Retrieved December 11, 2018
- Harris, C. (1997). *The Resettlement of British Columbia: Essays on Colonialism and Geographical Change*. Vancouver: UBC Press.
- Harris, C. (2002). *Making Native Space: Colonialism, Resistance, and Reserves in British Columbia*. Vancouver: UBC Press.
- Harris, C. (2008). *The Reluctant Land: Society, Space, and Environment in Canada before Confederation*. Vancouver: UBC Press.
- Harris, D. C. (2001). *Fish, Law, and Colonialism: The Legal Capture of Salmon in British Columbia*. Toronto: University of Toronto Press.
- Harris, D. C. (2008). *Landing Native Fisheries: Indian Reserves and Fishing Rights in British Columbia, 1849-1925*. Vancouver: UBC Press.
- Harris, M. (2014). *Party of One: Stephen Harper and Canada's Radical Makeover*. Toronto: Penguin Canada.
- Harrison, H. L., & Loring, P. A. (2014). Larger Than Life: The Emergent Nature of Conflict in Alaska's Upper Cook Inlet Salmon Fisheries. *SAGE Open*, 1-14.
- Hayes, F. R. (1973). *The Chaining of Prometheus: Evolution of a Power Structure for Canadian Science*. Toronto: University of Toronto Press.
- Heaslip, R. (2008). Monitoring salmon aquaculture waste: the contribution of First Nations' rights, knowledge, and practices in British Columbia, Canada. *Marine Policy*, 32(6), 988-996.
- Heath, D. (1998). Locating Genetic Knowledge: Picturing Marfan Syndrome and its Traveling Constituencies. *Science, Technology, & Human Values*, 23(1), 71-97.
- Helston, C., & Farris, A. (2016). *Large Hydropower*. Retrieved June 26, 2020, from EnergyBC: <http://energybc.ca/largehydro.html>
- Henke, C. R., & Gieryn, T. F. (2008). Sites of Scientific Practice: The Enduring Importance of Place. In E. J. Hackett, O. Amsterdamska, M. Lynch, & J. Wajcman (Eds.), *The Handbook of Science and Technology Studies* (3rd ed., pp. 353-376). Cambridge: The MIT Press.
- Hine, C. (2008). Virtual Ethnography: Modes, Varieties, Affordances. In N. G. Fielding, R. M. Lee, & G. Blank (Eds.), *The SAGE Handbook of Online Research Methods* (pp. 257-270). London: Sage Publications Ltd.
- Horn, K. (2013). *Reconfiguring Assimilation: Understanding the First Nations Property Ownership Act in Historical Context*. (Master's Thesis). Ottawa: Carleton University.

- Hubbard, J. (2006). *A Science on the Scales: The Rise of Canadian Atlantic Fisheries Biology, 1898-1939*. Toronto: University of Toronto Press.
- Hubbard, J. (2014a). Johan Hjort: The Canadian Fisheries Expedition, International Scientific Networks, and the Challenge of Modernization. *ICES Journal of Marine Science*, 71(8), 2000-2007.
- Hubbard, J. (2014b). In the Wake of Politics: The Political and Economic Construction of Fisheries Biology, 1860-1970. *Isis*, 105(2), 364-378.
- Hubbard, J. (2018). Fisheries Biology and the Dismal Science: Economists and the Rational Exploitation of Fisheries for Social Progress. In G. M. Winder (Ed.), *Fisheries, Quota Management and Quota Transfer: Rationalization through Bio-economics* (pp. 31-61). Cham: Springer.
- Hull, M. S. (2012). Documents and Bureaucracy. *Annual Review of Anthropology*, 41, 251-267.
- Hume, M. (2008, May 7). 'Chain of legal actions' planned to fight fish farms. *The Globe and Mail*, p. A6.
- Hume, M. (2009a, August 13). Fraser River's salmon stocks 'beyond a crisis'. *The Globe and Mail*.
- Hume, M. (2009b, November 7). Ottawa gives B.C. judge broad powers to probe collapse of salmon stock. *The Globe and Mail*.
- Hume, M. (2010, November 3). Brain lesions linked to sharp drop in sockeye stocks. *The Globe and Mail*, p. A16.
- Hume, M. (2011a, April 29). Salmon inquiry too secretive, participant complains. *The Globe and Mail*.
- Hume, M. (2011b, June 29). Turmoil below surface at Cohen inquiry. *The Globe and Mail*, p. S3.
- Hume, M. (2011c, September 8). Key witnesses draw crowd to spirited panel talks on salmon. *The Globe and Mail*, p. S1.
- Hume, M. (2011d, September 9). Fish farm opponent apologizes to commission for blogging while under oath. *The Globe and Mail*, p. S1.
- Hunt, D., & Stevenson, S. A. (2017). Decolonizing Geographies of Power: Indigenous Digital Counter-Mapping Practices on Turtle Island. *Settler Colonial Studies*, 7(3), 1-21.
- Hunt, S. (2014). *Witnessing the Colonialscape: Lighting the Intimate Fires of Indigenous Legal Pluralism*. (Doctoral Thesis). Vancouver: Simon Fraser University.
- Hunter, J. (2009, September 17). B.C. seeks probe into sockeye collapse. *The Globe and Mail*.
- Hutchings, J. A. (1999). The Biological Collapse of Newfoundland's Northern Cod. In R. E. Ommer, & D. Newell (Eds.), *Fishing Places, Fishing People* (pp. 260-275). Toronto: University of Toronto Press.
- Hutchings, J. A., & Post, J. R. (2013). Gutting Canada's Fisheries Act: No Fishery, No Fish Habitat Protection. *Fisheries*, 38(11), 497-501.
- Ignace, M., & Ignace, R. E. (2017). *Secwépemc People, Land, and Laws: Yerí7 re Stsq'ey's-kucw*. Montreal & Kingston: McGill-Queen's University Press.
- Indian Residential School History & Dialogue Centre. (2018). *Schools*. Retrieved May 8, 2020, from University of British Columbia: <https://collections.irshdc.ubc.ca/>
- Indigenous and Northern Affairs Canada. (2020, March 11). *First Nations Profiles*. Retrieved May 13, 2020, from Indigenous and Northern Affairs Canada: <https://fnppn.aadnc-aandc.gc.ca/fnp/Main/Index.aspx?lasng=eng>

- Jacobs, J. M. (1996). *Edge of Empire: Postcolonialism and the City*. London: Routledge.
- Jasanoff, S. (1987). Contested Boundaries in Policy-Relevant Science. *Social Studies of Science*, 17, 195-230.
- Jasanoff, S. (1996). Beyond Epistemology: Relativism and Engagement in the Politics of Science. *Social Studies of Science*, 26(2), 393-418.
- Jasanoff, S. (2003). Breaking the Waves in Science Studies. *Social Studies of Science*, 33(3), 389-400.
- Jasanoff, S. (2005). *Designs on Nature: Science and Democracy in Europe and the United States*. Princeton: Princeton University Press.
- Jasanoff, S. (2012). Genealogies of STS. *Social Studies of Science*, 42(3), 435-441.
- Joks, S., & Law, J. (2017). Sámi Salmon, State Salmon: TEK, Technoscience, and Care. *The Sociological Review Monographs*, 65(2), 150-171.
- Jones, R., Shepert, M., & Sterritt, N. J. (2004). *Our Place at the Table: First Nations in the B.C. Fishery*. Vancouver: First Nation Panel on Fisheries.
- Kane, L. (2017, August 30). First Nations, environmentalists occupy B.C. salmon farm. *CBC News*. Retrieved September 27, 2019, from <https://www.cbc.ca/news/canada/british-columbia/first-nations-environmentalists-occupy-b-c-salmon-farm-1.4268234>
- Karlsbakk, E., Sæther, P. A., Høstlund, C., Fjellsøy, K. R., & Nylund, A. (2002). *Parvicapsula pseudobranchicola* n.sp. (Myxozoa), a myxosporidian infecting the pseudobranch of cultured Atlantic salmon (*Salmo salar*) in Norway. *Bulletin - European Association of Fish Pathologists*, 381-387.
- Karp, D. (2009, July 27). Sockeye salmon numbers crash as bust replaces anticipated bounty on B.C. coast; Pacific Salmon Commission cuts estimates of spawning salmon almost in half. *The Vancouver Sun*, p. A4.
- Kino-nda-niimi Collective. (2014). *The Winter We Danced: Voices from the Past, the Future, and the Idle No More Movement*. Winnipeg: ARP Books.
- Kirchmeier-Young, M. C., Gillett, N. P., Zwiers, F. W., Cannon, A. J., & Anslow, F. S. (2019). Attribution of the Influence of Human-Induced Climate Change on an Extreme Fire Season. *Earth's Future*, 7, 2-10.
- Knorr-Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Cambridge: Harvard University Press.
- Koch, D. G. (2019, February 8). Dissenter from group of scientific experts calls foul on DFO, says effects of fish farm virus 'extremely uncertain'. *Sooke News Mirror*. Retrieved June 25, 2019, from <https://www.sooke.newsmirror.com/news/dissenter-from-group-of-scientific-experts-calls-foul-on-dfo-says-effects-of-fish-farm-virus-extremely-uncertain/>
- Kopytoff, I. (1986). The Cultural Biography of Things: Commoditization as Process. In A. Appadurai (Ed.), *The Social Life of Things: Commodities in Cultural Perspective* (pp. 64-93). Cambridge: Cambridge University Press.
- Kourany, J., & Carrier, M. (Eds.). (2020). *Science and the Production of Ignorance: When the Quest for Knowledge is Thwarted*. Cambridge: MIT Press.
- Kowal, S., & O'Connell, D. C. (2014). Transcription as a Crucial Step of Data Analysis. In U. Flick (Ed.), *The SAGE Handbook of Qualitative Data Analysis* (pp. 64-78). London: Sage Publications.

- Krkošek, M., Connors, B. M., Morton, A., Lewis, M. A., Dill, L. M., & Hilborn, R. (2011). Effects of parasites from salmon farms on productivity of wild salmon. *PNAS*, 108(35), 14700-14704.
- Krkošek, M., Ford, J. S., Morton, A., Lele, S., Myers, R. A., & Lewis, M. A. (2007, December 14). Declining Wild Salmon Populations in Relation to Parasites from Farm Salmon. *Science*, pp. 1772-1775.
- Krkošek, M., Lewis, M. A., & Volpe, J. P. (2005). Transmission dynamics of parasitic sea lice from farm to wild salmon. *Proceedings of the Royal Society B*, 272(1564).
- Krkošek, M., Morton, A., Volpe, J. P., & Lewis, M. A. (2009). Sea lice and salmon population dynamics: effects of exposure time for migratory fish. *Proceedings of the Royal Society B*, 276(1668).
- Lamb, W. K. (2007). Introduction. In S. Fraser, *The Letters and Journals of Simon Fraser, 1806-1808* (pp. 21-80). Toronto: Dundurn Press.
- Lather, P. (1986). Research as Praxis. *Harvard Educational Review*, 56(3), 257-278.
- Latour, B. (1983). Give Me a Laboratory and I will Raise the World. In K. D. Knorr-Cetina, & M. Mulkay (Eds.), *Science Observed: Perspectives on the Social Study of Science* (pp. 141-169). London: Sage Publications.
- Latour, B. (1987). *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge: Harvard University Press.
- Latour, B. (1988). *The Pasteurization of France*. (A. Sheridan, & J. Law, Trans.) Cambridge: Harvard University Press.
- Latour, B. (1993). *We Have Never Been Modern*. Cambridge: Harvard University Press.
- Latour, B. (1999). *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge: Harvard University Press.
- Latour, B. (2004). Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern. *Critical Inquiry*, 30(2), 225-248.
- Latour, B., & Woolgar, S. (1979). *Laboratory Life: The Construction of Scientific Facts* (2nd ed.). Princeton: Princeton University Press.
- Latulippe, N. (2017). *Belonging to Lake Nipissing: Knowledge, Governance, and Human-Fish Relations*. (Doctoral Thesis). Toronto: University of Toronto.
- Law, J. (1987). Technology and Heterogeneous Engineering: The Case of Portuguese Expansion. In W. E. Bijker, T. P. Hughes, & T. J. Pinch (Eds.), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (pp. 111-134). Cambridge: MIT Press.
- Law, J. (1992). Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity. *Systems practice*, 5(4), 379-393.
- Law, J., & Lien, M. E. (2012). Slippery: Field notes in empirical ontology. *Social Studies of Science*, 363-378.
- Leggatt, S. M. (2001). *Clear Choices, Clean Waters: The Leggatt Inquiry into Salmon Farming in British Columbia*. Vancouver: David Suzuki Foundation.
- Legislative Assembly of British Columbia. (2007). *Special Committee on Sustainable Aquaculture: Final Report, Volume One*. Victoria: Legislative Assembly of British Columbia.
- Lemke, T. (2002). Foucault, Governmentality, and Critique. *Rethinking Marxism*, 14(3), 49-64.

- Levidow, L. (2001). Precautionary Uncertainty: Regulating GM Crops in Europe. *Social Studies of Science*, 31(6), 845-878.
- Lewis, B. (2009, July 23). Sockeye forecast is bright, but changeable; Huge numbers predicted, but early results poor. *The Province*, p. A13.
- Leyne, L. (2010, February 24). Endless Cycle of Fraser Salmon Inquiries. *Times Colonist*, p. A12.
- Liberal Party of Canada. (2015). *A New Plan For a Strong Middle Class*. Ottawa: Federal Liberal Agency of Canada.
- Living Oceans Society. (2014, April 9). *Salmon Farm Licenses and Tenures Broughton Archipelago*. Retrieved January 7, 2020, from Living Oceans: Healthy Oceans. Healthy Communities.: <https://livingoceans.org/maps/salmon-farm-licenses-and-tenures-broughton-archipelago>
- Ljunggren, D. (2009, September 25). Every G20 Nation Wants to be Canada, Insists PM. *Reuters*. Retrieved April 18, 2021, from <https://www.reuters.com/article/columns-us-g20-canada-advantages-idUSTRE58P05Z20090926>
- Louis, R. P., Johnson, J. T., & Pramono, A. H. (2012). Introduction: Indigenous Cartographies and Counter-Mapping. *Cartographica*, 47(2), 77-79.
- Martin, B. (1988). Analyzing the Fluoridation Controversy: Resources and Structures. *Social Studies of Science*, 18, 331-363.
- Martin, B. (1996). Sticking a Needle into Science: The Case of Polio Vaccines and the Origins of AIDS. *Social Studies of Science*, 26(2), 245-276.
- Martin, E. (1987). *The Woman in the Body: A Cultural Analysis of Reproduction*. Boston: Beacon Press.
- Martin, E. (1991). The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles. *Signs*, 16(3), 485-501.
- Martin, E. (2010). Self-Making and the Brain. *Subjectivity*, 3(4), 366-381.
- McCay, B. J., & Finlayson, A. C. (1995). The Political Ecology of Crisis and Institutional Change: The Case of Northern Cod. *Annual Meeting of the American Anthropological Association* (pp. 1-18). Washington, DC: American Anthropological Association.
- McCreary, T. A. (2013). *New Relationships on the Northwest Frontier: Episodes in the Gitksan and Witsuwit'en Encounter with Colonial Power*. (Doctoral Thesis). Toronto: York University.
- McGoey, L. (2009). Pharmaceutical Controversies and the Performative Value of Uncertainty. *Science as Culture*, 18(2), 151-165.
- McGoodwin, J. R. (2006). Integrating Fishers' Knowledge into Fisheries Science and Management: Possibilities, Prospects, and Problems. In C. R. Menzies (Ed.), *Traditional Ecological Knowledge and Natural Resource Management* (pp. 175-194). Lincoln: University of Nebraska Press.
- McRae, D. M., & Pearse, P. H. (2004). *Treaties and Transition: Towards a Sustainable Fishery on Canada's Pacific Coast*. Vancouver: Federal-Provincial Post Treaty Fisheries Joint Task Group.
- Meggs, G. (1991). *Salmon: The Decline of the British Columbia Fishery*. Vancouver: Douglas and McIntyre.

- Menzies, C. R. (2006). Ecological Knowledge, Subsistence, and Livelihood Practices. In C. R. Menzies (Ed.), *Traditional Ecological Knowledge and Natural Resource Management* (pp. 87-104). Lincoln: University of Nebraska Press.
- Menzies, C. R., & Butler, C. (2006). Introduction: Understanding Ecological Knowledge. In C. R. Menzies (Ed.), *Traditional Ecological Knowledge and Natural Resource Management* (pp. 1-17). Lincoln: University of Nebraska Press.
- Menzies, C. R., & Butler, C. F. (2007). Returning to Selective Fishing through Indigenous Fisheries Knowledge: The Example of K'moda, Gitxaala Territory. *The American Indian Quarterly*, 441-464.
- Merchant, C. (1980). *The Death of Nature: Women, Ecology, and the Scientific Revolution* (1990 ed.). New York: Harper & Row.
- Merchant, C. (2004). *Reinventing Eden: The Fate of Nature in Western Culture*. New York: Routledge.
- Michaels, D. (2006). Manufactured Uncertainty: Protecting Public Health in the Age of Contested Science and Product Defense. *Annals of the New York Academy of Sciences*, 1076(1), 149-162.
- Miller, J. R. (1996). *Shingwauk's Vision: A History of Native Residential Schools*. Toronto: University of Toronto Press.
- Miller, K., Li, S., Kaukinen, K., Ginther, N., Hammill, E., Curtis, J., . . . Farrell, A. (2011). Genomic Signatures Predict Migration and Spawning Failure in Wild Canadian Salmon. *Science*, 331(6014), 214-217.
- Million, D. (2013). *Therapeutic Nations: Healing in an Age of Indigenous Human Rights*. Tucson: The University of Arizona Press.
- Milloy, J. S. (1999). *A National Crime: The Canadian Government and the Residential School System, 1879 to 1986*. Winnipeg: University of Manitoba Press.
- Mitchell, T. (2009). How Neoliberalism Makes Its World: The Urban Property Rights Project in Peru. In P. Mirowski, & D. Plehwe (Eds.), *The Road from Mont Pèlerin: The Making of the Neoliberal Thought Collective* (pp. 387-416). Cambridge: Harvard University Press.
- Mol, A., & Mesman, J. (1996). Neonatal Food and the Politics of Theory: Some Questions of Method. *Social Studies of Science*, 26(2), 419-444.
- Morton v. British Columbia (Agriculture and Lands), 2009 BCSC 136.
- Morton, A. (2017, August 23). A look inside salmon farms. Retrieved September 27, 2019, from <https://www.youtube.com/watch?v=duhnZB5Bjcw>
- Morton, A. (2020a). *Alexandra Morton's Typepad Blog*. Retrieved August 22, 2020, from Typepad: <https://alexandramorton.typepad.com/>
- Morton, A. (2020b). *Alexandra Morton's Vimeo Channel*. Retrieved August 25, 2020, from Vimeo: <https://vimeo.com/user3586150>
- Morton, A., & Williams, R. (2003). First Report of a Sea Louse, *Lepeophtheirus salmonis*, Infestation on Juvenile Pink Salmon, *Oncorhynchus gorbuscha*, in Nearshore Habitat. *Canadian Field Naturalist*, 117(4), 634-641.
- Morton, A., Routledge, R., & Krkošek, M. (2008). Sea Louse Infestation in Wild Juvenile Salmon and Pacific Herring Associated with Fish Farms off the East-Central Coast of Vancouver Island, British Columbia. *North American Journal of Fisheries Management*, 28(2), 523-532.

- Morton, A., Routledge, R., McConnell, A., & Krkošek, M. (2010). Sea lice dispersion and salmon survival in relation to salmon farm activity in the Broughton Archipelago. *ICES Journal of Marine Science*, 68(1), 144-156.
- Morton, A., Routledge, R., Peet, C., & Ladwig, A. (2004). Sea lice (*Lepeophtheirus salmonis*) infection rates on juvenile pink (*Oncorhynchus gorbuscha*) and chum (*Oncorhynchus keta*) salmon in the nearshore marine environment of British Columbia, Canada. *Canadian Journal of Fisheries and Aquatic Sciences*, 61(2), 147-157.
- Mulkay, M., Potter, J., & Yearley, S. (1983). Why an Analysis of Scientific Discourse is Needed. In K. D. Knorr-Cetina, & M. Mulkay (Eds.), *Science Observed: Perspectives on the Social Study of Science* (pp. 171-204). London: Sage Publications.
- Musqueam Indian Band. (2006). *Musqueam: A Living Culture*. Victoria: CopperMoon Communications Inc.
- Myers, R. A., Hutchings, J. A., & Barrowman, N. J. (1997). Why do Fish Stocks Collapse? The Example of Cod in Atlantic Canada. *Ecological Applications*, 7(1), 91-106.
- Nadasdy, P. (1999). The Politics of TEK: Power and the "Integration" of Knowledge. *Arctic Anthropology*, 36(1-2), 1-18.
- Nadasdy, P. (2003). *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal State Relations in the Southwest Yukon*. Vancouver: UBC Press.
- Nadasdy, P. (2005). The Anti-Politics of TEK: The Institutionalization of Co-Management Discourse and Practice. *Anthropologica*, 47(2), 215-232.
- Nadasdy, P. (2007). The Gift in the Animal: The Ontology of Hunting and Human-Animal Sociality. *American Ethnologist*, 34(1), 25-43.
- Nadasdy, P. (2012). Boundaries Among Kin: Sovereignty, the Modern Treaty Process, and the Rise of Ethno-Territorial Nationalism among Yukon First Nations. *Comparative Studies in Society and History*, 54(3), 499-532.
- Nagel, J. (2009a, July 4). Fishing hopes high as salmon swim for shore. *Chilliwack Progress*.
- Nagel, J. (2009b, July 21). Sockeye run may not be as big as predicted. *The Review*.
- National Centre for Truth and Reconciliation. (2016). *Map*. Retrieved May 8, 2020, from National Centre for Truth and Reconciliation, University of Manitoba: <http://nctr.ca/map.php>
- National Oceanic and Atmospheric Administration. (2015). *Optimum Interpolation Sea Surface Temperature Anomaly - Feb to Mar: 2015*. Boulder: NOAA/ESRL Physical Sciences Division. Retrieved from <http://psl.noaa.gov/>
- Native Land Digital. (2018). *Native Land Map*. Retrieved from Native-Land.ca | Our home on native land: <https://native-land.ca/>
- Neale, T., Carter, R., Nelson, T., & Bourke, M. (2019). Walking Together: A Decolonising Experiment in Bushfire Management on Dja Dja Wurrung Country. *Cultural Geographies*, 26(3), 341-359.
- Nelkin, D. (1971). Scientists in an Environmental Controversy. *Science Studies*, 1(3/4), 245-261.
- Nelkin, D. (1975). The Political Impact of Technical Expertise. *Social Studies of Science*, 5(1), 35-54.
- Neubauer, R. (2017). *Gateway to Crisis: Discourse Coalitions, Extractivist Politics, and the Northern Gateway Conflict*. (Doctoral Thesis). Burnaby: Simon Fraser University.

- Newell, D. (1993). *Tangled Webs of History: Indians and the Law in Canada's Pacific Coast Fisheries*. Toronto: University of Toronto Press.
- Office of the Auditor General of British Columbia . (2005). *Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon*. Victoria: Office of the Auditor General of British Columbia.
- Office of the Auditor General of Canada. (2000). *The Effects of Salmon Farming in British Columbia on the Management of Wild Salmon Stocks*. Ottawa: Office of the Auditor General of Canada.
- Office of the Auditor General of Canada. (2004). *Salmon Stocks, Habitat, and Aquaculture*. Ottawa: Office of the Auditor General of Canada.
- Oliver, J. (2010). *Landscapes and Social Transformations on the Northwest Coast: Colonial Encounters in the Fraser Valley*. Tucson: The University of Arizona Press.
- O'Neil, P. (2014, April 18). Fisheries department response to salmon decline report remains secret. *Vancouver Sun*. Retrieved September 27, 2019, from <http://www.vancouversun.com/Fisheries+department+response+salmon+decline+report+remains+secret/9753367/story.html>
- Oreskes, N., & Conway, E. M. (2010). *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. New York: Bloomsbury Press.
- Orr, C., & Husband, V. (2009, September 10). Who's Looking After Sockeye? *The Vancouver Sun*.
- Owen, B. (2020, June 10). 'Almost complete loss' of early salmon runs at Fraser River slide last year: DFO. *CBC News*. Retrieved July 16, 2020, from <https://www.cbc.ca/news/canada/british-columbia/big-bar-landslide-salmon-run-almost-complete-loss-1.5605907>
- Özden-Schilling, T. (2016). *Salvage Cartographies: Mapping, Futures, and Landscapes in Northwest British Columbia*. (Doctoral Thesis). Cambridge: Massachusetts Institute of Technology.
- Özden-Schilling, T. (2019). Cartographies of Consignment: First Nations and Mapwork in the Neoliberal Era. *Anthropological Quarterly*, 92(2), 541-574.
- Pacific Salmon Commission. (2009). *Fraser River Panel - News Release No. 1*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2016a). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2011 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2016b). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2015 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2016c). *Test Fisheries Maps*. Retrieved July 8, 2020, from Pacific Salmon Commission: <https://www.psc.org/publications/fraser-panel-in-season-information/test-fishing-results/fisheries-maps/>
- Pacific Salmon Commission. (2017a). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2012 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.

- Pacific Salmon Commission. (2017b). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2016 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2017c). *Fraser River Panel - Weekly Report No. 1*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2017d, July 21). *Fraser River Panel Regulatory Announcement*. Retrieved May 28, 2020, from Pacific Salmon Commission: <https://www.psc.org/download/468/2017/8340/july-21-2017.pdf>
- Pacific Salmon Commission. (2017e). *Fraser River Panel - Weekly Report No. 4*. Vancouver: Pacific Salmon Commission. Retrieved August 5, 2017, from <https://www.psc.org/download/469/2017/9278/august-4-2017.pdf>
- Pacific Salmon Commission. (2017f, August 4). *Fraser River Panel Regulatory Announcement*. Retrieved May 28, 2020, from Pacific Salmon Commission: <https://www.psc.org/download/468/2017/9276/aug-4-2017.pdf>
- Pacific Salmon Commission. (2017g). *Fraser River Panel - Weekly Report No. 5*. Vancouver: Pacific Salmon Commission. Retrieved August 11, 2017, from <https://www.psc.org/download/469/2017/9282/august-11-2017.pdf>
- Pacific Salmon Commission. (2017h, September 12). *Fraser River Panel Regulatory Announcement*. Retrieved June 17, 2020, from Pacific Salmon Commission: <https://www.psc.org/download/468/2017/9329/sept-12-2017.pdf>
- Pacific Salmon Commission. (2018a). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2014 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2018b). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2017 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2018c). *Thirty-Third Annual Report 2017/2018*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2019a). *Report of the Fraser River Panel to the Pacific Salmon Commission on the 2013 Fraser River Sockeye and Pink Salmon Fishing Season*. Vancouver: Pacific Salmon Commission.
- Pacific Salmon Commission. (2019b). *Treaty Between the Government of Canada and the Government of the United States of America Concerning Pacific Salmon*. Retrieved May 27, 2019, from <https://www.psc.org/download/45/miscellaneous/2337/pacific-salmon-treaty.pdf>
- Pasternak, S. (2010). Book Review - Beyond the Indian Act: Restoring Aboriginal Property Rights. *The Canadian Journal of Native Studies*, 30(2), 424-425.
- Pasternak, S. (2014). Occupy(ed) Canada: The Political Economy of Indigenous Dispossession. In *The Winter We Danced: Voices from the Past, the Future, and the Idle No More Movement*. Winnipeg: Arbeiter Ring Publishing.
- Pasternak, S. (2015). How Capitalism Will Save Colonialism: The Privatization of Reserve Lands in Canada. *Antipode*, 47(1), 179-196.
- Pauly, D. (2010). *5 Easy Pieces: The Impact of Fisheries on Marine Ecosystems*. Washington: Island Press.

- Pearse, P. H. (1982). *Turning the Tide: A New Policy for Canada's Pacific Fisheries*. Vancouver: Commission on Pacific Fisheries Policy.
- Pearse, P. H., & Larkin, P. A. (1992). *Managing Salmon in the Fraser: Report to the Minister of Fisheries and Oceans on the Fraser River Salmon Investigation*. Vancouver: Fisheries and Oceans Canada.
- Pels, D. (1996). The Politics of Symmetry. *Social Studies of Science*, 26(2), 277-304.
- Peluso, N. L. (1995). Whose Woods Are These? Counter-Mapping Forest Territories in Kalimantan, Indonesia. *Antipode*, 27(4), 383-406.
- Penikett, T. (2006). *Reconciliation: First Nations Treaty Making in British Columbia*. Vancouver: Douglas & McIntyre Ltd.
- Petersen, H. (2017, August 28). First Nations occupy Marine Harvest fish farm. *Cowichan Valley Citizen*. Retrieved September 27, 2019, from <https://www.cowichanvalleycitizen.com/news/first-nations-occupy-marine-harvest-fish-farm/>
- Pinkerton, E., & Davis, R. (2015). Neoliberalism and the Politics of Enclosure in North American Small-Scale Fisheries. *Marine Policy*, 61, 303-312.
- Preston, J. (2017). Racial Extractivism and White Settler Colonialism: An Examination of the Canadian Tar Sands Mega-Projects. *Cultural Studies*, 31(2-3), 353-375.
- Price, M. H., English, K. K., Rosenberger, A. G., MacDuffee, M., & Reynolds, J. D. (2017). Canada's Wild Salmon Policy: An Assessment of Conservation Progress in British Columbia. *Canadian Journal of Fisheries and Aquatic Sciences*, 74(10), 1507-1518.
- Proctor, R. N. (2006). "Everyone knew but no one had proof": tobacco industry use of medical history expertise in US courts, 1990-2002. *Tobacco Control*, 15, 117-125.
- Proctor, R. N. (2008). Agnotology: A Missing Term to Describe the Cultural Production of Ignorance (and Its Study). In R. N. Proctor, & L. Schiebinger (Eds.), *Agnotology: The Making and Unmaking of Ignorance* (pp. 1-33). Stanford: Stanford University Press.
- Proctor, R. N., & Schiebinger, L. (Eds.). (2008). *Agnotology: The Making and Unmaking of Ignorance*. Stanford: Stanford University Press.
- Prystupa, M. (2018, June 27). *Swanson Occupation: The Battle for Wild Salmon*. Retrieved from Cascadia Magazine: <https://www.cascadiamagazine.org/features/swanson-occupation-the-battle-for-wild-salmon/>
- Pynn, L. (2009, June 24). Improved Fraser sockeye return predicted. *The Vancouver Sun*.
- Quinn, T. P. (2005). *The Behavior and Ecology of Pacific Salmon & Trout*. Seattle: University of Washington Press.
- R v. Sparrow, [1990] 1 S.C.R. 1075.
- R v. Van der Peet, [1996] 2 S.C.R. 507.
- R. v. Armstrong, 2012 BCCA 242.
- R. v. Kapp, [2008] 2 S.C.R. 483.
- Ratushny, E. (2009). *The Conduct of Public Inquiries: Law, Policy, and Practice*. Toronto: Irwin Law.
- Regehr, T. D. (1976). *The Canadian Northern Railway: Pioneer Road of the Northern Prairies 1895-1918*. Toronto: Macmillan.

- Richards, E. (1988). The Politics of Therapeutic Evaluation: The Vitamin C and Cancer Controversy. *Social Studies of Science*, 18, 653-701.
- Richards, E. (1996). (Un)Boxing the Monster. *Social Studies of Science*, 26(2), 323-356.
- Richards, E., & Ashmore, M. (1996). More Sauce Please! The Politics of SSK: Neutrality, Commitment and beyond. *Social Studies of Science*, 26(2), 219-228.
- Said, E. W. (1978). *Orientalism*. London: Penguin Press.
- Said, E. W. (1983). Traveling Theory. In *The World, the Text, and the Critic* (pp. 226-247). Cambridge: Harvard University Press.
- Said, E. W. (1993). *Culture and Imperialism*. New York: Knopf.
- Said, E. W. (1994). Secular Interpretation, the Geographical Element, and the Methodology of Imperialism. In G. Prakash (Ed.), *After Colonialism: Imperial Histories and Postcolonial Displacements* (pp. 21-39). Princeton: Princeton University Press.
- Sanford, B. (1977). *McCulloch's Wonder: The Story of the Kettle Valley Railway*. West Vancouver: Whitecap Books.
- Satizábal, P., & Dressler, W. H. (2019). Geographies of the Sea: Negotiating Human–Fish Interactions in the Waterscapes of Colombia's Pacific Coast. *Annals of the American Association of Geographers*, 109(6), 1865-1884.
- Sawer, M., & Laycock, D. (2009). Down with Elites and Up with Inequality: Market Populism in Australia and Canada. *Commonwealth & Comparative Politics*, 47(2), 133-150.
- Schiefer, P. E. (2019). *Cultivating Salmon: Human-Fish Relations in Bethel, Alaska*. (Doctoral Thesis). Aberdeen: University of Aberdeen.
- Schreiber, D. (2006). First Nations, Consultation, and the Rule of Law: Salmon Farming and Colonialism in British Columbia. *American Indian Culture and Research Journal*, 30(4), 19-40.
- Schreiber, D., & Newell, D. (2006). Negotiating TEK in BC Salmon Farming: Learning from Each Other or Managing Tradition and Eliminating Contention? *BC Studies*, 79-102.
- Scott, P. (1989). Culling Technological White Elephants: Lessons from the Australian Animal Health Laboratory. *Science and Public Policy*, 16, 47-51.
- Scott, P., Richards, E., & Martin, B. (1990). Captives of Controversy: The Myth of the Neutral Social Researcher in Contemporary Scientific Controversies. *Science, Technology, & Human Values*, 15(4), 474-494.
- Sea Shepherd Conservation Society. (2017, August 24). *Occupation of a Salmon Farm: Why?* Retrieved September 26, 2019, from YouTube: https://www.youtube.com/watch?v=X_bbmMI_Tdk
- Shapin, S., & Schaffer, S. (1985). *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (2011 ed.). Princeton: Princeton University Press.
- Shepard, M. P., & Argue, A. W. (2005). *The 1985 Pacific Salmon Treaty*. Vancouver: UBC Press.
- Simon Fraser University. (2010, March 25). *Six to receive honorary degrees*. Retrieved April 19, 2018, from SFU News Online: <http://www.sfu.ca/archive-sfunews/news/six-to-receive-honorary-degrees.shtml>
- Simon Fraser University Centre for Coastal Studies. (2009, December 9). Statement from Think Tank of Scientists. Vancouver: Simon Fraser University. Retrieved September 17, 2020, from

- <https://web.archive.org/web/20100108062430/http://www.sfu.ca/cstudies/science/resources/adaptingtochange/FraserSockeyeThinkTankStatement.pdf>
- Simpson, A. (2007). Ethnographic Refusal. *Junctures*, 9, 67-80.
- Simpson, A. (2014). *Mohawk Interruptus: Political Life Across the Borders of Settler States*. Durham: Duke University Press.
- Simpson, A. (2016). The State is a Man: Theresa Spence, Loretta Saunders and the Gender of Settler Sovereignty. *Theory & Event*, 19(4), 1-30.
- Simpson, L. (2002). Indigenous environmental education for cultural survival. *Canadian Journal of Environmental Education*, 7(1), 13-25.
- Simpson, L. (Ed.). (2008). *Lighting the Eighth Fire: The Liberation, Resurgence, and Protection of Indigenous Nations*. Winnipeg: Arbeiter Ring Publishing.
- Simpson, L. (2011). *Dancing On Our Turtle's Back: Stories of Nishnaabeg Re-Creation, Resurgence, and a New Emergence*. Winnipeg: Arbeiter Ring Publishers.
- Simpson, L. B. (2017). *As We Have Always Done: Indigenous Freedom Through Radical Resistance*. Minneapolis: University of Minnesota Press.
- Simpson, S. (2009, August 15). Poor ocean survival blamed for returns. *The Vancouver Sun*.
- Singleton, V. (1996). Feminism, Sociology of Scientific Knowledge and Postmodernism: Politics, Theory and Me. *Social Studies of Science*, 26(2), 445-468.
- Sismondo, S. (2008). Science and Technology Studies and an Engaged Program. In E. J. Hackett, O. Amsterdamska, M. Lynch, & J. Wajcman (Eds.), *The Handbook of Science and Technology Studies* (3rd ed., pp. 13-31). Cambridge: MIT Press.
- Sismondo, S. (2010). *An Introduction to Science and Technology Studies*. West Sussex: Wiley-Blackwell.
- Skwxwú7mesh Úxwumixw. (2013a). *Our Land*. Retrieved February 24, 2020, from Skwxwú7mesh Úxwumixw: <https://www.squamish.net/about-us/our-land/>
- Skwxwú7mesh Úxwumixw. (2013b). *The Nation Today*. Retrieved February 24, 2020, from Skwxwú7mesh Úxwumixw: <https://www.squamish.net/about-us/the-nation-today/>
- Smith, L. T. (1999). *Decolonizing Methodologies: Research and Indigenous Peoples*. New York: Zed Books.
- Sparke, M. (1998). A Map that Roared and an Original Atlas: Canada, Cartography, and the Narration of Nation. *Annals of the Association of American Geographers*, 88(3), 463-495.
- Stacey, J. (2016). The Environmental, Democratic, and Rule-of-Law Implications of Harper's Environmental Assessment Legacy. *Review of Constitutional Studies*, 21(2), 165-185.
- Star, S. L., & Griesemer, J. R. (1989). Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, 19, 387-420.
- Stephenson, R. L., Paul, S., Pastoors, M. A., Kraan, M., Holm, P., Wiber, M., . . . Benson, A. (2016). Integrating Fishers' Knowledge Research in Science and Management. *ICES Journal of Marine Science*, 73(6), 1459-1465.
- Sterud, E., Simolin, P., & Kvellestad, A. (2003). Infection by *Parvicapsula* sp. (Myxozoa) is associated with mortality in sea-caged Atlantic salmon *Salmo salar* in northern Norway. *Diseases of aquatic organisms*, 54(3), 259-263.

- Sutherland, C. C. (2013). *The Fraser River: Where Epistemologies Collide*. (Major Research Project). Toronto: York University.
- Sutherland, C. C. (2015). The Cohen Report and the Black Hole of Indifference. In J. Berland, J. Dalton, & N. Myers (Eds.), *Canada Watch: The Politics of Evidence* (pp. 22-25). Toronto: Robarts Centre for Canadian Studies. Retrieved from http://robarts.info.yorku.ca/files/2015/09/CW_Fall2015_FINAL.pdf?x73767
- Swanson, H. A. (2017). Methods for Multispecies Anthropology. *Social Analysis*, 61(2), 81-99.
- Swanson, H. A. (2019). An Unexpected Politics of Population: Salmon Counting, Science, and Advocacy in the Columbia River Basin. *Current Anthropology*, S272-S285.
- Tallbear, K. (2013a). *Native American DNA*. Minneapolis: University of Minnesota Press.
- Tallbear, K. (2013b). Genomic Articulations of Indigeneity. *Social Studies of Science*, 43(4), 509-533.
- Taylor, J. E. (1998). Making Salmon: The Political Economy of Fishery Science and the Road Not Taken. *Journal of the History of Biology*, 31, 33-59.
- Taylor, J. E. (1999). *Making Salmon: An Environmental History of the Northwest Fisheries Crisis*. Seattle: University of Washington Press.
- Te'mexw Treaty Association. (2013). *Statement of Intent Map*. Retrieved September 26, 2020, from Te'mexw Treaty Association: https://temexw.org/wp-content/uploads/2019/06/SOI_Hillshade_E2.pdf
- Teit, J. A. (1900). *The Thompson Indians of British Columbia*. New York: American Museum of Natural History.
- The Canadian Press. (2009, August 7). Poor sockeye salmon numbers on B.C. rivers sending fishermen home empty handed. *The Canadian Press*.
- The Canadian Press. (2020, February 15). A Timeline on Rail Disruptions by Anti-Pipeline Protesters Across Canada. *The Province*. Retrieved April 18, 2021, from <https://theprovince.com/news/local-news/a-timeline-on-rail-disruptions-by-anti-pipeline-protesters-across-canada/wcm/50eed246-bf64-4544-9907-e38a3ee60b30>
- Thom, B. (2009). The Paradox of Boundaries in Coast Salish Territories. *Cultural Geographies*, 16(2), 179-205.
- Thom, B. (2014). Reframing Indigenous Territories: Private Property, Human Rights, and Overlapping Claims. *American Indian Culture and Research Journal*, 38(4), 3-28.
- Thom, B. (2020). Addressing the Challenge of Overlapping Claims in Implementing the Vancouver Island (Douglas) Treaties. *Anthropologica*, 62(2), 295-307.
- Thomas, M. (2018, December 14). 17 fish farms could all be phased out under new agreement between B.C. government, First Nations. *CBC News*. Retrieved September 27, 2019, from <https://www.cbc.ca/news/canada/british-columbia/bc-fish-farms-broughton-archipelago-1.4946570>
- Todd, Z. (2014). Fish Pluralities: Human-Animal Relations and Sites of Engagement in Paulatuuq, Arctic Canada. *Inuit Studies*, 38(1-2), 217-238.
- Todd, Z. (2016). An Indigenous Feminist's Take On The Ontological Turn: 'Ontology' Is Just Another Word For Colonialism. *Journal of Historical Sociology*, 29(1), 4-22.
- Todd, Z. (2018). Refracting the State Through Human-Fish Relations: Fishing, Indigenous Legal Orders and Colonialism in North/Western Canada. *Decolonization: Indigeneity, Education & Society*, 7(1), 60-75.

- Truth and Reconciliation Commission of Canada. (2015). *The Final Report of the Truth and Reconciliation Commission of Canada*. Montreal: McGill-Queen's University Press.
- Tsleil-Waututh Nation. (n.d.). *About Tsleil-Waututh Nation*. Retrieved May 29, 2020, from Tsleil-Waututh Nation: People of the Inlet: <https://twnation.ca/about/>
- Tsleil-Waututh Nation: Treaty, Lands & Resources Department. (2015). *Assessment of the Trans Mountain Pipeline and Tanker Expansion Proposal*. North Vancouver: Tsleil-Waututh Nation Sacred Trust Initiative.
- Turner, C. (2013). *The War on Science: Muzzled Scientists and Wilful Blindness in Stephen Harper's Canada*. Vancouver: Greystone Books.
- Turner, C., & Fondahl, G. (2015). "Overlapping claims" to territory confronting treaty-making in British Columbia: Causes and implications. *The Canadian Geographer*, 59(4), 474-488.
- Tzeachten First Nation. (2018). *Culture & language*. Retrieved June 10, 2020, from Tzeachten First Nation: <https://www.tzeachten.ca/about-tzeachten/culture-language/>
- U'mista Cultural Society. (2020). *Our Land*. Retrieved June 9, 2020, from Living Tradition: The Kwakwaka'wakw Potlatch on the Northwest Coast: https://umistapotlatch.ca/notre_terre-our_land-eng.php
- Union of B.C. Indian Chiefs. (2020, June 14). *Devastating Trans Mountain Pipeline Spill Reinforces Urgency to Halt Further Expansion*. Retrieved June 24, 2020, from Union of B.C. Indian Chiefs: https://www.ubcic.bc.ca/stop_tmx_devastating_trans_mountain_pipeline_spill_reinforces_urgency_to_halt_further_expansion
- United Nations. (1992). *Rio Declaration on Environment and Development*. Rio de Janeiro: United Nations Department of Economic and Social Affairs.
- United Nations. (2007). *United Nations Declaration on the Rights of Indigenous Peoples*. New York: United Nations.
- Vagle, S., Ding, L., Boesen, M., Cronkite, G., & Xie, Y. (2008). *A study to determine the feasibility of hydroacoustic monitoring of migrating sockeye and pink salmon in the marine area*. Vancouver: Pacific Salmon Commission.
- Van den Belt, H., & Gremmen, B. (2002). Between Precautionary Principle and "Sound Science": Distributing the Burdens of Proof. *Journal of Agricultural and Environmental Ethics*, 15(1), 103-122.
- Viveiros de Castro, E. V. (1998). Cosmological Deixis and Amerindian Perspectivism. *Journal of the Royal Anthropological Institute*, 4(3), 469-488.
- Volpe, J. P., & Shaw, K. (2008). Fish Farms and Neoliberalism: Salmon Aquaculture in British Columbia. In C. Gore, & P. Stoett (Eds.), *Environmental Challenges and Opportunities: Local-Global Perspectives on Canadian Issues*. Toronto: Emond Montgomery Publications.
- Volpe, J. P., Taylor, E. B., Rimmer, D. W., & Glickman, B. W. (2000). Evidence of Natural Reproduction of Aquaculture-Escaped Atlantic Salmon in a Coastal British Columbia River. *Conservation Biology*, 14(3), 899-903.
- Wadewitz, L. K. (2012). *The Nature of Borders: Salmon, Boundaries, and Bandits on the Salish Sea*. Seattle: University of Washington Press.
- Wappel, T. (2003). *The 2001 Fraser River Salmon Fishery*. Ottawa: Standing Committee on Fisheries and Oceans.

- Wappel, T. (2005). *Here We Go Again... Or the 2004 Fraser River Salmon Fishery*. Ottawa: Standing Committee on Fisheries and Oceans.
- Weinel, M. (2008). Counterfeit Scientific Controversies in Science Policy Contexts. *Cardiff School of Social Sciences Working Paper #120*. Cardiff: Cardiff School of Social Sciences. Retrieved March 27, 2020, from <http://orca.cf.ac.uk/73744/1/wp120.pdf>
- Weinel, M. (2012). Expertise and Inauthentic Scientific Controversies: What You Need to Know to Judge the Authenticity of Policy-Relevant Scientific Controversies. In J. Goodwin (Ed.), *Between Scientists & Citizens* (pp. 427-440). Ames: Great Plains Society for the Study of Argumentation. Retrieved March 27, 2020, from <https://pdfs.semanticscholar.org/7146/cfc367caa32741e382e7690e0a04efa1ee14.pdf>
- Weinel, M. (2019). Recognizing Counterfeit Scientific Controversies in Science Policy Contexts: A Criteria-Based Approach. In D. S. Caudill, S. N. Conley, M. E. Gorman, & M. Weinell (Eds.), *The Third Wave in Science and Technology Studies: Future Research Directions on Expertise and Experience* (pp. 53-70). Camden: Palgrave Macmillan.
- Weinel, T. (2009). *Thabo Mbeki, HIV/AIDS and Bogus Scientific Controversies*. Retrieved March 27, 2020, from Politicsweb: <http://orca.cf.ac.uk/73738/1/thabo-mbeki-hiv-aids-and-bogus-scientific-controversy>
- White, G. (2006). Cultures in Collision: Traditional Knowledge and Euro-Canadian Governance Processes in Northern Land-Claim Boards. *Arctic*, 59(4), 401-414.
- White, R. (1996). *The Organic Machine: The Remaking of the Columbia River*. New York: Macmillan.
- Widodo, H. P. (2014). Methodological Considerations in Interview Data Transcription. *International Journal of Innovation in English Language Teaching and Research*, 3(1), 101-107.
- Williams, B. (2005). *2004 Southern Salmon Fishery: Post-Season Review*. Vancouver: Fisheries and Oceans Canada.
- Woodhouse, E., Hess, D., Breyman, S., & Martin, B. (2002). Science Studies and Activism Possibilities and Problems for Reconstructivist Agendas. *Social Studies of Science*, 32(2), 297-319.
- Woolgar, S. (1981). Interests and Explanation in the Social Study of Science. *Social Studies of Science*, 11(3), 365-394.
- Wynne, B. (1992). Misunderstood Misunderstanding: Social Identities and Public Uptake of Science. *Public Understanding of Science*, 1(3), 281-304.
- Wynne, B. (1996). SSK's Identity Parade: Signing-Up, Off-and-On. *Social Studies of Science*, 26(2), 357-391.
- Wynne, B. (2003). Seasick on the Third Wave? Subverting the Hegemony of Propositionalism. *Social Studies of Science*, 33(3), 401-417.
- Young, N., & Matthews, R. (2010). *The Aquaculture Controversy in Canada: Activism, Policy, and Contested Science*. Vancouver: UBC Press.