

**COMMISSION OF INQUIRY INTO THE DECLINE OF SOCKEYE SALMON
IN THE FRASER RIVER**

In the matter of Her Excellency the Governor General in Council, on the recommendation of the Prime Minister, directing that a Commission do issue under Part I of the *Inquiries Act* and under the Great Seal of Canada appointing the Honourable Bruce Cohen as Commissioner to conduct an inquiry into the decline of sockeye salmon in the Fraser River

FINAL SUBMISSIONS OF THE FIRST NATIONS COALITION

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**FNC Final Submissions
filed with the Cohen Commission**

Errata

Executive Summary

1. P. IV, para 13 replace “diving” with “driving”
2. P. VIII, para 29 “inclusive of Tier 3”
3. P. V, para 15 “Tier 1, 2 and 3”
4. P. XI, para 40 replace “usefu” with “useful”
5. P. XVIII, para 69 replace “on” with “one” in the last sentence

Main

6. P. 259, para 694 delete (a)
7. P. 262, para 713 replace “venerable” to “vulnerable”
8. P. 275, para 727 delete “not” in last line of (b)
9. P. 278, para 753 replace “Tier 1” with “Tier 2 level” in 6th line
10. P. 280, para 757 replace “DO” to “DFO”

Reply Submission:

Footnote

1. P. 26, footnote 82 replace “p. 57” with “p. 61”

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I. EXECUTIVE SUMMARY AND RECOMMENDATIONS

1. Since time immemorial, First Nations have extensively used and occupied the lands and waters along the migratory route of the FRSS, and have been stewards of the resource.¹ Their traditional laws require them to honour and respect the salmon so that they may ensure their sustainability for future generations.² For First Nations, there is a sacred relationship to salmon which provides the ethic of sustainability. Crown recognition and respect for First Nations' rights and responsibilities as stewards of the FRSS is required to ensure the future sustainability of the FRSS. This recognition within co-management government-to-government agreements is the strongest security that FRSS will be sustained.

Framework for the Inquiry

2. The framework for the Inquiry was set in the Terms of Reference, which direct the Commissioner to:
 - a. Conduct the Inquiry without seeking to find fault, and with the overall aim of respecting the conservation of FRSS, and by encouraging broad cooperation among stakeholders;³
 - b. Investigate and make findings of fact regarding the current state of FRSS, and the causes of decline of FRSS;⁴
 - c. Consider the policies and practices of DFO with respect to FRSS, including its scientific advice, its fisheries policies and programs, its risk management

¹ Transcript, June 22, 2011, p. 77 (Dr. Douglas Harris); Transcript, December 13, 2010, pp. 26-28 (Chief Willie Charlie)

² Transcript, December 13, 2010, pp. 26-29 (Chief Willie Charlie); Transcript, December 15, 2010, pp. 53, 57 (Guujaaw); Transcript, December 14, 2010, pp. 27-28 (Dr. Ron Ignace); Transcript, December 14, 2010, pp. 7-8 (Chief Fred Sampson); Transcript, December 14, 2010, p. 40 (Chief Thomas Alexis)

³ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (A)

⁴ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (C) (I), (II)

strategies, its allocation of Departmental resources and its fisheries management practices and procedures;⁵ and

- d. Develop recommendations for improving the future sustainability of the FRSS fishery.⁶
3. The FNC is one of the few participant groups in the Inquiry that was awarded a full grant of standing. The FNC's active participation on all matters considered in this Inquiry illustrate the breadth and depth of the concerns First Nations have regarding FRSS. At the commencement of the public hearings, the FNC advised that the effects of cumulative impacts on FRSS have long been a concern and was an area that required in-depth attention in this Inquiry; the FNC also noted that care should be taken not to lose this difficult subject in the long list of impacts affecting FRSS.⁷ Now, at the end of the evidentiary hearings we confirm that it remains the view of the FNC that the primary causes of the decline in FRSS are cumulative and multiple stressors.
 4. While there are many reasons to be very concerned about both the status of FRSS and DFO's policies and practices (and its ability to implement such policies), the FNC's approach to this Inquiry has been forward looking and recommendation focussed. Our approach has been to search for and suggest solutions to inspire the path forward. The FNC remained committed throughout this Inquiry to place before the Commissioner information helpful to understand First Nations' perspectives, concerns, interests and recommended approaches for the path of reconciliation, which could engender the most collaboration amongst governments (Canada, the Province and First Nations), ENGOs and stakeholders interested in the long term sustainability of FRSS. In our view the strongest recommendations for change the Commissioner should make are towards the creation of collaborative joint management relationships and processes between DFO and First Nations.

⁵ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (B)

⁶ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (D)

⁷ Transcript, June 15, 2010, p. 74 (Submissions on behalf of FNC)

FRSS: Causes of the Decline

5. Over the four to five years of their life cycle, FRSS encounter largely unmonitored variations in physical and chemical conditions, food, competitors, predators, and disease over several thousand kilometres from the upper reaches of the Fraser River to the Gulf of Alaska, with cumulative and interactive effects (most unknown), occurring over multiple life history stages in ways that vary from year to year.
6. There are multiple stressors affecting FRSS throughout their life histories. These cumulative impacts are difficult to tackle within scientific inquiry as they require taking a holistic ecosystem based approach with a species who prefers to die privately. A holistic ecological perspective is embodied within First Nations' management, and assisted by TEK.
7. The scientific process of investigating causes or contributing factors of decline in FRSS is frustrated by numerous data gaps and limitations. Gaps exist not only in baseline data (limited time series and spatial coverage for many factors), but also in fundamental scientific understandings of various conditions and their relation to salmon populations.⁸
8. Because ecological systems are alive and dynamic, they constantly change across space and time. They are composed of complex sets of components interacting to changes arising within environmental processes (e.g., ocean conditions) and human activities (e.g., fish farming). Because of such simultaneously occurring environmental and human processes, it can be very difficult to attribute single dominant causes to observed ecological changes. Therefore, while it is important to investigate each potential cause individually, it is important to be aware that it most likely will be the interaction of several factors, rather than one factor *per se*, that has caused the declines in FRSS that First Nations have been experiencing for decades.⁹
9. The weight of the evidence in the Inquiry regarding the 2009 returns, supports the reasonable conclusion that cumulative or multiple stressors in the marine environment for the 2007 out- migrating smolts is the primary cause for the poor 2009 returns. Primary cumulative stressors on the 2009 return appear to have arisen during the life

⁸ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 13

⁹ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), pp. 13-14

cycle of the 2007 migrating smolts. It is unknown whether the lethal effect on the 2007 outmigration occurred prior to or after arrival in the Gulf of Alaska. The smolts did not return as adult sockeye in 2009. The cumulative impacts in the marine environment that scientists have identified are: the overlapping stressors of marine conditions (including poor food supply in the SOG, HABs, and water runoff in QCS), climate change, predation and contaminants (river, estuary and mouth). While it is possible that contaminants, fish farms and competition for food in the open ocean contributed to the poor 2009 return, this is not yet known.

10. The weight of the evidence in the Inquiry also supports the reasonable conclusion that shifts in oceanic conditions and cumulative or multiple stressors in the marine and fresh water environments are contributing to the longer term decline. Climate change is also a contributor to the stressors. The precise role for contaminants, fish farms and competition for food in the open ocean has not yet been determined by science.
11. Although there is not yet sufficient scientific evidence to determine whether disease from fish farms, and endocrine disrupting contaminants and ECCs were primary contributors to the 2009 poor return and the longer term decline, we submit that it is mandatory to apply a precautionary approach with regard to such impacts, while further data is collected and further research conducted.
12. One of the consequences of climate change is increasing variability and the potential synergistic effects on predation, contaminants, harmful algae blooms, ocean conditions and disease affecting FRSS. All of this variability will require careful monitoring, increased precaution and more developed approaches to EBM and ecosystem based science. There are CU specific responses being observed to climate change and these multiple and cumulative stressors.
13. Despite evidence about the likely impacts to FRSS and their ecosystems from changing climates and fluctuating temperatures due to climate change, DFO is not currently a leader with climate research. Most fisheries scientists and managers view climate change as a potentially serious factor diving current and future sustainability of FRSS.
14. Given their relationship to FRSS, and their intimate familiarity with the various CUs and the ecosystems on which they rely, First Nations have much expertise. First Nations will be extremely helpful when applying an EBM and cumulative impact assessment. The

FNC submits that First Nations must be involved in developing research priorities and projects and conducting monitoring and data collection for FRSS. Scientists must work closely with First Nations on assessment projects, incorporating TEK wherever possible.

15. The approach to the prioritization of the recommendations set out in Technical Report #6 is a reasonable one, and would best be conducted through a process with all levels of government: Canada, the Province, and First Nations, with advice from stakeholders, including ENGOs, who are interested in contributing to the conservation and long term sustainability of FRSS. The FNC submits that once research recommendations are prioritized, a clear plan for implementation must be developed (with clear timelines and benchmarks for each aspect of the plan). A mechanism for oversight should be included. This work can be done within Tier 1 and 2 co-management structures.

DFO's Policies and Practices

Ecosystem Based Management

16. During the Inquiry, many witnesses spoke about the importance of maintaining ecosystems in order to preserve FRSS for future generations. EBM entails developing an understanding for how the environment, humans, and other ecosystem components impact ecosystems, which is exactly where the assessment of FRSS falls short.¹⁰ The FNC submits that EBM, and an ecosystem based approach to science, as exemplified within the PNCIMA Initiative, must be implemented in the various ecosystems of the FRSS. EBM can be implemented within the Tier 1 and Tier 2 co-management model proposed herein.
17. Canada has not moved very far towards EBM.¹¹ This is of grave concern to the FNC. Given that single species management models are not adequate there's a strong scientific, almost consensus that we may see less failures if we understand the ecosystems better.¹² There is no indication or commitment that EBM or food web considerations are factored into the advice the PSC provides to Canada and the US on shared Pacific salmon stocks.¹³ DFO has no consistent agreed upon definition or framework to guide its ecosystem approach to management. EBM means a quantum

¹⁰ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 80

¹¹ Technical Report #8 citing a 2010 PICES Report

¹² Transcript, May 4, 2011, p. 28 (Dr. Villy Christensen)

leap forward by DFO to a management system that First Nations have used for millennia.¹⁴ The entry point for ecosystem based management is geographic.¹⁵

Indigenous Knowledge and TEK

18. TEK is a cumulative body of knowledge, practice and expertise handed down through generations by cultural transmission.¹⁶ It is dynamic knowledge that has evolved over time and continues to evolve today.¹⁷ Indigenous Knowledge is a holistic way of knowing that encompasses social, environmental, economic, cultural and spiritual elements, where humans are recognized as an intimate part of the natural world.¹⁸ Like the scientific method, TEK involves observations, questions, hypotheses, experimentation, interpretation, and reporting.¹⁹
19. Article 8(j) of the Convention of Biological Diversity requires that Canada respect, preserve, maintain and promote the use and application of TEK. In addition the UN Declaration on Indigenous Peoples recognizes and affirms that First Nations have the right and responsibility to protect the environment in their traditional territories, and also affirms that Governments are to recognize and support the use of traditional knowledge.
20. Numerous scientists testified on the importance of including TEK in their work – whether such work is stock assessment, assessments of fish health, ecosystem based modeling and management, implementation of the WSP, or other matters.²⁰ Numerous fisheries managers have also testified about their aspirations for true incorporation of TEK along side “western science” – and for the use of two-eyed seeing.

¹³ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 79

¹⁴ Transcript, May 6, 2011, p. 24 (Mr. Sandy McFarlane)

¹⁵ Transcript, May 6, 2011, p. 22 (Dr. Villy Christensen)

¹⁶ Exhibit 224 (Knowledge Integration in Salmon Conservation and Sustainability Planning, March 2009) p. iv

¹⁷ Exhibit 155A (Considering ATK in the Implementation of the WSP, September 14, 2009), p. 3

¹⁸ Exhibit 155A (Considering ATK in the Implementation of the WSP, September 14, 2009), p. 3

¹⁹ Exhibit 5 (Ways of Knowing PowerPoint presentation by Dr. David Close, October 2010), p. 7

²⁰ Transcript, October 25, 2010, p. 11 (Mike Lapointe); Transcript, November 29, 2010, pp. 64-65 (Dr. Jim Irvine); Transcript, December 7, 2010, pp. 91, 93 (Dr. Carrie Holt); Transcript, February 3, 2011, pp. 51-52 (Timber Whitehouse and Dr. Brian Riddell); Transcript, July 8, 2011, p. 61 (Dr. David Welch); Transcript, March 9, 2011, p. 77 (Dr. Scott Hinch); Transcript, May 5, 2011, pp. 8-9 (Dr. Andrew Trites); Transcript, August 25, 2011, pp. 35-36 (Dr. Kristi Miller-Saunders); Transcript, May 10, 2011, pp. 69, 72 (Donald McDonald); Transcript, September 20, 2011, pp. 98-99 (David Marmorek)

21. Despite recognition from First Nations, academics, scientists and DFO managers alike, and despite many mentions of the need to include TEK in DFO's policies and guidance documents, very little progress has been made to incorporate TEK.²¹ While the need to embrace TEK and the potential benefits are acknowledged, the manner of doing so is much less clear. The FNC submits that meaningful co-management with First Nations is the clearest way to ensure that TEK is brought to the table and integrated into science and management decisions.
22. The FNC also submits that First Nations, with support from DFO, should develop a set of best practices or guidelines for the use of TEK in fisheries management and science.²²

WSP

23. The FNC submits that more robust efforts are required to bring fisheries management related to FRSS into alignment with the goals and strategies of the WSP, including continued and enhanced exploration of (a) terminal or near terminal fisheries river fisheries on known stocks in the coastal areas and Fraser watershed; (b) selective harvesting methods; (c) harvest closures as required to protect vulnerable CUs; and (d) improved stock assessment at a CU level.
24. DFO must secure funding and demonstrate a stronger commitment to implementing the goals and principles of the WSP through its scientific research agenda, its engagement processes, and its management actions.²³
25. Because the WSP doesn't prescribe how much conservation is enough, it was understood that discussions regarding conservation objectives would have to occur once CUs were defined and biological status was assessed.²⁴ Despite commitments made to First Nations that they would be actively consulted regarding the implementation of the

²¹ Transcript, February 3, 2011, pp. 51-52 (Timber Whitehouse and Dr. Brian Riddell); Transcript, November 4, 2010, pp. 113-114 (Dr. Laura Richards); Transcript, November 2, 2010, pp. 89, 114 (Susan Farlinger and Paul Sprout); Transcript, December 8, 2010, p. 96 (Mark Saunders)

²² Exhibit 155A (Considering ATK in the Implementation of the WSP, Sept 14, 2009), p. 11; Exhibit 224 (Knowledge Integration in Salmon Conservation and Sustainability Planning, March 2009), pp. 24-32

²³ Exhibit 108 (CV of Brian Riddell, March 19, 2009)

²⁴ Transcript, November 29, 2010, p. 23 (Pat Chamut)

WSP,²⁵ DFO has returned to its own, primarily internal and technical processes, to work, albeit slowly, on Strategy 1.²⁶

26. DFO suggests that First Nations have been engaged in the implementation of the WSP through the FRSSI.²⁷ The FRSSI model as it is currently implemented, does not go far enough to implement the WSP as it relies predominantly on an aggregate-based approach and not a CU approach.²⁸
27. DFO must devote the necessary long-term and stable resources to implement the WSP. The FNC submit that a commitment of \$5 million per year for the next 5 years would be a useful next step to support the implementation of the WSP in a manner that contributes to the long term sustainability of FRSS.
28. The FNC also submits that appointing one or several champions within DFO who can bridge the strategies and oversee implementation of the WSP is required.²⁹ The FNC submit that it is inappropriate to assume that the RDG alone, who is responsible for delivery all programs and activities within her region in accordance with assigned resources,³⁰ could alone take on this responsibility.
29. True implementation of the WSP, together with the application of EBM and the incorporation of TEK, will be assisted greatly by Tier 1 and Tier 2 co-management structures.

Habitat

30. The Fraser River supports the largest abundance of FRSS in the world for a single river due to its length (1600 km), watershed size (223,000 km²), and the lake nursery area

²⁵ Transcript, December 1, 2010, pp. 97, 102 (Mark Saunders); Transcript, December 3, 2010, pp. 50-51 (Mark Saunders)

²⁶ Transcript, July 4, 2011, pp. 71-72 (Marcel Shepert)

²⁷ Exhibit 756 (Ryall Response to FNC Questions, April 21, 2011), p. 1

²⁸ Transcript, July 4, 2011, p. 73 (Marcel Shepert); see also Exhibit 413 (Fraser River Integrated Sockeye Spawning Initiative, prepared by Ken Wilson, March 2009) pp. 4, 5, 7

²⁹ Exhibit 937 (Returning Salmon: Integrated Planning and the Wild Salmon Policy in BC, March 10, 2008), p. 2; Transcript, November 29, 2010, pp. 73-74 (Pat Chamut); Transcript, December 3, 2010, p. 57 (Mark Saunders); Transcript, December 8, 2010, p. 65 (Heather Stalberg); Transcript June 1, 2011, p. 100 (Jeffrey Young); Transcript, June 2, 2011, pp. 6-7 (Dr. Brian Riddell and Jeffrey Young)

³⁰ Transcript, November 1, 2010, p. 13 (David Bevan)

(2,500 km²).³¹ The long-distance migrations of sockeye salmon from habitat to habitat provide some of the most enduring puzzles in salmon ecology.³²

31. There must be increased research and protection of FRSS habitat in both the Fraser watershed and marine environments. Increased research on the marine migratory route of FRSS at a CU level is a priority.
32. A comprehensive inventory of FRSS habitat is not available and thus the status of total FRSS habitat gains and losses in the lower Fraser River and marine environment cannot be quantified.³³
33. Witnesses testifying to the impacts of development along the Fraser agreed that many of the human-induced changes in the Fraser watershed have been, on an evolutionary scale, relatively rapid and that there were potential impacts to FRSS habitat from urbanization and forestry.³⁴ Given the high potential for development activities along the Fraser River to impact FRSS through cumulative effects, there is need for ongoing research, monitoring and protection of fresh water habitat.
34. There are a number of marine ecosystems that FRSS pass through during their migration from the Fraser River to the open ocean. At the beginning of the Inquiry, Dr. Welch outlined each of the bodies of water that are part of the migration route of FRSS, with reference to the map on page 5 of Exhibit 2.³⁵
35. The FNC submits that in order to ensure ongoing habitat protection, increased monitoring and data collection and the creation of an inventory of habitat values under WSP Strategy 2 are necessary, as is ensuring that habitat restoration and compensation projects continue with proper oversight and assessment. It is critical that First Nations are involved in data collection, the identification of habitat values, and in habitat monitoring and restoration work given their expertise, TEK, indigenous knowledge, and

³¹ Exhibit 1915 (Evaluation of Uncertainty in Fraser Sockeye (*Oncorhynchus nerka*) Wild Salmon Policy Status Using Abundance and Trends in Abundance Metrics, August 25, 2011), p. 6

³² Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 10

³³ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 57

³⁴ Transcript, October 25, 2010, pp. 85-86 (Dr. David Welch)

³⁵ Exhibit 2 (PowerPoint Presentation: Overview of freshwater life history of Fraser Sockeye), p. 5; Transcript, October 25, 2010, p. 32 (Dr. David Welch)

the potential impact that habitat destruction has for their traditional territories and on FRSS.

36. A group of PISCES scientists suggested that the 15-year decline in marine productivity of FRSS appears to bear a stronger resemblance to a shift to lower productivity in 12 of 16 FRSS stocks in 1992 for a variety of reasons, including: the coinciding decline of other stocks that share the same migration route with FRSS through Queen Charlotte Strait and Queen Charlotte Sound, and that the winter of 1991/92 was the start of a persistent el Niño, which was accompanied by relatively dramatic changes in many characteristics of the west coast ocean ecosystem. However, the authors of Technical Report 4 also noted that a large-scale climatic change in the North Pacific occurred in 1989, and whether that shift and the el Niño phenomenon are connected is not known.³⁶
37. During the hearings on cumulative impacts, David Marmorek stated that it appears that both the SOG and Queen Charlotte Sound/Strait are important, and therefore, in order to understand the role of the marine environment in the long term decline and for the 2009 poor returns, one should focus on the total marine environment.³⁷
38. The FNC submits that DFO cannot take a myopic view in determining where conditions in the marine environment may be negatively impacting FRSS. The evidence presented in the Inquiry makes it clear that ocean conditions in the SOG, Queen Charlotte Sound/Strait and the Gulf of Alaska may have played a significant role in the poor returns of 2009 and in the longer term decline of FRSS.
39. The FNC submits that in order to better understand how ocean conditions in various ecosystems in the marine environment might impact FRSS, more comprehensive and collaborative research studies must be undertaken and funded. Canada and First Nations must collaboratively determine and prioritize the questions that are to be answered through the research and develop the research plan.
40. In the meantime, numerous witnesses spoke about the value of completing marine use planning, such as that completed by the Haida and First Nations of the central coast, for identifying migratory routes of key species, important food gathering areas, as well as for

³⁶ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), pp. x-xi

³⁷ Transcript, September 19, 2011, p. 90 (David Marmorek)

highlighting sensitive areas. Dr. McKinnell agreed that the work being done by the Haida³⁸ and other coastal First Nations³⁹ under the PNCIMA Initiative, including mapping and monitoring the marine environment in their traditional territory, is useful and “part of the scientific process to understand the distribution and ranges of species in an area.”⁴⁰ Dr. Ross also agreed that the mapping work being done by the Haida in their traditional marine territory was extremely useful.⁴¹ It is the FNC’s submission that these maps and research projects are practical and immediate methods for identifying potential bottlenecks and areas of critical refuge within the marine environment.

Section 35 Rights and Responsibilities

41. In the FNC’s submission, the Terms of Reference require that the Commissioner consider the *practical implications* of the evolving law regarding s. 35 rights as it relates to the sustainability and management of FRSS. In particular, the FNC submits that there are significant practical implications arising from (a) the historical context for reconciliation; (b) the Constitutional priority of the Aboriginal right to fish for food, social and ceremonial purposes; (c) First Nations’ historic and ongoing need for meaningful participation in the management of the fishery; and (d) the honour of the Crown and the duty to consult and accommodate.
42. While Participants may argue on the *state* or *content* of the law on Aboriginal and Treaty rights, including title, to the FFSS fishery, this Inquiry has not been tasked with making any new findings of law or facts regarding such rights. Rather, it is the submission of the FNC that when considering the evidence and developing recommendations to improve the future sustainability of FRSS and the fishery, the Commissioner must also consider how such recommendations can assist DFO in meeting its obligations to First Nations and promote reconciliation.
43. First Nations, including those that are members of the FNC, have consistently and strongly asserted that the territories over which they exercise and hold Aboriginal title, include not only land, but also lakes, rivers, banks, fishing rocks, and the parts of the

³⁸ Exhibit 1345 (Ocean and Way of Life Brochure and Haida Ocean and Way of Life Map, 2011)

³⁹ Exhibit 1346 (Coastal First Nations Into the Deep Blue Report and Coastal First Nations Sea of Change Report)

⁴⁰ Transcript, July 8, 2011, p. 60 (Dr. Stewart McKinnell)

⁴¹ Transcript, August 18, 2011, p. 30 (Dr. Peter Ross)

ocean, seabed, and foreshore that they have traditionally used and occupied and continue to rely on today. First Nations' use and occupation of their territories is interconnected with the resources of those territories, including FRSS. First Nations' connections to those vital resources for sustenance, economic, spiritual, social, ceremonial and other purposes, together with the practices of fishing, hunting, gathering, are all the foundations for and indicia of Aboriginal title. Traditional villages, and later reserves, are often located adjacent to or in strategic locations along the Fraser River, its tributaries, and key marine access points.

Historical Context for Reconciliation

44. At the time of European contact, Aboriginal peoples inhabiting the Fraser watershed and the coastal marine waters of what is now British Columbia, and had created lives and communities deeply connected with salmon. For example, Haida ethics as expressed in beliefs say that animals, including salmon, have a spirit and that at the head of each creek resides a supernatural being, a Creek Woman, who stewards the resources in that tributary. Before any salmon can be taken from the creeks or rivers, the permission of the Creek Woman must be obtained and respect must be paid through offerings.⁴² The Interior Salish express their deepest respect for the transformers who transformed life along the Fraser River, including salmon. For example, the Secwepemc tell of Coyote, a transformer, whose one time boastful ways and lack of respect for the salmon led the salmon to jump off his drying rack and return to the river leaving only slime. The Secwepemc say that when we disrespect the salmon and their homes and are more concerned about showing off our catches than ensuring sustainability, the salmon will leave us.⁴³
45. Indigenous families, villages and Nations rest on an interconnectedness with all the resources of the lands and waters that have sustained them since time immemorial. These peoples' indigenous laws, customs, practices and traditions are intimately connected with their fisheries in a spiritual, material and ecological manner. Their communities thrived with these salmon colonies, and their responsibilities to the salmon beings are part and parcel of who they are. Their traditional fisheries and practices

⁴² Russ Jones and Terri-Lynn Williams-Davidson, "Applying Haida Ethics in Today's Fishery" in Harold Coward, Rosemary Ommer, Tony J. Pitcher, eds. *Just Fish: Ethics and Canadian Marine Fisheries* (St. John's: Institute of Social and Economic Research, 2000), p. 100.

exude a sophistication with, and deep respect and reverence for, the salmon populations of the Fraser River which, after thousands of years of use, were thriving when the colonists arrived.

46. In just over a century much of that has been fundamentally challenged to the brink of extinction. In support of a salmon canning industry being established in the 1870s, the Canadian government began severely restricting Aboriginal river fisheries, limiting them to fish for food, prohibiting the use of their most productive (and selective) gears, such as weirs and traps, and denying them a meaningful role in the management and expansion of the fishery resulting from industrialization. The development of the commercial marine fishery operated for decades without sufficient responsibility to conserve the salmon resource and without respect for Aboriginal fisheries.
47. After years of colonization, First Nations began turning to the Courts to seek recognition and protection of their s.35 rights, in the hopes that such recognition would respect and help re-build their foundational relationship with the fish, waters, and lands.
48. The courts have been clear that the “fundamental objective” of the modern law of Aboriginal and Treaty rights is the “reconciliation of aboriginal peoples and non-aboriginal peoples and their respective claims, interests and ambitions”⁴⁴ and the “reconciliation of the pre-existence of Aboriginal societies with the sovereignty of the Crown”.⁴⁵ Implicit in the language of the Supreme Court of Canada in *R. v. Gladstone* is the requirement that the Crown and First Nations find workable accommodations in a modern context on all matters related to the access, use and management of fisheries resources.⁴⁶ While this area of constitutional law is still being articulated, there is already sufficient judicial direction available to advance the changes to the *status quo* presented by the FNC during this Inquiry which are necessary for reconciliation.
49. In 2004 the First Nations Panel on Fisheries articulated a vision for future fisheries management that would provide some certainty to users in terms of access and use of

⁴³ Exhibit 294 (Witness Summary of Dr. Ron Ignace).

⁴⁴ *Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage)*, 2005 SCC 69, para. 1 (“*Mikisew*”)

⁴⁵ *R. v. Van der Peet*, [1996] 2 S.C.R. 507, para. 31 (“*Van der Peet*”)

⁴⁶ *Delgamuukw v. British Columbia*, [1997] 3 S.C.R. 1010 quoting *R. v. Gladstone*, [1996] 2 S.C.R. 723, para. 161 (“*Delgamuukw*”)

fisheries resources. *Our Place at the Table* lays out the vision for BC fisheries which focuses on healthy ecosystems and species, and equitable sharing of fisheries resources. The solutions and recommendations were aimed at bringing a high degree of certainty to Aboriginal and non-Aboriginal interests alike while ensuring the conservation of fisheries resources.⁴⁷ Seven years after the release of *Our Place at the Table*, many of these recommendations are still waiting to be realized.

Co-management

50. For decades First Nations have sought a meaningful role in the management of the FRSS. Although the focus of the Inquiry began with the low returns in 2009, Aboriginal people have witnessed a steady and continuous decline of FRSS for many decades. Through the work of this Inquiry that steady decline has now also been confirmed by scientists.
51. The FNC submits that Aboriginal and Treaty rights to fish would be rendered meaningless by reducing that right simply to a right of access or a right to harvest. Such a right will always include the responsibility to manage the fishery for present and future generations, including the responsibility to make policy, strategic and operational decisions that protects and preserve the resource and their ability to harvest that resource into the future for the well being of their families and communities. First Nations exercise these management responsibilities through their governments.
52. The evidence in this Inquiry illustrates the difficulties facing DFO in meeting its obligations to First Nations. FRSS are complex fish within complex ecosystems and DFO must engage many First Nations across different geographies. Despite the direction of the SCC in landmark decisions like *R. v. Sparrow*,⁴⁸ *Delgamuukw* and *Haida v. British Columbia*,⁴⁹ DFO has not yet developed adequate structures or tools for properly or efficiently informing itself on the potential impacts and infringements that its management decisions could have to the exercise of Aboriginal rights, or to the possible mitigation and accommodation measures.

⁴⁷ Exhibit 493 (First Nations Panel, *Our Place at the Table*), p. 1

⁴⁸ *R. v. Sparrow*, [1990] 1 S.C.R. 1075 (“*Sparrow*”)

⁴⁹ *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511 (“*Haida*”)

53. The fact that fisheries management decisions involve social, economic, political, and scientific considerations, including uncertainties and risks, requires that First Nations have a central and meaningful place at the table with DFO. The FNC submits that the development and support of Tier 1 and Tier 2 co-management processes will help ensure the long term sustainability of FRSS and assist DFO in meeting its legal obligations.
54. The SCC's confirmation in *Sparrow* that First Nations' priority to FRSS for FSC purposes is subject only to conservation is consistent with Indigenous laws, practices, customs and tradition. Similarly the concept of biodiversity is embedded within indigenous laws, practices, customs and traditions and necessary for conservation and sustainability for FRSS.
55. Despite adopting policies aimed at conservation, DFO is still not consistently operating with conservation of FRSS, at the CU and aggregate level, as a true priority. From First Nations' perspectives, DFO has made decisions that have and continue to put their fisheries at risk. The level of risk tolerance inherent in DFO's management approach has often been unacceptable to First Nations whose own laws, practices and traditions require a precautionary approach that builds, rebuilds and sustains the fishery for this and future generations.
56. To best provide for the long term sustainability of FRSS, (and all aquatic resources) Canada and First Nations must establish a collaborative government-to-government relationship for the stewardship and management of the fisheries.
57. DFO must be willing to implement, through negotiated agreements, the right to manage. These structures must proceed to be build on the foundation of respect and recognition of strong *prima facie* s. 35 rights, including the right to manage. This appears to be the preferred approach of DFO managers and policy analysts charged with the day-to-day responsibility of engaging with First Nations and advancing co-management.
58. It is the FNC's submission that in order to best ensure the long term sustainability of FRSS, First Nations' s. 35 rights must be recognized, respected and appropriately prioritized. In short, DFO and First Nations must implement co-management. This will mean more expertise and precaution will be brought to the management of FRSS.

59. In order to adequately understand, consult and accommodate potential impacts to s.35 rights to FRSS and better implement the WSP and SARA, DFO and First Nations must develop and implement as a transparent co-management decision making structure that, amongst other things, helps to identify those fisheries matters that may be addressed strategically, regionally, tribally and locally.
60. Given the many governments with responsibilities to FRSS and its habitat, it would be useful to have a clear tripartite process. For example, decisions relating to water management have the potential to impact the exercise of s. 35 rights and a clear tripartite process would be helpful to First Nations, the Province and DFO.⁵⁰
61. In order that Tier 1 and 2 processes can be established for FRSS, DFO must allocate significant human and financial resources to negotiate and implement these processes and structures. Both DFO and First Nations witnesses active in this work suggest that a 3 year budget with champions would be necessary to negotiate the structures.

Harvest Management

62. In-season management, because it can account for the actual returns and not just projected returns, is the key to successful authorization of sustainable fisheries.⁵¹ In-season management of FRSS occurs in an environment full of uncertainties including uncertainty regarding estimates of fish abundance and health, regarding existing and future environmental conditions, regarding future economic and social conditions of the fisheries, and regarding future management objectives.⁵² Given that differing responsibilities, experiences, values, and risk tolerances will result in different reactions and responses to uncertainties, the FNC submits that it is crucial for DFO to improve First Nations consultation, on a bi-lateral or Tier 2 level, to get real input into how to respond to such uncertainty.
63. DFO's management of FRSS incorrectly assumes that exploitation rates on each CU are the same for all CUs within the group.⁵³ Each CU can sustain different rates of harvest and such rates of harvest change annually and may change even more as climate

⁵⁰ Transcript, September 16, 2011, p. 80 (Lynn Kriwoken)

⁵¹ Transcript, February 7, 2011, p. 75 (Ken Wilson)

⁵² Transcript, January 25, 2011, pp. 24-25 (Barry Rosenberger)

⁵³ Transcript, January 21, 2011, pp. 22-24 (Barry Rosenberger)

change and other stressors increase.⁵⁴ First Nations and biologists have questioned how aggregate management and the setting of aggregate escapement goals that are applied to a mixture of stocks with different productivities can protect the weaker stocks from over-harvest.⁵⁵ Part of implementing the WSP is understanding what would be the best aggregation of the stocks or CUs.⁵⁶

64. Although the WSP does not preclude fisheries operating on an aggregate basis, it does note that increased attention to all of the CUs within the aggregate will likely require significant changes to current management practices.⁵⁷ The FNC submits that much more concrete management changes must be implemented to manifest the change in *status quo* as required by the WSP.
65. The FNC submits that updating the run timing groups to ensure accuracy and assist in the implementation of CU-based management required by the WSP is a priority management step going forward. This must be included in the renegotiation of Annex 4 of Chapter IV of the PST.⁵⁸ FNC submits that DFO, with assistance of First Nations, should analyse whether the current number and composition of the run-timing groups is accurate and appropriate, or whether a re-organization or dis-aggregation of the run-timing groups may lead to improved management at the CU level.⁵⁹
66. The goal of the FRSSI process is often described as trying to find a balance between the objectives of (1) ensuring spawner abundance and production for individual stocks; and (2) accessing the catch related benefits.⁶⁰ This balancing is also referred to as the policy choices of trading off harvest benefits against providing protection to individual stocks; of trading off short-term gains against long-term benefits; and of trading off stability in catch against maximizing opportunity.⁶¹ For this reason, DFO's perspective is often observed as a trade-off between conservation/biodiversity vs. harvest, in an uncertain world.⁶²
The FNC submits the trade-off should not be between biodiversity on the one hand, and

⁵⁴ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 45

⁵⁵ Transcript, February 7, 2011, p. 47 (Ken Wilson)

⁵⁶ Transcript, January 21, 2011, p. 19 (Barry Rosenberger)

⁵⁷ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 33; Transcript, January 21, 2011, pp. 20-21 (Barry Rosenberger)

⁵⁸ Transcript, January 21, 2011, p. 19 (Barry Rosenberger)

⁵⁹ Transcript, September 28, 2011 (Susan Farlinger)

⁶⁰ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 17

⁶¹ Exhibit 398 (2008 Collaborative Development of Escapement Strategies for Fraser River Sockeye: Summary Report 2003-2008), p. 25

sustainable fisheries on the other. Sustainable fisheries require a degree of biodiversity; and further, sustainable fisheries require rebuilding fisheries on known stocks, which is the same as maintaining First Nations fisheries in their traditional locations.

67. The MA was designed by DFO to increase the likelihood of meeting spawning escapement targets.⁶³ It is critical for prudent management that DFO and First Nations continue to use and refine the MA, including maintaining and improving the full dataset of environmental conditions throughout the migratory route of FRSS⁶⁴ The FNC submits that DFO and its partners must ensure that the necessary information that informs and improves the MA models is collected.
68. Through its policies (such as the WSP, the Selective Fishing Policy, and the Aboriginal Fisheries Policy), and its programs (such as PICFI and the Allocation Transfer Program), DFO has recognized that it must shift from the old ways of doing business, and must undertake sustainable fisheries. DFO must continue to move away from mixed stock fisheries (i.e. the “old way of doing business”) towards more terminal and near terminal river fisheries on known stocks in the Fraser watershed and coastal areas.⁶⁵ Moving to in-river terminal fisheries which is supported primarily by the PICFI program, is tied to DFO’s implementation of the WSP.⁶⁶
69. PICFI is aimed, in part, at achieving environmentally sustainable and economically viable commercial fisheries, where conservation is the first priority, and First Nations’ aspirations to be more involved in commercial fisheries are supported.⁶⁷ As noted in DFO’s 2010 evaluation of PICFI: “Moving towards a terminal fishery for salmon should lead to significant benefits from increased selectivity and lower costs of capture.”⁶⁸ A fair fishery is a just fishery and on that will be easier to govern.

⁶² Transcript, February 7, 2011, p. 74 (Al Cass)

⁶³ Transcript, January 27, 2011, pp. 93-94 (David Patterson); see also PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 123

⁶⁴ Transcript February 8, 2011, p. 14 (David Patterson)

⁶⁵ Transcript, July 5, 2011, pp. 65-66 (Barry Rosenberger); Transcript, August 19, 2011, pp. 11-12, 91 (Julie Stewart); Transcript, June 30, 2011, p. 29 (Russ Jones, Chief Nang Jingwas)

⁶⁶ Transcript, September 22, 2011, p. 64 (Susan Farlinger); Transcript, August 19, 2011, p. 59 (Julie Stewart); Transcript, January 25, 2011, p. 46 (Jeff Grout)

⁶⁷ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 3

⁶⁸ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 5

70. The FNC submits that the PICFI program is a direct attempt from DFO to respond to some of recommendations in *Our Place at the Table* and should be continued as the primary sustainability goals of PICFI are a work in progress.

Fisheries Monitoring, Catch Reporting and Enforcement

71. The FNC submits that increasing the awareness, understanding and knowledge about the fisheries monitoring and catch reporting programs and methods currently being used is crucial to overcoming the “crisis of confidence”.⁶⁹
72. Because there are groups that are continually pointing fingers and questioning catch numbers, consistency and transparency in catch reporting is important.⁷⁰ Although *Charting Our Course* refers to using “consistent standards to determine monitoring and reporting requirements [that] will be established for all fisheries,”⁷¹ there is, at the same time, recognition that not all fisheries are the same.⁷²

Regulation of Aquaculture

73. DFO has not adequately responded to the numerous concerns First Nations have raised over the last two years since the *Morton* decision, and, prior to that, about how wild salmon and their habitats will be protected from potential impacts or stressors from fish farm; how their Aboriginal title and rights will be recognized within the regulatory and management structures for aquaculture; and how they can play a role as co-managers in relation to aquaculture.
74. The FNC submits that the rushed and *ad hoc* approach DFO used in relation to its decision to roll-over aquaculture licences, demonstrates a failure to truly appreciate, address, and accommodate the concerns that First Nations have raised. Finfish aquaculture along the migration route of FRSS is an industry without certainty of operations.

⁶⁹ Transcript, May 11, 2011, p. 69 (Lester Jantz, Matt Parslow); Exhibit 850 (Monitoring and Compliance Observations in the Lower Fraser Fishery, October 21-22, 2009)

⁷⁰ Transcript, May 11, 2011, p. 24 (Lester Jantz); see also Transcript, September 22, 2011, pp. 20-21 (Susan Farlinger)

⁷¹ Exhibit 855 (Charting our Course, Fishery Monitoring in the Pacific Region, April 2011), p. 7

⁷² Exhibit 855 (Charting our Course, Fishery Monitoring in the Pacific Region, April 2011), p. 10; see also Transcript, May 12, 2011, p. 13 (Colin Masson)

75. Prior to making the decision to roll-over existing licences, DFO did not query whether: (1) the Province's siting criteria addressed current concerns or scientific information; or (2) whether the Province had properly applied the siting criteria used to determine the appropriate location of fish farms; or (3) whether First Nations had been adequately consulted about the potential impacts of such fish farm on wild salmon, including FRSS.
76. Since the first roll-over decision in 2010, DFO has not undertaken any comprehensive studies to address First Nations' concerns regarding the location, size, number and density of fish farms along the migratory route of FRSS, or the cumulative impacts of such.⁷³ It appears DFO is awaiting the outcome of this Inquiry before it will take any such action.
77. It is the FNC's submission that Canada, First Nations and the Aquaculture Industry should take immediate steps, with the assistance of the FNFC to create the protocol necessary to clarify how consultation will proceed.

⁷³ Transcript, August 31, 2011, p. 8 (Trevor Swerdfager)

Steps Forward

78. Following this Executive Summary are the FNC's proposed recommendations. In our submission these recommendations, together with a robust process for ensuring their implementation in a timely and meaningful manner is the way forward for the sustainability of FRSS.
79. The FNC recognizes the challenge presented to the Commissioner in making recommendations to assist in ensuring the sustainability of FRSS and the fishery. One such challenge is recognizing that fisheries management is in essence about managing people, not biology.
80. This Inquiry was struck with the recognition that we are facing significant uncertainties and changing times, ecologically, socially, legally, politically and economically. In such a situation the *status quo* cannot suffice. The FNC offers its submissions and recommendations for change with the aim of finding a better way forward and of improving the sustainability of FRSS for future generations. Collaboration amongst governments (Canada, the Province and First Nations) and stakeholders must recognize the reality of change and find governance and management systems that are responsive and adaptive.

8. **Recommendation:** As part of its commitment to co-management with First Nations, DFO must continue to help build capacity within First Nations for those aspects of fisheries management that are more efficiently delivered at the local level. p. 254
9. **Recommendation:** DFO must enhance its support for First Nations and Tribal Councils, as well as First Nations' regional and provincial fisheries organizations (e.g. FRAFS, FNFC), through stable, multi-year AAROM, AFS, or PICFI agreements, or other funding and capacity measures. p. 257
10. **Recommendation:** As an immediate sign of good faith and incentive, DFO must increase First Nations representation on the FRP to 50 percent of the Canadian caucus. To build the necessary accountability, First Nations representatives should be appointed to the FRP using Tier 1 processes. p. 284
11. **Recommendation:** Canada and First Nations must together develop improved and transparent consultation processes that can be implemented collaboratively, including:
 - a. determining whether strength of claim analysis must be done in order for the parties to reach mutually agreeable consultation processes. If so, getting these done;
 - b. streamlining Federal/Provincial/First Nation processes that address aspects that potentially affect fish and therefore s. 35 rights. For e.g. water allocations and management, industrial development, (including aquaculture, gravel, etc.); and
 - c. identifying accommodation options for the potential infringements to the exercise of s. 35 rights to FRSS – including both mitigation and compensation options. p. 258
12. **Recommendation:** Canada must conduct in-depth consultations with First Nations on its development of a percentage goal for the average total allowable catch that will be allocated to First Nations. p.242
13. **Recommendation:** Canada must provide the capacity for First Nations to determine intertribal allocations amongst themselves. p.242

TOPIC: Indigenous Knowledge and TEK

Principle: DFO should adopt two-eyed seeing and use Indigenous Knowledge and TEK alongside science.

14. **Recommendation:** DFO should work with First Nations, including with the FNFC at a strategic level, to collaboratively develop guidelines and best practices for the use of Indigenous Knowledge and TEK in fisheries research and management, including the implementation of the WSP. p.190
15. **Recommendation:** DFO Science should develop clear protocols with First Nations for the better and timely exchange of information and concerns related to salmon, in particular FRSS, including the application and integration of TEK to improve ecosystem understanding and research. p. 190

TOPIC: Conservation, Biodiversity, and Precautionary Approaches

Principle: Governments (Canada, the Province, First Nations), ENGOs and stakeholders must collaborate to help ensure that: conservation objectives are met and appropriately prioritized; commitments to conserving biodiversity are implemented; and precautionary approaches are utilized.

16. **Recommendation:** DFO must improve and implement conservation measures, and meet First Nations' food, social and ceremonial requirements and treaty obligations as allocation priorities in all fisheries management decisions. p. 279
17. **Recommendation:** DFO must authorize fisheries and manage the human activities that are within Canada's jurisdiction using ecosystem based management, in a manner that implements its articulated commitment to biodiversity found in both the CBD and the WSP. p. 309
18. **Recommendation:** DFO and First Nations must together develop and apply more precautionary approaches in all aspects of fisheries management. p. 22
19. **Recommendation:** In the FRSSI model and other management models, DFO must include objectives that ensure sufficient fish are delivered to specific geographic areas, thereby promoting biodiversity and ensuring First Nations' food, social and ceremonial requirements are met. p. 267

TOPIC: WSP

Principle: DFO should develop a more robust and comprehensive approach to implement and apply the WSP.

WSP: General

- 20. Recommendation:** DFO must implement every action step of every strategy of the WSP in a manner that meets its obligations to First Nations and upholds the honour of the Crown. p. 193
- 21. Recommendation:** DFO should bring fisheries management into alignment with the WSP, including continued and enhanced implementation of:

 - a. terminal or near terminal river fisheries on known stocks in the coastal areas and in the Fraser River watershed;
 - b. selective fisheries in the marine and freshwater;
 - c. harvest closures as required to protect CUs; and
 - d. stock assessment measures that operate at a CU level. p. 196
- 22. Recommendation:** DFO should work with First Nations to identify a champion or a core group of dedicated people who will have the responsibility of effecting the implementation of the WSP in a timely and comprehensive manner. Although the RDG may be a part of this core group of dedicated people, the RDG alone should not be responsible for this task. p. 211
- 23. Recommendation:** DFO should allocate stable, long-term funding which, at a minimum should be approximately \$5 million per year for five years, to support implementation of the WSP. p. 178
- 24. Recommendation:** As part of the Tier 1 and 2 co-management process, DFO and First Nations should explore how to efficiently establish recovery team(s) (including Tier 3 working groups), either under Strategy 4 of the WSP or SARA to develop and oversee recovery initiatives. p. 218
- 25. Recommendation:** In the future development of fisheries related statutes, regulations, policies and other guidance documents, DFO should adopt a model of transparent, and meaningful engagement similar to that used in the development of the WSP, and provide sufficient time and resources for both DFO and First Nations to meaningfully engage. p. 194

WSP: CUs

26. **Recommendation:** As required by the WSP, DFO must secure core program funding (human and financial) to address the data weaknesses and gaps that impede its ability to assess the status of CUs. Such data collection must include the gathering and incorporation of TEK. p. 201
27. **Recommendation:** As required by the WSP, DFO must incorporate the distribution metric as one of the indicators to be used to assess the status of CUs and must work closely with First Nations to do so. p. 201
28. **Recommendation:** As required by the WSP, DFO must meaningfully engage with First Nations to finalize the list of FRSS CUs and identify priority CUs within that list. p. 201
29. **Recommendation:** In collaboration with First Nations, DFO must take immediate action to protect and rebuild CUs that have been assessed as having potentially poor, weak, red or amber status. p. 201

WSP: Ecosystem Based Management and Integrated Strategic Planning

30. **Recommendation:** DFO and First Nations (with the assistance of the Province, ENGOs, and stakeholders interested in conservation) should develop an inventory of habitat values for FRSS under the WSP, including ecosystem values for monitoring the status of freshwater and marine environments. This inventory should be made available to those conducting research and stewardship activities. p. 48
31. **Recommendation:** DFO should prioritize the collection of essential baseline information on habitat values, pressures, and forecasts along the entire migratory route of FRSS. This work should be coordinated with the requirements of Strategy 2 of the WSP and must actively engage First Nations. p. 48
32. **Recommendation:** DFO must work with First Nations to implement ecosystem based management and an ecosystem based approach to science, including TEK. p. 204
33. **Recommendation:** DFO must work with First Nations to set priorities for habitat protection, and to carry out stewardship and habitat protection responsibilities. p. 221
34. **Recommendation:** DFO must work with First Nations in the development of the Integrated Planning Structure under Strategy 4 of the WSP, and employ this planning structure in accordance with Appendix 2. p. 172

TOPIC: Harvest Management

Principle: *First Nations as holders of s.35 rights have an interest in improving the effective and precautionary management of harvestable surpluses (in excess to spawning requirements) and therefore have an interest in all aspects of fisheries management related to FRSS.*

General

35. **Recommendation:** DFO, and First Nations, should together (a) reconsider the current number and composition of the run-timing groups; (b) conduct analyses of the management impacts and implication of moving stocks from one timing group to another; and (c) consider whether re-organization or dis-aggregation of the run-timing groups may lead to improved management at the CU level, and to better protecting s.35 Aboriginal rights. p. 262
36. **Recommendation:** DFO together with First Nations and interested stakeholders should develop a more robust and transparent process or framework to assess risks and uncertainties associated with fisheries management decisions, including decisions relating to listing populations under SARA and implementing the WSP. p. 216

FRSSI and Setting Escapement Objectives

37. **Recommendation:** In setting escapement goals, through FRSSI or otherwise, DFO must be committed to strengthening weak and at-risk CUs. DFO should explicitly recognize that preserving biodiversity and conducting sustainable fisheries are twin aims, not trade-offs. p. 265
38. **Recommendation:** DFO should aim to increase the understanding and reliability of the FRSSI model by improving its FRSSI communications processes, offering hands-on workshops, and providing support for the development of technical capacity amongst First Nations. p. 268
39. **Recommendation:** DFO should, with the assistance of First Nations, develop a model that simulates a variety of fisheries beyond the mixed stock fishery, including increased terminal and near terminal river fisheries on known stocks in the coastal areas and Fraser River watershed. Whether or not this could be an extension of the FRSSI model will need to be considered. p. 269
40. **Recommendation:** DFO should, with the assistance of First Nations, thoroughly examine and evaluate whether the 60% TAM Rule is sufficient to protect weak and unmodelled CUs within the run-timing aggregates. p. 266
41. **Recommendation:** DFO should, with the assistance of First Nations, develop a method for reconciling and associating the 19 FRSSI modelled FRSS stocks with the FRSS CUs and expanding the modelled stocks in order to support WSP implementation and better ensure sustainable fisheries. p. 267

Pre-season Forecast

42. **Recommendation:** DFO should improve the way it communicates pre-season forecasts, their meaning, and their associated uncertainties. p. 272
43. **Recommendation:** DFO must develop the data to dis-aggregate the 19 forecasted stocks, so that individual CUs can be considered and forecasts can be better aligned with that of the WSP. p. 272

Management Adjustments

44. **Recommendation:** Canada, including DFO and its partners, must secure budgets for and continue to collect the necessary data to inform and improve the MA models. This includes improving both the EWatch program and the State of the Oceans research so that reliable baseline data correlated to FRSS is maintained and improved including, baseline data regarding fresh water (rearing lakes, streams, Fraser river, estuary) and marine (area surface temperature and salinity.) p. 275
45. **Recommendation:** DFO must continue to employ and refine the MA, and to educate First Nations and stakeholders about its usefulness. p. 275

Developing the IFMP

46. **Recommendation:** DFO must include within the IHPC advisory process efforts to improve the understanding of the WSP and to develop measures to sustain and protect CUs, including the use of selective fishing methods. Specific and measurable conservation objectives consistent with the WSP must be included in the IFMP. p. 283
47. **Recommendation:** DFO should ensure that the IFMP process is transparent and accountable to Tier 1 and 2 processes and consistent with DFO's legal obligations. p. 284

Selective and Known Stock Fisheries

48. **Recommendation:** Given the requirements for conservation and biodiversity, and the priority obligation for First Nations' FSC, there should be continued and improved efforts to explore and implement with First Nations terminal and near terminal river fisheries on known stocks in the coastal areas and Fraser watershed. p. 293
49. **Recommendation:** In the manner initiated under PICFI, DFO must continue to work with First Nations to develop capacity (method and options) for conducting terminal and near terminal river fisheries on known stocks. p. 293
50. **Recommendation:** DFO must renew PICFI, which will otherwise sunset in March 2010, to continue efforts made to date and better ensure a stable prosperous transition from mixed stock to known stock fisheries. p. 293

Stock Assessment

51. **Recommendation:** DFO, in partnership with First Nations, should prioritize and identify stock assessment programs for FRSS CUs. p. 277
52. **Recommendation:** DFO should develop an integrated stock assessment platform or network to better enable managers to have access to the data required to make reasoned decisions in an ever changing environment. p. 277
53. **Recommendation:** DFO must have sufficient budgets and direction to support and encourage First Nations' active involvement in stock assessment programs, including those that are more efficiently delivered at the local level. p. 277
54. **Recommendation:** As a priority, DFO must maintain and improve its in-season assessments of run size, health, CU make up, and spawning escapement information including: test fisheries, the Mission Hydroacoustic facility, the Qualark Program, escapement data, and genomics and telemetry research at CU level, including fish health. p. 277

TOPIC: Habitat Management, Protection and Enforcement

***Principle:** The long term sustainability of FRSS requires a renewed commitment to active habitat protection, preservation and enforcement in the fresh and marine water ecosystems. DFO, First Nations and the Province must collaborate better with each other and with all those interested in such sustainability to make habitat protection, preservation, and enforcement a priority.*

55. **Recommendation:** DFO must meaningfully consult with First Nations on the content (objectives, principles, and directions) of any proposed revisions to its 1986 Habitat Policy. Like the WSP, any renewed DFO habitat policy should include explicit recognition of Aboriginal title and rights and promote partnerships with First Nations in habitat protection and restoration activities. p. 224
56. **Recommendation:** DFO should provide both clearer policy guidance and enabling measures to protect and preserve FRSS habitat, including measures to properly assess habitat loss and gain according to ecological benefits, not simply habitat size. p. 224
57. **Recommendation:** DFO should actively pursue a government-to-government MOU with First Nations and the Province that encourages collaboration and efficiencies and clarifies roles and responsibilities regarding the protection, preservation and restoration of FRSS habitat, including water management. p. 224
58. **Recommendation:** DFO should strengthen its ability to conduct consistent project and habitat monitoring and assessing, and should ensure that adequate resources and proper training are provided, and that standardized approaches to data management are developed. p. 224

59. **Recommendation:** DFO's review of large or major projects must include better follow-up to determine whether habitat protection and enhancement goals have been achieved and maintained. p. 224
60. **Recommendation:** DFO must secure and apportion increased budgets and human resources so as to place priority on habitat protection from risks associated with smaller and medium-sized projects, including cumulative impacts. p. 224
61. **Recommendation:** DFO should develop and utilize better consultation protocols and referral tools for proposed developments. These protocols must provide for meaningful consultation and accommodation of s. 35 Aboriginal rights, and hold proponents responsible for destruction to fish habitat and failure to adhere to mitigation measures. p. 224
62. **Recommendation:** DFO must consult with First Nations to identify and proactively protect priority habitat preservation and protection measures. Habitat preservation and protection requires improved understanding and use of EBM and TEK. p. 226
63. **Recommendation:** DFO should work with First Nations to identify, prioritize, protect and preserve sensitive habitat and ecosystems within the entire life cycle and migratory route of FRSS, including places of refuge. p. 226
64. **Recommendation:** DFO should conduct a structured review of the FREP and should work with the Province to implement and monitor the recommendations outlined on pages 59 and 60 of the FREP Report. p. 56
65. **Recommendation:** DFO should actively pursue a government-to-government MOU with First Nations and the Province that encourages collaboration and consultation with respect to modernizing the provincial *Water Act*. p. 60

TOPIC: Fisheries Monitoring, Catch Reporting, and Enforcement

Principle: DFO should adopt a transparent and consistent approach to fisheries monitoring.

66. **Recommendation:** DFO should continue to improve the awareness, understanding and knowledge of governments about the fisheries monitoring and catch reporting programs and methods currently being used in all fisheries. p. 295
67. **Recommendations:** DFO should implement the Fisheries Monitoring and Catch Reporting Framework, Monitoring Standards and Information Requirements, Strategies, and Next Steps recommended in the ISDF's Charting Our Course. p. 295

68. **Recommendation:** When allocating budgets and priorities, DFO can proceed on the basis that the level of fisheries monitoring and catch reporting currently undertaken in First Nations fisheries along the migratory route of the FRSS is more than sufficient. p. 297
69. **Recommendation:** DFO should continue to enhance capacity in First Nations organizations to the conduct monitoring, catch reporting and enforcement. Synergies between this work and protection and preservation work should be encouraged. p. 300
70. **Recommendation:** C&P should direct more of its attention at Pillar 1 activities such as public education, shared stewardship, and relationship building with First Nations. p. 301
71. **Recommendation:** In consultation with First Nations, DFO should restore the Aboriginal Guardian Program. p. 302
72. **Recommendation:** C&P should adopt an open and transparent way of setting its activity priorities. Such priorities should reflect conservation concerns, and in particular those that present the greatest risk to fish and fish habitat. p. 303
73. **Recommendation:** DFO should re-integrate C&P as part its matrix management model and eliminate the line reporting relationship. p. 307

TOPIC: Commercial Fishing

Principle: The status quo of commercial fisheries must be prepared to adjust to changing conditions.

74. **Recommendation:** No further share-based quotas, including ITQs should be implemented or expanded on FRSS until First Nations have been properly consulted and outstanding allocation priorities have been properly addressed. p. 310
75. **Recommendation:** DFO must increase its use of license conditions to require commercial harvesters to use selective fishing methods. p. 319

TOPIC: Aquaculture and Contaminants

Principle: *Canada's constitutional obligations to conserve and protect wild salmon, including FRSS and to provide First Nations with priority access to FRSS to meet FSC requirements, together with a reasonable application of the precautionary principle, demands increased measures be taken to understand and protect against the potential effects to wild salmon from fish farms.*

- 76. Recommendation:** DFO must implement a research program, funded by Industry, that monitors the interactions between farmed fish and wild fish, particularly as it relates to potential transfer of pathogens and disease. This research must include: (a) multiple year surveys that identify pathogens, host distribution, and collect data on abundance and severity of infection; (b) conduct analysis about the role pathogens have on wild salmon, including FRSS survival at various life stages; (c) considers evolving interactions between environmental factors such as climate change and increased water temperature and pathogens and disease. p. 116
- 77. Recommendation:** DFO, in collaboration with First Nations and with stakeholders, must conduct an analysis and risk assessment that defines the ecologically and socially tolerable levels of disease that may transfer from farmed fish to wild fish. p. 116
- 78. Recommendation:** DFO Science should develop protocols with First Nations and Industry to ensure access to fish samples, transparency of data and research, and to ensure monitoring of fish health in open net pen fish farms. p. 117
- 79. Recommendation:** DFO should continue to fund Dr. Miller-Saunders' and Dr. Garver's genomics research into the MRS signature and parvovirus, including on wild fish and farmed fish. p. 117
- 80. Recommendation:** DFO should adopt the six principles articulated in the First Nation Summit's and the UBCIC's Resolutions, as well as the themes outlined in the *First Nations Views on a Proposed Federal Aquaculture Regulation for British Columbia* and actively address them within their plans for the management of aquaculture in BC. p.324
- 81. Recommendation:** DFO must meaningfully consult with First Nations on all proposed aquaculture regulations, policies, and licence conditions. Industry should pay for such consultations. p. 333

- 82. Recommendation:** With the assistance of the DFO-FNFC Joint Aquaculture Working Group, DFO should develop and implement a consultation protocol, that:
- a. identifies the potential impacts, concerns and interests of First Nations (building on the work already completed by the FNFC as outlined in Exhibit 1240);
 - b. identifies possible accommodation (avoidance, mitigation and compensation) options;
 - c. identifies the roles of DFO, the Province, First Nations and Industry going forward in the assessment of potential impacts and benefits, mitigation measures and accommodations options;
 - d. identifies First Nations and organizations who wish to participate, including First Nations along the FRSS migratory route, FRAFS and FNFC;
 - e. identifies the research studies that will be undertaken, including any strength of claim analysis, impact/benefit analysis, independent scientific research, and any relevant socio-economic analysis, including cost-benefit work;
 - f. sets out a timeline for the completion of the studies;
 - g. identifies how Industry must contribute to the cost of this work; and
 - h. identifies a facilitator to oversee the implementation of the consultation process. p.326
- 83. Recommendation:** In collaboration with First Nations and at the cost of Industry, DFO must ensure that independent transparent research is conducted on:
- a. the interaction between existing finfish farms (including density, location, fish health and transfer of disease along the FRSS migratory route) and migrating wild salmon, including FRSS;
 - b. the experimental removal and relocation of fish farms along the FRSS migratory route; and
 - c. the feasibility of other models of farming fish (e.g. closed containment) that may present fewer risks and uncertainties for the health of wild salmon. p. 117
- 84. Recommendation:** In collaboration with First Nations, DFO must undertake a substantive review of the adequacy and application of existing siting criteria for fish farms using current scientific knowledge and TEK. This review should be conducted as part of the consultative process that respects First Nations' unique constitutional rights and perspectives. p. 117

85. **Recommendation:** DFO should implement the recommendations outlined in *Planning for the Development of Integrated Management of Aquaculture Plans and an Advisory Committee Process for Aquaculture*. p.328
86. **Recommendation:** DFO must nest the proposed IMAP approach to aquaculture within the government-to-government Tier 1 and Tier 2 process. Through the Tier 1 and 2 processes, and with the assistance of the FNFC, DFO and First Nations will develop a structured and resourced multi-step process that allows First Nations to appoint representatives, discuss management plans bi-laterally, and engage with other stakeholders in an integrated process. p. 330
87. **Recommendation:** DFO should continue to only grant one-year extension of the licences rolled over by DFO in December, 2010, until the consultation is completed and accommodations have been reached to address potential impacts. p. 328
88. **Recommendation:** First Nations' participation in the management and governance, economic opportunities, science and research, and monitoring and enforcement of fish farms must be encouraged and funded. DFO should work closely with First Nations to develop capacity, including trained staff and associated resources required to effectively enforce aquaculture regulations and licenses. p. 324
89. **Recommendation:** Canada must adopt a more precautionary approach to Emerging Chemicals of Concern ("ECCs") and endocrine disrupting contaminants, including improved regulatory mechanisms. p. 135
90. **Recommendation:** DFO should implement a program combining genomics and contaminant research on FRSS, incorporating TEK of First Nations who live along the migratory route of FRSS as an essential component of the program. p. 135
91. **Recommendation:** DFO should develop and implement a robust research and monitoring program that addresses contaminants and cumulative impacts and that involves First Nations, the Province, local governments and ENGOs. p. 135

TOPIC: Marine Environment

Principle: *Given the importance of the marine environment to the long term sustainability of FRSS, further research and monitoring should be conducted using an ecosystem based approach to science, including TEK.*

92. **Recommendation:** As part of the Tier 1 and Tier 2 co-management structures, Canada and First Nations must collaboratively prioritize marine research programs for FRSS (and other salmon), and collaboratively determine the questions to be answered and the approach to research. p.85

93. **Recommendation:** DFO should Prioritize POST sampling and DNA program at Mission Hydroacoustic facility, Johnstone Strait and Discovery Passage in order to better assess FRSS migration, distribution and survivability, including potential bottlenecks. p. 86
94. **Recommendation:** DFO should work with First Nations to implement collaborative marine research and monitoring programs that incorporates TEK. p. 86
95. **Recommendation:** DFO should create a central diet database for research on food webs and predator-prey interactions and that is accessible to governments, First Nations and researchers. p. 95

TOPIC: Research Gaps and Approach

Principle: Research, including the identification of priorities and iterative work of establishing the research questions, informing and determining the acceptable risk and uncertainties, and responding to outcomes, is best accomplished with an active and meaningful decision making role for First Nations. In this way the research that must be conducted by the Crown to better understand potential impacts to FRSS, and therefore to First Nations, and to improve understanding of ecosystem processes, will become more streamlined and efficient.

TEK

96. **Recommendation:** As a priority DFO and First Nations must develop mechanisms for the application and integration of Traditional Ecological Knowledge within Science and Management decisions.

Stock Assessment

97. **Recommendation:** As a priority DFO must commit the financial and human resources to maintain and improve stock assessment tools, including:
- a. those that provide reliable and real time accuracy in season assessment of both the run size, health and stock composition by CU make up of the adult returns and the spawning escapement,
 - b. salmon status throughout life history at level of CUs (egg to fry to smolt to adult returning), including the priority of developing baseline data on smolt out migration into the marine environment, including estuary, and the Strait of Georgia and along the coastal and ocean migratory route for all CU; and
 - c. where necessary, and after consultation with First Nations, priority or proxies for CUs should be determined with due consideration of those that may be in the “red” or “amber” benchmark category.
 - d. baseline data correlated to FRSS to understand and assess climate changes and its effect in the fresh and marine ecosystems (rearing lakes,

streams, Fraser river, estuary) and marine (area surface temperature and salinity), including both the EWatch program and the State of the Oceans research. p. 141

Fish Health

- 98. Recommendation:** As a priority DFO must commit the financial and human resources to conduct research on fish health, including:
- a. the integration of TEK of First Nations who live along the migratory route of FRSS as an essential component of the program,
 - b. research combining genomic and contaminant research on FRSS;
 - c. to better understand new and emerging pathogens, diseases, and exposures to contaminants;
 - d. assessing health and production of out-migrating smolts;
 - e. assessing the interaction of farmed finfish and wild salmon; and,
 - f. assessing the interactive effects of climate change (in particular temperature and salinity), disease and contaminants. p.275

Wild Salmon Policy

- 99. Recommendation:** DFO must prioritize and conduct research necessary to inform and implement the WSP, including improving genomics research at the CU level on stock identification and health. p.200

Tools for Management

- 100. Recommendation:** DFO working collaboratively with First Nations should conduct research and develop methods for designing and evaluating stock production frameworks (e.g. FRSSI) and fisheries regimes (mixed stock, known stock, including terminal and near terminal river fisheries and quota fisheries). p.292
- 101. Recommendation:** DFO working collaboratively with First Nations should develop evaluation frameworks to assist in the cost benefit analysis of various stock production and fisheries regimes. p.293
- 102. Recommendation:** DFO working collaboratively with First Nations with the assistance of the FNFC, must develop a more robust understanding and policy framework for conducting socio-economic analyses. Such frameworks must be developed in collaboration with First Nations, economists, and social scientists, and must explore ways in which First Nations' values can be meaningfully considered. p. 216

- 103. Recommendation:** DFO must collaboratively work with First Nations to conduct socio-economic impact and benefit assessments early in any decision making process. Such assessments must be shared with First Nations in a meaningful and timely way. p. 217
- 104. Recommendation:** DFO must consult with First Nations on the methodologies, analysis, outcomes and recommendations of socio-economic analysis. p. 217

EBM Approach to Research Considering Climate Change and Cumulative Impacts

- 105. Recommendation:** DFO, in collaboration with First Nations, should design a policy framework for climate change. p. 155
- 106. Recommendation:** An interdepartmental, multi-stakeholder research and science program should be developed that incorporates climate change, cumulative impacts and ecosystem based approaches to science. p. 176
- 107. Recommendation:** DFO and First Nations should implement the process for determining the priority for research on cumulative impacts recommended on page 107 of Technical Report #6. p. 176
- 108. Recommendation:** DFO, working collaboratively with First Nations, should conduct research on how to assist managers to apply an EBM and adaptive management approach to FRSS, including: identification of the bottlenecks, and understanding and managing human behaviour, including the cumulative and multiple impacts/stressors, along the FRSS migratory route and for all stages of FRSS life histories. p.184
- 109. Recommendation:** DFO, in collaboration with other governments (the Province and First Nations) and researchers (universities, ENGOs and industry) should create a central salmon database. p.38
- 110. Recommendation:** DFO, in collaboration with First Nations, should develop and implement a policy framework for climate change that would address the impact of climate change on the long-term sustainability of FRSS. p. 150
- 111. Recommendation:** DFO should develop an interdepartmental, multi-stakeholder research program that incorporates climate change, cumulative impacts and an ecosystem-based approach to science p. 151
- 112. Recommendation:** DFO should ensure that multi-year funding is available for climate change research, including funding for ecosystem-based science initiatives and the oceans climate modelling program. p. 151

Transparency and Improved Reliability of Research

- 113. Recommendation:** DFO should strive to improve the transparency and utility of its research by:
- a. Utilizing an independent technical panel or working group responsible to governments (Canada, the Province, First Nations) and stakeholders that sets research priorities and develops the questions asked of scientists;
 - b. Developing protocols for new integration of traditional knowledge (“TK”) and traditional ecological knowledge (“TEK”) with western science, and recognizing that TK and TEK must have a place within management;
 - c. Developing a transparent iterative relationship and accountability between research and managers (DFO and First Nations);
 - d. Improving data quality and consistency within DFO, related provincial agencies, First Nations organizations and third parties (e.g., industry and universities); and
 - e. Improving information sharing protocols between DFO and First Nations and between Industry and First Nations. p.37

TOPIC: Implementation of these Recommendations

- 114. Recommendation:** Given the time and resources invested in the Inquiry, there must be an implementation process for the Commissioner’s Recommendations that includes ongoing oversight and accountability. The options identified include:
- a. Tripartite Government Committee with Federal, Provincial and First Nation appointed representatives charged with evaluating the implementation of the recommendations on an annual basis, including receiving submissions from First Nations and stakeholders;
 - b. Auditor General oversight/ parliamentary committee which reports annually to Parliament; and/or
 - c. Continued judicial oversight by Justice Cohen. p.334

II. PREFACE

1. This is the final written submission of the participant group, the First Nations Coalition (“FNC”), for the preparation of the final report and recommendations of the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River (“Inquiry”).

A. The First Nations Coalition

2. The FNC is one of the few participant groups in the Inquiry that was awarded a full grant of standing. The FNC was recognized by the Commissioner as having a “substantial and direct interest in the policies and practices of the DFO with respect to Fraser River Sockeye and the causes for the decline of Fraser River sockeye,”¹ and has actively participated in all hearing topics in this Inquiry.
3. The FNC is composed of several First Nations fisheries organizations, First Nations, and Tribal Councils, all of which have interests in and substantial concerns about the health of FRSS, their habitats, and the future sustainability of the FRSS fishery. Its members include:
 - a. One provincial umbrella organization: the FNFC,² and one Fraser watershed umbrella organization: the Aboriginal Caucus of the FRAFS³ that work with and provide technical and capacity support to a broad group of First Nations in relation to the promotion of their Aboriginal title and rights, treaty rights, and other interests in fisheries matters;
 - b. First Nations’ organizations with fisheries related mandates and expertise arising in geographically specific areas of the Fraser River in what is commonly referred

¹ Ruling on Standing, April 14, 2010, para. 68

² For more information on the FNFC see PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), paras. 306-310; see also Exhibit 292 (Witness Summary of Thomas Alexis); Exhibits 1192-1195 (FNFC Working Groups Terms of Reference); Exhibit 1191 (Commitment to Action and Results FNFC-DFO, May 26, 2010); Exhibit 1190 (BC FNFC Statement of Solidarity on Fisheries and Aquatic Resources Joint Management, November 2, 2010); Exhibit 1189 (BC First Nations Fisheries Action Plan, Preparing for Transformative Change in the BC Fishery); see also Transcript, June 28, 2011, pp. 34-35, 80 (Russ Jones, Chief Nang Jingwas) and Transcript, November 2, 2010, p. 87 (Susan Farlinger)

³ For more information on FRAFS see PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), paras. 313-317; see also Exhibit 292 (Witness Summary of Thomas Alexis); and Transcript, July 4, 2011, pp. 46-47 (Marcel Shepert)

to as the lower, middle and upper Fraser: the FVAFS,⁴ the SFC,⁵ and the UFFCA;⁶ and

- c. Specific Aboriginal title and rights and treaty rights holders from along the Fraser River, the tributaries and the coastal marine environment: the Sts'ailes (formerly Chehalis Indian Band);⁷ the ALIB; the NSTC;⁸ the CSTC,⁹ the CHN,¹⁰ and the Douglas Treaty First Nations of Snuneymuxw, Tsartlip and Tsawout.¹¹ Both the SFC and the UFFCA have mandates to represent and promote Aboriginal title and rights holders.

B. Importance of FRSS to First Nations: Cultural, Historical and Legal Framework

4. Since time immemorial, First Nations have extensively used and occupied the lands and waters along the migratory route of the FRSS, and have been stewards of the resource.¹² Their traditional laws require them to honour and respect the salmon so that they may ensure their sustainability for future generations.¹³ Aboriginal teachings do not separate species from their ecological habitats and ecosystems; and include cultural and spiritual ethics into the management of the fisheries. For example, all relations must be maintained respectfully in order to be sustainable for this and future generations.

⁴ For more information on the FVAFS see PPR 12 (Fishery Monitoring and Catch Reporting for Commercial and Aboriginal Fraser River Sockeye Salmon Fisheries, March 17, 2011), paras. 158, 162 and Exhibit 858 (Fraser Valley Aboriginal Fisheries Society Catch Monitoring Program 2010); and Transcript, May 12, 2011, pp. 46-50 (Grand Chief Ken Malloway)

⁵ For more information on the SFC see Transcript, February 1, 2011, pp. 3, 6-8, 24 (Pat Matthew) and Transcript, February 3, 2011, p. 77 (Pat Matthew)

⁶ For more information on the UFFCA see PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), paras. 318-321, Transcript, July 4, 2011, p. 47 (Marcel Shepert), and Exhibit 292 (Witness Summary of Thomas Alexis)

⁷ For more information on Sts'ailes see Transcript, December 13, 2010 (Chief Willie Charlie); see also Exhibit 279 (Witness Summary of Chief William Charlie)

⁸ For more information on the NSTC see Transcript, February 3, 2011, p. 68 (Gord Sterritt)

⁹ For more information on the CSTC see Transcript, December 14, 2010 (Chief Thomas Alexis) and Exhibit 292 (Witness Summary of Thomas Alexis)

¹⁰ For more information on the CHN see Transcript, December 15, 2010 (Guujaaw), Transcript, June 28, 2011 (Russ Jones, Chief Nang Jingwas), and Exhibit 299 (Witness Summary of President Guujaaw); Exhibit 540 (Applying Haida Ethics in Today's Fishery); Exhibit 1345 (Haida Ocean & Way of Life Brochure)

¹¹ For more information on the Douglas Treaty First Nations including the Snuneymuxw, Tsawout and Tsartlip see Transcript, June 27, 2011 (Dr. Douglas Harris) and Exhibit 1135 (The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982, January 12, 2011)

¹² Transcript, June 22, 2011, p. 77 (Dr. Douglas Harris); Transcript, December 13, 2010, pp. 26-28 (Chief Willie Charlie)

5. First Nations have laws, customs, traditions and practices that honour salmon. For example, the Haida people speak of the supernatural Creek Women who guard the creeks, regulating the water flows and looking after the salmon as they come and go.¹⁴ The Secwepemc people tell of Coyote and how his boastful or greedy ways resulted in the salmon that were drying on his racks jumping back into the river, leaving Coyote with only slime.¹⁵ In smokehouses in the upper reaches of the Fraser River, the Carrier people tell the story of the salmon spirit, and how a man, frustrated with having to fish instead of hunt, threw a salmon on the ground and stomped on it in anger, and the salmon spirit taught the man a lesson. Because the man had disrespected the salmon, the salmon spirit caused it to snow, burying the man in his smokehouse.¹⁶ And the Sts'ailes people teach how *Snowoyelh*, the laws of how they must live in harmony with all living things, require them to be stewards of all living things and to treat everything as interconnected.¹⁷
6. Stewardship and respect infuse First Nations' approaches to fisheries management. The indigenous laws, customs, traditions, practices and stories told to the Commissioner by First Nations representatives provide an essential context for the submissions and recommendations advanced by the FNC.
7. Through laws, stories, and ceremonies, First Nations in British Columbia keep their cultures of respecting the salmon, paying gratitude to the salmon, and treating salmon as one of the many interconnected beings, alive. For Chief Willie Charlie of Sts'ailes, former Skeetchestn Chief, Dr. Ron Ignace (*Stsmé'ecqen*), former Tl'atz'en Chief Thomas Alexis, and many other Chiefs, Elders, fishers, and managers who have testified in this Inquiry, their peoples' interest is in preserving the sustainability of the fish and the fishery for generations to come. As Chief Fred Sampson of Siska testified: **"They [FRSS] are not a fish to us; [they] are our relatives.** We believed that by returning fish to the river [during the First Fish Ceremony], they would continue to come

¹³ Transcript, December 13, 2010, pp. 26-29 (Chief Willie Charlie); Transcript, December 15, 2010, pp. 53, 57 (Guujaaw); Transcript, December 14, 2010, pp. 27-28 (Dr. Ron Ignace); Transcript, December 14, 2010, pp. 7-8 (Chief Fred Sampson); Transcript, December 14, 2010, p. 40 (Chief Thomas Alexis)

¹⁴ Transcript, December 15, 2010, p. 53 (Guujaaw); see also Exhibit 540 (Applying Haida Ethics in Today's Fishery), pp. 105-106, 111

¹⁵ Transcript, December 14, 2010, pp. 27-28 (Dr. Ron Ignace)

¹⁶ Transcript, December 14, 2010, pp. 40-41 (Chief Thomas Alexis)

¹⁷ Transcript, December 13, 2010, pp. 26-29 (Chief Willie Charlie)

back for us in respect.”¹⁸ And as Chief Charlie said: “that great resource belongs to all of us and belongs to our future generations...so it’s up to all of us to work together to protect that.”¹⁹

8. Many of the Chiefs and Elders who testified in the Inquiry, spoke of salmon being a staple food in their youth, and of eating salmon three times a day.²⁰ Others, such as Chief Charlie spoke about how salmon is more than a staple food, but is a part of his people:

...that salmon when... it's been a major part of your diet for so many generations, for so many years, thousands of years and it becomes a part of you and becomes... if you will, **it becomes soul food, it becomes medicine.**²¹

9. The FRSS are of deep cultural significance to First Nations in British Columbia. For First Nations on the lower Fraser River, salmon are used in all social gatherings and ceremonies. For the Stó:lo and other First Nations, feeding people at such gatherings is not simply the act of a good host, but one of their main teachings.²²
10. Just as the fish themselves are sacred, so too are the fishing sites. Many of the fishing sites of the First Nations people along the Fraser River have been held, and passed down, for generations. Chief Sampson testified to how, when he dipnets at his family’s fishing site in the Siska area, he is literally standing in the feet of his ancestors, as the rock is worn down from such use:

Where my family fishes, it is the key dipnet site in the Siska area, to the point that when you're down there at the fishing site, there is what we call the dipping rock. **You can actually see where our ancestors have worn the rock.** There are three different levels to the dipping rock, and they – as the river drops, then people will move and shift. Of course they have to, to stay close to the water. But there are three levels on that rock and **I was told by my grandfather that that rock was put there by Coyote for the people, and he made the rock have those three levels that targeted and coincided with the three biggest runs that come up our river. You can actually see the rock is worn. When I**

¹⁸ Transcript, December 14, 2010, pp. 7-8 (Chief Fred Sampson)

¹⁹ Transcript, December 13, 2010, pp. 28-29 (Chief Willie Charlie)

²⁰ Transcript, December 13, 2010, p. 29 (Chief Willie Charlie); Transcript, December 15, 2010, pp. 23-24 (Chief Robert Mountain)

²¹ Transcript, December 13, 2010, p. 31 (Chief Willie Charlie)

²² Transcript, December 13, 2010, p. 17 (Grand Chief Clarence Pennier)

stand down there and I'm going to start dipping, I have this incredible sense of belonging, because I know that I'm standing in the footprints of my ancestors, and you can see that.²³

11. The fishing methods used by First Nations both historically and today, such as the dipnet, fish wheels, and weirs, among others, are some of the many selective methods the Aboriginal people developed in order to both allow for a prosperous fishery, and ensure sustainability of the stocks.²⁴ First Nations have, in modern times, experienced the regulation, and in some cases banning, of selective fishing methods including torch lighting and the use of weirs.²⁵
12. Grand Chief Saul Terry, of the Xwisten or Bridge River community, which is a member of the St'át'imc Nation, testified to the importance of the Xwisten salmon fishery.²⁶ He noted how the St'át'imc people traditionally harvested a lot of fish and were able to develop a lucrative trading enterprise.²⁷ He also noted that the unique geographic features of the Fraser Canyon in the Bridge River area made this an ideal location for setting up drying racks, where salmon are dried by the wind.²⁸
13. A respectful, holistic relationship to salmon, including FRSS, within a complex ecosystem, that treats salmon as a sacred trust for this and future generations, is the ethic guiding First Nations' fisheries management, and the FNC submits that this ethic should similarly guide all those committed to the long term sustainability of the FRSS and the fisheries, including DFO.

C. Government Regulation of First Nations Fisheries

14. The regulation of First Nations' fisheries by the Crown began in the late 19th century, when the legal construct of a "food fishery" for Aboriginal people began to emerge as a "way of containing an Aboriginal presence in the fishery or perhaps a way of containing claims of Aboriginal rights to the fisheries that might have given rise to access to the

²³ Transcript, December 14, 2010, p. 5 (Chief Fred Sampson)

²⁴ Transcript, December 14, 2010, pp. 7, 13, 31, 33, 39 (Chief Fred Sampson, Dr. Ron Ignace, Chief Thomas Alexis)

²⁵ Transcript, December 14, 2010, p. 74 (Chief Thomas Alexis); Transcript, December 13, 2010, p. 26 (Chief Willie Charlie); Transcript, December 13, 2010, p. 41 (Councillor June Quipp); see also Transcript, June 27, 2011, pp. 80-81 (Dr. Douglas Harris)

²⁶ Transcript, December 14, 2010, p. 15 (Grand Chief Saul Terry)

²⁷ Transcript, December 14, 2010, p. 15 (Grand Chief Saul Terry)

²⁸ Transcript, December 14, 2010, p. 16 (Grand Chief Saul Terry)

fisheries that other people didn't have."²⁹ As Dr. Douglas Harris, the Nathan Nemetz Chair in Legal History at the University of British Columbia and the author of several books and scholarly articles on fisheries law and Aboriginal rights, explained, the so-called food fishery was a "legal construct really intended to confine the Aboriginal fishery."³⁰ Rather than recognize millennia of pre-existing Aboriginal fishing rights, as Governor Douglas did through the Douglas Treaties which recognized the rights of, *inter alia*, the Snuneymuxw, Tsartlip and Tsawout peoples to "carry on their fisheries as formerly", and as some of the Indian Reserve Commissioners did through their reserve allotments; officials from what was to become DFO began to conceive of Aboriginal fishing rights as a "privilege" or an "act of grace" bestowed on Aboriginal people, rather than a right.³¹

15. The Crown's switch from an early recognition of broadly construed pre-existing Aboriginal rights, to the development of a *de-minimis* vision of Aboriginal people holding a privilege to fish for food has contributed to much conflict between First Nations and DFO. The concerns expressed by First Nations, such as Charlie Caplin from Musqueam and Captain George of Chehalis, to the Commission established in 1892, to report on the state of the fishery in British Columbia, nearly 120 years ago, that fisheries officers were restricting their food fishery and offering insufficient access to commercial licences, are eerily and sadly similar to concerns voiced by Aboriginal witnesses in this Inquiry.³² The Commissioner has heard evidence from Aboriginal witnesses who maintain that the legal construct of a "food, social, and ceremonial" fishery is an inadequate description or understanding of their right to fish.³³
16. FRSS was a principal source of sustenance and wealth for Aboriginal people on the coast and in the Fraser watershed.³⁴ As explained by Dr. Harris, First Nations had a sophisticated political society built around the fishery.³⁵ First Nations exercised their

²⁹ Transcript, June 27, 2011, pp. 55-56 and 61-62 (Dr. Douglas Harris)

³⁰ Transcript, June 27, 2011, pp. 61-62 (Dr. Douglas Harris)

³¹ Transcript, June 27, 2011, pp. 7-10, 15, 28-29, 37 (Dr. Douglas Harris)

³² Exhibit 1135 (The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982), p. 19 citing the British Columbia Fishery Commission Report, 1892, in Canada, *Sessional Papers*, 1893, p. 393; see also Transcript, June 27, 2011, p. 85 (Dr. Douglas Harris)

³³ Transcript, December 13, 2010, pp. 30, 79 (Chief Willie Charlie); Transcript, December 14, 2010, pp. 10-11 (Chief Fred Sampson); Transcript, December 14, 2010, pp. 15, 17, 18 (Grand Chief Saul Terry); Transcript, December 15, 2010, pp. 29-30 (Chief Edward Newman)

³⁴ Transcript, June 27, 2011, p. 77 (Dr. Douglas Harris)

³⁵ Transcript, June 27, 2011, pp. 82-83, 90 (Dr. Douglas Harris)

laws regarding ownership of and access to fishing sites, such that their ownership of the fisheries blurred with their management of them.³⁶ As Dr. Harris explains:

... what does ownership of these fisheries mean? ... I think that the language of ownership, while accurate, does not equate precisely with how in an English common law system we would understand private property. Yes, these were owned sites. Yes, there was a right to exclude others, but that the holder of that right or the owner of that right didn't themselves have the exclusive right to fish, that in fact, what they **were stewards of a resource in a particular territory. And so the concept of ownership, I think, merges quite nicely with the concept of stewardship, that there was not just rights but also responsibilities associated with ownership, responsibilities reflected in this notion of stewardship.** And these responsibilities would include – would varyingly include a responsibility to ensure that members of the community had sufficient access for their needs, a responsibility to ensure that the resource was managed on a basis that would allow it to continue to be used by the community for it to be managed sustainably. **And so what I'm getting at here is that by saying ownership of fisheries blurred with management, this idea that ownership and stewardship were really combined together in a form of governing the human relationship to a resource or the – or in governing the relations between people with respect to a resource, in this case the fishery.**³⁷

17. As is expanded on in these submissions, the FNC submits that what Governor Douglas, reserve commissioners, and others intended in the late 19th and early 20th centuries was to recognize Aboriginal rights to fish. That recognition of rights and respect for First Nations' ownership, stewardship and management of the fishery was never brought about. The FNC submits that what is now required to ensure the future sustainability of FRSS, and to institute a well and justly managed fishery, is a recognition of Aboriginal title and rights and treaty rights as they pertain to the fishery. The FNC submits that recognizing First Nations' rights and responsibilities as stewards of FRSS and the fishery holds the promise of leading to a more respectful and sustainable use of the resource. Furthermore, the FNC submits that recognition by DFO of First Nations' historic and modern responsibilities as stewards of the fish, fish habitat, and fishery will help to pave the path of reconciliation of the Crown's assertion of sovereignty with First Nations' underlying Aboriginal title, rights or treaty rights to the fishery.

³⁶ Transcript, June 27, 2011, pp. 82-83, 90 (Dr. Douglas Harris)

³⁷ Transcript, June 27, 2011, pp. 82-83 (Dr. Douglas Harris)

Recommendation: DFO must actively take steps to recognize and affirm Aboriginal title, rights, and treaty rights and promote reconciliation with First Nations in all matters related to the fishery, including FRSS.

18. First Nations have experienced the declining returns of FRSS in a unique way. For Aboriginal people, the loss of fish and fishing opportunities includes the loss of an important food source and winter supply, but also the loss of customs, traditions, culture, language, and the loss of an opportunity to teach and transfer skill and knowledge to the next generation.³⁸ Such unique losses are not only difficult to describe and understand but also very difficult to quantify in any socio-economic analysis.
19. Aboriginal fishers have experienced the decline in FRSS as they sit on the banks of the Fraser River.³⁹ They have felt the decline in FRSS when they see what's missing from their tables.⁴⁰ And they have felt the decline in FRSS when they experience the social difficulties in their communities.⁴¹
20. Although much of the focus of the Inquiry has been on the cause of the low returns in 2009, Aboriginal people have been witness to a steady and continuous decline of FRSS. As Chief Charlie noted:

... my grandfather...he was a great fisherman. And going back about 15 or 18 – I don't know how many years ago ... my grandfather used to say to us, he goes, "Oh, you poor kids. You have no more fish." This was going back 20 years ago when we thought we had a few fish. And then he would talk about the great runs of salmon that would come on the – the Fraser and its tributaries. He said you could see the water change colour when these schools of fish would come in. And so the – over my grandfather's time and my time and then you could start to see the decline in the salmon, the continuous decline in salmon for a hundred years.⁴²
21. The FNC submits that a longer backwards looking lens is required in order to understand the more recent declines in FRSS productivity and abundance and to develop recommendations to assist not only in the near future, but for at least seven generations.

³⁸ Transcript, December 14, 2010, pp. 6-7, 10, 18, 43 (Chief Fred Sampson, Grand Chief Saul Terry, Chief Thomas Alexis)

³⁹ Transcript, December 13, 2010, pp. 34-35 (Chief Willie Charlie)

⁴⁰ Transcript, December 13, 2010, p. 20 (Grand Chief Clarence Pennier)

⁴¹ Transcript, December 15, 2010, pp. 29-30 (Chief Edward Newman)

⁴² Transcript, December 13, 2010, pp. 34-35 (Chief Willie Charlie)

D. Aboriginal Title, Rights and Treaty Rights

22. Although the FNC has approached this Inquiry with an appreciation that the Commissioner is not mandated through the Terms of Reference to make findings of fact as to the existence of specific Aboriginal title, rights or treaty rights, the FNC submits that the legal context – and specifically the inherent nature of Aboriginal rights, the constitutional recognition and affirmation of Aboriginal and treaty rights in s.35(1) of the *Constitution Act, 1982*,⁴³ and the concomitant duty to consult and accommodate – provides a critical context for both interpreting DFO's policies, practices and procedures, and for making recommendations related to ensuring the long-term sustainability of the fisheries.

i) Inherent Aboriginal Rights and their Constitutional Entrenchment

23. Inherent Aboriginal rights arise from the presence of Aboriginal Nations living in and using the lands and waters of the area now known as British Columbia prior to the arrival of Europeans. These inherent Aboriginal rights exist independently of and do not require the recognition of any other legal system. Since time immemorial First Nations have had, and continue to have, their own legal systems, including those that govern their existence in and interaction with the ecosystem, including land, water, and wildlife. First Nations sustainably managed fish, and fisheries, including FRSS fisheries, according to their laws for thousands of years – prior to the institution of colonial regulatory structures.

24. As noted in PPR 1: *Aboriginal Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery* (which was prepared by Commission Counsel to provide the Commissioner with an overview of some of the significant applicable law)⁴⁴ constitutional entrenchment of Aboriginal and treaty rights affirmed and recognized in Canadian law that, as the first inhabitants of North America, the rights of the Aboriginal peoples of Canada are to be accorded special legal and constitutional protection.⁴⁵ Then Chief Justice Lamer explained this in the Aboriginal fishing rights case *Van der Peet*:

⁴³ *The Constitution Act, 1982*, being Schedule B to the *Canada Act 1982* (U.K.), 1982, c. 11, s.35(1) provides as follows: the existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.

⁴⁴ Transcript, October 26, 2010, p. 1 (Patrick McGowan, Commission Counsel)

⁴⁵ PPR 1 (Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery, October 1, 2010), para. 4

In my view, the doctrine of aboriginal rights exists, and is recognized and affirmed by s. 35(1), because of one simple fact: when Europeans arrived in North America, aboriginal peoples were already here, living in communities on the land, and participating in distinctive cultures, as they had done for centuries. It is this fact, and this fact above all others, which separates aboriginal peoples from all other minority groups in Canadian society and which mandates their special legal, and now constitutional status.⁴⁶ [emphasis in original]

25. The constitutional entrenchment of Aboriginal and treaty rights in s.35(1) is to “hold the Crown to a substantive promise” and to “[give] a measure of control over government conduct and a strong check on legislative power” by ensuring that the government is required to “bear the burden of justifying any legislation that has some negative effect on any aboriginal right protected under s. 35(1)”⁴⁷.
26. Again, as noted in PPR 1, the recognition and affirmation of rights is only a starting point.⁴⁸ In developing the law of Aboriginal and treaty rights, courts must also take into account the fundamental objective that underscores such recognition and affirmation. This objective is the reconciliation of relationships among Aboriginal and non-Aboriginal peoples. As explained by Binnie J. in *Mikisew Cree First Nation v. Canada*, the reconciliation of the claims, interests and ambitions of both groups rests at the heart of modern aboriginal and treaty rights law:

The fundamental objective of the modern law of aboriginal and treaty rights is the reconciliation of aboriginal peoples and non-aboriginal peoples and their respective claims, interests and ambitions.⁴⁹

27. While the FNC submits that Aboriginal rights to manage and to be involved in management decisions regarding the fishery are inherent rights, we note that such rights are also tied to two sources of common law: (1) Aboriginal title, and (2) Aboriginal and treaty rights, including self-governance. All of which are evidencing areas of the law.

⁴⁶ *R. v. Van der Peet*, [1996] 2 S.C.R. 507; see also PPR 1 (Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery), para. 4

⁴⁷ *R. v. Sparrow*, [1990] 1 S.C.R. 1075, para. 65; see also PPR 1 (Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery, October 1, 2010), para. 5

⁴⁸ PPR 1 (Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery, October 1, 2010), para. 6

⁴⁹ *Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage)*, 2005 SCC 69

28. Aboriginal title includes the right to exclusively use and occupy an area for a variety of purposes and the right to choose to what ends an area will be put.⁵⁰ The right to choose how land is used necessarily includes a management component. Given the nature of Aboriginal title, the FNC submits that recognition by the Crown of the existence, or potential existence, of Aboriginal title to a territory that includes a fishery requires the recognition of the right to manage the fishery in that territory.
29. As noted in the FNC's submissions in response to PPR 1, the FNC reiterates that the law regarding Aboriginal title to fresh and marine waters, including submerged lands – like all aspects of Aboriginal law – will evolve over time.⁵¹ While no Canadian court has yet to fully apply the concept of Aboriginal title to marine areas or rivers, the FNC submits that the law of Aboriginal title could be successfully applied to include water areas, and that such is a predictable evolution of the law. The FNC submits that where assertions of Aboriginal title exist, the Crown must proceed honourably when contemplating any actions or decisions that could affect such title.
30. The law on Aboriginal rights to fish is also evolving. In 1990, the Supreme Court of Canada in *R. v. Sparrow*⁵² recognized the Musqueam's right to fish for food, social and ceremonial purposes. In 1996, the Supreme Court of Canada in *R. v. Gladstone*⁵³ recognized the Heiltsuk's right to trade in roe on kelp on a commercial basis. In the last few years, courts in British Columbia have begun to recognize broad Aboriginal rights to fish and sell fish (see, for example *Ahousaht Indian Band and Nation v. Canada (Attorney General)*).⁵⁴
31. Courts have repeatedly indicated that the content of any Aboriginal right must be guided by the Aboriginal perspective of the right.⁵⁵ The First Nations' perspective on the Aboriginal right to fish is integrated and holistic; it does not parse the right to harvest and use fish from the responsibility to manage fish in a sustainable manner. First Nations of the Fraser watershed and marine areas include in any description of their Aboriginal rights to fish the following elements:

⁵⁰ *Delgamuukw v. British Columbia*, [1997] 3 S.C.R. 1010, paras. 166-168

⁵¹ PPR 1 with Reply Submissions (Submissions of the FNC in Response to the Commission's Paper begin at p. 182), para. 4

⁵² *R. v. Sparrow*, [1990] 1 S.C.R. 1075

⁵³ *R. v. Gladstone*, [1996] 2 S.C.R. 723

⁵⁴ *Ahousaht Indian Band and Nation v. Canada (Attorney General)*, 2009 BCSC 1594; 2011 BCCA 237

⁵⁵ *Delgamuukw v. British Columbia*, [1997] 3 S.C.R. 1010, paras. 81-82

- a. responsibilities to protect, conserve and sustain the fishery for this and future generations, and therefore responsibilities to manage and preserve FRSS and the ecosystems on which they rely;
 - b. responsibilities to other First Nations who access and depend on FRSS;
 - c. rights to harvest FRSS for all purposes within their own homelands, and in particular to harvest FRSS to support thriving families, villages and Nations, including for FSC and economic purposes;
 - d. rights to harvest FRSS using all the traditional methods known and passed down over the centuries, and the methods that evolve and are developed; and
 - e. rights and responsibilities to exercise and maintain proper relations to FRSS and its ecology, including the rivers, forests, and marine areas.
32. The FNC submits that Aboriginal rights to fish would be rendered meaningless by reducing an Aboriginal right to being simply a right of access or a right to harvest. Such a right, when viewed from the Aboriginal perspective, and when considered with an appreciation for the inherent nature of Aboriginal rights, always includes the right and responsibility to manage the fishery for present and future generations, and the right to make strategic and operational management decisions, including such matters as determining necessary conservation measures, chosen fishing methods, fishing times, and habitat protection measures.
33. Treaty rights also provide recognition of First Nations' rights as managers of the fishery. The Douglas Treaties provide rights to the descendants of its signatories, including the Snuneymuxw, Tsartlip and Tsawout First Nations, to their "fisheries as formerly".⁵⁶ Courts have interpreted the "fisheries as formerly" provision in the Douglas Treaties as including, at the very least, a right of priority over existing fish stocks, and the power to manage the fishery in a manner that does not jeopardize the constitutionally rights protected in the treaties.⁵⁷ In *Tsawout Indian Band v. Saanichton Marina Ltd.* the British Columbia Court of Appeal noted that the meaning of the word "fishery" could include "the business, occupation or industry of catching fish or of taking other products of the sea or

⁵⁶ Exhibit 1135 (The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982), p. 2

rivers from the water”. Clearly, the Douglas Treaty right to the “fisheries as formerly” engages a right to be involved in the “business” of harvesting fish and gives rise to a power to “manage the fishery”.

34. The FNC submits that the responsibility of conserving and managing FRSS provides Canada with a true opportunity to start applying the evolving nature of the law on Aboriginal rights relating to fish and fisheries now, in good faith, in order to meet its constitutional obligations and to strengthen its relations with First Nations. The other alternative, denying or resisting the recognition and respect of Aboriginal title, rights and responsibilities, to the fishery and litigating the step along the path to reconciliation are costly and divisive.⁵⁸

ii) The Duty to Consult

35. The Supreme Court of Canada in *Haida* held that the Crown has a duty to consult and accommodate Aboriginal concerns even in situations where Aboriginal title or rights have not yet been determined or proven in a court of law. This obligation flows from the promise of “rights recognition” embodied in s. 35.⁵⁹ The content of the duty to consult and accommodate varies with the circumstances: the scope of the duty is proportionate to a preliminary assessment of the strength of the case supporting the existence of the right or title, and to the seriousness of the potentially adverse effect upon the right or title claimed.⁶⁰
36. The evidence in this Inquiry illustrates some of the difficulties facing DFO in meeting its obligation to consult. It does not conduct assessments of First Nations’ strength of claim, it must engage many First Nations and has not developed the adequate structures or tools for properly informing itself on the potential impacts and infringements that its management decisions could have to the exercise of s. 35 fishing rights.
37. First Nations of the Fraser watershed and coastal marine areas have and continue to notify the Crown of their assertions of Aboriginal title to the areas through which FRSS travel and of their Aboriginal rights to fish, including the right and responsibility to

⁵⁷ *Snuneymuxw First Nation v. British Columbia*, 2004 BCSC 205

⁵⁸ This is contrary to the courts’ consistent direction to achieve reconciliation through negotiation, not litigation. See, for example, *Delgamuukw v. British Columbia*, [1997] 3 S.C.R. 1010, para. 186.

⁵⁹ *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511, para. 20.

⁶⁰ *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511, para. 39.

manage fisheries for this and future generations. In addition, the Crown has knowledge of Douglas Treaty rights, which include a right to “carry on their fisheries as formerly.”

38. As outlined in para. 7 of the FNC’s submissions in response to PPR 1,⁶¹ the FNC submits that these strong assertions of Aboriginal title and rights require the Crown to proceed honourably when contemplating any actions or decisions that could adversely affect such rights, and to engage in deep consultation with First Nations. Otherwise, the Crown would be reverting to a post-proof sphere and, as stated by the Supreme Court of Canada in *R. v. Sparrow* and again in *Haida Nation v. British Columbia (Minister of Forests)*, would then be treating reconciliation as a “distant legalistic goal, devoid of the ‘meaningful content’ mandated by the ‘solemn commitment’ made by the Crown in recognizing and affirming aboriginal rights and title.”⁶²
39. The need to make decisions within tight timeframes does not obviate the Crown’s obligations to consult with many First Nations. The fact that modern day management decisions involve social, economic, political, and scientific considerations, including uncertainties and risks makes it all the more important that First Nations have a central and meaningful place at the table with DFO. In these submissions, the FNC sets out how the development and support of Tier 1 and Tier 2 co-management processes can assist DFO in meeting its legal and management obligations.

iii) The Priority of Conservation and Aboriginal Rights

40. Since *R. v. Sparrow*, First Nations along the migratory route of FRSS have relied on the constitutional protection of their rights to access FRSS for FSC purposes. The Supreme Court of Canada has confirmed that the right has a constitutional priority, second only to the needs of conservation. Since *Sparrow* there have been differing perspectives on what this priority means and whether DFO is meeting this priority.
41. In addition, as times of scarcity become more prevalent, the requirement that the brunt of conservation measures be borne by the practices of sport fishing and commercial fishing is becoming increasingly challenging for DFO to implement.⁶³

⁶¹ PPR 1 with Reply Submissions (Submissions of the FNC in Response to the Commission’s Paper begin at p. 182), para. 7

⁶² *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511, para. 33

⁶³ *R. v. Sparrow*, [1990] 1 S.C.R. 1075

42. The constitutional priority for s.35 Aboriginal rights gives rise to at least two practical implications: first, what does conservation mean, and second, how can First Nations' FSC priority be protected in a fishery that historically denied that right and faces continued pressures from other users and industries, including the commercial and recreational sectors.
43. The FNC submits that despite adopting policies said to be aimed at conservation, DFO is still not consistently operating with conservation of FRSS at the CU level as a true priority. From First Nations' perspectives, DFO has made decisions that have and continue to put their fisheries at risk. The level of risk tolerance inherent in DFO's management approach has often been unacceptable to First Nations whose own laws, practices and traditions require a precautionary approach that builds, rebuilds and sustains the fishery for this and future generations.
44. For First Nations, the balancing exercise relied upon by DFO to continue to meet the needs of other sectors, has often not respected the constitutional priority for rights-based fisheries. Particularly during times of scarcity, priority and "balancing" are viewed by First Nations as mutually exclusive. As the Court in *Sparrow* noted:
- If, in a given year, conservation needs required a reduction in the number of fish to be caught such that the number equalled the number required for food by the Indians, then all the fish available after conservation would go to the Indians according to the Constitutional nature of their fishing right.⁶⁴
45. Commercial fishing on mixed stocks in the marine area before the fish have begun to make their way to their natal streams has resulted in the serious depletion of smaller populations of FRSS, many of which are the fish that up-river First Nations depend on to meet their food, social and ceremonial needs. While the FNC recognizes that the successful implementation of the FSC priority is a challenge, we also submit that neither the complicated nature of the fishery, nor the pressures from entrenched commercial interests, are sufficient excuses for failing to honour this constitutionally held right.

E. Importance of Biodiversity

46. The concept of "biodiversity" is present in First Nations' laws, customs, traditions and practices. Many First Nations in British Columbia are guided by a sacred quest for

balance. For the Haida, this concept is embodied in their proverb, “the world is as sharp as the edge of a knife”.⁶⁵ As Russ Jones and Terri-Lynn Williams-Davidson explain in their article *Applying Haida Ethics in Today’s Fishery*, this proverb teaches the importance of finding balance not only with First Nations’ values and virtues, but also with all activities.⁶⁶ For First Nations the concept of balance pairs nicely with that of biodiversity – as preserving biodiversity is one of the ways of ensuring sustainability of the species and balance within the ecosystem.

47. Balance is also a term referred to by scientists and commercial harvesters. Although an imperfect analogy, numerous scientists described the importance of preserving the genetic biodiversity of FRSS as being akin to holding a balanced and diversified stock portfolio. PSC Chief Biologist Mike Lapointe remarked that biodiversity will help to ensure that populations of FRSS persist even in the event that there are a variety of environmental factors that could threaten their existence.⁶⁷ The more diversity there is in terms of CUs, the better off we will be in terms of ensuring the sustainability of the FRSS.⁶⁸
48. Dr. John Reynolds, the Tom Buell BC Leadership Chair in Salmon Conservation at SFU, explained there are 4 key reasons why we should be concerned about maintaining the diversity of FRSS: (1) holds cultural and aesthetic value; (2) helps maintain the ability of fish to evolve; (3) helps maintain fisheries through portfolio effects; (4) leads to spatial and temporal maintenance of ecosystems.⁶⁹ In essence, in order to adjust and evolve to changing environmental conditions, including climate change and other impacts of human-caused as well as naturally occurring events, fish need “as much room to manoeuvre as possible”, as the erosion of diversity constrains the species’ options for the future.⁷⁰
49. Dr. Scott Hinch, a Professor at UBC’s Faculty of Forest Sciences and Institute for Resources, Environment and Sustainability, who was qualified as an expert in the area

⁶⁴ *R. v. Sparrow*, [1990] 1 S.C.R. 1075

⁶⁵ Exhibit 540 (*Applying Haida Ethics in Today’s Fishery*), p. 106

⁶⁶ Exhibit 540 (*Applying Haida Ethics in Today’s Fishery*), p. 106

⁶⁷ Transcript, October 25, 2010, pp. 70-71 (Mike Lapointe)

⁶⁸ Transcript, October 25, 2010, pp. 70-71 (Mike Lapointe)

⁶⁹ Transcript, October 28, 2010, pp. 17-20 (Dr. John Reynolds); see also Exhibit 4 (Presentation: A scientific view of conservation and sustainability), slide 4

⁷⁰ Transcript, October 28, 2010, p. 18 (Dr. John Reynolds)

of aquatic ecology,⁷¹ emphasized the importance of preserving biodiversity in an era of climate change, and noted that this was a basic perspective among conservation biologists:

So biodiversity in this context, I would define as both variability, genetic variability within a population, as well as the variability that exists between populations. Each as we can see, these populations, many of them are uniquely adapted to dealing with their local conditions. **In my view it's paramount to be able to protect as many of these populations as possible, because we don't know what environmental conditions are going to change like in all the different life stages, and there will be some populations that may be able to cope particularly well. We just don't know that yet. And having the ability of some of these populations to either expand their range or move their range is going to be important for the persistence of the species. And so this is a standard conservation biology perspective on biodiversity. It's not just mine for Fraser sockeye. I think that's the way most conservation biologists feel about most populations.**⁷²

50. Clearly, the benefits of preserving biodiversity are now accepted by the science community both domestically and internationally. Canada, specifically, has articulated a commitment to preserving biodiversity by becoming a signatory to the CBD and through the passage of the WSP. The CBD affirms that the “conservation of biological diversity is a common concern of humankind”; and Article 6 requires each contracting party to (a) develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes; and (b) integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies.⁷³ In the WSP, DFO commits to managing FRSS in a manner that promotes sustainability and biodiversity as a basis of conservation.⁷⁴ The WSP notes that “protecting diversity is the most prudent policy for the future continuance of wild salmon as well as the ecological processes that depend on them and the cultural, social, and economic benefits drawn from them”.⁷⁵

⁷¹ Exhibit 551 (CV of Dr. Scott Hinch)

⁷² Transcript, March 8, 2011, pp. 55-56 (Dr. Scott Hinch)

⁷³ Exhibit 13 (Convention on Biological Diversity “CBD”), Article 6; Canada ratified the CBD on December 4, 1992.

⁷⁴ Exhibit 8 (Wild Salmon Policy), see for example snapshot page and also pp. 2, 3, 4, 7, 9-11

⁷⁵ Exhibit 8 (Wild Salmon Policy), p. 2

51. It is clear from the evidence at this Inquiry that it is easier to articulate a commitment to biodiversity than it is to implement actions directed towards preserving biodiversity. As discussed in detail below, preserving the biodiversity of FRSS will require continued changes to how DFO authorizes fisheries, a renewed commitment to assessing and protecting the CUs, and dedication to preserving habitat. The FNC submits that Canada needs help to implement the WSP in a manner that will promote the aims of the CBD.

Recommendation: DFO must authorize fisheries and manage the human activities that are within Canada's jurisdiction using an ecosystem based framework, in a manner that implements its articulated commitment to biodiversity found in both the CBD and the WSP.

F. The Precautionary Approach

52. The precautionary principle is a central principle of international environmental law.⁷⁶ The most well-known and widely accepted definition of the precautionary principle is found in Principle 15 of the Rio Declaration, which provides:

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where 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.⁷⁷

53. Article 6.2 of the 1995 UN Agreement builds on Principle 15 of the Rio Declaration and provides:

States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.⁷⁸

54. The international community has developed a comprehensive framework for the implementation of the precautionary principle which was codified in a 1995 document published by the FAO called, the "Precautionary Approach to Fisheries; Part 1:

⁷⁶ PPR 2 (International Law Relevant to the Conservation and Management of Fraser River Sockeye Salmon), para. 17

⁷⁷ *Rio Declaration on Environment and Development*, 3 June 1992, [1992] PITSE 11, UN Doc A/CONF.151/26 (Vol. I), Principle 15

⁷⁸ *UN Agreement (Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995)*, Article 6.2, referred to in Exhibit 8 (Wild Salmon Policy), p. 15

Guidelines on the Precautionary Approach to Capture Fisheries and Species Introductions”.⁷⁹ In an article entitled *An overview of the precautionary approach in fisheries and some suggested extensions*, Dr. Randall Peterman notes that the FAO’s framework reflects lessons learned about dealing with uncertainties over the previous five decades in fisheries science and management and encapsulates the lessons into a framework that can help other agencies implement a precautionary approach.⁸⁰

55. During the Inquiry there was some discussion about the difference between the precautionary principle and the precautionary approach, and whether such differences are purely semantic.⁸¹ Both Dr. Peterman and Mr. Marmorek have noted that application of the precautionary principle may result in more restrictions being imposed on human activities than application of the precautionary approach.⁸²
56. Canada, on the other hand, melds the precautionary principle with the precautionary approach. Canada’s *Framework for the Application of Precaution in Science-based Decision Making About Risk* defines the precautionary principle or approach as follows: “The application of “precaution”, the “precautionary principle” or the “precautionary approach” recognizes that the absence of full scientific certainty shall not be used as a reason for postponing decisions where there is a risk of serious or irreversible harm.”⁸³
57. Other than referencing Article 6.2 of the 1995 UN Agreement, the WSP doesn’t refer to the precautionary principle at all, but instead notes:

Precautionary approaches are now widely applied in fisheries management and the protection of marine ecosystems. The approach identifies important considerations for management: acknowledgement of uncertainty in information and future impacts and the need for decision making in the absence of full information. It implies a reversal in the burden

⁷⁹ FAO, *Precautionary Approach to Fisheries; Part 1: Guidelines on the Precautionary Approach to Capture Fisheries and Species Introductions*, referred to in Exhibit 8 (Wild Salmon Policy), p. 15

⁸⁰ Exhibit 1906 (An overview of the precautionary approach in fisheries and some suggested extensions), p. 234

⁸¹ Transcript, September 20, 2011, pp. 4-9 (David Marmorek); see also Transcript, September 23, 2011, pp. 63-64 (David Bevan)

⁸² Exhibit 1906 (An overview of the precautionary approach in fisheries and some suggested extensions), p. 234, Figure 23.1; see also Transcript, September 20, 2011, pp. 4-9 (David Marmorek)

⁸³ Exhibit 51 (A Framework for the Application of Precaution in Science-Based Decision Making About Risk), p. 2

of proof and the need for longer term outlooks in conservation of resources.⁸⁴

58. The definition section of the WSP does not provide a definition (or interpretation) of the precautionary principle, but only the precautionary approach noting:

When used in an advisory context in support of decision-making by the Government of Canada, this term conveys the sense that the advice is provided in situations of high scientific uncertainty. It is intended to promote actions that would result in a low probability of harm that is serious or difficult to reverse.⁸⁵

59. Throughout this Inquiry, DFO has said, through the testimony of its managers and scientists and through its policies and guideline documents, that it is committed to using a precautionary approach.⁸⁶ Dr. Wendy Watson-Wright, DFO's former Assistant Deputy Minister of Science, testified that during this time of changing ocean conditions, climate change, and increased developments of resources, we cannot use scientific uncertainties as an excuse for inaction.⁸⁷ The FNC strongly agrees; the uncertainties (biological, economic, and social) can be overwhelming – but inaction is not the answer.
60. The FNC submits that the challenge in applying a precautionary approach is determining the level of precaution required in any particular situation of uncertainty. Dr. Peterman describes the three “standard responses” by harvesters and managers to uncertainties and risks as follows:

First, people may make an optimistic assumption about how the ecological system might respond to human disturbances; this usually leads to aggressive actions such as high harvest rates or the introduction of non-native species. Second is the often-noted response that, “We know so little about what to do that we should just leave things alone.” This view means that, for example, a decrease in productivity of some stock should not be attributed to fishing until all other alternative explanations such as environmental changes are ruled out. This approach uses uncertainties to maintain the status quo. Another alternative is to make a more pessimistic assumption about the ability of the ecological system to respond to human disturbance, cautiously

⁸⁴ Exhibit 8 (Wild Salmon Policy), p. 15

⁸⁵ Exhibit 8 (Wild Salmon Policy), p. 39

⁸⁶ Transcript, October 28, 2010, pp. 23-24 (Dr. John Reynolds); Transcript, November 4, 2010, p. 23 (Dr. Wendy Watson-Wright); Transcript, September 23, 2011, pp. 55-56 (Susan Farlinger); Transcript, September 23, 2011, pp. 63-64 (David Bevan)

⁸⁷ Transcript, November 4, 2010, p. 23 (Dr. Wendy Watson-Wright); Transcript, October 28, 2010, pp. 23-24 (Dr. John Reynolds)

alter the system, and monitor its response. This third response to uncertainties reflects the view that, with appropriately cautious harvesting and management actions, we might not be able to reduce uncertainties further but we might be able to reduce the resulting risks.⁸⁸

61. Dr. Peterman goes on to consider how to choose an appropriate level of precaution in a particular situation. He writes:

One question that often arises is how to choose an appropriate level of precaution in a particular situation. We could arbitrarily choose the best action in an *ad hoc* manner, which has often been the case for management targets such as F0.1 and Fmed used in non-salmonid fisheries. **In contrast, quantitative risk analyses can help choose the most appropriate action in a consistent, rigorous manner. Such analyses describe a range of alternative hypotheses about how the natural system and the physical system interact. This range of hypotheses includes different structural forms of the underlying models, rather than simply assuming the best-fit model is true. This approach is important because at least parts of the range of alternative models have the potential to create different feedbacks within the system and therefore quite different outcomes from the best-fit model. Risk analysis includes extensive sensitivity analyses to understand how these different assumptions affect the recommended actions (Peterman and Anderson 1999). Despite such analyses, uncertainties will always remain. We therefore want risk analyses and decision analyses to identify actions that are robust (i.e. perform well) across a wide range of assumptions about the uncertain components of an analysis.**⁸⁹

62. The FNC submits that uncertainties should not be pushed aside to allow for harvests, nor should they be used to maintain the *status quo*. The FNC submits that when faced with considerable uncertainties and risks, DFO must meaningfully consult First Nations, to understand their values and risk tolerances, and accommodate their interests and concerns. Given the potential infringements to s. 35 Aboriginal rights resulting from all salmon management decisions, including decisions about what scientific research is to be undertaken (or not undertaken), First Nations must be adequately informed and consulted regarding uncertainties, risks, analyses (and models used to arrive at such), and the available and alternative options.

⁸⁸ Exhibit 1906 (An overview of the precautionary approach in fisheries and some suggested extensions), p. 232

⁸⁹ Exhibit 1906 (An overview of the precautionary approach in fisheries and some suggested extensions), pp. 236-237

63. As required by the 1995 UN Agreement, the FNC submits that DFO must develop more thorough processes that transparently outline how uncertainties and risks are explicitly taken into account during scientific analyses and management decisions.⁹⁰
64. In April 2011, experts on the ocean met world science leaders on ocean stresses and had a rare opportunity to meet for three days to assess the latest information on impacts and stresses, and the synergistic effects they are having on the global ocean. In their June 2011 summary workshop report, they advised that the magnitude of the cumulative impacts on the ocean is greater than previously understood and that ecosystem collapse is occurring as a result of both current and emerging stressors. As a result, they recommended urgent actions to restore the structure and function of marine ecosystems and the “Proper and universal implementation of the precautionary principle.” These world-renowned scientists called for “reversing the burden of proof so activities proceed only if they are shown not to harm the ocean singly or in combination with other activities.”⁹¹

Recommendation: DFO and First Nations must together develop and apply more precautionary approaches in all aspects of fisheries management.

G. Key Themes

65. Throughout the Inquiry, the FNC has explored:
- a. How conservation of FRSS must be understood and implemented as a clear priority;
 - b. How the precautionary approach must better inform all FRSS fisheries related decisions;
 - c. How First Nations’ title and rights can achieve recognition and respect within current fisheries statutes, regulations, policies, practices, procedures, and organizational structures;

⁹⁰ See also Exhibit 754 (Possible Solutions to Some Challenges Facing Fisheries Scientists and Managers, June 2004)

⁹¹ Exhibit 1348 (IPSO Ocean Stresses and Impacts Summary Report, June 2011), pp. 1, 6 and 8.

- d. How DFO's existing governance and decision making processes must be changed to better ensure the long-term sustainability of FRSS and meet Canada's constitutional obligations to First Nations and to demonstrate its commitment to co-management;
 - e. How Indigenous knowledge and TEK can inform and become integrated with science and be used to guide fisheries related decisions;
 - f. How improvements to stock and ecosystem assessments, including improvements to the quality, consistency, and transparency of data and research can be advanced; and,
 - g. How commitments to support and fund such changes can be ensured.
66. The FNC's submissions and the recommendations made herein are aimed at developing these themes for the benefit of First Nations and all Canadians, the FRSS, and the fishery as a whole.
67. The FNC recognizes the challenge presented to the Commissioner in making recommendations to assist in ensuring the sustainability of FRSS and the fishery. One such challenge is recognizing, as Dr. John Davis, DFO's former Assistant Deputy Minister of Science and former RDG for the Pacific Region,⁹² said: that fisheries management is in essence about managing people, not biology.

We think that we manage things through biology, but in fact all our tools in fisheries management are about people and either allowing or disallowing their access. So the psychology, it's very important here from the perspective of achieving change and getting a buy-in to policy.⁹³

Given Dr. Davis' sage words, the FNC's recommendations are aimed at achieving support from all the required governments, including First Nations governments, as well as stakeholders.

68. The FNC hopes that our recommendations for transformative change will be endorsed by other Participants in the Inquiry. As Dr. Davis notes:

⁹² Exhibit 884 (CV of John Davis)

⁹³ Transcript, May 30, 2011, p. 42 (Dr. John Davis)

People see the status quo as being less risky than an uncertainty associated with change. We all fear the loss of benefits and involvement or our status with respect to our position in a given lobbying structure or activity. We fear hidden agendas in the unknown when change comes before us. We tend to associate our beliefs with others of similar belief rather - well, all the guys in this group feel that way, so I should think likewise, because that's the common understanding with respect to how we think about this. **It's much easier to do nothing than accept uncertainty of change, and we may not understand the proposed changes, so in the context of DFO or the Commission, rolling out something new, how all of these societal ideas, values, how psychology works, is really important.** I used to sit my office as the RDG at the end of a horrible week and think, boy, everyone out there I've talked to all week basically wants to do the right thing for the fish or for the future. They all share this common understanding, but they spend most of their time poking each other in the eye and arguing over it's your fault, or it's the Department's fault or something like that. **There has to be a better way forward, and I think part of the route of it is in the basis of understanding people and understanding how they approach things and helping them approach these kinds of creative changes from a conservation point of view.**⁹⁴

69. This Inquiry was struck with the recognition that we are facing significant uncertainties and changing times, ecologically, socially, legally and economically. In such a situation the *status quo* cannot suffice. The FNC offers its submissions and recommendations for change with the aim of finding a better way forward and of improving the sustainability of FRSS for future generations. Collaboration amongst governments (Canada, the Province and First Nations) and stakeholders must recognize the reality of change and find governance and management systems that are robust, efficient, responsive and adaptive.

III. FRAMEWORK

A. Terms of Reference

70. The framework for the Inquiry was set in the Terms of Reference, which direct the Commissioner to:

⁹⁴ Transcript, May 30, 2011, pp. 42-43 (Dr. John Davis)

- a. Conduct the Inquiry without seeking to find fault, and with the overall aim of respecting the conservation of FRSS, and by encouraging broad cooperation among stakeholders;⁹⁵
 - b. Investigate and make findings of fact regarding the current state of FRSS, and the causes of decline of FRSS;⁹⁶
 - c. Consider the policies and practices of DFO with respect to FRSS, including its scientific advice, its fisheries policies and programs, its risk management strategies, its allocation of Departmental resources and its fisheries management practices and procedures;⁹⁷ and
 - d. Develop recommendations for improving the future sustainability of the FRSS fishery.⁹⁸
71. The FNC's approach to the evidentiary hearings has been forward looking and recommendation focussed. The FNC's active participation in the Inquiry has not been focused on finding one or any smoking gun that will explain the causes of decline of FRSS, but rather to assist in the investigation into how both the poor 2009 return and the gradual declines of FRSS over the last few decades may be explained by multiple stressors, including climate change, inadequate management practices including the inability to wholeheartedly implement existing policies, and the complexity of cumulative and interacting stressors. Our approach has been to suggest solutions to inspire the path forward.
72. The FNC has organized its final submissions to be responsive to the Terms of Reference focusing primarily on the *viva voce* evidence. We begin with submissions on what we submit are the non-contentious findings of fact which we urge to the Commissioner to make regarding the current state of FRSS, including our submissions on the factors contributing to the long term decline of FRSS. We then offer submissions

⁹⁵ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (A)

⁹⁶ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (C) (I), (II)

⁹⁷ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (B)

⁹⁸ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, a (i) (D)

on DFO's policies and practices, including: current policies and practices regarding conservation, sustainability and protection of FRSS; policies and practices potentially affecting First Nations' exercise of their s. 35 Aboriginal rights and responsibilities; and how DFO and First Nations' responsibilities for conservation and stewardship of FRSS must continue to spur changes to existing policies and practices.

IV. CURRENT STATE OF THE STOCKS

73. Both science and TEK have ways of assessing the strengths and vulnerabilities of FRSS. As the prefaces for each of the Technical Reports note: FRSS are key components of freshwater and marine aquatic ecosystems and events over the past century have shown that the Fraser sockeye resource is fragile and vulnerable to human impacts, natural environmental variation and population cycles that strongly influence survival and production.
74. The Fraser River supports the largest abundance of FRSS in the world for a single river due to its length (1600 km), watershed size (223,000 km²), and the lake nursery area (2,500 km²). Over 50 percent of all salmon production in British Columbia (over 65 percent for sockeye) occurs in the Fraser watershed. Within the Fraser watershed there are hundreds of tributaries, streams, marshes, bogs, swamps, sloughs and lakes. The dependence of FRSS on these various habitats results in greater variety of life history patterns relative to other Pacific salmon.⁹⁹
75. The long-distance migrations of sockeye salmon from habitat to habitat provide some of the most enduring puzzles in salmon ecology. The migrations are well timed and well directed and can vary from a few hundred metres to thousands of kilometres. To perform these feats, sockeye salmon possess a remarkable set of direction-finding mechanisms that include sun compass and magnetic compass orientation. They are also able to distinguish water masses, such as between their natal tributary and nearby tributaries, and differences between stocks on the basis of odour.¹⁰⁰
76. FRSS have widely varying life histories, genetic and habitat characteristics that create different levels of vulnerability to the stressors each stock encounters. Effects of

⁹⁹ Exhibit 1915 (Evaluation of Uncertainty in Fraser Sockeye (*Oncorhynchus nerka*) Wild Salmon Policy Status Using Abundance and Trends in Abundance Metrics, August 25, 2011), p. 6

stressors on survival at any life history stage depend on both the magnitude of the stress and the vulnerability of the salmon. Characteristics that vary across the stocks include: spawning habitat (inlets, outlets, lake shore, flow rates, substrate conditions, environmental conditions), nursery lakes (area, size, productivity, temperature, ice break-up, duration of rearing), smolt out-migration (timing, duration, route) and adult migration (return route, age of return, timing, estuary residence time, timing of upstream migration, upstream distances and duration, river temperatures and other environmental characteristics, PSM rates).¹⁰¹

77. Scientists in this Inquiry have provided the following descriptions of the state of FRSS stocks:
- a. FRSS enter the SOG on their way to the Fraser River estuary by taking either the southern route via Juan de Fuca Strait or the northern route via Johnstone Strait. Until 1977 about 80 percent of sockeye salmon used the southern route. Thereafter, an increasing number (approximately 50 percent) entered the SOG via the northern route. Although the cause of the change is not yet known, years of warmer SST on the West coast of Vancouver Island may have resulted in more FRSS using the northern route.¹⁰²
 - b. Despite an understanding of the migratory patterns of FRSS, the least well known part of their life is their life at sea.¹⁰³ The oceanic distributions of populations of FRSS are not known with sufficient accuracy to understand if they have varied from year to year, or decade to decade, or place to place.¹⁰⁴
 - c. In 2009 only 1.5 million adult FRSS returned to their spawning grounds in the Fraser watershed – the lowest number since 1947 and only 14 percent of the pre-season forecast of 10.5 million fish. This 2009 event was only the most recent in a series of indications that FRSS populations were facing serious

¹⁰⁰ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 10

¹⁰¹ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 14

¹⁰² Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 9

¹⁰³ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 10

¹⁰⁴ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 137

widespread problems. While the largest returns of these fish in 80 years occurred in the early 1990s (over 20 million sockeye in 1990 and 1993), this situation has now changed to having the lowest returns since the 1920s in 2007, 2008 and 2009 (less than 2 million per year).¹⁰⁵

- d. Declining productivity has occurred over a much larger area than just the Fraser watershed and is not unique to it. There have been relatively large, rapid, and consistent decreases in sockeye productivity since the late 1990s in many areas along the west coast of North America.¹⁰⁶
- e. Most Fraser and many non-Fraser sockeye stocks, both in Canada and the United States, show a decrease in productivity, especially over the last decade, and often also over a period of decline starting in the late 1980s and or early 1990s.¹⁰⁷ In contrast, western Alaskan sockeye populations have generally increased in productivity over the same period, rather than decreased.¹⁰⁸
- f. Seventeen of the 19 FRSS stocks have shown declines in productivity over the last two decades (with two exceptions being the Harrison and Late Shuswap).¹⁰⁹ Harrison fish are known to have quite different juvenile life history from other FRSS. Their juveniles go to sea as fry instead of one year later as smolts, and they appear to migrate out through the Strait of Juan de Fuca rather than Johnstone Strait.¹¹⁰
- g. Most FRSS stocks had very poor returns/spawner in 2009, but Columbia River sockeye had double their average returns in 2009.¹¹¹
- h. Historical data on survival rates of FRSS stocks by life stage show that declines in total life-cycle productivity from spawners to adult recruits have usually been

¹⁰⁵ Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010, prepared for Pacific Salmon Commission), p. 32

¹⁰⁶ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 2

¹⁰⁷ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 2; Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 2

¹⁰⁸ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 2

¹⁰⁹ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 2

¹¹⁰ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 48

¹¹¹ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 32, citing Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011)

associated with declines in juvenile to adult survival but not with the freshwater stage of spawner to juvenile productivity. Specifically for the nine FRSS stocks with data on juvenile abundance (fry or seaward migrating smolts) only Gates sockeye have showed declines in juvenile productivity (i.e., from spawners to juveniles) but seven of the nine stocks (excluding Late Shuswap and Cultus) showed consistent reductions in post juvenile productivity (i.e., from juveniles to returning adult recruits) over those years with declining productivity from spawners to recruits.¹¹²

- i. There have been three separate phases of declines in productivity in FRSS since 1950. The first started in the 1970s, the second in the mid-1980s, and the most recent one occurred in the late 1990s, with individual stocks showing these trends to various extents.¹¹³
- j. Over the last two decades there has been an increasing amount of ERL and pre-spawn or premature mortality on the spawning grounds of returning adult FRSS.¹¹⁴
- k. ERL and PSM in adult FRSS are significant factors that reduce the number of effective female spawners, and thus pose a threat to the long-term viability of the populations that are particularly affected.¹¹⁵
- l. Generally ERL began to be reported in 1992 for Early Stuart, Early summer, and Summer runs, but not until 1996 for Late runs. Relative to total catch and spawning ground escapement, levels of ERL have been increasing.¹¹⁶
- m. The earlier runs (e.g. Early Stuart, Scotch, Seymour, Fennell, Gates and Nadina) and the later runs (Harrison, Portage and Weaver) have the most years with high ERL. Summer runs (e.g. Quesnel and Chilko) have experienced few if any years

¹¹² Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 2; Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 5 pdf

¹¹³ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 2

¹¹⁴ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 3

¹¹⁵ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 6

¹¹⁶ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 4

with large (greater than 50 percent) ERL. There is good evidence that the among-stock patterns in ERL are indicative of stock specific abilities to cope with warming rivers and high river temperatures.¹¹⁷

- n. Run timing appears to be relevant to ERL. According to Technical Report #9, the body of evidence indicates that ERL is stock specific with Summer runs having the greatest thermal tolerance, relative to earlier and later runs, supporting the among stock patterns in ERL. Research to date emphasizes that stock-specific responses to temperature and climate warming need to be considered in fisheries management and conservation strategies.¹¹⁸
- o. PSM of FRSS is highly variable among stocks, run-timing groups and years.¹¹⁹
- p. Spawning abundance has declined in Early Stuarts and several Late run stocks during a time period when ERL has become a significant component of the total fate of adult migrants in those groups of fish.¹²⁰
- q. Spawning abundance has not declined dramatically in most stocks partly because of reductions in harvest associated with MA made to compensate for ERL.¹²¹
- r. Many FRSS are strongly cyclical (e.g. Late Shuswap, Quesnel, Scotch) whereas others are less so. Once mobile, each salmon has a reoccurring choice – eat or hide. Sockeye stocks (and sub-populations within each stock) have developed

¹¹⁷ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), pp. 4-5

¹¹⁸ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 5; Exhibit 1855 (Effects of river temperature: Climate warming on stock-specific survival of adult migrating Fraser River sockeye salmon, 2010), p. 99

¹¹⁹ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 5

¹²⁰ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 6

¹²¹ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 6

complicated and varying life histories that include moving between ranges of habitats varying in the risks they represent.¹²²

- s. While the literature offers some support that both simple and delayed density dependence occur for FRSS, studies have so far failed to show conclusively that either form of density dependence has had a substantial influence on FRSS dynamics.¹²³
 - t. Although there is evidence of both simple and delayed density dependence for many FRSS stocks, results to date do not support the general hypothesis that efforts to rebuild Fraser populations in recent years may have resulted in “over-spawning”, thereby causing substantial declines in productivity for these stocks. The only exception to this generalization is the Quesnel stock, which shows evidence of both delayed density dependence and patterns of spawner and recruit abundance that are consistent with the hypothesis that recent declines in productivity are attributable mostly to increased spawner abundance.¹²⁴
78. Over the four to five years of their life cycle, FRSS encounter largely unmonitored variations in physical and chemical conditions, food, competitors, predators, and disease over several thousand kilometres from the upper reaches of the Fraser River to the Gulf of Alaska, with cumulative and interactive effects (most unknown), occurring over multiple life history stages in ways that vary from year to year. Gaps exist not only in data (limited time series and spatial coverage for many factors), but also in fundamental understanding of various conditions and their relation to salmon populations.¹²⁵
79. Ecological systems are dynamic, and constantly change across space and time. They are composed of complex sets of components that interact to generate responses to concurrently operating disturbances arising from both natural processes (e.g., ocean conditions) and human activities (e.g., fish farming). Because of such simultaneously occurring natural and human processes, it can be very difficult to attribute single dominant causes to observed ecological changes. Therefore, while it is important to investigate each potential cause individually, it is important to be aware that it might

¹²² Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 14

¹²³ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 13

¹²⁴ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 45

¹²⁵ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 13

have been the interaction of several factors, rather than one factor *per se*, that caused the changes.¹²⁶

80. Stressors which may be unlikely primary causes of productivity declines may combine with other factors to create sufficient cumulative stress to kill salmon (i.e., through additive or greater than additive (synergistic) interactions) in some stocks in some years.¹²⁷
81. The coastal migration phase of FRSS' life history provides a good example of multiple stressors interacting to cause cumulative impacts. There is indirect evidence that while ocean temperatures were not high enough to directly kill sockeye smolts in the summer of 2007, these warmer temperatures may have decreased the quantity and quality of available food, and increased other stressors (e.g., metabolic demands during inshore migration, vulnerability to predators, the level of pathogens and harmful algae). The combined effect of all these factors may have caused significant smolt mortality in 2007, while each of the stressors independently would have been insufficient to kill smolts.¹²⁸

V. UNDERSTANDING THE CAUSES OF DECLINE

A. Introduction

82. While many First Nations have been unable to access sufficient fish to meet their food, social, and ceremonial requirements for many years,¹²⁹ finally in 2009, when the decline of FRSS led to the closure of the commercial marine mixed stock fishery for the third consecutive year, despite favourable pre-season estimates, this Inquiry was struck to better understand the causes of decline.
83. The topics for scientific investigation and inquiry into both the poor 2009 returns and the long-term decline appear to have been informed, in part, by a December 3, 2009 Memo for the Minister entitled *Factors Affecting the 2009 Fraser Sockeye Return*, which was

¹²⁶ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), pp. 13-14

¹²⁷ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 88

¹²⁸ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 88, citing Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011) and Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011).

¹²⁹ See paragraphs 19 and 20, above.

prepared by DFO Science staff (the “2009 Memo to the Minister”).¹³⁰ In the 2009 Memo to the Minister, DFO considered and categorized factors that: (1) were unlikely to have contributed to the poor 2009; (2) may have contributed to mortality of FRSS but not at a magnitude sufficient to explain the poor 2009 return; (3) that could possibly have led to FRSS mortality on the scale seen in 2009.¹³¹

84. Pollution in the Fraser River, capture by Canadian fisheries, predation in the SOG, and low food abundance in the SOG were all considered unlikely to have contributed to the cause of the decline. Predation by Humboldt Squid, capture by US fisheries in the Gulf of Alaska and Bering Sea, mortality from sea lice from fish farms in Discovery Passage were considered to lead to FRSS mortality but not in enough magnitude to explain the decline. Toxic algal blooms in the SOG and low food abundance in Queen Charlotte Sound in the spring of 2007 and viral disease were considered to be possible factors of the 2009 decline.
85. Further work in identifying potential causes of decline of FRSS was done at the June 15-17, 2010 PSC workshop.¹³² The purpose of the workshop was to “evaluate evidence for and against possible causes of these declines. The workshop was viewed as a first step toward evaluating and synthesizing evidence on alternative explanations for the Fraser sockeye situation.”¹³³ Hypotheses considered at the workshop included those outlined in the 2009 Memo to the Minister. As part of the workshop, an expert advisory panel of 11 experienced researchers from Washington and British Columbia was convened and 25 other experts were invited to attend the workshop “to present research and to critically evaluate data and hypotheses about causes of the decline.”¹³⁴
86. At the close of the workshop, the expert panel grouped the possible explanations for the cause of both the 2009 poor return and the longer term decline into nine categories including: (1) Predation by marine mammals and/or unreported fishing in the ocean; (2)

¹³⁰ Exhibit 616A (Memo for the Minister (Information Only) re: Factors Affecting the 2009 Fraser Sockeye Return, December 3, 2009), p. 3

¹³¹ Exhibit 616A (Memo for the Minister (Information Only) re: Factors Affecting the 2009 Fraser Sockeye Return, December 3, 2009), p. 3

¹³² Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010, prepared for Pacific Salmon Commission), p. 3

¹³³ Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010, prepared for Pacific Salmon Commission), p. 3

¹³⁴ Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010, prepared for Pacific Salmon Commission), p. 3

Marine and freshwater pathogens, including parasites, bacteria and/or viruses; (3) Oceanographic conditions (physical and biological) inside and/or outside SOG; (4) HABs in the SOG and/or northern Puget Sound/Strait of Juan de Fuca; (5) Contaminants in the Fraser River and/or SOG; (6) Freshwater habitat conditions in the Fraser watershed; (7) Delayed density-dependent mortality; (8) ERL during upstream migration, plus its effects on fitness of the next generation; (9) Competitive interactions with wild and hatchery pink salmon.¹³⁵

87. Twelve scientific projects were undertaken for the Inquiry, many of which reflected the hypotheses outlined in the 2009 Memo to the Minister, as well as the work done at the PSC workshop. The result of these projects were the production of 12 Technical Reports, including: Technical Report #1: *Diseases and Parasites*; Technical Report #2: *Effects of Contaminants on Fraser River Sockeye Salmon*; Technical Report #3: *Fraser River Freshwater Ecology and Status of Sockeye Conservation Units*; Technical Report #4: *Marine Ecology*; Technical Report #5: *Impacts of Salmon Farms on Fraser River Sockeye Salmon*; Technical Report #6: *Data Synthesis and Cumulative Impact Analysis*; Technical Report #7: *Fraser River Sockeye Fisheries Harvesting and Fisheries Management*; Technical Report #8: *Effects of Predators on Fraser River Sockeye Salmon*; Technical Report #9: *Effects of Climate Change on Fraser River Sockeye Salmon*; Technical Report #10: *Fraser River Sockeye Production Dynamics*; Technical Report #11: *Fraser River Sockeye Salmon – Status of DFO Science and Management*; Technical Report #12: *Sockeye Habitat Analysis in the Lower Fraser River and the Strait of Georgia*.

B. Determining the Causes of Decline: The Problem of Limited Data

88. One of the recurring themes heard throughout the Inquiry, from both scientists and managers, was the challenge resulting from limited or no data. Scientists testified that they often struggle to reach conclusions regarding wild salmon when there are such data limitations. The many distinctions between correlations and causation resound throughout much of the testimony.

¹³⁵ Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010, prepared for Pacific Salmon Commission), p. 4

89. Scientists testified about data limitations with respect to different FRSS life stages. For example, Dr. Timothy Parsons testified that there was very little data on the time period that juvenile FRSS spend in the ocean:

So it's that ocean juvenile stage, Gulf of Alaska, which I think is the one in which we don't really have very much data... it's expensive to go out and study salmon once they're widely distributed. It can be done much easier in a place like the Strait of Georgia. But once they get out into the ocean, there are no studies, basically, on this [referring to trophodynamics of sockeye in the open ocean].¹³⁶

90. Dr. Scott Hinch testified about a lack of data with respect to the juvenile life stage and a the lack of understanding around contaminants. He testified:

...there are issues we still don't understand about chemicals and contaminants and pollution, and it's true, we don't understand it. What the role in the greater scheme of things for sockeye is perhaps yet to be determined... We don't know anything... about the juvenile life stage in terms of how long they're spending in freshwater, where they're spending it as they're migrating out, who they're interacting with.¹³⁷

91. Data limitations also impaired the ability of scientific experts to draw strong conclusions about whether certain factors were a cause of the 2009 decline or causative of the longer term decline of FRSS. For example, Sandy McFarlane from DFO science, in his assessment of Technical Report #8, concluded that other marine fish probably were not a major factor in the 2009 reduced returns of FRSS. However, he testified that: "much of this is based on limited data on many of these species and that, in general, it would be nice to be able to look a little more closely at some of the species, as they (the Technical Report #8 authors) suggest."¹³⁸

92. Dr. Robie MacDonald testified that conclusions reached in Technical Report #2 with respect to contaminants and their impacts on FRSS were only correlations of evidence, due to data limitations. He stated:

... we need to collect the correct type of data so that we can evaluate those hypotheses, and then we can look at the data very carefully. But, you know, keeping in mind that one of the things

¹³⁶ Transcript, July 8, 2011, p. 89 (Dr. Timothy Parsons)

¹³⁷ Transcript, March 9, 2011, pp. 26-27 (Dr. Scott Hinch)

¹³⁸ Transcript, May 5, 2011, pp. 32-33 (Jeremy Hume)

that I think I tried to be as clear as I can about is that there are very serious data limitations associated with the work that we've done here in terms of trying to link exposure to contaminants to effects on sockeye salmon. So I don't disagree that there is a need to examine data in more detail, but I would argue strongly that before we do that, there is a need to make sure that we have the right data in front of us to be able to do those kinds of analyses.¹³⁹

93. Dr. McKinnell spoke not only about lack of data, but also about how data was being collected and managed and shared among researchers. He testified:

... one is an issue that I think was shared by a number of researchers who were attempting to create the Commission's technical reports. And that has to do with the data collection management and delivery of information that the Department of Fisheries collects. It was very difficult to get some datasets, particularly those datasets that relate to salmon biological data. The oceanographic data appeared to be well managed and easy to get at. But there were challenges for all of us, I think, in how the Department delivers the salmon biological data that it collects... But certainly there isn't an up-to date assessment of abundance and histories that are served on the DFO website that are available to researchers outside of the Department anyway.¹⁴⁰

94. In some cases, data limitations meant that it was difficult to determine where further research should be done to determine causes of decline. For instance, during the hearings on the Effects in the Marine Environment, Dr. Dick Beamish had data that pointed to anomalous ocean conditions in the SOG that could have been responsible for the 2009 decline. Dr. Stewart McKinnell had data that pointed to anomalous conditions in the area north of the SOG. Dr. David Welch discussed the disagreement in terms of a data issue, testifying:

The broader issue that I take issue with is not Dr. Beamish's excellent data, but the inference that we know that the survival problem, with very high likelihood, happened in the Strait of Georgia. The reason that's a policy issue, **that if you make that decision and conclude that it happened, then you would focus all of your work in the Strait of Georgia to better understand those issues in the future. That's not reasonable given the data. In fact, over the last year or so, you've seen a backing off from that position that was summarized in the PSC report from June of 2010 which characterized the Strait of Georgia as being the primary location. We now see Dr.**

¹³⁹ Transcript, May 9, 2011, p. 94 (Dr. Robie MacDonald)

¹⁴⁰ Transcript, July 7, 2011, pp. 27-28 (Dr. Stewart McKinnell)

McKinnell's report showing the same types of anomalous conditions, or highly anomalous conditions happening to the area to the north. So we now have a situation where I don't think it's appropriate to conclude that we can say where the survival problem happens. We know a lot of things went – "wrong" is the wrong – isn't quite the right terminology, but a lot of things were in extreme conditions in 2007. But to infer where the fish died and caused the crisis that we see in 2009 and brought us all here, is not appropriate, in my opinion, to draw from these pieces of data.¹⁴¹

95. The FNC submits that, given some of the data limitations, illustrated in part by the examples above, it is difficult for scientists to conclusively determine the ways in which certain factors have impacted or are impacting fish health, and difficult to say which factors were the cause of the 2009 poor returns or have been causative of the longer term decline of FRSS. However, as Dr. Ross testified, absence of evidence is not evidence of absence. The FNC submits that just because scientific experts could not definitively conclude which factor, or set of factors, caused the 2009 poor returns or longer-term declines in FRSS abundance and productivity, does not eliminate such factors as being important to the current and future sustainability of FRSS populations.

Recommendation: DFO, in collaboration with other governments (the Province and First Nations) and researchers (universities, ENGOs and industry) should create a central salmon database.

Recommendation: DFO should strive to improve the transparency and utility of its research by: (a) utilizing an independent technical panel or working group responsible to governments (Canada, the Province, First Nations) and stakeholders that sets research priorities and develops the questions asked of scientists; (b) developing protocols for new integration of traditional knowledge ("TK") and traditional ecological knowledge ("TEK") with western science, and recognizing that TK and TEK must have a place within management; (c) developing a transparent iterative relationship and accountability between research and managers (DFO and First Nations); (d) improving data quality and consistency within DFO, related provincial agencies, First Nations organizations and third parties (e.g., industry and universities); and (e) improving

¹⁴¹ Transcript, July 7, 2011, pp. 75-76 (Dr. David Welch)

information sharing protocols between DFO and First Nations and between Industry and First Nations.

C. Potential Causes of Decline Arising in the Freshwater Environment

i) General Effects

96. There were a number of scientific projects that relate to potential causes of decline arising in the freshwater environment. Technical Report #3: *Fraser River Freshwater Ecology and Status of Sockeye Conservation Units*¹⁴² specifically dealt with the freshwater environment. Technical Report #12: *Sockeye Habitat Analysis in the Lower Fraser River and the Strait of Georgia*¹⁴³ focussed on potential causes of decline in the lower Fraser River. Other projects that discussed the freshwater environment, in part, were Technical Report #8: *Effects of Predators on Fraser River Sockeye Salmon*,¹⁴⁴ Technical Report # 9: *Effects of Climate Change on Fraser River Sockeye Salmon*¹⁴⁵ and Technical Report #2: *Effects of Contaminants on Fraser River Sockeye Salmon*.¹⁴⁶ For the purposes of organizing these submissions, impacts arising from climate change, contaminants and predators are dealt with in a separate section.
97. In addition to the five scientific projects that related to the freshwater environment, there were five main Policy and Practice Reports (“PPRs”) that related to activities that might impact upon the freshwater environment, including: PPR 14: *Overview of Freshwater Urbanization Impacts and Management*,¹⁴⁷ PPR 15: *Municipal Wastewater, Pulp and Paper and Mining Effluents*,¹⁴⁸ PPR 16: *Gravel Removal in the Lower Fraser River*,¹⁴⁹

¹⁴² Exhibit 562 (Technical Report #3: Freshwater Ecology & CU Status, February 2011)

¹⁴³ Exhibit: 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011); it also includes exhibits 735-1 (Technical Report #12: Appendix M, Part 1 of 3); 735-2 (Technical Report #12: Appendix M, Part 2 of 3); 735-3 (Technical Report #12: Appendix M, Part 3 of 3); and 735A (Errata Sheet for Cohen Commission Technical Report 12, April 14, 2011)

¹⁴⁴ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011)

¹⁴⁵ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011)

¹⁴⁶ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011)

¹⁴⁷ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011)

¹⁴⁸ PPR 15 (Municipal Wastewater, Pulp and Paper and Mining Effluents, May 24, 2011)

¹⁴⁹ PPR 16 (Gravel Removal in the Lower Fraser River, May 20, 2011)

PPR 17: *Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat*,¹⁵⁰
and PPR 21: *Regulation of Water Uses in the Fraser River Watershed*.¹⁵¹

ii) The Freshwater Environment for FRSS

98. FRSS rely on three classes of freshwater-related habitat: wetted, riparian and upslope habitat. Wetted habitat includes streams, lakes and estuaries. Within streams, there are a large number of micro-habitats with different attributes (e.g., flow, depth, and substrate). Streams provide micro-habitats for FRSS as well as flowing water which is crucial in helping spawning salmon build redds, in keeping redds clear of fine silt, fertilizing eggs, providing oxygen to eggs and larvae in the redds, stabilizing stream beds and moving debris to create hiding habitat.¹⁵²
99. Lakes provide rearing habitat for many CUs of juvenile FRSS. The productivity of nursery lakes depends on a number of factors including, temperature, nutrients, competitors and predators, basin topography and hydrology.¹⁵³
100. Estuaries are the link between the freshwater and marine environment. The lower Fraser River and estuary are primarily used by both adult and juvenile sockeye over periods of days as migratory corridors, with some exceptions. River-type FRSS aged 0+ originating from Harrison Lake use various sloughs and off-channel areas in the lower Fraser River above the tidal area, for rearing for a period of two to six months.¹⁵⁴
101. Riparian areas are regions adjacent to ditches, streams, lakes and wetlands. These areas are often very productive and contain vegetation that both provides and directly influences fish habitat by building and stabilizing stream banks and channels, providing shade, shelter for fish and food (leaves and insects falling into the river).¹⁵⁵
102. Upslope habitat (i.e., the habitat beyond the wetted and riparian areas) are influenced by stream conditions such as hydrology, temperature and types and concentrations of nutrients.¹⁵⁶

¹⁵⁰ PPR 17 (Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat, May 2011)

¹⁵¹ PPR 21 (Regulation of Water Uses in the Fraser River Watershed, August 18, 2011)

¹⁵² PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), pp. 8-9

¹⁵³ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 9

¹⁵⁴ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 9

¹⁵⁵ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 10

¹⁵⁶ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 10

iii) Urbanization

103. Freshwater urbanization encompasses all types of land alienation for residential, commercial and industrial purposes within a watershed that supports FRSS.¹⁵⁷ There are two types of effects to FRSS from freshwater urbanization: (1) the physical loss or alteration of habitat; and (2) changes in water quality.¹⁵⁸
104. The physical loss or alteration of habitat along the Fraser River has historically been due to dyking and dredging of river flood plains for agricultural purposes. More recently, dredging and dyking has been done for flood protection purposes. Physical habitat loss and destruction has also resulted from the urban and industrial development.¹⁵⁹ Over half of the British Columbia population resides within the 2.8% of the province that makes up the Fraser River floodplain.¹⁶⁰ In addition, measures created to protect fish habitat, through stream bank stabilization and the use of rip-rap, have had negative consequences for stream health.¹⁶¹
105. Adverse physical alterations to freshwater habitat can result in increased sedimentation, in-stream gravel displacement, loss of streamside vegetation, channelization and the formation of obstructions. Alteration of fish habitat may also increase water flow and may physically alter the stream bed and riverine areas. The removal or alteration of streamside vegetation can also reduce available cover, shade and food for salmonids and reduce bank stability.¹⁶² In the case of rip-rap, the negative impacts can include a loss of riparian vegetation, nutrients and food sources, reduction in the amount of large woody debris in streams and the reduction of shade.¹⁶³
106. Changes in water quality, as a result of urbanization, can impact FRSS production, since salmonids adapt to particular flow regimes. Urbanization may cause changes to the temperature regime in streams and lakes, which can also affect production and survival. Contaminants in the Fraser watershed may also impact on FRSS by affecting growth, reproduction, behaviour and survival.¹⁶⁴

¹⁵⁷ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 6

¹⁵⁸ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 10

¹⁵⁹ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 10

¹⁶⁰ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 33

¹⁶¹ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 10

¹⁶² PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), pp. 10-11

¹⁶³ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 11

¹⁶⁴ PPR 14 (Freshwater Urbanization Impacts and Management, May 11, 2011), p. 12

107. One significant geographic difference between Bristol Bay and Fraser River Fisheries is that the Fraser River has one main stem, heavily urbanized estuary leading to the marine environment while Bristol Bay has many bays.¹⁶⁵
108. The Technical Report that looked at the impacts from urbanization was Technical Report #12.¹⁶⁶ The lead author of the Report, Dr. Mark Johannes was qualified as an ecosystem biologist with technical specialties in aquatic ecology and environmental assessment.¹⁶⁷
109. The primary objective of Technical Report #12 was to review and summarize potential human development-related impacts over the recent 1990 to 2010 period and to examine potential interactions between human development and activities in the lower Fraser River and SOG and FRSS habitats.
110. The report highlighted that the population of British Columbia has grown to more than 4 million people in 2005, with 3.2 million people living in urban areas concentrated around the lower Fraser River and the SOG. Many of the development activities for housing, industry, infrastructure, transportation, forestry, agriculture and mining have taken place at or near the lower Fraser River and in urban and industrial centres along shorelines around the SOG and thus have the potential to interact with habitats used by FRSS.¹⁶⁸
111. The factors used in Technical Report #12 to examine changes in the level of human activities and or possible outcomes of those activities included: population (size, density), land use (agriculture, forestry), large industrial and infrastructure sites and projects, waste (liquid and solid waste), shipping vessel traffic, lower Fraser River dredging and dyking, and the SOG biological and physical water characteristics including non indigenous (invasive) species and human derived contaminants. The approach and methods used to identify and define interactions, and analyse their

¹⁶⁵ Exhibit 718 (Technical Report #7: Fraser River Sockeye Fisheries and Fisheries Management and Comparison with Bristol Bay Sockeye Fisheries, February 2011), p. 129

¹⁶⁶ Exhibit: 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011); it also includes exhibits 735-1 (Technical Report #12: Appendix M, Part 1 of 3); 735-2 (Technical Report #12: Appendix M, Part 2 of 3); 735-3 (Technical Report #12: Appendix M, Part 3 of 3); and 735A (Errata Sheet for Cohen Commission Technical Report 12, April 14, 2011)

¹⁶⁷ Transcript, April 18, 2011, p. 16 (Patrick McGowan)

¹⁶⁸ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 1

potential extent or overlap between human activity and sockeye habitats, reflects a process used in environmental impact assessments.¹⁶⁹

112. The method used in the report was to look at FRSS distribution and their use of various habitats, based on available information. Making determinations involved compiling available data from various technical reports, primary literature and online sources of potential factors or measures related to human development and activities in the lower Fraser and SOG. Then, an environmental impact assessment process was used to identify and define interactions between human activity and FRSS habitats and analyse the potential extent of the interactions. Under this approach, potential interactions were defined as: (a) likely interaction, (b) limited interaction, and (c) no interaction. An ordinal rank was then applied to classify the level of interaction between factors used to express changes in human activities and the potential for loss or degradation of key FRSS habitats in the lower Fraser River and SOG. The level of significance of the potential interaction was evaluated and assigned based on criteria adopted from definitions provided in the Canadian Environmental Assessment Agency's reference guide.¹⁷⁰

113. In his testimony, Dr. Johannes testified as to his approach:

...there hasn't been an extensive project or program that looked at sockeye distribution habitat use in a continuous basis. So there's yearly annual surveys methodologies, even some that were Carl Haegele and Doug Hay's work on herring which captured sockeye throughout the Strait. Those found sockeye in some places and not in others. So all we could do, together with some of the modelling results by Cees Groot and Randall Peterman and others, was compile a slow, careful evidence of what existed in terms of information, and what we believed was the assembled information that allowed us to say what we said.¹⁷¹

114. He went on to say that they then gave a ranking to each human activity for each of the six sub areas. Each of the six sub areas was assigned a ranking of either "Nil," "Low," "Moderate" or "High." Based on these rankings, an opinion was expressed as to the likelihood that each of the human activities was linked to sockeye salmon decline.¹⁷²

¹⁶⁹ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), pp. 1-2

¹⁷⁰ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 12

¹⁷¹ Transcript, April 18, 2011, pp. 24-25 (Dr. Mark Johannes)

¹⁷² Transcript, April 18, 2011, p. 28 (Dr. Mark Johannes)

115. A statistical analysis relating to human activity and potential impacts on FRSS habitats and, in turn, on productivity was not possible in this review due to limited data for human activity, and in particular, the lack of quantitative information on FRSS habitats.¹⁷³
116. One of the challenges in making an adequate assessment of the impact on habitat from various forms of development was that information on habitat gains and losses was only available from habitat authorization files held by DFO and FREMP as a result of regulatory reviews of projects. These data are therefore skewed to the representation of data on habitat gains and losses as encountered during the regulatory project review process. A comprehensive inventory of FRSS habitat, independent of data maintained as the result of specific project reviews, is not available and thus the status of total FRSS habitat gains and losses in the lower Fraser River and SOG could not be quantified.¹⁷⁴
117. Despite the many limitations with this data, the conclusion of Technical Report #12 was that habitat restoration efforts as part of the development of major projects have resulted in a net gain of fish habitat during the period 1990 – 2010, which is the same period as FRSS are declining.¹⁷⁵ However, during his testimony, Dr. Johannes admitted that the conclusion or assumption that there have been net habitat gains in the Lower Fraser from 1990 to 2010 is based on the limited literature.¹⁷⁶ He also admitted that he did not consider the productive capacity of the habitat gains that were made from compensation projects, since the “no net loss policy” only deals with square footage and not productive capacity.¹⁷⁷ Nor did the report assess the level effectiveness of habitat restoration projects, other than three projects which had confirmed to have sockeye present.¹⁷⁸ Dr. Johannes agreed with the proposition that with respect to compensation projects and restoration projects, as different types of habitats that have been created and functioned, he was talking largely about area replaced as opposed to productive capacity replacement.

¹⁷³ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 12; Transcript, April 18, 2011, p. 29 (Dr. Mark Johannes)

¹⁷⁴ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 57

¹⁷⁵ Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), pp. 58-59

¹⁷⁶ Transcript, April 18, 2011, p. 34 (Dr. Mark Johannes); Exhibit 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 53

¹⁷⁷ Transcript, April 18, 2011, p. 43 (Dr. Mark Johannes)

¹⁷⁸ Transcript, April 18, 2011, p. 43 (Dr. Mark Johannes); the three projects with salmon confirmed using them include the Upper Pitt River, Alvin Patterson Channel and in Big Silver side channel projects.

118. The FNC submits that Dr. Johannes' conclusion that there has been "a net gain of fish habitat" must be given no or little weight in light of both the data limitations within which he was working, and, the contrary testimony of Jason Hwang, Rebecca Reid, Michael Crowe, and Patrice LeBlanc.
119. With respect to whether the conclusions in the report could be substantiated, the following was asked by Commission Counsel:

Q: We could just turn back to 58 [of Technical Report #12], the last sentence on page 58, please? Q And you're speaking here about human activities, habitat interactions and sockeye production. Given the qualifications we just went through, or limitations, about the extent of knowledge about productive capacity at page 59 and 60, and given that you've just told the Commissioner you don't have information presently about the effectiveness of this replacement habitat, I'm wondering about this last sentence and whether it's supportable:

More broadly, a hypothesis that the declines in the Fraser River sockeye adult returns (Figure 8) are the result of the development of major projects is not supported by the likely net gains in habitat that have occurred during the review of major projects following implementation of the "no net loss" policy.¹⁷⁹

120. Dr. Johannes answer was as follows:

I think there's enough qualifiers in there to actually support that statement, honestly. And it has to do with, again, major projects, the ones that are under environmental review that characterize how projects are intended to be done. **In terms of the compliance of those habitat compensation issues, I don't necessarily have that information. But that statement is predicated on most of the results that we've dealt with in Table 2 because it says the edge effects of major projects and their development are not normally associated with the areas that sockeye use. So at the population level... across the characteristics of the Fraser sockeye population, more broadly, the hypothesis of the declines of those populations is not supported by the imposed environmental regulatory review of projects and their needs to replace almost two-to-one losses with gains. And so that's an assumption. And then the place and location of those specific projects. And so, you know, that's a largely but it's sockeye-related. And it's for the period of 1990 to 2010.**¹⁸⁰

¹⁷⁹ Transcript, April 18, 2011, p. 46 (Dr. Mark Johannes)

¹⁸⁰ Transcript, April 18, 2011, p. 46 (Dr. Mark Johannes)

121. Dr. Johannes went on to state that many of the rankings provided in Table 4 of the Report were based on macro-level analysis rather than consideration at an individual species. He further testified that the authors of Technical Report #12 were only asked to look at Fraser River juvenile sockeye salmon as a population, at the macro level.¹⁸¹

122. Although Dr. Johannes testified that he could not conclude that habitat loss from development led to the decline between 1990 and 2010, he did agree that all these activities were having an impact. He testified:

... as I said a little bit earlier, death by a thousand sort of knife strokes, incremental indirect diffuse changes from urban development, and the associated practices, undoubtedly have some sort of influence somewhere. Those are unmeasured, but may have implications. So the combination I am unsure of, how that will resolve itself...

123. The FNC submits that, due to the limitations with the method and the data used in Technical Report #12, it is difficult to conclude that urban development caused the 2009 poor returns for FRSS. However, it is very likely that impacts from urban development have played a role in the overall long-term decline of FRSS and will continue to do so in the future. Given the high potential for development activities along the Fraser River to impact FRSS through cumulative effects, there is need for ongoing research, monitoring and protection of habitat. In Technical Report #12, Dr. Johannes did make a number of recommendations regarding how research and monitoring of FRSS habitat should proceed in the future.

124. With respect to biological monitoring of constructed habitats, Technical Report #12 stated that the ability to effectively measure the success or failure of constructed and restored habitats is dependent on monitoring and evaluating habitat projects using consistent and comparable methods. Although there is habitat monitoring being carried out at present, the simple metrics such as the area lost and the area gained do not adequately provide data on the ecological services that have been lost or gained. Such data will have present and future benefits in managing habitat as it will also contribute to habitat science.¹⁸²

¹⁸¹ Transcript, April 18, 2011, pp. 76-77 (Dr. Mark Johannes)

¹⁸² Exhibit: 735 (Technical Report #12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, February 2011), p. 60

125. With respect to biological monitoring of existing habitat, the data on the current status of habitat is needed to determine the quantity and quality of FRSS habitats in the lower Fraser. The report also recommended that the present manner in which physical and biological habitat data are collected reported and stored is not readily available for analysis and use in order to evaluate and manage current and future habitat compensation and restoration projects and their design and implementation. The development of a data management framework for monitoring programs would provide a basis for review and evaluation of habitat projects, but would require some standardization of monitoring approaches.
126. Other witnesses testified as to the impacts of development along the Fraser for FRSS. Dr. Welch agreed that many of the human-induced changes in the Fraser watershed have been, on an evolutionary scale, relatively rapid and that there were potential impacts to habitat from urbanization and forestry.¹⁸³ Development in the Shuswap Lake area, which is a rearing lake for some FRSS, were also identified as having an impact on FRSS. In response, Shuswap Lake, Mara Lake, Little Shuswap Lake and Little River foreshore inventory and mapping was conducted using the SLIPP process, which is an integrated governance planning process designed to respond to development in the Shuswap lakes area.¹⁸⁴ In Exhibit 1019, on pages 39-41 of the document, a number of recommendations were made, including habitat restoration works, identification of core habitat areas; creation of an Environmental Advisory Committee to conduct a development review process, and others.¹⁸⁵
127. Michael Crowe, Area Manager for EMB (formerly OHEB), testified that he supported the recommendations in Exhibit 1019¹⁸⁶ and indicated that DFO was a key player in the development of the document and in the SLIPP. Mr. Crowe also testified that SLIPP would be a very good process to help guide and direct compensatory work for development activities resulting in a HADD in the Shuswap Lake area.¹⁸⁷

¹⁸³ Transcript, October 25, 2010, pp. 85-86 (Dr. David Welch)

¹⁸⁴ Exhibit 1019 (Final Work Draft – Shuswap Watershed Mapping Project: Shuswap Lake, Mara Lake, Little Shuswap Lake and Little River Foreshore Inventory and Mapping, June 2009)

¹⁸⁵ Exhibit 1019 (Final Work Draft – Shuswap Watershed Mapping Project: Shuswap Lake, Mara Lake, Little Shuswap Lake and Little River Foreshore Inventory and Mapping, June 2009), pp. 39-41

¹⁸⁶ Exhibit 1019 (Final Work Draft – Shuswap Watershed Mapping Project: Shuswap Lake, Mara Lake, Little Shuswap Lake and Little River Foreshore Inventory and Mapping, June 2009),

¹⁸⁷ Transcript, June 8, 2011, pp. 86 (Michael Crowe)

128. Mr. Crowe went on to testify as to the importance of involving First Nations in the protection of habitat in the interior. He stated: “for the most part, I would have to say First Nations are a very keen interest in the sustainability of the Shuswap Lake area...”¹⁸⁸ and “because First Nations are so important to the Shuswap Lake area, and there was a desire to integrate them as much as possible. In SLIPP, it would only make sense that we would try to do it in all components.”¹⁸⁹

129. Mr. Crowe went on to discuss some of the challenges for habitat protection in the freshwater environment. In response to a question about whether EBM remains a priority in the region, Mr. Crowe testified:

We have tried to align our monitoring with our primary statutory obligations and responsibilities and that is authorizations under the Fisheries Act, responsibilities under CEAA and Species at Risk Act. Essentially, while we have plans for a monitoring program in the future to address a wide spectrum of development activities, right now we are focusing on confirming that the decisions we are making under our primary statutory obligations are being effective and doing essentially what they're intended to do. So right now most of our monitoring is focused on the issues such as our authorizations.¹⁹⁰

130. A program overview of OHEB interior written by Mr. Crowe in 2007¹⁹¹ outlined a number of challenges for habitat protection in the interior. Some of the listed challenges were: very few stewardship projects going ahead; no support to fisheries management to develop First Nations capacity; and the inability to participate in foreshore planning.

131. In answer to the question of whether the BC Interior Region had the ability to meet objectives under the WSP, given the challenges outlined in the program overview, Mr. Crowe testified:

Essentially, the Habitat Management Program objective is to protect and conserve fish and fish habitat, so essentially we are trying to deliver the key objective of the policy which is the conservation of wild salmon stocks or conservation units. With regards to Wild Salmon Policy processes, the habitat component is really dependent on having, under Strategy 2, a very good

¹⁸⁸ Transcript, June 8, 2011, p. 88 (Michael Crowe)

¹⁸⁹ Transcript, June 8, 2011, p. 91 (Michael Crowe)

¹⁹⁰ Transcript, June 8, 2011, pp. 91-92 (Michael Crowe)

¹⁹¹ Exhibit 1003 (DFO, BCI Mid-Fraser/Thompson/Okanagan Habitat Management Section Program Review, January 2007), p. 9

inventory of habitat values based on assessment studies and understanding of indicators and overall habitat condition. We essentially don't have a lot of that basic information. So while we're working towards the spirit and intent of WSP, I would say we're not doing it directly within the manner that WSP envisions or intends.¹⁹²

132. The FNC submits that in order to ensure ongoing habitat protection, increased monitoring and data collection and the creation of an inventory of habitat values under WSP Strategy 2 are necessary, as is ensuring that habitat restoration and compensation projects continue with proper oversight and assessment. It is critical that First Nations are involved in data collection, the identification of habitat values, and in habitat monitoring and restoration work given their expertise, TEK, knowledge, and the potential impact that habitat destruction has for their traditional territories and on FRSS.

Recommendation: DFO should prioritize the collection of essential baseline information on habitat values, pressures, and forecasts along the entire migratory route of FRSS. This work should be coordinated with the requirements of Strategy 2 of the WSP and must actively engage First Nations.

Recommendation: DFO and First Nations should develop an inventory (with the assistance of the Province, ENGOs and stakeholders interested in conservation) of habitat values for FRSS under the WSP, including ecosystem values for monitoring the status of freshwater and marine environments. This inventory should be made available to those conducting research and stewardship activities.

Recommendation: DFO should provide both clearer policy guidance and enabling measures to protect and preserve FRSS habitat, including measures to properly assess habitat loss and gain according to ecological benefits, not simply habitat size.

¹⁹² Transcript, June 8, 2011, p. 92 (Michael Crowe)

iv) Logging & Forestry

133. As noted in the Technical Report #3, scientific literature exists linking forestry practices to a variety of possible impacts on stream habitat.¹⁹³ In PPR 17, four potential impacts on FRSS habitat as a result of forestry and logging were discussed, including:
- a. Large Woody Debris (“LWD”): LWD is the natural and human-placed logs, branches, or other wood, including uprooted or fallen trees, along the foreshore or riverbed of a stream. For fish-bearing streams, LWD is important for the overall creation of fish habitat. It maintains stream channel morphology, and provides storage of sediment and organic matter. In addition, LWD plays an important role in forming salmonid rearing pool habitats. These pools provide a variety of biological benefits for salmonid feeding, growth, predator avoidance, and habitat partitioning within and between species. The presence and amount of these pools is directly related to the amount and distribution of LWD. The removal of sources of LWD through forestry practices can negatively impact on stream morphology by reducing sediment storage capacity and eliminating local hydraulic variability.¹⁹⁴
 - b. Sedimentation: Many forestry practices, particularly road construction and steep slope logging, create soil disturbance which has the potential to significantly increase the rate of sediment input into streams. There are both short-term effects (turbidity increases) and long-term effects (changes to stream channel configuration) associated with increased sedimentation, all of which can be damaging to fish habitat and fish production.¹⁹⁵
 - c. Fish-Stream Crossing Structures: The installation of crossing structures may potentially cause sediment loading into streams, create alterations in channel morphology, result in direct losses to fish habitat by way of channel, benthic and riparian loss, and impede fish passage. Adult and young fish need to be able to move freely throughout a stream system in order to find suitable habitat, and to migrate. Crossings can impede fish passage by creating outlet drops too high for

¹⁹³ PPR 17 (Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat, May 20, 2011), p. 5

¹⁹⁴ PPR 17 (Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat, May 20, 2011), p. 6

¹⁹⁵ PPR 17 (Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat, May 20, 2011), pp. 6-7

fish to navigate, “plunge” pool conditions, turbulence within the culvert, ice and debris blockage, and a lack of resting pools.¹⁹⁶

- d. Mountain Pine Beetle (“MPB”): Over 60 percent of the Fraser River watershed is affected by the MPB epidemic. In an attempt to salvage the trees killed by MPB, the provincial government significantly increased the allowable annual cut by 50 percent. MPB salvage logging results in loss of the forest canopy, potentially affecting water yield (the total amount of water flowing out of a watershed), low and peak flows, and flood timing.

134. On June 17, 2011 Dr. Tschaplinski also identified the main forestry-related impacts on FRSS habitat. He testified:

There are a number of potential impacts and those impacts could be around changes to watershed hydrology, based on amount of forest harvested, the rate of harvest. The hydrology changes could influence stream flow, stream processes, channel form, erosional processes, and that translates to certain elements of fish habitat. Other ways forestry potentially could affect streams and fish, or aquatic environments and fish, is through streamside management practices, and how the streamside environment might change with different practices applied, and there could be impacts on a number of different levels, water temperature, nutrient provision to the streams, provision of wood floor channel structure, bank and stream microclimate, sub forest microclimate, and so forth. Those are some of the main issues.¹⁹⁷

135. Dr. Tschaplinski, who was a Research Scientist, Fish Habitat Biology for the Fish-Forestry Interactions and Watershed Research Program of the BC Ministry of Forests and is currently a Research Scientist with the Aquatic Ecosystems Conservation Science Program at the BC Ministry of Environment,¹⁹⁸ also outlined the type of impacts each of these factors might have for FRSS. He testified that sediment can affect benthic invertebrate production, food organisms for fish and excess sediment is known to decrease their abundance. Sediment can also directly affect the survival of fish, egg survival, juvenile habitat in the stream.¹⁹⁹

¹⁹⁶ PPR 17 (Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat, May 20, 2011), p. 7

¹⁹⁷ Transcript, June 17, 2011, p. 6 (Dr. Peter Tschaplinski)

¹⁹⁸ Transcript, June 17, 2011, p. 3 (Dr. Peter Tschaplinski)

¹⁹⁹ Transcript, June 17, 2011, p. 7 (Dr. Peter Tschaplinski)

136. Dr. Tschaplinski testified that streamside practices that remove vegetation can alter the proper functioning of the channel, altering important aspects of river habitat including shade, water temperature, nutrient organic material input to the channel. He further testified that removal of vegetation changes dynamics of the channel, erosional processes, sediment storage and release.²⁰⁰
137. Dr. Tschaplinski also testified that stream banks and channels that are unaffected by human development are able to withstand peak flood events without radically changing their form or experiencing radical rates of erosion. Under forest practices, the goal is not to accelerate the rates of natural change in stream banks so that the bank becomes unstable or collapses. He testified:
- When the channel banks go, the debris goes. When the debris goes, the stream becomes a more simpler environment. The alternating sequence in many low gradient streams, important for salmon, deep pools, slow moving water, faster riffle areas in between them. These features which add diversity for the channel and fish habitat, tend to become lost. The diversity declines. The habitat quality decreases, and the capacity of the stream to support fish decreases. So stable banks are important for maintaining those structures, characteristics and functions.²⁰¹
138. Dr. Tschaplinski also testified how water flow could be altered through forestry practices. He stated that it is important to look at the amount and extent of area that has been harvested in a watershed area.²⁰² He testified that area and amount harvested alone can serve to, in some cases, increase the levels of runoff because of the amount of forest foliage is no longer present to intercept precipitation. In this case, the amount of water in the drainage basin of a watershed increases overtime, which can then alter flow timing, create faster runoff, create peak flows after storm events, which then in turn can alter the stream channel and impact fish habitat.²⁰³
139. Dr. Tschaplinski testified that the issue of increased water temperature was largely a matter of riparian vegetation removal, which resulted in an increasing of the amount of sun falling on the channel and directly heating the water.²⁰⁴

²⁰⁰ Transcript, June 17, 2011, p. 7 (Dr. Peter Tschaplinski)

²⁰¹ Transcript, June 17, 2011, p. 8 (Dr. Peter Tschaplinski)

²⁰² Transcript, June 17, 2011, pp. 8 (Dr. Peter Tschaplinski)

²⁰³ Transcript, June 17, 2011, p. 8 (Dr. Peter Tschaplinski)

²⁰⁴ Transcript, June 17, 2011, p. 9 (Dr. Peter Tschaplinski)

140. Dr. Tschaplinski testified that the MPB epidemic is an enormous and unprecedented phenomenon in British Columbia. It is estimated that total area affected by MPB covers 17.5 million hectares, with the great majority of the area affected being in the Fraser River drainage. Issues for FRSS resulting from the MPB epidemic include impacts to spawning, rearing and migration habitats. Potential impacts from high rates of salvage harvest in a watershed are high levels of forest removal, increased water table levels because of alteration to watershed hydrology, less interception of precipitation, faster runoff. In the Interior, impacts could include faster and earlier snowmelt in the spring, also contributing to high levels and rapid runoff, which could have high energy erosional implications for both spawning and rearing habitats.²⁰⁵
141. Dr. Tschaplinsky's testimony was that the MPB epidemic peaked approximately in 2005, although it is still ongoing. He stated that there has been work in the field to look at some of the potential effects or actual effects, including Forest and Range Evaluation Program assessments. The information from field seasons between 2005 and 2008 indicated that:

... a substantial number or proportion of the impacts we have seen can be attributed to the infestation alone, and the infestation augmented by fires that can be more frequent and more severe as one of the consequences of the mountain pine beetle infestation. Dead, drying forests, dead foliage, there's the potential that fires started by any mechanism can occur. They can be more frequent, and the consequences for stream channels may be increased water temperatures, changes in the dynamics of material delivery. There could be issues of terrain stability, and landslide frequency increase.²⁰⁶

142. Dr. Tschaplinski went on to testify that:

Our assessments in the field show that [riparian loss] hasn't occurred to date. For the most part, licensees who have been salvaging wood have maintained riparian management areas, as per Forest Practices Code or Forest Range Practices Act standard. One of the reasons may be that in most riparian areas pine is not a leading species, spruce is, and other species. So the opportunities for salvage are more complicated. For the most part we see that riparian areas

²⁰⁵ Transcript, June 17, 2011, p. 10 (Dr. Peter Tschaplinski)

²⁰⁶ Transcript, June 17, 2011, pp. 10-11 (Dr. Peter Tschaplinski)

have not been clear-cut any more than they normally are through normal practices.²⁰⁷

143. Technical Report #3 also concluded that the effects of MPB on FRSS were expected to be relatively small, although that Report was primarily focussed on whether certain impacts arising from the freshwater environment, including MPB, could have led to the 2009 decline and not longer term decline.²⁰⁸ However, Dr. Tschaplinski testified that further research was required to fully understand the impacts to fish habitat from MPB associated logging. He stated:

... the province had considered where the major data gaps, information gaps would be on the Mountain Pine Beetle front, and the three general areas, there are a number of things that relate to hydrology, stream channel form, the geomorphology and the fish habitat. And overarching the changes in the forest that impact the hydrologic cycle, the implication for water tables, peak flows, flow timing, channel stability, channel form, and all the implications for fish habitat. More research, I think, a process-based research and perhaps an optic research looking at watersheds at different levels of infestation and physical and biological response would be important to carry on with.²⁰⁹

144. Dr. Tschaplinski was asked to comment on the importance of research about forest practices as it relates to the Inquiry's concern about the 20-year decline of FRSS. He was referred to his research report from December 2010, titled *State of Stream Channels, Fish Habitats and their Adjacent Riparian Areas* (the "FREP report"),²¹⁰ and testified as follows:

... the Commission is concerned with the inter-annual variation in sockeye numbers over the past 20 years. And during this period of record, as far as forest practices are concerned, page 7 of the item listed shows the difference in performance under the Forest Practice Code, 1999 and afterwards, compared to prior... And by stream class, there have been enormous improvements in outcomes of streams in the riparian areas that were the consequence of implementing the Code in 1995. The Forest Practices Board concluded this in their early audit of Code performance in the late 1990s, and we confirmed it with a very large sample of streams recently.... And perhaps more importantly,

²⁰⁷ Transcript, June 17, 2011, p. 11 (Dr. Peter Tschaplinski)

²⁰⁸ Exhibit 562 (Technical Report #3: Evaluating the Status of Fraser River Sockeye Salmon and Role of Freshwater Ecology in their Decline, February 2011) at 111

²⁰⁹ Transcript, June 17, 2011, p. 57 (Dr. Peter Tschaplinski)

²¹⁰ Exhibit 1107 (Tschaplinski, Technical Report #27: State of Stream Channels, Fish Habitats and their Adjacent Riparian Areas, December 2010) [FREP]

the large fish-bearing streams, classes S2s and S3s, now, these are streams that are prime sockeye habitat. In the 1980s, 41 percent of the S3s and 20 percent of the S2s were in bad shape. Since the Code, overall, we've had an enormous improvement in outcomes, say, by a factor of 10 overall, sometimes more. For the S2s, we've got, basically, one percent of streams that are essentially problematic. Five percent of S3s and S5s. So the performance that has resulted from the implementation of the Code is marked, the increase in performance vis-à-vis streams of all classes. And I think, you know, this – during the period of record, when sockeye have shown a general pattern of decline and otherwise have varied significantly among years, practices on the ground, on the land base as far as forestry are concerned, have shown a steady, if not marked improvement.²¹¹

145. Based on this evidence from Dr. Tschaplinski, there appears to have been an improvement in forest practices, particularly with respect to practices that impact upon streams and riparian areas, due in large measure to the stringent requirements of the *Forest Practices Code*.²¹² However, the Forest Practices Code has now been replaced with the *Forest Range and Practices Act* (“FRPA”).²¹³ Although the streams, riparian areas and watersheds managed under the FRPA are currently being assessed, Dr. Tschaplinski testified:

... the management standards and practices under the Code have been largely migrated to the FRPA. Licensees can also do something alternate to these standards if so approved in a Forest Stewardship Plan. But by and large the stream classification system, the system of riparian management areas, no-harvest reserves and management zones remain the same.²¹⁴

146. Mr. Peter Delaney, a former senior program advisor at the DFO,²¹⁵ testified that if you extrapolate surveys to a larger area than just the field sites, one could argue that riparian buffer areas have been reasonably protected. However, Mr. Delaney also testified that more research would be required to go that next step of knowing whether the improvements in protection of riparian buffer zones has or has not translated into an impact to FRSS.²¹⁶

²¹¹ Transcript, June 17, 2011, pp. 50-51 (Dr. Peter Tschaplinski)

²¹² *Forest Practices Code of B.C. Act*, R.S.B.C. 1996, c. 159

²¹³ *Forest and Range Practices Act*, S.B.C. 2002, c. 69

²¹⁴ Transcript, June 17, 2011, p. 14 (Dr. Peter Tschaplinski)

²¹⁵ In this role, Mr. Delaney coordinated the interaction of provincial agencies, industry and regional DFO Habitat staff in relation to fish-forestry files; Transcript, June 17, 2011, p. 5

²¹⁶ Referring to Exhibit 1003 (DFO, BCI Mid-Fraser/Thompson/Okanagan Habitat Management Section Program Review, January, 2007); Transcript, June 17, 2011, pp. 81-82 (Peter Delaney)

147. **Finally, Mr. Delaney testified that DFO has no active research underway on fish-forestry interactions and that research funds have dried up.**²¹⁷
148. Given the evidence of Dr. Tschaplinski and Mr. Delaney, and the conclusions in Technical Report #3 regarding the impact of the MPB epidemic, the FNC submits that it is unlikely that forestry and logging were the primary causes of the 2009 poor returns. However, further research is required in order to determine the impact of forestry and logging on fish habitat and fish health on the long term declines or the future productivity of FRSS, particularly in light of the MPB salvage logging.
149. More importantly, however, mechanisms for the ongoing protection of fish habitat as it relates to impact from forestry and logging need to be implemented and pursued. Although there have been improvements to forest practices, Mr. Delaney explained that recently, with the enactment of the FRPA, DFO field staff have been less engaged in reviewing forestry activities and less involved in research and monitoring.²¹⁸ The reasons for the limited engagement is tied, on the provincial level, to FRPA, and, on the federal level, to the Environmental Process Modernization Plan (“EPMP”).²¹⁹ Mr. Delaney testified:
- ... the FRPA operates differently, it's results based, professional reliance and there is much more reliance upon the industry to undertake their role out there in forest harvesting. So there's not as much information coming to DFO to review referrals as there was in the past. The Environmental Process Modernization is one of streamlining our regulatory reviews, risk management, more partnerships, engaging others in the activities that we're undertaking. So both of these, the implementation of FRPA and likewise the implementation of EPMP were coming along at the same time. There have been reduction in staff also during that time period.²²⁰
150. He went on to testify that the change under the FRPA, to a results-based approach, has significantly changed the extent to which DFO receives referrals. He stated that “we're not getting referrals on the – as far as the cutting plans, et cetera, out in the field itself”²²¹

²¹⁷ Transcript, June 17, 2011, p. 59 (Peter Delaney)

²¹⁸ Transcript, June 17, 2011, p. 19 (Peter Delaney)

²¹⁹ The EPMP is discussed in greater detail in the Habitat Management Section below.

²²⁰ Transcript, June 17, 2011, p. 19 (Peter Delaney)

²²¹ Transcript, June 17, 2011, p. 20 (Peter Delaney)

and stream crossing notifications, to be sent to DFO according to the Stream Crossing Guidebook,²²² are not, in many cases, being received by field staff.²²³

151. Mr. Delaney testified that from DFO's perspective, there have been two main issues on the fish-forestry file: (1) riparian standards and (2) fish stream crossing; the FNC agrees. Much of the concern expressed by field staff was anecdotal and based on the Auditor General's review of the habitat program. However, there was not rigorous monitoring or data collection about these impacts.²²⁴ Mr. Delaney went on to say that the FREP Report produced by Dr. Tschaplinski "is moving along in that direction of finally presenting information on whether there is an impact or not."²²⁵

The FREP report did outline a number of recommendations but Mr. Delaney's evidence was: I think it's [the FREP Report] a good direction to be going. It's very useful information. I am unaware – I could be corrected on this – of any structured review within the department [DFO] of that report. Some of the recommendations coming out of it of the ten-metre leave strip and the reserve zone is part of the message that we've been trying to get it implemented. And so if those recommendations are carried forward, one of the other areas that we've been trying to work on is a revamping of the riparian area management guidebook and hopefully, those recommendations would be included in the guidebook at that point so that fish-bearing streams or those leading into fish-bearing streams would have a stronger protection on them.²²⁶

Recommendation: DFO should conduct a structured review of the FREP and should work with the Province to implement and monitor the recommendations outlined on pages 59 and 60 of the FREP Report.

v) Water Use

152. In the hearings on freshwater urbanization, Michael Crowe testified that: "water management issues were one of the greatest challenges we face in the BC Interior Region in terms of ensuring conservation and protection of fish and fish habitat."²²⁷ Mr. Crowe further testified:

²²² Exhibit 1111 (Fish-stream Crossing Guidebook, March 2002, Forest Practices Code)

²²³ Transcript, June 17, 2011, p. 20 (Peter Delaney)

²²⁴ Transcript, June 17, 2011, p. 30 (Peter Delaney)

²²⁵ Transcript, June 17, 2011, pp. 30-31 (Peter Delaney)

²²⁶ Transcript, June 17, 2011, p. 32 (Peter Delaney)

²²⁷ Transcript, June 8, 2011, p. 93 (Michael Crowe)

the extraction of water for agriculture and other land use issues is a substantial problem in the B.C. Interior, particularly in those areas that are very drought prone where there's long extended summers with very little precipitation. Yes, we share with all others that water use is a very big problem for us. Historically, water licenses were granted with no consideration of in-stream flows. Fish don't even have rights to water right now under the present Water Act. It is proposed for change through the provincial changes to the Water Act under a process called water modernization. We're very optimistic that will protect and ensure minimum-based flows into the future, but essentially water is a very big problem. I wouldn't say just from agriculture, but agriculture is a big part of that problem with regards to over-licensing of the past and present use.²²⁸

153. During the hearings on water use, Dr. Mike Bradford and Dr. Steve Macdonald, both research scientists at DFO, and Dr. Craig Orr, executive director of Watershed Watch Salmon Society, testified as to the impacts of water use on FRSS. A regulatory panel consisting of Jason Hwang from DFO, Lynn Kriwoken from BC Ministry of Environment, who is in charge of creating the new *Water Act*, Glen Davidson, the BC Comptroller of Water Rights, and Paul Higgins from BC Hydro testified as to how water use was being regulated and planned for certain uses in British Columbia (e.g., hydro electricity).
154. Clearly more effort needs to be made to understand and plan for increased water demands for domestic and agriculture use where limited planning and limited regulatory controls exist.
155. Dr. Bradford testified about the importance of water flow. He agreed that given temperature change in the future, and the complexity of the system, the understanding of what is going on with water flow is evolving.²²⁹ Dr. Bradford was questioned about an article he had written entitled, *Test of an environmental flow release in a British Columbia: does more water mean more fish, 2011*.²³⁰ He confirmed the following points made in the article: (1) that environmental benefits of in-channel flows are difficult to predict with accuracy or precision, and that some of the uncertainty can be attributed to shortcomings in the tools or models used for evaluating flows;²³¹ and (2) that the tools

²²⁸ Transcript, June 8, 2011, p. 92 (Michael Crowe)

²²⁹ Transcript, September 15, 2011, p. 77 (Dr. Mike Bradford)

²³⁰ Exhibit 1860 (Freshwater Biology: Test of an Environmental Flow Release in a British Columbia River, 2011)

²³¹ Exhibit 1860 (Freshwater Biology: Test of an Environmental Flow Release in a British Columbia River, 2011), p. 1

used to predict the environmental effects of instream flow are often unreliable, as assumptions within the models are not tested.²³²

156. Dr. Macdonald testified about the importance of groundwater to FRSS.²³³ Groundwater can contribute up to 60 per cent of surface water sources in certain streams in British Columbia.²³⁴ Dr. Macdonald testified to this importance, stating: "So in the wintertime, there's certain parts of this province where we wouldn't have sockeye salmon if it wasn't for groundwater."²³⁵
157. Dr. Orr noted two key concerns related to groundwater. First, he testified that pumping wells have significant effects on streams as they reduce groundwater levels creating a gradient that captures some of the surrounding groundwater flow that would have otherwise discharged as base flow to the surface water.²³⁶ When pumping rates are sufficiently high, declining groundwater induces flow out of the surface water into the aquifer, and Dr. Orr noted that this is potentially a huge problem.²³⁷ Second, Dr. Orr testified that parts of British Columbia are over-subscribed for water licences.²³⁸ In addition, only extremely large amounts of groundwater are required to be licensed. In his view, the Province is not adequately regulating or protecting groundwater.²³⁹
158. Given the potential impacts of water use for FRSS sustainability, Mr. Hwang was asked to discuss how groundwater can be protected. He agreed that it was difficult to prove direct causation between the use of groundwater and impacts on fish habitat.²⁴⁰ He also stated that it was challenging to use the provisions of the *Fisheries Act* to achieve protection for groundwater.²⁴¹
159. With respect to how groundwater could be protected under the new *Water Act*, being contemplated under the Province's *Water Act* modernization process, Dr. Orr testified:

²³² Transcript, September 15, 2011, p. 78 (Dr. Mike Bradford)

²³³ Transcript, September 15, 2011, pp. 6-8 (Dr. Steve MacDonald)

²³⁴ Transcript, September 15, 2011, p. 85 (Dr. Steve MacDonald)

²³⁵ Transcript, September 15, 2011, p. 7 (Dr. Steve MacDonald)

²³⁶ Transcript, September 15, 2011, p. 86 (Dr. Craig Orr)

²³⁷ Transcript, September 15, 2011, p. 86 (Dr. Craig Orr)

²³⁸ Transcript, September 15, 2011, p. 6 (Dr. Craig Orr)

²³⁹ Transcript, September 15, 2011, pp. 8-9 (Dr. Craig Orr)

²⁴⁰ Transcript, September 16, 2011, p. 78 (Jason Hwang)

²⁴¹ Transcript, September 16, 2011, p. 78 (Jason Hwang)

There has to be blanket coverage, and it can't just include problem areas and for extremely large groundwater extractions. We've spent a bit of time talking about cumulative effects, and, you know, the cumulative effects of many wells, especially around streams and in water stressed areas is going to add up to a very large problem. So we've been advocating, Watershed Watch and others, have been advocating for consistent groundwater protection, licensing of all groundwater wells that are drilled in British Columbia.²⁴²

Jason Hwang also agreed that legislating environmental flow standards on fish bearing streams in the new *Water Act* would be excellent to help protect fish.²⁴³

160. The FNC submits that decisions relating to water management have the potential to impact the exercise of s. 35 Aboriginal rights. The FNC also submits that it would be useful to have a clear tripartite consultative process involving First Nations, the Province and DFO that considers how to implement the *Water Act* and the modernization thereof in a manner that addresses First Nations' concerns. Ms. Kriwoken agreed with this recommendation.²⁴⁴
161. One subject that was addressed with the panel testifying on water management issues was the adaptive management approach adopted in the Bridge River Agreement signed by the St'at'imc, the Province, and BC Hydro.²⁴⁵ Together with the St'at'imc, Dr. Bradford and Paul Higgins, were both involved in the development of an adaptive management framework document that describes the structured decision process, the decision making rules that guide the efforts of BC Hydro, DFO and the St'at'imc in making adaptive management decisions regarding the Bridge River water flows. Dr. Bradford testified about the benefits to fish from the approach used to address water flow issues in the Bridge River Agreement stating:

The benefits are both for fish, in the sense that we have a lot of detailed data to understand what's gone on in relation to the flow, but I think a very significant benefit is a tool for engaging all the stakeholders, because you get engaged, you have data that comes, you discuss, you work together. It's a very long-term

²⁴² Transcript, September 15, 2011, p. 59 (Dr. Craig Orr)

²⁴³ Transcript, September 16, 2011, p. 76 (Jason Hwang)

²⁴⁴ Transcript, September 16, 2011, p. 80 (Lynn Kriwoken)

²⁴⁵ Exhibit 1861 (St'at'imc, BC Hydro Agreements, Schedule 5 to the Relations Agreement, Lower Bridge River Flow AMDM Framework)

process. The experiment itself ties people together and I think that has huge benefits for stakeholders.²⁴⁶

162. Dr. Bradford also agreed that the adaptive management approach in the Bridge River Agreement was valuable for identifying specific stream and flow regimes throughout the salmon migratory route that would be of benefit for the long-term sustainability of FRSS. However, he cautioned that the process is demanding and that there may be a limit to how many of these processes the Province could engage in.²⁴⁷
163. Mr. Higgins was asked about the challenges and values of developing adaptive management approaches with First Nations that include a place for unique St'at'imc knowledge, TEK and values.²⁴⁸ He testified:

The challenges were great because we - none of us sitting around the table really knew how to do this when we first started. **But it was through the exploration of our values and that the time we spent together that we did find a way that we could bring this information in.** And in my experience in in-stream flow across the system, this has not been repeated anywhere else, and it was through those discussions and the collaborations which we were able to get a deeper understanding of each other's values and a deeper respect for those. **And that ultimately led to a place where we had agreement on what the best way forward was. So it was a very high value.**²⁴⁹

Recommendation: DFO should actively pursue a government-to-government MOU with First Nations and the Province that encourages collaboration and consultation with respect to modernizing the provincial *Water Act*.

D. Potential Causes of Decline arising in the Marine Environment

i) Introduction

164. The FNC submits that the weight of the evidence supports the conclusion that the marine environment is a major cause for the poor 2009 FRSS returns and for the overall declining trend in recent years. There is debate about what area, specifically, in the marine environment, may have had the biggest impact on FRSS, and the FNC submits

²⁴⁶ Transcript, September 15, 2011, p. 82 (Dr. Mike Bradford)

²⁴⁷ Transcript, September 15, 2011, p. 83 (Dr. Mike Bradford)

²⁴⁸ Exhibit 1861, (St'at'imc BC Hydro Agreement, Schedule 5 to the Relations Agreement – Lower Bridge River Flow AMDM Framework)

²⁴⁹ Transcript, September 16, 2011, pp. 87-88 (Paul Higgins)

that this points towards a need for more research in order to understand causality in the marine environment and the implications for management.

165. Project 4, which was carried out by a team of scientists from PICES, provided a comprehensive look at what is known about FRSS in the ocean.²⁵⁰ The project resulted in Technical Report #4. Dr. Stewart McKinnell, the lead author on Technical Report #4, testified during the Inquiry and was qualified as an expert in salmon biology and marine ecology with a particular expertise in the Pacific Ocean including the Gulf of Alaska.²⁵¹
166. Dr. Richard Beamish and Dr. David Welch testified on a panel with Dr. McKinnell. Dr. Beamish, Head of Salmon Interactions at DFO, was qualified as an expert in fish biology with particular expertise in factors affecting survival and abundance of fish including climate and oceans.²⁵² He testified at the Inquiry on the anomalous conditions that he and others had observed in the SOG in 2007, which could have accounted for the poor 2009 returns. In giving his evidence, he referred to four papers that had been written about the conditions in the SOG.²⁵³
167. Dr. Welch, a scientist who is the CEO of Kintama Research Services and is the developer of the acoustic array system for tracking FRSS migration, was qualified as an expert in fish biology, fisheries oceanography and acoustic telemetry with particular expertise in Pacific salmon.²⁵⁴
168. There are a number of marine ecosystems that FRSS pass through during their migration from the Fraser River to the open ocean. At the beginning of the Inquiry, Dr. Welch outlined each of the bodies of water that are part of the migration route of FRSS, with reference to the map on page 5 of Exhibit 2.²⁵⁵ He testified:

²⁵⁰ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. ix

²⁵¹ Transcript, July 6, 2011, p. 4 (Dr. Stewart McKinnell)

²⁵² Transcript, July 6, 2011, p. 5

²⁵³ Exhibit 1309 (Beamish *et al.*, Evidence of Synchronous Failure in Juvenile Pacific Salmon and Herring Production in the SOG in Spring 2007, undated); Exhibit 1303 (Thomson, *et al.*, Anomalous Ocean Conditions May Explain the Recent Extreme Variability in FRSS Production, March 2011); Exhibit 1305 (Preikshot, *et al.*, The Residence Time of Juvenile FRSS in the Strait of Georgia, undated); Exhibit 1307 (Beamish, *et al.*, A Late Ocean Entry Life History Type Has Improved Survival For Sockeye and Chinook Salmon in Recent Years in the Strait of Georgia, undated)

²⁵⁴ Transcript, July 6, 2011, p. 7

²⁵⁵ Exhibit 2 (PowerPoint Presentation: Overview of freshwater life history of Fraser Sockeye), p. 5

From the lower right, we have Juan de Fuca Strait, the Strait of Georgia, Johnstone Strait, Discovery Passage, Queen Charlotte Strait and, of course, within that the Broughton Archipelago and then Southeast Alaska where the panhandle to the north there. Offshore we have Queen Charlotte Sound in yellow, which is the marine area between Vancouver Island and the Haida Gwaii, formerly the Queen Charlotte Islands, now Haida Gwaii to the north and then farther west you'll see Kodiak Island, the Alaska Peninsula, the Bering Sea to the far left, the Aleutian Islands are a chain of volcanic islands arcing out from the Alaska Peninsula and then in the North Pacific Ocean there is, in the right-hand area, the Gulf of Alaska, which is, I point out, is where most Fraser sockeye take up residence ultimately. So these are landmarks that I'll be referring to in my presentation.²⁵⁶

169. In his testimony, Dr. McKinnell confirmed the geographic boundaries of the various marine ecosystems that the Technical Report #4 authors used, referencing the map on page 5 of Exhibit 2.²⁵⁷ He testified that the SOG includes the area from just south of the Fraser River at Haro Strait up to Redonda Island or Discovery Pass. QCS was described as “a region that is the upper part of the narrow ocean between Vancouver Island and the Mainland, ending around Telegraph Cove”.²⁵⁸ Queen Charlotte Sound and Hecate Strait were broadly described as being the body of water above QCS, with Hecate Strait being between Haida Gwaii and the Mainland, then Dixon Entrance at the top of Haida Gwaii.²⁵⁹
170. Technical Report #4 sets out the migration routes of FRSS through each of the different marine ecosystems. According to the report, there are two known migration routes that FRSS juvenile use after entering the SOG, one is north through Johnstone Strait; the other is through a southern route via the Juan de Fuca Strait.²⁶⁰ Up to 1977, on average about 80% of the FRSS smolts used the southern route. After 1977, an increasing percentage (around 50%) of FRSS migrated via the northern route. Although the cause of the change is not yet known, one hypothesis is that in years of warmer SST on the West coast of Vancouver Island more FRSS use the northern route.²⁶¹

²⁵⁶ Transcript, October 25, 2010, p. 32 (Dr. David Welch)

²⁵⁷ Exhibit 2 (PowerPoint Presentation: Overview of freshwater life history of Fraser Sockeye), p. 5

²⁵⁸ Transcript, July 6, 2011, p. 10 (Dr. Stewart McKinnell)

²⁵⁹ Transcript, July 6, 2011, p. 11 (Dr. Stewart McKinnell)

²⁶⁰ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 9

²⁶¹ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 9. See Figure 6 in Technical Report #4 for a map of FRSS migration routes in the Marine Environment.

171. FRSS smolts using the northern migration route pass through Johnstone Strait and QCS, entering the North Pacific Ocean south of Haida Gwaii. It is believed that once they enter the North Pacific Ocean, the post smolts migrate north and west within 35 kilometres off the coasts of British Columbia and Central Alaska until they reach the overwintering grounds south of Alaska during late autumn and early December.²⁶² During their ocean residence, FRSS move relative to the annual temperature cycle in the Subarctic North Pacific Ocean, moving south in spring and summer and north in autumn and winter. When FRSS mature, they migrate north from their ocean feeding grounds in late summer, before journeying to their home streams and rivers and finally migrating upstream to their ancestral spawning grounds. The understanding that mature FRSS migrate north and then south towards the Fraser River relies on data that has been captured and tagged in the North Pacific Ocean between April and August and that are then recovered in fisheries that operate in the approach routes to the Fraser River around Vancouver Island.²⁶³
172. In his testimony, Dr. Welch focused on two phases of juvenile FRSS marine migration: (1) the time FRSS spend in the SOG, and (2) the time from the SOG and along the coastal shelf northwards. A key point he emphasized was that there is a mixture of migratory and non-migratory FRSS that have different behaviours.²⁶⁴ He identified that most FRSS migrate north rapidly.²⁶⁵ Relying on studies that have predicted the speed at which FRSS swim while migration, Dr. Welch testified that:

...most fish move at about one body-length a second when they're migrating. That implies that they're moving at just under ten kilometres a day out so to reach the north end of Vancouver Island, they will achieve that in about another 45 days, 46 days for the normally-sized white smolts. **So the average Strait of Georgia, Johnstone Strait, Queen Charlotte Strait residency is thus about 1.5 months and making the entry into Queen Charlotte Sound as mid to late June.** Now, within the Strait of Georgia...sockeye catches are dropping off very rapidly in July because it's the tail end of the run for most of the smolts that have migrated out.²⁶⁶

²⁶² Exhibit 1291 (Technical Report #4, The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 9

²⁶³ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 9

²⁶⁴ Transcript, October 25, 2010, p. 33 (Dr. David Welch)

²⁶⁵ Transcript, October 25, 2010, p. 33 (Dr. David Welch)

²⁶⁶ Transcript, October 25, 2010, p. 35 (Dr. David Welch)

173. Technical Report #4 outlined various studies that had been done to understand the amount of time that FRSS spend in each ecosystem within the Marine environment. The latest study, an acoustic tagging study of Chilko Lake FRSS in 2010, from which evidence of migration through the SOG was estimated, placed Chilko Lake postsmolts in Johnstone Strait by the middle to end of June.²⁶⁷ Technical Report #4 also considered the speed of migration through the SOG. Estimates of migration speed were inferred from spatial patterns of FRSS that have been collected through field surveys. Field surveys conducted by Groot and Cooke suggested that FRSS postsmolts move through the SOG in about one month. Acoustic tagging studies of hatchery reared FRSS smolts from Cultus Lake between 2004 and 2007 showed an average residence time in the SOG from 25.6 to 34.1 days. Technical Report #4 identified that these results may not reflect migration speed and the general population, however, as the average size of the tagged sockeye salmon smolts from Cultus Lake was nearly double the average size of a wild sockeye smolt.²⁶⁸ A diffusion model of the downstream migration of Chilko Lake sockeye placed all Chilko Lake postsmolts in the SOG by the end of May.²⁶⁹
174. With respect to FRSS migration after they leave the SOG, the authors of Technical Report #4 noted that FRSS postsmolts in summer (July–August) were highest in central British Columbia (Queen Charlotte Sound and southern Hecate Strait). They reported that Stuart Lake and Stellako River populations were not found in catches in central British Columbia by the fall of the migration year, but that other FRSS populations were found in that area in the fall.²⁷⁰ The report went on to state that “coastal trawling for juvenile sockeye salmon from 1996–2007 confirmed previous conclusion that sockeye salmon postsmolts followed a northward and westward migration along the continental shelf.”²⁷¹
175. The distribution of FRSS once they are in the North Pacific Ocean was described in Technical Report #4 as follows:

²⁶⁷ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 18

²⁶⁸ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 22

²⁶⁹ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 22

²⁷⁰ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 17

²⁷¹ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 18

The distribution of Fraser sockeye extends approximately to the dateline, 180 degrees, and generally is north of about, I would say, 50 degrees north latitude. So they occupy the region in the North Pacific known as the sub-Arctic Pacific... They spend the next several years -- well, depending on what kind of animal they are -- some of them mature in the following year, they do not migrate as far and they return after one year at sea. Some of them spend one, two and three years at sea. The bulk of Fraser River fish return after two years at sea. They feed in this sub- Arctic part of the Gulf of Alaska.²⁷²

176. Technical Report #4 also identified that the distribution and movement of juvenile FRSS at sea is “the least understood of all life history phases.”²⁷³ Some tagging data has shown post smolts closer to land, with maturing fish being found in various places in the Gulf of Alaska, along with mature fish.²⁷⁴ Dr. Welch has this to say about what was known thus far about the distribution of FRSS in the Gulf of Alaska, stating:

I think it's clear from the data that's available that they're not randomly distributed. We don't fully understand what it is, but there are multiple sources of evidence that suggest different stocks have, at least to some degree, different areas of distribution within the Gulf of Alaska.²⁷⁵

177. Dr. McKinnell focused his evidence on the FRSS that return after two years at sea. He stated that the maturing fish must find food to put on 50 percent of their weight in the last spring at sea, and described some of the behaviours associated with this quest for food:

it's a huge energetic demand on the maturing fish... because they have to be able to have enough resources to get from the Gulf of Alaska to fresh water, to swim up the rivers, to mate and produce gametes and everything that goes along with maturation. That's an energy intensive-process. So they end up with different behaviours as a consequence of this. The one that we notice the most is the migration behaviour, because we see them start

²⁷² Transcript, July 6, 2011, pp. 9-10 (Dr. Stewart McKinnell)

²⁷³ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 31

²⁷⁴ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), Figure 17, p. 32 and Figure 18, p. 33

²⁷⁵ Transcript, July 6, 2011, p. 57 (Dr. Welch). See also Exhibit 1892 (Values as Indicators of Trophic Position and Competitive Overlap for Pacific Salmon, 1993); Exhibit 1893 (Sea Surface Temperature and the Pre-Season Prediction of Return Timing in FRSS, 1987); and Exhibit 1894 (Locations of Marine Animals Revealed by Carbon Isotopes, 2011).

moving closer to the coast and the fisheries take advantage of that when they get to the coast.²⁷⁶

178. In addition to providing details on the life history of FRSS in the marine environment, Technical Report #4 attempted to answer two questions: “(1) can the decline in Fraser sockeye in 2009 be explained by the conditions FRSS experienced in the marine environment; and (2) is there any evidence for declines in marine productivity or changes in Fraser sockeye distribution that can be associated with the 15 year gradual decrease in Fraser sockeye productivity?”²⁷⁷

ii) Assessing the Longer Term Declines

179. Regarding the implications of the change throughout the marine environment to the longer term decline in FRSS productivity, the authors of Technical Report #4 suggest that what is being characterized as a 15-year decline in marine productivity bears a stronger resemblance to a shift to lower productivity in 12 of 16 FRSS stocks in 1992 for a variety of reasons, including: the coinciding decline of other stocks that share the same migration route with FRSS through QCS and Queen Charlotte Sound, and that the winter of 1991/92 was the start of a persistent el Niño, which was accompanied by relatively dramatic changes in many characteristics of the west coast ocean ecosystem. However, the authors also noted that a large-scale climatic change in the North Pacific occurred in 1989, and whether that shift and the el Niño phenomenon are connected is not known.²⁷⁸
180. The climatic marine changes and productivity changes referred to in Technical Report #4 are further described by Dr. Randall Peterman. In Technical Report #10, Dr. Peterman and Dr. Brigitte Dorner found that “most Fraser and many non-Fraser sockeye stocks, both in Canada and the USA show a decrease in productivity especially over the last decade and often also over a period of decline starting in the late 1980’s or early 1990’s.”²⁷⁹ The observation that productivity has followed shared trends over an area much larger than just the Fraser River system is an important new finding.

²⁷⁶ Transcript, July 6, 2011, p. 21 (Dr. Stewart McKinnell)

²⁷⁷ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. ix

²⁷⁸ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), pp. x-xi

²⁷⁹ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), p. 2

181. Dr. Welch testified that it was important to understand which type of change had occurred and the nature of the change before scientists go out and try to determine what the cause of the problem was. He testified:

If you think it's just a change in mean value, then you'd say, "Okay, the ecosystem has suddenly changed from a blue state to a red state," and you would categorize those types of changes to identify the suite of things that were associated with the change. If it's a persistent change to lower and lower survival over time, you would look for increasing changes in environmental conditions after the change occurred. So that's an important piece for the scientific community that your Commission will bring out, in that we have two reports [Technical Report #10: *Fraser River Sockeye Production Dynamics* and Technical Report #4: *The Decline of Fraser River Sockeye Salmon *Oncorhynchus nerka* (Steller, 1743) in Relation to Marine Ecology*] that identify a much more broad, geographically widespread change in time, but we still have some work to do refine some of those details. So that's important for the detectives that are going to go out, now, to look at back in the data to try to better quantify what's going on.²⁸⁰

182. One of the challenges identified for determining the longer term decline had to do with methods for measuring survival of FRSS. Dr. McKinnell's evidence was that the most common method for measuring survival, which takes a census of the population when they are spawning, and a census of the population when you see the next generation of that spawners return, cannot be used to understand the different life stage impacts on survival.²⁸¹ He went on to state "that if you actually want to understand where survival is being affected, you need to census the population at different periods in time."²⁸²
183. There are no definitive estimates of marine survival for FRSS because in order to get an estimate of marine survival one needs a census of the outmigration population at the mouth of the Fraser River, and the census would need to be done for each population of FRSS because one must understand stock-specific abundances.²⁸³ Dr. McKinnell agreed, in theory, that sampling at the mouth of the Fraser River could help provide survival estimates of FRSS in the marine environment.²⁸⁴

²⁸⁰ Transcript, July 8, 2011, pp. 47-48 (Dr. Welch)

²⁸¹ Transcript, July 6, 2011, p. 25 (Dr. Stewart McKinnell)

²⁸² Transcript, July 6, 2011, p. 26 (Dr. Stewart McKinnell)

²⁸³ Transcript, July 6, 2011, p. 26 (Dr. Stewart McKinnell)

²⁸⁴ Transcript, July 6, 2011, p. 26 (Dr. Stewart McKinnell)

184. Dr. McKinnell also testified that although there has been an assumption that most of the mortality occurs soon after FRSS enter the ocean, this has rarely been measured. To estimate mortality over a certain period, one requires a census of abundance at a specific time, then a census of abundance at a later time in order to note the change over the periods in time. In addition, the difference will vary by FRSS population because each has its own unique characteristics.²⁸⁵ Dr. McKinnell went on to say that “repeated measurements where you have a representative sample of abundance are generally even throughout their lifespan into adulthood, not available.”²⁸⁶ This basic information to understand the time of mortality is lacking.
185. Dr. Welch testified about the assumptions that the greatest FRSS mortality happens soon after smolts enter the marine environment. His evidence was:
- In fisheries for about a century, the theory has been that there's a critical period early on in the life history, because the mortality rate is very high. The key point there is that the mortality rate is high, but it's a relatively short duration relative to the rest of the life history. So in the rest of the life history in this case, after the first month and a half after release, for Cultus Lake sockeye we're able to do a calculation that's seven-eighths of the total mortality after release at Cultus Lake occurred north of Vancouver Island.²⁸⁷
186. Dr. McKinnell could not say whether the effect of climate change on immature FRSS would be positive or negative without more research. Climate change could allow for an earlier timing of the spring bloom, which is a time in the ocean when there's biological productivity and food available, which could improve the growth of sockeye. However, climate change could also increase winds and delay the spring bloom, and keep the region cold with lower food abundance, which could have a negative effect.²⁸⁸
187. The authors of Technical Report #4 reported a correlation between SST and the mean size of all FRSS returning to the Fraser River. According to Dr. McKinnell, a larger size

²⁸⁵ Transcript, July 6, 2011, p. 12 (Dr. Stewart McKinnell)

²⁸⁶ Transcript, July 6, 2011, pp. 12-13 (Dr. Stewart McKinnell)

²⁸⁷ Transcript, July 6, 2011, p. 48 (Dr. David Welch). Dr. Welch described the Cultus Lake study as showing that the quite high mortality in some years in the Lower Fraser River was isolated to the period immediately after release, from the outlet of Cultus Lake to the Fraser main stem, just downstream from the Sweltzer Creek. So the issue is that in the Lower Fraser River the survival is high for all of the stocks, or all of the years, and then in the northern SOG, which is from the Fraser River mouth to the north end of Texada Island, Comox to Powell River, survival is high and fairly stable. And then the surprise for us in 2010 is the survival from the north end of Texada Island to near the exit of QCS, survival was only about a third to a quarter in 2010 for these smolts.

means greater individual fitness, which makes it more likely that their genes will survive. With reference to Figure 36 in Technical Report #4, Dr. McKinnell testified:

Anywhere where it's blue or purple in this plot means that increasing temperature means decreasing size. So what you see, this relationship, because we have a grid of temperatures available through time over the Gulf of Alaska, you can make these comparisons from year to year. So if the Gulf of Alaska gets warmer, the sockeye get smaller.²⁸⁹

188. In response to a question about whether there had been any changes to plankton production in the marine environment in the last 15 years, Dr. McKinnell noted that the most common plankton cocopod had been reported as being in lower abundance than it had been historically.²⁹⁰
189. Ultimately, Dr. McKinnell testified that with respect to the long term decline of FRSS, the most likely cause of the decline was in the marine environment, regardless of whether the decline was a step function or a trend in decline.²⁹¹

iii) Marine Conditions and the Poor 2009 Returns

190. Dr. McKinnell testified that the most useful approach for understanding the 2009 poor return was to seek out any evidence of extreme observations that would match the extremely low survival for that particular year of sockeye.²⁹² This is the approach adopted in Technical Report #4. His evidence was that for the SOG, there were variable patterns; however, 2007 freshwater discharge was the 17th highest year peak discharge in the record. Dr. McKinnell did not think that this was unusual.²⁹³
191. The authors of Technical Report #4 also reviewed the effect of surface mixing in the water column in the SOG by comparing density in an upper and lower layer of the water column. Two significant issues that can arise when there is inadequate mixing in the water column are: (1) if the mixed layer is deep, then phytoplankton cells mix in the dark areas below where they cannot reproduce; (2) if the mixed layer is shallow, this restricts circulation in the ocean and results in an increase in SSTs that may not be beneficial for

²⁸⁸ Transcript, July 6, 2011, pp. 19-20 (Dr. Stewart McKinnell)

²⁸⁹ Transcript, July 6, 2011, pp. 23-24 (Dr. Stewart McKinnell)

²⁹⁰ Transcript, July 6, 2008, p. 16 (Dr. Stewart McKinnell)

²⁹¹ Transcript, July 8, 2011, p. 56 (Dr. Stewart McKinnell)

²⁹² Transcript, July 6, 2011, p. 32 (Dr. Stewart McKinnell)

²⁹³ Transcript, July 6, 2011, pp. 32-33 (Dr. Stewart McKinnell)

FRSS. Dr. McKinnell noted that it is known for FRSS with some certainty that when the surface layer is warm as the smolts enter the ocean, survival tends to be worse.²⁹⁴ PICES' review of the data did not find anything anomalous,²⁹⁵ except that the water column in 2007 was more resistant to deeper mixing than in other years. Dr. McKinnell noted that the mixing was not the most extreme on record and that there were other years that had similar measurement values as 2007.²⁹⁶

192. In relation to SSTs in the ocean, Dr. McKinnell testified that 2005 was probably one of the warmest years for SST ocean in the Gulf of Alaska in decades, where an extremely warm surface layer occurred throughout the Gulf of Alaska, including the coastal region. These warm temperatures started to abate in 2006. Between 2005, at the peak, and 2008, which was one of the coldest years throughout the Gulf of Alaska in 35 years, there was a transition moving from warmer to cooler temperatures. Anomalies in SST were also observed in 2007. Dr. McKinnell testified that the most extreme SST value since 1982 was in 2007 and occurred in QCS.²⁹⁷ With reference to p. 107 of Technical Report #4, Dr. McKinnell testified that in 2007, there was a much less saline and a much fresher layer in the surface than has ever appeared in the record.²⁹⁸
193. Dr. McKinnell testified that in years when FRSS go to sea, and it's warm, they do not survive very well, and although it is debatable as to how the warmer SST actually affect FRSS, this would be considered an unfriendly environment for FRSS to be swimming through.²⁹⁹
194. Dr. McKinnell also testified to the unusual wind pattern in QCS in 2007 which contributed to low-surface salinity as described in Technical Report #4. He testified:

...So in the entire record of average wind speeds over Queen Charlotte Sound, the most extreme winter-like pattern, and these are southeast winds, or at least not -- yeah, so these tended to be

²⁹⁴ Transcript, July 6, 2011, pp. 33-34 (Dr. Skip McKinnell)

²⁹⁵ Transcript, July 6, 2011, p. 33 (Dr. Skip McKinnell). The density of the surface water column was described as the degree of mixing between the upper layer of an ocean with the deeper water. Decreasing salinity, or increasing heat will cause the upper layer of the ocean to stop mixing with the deeper parts of the ocean.

²⁹⁶ Transcript, July 6, 2011, p. 35 (Dr. Skip McKinnell)

²⁹⁷ Transcript, July 6, 2011, p. 36 (Dr. Stewart McKinnell); see Figures 69 and 70 on p. 130 in Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011).

²⁹⁸ Transcript, July 6, 2011, p. 38 (Dr. Stewart McKinnell)

²⁹⁹ Transcript, July 6, 2011, p. 38 (Dr. Stewart McKinnell)

southeast winds, winter-like winds, set up in 2007. Well, one of the things that happens in the northern hemisphere is that southeast winds will retain the water within Queen Charlotte Sound. They will blow water in—surface waters into the Sound. So you had this high—this thick layer of freshwater coming off the coastal mountains into Queen Charlotte Sound that was being retained within the Sound by these very anomalous south easterly winds in 2007. And as a consequence you ended up building up both because of the volume of the discharge coming off the mountains, and the wind patterns, you create the anomaly that we showed you before, which was the very low salinities in the surface layer of Queen Charlotte Sound and Strait.³⁰⁰

195. The authors of Technical Report #4 also observed changes in the conditions between 2007 and 2008 in Queen Charlotte Sound/Strait. Dr. McKinnell testified that in a period up to July 2007, the Gulf of Alaska was generally experiencing a cooling trend, but that the British Columbia coast was experiencing a warming of approximately half a degree. In August 2007, the whole coast has developed positive SST anomalies while it remained cold offshore, which then abated in September 2007. In 2008, it was cold in both the Gulf of Alaska and on the entire coast, so that the kind of ocean that the fish entered in 2008 was markedly different than what they had experienced in 2007.³⁰¹ Dr. McKinnell went on to testify that the evidence of anomalous ocean conditions in Queen Charlotte Sound/Strait in 2007 was not proof of causation for the poor returns in 2009, but was only a correlation between the conditions and the poor 2009 returns. He testified that further work would need to be done in order to get to the level of causation.³⁰²
196. TR 4 also reported on climate conditions in the winter of 2006/2007 that may have had an impact on ocean conditions in Queen Charlotte Strait/Sound. The report concluded that the unusual layer of low salinity water that appeared in Queen Charlotte Strait/Sound in the summer of 2007 was caused by extremely high river discharge volumes from snow melt in the coastal mountains combined with high precipitation in early June of 2007. Discharge from the Wannock River (Rivers Inlet), a major freshwater source in eastern Queen Charlotte Sound, and the Klinaklini River (upper Queen Charlotte Strait) were the highest on record in July 2007.³⁰³ In his testimony, Dr.

³⁰⁰ Transcript, July 6, 2011, p. 39 (Dr. Stewart McKinnell)

³⁰¹ Transcript, July 6, 2011, p. 40 (Dr. Stewart McKinnell): Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 11, top figure

³⁰² Transcript, July 6, 2011, p. 40 (Dr. Stewart McKinnell)

³⁰³ Exhibit 1291: Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 108

McKinnell testified that the snowpacks in the coast mountains in the winter of 2006/2007, that led to this run-off event, was the highest recorded in British Columbia history.³⁰⁴

197. Ultimately, the authors of Technical Report #4 concluded, and Dr. McKinnell testified, that the marine conditions they observed in the QCS region and Queen Charlotte Sound regions, and even into Southeast Alaska, through the life history of the FRSS smolts from 2007 to 2009 were consistent with the idea of poor survival. Dr. McKinnell testified that these marine conditions may even have first occurred in the SOG, or have been a footprint of this larger scale effect going on.³⁰⁵ However, he would not put as much emphasis on SOG as other witnesses because in order to explain the 2009 poor return, he was looking for extremes in ocean conditions as described by physics, potentially by chemistry, and where those occurred.³⁰⁶
198. With reference to the four papers he co-authored, Dr. Beamish testified about the ocean conditions in the SOG and the conclusions that he drew about how this affected the 2009 poor return. Dr. Beamish's analysis and his papers focus on the critical size/critical period hypothesis, which he first developed in 2001. Dr Beamish described the critical size/critical period hypothesis, as follows:

So in general, then, what we're saying is that juvenile salmon enter the ocean and have to grow quickly. There's large mortalities in that first up to six week period, and the fish that grow the fastest are the ones that are the larger ones, store energy and continue to store energy through the summer and survive the harsher conditions when feeding is less available, and prey are less available in the winter. And then I said that you can have the anomalies where you could have some very poor growth in that first marine period and then you might be compensated, to some extent, by maybe exceptional conditions during the winter. And then I said that you can have the anomalies where you could have some very poor growth in that first marine period and then you might be compensated, to some extent, by maybe exceptional conditions during the winter. But those [exceptional winter] conditions would, in general, be rare.³⁰⁷

199. Dr. Beamish went on to clarify that the critical size/critical period hypothesis does not require mortality to have occurred in the same location that the poor growth occurred, so

³⁰⁴ Transcript, July 6, 2011, p. 42 (Dr. Stewart McKinnell)

³⁰⁵ Transcript, July 6, 2011, p. 43 (Dr. Stewart McKinnell)

³⁰⁶ Transcript, July 6, 2011, p. 44 (Dr. Stewart McKinnell)

that mortality can occur later.³⁰⁸ Relying on this hypothesis, surveys had been conducted for a variety of juvenile species in the SOG, including pacific herring, sockeye, chum, chinook and coho over a period of years.³⁰⁹ Dr. Beamish testified that for 2007, the survey estimates indicated that juvenile herring had the lowest abundance in record.³¹⁰ Dr. Beamish also testified that in the July 2007 Chinook and Coho samples also showed that the sizes, both in terms of lengths and weight, were very small, and when calculations on condition were made, the condition also was the lowest in the time series.³¹¹ With respect to sockeye salmon, Dr. Beamish testified that the sample size was low, but the samples did have showed poor condition.³¹² He also testified that the abundance of the juvenile chum salmon in 2007 were the lowest in the time series.³¹³

200. Dr. Beamish concluded from this data that all of the species in the surface water in the SOG in 2007 had extremely poor growth or survival. He testified that he did not know of anywhere, where there was such a synchronous failure in year-class strength.³¹⁴ At the Inquiry, Dr. Beamish was asked about the conclusion he made in his Synchronous Failure paper³¹⁵—that the low volume of fish in the diet of Chinook and the complete absence of Pacific herring further demonstrate the ecosystem-wide anomaly of 2007 and indicate a collapse of the plankton that are normally consumed by larval and juvenile Pacific herring.³¹⁶ He testified that the Thomson paper had not done any survey of the plankton in the SOG, but had made an inference based on the physical conditions in the SOG.³¹⁷ According to Dr. Beamish, the conditions were indicative of poor plankton production and poor prey production, from which they formed the conclusion that the poor survival of FRSS was the result of problems with prey production.³¹⁸

³⁰⁷ Transcript, July 6, 2011, pp. 63-64 (Dr. Richard Beamish)

³⁰⁸ Transcript, July 6, 2011, p. 66 (Dr. Richard Beamish)

³⁰⁹ Transcript, July 6, 2011, p. 65 (Dr. Richard Beamish)

³¹⁰ Transcript, July 6, 2011, p. 65 (Dr. Richard Beamish)

³¹¹ Transcript, July 6, 2011, p. 67 (Dr. Richard Beamish)

³¹² Transcript, July 6, 2011, pp. 66-67 (Dr. Richard Beamish)

³¹³ Transcript, July 6, 2011, p. 67 (Dr. Richard Beamish)

³¹⁴ Transcript, July 6, 2011, p. 68 (Dr. Richard Beamish)

³¹⁵ Exhibit 1309 (Beamish *et al.*, Evidence of Synchronous Failure in Juvenile Pacific Salmon and Herring Production in the SOG in Spring 2007, undated)

³¹⁶ Exhibit 1309 (Beamish *et al.*, Evidence of Synchronous Failure in Juvenile Pacific Salmon and Herring Production in the SOG in Spring 2007, undated), p. 16

³¹⁷ Exhibit 1303 (Thomson *et al.* Anomalous Ocean Conditions May Explain the Recent Extreme Variability in FRSS Production, March 2011)

³¹⁸ Transcript, July 6, 2011, p. 69 (Dr. Richard Beamish)

201. Dr. Beamish was referred to a paper by Dr. Angelica Peña,³¹⁹ which found that the distribution of phytoplankton and nitrate concentration during the winter and spring of 2007 was similar to those observed in previous years. In response, Dr. Beamish testified that this did not change his own interpretations of what happened with prey production in the SOG in 2007.³²⁰
202. Dr. Beamish testified that he would not rule out the impact of conditions in Queen Charlotte Sound or in the Gulf of Alaska to the marine survival of FRSS, stating that “they obviously contributed to the extremely poor returns.”³²¹ His disagreement with Dr. McKinnell and Dr. Welch centred on the conditions and the residence time for juvenile FRSS in the SOG in 2007, which led to his conclusion that the SOG was the area where FRSS survival was impacted. In addition, Dr. Beamish testified that he had “not read or heard of anyone even talking about the mortality in Queen Charlotte Sound,” nor was it clear what the residence time for that area was.³²² He went on to say that “he guessed” the residence time in Queen Charlotte Sound was much shorter than the SOG because FRSS have already started their migration.³²³
203. Other witnesses put varying emphasis on the importance of SOG as compared to Queen Charlotte Sound, Southeast Alaska or the Gulf of Alaska as the source of high marine mortality of FRSS. For example, there was considerable discussion about the length of time that FRSS juveniles spend in SOG as described below.
204. Dr. McKinnell took issue with a number of Dr. Beamish’s conclusions with respect to the importance of the SOG to the poor return of FRSS in 2009. For example, Dr. Beamish testified that his team had relied on a paper by Preikshot et. al. that estimated FRSS spend about 35 days in the SOG.³²⁴ Dr. Beamish testified that he had also relied on a paper published by Dr. Welch stating that FRSS stay in the SOG longer than 15 days.³²⁵ Dr. Beamish thought that Welch’s paper had stated FRSS spend around 25 or 30 days

³¹⁹ This paper was referenced at page 102 in Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011).

³²⁰ Transcript, July 6, 2011, pp. 70-71 (Dr. Richard Beamish)

³²¹ Transcript, July 6, 2011, pp. 77 (Dr. Richard Beamish)

³²² Transcript, July 6, 2011, pp. 77 (Dr. Richard Beamish)

³²³ Transcript, July 6, 2011, pp. 77 (Dr. Richard Beamish)

³²⁴ Exhibit 1305 (Preikshot *et al.*, The Residence Time of Juvenile FRSS in the Strait of Georgia, undated)

³²⁵ Exhibit 1314 (Freshwater and marine migration and survival of endangered Cultus Lake sockeye salmon smolts using POST, a large-scale acoustic telemetry array, 2009), p. 736

in the SOG.³²⁶ He indicated that residence time was important in determining whether FRSS spent enough time in the SOG to experience the poor conditions in a way that would eventually lead to their mortality.³²⁷

205. At the hearings, Dr. Welsh discussed the conclusions in both the Preikshot paper and what his own paper had found. Dr. Welch questioned the assumptions about migration time for sockeye smolts from Chilko Lake that were used in the Preikshot paper:

Well, I'd say it was an overestimate...I've reviewed the document, it's based on the...estimated time of arrival at the Lower Fraser River, the last one percent of the migrating smolts, and then the estimated time of arrival of the last one percent of the migrating smolts at the north end of the Strait of Georgia. And that tends to spread out the distribution, because we know that sockeye smolts, some of them go into the inlets, such as Howe Sound, so their average speed drops. But even if we take that as the estimate, that would be about 35 days. All of the acoustic telemetry work is indicating four to seven days for the smolts to get from release at the lake down to the mouth of the Fraser River, so even if I would -- my calculation would be, rather than the 35 days that Preikshot, et al would suggest the average would be closer to 15 days, couple of weeks. So since the peak of the run is leaving the Cultus or Chilko Lake at the end of April, that puts them out of the Strait of Georgia, the majority out of the Strait of Georgia by the middle of June.³²⁸

206. With respect to his own paper, Dr. Welch explained:

When we look at the rates of movement of the fish, our acoustically tagged smolts are moving about a body length a second, which is typically what's expected for fish. The wild fish, Dr. Trudel has caught the untagged wild fish up in Hecate Strait from the Fraser River. Those smaller wild fish are also moving at about a body length a second. So take that as just under 10 kilometres a day that the wild fish would be migrating. So to get to the north end of -- from the Fraser River mouth to get to the north end of the Strait of Georgia, 150 kilometres, so about 15, 20 days for the average smolt to clear through the Strait of Georgia, and then something similar to get up to the Queen Charlotte Straits sub-array that we have.³²⁹

³²⁶ Transcript, July 6, 2011, p. 73 (Dr. Dick Beamish)

³²⁷ Transcript, July 7, 2011, p. 35 (Dr. Dick Beamish)

³²⁸ Transcript, July 6, 2011, p. 52 (Dr. David Welch)

³²⁹ Transcript, July 6, 2011, p. 51 (Dr. David Welch)

207. Dr. Beamish challenged Dr. Welch's evidence, stating that he had quoted the abstract of Dr. Welch's paper. He testified that his own estimates were similar and that 35 days "seemed pretty consistent with what people had said."³³⁰ In response, Dr. Welch clarified the difference between his testimony that FRSS spend approximately 15 days in the SOG, as opposed to his paper, which indicated 25 to 35 days. Dr. Welch testified that there was a difference in how he had defined the SOG in his paper as opposed to how it was being defined at the Inquiry. He testified that:

...we didn't know that the focus on the Strait of Georgia, or the definition of it was going to be as important as it is now, so we were using the term more loosely to include up to Queen Charlotte Strait ... And finally, if the commission's -- or if people are interested in looking at the rates of travel, Figure 8 on page 747 [Exhibit 1314] shows the estimated or the measured rates of travel through the different sections of the system that we could measure... take it as 20 days for wild smolts that we have not yet tagged.³³¹

208. Dr. Welch also went on to correct Preikshot's interpretation of his own timing data,³³² stating:

It's a misinterpretation, because of my loose terminology, so I had used Strait of Georgia but was thinking of it as up to Queen Charlotte Strait. The Preikshot report is calculating to the end of the Strait of Georgia, so about half that distance. So I would maintain that our estimates would give residence times half of what is indicated here for the Strait of Georgia as the Commission is currently... defining that term.³³³

209. Given the explanation provided by Dr. Welch, the FNC submits that the residence time of FRSS in the SOG is likely between 15 and 20 days, and not 35 days as Dr. Beamish testified. The FNC submits that the SOG may still be important as a potential source of early mortality of FRSS but information is lacking for both the SOG and other locations along the migratory route that is needed to assess the SOG's importance relative to other areas as discussed in the following sections.

³³⁰ Transcript, July 6, 2011, p. 80 (Dr. Richard Beamish)

³³¹ Transcript, July 8, 2011, p. 75 (Dr. David Welch)

³³² Exhibit 1305 (Preikshot *et al.*, The Residence Time of Juvenile FRSS in the Strait of Georgia, undated), p. 13

³³³ Transcript, July 8, 2011, pp. 75-76 (Dr. David Welch)

210. Dr. McKinnell identified another issue with Dr. Beamish's reports which is that the reports sometimes include some fish in their analyses and at other times exclude them. As well, in most of the plots that show time series, there's no indication of how uncertain the values are. Dr. McKinnell went on to say he had problems with some of the statistics that were reported in Dr. Beamish's papers.³³⁴

211. Dr. McKinnell also testified:

... I would like to point out that in some work that I did after preparing the report, the rivers that were discharging into the coast of British Columbia, all of the ones that ranked either first or second in 2007 were from Rivers Inlet north, actually from Queen Charlotte Strait north, the Klinaklini, the Whonnock, the Bella Coola, the Bulkley, Nass and Skeena. All of those rivers had the highest peak five-week discharge in the spring of 2007, whereas in the Georgia Strait the Cowichan River was 11th highest, the Fraser River was 17th highest in the record and the Puntledge River was 51st highest in the record. And so the point I'm making is that the extremes, in my view, are not equally distributed between Georgia Strait and Queen Charlotte Sound/Queen Charlotte Strait region. **I can use the word extreme for physical conditions in Queen Charlotte Strait and Sound. I cannot use that word for anything that I found looking at Georgia Strait.**³³⁵

212. Although Dr. Welch agreed that the SOG was an ecosystem that matters to FRSS, he could not conclude that it is the determining location to explain mortality.³³⁶ Both he and Dr. McKinnell agreed that there could have been an array of things that could have caused the poor 2009 return. Dr. Welch testified as to why it's important to consider where mortality of FRSS was occurring and why, stating:

...whether the Fraser sockeye primarily died in the Strait of Georgia or Queen Charlotte Strait/Sound or somewhere else, is critical to the decision about where the research should be focused from this point forward, if there is going to be additional research. I certainly don't disagree with continuing the research in the Strait of Georgia. The strategic concern I would have is that focusing the effort there before we actually know that that's where the problem is, is essentially a recipe for continuing the study for a hundred years if, in fact, the survival problem did not happen in the Strait of Georgia because there's no way to bound that study

³³⁴ Transcript, July 6, 2011, pp. 44-45 (Dr. Stewart McKinnell)

³³⁵ Transcript, July 7, 2011, pp. 37-38 (Dr. Stewart McKinnell)

³³⁶ Transcript, July 6, 2011, p. 51 (Dr. David Welch)

and say at what point do you give up and say the focus isn't correct.³³⁷

213. In the FNC's submission, both Drs. Beamish and Welch are doing important research. We suggest Dr. Beamish's work helps us understand better conditions in the SOG. Dr. Welch's work, focussed on the POST program, will help us understand the coastal migration of smolts along the continental shelf. Dr. Welch's work is critical to better understanding the potential causes of the decline. It needs to be enhanced through more tagging studies and through support from DFO.
214. The FNC submits that it is reasonable to conclude that the conditions of the marine environment were the primary cause for the 2009 poor returns. It is also reasonable to conclude that these conditions arose in at least the SOG, QCS and Queen Charlotte Sound and could also include the Gulf of Alaska and the Bering Sea.

iv) Heterosigma Algae Blooms

215. Dr. Jack Rensel testified at the Inquiry on August 17, 2011 and was qualified as an expert in algal zooplankton and marine and freshwater habitats, as well as HAB dynamics, monitoring and mitigation studies, and fish physiology studies, bioassays and fish kill assessments.³³⁸ Part of his testimony was entered through affidavit evidence, which is Exhibit 1363.³³⁹
216. Dr. Rensel explained the correlations that he found between the presence of Heterosigma blooms and Chilko and juvenile herring over a 20-year period. He determined that there was the HAB, Heterosigma akashiwo, in the south SOG in the same year when the smolts were out-migrating, there would be a correlation with a poor return two years later.³⁴⁰ However, Dr. Rensel testified that he was unable to determine if the effect of HABs on juvenile FRSS was mortality, acute mortality, chronic mortality, a food web effect, or all of the above. He suggested that it could be some combination of each of these.³⁴¹ Dr. Rensel also agreed that at this point in time, scientists do not know

³³⁷ Transcript, July 7, 2011, p. 36 (Dr. David Welch)

³³⁸ Transcript, August 17, 2011, p. 4 (Dr. Jack Rensel)

³³⁹ Exhibit 1363 (Affidavit #1 of Jack Rensel sworn August 17, 2011)

³⁴⁰ Transcript, August 17, 2011, p. 5 (Dr. Jack Rensel)

³⁴¹ Transcript, August 17, 2011, p. 6 (Dr. Jack Rensel)

whether HABs are directly causing mortality, or whether they are a cumulative or co-occurring stressor.³⁴²

217. With respect to how HABs might have impacted the 2009 poor returns, Dr. Rensel testified that both early and large discharge from the Fraser River was very important for setting the conditions for an increase in HABs in the southern SOG. For 2007, he believed that the very early high discharge from the Fraser River, followed by sunny weather set up a good condition for HAB.³⁴³ Dr. Rensel did clarify, however, that the scientists working with Dr. Rensel had no data collection to acquire sample sources from central and northern SOG during 2007.³⁴⁴
218. Dr. Rensel agreed that future work such as monitoring, using remote sensing and studying causes of fish mortality were reasonable recommendations to further determine the causal or correlative relationship between HABS and FRSS.³⁴⁵ He also agreed that studies of acoustically tagged smolts to determine overlap with, and behaviour near, HABs would be very important, as would genetic analysis of HABs.³⁴⁶
219. Dr. Rensel testified that after 2004, DFO stopped participating in the HAB program, which meant that DFO did not have data for the years that could have impacted the poor 2009 return.³⁴⁷ This was confirmed by Robin Brown, Division Head of Ocean Science at DFO's Institute of Ocean Sciences. Mr. Brown testified that in approximately 2004/2005 funding for the HAB program ran out and the priority for this activity had decreased.³⁴⁸
220. The FNC submits that given the lack of data on the impact of HABs on FRSS it is not possible to determine whether HAB was causative of the 2009 poor returns or of the longer term declines of FRSS.

v) Some Data Limitations

221. The authors of Technical Report #4 outlined some of the data limitations that affect their ability to draw conclusions about how marine conditions have affected FRSS survival.

³⁴² Transcript, August 17, 2011, p. 17 (Dr. Jack Rensel)

³⁴³ Transcript, August 17, 2011, p. 17 (Dr. Jack Rensel)

³⁴⁴ Transcript, August 17, 2011, p. 45 (Dr. Jack Rensel)

³⁴⁵ Transcript, August 17, 2011, p. 12 (Dr. Jack Rensel)

³⁴⁶ Transcript, August 17, 2011, p. 19 (Dr. Jack Rensel)

³⁴⁷ Transcript, August 17, 2011, pp. 8-9 (Dr. Jack Rensel); Exhibit 1363 (Affidavit #1 of Jack Rensel sworn August 17, 2011)

There is currently no system to observe FRSS on the high seas beyond the continental shelf. Research and monitoring in the SOG since 1997 has focused on coho and chinook salmon in July and September after many FRSS postsmolts have left the area, and DFO's high seas salmon program has focused on postsmolt surveys on the continental shelf since the late 1990s. Therefore, during the years of interest to the Inquiry, there are no observations of FRSS during approximately 75 percent of their life at sea, and the value of coincidental samples taken during their emigration from the SOG is debatable.³⁴⁹

222. Dr. McKinnell described a lack of understanding about FRSS off the continental shelf as a major data gap. He testified:

But as you go around and get later into the season of the juvenile salmon, what you find is that the period between when they are migrating on the continental shelf and the period when they appear in deep water, that's probably one of the least well-known periods of time or areas of migration for these animals, in part because winter sampling is involved.³⁵⁰

223. He also testified that population-specific studies of young FRSS during their first year at sea are rare because of the (historical) problem of identifying the origin of individual fish.³⁵¹
224. During his evidence at the Inquiry, Dr. Parsons also testified as to the lack of data for ocean juvenile stage in the Gulf of Alaska. He stated that there was not much literature on the trophodynamics of salmon in the sea because it's expensive to go out and study salmon once they're widely distributed. Dr. Parsons testified that it could be done much easier in a place like the SOG, but that once FRSS get out into the ocean, there are essentially no studies.³⁵²
225. The FNC submits that further study and research is needed with respect to conditions throughout the marine environment, including researching the migration and distribution of FRSS in the marine environment in order to understand the causes of the longer term

³⁴⁸ Transcript, August 18, 2011, pp. 62-63 (Mr. Robin Brown)

³⁴⁹ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011) pp. 3-4

³⁵⁰ Transcript, July 6, 2011, p. 12 (Dr. Stewart McKinnell)

³⁵¹ Exhibit 1291 (Technical Report #4: The Decline of Fraser River Sockeye Salmon in Relation to Marine Ecology, February 2011), p. 13

³⁵² Transcript, July 8, p. 89 (Dr. Timothy Parsons)

decline and to enable prudent management decisions to ensure the long term sustainability of FRSS.

vi) Recommendations for Science in the Marine Environment

226. During the Inquiry, there was ongoing debate about where further research in the marine environment should take place. Early in the hearing, Dr. Riddell testified that the SOG would be the best place to examine why there are fluctuating returns.³⁵³ He testified that:

We shouldn't forget that there is this compounding factor of the fish health issue now, that if the fish are carrying something that we don't fully understand, but it does look disease-like or a viral signature they referred to, then that may confound what's going on in the Strait of Georgia. But the Strait of Georgia has been largely neglected as a major study in terms of ecosystems that salmon all use, and there really hasn't been a comprehensive study of the strait and what determines marine survival in the early phase. Most countries around the North Pacific are certainly coming to agreement that the majority of the survivorship in terms of numbers of animals does occur in the early marine period, probably a month to two months even.³⁵⁴

227. Dr. Welch was asked to discuss his concerns with a single focus on the SOG, based on an email that he had sent to Robin Brown and others.³⁵⁵ Dr. Welch testified:

I was concerned about the view being myopic and too restrictive early in the process. And the reason for that, taking it right back out of this particular issue in front of the commission, but a common issue in fisheries is to assume there's a critical period in a certain period of the life history of fish. **In fact, the theory of critical periods for fish has never been actually established as correct. It's often used as a justification for studying something and it's generally the thing that's easy to do. The more expensive hard things to do are essentially left off the table because it's easy for the scientists to move forwards on a piece of work if it's, for example, in the Strait of Georgia. That's easier than farther away logistically and it's going to be less cost. My concern about that, taking it right back to the general scientific issue is that for a hundred years we've done that on recruitment issues in fish without being successful.** And I've said for most of my career that that probably indicates that...the critical period theories aren't necessarily

³⁵³ Transcript, February 3, 2011, p. 3 (Dr. Brian Riddell)

³⁵⁴ Transcript, February 3, 2011, pp. 3-4 (Dr. Brian Riddell)

³⁵⁵ Exhibit 1343 (Email correspondence between David Welch, Robin Brown and others, ending June 8, 2010)

correct so we shouldn't use them as a justification for focusing. We should be testing whether those assumptions of a critical period are, in fact, there.³⁵⁶

228. Dr. Welch disagreed with the suggestion to focus on the SOG, stressing the opportunity cost associated with spending years studying something if it's not necessarily the correct location for the primary problem. He outlined that the SOG has been studied since the 1930s, and was concerned with how long DFO was spending there before they conclude that the SOG is not the source of the problem. Dr. Welch stressed that in his view, what needs to be done is to determine what salmon leave the SOG and what salmon go up to QCS or survives to reach southeast Alaska.³⁵⁷
229. During the hearings on cumulative impacts, David Marmorek stated that it appears that both the SOG and Queen Charlotte Sound/Strait are important, and therefore, in order to understand the role of the marine environment in the long term decline and for the 2009 poor returns, one should focus on the total marine environment.³⁵⁸
230. With respect to which marine ecosystems should be a priority for research going forward, Dr. McKinnell agreed that part of the solution to the issue of where to continue further research was to "ask the right question and have a mechanism whereby you can reasonably expect to answer it."³⁵⁹ Dr. Irvine, who was qualified as a fish biologist with a focus on salmon and salmon ecology in both the freshwater and the marine environment,³⁶⁰ gave a similar recommendation, stating:

I think the most important thing, before designing or thinking about any new program, is to be very specific as to the questions you're trying to answer. So are we just trying to figure out what happened with Fraser sockeye? Are we trying to understand the entire ecosystem? Are we trying to predict what's likely going to return? Are we trying to understand the mechanisms?...it comes back to... what are the questions we're trying to answer³⁶¹

231. Dr. Irvine testified that work was needed in Queen Charlotte Sound and Gulf of Alaska. He pointed out that quite a bit of work was already being done in the Gulf of Alaska and

³⁵⁶ Transcript, July 18, 2011, p. 54 (Dr. David Welch)

³⁵⁷ Transcript, July 18, 2011, p. 55 (Dr. David Welch)

³⁵⁸ Transcript, September 19, 2011, p. 90 (David Marmorek)

³⁵⁹ Transcript, July 18, 2011, p. 56 (Dr. Stewart McKinnell)

³⁶⁰ Transcript, July 8, 2011, p. 78

³⁶¹ Transcript, July 8, 2011, p. 104 (Dr. James Irvine)

also the Bering Sea by others and that it would be important to collaborate with those researchers. Dr. Timothy Parsons, who was qualified as an expert in biological oceanography with particular expertise in marine food webs and fisheries oceanography,³⁶² also gave evidence that real time data collections were needed in order to understand what is happening in the Gulf of Alaska.³⁶³ He went on to describe data gathering methods that might be used including: new instrument gliders, satellite systems, tagging, and the Argo Float Program. He cautioned against the use of ecosystem models, stating that they were helpful for understanding mechanisms but not for being predictive.³⁶⁴

232. During the marine environment hearings, a number of different ecosystem research initiatives were proposed as models for moving forward with research in the marine environment. One initiative was an ecosystem study taking place in the Bering Sea under the auspices of the American National Oceanic and Atmospheric Agency (“NOAA”).³⁶⁵ The study was described as being comprehensive, where people came together, agreed on the questions and agreed on the approach. The study also included First Nations as collaborative researchers. Dr. McKinnell agreed that this study was useful, but that it also required a certain level of funding.³⁶⁶
233. The SOG Ecosystem Research Initiative (“SOG ERI”) was also discussed as a potential model. The SOG ERI was set up to understand how the SOG ecosystem works, identify the various drivers of change most likely to determine future conditions, and analyze the future responses of the system under the influences of these drivers of change.³⁶⁷ According to the SOG ERI research plan, the research conducted is designed to align with DFO’s goals of ensuring a healthy and productive aquatic ecosystem in the SOG, and to support sustainable fisheries and aquaculture in that area.³⁶⁸
234. A third Initiative discussed during the Inquiry was the PNCIMA Initiative, which is collaborative work involving Canada, the Province and Coastal First Nations (“CFN”)

³⁶² Transcript, July 8, 2011, p. 77

³⁶³ Transcript, July 8, 2011, p. 102 (Dr. Timothy Parsons)

³⁶⁴ Transcript, July 8, 2011, p. 103 (Dr. Timothy Parsons)

³⁶⁵ Exhibit 1347 (Bering Sea Integrated Ecosystem Program Overall Study Plan, undated)

³⁶⁶ Transcript, July 8, 2011, p. 62-63 (Dr. Stewart McKinnell)

³⁶⁷ Exhibit 798 (Ecosystem Research Initiative (ERI) Pacific Region – “The Strait of Georgia in 2030” Research Plan, January 2008)

³⁶⁸ Exhibit 798 (Ecosystem Research Initiative (ERI) Pacific Region – “The Strait of Georgia in 2030” Research Plan, January 2008), p. 2

including a member of the FNC, the CHN. PNCIMA is a planning process to develop an integrated and ecosystem based ocean management plan for the Pacific central and north coast, including Queen Charlotte Sound and QCS.³⁶⁹ Mr. Robin Brown testified that “what goes on in PNCIMA is likely relevant and important to FRSS conservation units.”³⁷⁰ Dr. McKinnell agreed that the work being done by the CHN³⁷¹ and other First Nations³⁷² under the PNCIMA Initiative, including mapping and monitoring the marine environment in their traditional territory, was useful and “part of the scientific process to understand the distribution and ranges of species in an area.”³⁷³ Dr. Ross also agreed that the mapping work being done by the CHN in their traditional marine territory was extremely useful for identifying migratory routes of key species, important food gathering areas as well as for highlighting sensitive areas that could be impacted by contaminants.³⁷⁴

235. Despite the potential importance of the work being done in the PNCIMA Initiative, and the need for further research in the North Pacific, including QCS and Queen Charlotte Sound, PPR 19: *Marine Environment Issues Potentially Relevant to Fraser Sockeye Salmon* noted that DFO had switched focus and funding away from PNCIMA. Mr. Brown testified that DFO Science Branch has not gotten more ongoing funding in PNCIMA for research. He explained that the block of funding that had been received was to develop ecosystem overview and assessment reports, including summarizing existing information and developing maps of ecologically sensitive areas.³⁷⁵ PNCIMA supports an ecosystem-based approach to management and continued research will ultimately assist in better understanding ecosystem processes and interrelationships between FRSS and other species in the ecosystem covered in the PNCIMA Initiative.
236. In his evidence, Robin Brown admitted that DFO had shifted attention from PNCIMA to the SOG, as a practical and technical move by its Science Branch. He further testified:

³⁶⁹ Exhibit 1383 (Pacific North Coast Integrated Management Area initiative update, May 2011), slides 3-4. See also Exhibit 1384 (PNCIMA Initiative Engagement Strategy, May 30 2010); Exhibit 1385 (PNCIMA Issue Outputs and Tasks Review and Recommendations, Feb 14 2011).

³⁷⁰ Transcript, August 18, 2011, pp. 82-83 (Robin Brown)

³⁷¹ Exhibit 1345 (Ocean and Way of Life Brochure and Haida Ocean and Way of Life Map, 2011)

³⁷² Exhibit 1346 (Coastal First Nations Into the Deep Blue Report and Coastal First Nations Sea of Change Report)

³⁷³ Transcript, July 8, 2011, p. 60 (Dr. Stewart McKinnell)

³⁷⁴ Transcript, August 18, 2011, p. 30 (Dr. Peter Ross)

³⁷⁵ Transcript, August 18, 2011, pp. 81-82 (Mr. Robin Brown), the transcript erroneously refers to the answer as being the question.

We debated this, do we do this work in PNCIMA, do we do it in the Strait of Georgia extensively? We chose the Strait of Georgia because we knew there were important issues. And that is where the existing database was the best. We were going to use this as a model for developing the tools where we have good data so that we could apply them more confidently in PNCIMA and other areas where the data, historical database is not so strong. So that was kind of—that's what science managers talk about when they meet in meetings.³⁷⁶

237. One of the challenges identified for all of the ecosystem research initiatives is funding. Mr. Brown testified that although a three to five year funding envelope was typical within DFO's Science Branch, it was not a particularly successful model for this type of science research, particularly given that there is a lot of overhead in setting up management and funding for new programs and then winding them down.³⁷⁷ He testified that although reviews of science programs are legitimate, using limited term funding is not a useful way to conduct such large-scale research projects. He outlined other alternatives, which includes setting up mid-term reviews or reviewing portions of a program every year.³⁷⁸
238. The FNC submits that DFO cannot take a myopic view in determining where conditions in the marine environment may be negatively impacting FRSS. The evidence presented in the Inquiry makes it clear that ocean conditions in the SOG, Queen Charlotte Sound/Strait and the Gulf of Alaska may have played a significant role in the poor returns of 2009 and in the longer term decline of FRSS.
239. The FNC submits that in order to better understand how ocean conditions in various ecosystems in the marine environment might impact FRSS, more comprehensive and collaborative research studies must be undertaken and funded. Canada and First Nations must collaboratively determine and prioritize the questions that are to be answered through the research and develop the research plan.

Recommendation: As part of the Tier 1 and Tier 2 co-management structures, Canada and First Nations must collaboratively prioritize marine research programs for FRSS (and other salmon), and collaboratively determine the questions to be answered and the approach to research.

³⁷⁶ Transcript, August 18, 2011, pp. 81-82 (Robin Brown)

³⁷⁷ Transcript, August 18, 2011, pp. 74-75 (Robin Brown)

³⁷⁸ Transcript, August 18, 2011, pp. 74-75 (Mr. Robin Brown)

240. With respect to determining whether effects on FRSS survival were happening in the marine or freshwater environment, Dr. Welch testified that sampling at the mouth of the Fraser River for total abundance of sockeye coming down each year would be useful. It would assist in determining whether or not changes in freshwater were a contributing factor or significant driver to what is happening to FRSS. Dr. Welch stated that sampling could be done simply, given that there is a sampling program at the Mission hydroacoustic facility. He testified that this could be supplemented by DNA analyses of the individual fish to get an index of total sockeye out-migration abundance.³⁷⁹ Dr. Irvine testified that a similar project could also be implemented in areas such as Johnstone Strait or Discovery Passage, so that the mortality could be partitioned further along in the time series.³⁸⁰
241. The FNC submits that as an immediate next step, a sampling program that includes DNA analysis should be set up at Mission, and at locations in the Johnstone Strait and Discovery Passage. The hydroacoustic array and sampling at locations in south-east Alaska should also be examined.

Recommendation: As part of the Tier 1 and Tier 2 co-management structures, Canada and First Nations must collaboratively prioritize marine research programs for FRSS (and other salmon), and collaboratively determine the questions to be answered and the approach to research.

Recommendation: DFO should Prioritize POST sampling and DNA program at Mission Hydroacoustic facility, Johnstone Strait and Discovery Passage in order to better assess FRSS migration, distribution and survivability, including potential bottlenecks.

242. Dr. Welch agreed that bringing the work of First Nations into science would provide a better information base for scientists.³⁸¹ Dr. Ross went on to testify about how TEK and science can be used together to protect marine environments:

³⁷⁹ Transcript, July 6, 2011, pp. 59-60 (Dr. David Welch)

³⁸⁰ Transcript, July 8, 2011, p. 108 (Dr. James Irvine)

³⁸¹ Transcript, July 8, 2011, p. 61 (Dr. David Welch)

I have been working for probably 12 years now with a number of different First Nations communities and I like to think that I bring scientific expertise to the table, but I am powerless in the face of the wealth of knowledge that traditional knowledge brings to the table and the way I've come to view this is that science is—science and traditional knowledge can work together to generate good understanding about habitat and ocean health, et cetera, so...I very much have valued traditional knowledge and the provision of that sense of place, that sense of people, that sense of value ascribed to marine resources and as you put it, the understanding and insight into migratory corridors and habitat for some of these valued species.³⁸²

243. The FNC submits that DFO must support the research programs for FRSS that combine western based science and First Nations TEK.

Recommendation: DFO should work with First Nations to implement collaborative marine research and monitoring programs that incorporates TEK.

vii) Predators

244. Predation was the subject of Technical Report #8. The Report authors were Dr. Andrew Trites and Dr. Villy Christensen, who testified during the hearings on predation. Dr. Trites was qualified as an expert in marine mammals and in their conservation status and recovery.³⁸³ Dr. Christensen was qualified as an expert in food web modelling and predator-prey relationships.³⁸⁴
245. In the technical report, Dr. Christensen and Dr. Trites described how predation impacts FRSS. According to the report, FRSS are repeatedly faced with two choices throughout their life cycle: (1) they can hide and limit risk of predation, but feed little and grow slowly; or (2) they can stay in the open and risk being eaten, but feed a lot and grow quickly. FRSS, like other fish, have successfully dealt with this choice by developing a complicated life history that includes moving between habitats with varying risks. Minimizing predation forms an important part of their life strategy.³⁸⁵

³⁸² Transcript, August 18, 2011, p. 30 (Dr. Peter Ross)

³⁸³ Transcript, May 4, 2011, p. 22

³⁸⁴ Transcript, May 4, 2011, p. 22

³⁸⁵ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 1

246. Spawning in nutrient-poor streams and moving on to lakes has been an important part of the life-history strategy of FRSS because neither of these habitats can maintain year-round predator populations that are abundant enough to severely impact varying numbers of FRSS. A similar strategy may be at play for the larger FRSS in the open ocean, where fish can hide at depth from predators during day, and feed at shallower depths at night. Between the lakes and the open ocean lies a dangerous stretch through the Fraser River and the SOG, and along the British Columbia coast to Alaska. Predators are likely to gather to prey upon the ample and seasonal supply of outward bound and returning FRSS. Making it through the gauntlet likely depends upon the size and speed of the migrating sockeye, the feeding conditions they encounter, and the species and numbers of predators that seek to eat them.³⁸⁶

247. In the report, the authors stated that scientifically supported, ecosystem-level information about predator species that prey on FRSS (numbers, diets, trends, and distributions) is sparse. Drs. Christensen and Trites found that there was little to no information about the abundance and trends of potential predators of FRSS in the freshwater environment. In response to a question about the potential list of predators on page 72 of the report and how the authors chose potential predators, Dr. Christensen stated:

That's a difficult question actually because are getting into less and less likely to be of importance. For some where we had no diets, no information about abundance or none of the criteria, but we had expectations or we had qualitative information that it was rare species, we would exclude it...No, just that we found evidence for all of these six that they might have a quite considerable impact but we also lack data for all of them to make a proper evaluation, a thorough evaluation, like real hard numbers as we love to do. We couldn't do that. The information was not available.³⁸⁷

248. Technical Report #8 outlined that in marine systems, there is more evidence about the abundance and trends of potential predators. A review of the scientific literature by Dr. Christensen and Dr. Trites revealed that of the species that have the remains of sockeye salmon in their stomachs, only a few have specialized in targeting sockeye. They

³⁸⁶ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 1

³⁸⁷ Transcript, May 4, 2011, pp. 25-26 (Dr. Villy Christensen)

reported that there were no studies showing a predator had consumed sufficient numbers over the past three decades to pose a population threat to sockeye salmon.³⁸⁸

249. In Technical Report #8, Dr. Christensen and Dr. Trites outlined the list of species that could have played a role in long term-decline in survival rate of FRSS, as well as in the 2009 poor returns. Among bird species, Caspian terns and double-crested cormorants, who feed on sockeye smolts in freshwater, may be increasing in numbers. Lampreys may be a major factor in the Fraser River estuary. Predators in the SOG include fish predators such as spiny dogfish, Coho and Chinook salmon, but each of these have also declined in numbers in recent decades so were deemed unlikely to have had a major impact on sockeye salmon.³⁸⁹
250. In QCS, Dr. Christensen and Dr. Trites identified a number of potential predators. Sablefish were found to be a potential predator along the coastal areas of QCS. Arrowtooth flounder, which has increased dramatically in recent decades, and could potentially be a predator of SS during their first months at sea. Once in the open ocean, predators of SS include salmon sharks, blue sharks, and daggertooth. All three species were reported to have increased in recent decades, but the report noted that there was insufficient data to draw any conclusions about their role in the 2009 poor returns of FRSS.
251. In addition to the daggertooth and sharks, marine mammals also consume adult sockeye salmon. However, sockeye are not an important part of marine mammal diets compared to the other species of salmon. No studies have reported marine mammals consuming sockeye salmon in the open ocean. However, small amounts of sockeye have been found in the stomachs or fecal samples collected from Stellar sea lions, northern fur seals, harbour seals, killer whales, and white-sided dolphins feeding over the continental shelf and inside waters of British Columbia. Seal and sea lion populations have increased significantly in British Columbia and southeast Alaska since the late 1970s. However, the available data indicate that sockeye salmon is not a preferred prey species among marine mammals.³⁹⁰

³⁸⁸ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 2

³⁸⁹ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 2

³⁹⁰ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), pp. 2-3

252. In the Northeast Pacific Ocean and Gulf of Alaska, other fish species have declined and so this many increase predation pressure on sockeye in these areas. However, there was no data available to assess whether this would be a significant impact.³⁹¹
253. In Technical Report #8, Dr. Christensen and Dr. Trites conducted an assessment of the evidence for 26 potential predators based on whether their diet included sockeye, whether the predator's abundance was high enough to have significant predation impact, whether the predator had spatial and temporal overlap with Fraser River sockeye, and whether there had been a positive trend in predator abundance over the last decades.³⁹²
254. Based on their analysis, Dr. Christensen and Dr. Trites determined that although there were many potential predators of sockeye salmon, only six species might have been a factor in the longer term decline of FRSS due to predator diet and increasing population trends of certain predators. The six predators were the salmon shark, at the top of the list, as well as blue sharks, daggertooth, sablefish, river lamprey and the common murre.³⁹³
255. In his evidence, Dr. Trites testified that the determination about the levels of predation on SS came down to diet, stating:
- So we just didn't find a high indication despite the fact that we've had increases in many of these populations and we've had certainly the chance because there's overlap between where sockeye are and where these marine mammal species are. But overall when we just looked at the big picture, it really came down to one of diet, just not a strong indication that the sockeye was an important salmonids in their diets.³⁹⁴
256. In Technical Report #8, Dr. Christensen and Dr. Trite outlined the need to move beyond diet studies to evaluating the importance of predators, which requires knowing the impact the predators may have, and even more importantly how this may have changed over time. It was concluded that estimates of predator abundance were needed, as well as information about their population dynamics (age structure, reproduction, and survival). The report concluded that the methods for obtaining this information were

³⁹¹ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 3

³⁹² Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 71

³⁹³ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 72

³⁹⁴ Transcript, May 4, 2011, p. 27 (Dr. Andrew Trites)

established but the data was poor for FRSS.³⁹⁵ In addition, estimating predation impact also requires knowing the consumption rates of predators, which is generally obtained by combining the predictions of a population dynamics model with the age-specific energy requirements predicted from bioenergetics models. Furthermore, the Technical Report outlined that consumption is not constant throughout the year, but varies with seasonal periods of growth and reproduction.³⁹⁶

257. During his testimony, Dr. Trites outlined the importance of understanding the complexity of predator-prey dynamics. With reference to a presentation that Dr. Trites gave at the Speaking for the Salmon Summit held at SFU,³⁹⁷ Dr. Trites testified:

the point of this in the presentation was to make people more appreciative of the fact that predation isn't just a two-way relationship. A lot of people think that because a seal eats a salmon and just a very simple thing, removing the seals, would result in more salmon. And so this is pointing out that many of these interactions are three-way, four-way, ten-way, 32 ways. We have to think of this as being food webs so that removing a major predator such as harbour seal would probably, based on the diet data we have from the 1980s, could result in more hake in the system, which could, in turn, result in them eating many other species, possibly salmon. But the point is that we're talking about a predator that's part of a food web, not part of a two-way relationship³⁹⁸

258. In Technical Report #8, Dr. Christensen and Dr. Trites concluded that although there were many potential predators of sockeye salmon, there were only a few species that might have been a major factor in the decline of FRSS, based on the diet and increasing population trends of those species. The report authors concluded that evidence of any single predator being responsible for the decline in FRSS was weak to non-existent. Rather, and of importance to the long term sustainability of FRSS, Dr. Christensen and Dr. Trites concluded that predation was more likely to be part of the cumulative threats facing sockeye .³⁹⁹

³⁹⁵ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), pp. 81-82

³⁹⁶ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 82

³⁹⁷ Exhibit 12 (Proceedings Summit on Fraser River Sockeye Salmon: Understanding Stock Declines and Prospects for the Future, March 30–31, 2010), p. 92

³⁹⁸ Transcript, May 4, 2011, p. 28 (Dr. Andrew Trites)

³⁹⁹ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 3

259. The conclusion that no single predator was responsible for the decline of FRSS was echoed by Dr. Ford, DFO research scientist and the program head of the Cetacean Research Program.⁴⁰⁰ At the Inquiry Dr. Ford was qualified as an expert in the conservation, behaviour and ecology of cetaceans in B.C. waters, including their foraging habits.⁴⁰¹ Dr. Ford testified that:

I think we're all in agreement that marine mammals seem to not – there's no evidence that they played a role in the situation in 2009. They may have played a role in the overall decline over the past 15 years, as a result of increasing predation levels for various reasons, mostly to do with changes in abundance.⁴⁰²

260. In his testimony at the commission, Mr. Olesiuk, a marine mammal biologist at DFO Pacific Biological Station, who was qualified as an expert in the conservation, biology and ecology of seals and sea lions in B.C. waters, including their prey requirements and diet,⁴⁰³ also agreed that marine mammals were not responsible for the low returns in 2009. However, Mr. Olesiuk did testify that it was likely that marine mammals played a role in the longer term decline of FRSS:

But getting back to your question as to how do we proceed from here and set priorities, and identify, as John has said, with a relatively high degree of confidence, we can conclude that marine mammals were not responsible for the low returns in 2009. As far as the general decline in productivity, I think we've narrowed it down to, you know, a couple of marine mammal species. And in the case of sea lions, we've identified when and where they are now feeding on sockeye. Then we've had a series of workshops in DFO where we get together with our colleagues that are studying salmon, and they're looking at the migration routes of salmon, where the mortality is occurring, and based on that, we are going to come up with presumably some sort of multidisciplinary projects where we're combining the factors that could be causing mortality with information where that mortality is occurring.⁴⁰⁴

261. The other predator that was considered at the commission hearings was the Humboldt Squid. Mr. Gillespie testified that they have no direct evidence that Humboldt squid overlap in time and space with Fraser River sockeye smolts, but do have evidence that they overlap in time and space with FRSS adults. He testified that it is also unlikely that

⁴⁰⁰ Transcript, May 4, 2011, p. 33 (Dr. John Ford)

⁴⁰¹ Transcript, May 4, 2011, pp. 33-34

⁴⁰² Transcript, May 5, 2011, p. 4 (Dr. John Ford)

⁴⁰³ Transcript, May 4, 2011, p. 34 (Peter Olesiuk)

⁴⁰⁴ Transcript, May 5, 2011, pp. 5-6 (Peter Olesiuk)

Humboldt squid eat adult FRSS.⁴⁰⁵ With respect to Humboldt Squid being a factor in the 2009 poor returns of FRSS, he testified:

If we're speaking about 2007 in particular, we have no evidence that Humboldt squid were in migratory pathways of sockeye smolts. We found them off the West Coast of Vancouver Island and did not find them further north in British Columbia, which would lead me to support for that year, at least, in 2007 that it was unlikely that they had an impact on out-migrating Fraser River sockeye smolts,⁴⁰⁶I would agree that they were not likely to have contributed to the low returns in that year.⁴⁰⁷

262. In his testimony Mr. Gillespie agreed with the conclusion in Exhibit 73⁴⁰⁸ that predation by Humboldt squid is unlikely to have impacted the long-term decline of Fraser sockeye as the squid are recent arrivals to B.C. because there was no definitive proof that Humboldt squid were in B.C. coastal waters until 2004. He stated that the only anecdotal evidence we had that they were even moving northward was in the mid-'90s and the period of decline started before that.
263. In a recent presentation, Exhibit 822,⁴⁰⁹ Mr. Gillespie outlined that there was new evidence that Humboldt Squid prey on salmon, but no definitive evidence that they prey on FRSS. Despite this evidence, Mr. Gillespie testified that these results did not change his conclusion that Humboldt Squid did not contribute to the long-term decline or the 2009 returns.⁴¹⁰
264. With respect to recommendations for assessing the impacts of predation on FRSS, Dr. Christensen testified that:

The recommendations follow after a plea for implementation of ecosystem-based management. We have traditionally been managing fisheries resources based on what we call single species management where we mainly consider the impact of the fisheries and tends not to fully include the considerations of the ecosystem, the other parts of the ecosystem and also of the environment. There's a strong scientific almost consensus that,

⁴⁰⁵ Transcript, May 6, 2011, p. 74 (Graham Gillespie)

⁴⁰⁶ Transcript, May 6, 2011, pp. 70-71 (Graham Gillespie)

⁴⁰⁷ Transcript, May 6, 2011, p. 75 (Graham Gillespie)

⁴⁰⁸ Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010), p. 67

⁴⁰⁹ Exhibit 822 (Humboldt Squid in B.C. - 2011 Update), p. PDF 9

⁴¹⁰ Transcript, May 6, 2011, p. 76 (Graham Gillespie)

including these additional facts that will minimize the risk of failures. So that's where it comes in that we may see less failures if we understand the ecosystems better....in this case, sockeye, but this may also have implications for the predators and the preys of sockeye and the competitors. So salmon are part of the ecosystem and that's what we encourage also with these recommendations...⁴¹¹

265. Dr. Ford also testified to the importance of conducting ecosystem based research. He stated that research in this area regarding the role of predation in the overall ecosystem will continue and may help shed further light on marine mammals as a contributing factor to declines of FRSS.⁴¹²
266. Dr. Christensen and Dr. Trites also recommended amassing more data on the diet and population trends of the six most significant species identified in their report. However, Dr. Christensen acknowledged that this would be a substantial effort as it would involve studies in the open ocean, which have not taken place in regards to salmon for many years. This recommendation was really a call for an international effort of the North Pacific countries, given that it would cost about \$10 million dollars or more between five countries.⁴¹³ Dr. Christensen and Dr. Trites also recommended setting up a central diet database for various predators, as it would facilitate assessing the effects of predation on species such as FRSS and would be integral to constructing ecosystem models and implementing EBM. They suggested starting with the creation of central database for the SOG.⁴¹⁴
267. The final recommendation was for the construction of a conceptual ecosystem model to assess the cumulative role of predation on sockeye. Dr. Christensen described what this would include:

First of all, it has to span the whole lifecycle of sockeye salmon. So we're talking about a model that starts in the freshwater and continues out to the straits and encompasses also the North Pacific, the open gyre area up there. This model would describe the environment that the sockeye salmon encounters, the prey and the predators, the competitors, draw information about what we know about these predators and put in some estimates for what's important, what's not important, a bit like we've been trying

⁴¹¹ Transcript, May 4, 2011, pp. 28-29 (Dr. Villy Christensen)

⁴¹² Transcript, May 5, 2011, pp. 4-5 (Dr. John Ford)

⁴¹³ Transcript, May 4, 2011, p. 29 (Dr. Villy Christensen)

⁴¹⁴ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 83

to do without making the model in our report. To do that really just calls for a person to do it. A post-doctoral fellow could easily do this in a matter of certainly within a year.⁴¹⁵

268. FNC submits that while predators are likely not responsible for the poor returns of FRSS in 2009, it is likely that some predators may be contributing to the longer term decline of FRSS and could, with climate change and other environmental stressors, become more significant. Presently there is not enough data available to make any conclusions about which predators are important, nor their level of impact on FRSS both past and present.
269. FNC submits that predators are another stressor adding to the cumulative impacts threatening the long term sustainability of FRSS.
270. FNC submits that a central diet database for various species, be created, with open access to governments, First Nations and Researchers.

Recommendation: DFO should create a central diet database for research on food webs and predator-prey interactions and this should be accessible to governments, First Nations and researchers.

271. The FNC also submits that the food chain modelling called for by these scientists should be undertaken as part of the ecosystem-based science and EBM that assesses and responds to, amongst other things, the cumulative impacts along the migratory route of FRSS.⁴¹⁶

E. Aquaculture (Diseases)

i) Introduction

272. In order to determine whether fish farms may have been responsible for the poor returns of FRSS in 2009 or the longer term declines of FRSS, the Inquiry heard evidence with respect to a number of elements associated with fish farms, including pathogens and disease, sea lice, waste and lights. First Nations have expressed to DFO their concerns about a number of these issues.⁴¹⁷

⁴¹⁵ Transcript, May 4, 2011, p. 31 (Dr. Villy Christensen)

⁴¹⁶ Please see section on Cumulative Impacts

⁴¹⁷ See, for example, Exhibit 1240 (First Nations' Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), Appendix 1

ii) Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye

273. Technical Report #1 focused on the potential impact of disease on the survivability of FRSS.⁴¹⁸ The report was written by Dr. Michael Kent, who was qualified as an expert with respect to fish disease and parasitology.⁴¹⁹ The report reviewed five viral, six bacterial, four fungal, and 19 parasitic pathogens that are known to or could potentially infect sockeye salmon in BC.⁴²⁰

274. In Technical Report #1, Dr. Kent did not deal with the risk of pathogens and disease being transferred from fish farms to wild salmon. Dr. Kent testified:

... when I talk about each particular disease and its role, I did not include a section saying what the risks [are] of the diseases emanating from fish farms. In each particular disease, I did not talk about what the role of fish farms would be in transmitting it to sockeye salmon.⁴²¹

275. Dr. Johnson noted a key distinction between carrying a pathogen and having a disease. Dr. Johnson testified that it was possible for species to carry a pathogen but have it not be fatal or cause disease:

It's not uncommon to find animals or fish within a population that carry pathogens and they show no signs of disease. However, given the appropriate environment conditions and that, what can become a natural association with a pathogen can become unbalanced and you can see the development of disease. So I guess the take-home message is that the presence of pathogens does not necessarily mean that there will be a disease or a disease outbreak within an individual or within a population.⁴²²

Dr. Kent and Dr. Johnson both identified that there are also many natural processes within the environment that may, under normal circumstances, not cause disease in fish, but given bad enough conditions, can result in severe disease.⁴²³

⁴¹⁸ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011)

⁴¹⁹ Transcript, August 22, 2011, p. 4

⁴²⁰ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. i

⁴²¹ Transcript, August 23, 2011, p. 27 (Dr. Michael Kent)

⁴²² Transcript, August 22, 2011, pp. 20-21 (Dr. Stewart Johnson)

⁴²³ Transcript, August 22, 2011, pp. 24-25 (Dr. Michael Kent; Dr. Stewart Johnson)

276. Dr. Kent testified as to the impacts of pathogens on hosts such as salmon, including: (a) very little impact on an individual or a population; (b) a severe impact on an individual but not on the population level because the prevalence of the pathogen is low; (c) chronic diseases where the fish may appear healthy but if you conducted an examination, they would have the pathogen or disease; and (d) the chronic disease may cause indirect effects on the fish's growth, smoltification, reproduction and spawning. With respect to chronic infections, Dr. Kent noted that if chronic infections are prevalent, they can impact fish at a population level, even if an individual fish appears normal.⁴²⁴
277. Technical Report #1 included a subjective assessment of the risk that each pathogen posed for significant disease in FRSS, based on the following risk assessment:
- a. the known or suspected virulence of the pathogen to Pacific salmon in general, and specifically to sockeye salmon; and
 - b. the likelihood that the pathogen would be prevalent in the Fraser River or in British Columbia, which was based on a review of the peer-reviewed literature, government documents DFO and interviews with DFO fish health scientists.⁴²⁵
278. Dr. Kent testified that while his rankings included a lot of subjectivity, they did not differ from other recent reports on FRSS.⁴²⁶
279. Dr. Kent described the criteria for identifying a high risk pathogen, found at page 2 of Technical Report #1. The first criteria would be that the pathogen is known to be virulent or pathogenic to salmon in general, and likely pathogenic or documentedly pathogenic, or highly pathogenic to sockeye. The second criteria required to fit within the high risk scenario would be that sockeye salmon in British Columbia or FRSS would be exposed or infected by that pathogen. The low risk pathogen would be where there was documented or suspected low virulence of the pathogen to sockeye salmon and

⁴²⁴ Transcript, August 22, 2011, p. 23 (Dr. Michael Kent)

⁴²⁵ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. i

⁴²⁶ Transcript, August 22, 2011, pp. 17-18 (Dr. Kent); The list agrees for the most part with one independently developed by Dr. Kyle Garver, DFO-PBS, where he concluded that IHN virus, *Parvicapsula*, and *Ich* are the pathogens of most concern in sockeye from this system. See Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. ii

specifically, to FRSS. The mid-range would be intermediate between low and high risk.⁴²⁷

280. At the Inquiry, Dr. Kent was asked whether there was potential that pathogens placed in the low risk category were placed there because of lack of information rather than his conclusion that it was not a pathogen of concern. In response, Dr. Kent testified:

It's the lack of information...a lot of these low organisms are ones that are not known, are not documented to be virulent, but that doesn't mean that they have been shown not to be, with experimental studies, that they have not been empirically shown not to cause disease.⁴²⁸

281. Dr. Johnson also pointed out that those pathogens that were placed in Dr. Kent's low risk category have the potential to cause disease within an individual or possibly within populations under the appropriate environmental conditions, where there are food limitations or other circumstances.⁴²⁹
282. In Technical Report #1, Dr. Kent concluded that the following pathogens were potentially high risk for causing disease in FRSS: IHN virus, three bacteria (*Vibrio anguillarum*, *Aeromonas salmonicida*, *Renibacterium salmoninarum*), and two parasites (*Ichthyophthirius multifiliis* and the myxozoan *Parvicapsula minibicornis*).⁴³⁰
283. According to the report, the IHN virus is well recognized as a lethal pathogen to sockeye fry in freshwater. It also occurs in marine waters in British Columbia, and has caused several outbreaks in pen-reared Atlantic salmon. Juvenile sockeye salmon are less susceptible, but recent evidence suggests that there is variability in the virulence of this virus, and thus it is conceivable that some strains may be more pathogenic to sockeye salmon in the ocean.⁴³¹
284. Dr. Kent testified that *Vibrio* was placed in the high risk category because it is everywhere in the marine environment and because, under certain conditions, it can be highly pathogenic. It was his understanding that although little work has been done on

⁴²⁷ Transcript, August 22, 2011, p. 17 (Dr. Michael Kent)

⁴²⁸ Transcript, August 22, 2011, p. 25 (Dr. Michael Kent)

⁴²⁹ Transcript, August 22, 2011, p. 26 (Dr. Stewart Johnson)

⁴³⁰ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. i

⁴³¹ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. i

how *Vibrio* might impact post-smolt sockeye when they enter seawater, in the scientific community, it was thought that the presence of *Vibrio* is associated with environmental conditions and the fish being stressed. Therefore, Dr. Kent felt that there could potentially be a high level of disease in sockeye salmon when they are experiencing stress, as they are migrating from freshwater to saltwater.⁴³²

285. Dr. Kent also discussed a second bacteria, *Aeromonas salmonicida*, that was placed in the high-risk category. This bacteria causes *furunculosis*, which is well-recognized as an important disease in captive fishes, and is highly pathogenic. In Dr. Kent's opinion, based on the ability of this pathogen, historically, to cause severe disease in a number of salmonid species, sockeye salmon would be highly susceptible to it and it could cause significant disease if it occurred in the sockeye salmon populations.⁴³³ However, he noted that in British Columbia, there have been no report outbreaks of this bacteria in wild sockeye salmon.⁴³⁴
286. The third bacteria in the high risk category was *Renibacterium*, which causes BKD. *Renibacterium* is an endemic pathogen in British Columbia in all Pacific salmon species. It is found in both hatcheries and salmon enhancement facilities, as well as in research stocks that have come from wild populations. It has also been found in wild fish, during the examination for another disease.⁴³⁵ In Technical Report #1, Dr. Kent reported that sockeye are particularly vulnerable to *Renibacterium* and that it can cause acute to chronic systemic disease which can result in death between weeks or months following infection.⁴³⁶ Dr. MacWilliams testified that in her experience, *Renibacterium* causes a chronic, progressive lifelong infection that gets worse over time. She also noted that because the bacteria infects the fish's immune cells, it can make the fish more susceptible to other diseases.⁴³⁷
287. Technical Report #1 also discusses two parasites, *Ich* and *Parvicapsula*, documented as being associated with PSM in sockeye. *Parvicapsula* also infects outmigrant

⁴³² Transcript, August 22, 2011, p. 32 (Dr. Michael Kent)

⁴³³ Transcript, August 22, 2011, p. 32 (Dr. Michael Kent)

⁴³⁴ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. i

⁴³⁵ Transcript, August 22, 2011, p. 34 (Dr. Christine MacWilliams)

⁴³⁶ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. 9

⁴³⁷ Transcript, August 22, 2011, p. 34 (Dr. Christine MacWilliams)

smolts.⁴³⁸ Dr. Kent testified that *Ich* is of particular concern as a cause of ERL and PSM in adult returns, and that it's been documented to actually be associated with severe disease in fish that have returned to spawn in freshwater. Dr. Kent noted that this parasite is not a problem in the marine environment, because salt is the treatment for the parasite. He noted that at certain water temperatures, around 15 to 20 degrees Celsius, the parasite can cause devastating mortality, particularly when fish are confined as they come back into spawning channels.⁴³⁹

288. Dr. Kent reported that the pathogen that scientists have the most data on for FRSS is *Parvicapsula minibicornis*. Recently there have been numerous reports of a high prevalence of the infection in adult FRSS, as well as outmigrating smolts. This pathogen causes chronic infection and targets the glomeruli of kidneys, which is a very important structure for filtering blood and maintaining osmoregulation in fish. Researchers have found that the infection from this pathogen was more severe in sockeye adults suffering PSM compared to successful spawners.⁴⁴⁰
289. Pathogens assigned to the moderate risk category were *Flavobacterium spp.*, fungi belonging to the genus *Saprolegnia*, the fungus-like pathogen *Ichthyophonus hoferi*, the PKX myxozoan, *Eubothrium spp.* tapeworms, and sea lice (*Lepeophtheirus salmonis* and *Caligus clemensi*). *Flavobacterium* and *Saprolegnia spp.* are recognized as significant, but usually opportunistic, pathogens in salmon in freshwater when environmental conditions are suboptimal, and thus could cause severe disease if the Fraser River system or marine environment is compromised. *Ichthyophonus hoferi* is of concern as it recently has been increasing in Chinook salmon in the Yukon River. *Eubothrium* is one worm parasite that has been already shown to compromise wild sockeye when infections are heavy.⁴⁴¹
290. Dr. Kent and Dr. MacWilliams also testified about ISA, including whether it existed in British Columbia and about its potential impact on FRSS. Dr. Kent testified that he had done no work on ISA, but had done work on the salmon leukemia virus that was

⁴³⁸ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. i

⁴³⁹ Transcript, August 22, 2011, pp. 34-35 (Dr. Michael Kent)

⁴⁴⁰ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), pp. 14-15

associated with a disease that the fish farm community call marine anaemia. Dr. Kent clarified that the ISA virus, which is called marine anaemia in other parts of the world, is different than the virus he had worked on, which is the salmon leukemia virus. He testified that to his knowledge the ISA virus, which is a well-defined virus and disease that can cause mortality in sockeye, has never occurred in British Columbia.⁴⁴²

291. Dr. MacWilliams, who was qualified as an expert in veterinary sciences with a specialty in fish health, confirmed that ISA and marine anaemia were not the same things. With respect to ISA, she testified that in lab experiments using very unnatural conditions, pacific salmon were shown to be relatively resistant to ISA, and those salmon that did get the virus in the lab did not get sick from it. Dr. MacWilliams was not able to confirm whether FRSS were part of these lab experiments. She went on to note that only Atlantic salmon have ever shown natural infection to ISA in the wild.⁴⁴³

iii) Sea Lice

292. Dr. Kent put caligid copepods (i.e., sea lice) in his moderate risk list. He identified that it has not been documented that sea lice cause mortality in wild sockeye salmon. However, given recent claims of sea lice killing wild pink salmon in British Columbia, further research on the impact of caligid juvenile sockeye salmon is needed.⁴⁴⁴
293. Dr. Jones testified that DFO currently does not have laboratory data to allow it to properly understand the threshold effects of sea lice on juvenile sockeye salmon, at the individual level or at the population level, nor does DFO yet have an understanding of what levels of infection the sea lice might be harmful to salmon.⁴⁴⁵
294. Dr. Dill highlighted the number of ways that sea lice can act as vectors for disease in Technical Report #5D. Dr. Craig Orr referred to this evidence in his testimony at the

⁴⁴¹ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), pp. i-ii

⁴⁴² Transcript, August 22, 2011, p. 21 (Dr. Michael Kent)

⁴⁴³ Transcript, August 22, 2011, pp. 21-22 (Dr. Christine MacWilliams)

⁴⁴⁴ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), pp. i-ii

⁴⁴⁵ Transcript, September 6, 2011, p. 16 (Dr. Simon Jones)

Inquiry.⁴⁴⁶ He went on to state that further studies should be done to understand if caligus sea lice act as a vector for disease in wild salmon.⁴⁴⁷

295. Dr. Jones testified that DFO is currently conducting research involving a field surveillance effort, which has been underway since 2010, as well as lab studies to determine whether sea lice are harmful to juvenile sockeye salmon.⁴⁴⁸

iv) The Genomic Signature and Parvovirus: Drs. Miller-Saunders and Garver

296. Dr. Kristi Miller-Saunders, qualified as an expert in molecular genetics, immunogenetics and functional genomics with a specialty in salmon,⁴⁴⁹ and her colleague, Dr. Kyle Garver, qualified as an expert in molecular virology with a specialty in viruses affecting salmon,⁴⁵⁰ have recently identified a genomic signature that is linked to a virus infection in salmon.
297. In her testimony, Dr. Miller-Saunders described the research on the genomic signature as follows:

[W]e basically were able to contrast the genomics of the fish that made it to the spawning ground successfully, or in the case of the study at the spawning grounds, the fish that were successfully spawned with those that were unsuccessful, either in terms of their migration or their spawning. And in doing so, we found that in all three of our independent tagging studies, that the same genomic signature was associated with poor success no matter whether the fish were tagged in the marine environment about 200 kilometres before they enter the river, whether they were tagged in the lower river, or whether they were tagged at the spawning grounds. The same signal was emanating from the data....that is what we have termed the mortality-related signature [MRS]. And in the marine environment, when fish carry that signature, they had 13.5 times lower probability of making it to the spawning grounds and that was also seen, although it was not as high a difference in probability in the lower river and, again, at the spawning grounds.⁴⁵¹

298. Dr. Miller-Saunders testified that one of the important findings from this research is that fish are already conditionally challenged before they're entering the Fraser River from

⁴⁴⁶ Transcript, September 6, 2011, p. 19 (Dr. Craig Orr)

⁴⁴⁷ Transcript, September 6, 2011, pp. 19-20 (Dr. Craig Orr)

⁴⁴⁸ Transcript, September 6, 2011, p. 16 (Dr. Simon Jones)

⁴⁴⁹ Transcript, August 24, 2011, p. 2

⁴⁵⁰ Transcript, August 24, 2011, p. 2

the marine. She identified the work of Dr. Scott Hinch and Dr. Tony Farrell, who have seen a correlation between stress and osmoregulation, which is needed for successful migration. Dr. Miller-Saunders noted that the studies of Dr. Hinch and Dr. Farrell could not propose a mechanism for why some of the fish, including many stressed fish, were sometimes much more ready for freshwater.⁴⁵²

299. Dr. Miller-Saunders testified that she uses genomics to seek a better understanding of the mechanisms that might create the patterns observed by Hinch, Farrell and others. She testified that the MRS genomic research provides a mechanistic understanding for observations that relied on markers that only could allow them to conclude that fish are stressed and had differences in osmo-regulatory preparation, but didn't provide any kind of explanation.⁴⁵³
300. Dr. Miller-Saunders worked with Dr. Garver to determine whether there was a virus in tissues that had the MRS. In early 2011, Dr. Miller-Saunders and Dr. Garver identified the parvovirus.⁴⁵⁴ Dr. Garver testified that his work is to confirm whether the virus is infectious. He had just begun several days before he testified.⁴⁵⁵ At this time, their scientific work needs to determine whether the parvovirus: (a) is an infection; (b) causes disease; (c) causes mortality; and if so (c) where in the FRSS lifecycle the mortality could occur. Dr. Miller-Saunders indicated that her focus right now is understanding whether or not there is a viral agent that is highly prevalent when FRSS are moving into the River.⁴⁵⁶
301. Dr. Miller-Saunders testified that, as of August 24, 2011, DFO had not tested Atlantic salmon samples from fish farms for the MRS signature.⁴⁵⁷ However, DFO will now be getting samples from the BCSFA.⁴⁵⁸ Dr. Garver also confirmed that he and Dr. Miller-Saunders will be looking for the parvovirus in Atlantic Salmon fish farms as soon as they get the samples.⁴⁵⁹

⁴⁵¹ Transcript, August 24, 2011, p. 5 (Dr. Kristi Miller-Saunders)

⁴⁵² Transcript, August 24, 2011, p. 16 (Dr. Kristi Miller-Saunders)

⁴⁵³ Transcript, August 24, 2011, p. 17 (Dr. Kristi Miller-Saunders)

⁴⁵⁴ Transcript, August 24, 2011, p. 30 (Dr. Kyle Garver)

⁴⁵⁵ Transcript, August 24, 2011, p. 32 (Dr. Kyle Garver)

⁴⁵⁶ Transcript, August 25, 2011, p. 29 (Dr. Kristi Miller-Saunders)

⁴⁵⁷ Transcript, August 24, 2011, pp. 14-15 (Dr. Kristi Miller-Saunders)

⁴⁵⁸ Transcript, August 24, 2011, p. 13 (Dr. Kristi Miller-Saunders)

⁴⁵⁹ Transcript, August 24, 2011, p. 33 (Dr. Kyle Garver)

302. With regard to funding, Dr. Miller-Saunders testified that it had not yet been confirmed whether DFO funds would be available for her continued work on FRSS.⁴⁶⁰

v) Potential of Disease and Sea Lice to Cause 2009 poor returns and the longer term decline

303. Dr. Kent made a number of conclusions, which he confirmed in his testimony at the Inquiry. On page i of Technical Report #1, Dr. Kent concluded: "At present, there are no direct links between a specific pathogen and sockeye salmon survival at a population level in BC."⁴⁶¹ He went on, at page 1, to conclude: "there have been only a few infectious diseases that have been shown or implicated to cause significant mortality in wild salmon in BC."⁴⁶²

304. In response to the question of whether pathogens were the "smoking gun" to the decline of FRSS, Dr. Kent testified:

In my opinion, I don't see a smoking gun for the present situation. As I said, there are some pathogens like the Ichthyophthirius multifiliis that has been described associated with pre-spawning mortality in sockeye up in the Babine system, et cetera. So there's specific examples where...there is, quote, a smoking gun in a particular population. But there at present there is no...scenario like that for...the populations of sockeye salmon that we're looking at in this particular exercise.⁴⁶³

305. Dr. Kent testified:

...the evidence does not show this, based on the data that we have...and so therefore we cannot say that there is not an infectious agent, or other disease phenomenon, and that's kind of an important role in the survival of sockeye salmon, and we just do not have any hard evidence to support that at this time.⁴⁶⁴

306. In his testimony, Dr. Kent concluded that further work must be done:

Yes. I think it's worthy of investigation. Simply to not move forward on investigations on the impacts of diseases on salmon, sockeye

⁴⁶⁰ Transcript, August 25, 2011, p. 39 (Dr. Kristi Miller-Saunders)

⁴⁶¹ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. I; Transcript, August 22, 2011, p. 18 (Dr. Michael Kent)

⁴⁶² Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. 1; Transcript, August 22, 2011, p. 19 (Dr. Michael Kent)

⁴⁶³ Transcript, August 22, 2011, p. 19 (Dr. Michael Kent)

⁴⁶⁴ Transcript, August 22, 2011, p. 19 (Dr. Michael Kent)

salmon, because we do not have any firm evidence at this time would not be prudent to do that.⁴⁶⁵

307. In his testimony, Dr. Kent clarified that the high risk pathogens he reviewed were endemic to British Columbia, and therefore.⁴⁶⁶

If there has been a dramatic increase in mortality caused by one or more of them in recent years, it is likely due to changes in the susceptibility of sockeye salmon to them or a change in the abundance in these pathogens...

... Environmental changes could be an underlying cause of either. Fish are very closely tied to their environment, and thus water quality and other environmental parameters play a very important role in their susceptibility and severity of diseases. Changes in water temperature, either in freshwater or seawater, are important likely candidates. Fish are cold-blooded (poikilothermic) and thus both their pathogens and the fish themselves are extremely influenced by temperature. At present, there are no direct links between a specific pathogen and sockeye salmon survival at a population level in British Columbia.⁴⁶⁷

308. Dr. Kent agreed that fish farms can cause a change in the environment that wild fish swim through in relation to potential risk of disease. He indicated that this would be a concern, and an area of risk that would need to be addressed. He suggested that the risk is of "unknown significance."⁴⁶⁸

309. Dr. Kent also testified that when a fish farm is undergoing a disease outbreak, it greatly increases the numbers of pathogens in the environment, and that it is unknown whether this increases the chance of infection from pathogens because scientists currently do not know much about the survival of many of these directly transmitted pathogens in the marine environment.⁴⁶⁹ He went on to testify as follows:

Yes, that would be a reasonable assumption to say that there's generally numbers of pathogens in and around the pen are going to be increased. How this would increase the exposure and

⁴⁶⁵ Transcript, August 22, 2011, p. 20 (Dr. Michael Kent)

⁴⁶⁶ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. ii

⁴⁶⁷ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. ii

⁴⁶⁸ Transcript, August 23, 2011, p. 42 (Dr. Michael Kent)

⁴⁶⁹ Transcript, August 23, 2011, p. 43 (Dr. Michael Kent)

infection in wild fish, that's -- that's really an important question that has to be answered for most diseases.⁴⁷⁰

310. Dr. Kent testified that it was his opinion that diseases of captive fish may pose a threat to wild fish when they are exotic diseases; have the potential to cause an increase in prevalence of an enzootic disease; or if their presence results in the use of drugs that are released into the environment.⁴⁷¹

vi) The Potential Impact of Fish Farms on Wild Sockeye

311. Technical Reports #5A, #5B, #5C, and #5D addressed the topic of whether fish farms have potentially led to mortality in FRSS. Technical Report #5A, written by Dr. Korman, was a synthesis of data relating to disease, utilizing the BCMAL records on which the other reports relied.
312. Technical Report #5B was written by Dr. Brendan Connors, who was qualified as an expert in expert in statistical analysis, fish population dynamics with a particular research emphasis on wild salmon/farmed salmon interactions.⁴⁷² The purpose of the report was to quantitatively evaluate the relationship between FRSS productivity and (a) sea lice (*Lepeophtheirus salmonis* and *Caligus clemensi*) abundance on farmed salmon; (b) disease frequency and occurrence on farmed salmon; (c) mortalities of farmed salmon; and (d) salmon farm production.⁴⁷³
313. Dr. Connors' analyses could not confirm a relationship between sockeye survival anomalies and sea lice abundance on farmed salmon in the spring/summer when juvenile sockeye migrate to sea, or between *A. salmonicida*, *R. salmoninarum*, IHN virus or total high risk pathogen occurrence on farmed fish in the year sockeye migrate to sea. It also could not confirm a relationship between sockeye survival anomalies and the number of farmed salmon or farmed salmon mortality rates along migration routes in the spring/summer sockeye migrate to sea.⁴⁷⁴ Technical Report #5 stressed that when there

⁴⁷⁰ Transcript, August 23, 2011, p. 43 (Dr. Michael Kent)

⁴⁷¹ Transcript, August 23, 2011, p. 67 (Dr. Michael Kent); Exhibit 1494 (IN PRESS: Fisken og Havet 13: The Impact of Diseases of Pen-Reared Salmonids on Coastal Marine Environments, by Michael L. Kent, February 10, 1993), abstract

⁴⁷² Transcript, August 25, 2011, p. 74

⁴⁷³ Exhibit 1545 (Technical Report #5B: Examination of Relationships between Salmon Aquaculture and Sockeye Salmon Population Dynamics, June 2011) (the "Connors Report"), p. i

⁴⁷⁴ Exhibit 1545 (Technical Report #5B: Examination of Relationships between Salmon Aquaculture and Sockeye Salmon Population Dynamics, June 2011), p. i

is a short time series of aquaculture variables, it is statistically difficult to detect a relationship between the aquaculture variables and sockeye survival, should a relationship exist. Given this lack of data, what can be drawn from the analyses is limited.⁴⁷⁵

314. One aquaculture variable that Dr. Connors did have available over a longer time scale was aquaculture production spanning the migratory route of FRSS. He related sockeye productivity to the measure of aquaculture product along with other possible contributors to the decline of FRSS, including ocean conditions during early marine life and competition with pink salmon in the ocean. He relied upon this variable to complete his analysis on the potential relationship between farmed fish and FRSS.
315. Dr. Connors' analysis suggest that increases in aquaculture production, SST, and pink salmon abundance all increase sockeye mortality with the predicted effects of aquaculture production further influenced by the abundance of pink salmon in the open ocean and SST in the winter preceding marine entry. However, there was large uncertainty around these estimated effects, which precludes drawing strong inference from these results.⁴⁷⁶ Technical Report #5B describes the relationships between pinks, SST, increasing farmed salmon production, as correlative and not causative of increased sockeye salmon mortality.⁴⁷⁷
316. Technical Report #5D was written by Dr. Larry Dill, who was qualified as an expert in behavioural ecology, predator/prey relationships and ecological factors affecting wild fishes, including parasites and fish farms.⁴⁷⁸ Dr. Dill concludes that Dr. Connors' statistical model is possibly capturing some underlying causal relationships between mortality in FRSS and SST and competition with pinks and increased farmed salmon production,⁴⁷⁹ and recommends that DFO repeat this analysis for a number of years to

⁴⁷⁵ Exhibit 1545 (Technical Report #5B: Examination of Relationships between Salmon Aquaculture and Sockeye Salmon Population Dynamics, June 2011), p. 22

⁴⁷⁶ Exhibit 1545 (Technical Report #5B: Examination of Relationships between Salmon Aquaculture and Sockeye Salmon Population Dynamics, June 2011), p. 22

⁴⁷⁷ Exhibit 1545 (Technical Report #5B: Examination of Relationships between Salmon Aquaculture and Sockeye Salmon Population Dynamics, June 2011), p. ii

⁴⁷⁸ Transcript, August 25, 2011, p. 71

⁴⁷⁹ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 2

see if any patterns emerge.⁴⁸⁰ The FNC note that these same possible factors were identified by Dr. Peterman in Technical Report #10.

317. In Technical Report #5D, Dr. Dill suggests that if there is an effect from fish farms, it is most likely due to disease, sea lice or both. Dr. Dill identified that there are a variety of ways these may be transferred from farmed fish to wild sockeye, including horizontal transfer of shed pathogens, via farmed salmon escapees, via movement of infected sea lice (vectoring), and through discharge of untreated "blood water" from processing facilities.⁴⁸¹
318. Dr. Dill identified viral and/or bacterial pathogens such as *Renibacterium salmoninarum* (causing bacterial kidney disease, BKD), the IHN virus (causing infectious hematopoietic necrosis, IHN) and *Aeromonas salmonicida* (causing furunculosis) to be a risk to FRSS. With respect to ISA, which has not been reported in British Columbia, Dr. Dill outlined that there should be close monitoring for the disease, and that biosecurity should be rigidly enforced.⁴⁸²
319. Dr. Dill concluded that at this stage of our knowledge it is not possible to say fish farms are *not* implicated in the decline of FRSS and suggested further work be done, including setting up a database to begin addressing data gaps.⁴⁸³
320. Technical Report #5C was written by Dr. Don Noakes, who was qualified as an expert in salmon population dynamics, including wild salmon/farmed salmon interactions, fisheries climate interactions and in statistical analysis including time series analysis.⁴⁸⁴ Based on his analysis, Dr. Noakes concluded that:
- a. there is no significant correlation between farmed salmon production within the main migration path of FRSS, the waters between Vancouver Island and the mainland of British Columbia, and the returns of FRSS and no causal relationship between these two time series;

⁴⁸⁰ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 4

⁴⁸¹ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 4

⁴⁸² Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 3

⁴⁸³ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 4

⁴⁸⁴ Transcript, August 25, 2011, p. 69

- b. there is no significant correlation between the number of sea lice on farmed salmon and the return of FRSS. The average number of lice (*Lepeophtheirus salmonis*) on farmed salmon has decreased from approximately 3 lice/fish in 2004 to between 1.0 lice/fish (annual mean) and 0.5 lice/fish (the April – June average - the time period when juvenile sockeye salmon are migrating past the salmon farms) in 2010;
 - c. the evidence suggests that disease originating from salmon farms has not contributed to the decline of FRSS.⁴⁸⁵
321. The FNC submits that the scientific state of knowledge regarding the relationship between farmed fish and wild fish is abysmally poor and that it is both prudent and precautionary that further research be conducted and prioritized. The FNC is very concerned with any scientist who, based on the lack of data, creates definitive conclusions. In our submission such conclusions should be given little weight.
322. In addition, the FNC submits that, given the identified lack of data in the time series and the other factors that were considered in Technical Reports #5B, #5C, and #5D, no conclusion can be made as to whether fish farms have or have not caused the decline in FRSS or the poor returns in 2009.
323. As Dr. Dill summarized well in his report:

It is naïve to believe that the present report, and the Cohen Commission in general, will identify the cause of the sockeye salmon decline, and in particular the return failure of 2009. Nature is complex and factors do not act in isolation on the population dynamics of any species. Pathogens from fish farms are just one factor among many that may influence the mortality rate of sockeye. There are several ways in which these various factors may interact, and a number of these are discussed. Although some are hypothetical at this stage of our knowledge, they highlight the complexities in the real world system in which farms and wild sockeye are embedded, and caution against any simplistic single-factor explanation.⁴⁸⁶

vii) Challenges and Limitations Existing in Research

324. Technical Report #1 noted that although there are many pathogens that occur in wild salmon, many of which are endemic to British Columbia, the precise impacts on survival

⁴⁸⁵ Exhibit 1536 (Technical Report #5C: Noakes, Impacts of Salmon Farms on FRSS: Results of the Noakes Investigation, June 2011), p. ii

⁴⁸⁶ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 3

of wild salmon are poorly understood. Therefore, there are not firm links between the presence of pathogens and the demise of sockeye populations, although some pathogens are clearly associated with PSM in freshwater.⁴⁸⁷

325. Technical Report #1 identified that the absence of data on pathogens and diseases in wild salmon in British Columbia reflects the fact that historically, research has been directed toward salmonid diseases afflicting captive fish, either in government hatcheries or private fish farms.⁴⁸⁸ Dr. Kent testified that:

Historically, not only within the Pacific Region of DFO...most of the emphasis has been directed towards investigations on disease phenomena and within hatcheries or captive populations. And since, you know, or I'd say probably 50 years ago...the field of fish disease for 50 or 70 years ago, you'll see the reports were mostly on infectious diseases and others in hatcheries. With the emergence of salmon farming I would say really taking off about 20 years ago, now we're starting to see a lot of information, studies on diseases affecting salmon in net pens and other captive private aquaculture operations. In comparison, there's relatively very little done on diseases of wild salmonids...as far as population studies, impacts of diseases, infectious diseases, parasites, viruses, bacteria at a population level with salmonids has been very minimal...compared to other fields of fish diseases, there's very little on impacts of parasites and other infectious agents at a population level, let alone an individual level with salmonids.⁴⁸⁹

326. Dr. Kent identified two main challenges in identifying the impact of pathogens on salmon populations, particularly in field studies. One challenge was that methods for investigating the impacts of disease at a population level require sampling the same population and knowing that it's the same population over multiple time periods, which is extremely difficult to do with migrating salmon.⁴⁹⁰ The second challenge was limited sample sizes. Many of the methods used to determine fish diseases require large

⁴⁸⁷ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011)

⁴⁸⁸ Exhibit 1449 (Technical Report #1: Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon, February 2011), p. ii

⁴⁸⁹ Transcript, August 22, 2011, pp. 10-11

⁴⁹⁰ Transcript, August 22, 2011, p. 11 (Dr. Michael Kent)

sample sizes from the same population, which again is very difficult to get with wild salmon.⁴⁹¹

327. Dr. Kent advised that scientists had more empirical data from lab studies on pathogens and disease, but that most lab studies have been directed towards pathogens that have been observed in disease in captive fish.⁴⁹² Another difficulty is relating lab findings to what is happening in the field, because fish are very tied to environmental conditions within the water. Dr. Kent noted that any changes in environmental conditions, temperature, etc., can greatly affect the pathogenesis of an organism. He testified that if you do a “a well-defined study in the lab under certain conditions, under certain temperature, you have to apply that to what that pathogen is doing in the field with extreme caution.”⁴⁹³

328. Dr. Johnson, who was qualified as an expert in aquatic animal diseases, immunology and physiology, as well as an expert in parasitology as it pertains to fish,⁴⁹⁴ also noted some of the limitations of conducting studies in the lab and how that might apply in the field to assess pathogens and disease in wild salmon populations. He testified:

Most of the laboratory studies we've done have been single pathogen studies. So we really haven't sort of gone to this concurrent infection. Most fish carry multiple pathogens. So that's another limitation. But so the laboratory studies have a place in investigations of salmon diseases, but they do not replace the sorts of field studies that Dr. Kent was talking about.⁴⁹⁵

329. One of the other challenges identified by Dr. Johnson was that there are stock-specific differences in susceptibility to some pathogens, as well as family specific differences. So, for example, susceptibility of a particular stock of Chinook salmon to a pathogen is not necessarily comparable to another stock.⁴⁹⁶ Another challenge identified by Dr. Kent was understanding the geographic distribution of pathogens, such as in the marine environment, although in his opinion this is not as difficult as the other identified challenges.⁴⁹⁷

⁴⁹¹ Transcript, August 22, 2011, pp. 11-12 (Dr. Michael Kent)

⁴⁹² Transcript, August 22, 2011, p. 12 (Dr. Michael Kent)

⁴⁹³ Transcript, August 22, 2011, p. 12 (Dr. Michael Kent)

⁴⁹⁴ Transcript, August 22, 2011, p. 6

⁴⁹⁵ Transcript, August 22, 2011, p. 13 (Dr. Stewart Johnson)

⁴⁹⁶ Transcript, August 22, 2011, p. 13 (Dr. Stewart Johnson)

⁴⁹⁷ Transcript, August 22, 2011, p. 14 (Dr. Michael Kent)

330. Another limitation was the lack of a baseline understanding of the types and prevalence of endogenous pathogens. Dr. Kent testified that many scientists feel that it is important to obtain this baseline information, but that it is difficult to get the work funded because it is seen as just “data collection” and not hypothesis driven.⁴⁹⁸ He identified that this data would provide an important foundation for determining whether there has been a change over time in pathogen distribution. He testified that the baseline data could help determine if a pathogen occurred or was present previously in wild salmon before salmon farming. He testified: “We don't have that information because the surveys weren't done, or in regions where salmon farming does not occur, that type of solid well-funded large studies on the distribution of pathogens, it's generally not done.”⁴⁹⁹
331. Another challenge is that when salmon die in the ocean, they disappear. Therefore there is no opportunity to find them and determine whether disease was the cause of mortality.⁵⁰⁰ Dr. Kent testified that we could conceivably have very large numbers of fish dying due to a new viral disease or other pathogenic phenomenon, and not detecting it.⁵⁰¹ Dr. Johnson testified that even in the Fraser River freshwater environment, where accessibility can be an issue, “we [DFO] simply doesn't have the people on the ground to make these sorts of observations.”⁵⁰²
332. Dr. Stephen, who was qualified as an expert in veterinary epidemiology with a specialty in the ecology of emerging diseases and surveillance of aquatic animal health and disease,⁵⁰³ also identified the lack of study on true distribution of diseases, or population based research on diseases. He testified that:

a critical element of risk is to identify that in fact [there] has been exposure, and we've had very little work in general, looking at the exposure of free-ranging species to pathogens of particular sources, and part of that comes back to the challenges again, as Dr. Kent mentioned, of tracking populations, but also of tracking and finding the pathogen in the environment.⁵⁰⁴

⁴⁹⁸ Transcript, August 22, 2011, p. 14 (Dr. Michael Kent)

⁴⁹⁹ Transcript, August 22, 2011, p. 14 (Dr. Michael Kent). Dr. Craig Stephen agreed with data and research limitations identified by Dr. Kent and Dr. Stewart, as outlined in this section of the submissions. See Transcript, August 22, 2011, p. 15 (Dr. Craig Stephen)

⁵⁰⁰ Transcript, August 22, 2011, p. 38 (Dr. Michael Kent)

⁵⁰¹ Transcript, August 22, 2011, pp. 37-38 (Dr. Michael Kent)

⁵⁰² Transcript, August 22, 2011, p. 38 (Dr. Stewart Johnson)

⁵⁰³ Transcript, August 22, 2011, p. 8

⁵⁰⁴ Transcript, August 22, 2011, pp. 15-16 (Dr. Craig Stephen)

333. Dr. Larry Dill outlined that lack of data severely limited analysis, stating in Technical Report #5D that the biggest problem facing the analysis is the fact that the impact of farms could only be examined for a few year classes (brood years) of wild sockeye, because good fish health records were only available from 2003 (2004 for lice), and complete sockeye escapement data were only available up to 2009 (the 2004 brood year).⁵⁰⁵
334. Dr. Dill also outlined a number of gaps that currently exist in the science and research with respect to the impact of fish farms on wild salmon, some of which include:
- a. detailed information on migration behaviour and pathways of sockeye smolts through the Discovery Islands area;
 - b. the attraction of sockeye juveniles (and other species) to the net pens;
 - c. the cumulative impact of repeated exposure to poor water quality and pathogens (including lice) when passing multiple farms in succession;
 - d. the impact of both species of lice (*Lepeophthierus salmonis* and *Caligus clemensi*), and of other pathogens, on feeding and anti-predator abilities and survival of sockeye smolts;
 - e. interactions of lice and other pathogens with other stressors in the marine environment, such as low food availability and pollutants;
 - f. disease incidence and levels in wild sockeye.⁵⁰⁶

viii) Recommendations for Research on Disease and Sea Lice

335. Dr. Kent concluded that in order to document the role of pathogens that may cause wild salmon mortality, a significant amount of research is needed. He recommended the following:
- a. conducting multiple year surveys to identify pathogens, fish distribution, and data on abundance and severity of infection;

⁵⁰⁵ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 34

- b. analysing the data collected through the surveys to document the role that identified pathogens have on survival in various life stages;
 - c. once a pathogen is shown to be associated with mortality in salmon, conducting investigations to determine which environmental factors, for example water temperature, river flow, land use practices, net pen farming, etc. influence the distribution and abundance of these pathogens; and
 - d. use appropriate diagnostic methods for specific pathogens, including histological analysis to screen fish for underlying pathological changes and unknown diseases.
336. Dr. Kent clarified that mathematicians, ecologists, fisheries biologists and others should also be looking at environment and other information while data and analyses regarding pathogens was being conducted.⁵⁰⁷ Dr. Johnson agreed that another gap in research was defining the socially and ecologically tolerable levels of disease associated with exposures to pathogens.⁵⁰⁸ Dr. Stephen agreed with the recommendation that research on defining socially and ecologically tolerable levels of disease would require a broad group of people who care about FRSS, including First Nation's being involved in helping to define socially and ecologically tolerable levels of risk from disease.⁵⁰⁹

Recommendation: DFO, in collaboration with First Nations and with stakeholders, must conduct an analysis and risk assessment that defines the ecologically and socially tolerable levels of disease that may transfer from farmed fish to wild fish.

337. Most importantly, as Dr. Stephen testified:

I think another important deficit in the science side is the focus we've had has been on disease, as opposed to health. And the broader capacity for that population to be resilient and to thrive in

⁵⁰⁶ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), pp. 38-39

⁵⁰⁷ Transcript, August 23, 2011, p. 92 (Dr. Michael Kent)

⁵⁰⁸ Transcript, August 23, 2011, p. 94 (Dr. Stewart Johnson); Exhibit 1461 (Introduction to Pathogens, Diseases and Host Pathogen Interactions of Sockeye Salmon, undated)

⁵⁰⁹ Transcript, August 23, 2011, p. 94 (Dr. Craig Stephen)

the face of challenges like disease. So the fish health world has really been a fish disease world.⁵¹⁰

338. Dr. Johnson testified, "if I want to study disease, the message here is you need to consider all three of these [the host, the environment and the pathogen] and the interactions that go between them."⁵¹¹ Dr. Stephen also included studying the social environment, stating:

I'd want to make sure that they're talking about not just the biotic environment but also the social environment...if you're going to look at health, you must look at all of them together, and that's the significant challenge we're facing, I think.⁵¹²

339. Dr. Johnson testified that it is important to limit exposure of one species to other species or fish that are carrying a pathogen. He went on to testify maintaining high levels of bio-security associated with aquaculture activities would be one way to prevent exposing wild salmon to other species that were carrying pathogens. He also agreed that if pathogens were being sent by a salmon farm, one could also move net pens from the migratory route of wild salmon.⁵¹³ Dr. Orr also supported the experimental removal or relocation of fish farms to help us better understand the potential impacts of such farms of FRSS.
340. In Technical Report # 5D, Dr. Lawrence Dill concluded that one of the most obvious solutions to the risk of pathogen infection of wild sockeye, and to other environmental issues arising from net pen fish farm, was closed containment, either on land or the water. Dr. Dill reported closed-containment technology had advanced considerably in recent years and appears to be both technologically and economically feasible as an alternative to open net pens.⁵¹⁴
341. In her evidence, Dr. Miller-Saunders agreed to the following recommendations:

⁵¹⁰ Transcript, August 22, 2011, p. 16 (Dr. Craig Stephen)

⁵¹¹ Transcript, August 23, 2011, p. 90 (Dr. Stewart Johnson); Exhibit 1461 (Introduction to Pathogens, Diseases)

⁵¹² Transcript, August 23, 2011, p. 90 (Dr. Craig Stephen)

⁵¹³ Transcript, August 23, 2011, pp. 90-91 (Dr. Stewart Johnson)

⁵¹⁴ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 37

- a. that it would be important to have First Nations working with her to make sure she has baseline data, including enough samples from stocks of interest to First Nations;⁵¹⁵
- b. that having direct and iterative engagement between DFO Science researchers and First Nations in order to facilitate the transparent exchange of information would be a good idea;⁵¹⁶
- c. that it would be useful to have a protocol in place between DFO, First Nations, and Industry that would allow her to get fish samples in a way that ensures timely research.⁵¹⁷

Recommendation: DFO must implement a research program, funded by Industry, that monitors the interactions between farmed fish and wild fish, particularly as it relates to potential transfer of pathogens and disease. This research must include: (a) multiple year surveys that identify pathogens, host distribution, and collect data on abundance and severity of infection; (b) conduct analysis about the role pathogens have on wild salmon, including FRSS survival at various life stages; (c) considers evolving interactions between environmental factors such as climate change and increased water temperature and pathogens and disease.

Recommendation: DFO, in collaboration with First Nations and with stakeholders, must conduct an analysis and risk assessment that defines the ecologically and socially tolerable levels of disease that may transfer from farmed fish to wild fish.

Recommendation: DFO Science should develop protocols with First Nations and Industry to ensure access to fish samples, transparency of data and research, and to ensure monitoring of fish health in open net pen fish farms.

⁵¹⁵ Transcript, August 25, 2011, p. 35 (Dr. Kristi Miller-Saunders)

⁵¹⁶ Transcript, August 25, 2011, p. 36 (Dr. Kristi Miller-Saunders)

Recommendation: DFO should continue to fund Dr. Miller-Saunders' and Dr. Garver's genomics research into the MRS signature and parvovirus, including on wild fish and farmed fish.

Recommendation: In collaboration with First Nations and at the cost of Industry, DFO must ensure that independent transparent research is conducted on: (a) the interaction between existing finfish farms (including density, location, fish health and transfer of disease along the FRSS migratory route) and migrating wild salmon, including FRSS; (b) the experimental removal and relocation of fish farms along the FRSS migratory route; and (c) the feasibility of other models of farming fish (eg. closed containment) that may present fewer risks and uncertainties for the health of wild salmon.

Recommendation: In collaboration with First Nations, DFO must undertake a substantive review of the adequacy and application of existing siting criteria for fish farms using current scientific knowledge and TEK. This review should be conducted as part of the consultative process that respects First Nations' unique constitutional rights and perspectives.

i) Localized impacts of fish farms: Waste, Chemicals and Escapes

342. In Technical Report #5D, Dr. Dill concluded that the impacts on sockeye from other factors, such as escapes, or waste and chemical inputs, are local and unlikely to be sufficient, alone or in concert, to cause either the long-term population declines or the especially low returns in 2009.⁵¹⁷ Dr. Dill reports that while effects from a single farm may be negligible, this may not be the case where there are cumulative impacts from multiple farms in close proximity, a situation that will be experienced by juvenile sockeye migrating through the Discovery Islands. The FNC submits that these local impacts are

⁵¹⁷ Transcript, August 25, 2011, p. 36 (Dr. Kristi Miller-Saunders)

⁵¹⁸ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 2

important to consider, given the density and location of fish farms along the FRSS coastal migratory route.

343. Dr. Dill recommends the following to determine impacts from density of fish farms: three dimensional hydrodynamic modeling to scientifically determine site selection” should be done in an attempt to predict whether essential pelagic ecosystem functions will be compromised.⁵¹⁹
344. The FNC submits that this modeling would be a useful tool in the review of the siting of existing fish farms called for elsewhere in these submissions.

RECOMMENDATION: In collaboration with First Nations and at the cost of Industry, DFO must ensure that independent transparent research is conducted on: (a) the interaction between existing finfish farms (including density, location, fish health and transfer of disease along the FRSS migratory route) and migrating wild salmon, including FRSS; (b) the experimental removal and relocation of fish farms along the FRSS migratory route; and (c) the feasibility of other models of farming fish (e.g. closed containment) that may present fewer risks and uncertainties for the health of wild salmon.

F. Contaminants

i) Sources of Contaminants

345. Source contaminants are categorized into three categories: (1) point sources from municipal wastewater treatment plants, pulp mills, mines, seafood processing facilities, cement and concrete plants, manufacturing facilities and contaminated sites, and other facilities that collectively discharge substantial volumes of wastewater into receiving waters within the Fraser watershed;⁵²⁰ (2) non-point sources, which includes forestry and agricultural runoff, municipal storm water run-off, and run-off from linear development such as railways and roads; and⁵²¹ (3) atmospheric sources, which includes natural

⁵¹⁹ Exhibit 1540 (Technical Report #5D: Impacts of Salmon Farms on FRSS: Results of the Dill Investigation, June 2011), p. 20

⁵²⁰ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 13-34

⁵²¹ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 34-41

sources of contaminants from forest fires and volcanoes, and anthropogenic sources such as vehicle exhaust and industrial pollution.⁵²²

346. During the hearings on municipal wastewater, Dr. Peter Ross testified about some of the sources of contaminants in the Fraser watershed. In reference to Exhibit 883, *Late-Run Sockeye at Risk: An Overview of Environmental Contaminants in the Fraser River Salmon Habitat*, Dr. Ross testified about the role of municipal wastewater. He stated: “we have 23,000 chemicals on the domestic substances list in Canada. Many of those chemicals are either used or end up in Fraser River salmon habitat.”⁵²³

347. He said this about contaminants from municipal wastewater:

...if we look at some of the chemicals of concern in the wastewater stream, there are a number of classes of concern and I think the way I would capture it is in the absence of direct – much direct evidence from the Fraser River system, we have to rely on some of the literature from other parts of the world, and then we have to [use] a risk oriented approach to try and rank which types of chemicals might present the greatest risk here. I should point out that there have been several examples from other parts of the world that would underscore the potentially important threat that wastewater treatment streams present to the health of fish. The widespread feminization of fish has been taking place in the United Kingdom. This is accentuated downstream of municipal wastewater treatment plants and this has been surmised and – surmised to be largely due to the estrogenic nature of the wastewater stream. Estrogenic nature simply means the stream has estrogenic potential and can feminize male fish or alter reproductive health in both the male and female fish. That estrogenic nature will come from natural estrogens, from human wastes, from agricultural animals, from birth control pills, but also a lot of pharmaceuticals, synthetic musks and a lot of the persistent bioaccumulative chemicals as well. So there are a lot of chemicals of potential concern, I would say, in the Fraser River system and certainly being released from wastewater treatment plants.⁵²⁴

ii) Assessing Potential Effects of Contaminants on FRSS

348. Mr. MacDonald, lead author of Technical Report #2, said this about how salmon are highly susceptible to impacts from contaminants:

⁵²² Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 41-42

⁵²³ Transcript, June 14, 2011, p. 12 (Dr. Peter Ross)

... when we develop environmental quality guidelines for individual contaminants, what we find is that salmonids are generally the most sensitive species to the contaminants that we're looking at...they are inherently more sensitive to most contaminants than are other aquatic organisms... and because they utilize so many different habitats throughout their life history and each one of those habitats has a potential to be adversely affected by discharges of contaminants or other anthropogenic factors that influence their survival during those critical time periods.⁵²⁵

349. Technical Report #2 was conducted to develop an Inventory of Aquatic Contaminants (“IAC”) for the Fraser River Basin and to evaluate the potential effects of those contaminants on FRSS. A risk-based approach was used to determine if the contaminants that have been released into freshwater ecosystems within the watershed have caused or substantially contributed to the decline of FRSS over the past 20 years or to the poor returns in 2009.
350. The Report’s lead author, Don MacDonald, qualified as an expert in environmental toxicology and chemistry with particular expertise in “ecological risk assessment and EBM, water quality and water use interactions, design and evaluation of contaminated sediments on ecological receptors including fish, design and implementation of environmental quality monitoring programs.”⁵²⁶
351. The method outlined in Technical Report #2 for assessing the potential impact of contaminants on FRSS involved a number of steps. First, an IAC, also known as chemicals of potential concern, was developed. The IAC used available information on land and water uses within the Fraser River Basin, and included substances that have been, or may have been, released to aquatic ecosystems in conjunction with these land and water uses. Mr. MacDonald testified that:

So what we did was we obtained information on the distribution of sockeye salmon within the Fraser River Basin. Then we conducted an evaluation of the availability of surface water chemistry, sediment chemistry and other types of data that could be used to evaluate conditions within the Fraser River Basin. We integrated those two types of information to identify a scope of the study area that would encompass the distribution of sockeye salmon within the system and throughout each of their life stages, through incubation and through – spawning and incubation

⁵²⁴ Transcript, June 14, 2011, p. 14 (Dr. Peter Ross)

⁵²⁵ Transcript, May 9, 2011, p. 66 (Don MacDonald)

⁵²⁶ Transcript, May 9, 2011, p. 9

through rearing, and then through the outmigration and upstream migration, as well, the adults. And so what we tried to do is make sure that our scope of the study area was inclusive of all of those areas, but was able to be evaluated using the data that were available to us. And so what we ultimately focused on then was identifying a total of 15 areas of interest within the Fraser River Basin that would provide us with the basis for evaluating those conditions, and how those conditions then might be influencing the abundance of sockeye salmon.⁵²⁷

352. With respect to the time frame for assessing the potential impacts from contaminants, Mr. MacDonald testified that:

Our interest was to be able to understand the factors, contaminant-based factors that could be influencing the decline of sockeye salmon over the last 20 years. And so we wanted to make sure that we captured the last 20 years, plus a period of time before that, so that we would have a basis for comparing information on environmental quality conditions prior to these major declines in sockeye salmon, and after the declines had ...begun.⁵²⁸

353. The authors of Technical Report #2 concluded that, based on information in the IAC, over 200 substances that were considered to be chemicals of potential concern are potentially being released into aquatic ecosystems within the Fraser River Basin.⁵²⁹

iii) Potential Impacts of “Contaminants of Concern” on FRSS

354. Next, a preliminary assessment indicated that a number of chemicals of potential concern exceeded the toxicity screening values in one or more environmental samples and therefore were identified as contaminants of concern.⁵³⁰ Determining which chemicals of concern were risk drivers for FRSS involved reviewing the toxicological data for many substances and determining that the ratio of no-effect levels to lowest-effect levels was typically on the order of 2.0. After reviewing the maximum hazard quotients calculated in the preliminary assessment, the Technical Report authors eliminated any substance with a maximum hazard quotient of less than 2.0 as it was

⁵²⁷ Transcript, May 9, 2011, p. 11 (Don MacDonald)

⁵²⁸ Transcript, May 9, 2011, p. 11 (Don MacDonald)

⁵²⁹ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. ii

⁵³⁰ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. ii

highly unlikely that contaminants of concern with hazard quotients of less than 2.0 would pose potential risks to sockeye salmon.⁵³¹

355. Those chemicals of concern that had a hazard quotient of 2.0 were retained for further evaluation, which focused on determining whether their concentrations in surface water, sediment, or fish tissues in the Fraser River or its tributaries were sufficient to adversely affect the survival, growth, or reproduction of sockeye salmon. **The results of this assessment indicated that exposure to contaminated surface water and sediment or accumulation of contaminants in fish tissues pose potential hazards to sockeye salmon utilizing spawning, rearing, or migration habitats within the Fraser River Basin.** The chemicals of concern that occurred in water at concentrations sufficient to adversely affect the survival, growth, or reproduction of FRSS included total suspended solids, six metals (aluminum, chromium, copper, iron, mercury and silver), and phenols.⁵³²
356. As part of their methodology the authors of Technical Report #2 also conducted an uncertainty analysis that identified sources of uncertainty in assessing whether contaminants pose a risk to FRSS. The uncertainties identified in this analysis included uncertainties in the conceptual model, uncertainties in the effects assessment, and uncertainties in the exposure assessment.⁵³³ One of the main uncertainties identified in Technical Report #2 was the general absence of data that describe the nature and extent (both spatial and temporal) of contamination by total suspended solids, major ions, nutrients, metals, and other chemicals of potential concern in spawning and rearing habitats within the watershed.⁵³⁴
357. Dr. Robie MacDonald, the Section Head of the Marine Environmental Quality Section at DFO's Institute of Ocean Sciences has spent 25 years studying contaminant pathways in temperate and polar aquatic systems.⁵³⁵ He also identified lack of data as an issue in assessing the risk of contaminants to FRSS. In answer to a question about whether

⁵³¹ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. 57

⁵³² Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. iii

⁵³³ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. iii-iv

⁵³⁴ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. iv

⁵³⁵ Transcript, June 6, 2011, p. 3 (Dr. Robie MacDonald)

there were specific toxins in the Fraser River environment that he thought were harming FRSS, Dr. MacDonald testified that:

I worry about some, but I haven't got evidence to show what the harm is....So our task, here, is to do several things. One, is to identify those compounds that have a definite toxicity and we understand it, and then to look at the environment and ask the question of whether thresholds of toxicity are being passed. And we certainly don't have the science together for many, many compounds in that context.⁵³⁶

358. Despite the uncertainties, the authors of Technical Report #2 concluded that declines in FRSS abundance over the past 20 years or in 2009 were not likely caused by the substances considered in the water quality index, based on their analyses of the of water quality index scores and measures of productivity.⁵³⁷

iv) Potential Impacts of Endocrine Disrupting Contaminants and Emerging Chemicals of Concern on FRSS

359. In addition to chemicals of concern, the IAC identified many other substances that also have the potential to adversely affect FRSS. These substances could not be categorized as chemicals of concern because there was insufficient information to evaluate the hazards that exposure these contaminants posed to FRSS. Therefore the authors of Technical Report #2 identified these substances as uncertain contaminants of concern, which include ECCs.⁵³⁸

360. Contaminants identified in Technical Report #2 as ECCs included: organometals, cyanides, monoaromatic hydrocarbons, chlorinated and non-chlorinated phenolic compounds, resin and fatty acids, polybrominated diphenyl ethers, hormone mimicking substances, pharmaceuticals, personal care products, wood preservation chemicals and nanoparticles.⁵³⁹

361. Dr. Robie MacDonald testified as to how ECCs make their way into FRSS habitats:

⁵³⁶ Transcript, June 6, 2011, pp. 53-54 (Dr. Robie MacDonald)

⁵³⁷ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. iii

⁵³⁸ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. ii

⁵³⁹ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. ii; pp. 109-111

For many of the contaminants we put out into the circulating systems, like PCBs, their concentrations are very low in water and atmosphere. So it requires some kind of process to concentrate them to make them a risk. And animals themselves can be part of this process. And, for example, the concentration of a PCB in the water, compared to what it might be in a top predator, can be a factor of a million or more higher, right, in the predator. So what happens is when animals feed in trophic systems, they are basically transferring fat from lower levels to higher levels. And with the fat they tend to transfer fat soluble contaminants like PCBs and PBDEs. So they get concentrated as you go up the food web. They get concentrated initially because they like to transfer out of the water into the bottom end of the food web, like phytoplankton, and then when zooplankton eat the phytoplankton they metabolize some of the fat, but they maintain the organofat soluble contaminants. And this goes on up into the zooplankton, into fish, and then into those things that eat fish. **And salmon are seated about trophic level 3 in the middle, so they're not the worst exposed, but they're certainly accumulating these contaminants as they feed in the ocean to levels that are easily detectible...salmon have this particular property of congregating in the same place.** So what happens is these salmon all go out to sea and feed and accumulate their body mass, and they accumulate contaminants, and then they come back to a particular lake or natal stream. And so there might be a million fish that come into a particular lake, and there could be 40,000 of these per hectare. They spawn, they die. **So the contaminants they bring back that way can sometimes exceed the contaminants that deposit in the system to start with from the atmosphere.**⁵⁴⁰

362. Dr. Ross also testified about the presence of ECCs in the SOG:

... Our study examining PCBs and PBDEs in sediments in the Strait of Georgia show very high concentrations around, well, the eastern shoreline of the Strait of Georgia, notably around the outfalls and into Burrard Inlet. So very, very high concentrations of PBDEs, much higher than we would expect based on our observations with PCBs, which indicates, to me, very strong localized point sources of flame retardant chemicals that are coming out of day-to-day use, computers, furniture, carpeting, textiles, electronics, automobiles, landfill leachate, clothing, even. And these things would get into the wastewater stream, whether it's primary or secondary, there's certainly a large fraction ending up going into the plume, into the stream and into the Strait of Georgia. The concern about that is that over time we're building up a reservoir in the Strait of Georgia,

⁵⁴⁰ Transcript, June 6, 2011, pp. 4-5 (Dr. Robie MacDonald)

and over time that will start to present biological risks to the critters that live and/or transit the Strait of Georgia.⁵⁴¹

363. The authors of Technical Report #2 identified that there was insufficient data to evaluate relationships between exposure (i.e., concentrations in surface water, sediment, or fish tissues) and response (i.e., productivity indicators for FRSS) for any of the endocrine disrupting compounds and ECCs that were identified in the Fraser River Basin. Given the limitations of exposure data and/or toxicity thresholds for endocrine disrupting chemicals and ECCs, the authors of Technical Report #2 were only able to conduct a qualitative evaluation to assess their potential effects on FRSS.⁵⁴²
364. The results of this evaluation indicated that it was unlikely that exposure to these contaminants was the sole cause of the observed patterns in sockeye salmon abundance, either over the past 20 years or in 2009.⁵⁴³
365. Although evidence in the report determined that contaminant-related effects may not be the most important factor affecting FRSS abundance, studies done by the Siska Traditions Society (the “Siska Study”)⁵⁴⁴ using TEK, revealed that the length, weight, and girth of sockeye salmon have changed over the last couple of decades, as has the skin condition and colour of internal organs. The study also reported the feminization of one male sockeye salmon in 2007. Technical Report #2 stated that such changes could be a possible response to endocrine disrupting compounds and/or other contaminants.⁵⁴⁵
366. The authors of Technical Report #2 concluded that exposure to endocrine disrupting compounds and/or ECCs represents a possible contributing factor in the decline of FRSS abundance. The pathways through which such effects on FRSS abundance could be expressed include:

⁵⁴¹ Transcript, June 14, 2011, p. 30 (Dr. Peter Ross)

⁵⁴² Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 112-118

⁵⁴³ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. 138

⁵⁴⁴ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 118-119 Siska Salmon and Indigenous Peoples’ Life Work. Mr. Don MacDonald testified on May 10, 2011 that he considered the data that was collected and reported by Siska to be reliable from a scientific basis therefore could use it to draw conclusions in Technical Report 2 (Transcript, May 10, 2011, p. 63)

⁵⁴⁵ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 118-119

- a. Immunosuppression due to exposure to endocrine disrupting compounds (such as PAHs, PCBs, PBDEs, and other endocrine disrupting compounds) during smolt outmigration and associated increased susceptibility to infection by disease agents, leading to higher rates of mortality;
 - b. Reduced ability to adapt to conditions in marine ecosystems due to exposure to endocrine disrupting compounds (such as APEOs and associated metabolites) during smolt outmigration, an effect that is likely enhanced by increased susceptibility to infection by disease agents; and,
 - c. Reduced survival of sockeye salmon eggs due to magnification of persistent, bioaccumulative, and toxic contaminants (such as PCBs, PCDDs, and PCDFs) in gonad tissues during upstream migration. This effect is likely to be most severe for those stocks that travel the longest distances during upstream migration.
367. In his testimony, Don MacDonald confirmed that effects outlined above were known as sublethal effects, meaning that they do not necessarily result in immediate mortality.⁵⁴⁶ He also agreed that if fish have been stressed and encounter a contaminant, it could have a synergistic effect, including for example:
- what's been reported in the literature so far is actually the reverse of that, where the exposure is to the contaminant first, that then seems to have an effect where we see a suppression of the immune system and that predisposes the animal to infection by these pathogens. So, yes, this kind of interactive effect and potentially synergistic effects are certainly possible, for sure.⁵⁴⁷
368. Therefore, recommendation 8 in Technical Report #2 outlined the need for studies to understand the synergistic effects of contaminants.⁵⁴⁸ There are some difficulties in assessing the risks that endocrine disrupting chemicals or ECCs pose to FRSS because of sublethal effects. Dr. Robie MacDonald testified:

The contaminants that we're talking about, and the stresses on fish themselves in their lifecycles, isn't really about belly-upness. I mean, I think we know very well when we have a spill of

⁵⁴⁶ Transcript, May 10, 2011, p. 60

⁵⁴⁷ Transcript, May 10, 2011, pp. 59-60

⁵⁴⁸ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. 141; Transcript, May 10, 2011, p. 60 (Don MacDonald)

something and we kill a lot of fish. We've seen that and that was certainly something we saw a lot more of in the 1950s and '60s, and we understand that pretty well. **What we're talking about here is sub-lethal effects, things that affect endocrine development, that affect immediate immune function, affect olfaction, for fish, and these are very subtle. They fly under the death radar. You're not going to see them show up in an L50 [the measurement of potential acute toxicity of a material]. And yet they may be every bit as risky for the fish and their lifecycle as these things that kill them on the spot.** What happens, and we have one case from New Brunswick, well, some research done by Wayne Fairchild, that showed exposure to nonylphenol in the river didn't kill the fish outright. They went out to sea. They just did not come back.⁵⁴⁹

369. Despite the challenges, Mr. van Aggelen, who is head of the Environmental Toxicology Section in the Pacific Environmental Sciences Centre of Environment Canada,⁵⁵⁰ discussed a recent research project to evaluate ECCs in municipal wastewater effluents within the Georgia Basin.⁵⁵¹ The purpose of the project was to determine if genomic methods would lend themselves to looking at ECCs contained within municipal wastewater effluent, particularly at Annacis Island. As part of the study, they looked at genes that were responsible for reproduction and other types of general genes. The study found that certain levels of the vitellogenin proteins, which are responsible for reproduction, showed up in the studies. However, scientists were not able to draw a straight line correlation to receiving water impacts.⁵⁵²
370. Mr. van Aggelen went on to testify that the continuation of this kind of research was critical for understanding the potential impacts, sublethal impacts or cumulative impacts of emerging chemicals in municipal wastewater on fish. The reasons given for continuing this research were due to the complex mixtures of various compounds existing in wastewater, the ultra low levels of ECCs that have been demonstrated to cause endocrine disrupter effects, and because most wastewater treatment systems do not or cannot remove or treat a lot of the ECCs.⁵⁵³

⁵⁴⁹ Transcript, June 6, 2011, pp. 17-18 (Dr. Robie MacDonald)

⁵⁵⁰ Transcript, June 14, 2011, p. 2

⁵⁵¹ Exhibit 1046 (Toxicological Evaluation of Emerging Chemicals in Municipal Wastewater Effluents Within the Georgia Basin, by Graham van Aggelen, *et al.*, March 31, 2009)

⁵⁵² Transcript, June 14, 2011, pp. 9-10 (Graham Van Aggelen)

⁵⁵³ Transcript, June 14, 2011, pp. 10-11 (Graham Van Aggelen)

371. In his testimony Dr. MacDonald agreed that contaminant research along with genetic research could provide cutting edge information about causes of decline of FRSS, stating: “the role of contaminants is not at all clear, and as you've put it, genetic research together with contaminant exposure research would put us a long way towards that.” He also agreed that more funding and/or a program that would combine these two areas of research would be useful for understanding the long term sustainability of FRSS.⁵⁵⁴
372. The fact that wastewater treatment plants in the Fraser River Basin cannot treat ECCs and endocrine disrupting compounds was highlighted by Dr. Ross, who testified:

...If we're talking about persistent contaminants, **the PCBs, the dioxins, the furans, the organic chlorine pesticides, the perfluorinated compounds, the polybrominated diphenyl ethers - those are flame retardants that are only recently under the regulatory microscope in North America - these are all very, very persistent compounds.** Upgrading blindly from primary to secondary to tertiary does not degrade these compounds, does not breakdown these compounds, but it does retain many of these compounds, because these chemicals are **all persistent and they bind to organic materials or to fats in the food web.** The fact that they're so persistent means there's only one way to get rid of them, and that's with incineration at 1,000 degrees Celsius or higher. The half life of most of these chemicals in the environment is in the order of hundreds of years. If sludge is being retained, biosolid is being retained and transferred to agricultural lands, forestry lands, mine reclamation projects, or landfills, those chemicals are maybe not coming out the pipe anymore, but they are entering the environment; **they're simply being cycled to another part of what is likely to be Fraser River sockeye habitat.**⁵⁵⁵

373. Witnesses also expressed significant concerns and criticism about the proposed Wastewater System Effluent Regulations,⁵⁵⁶ particularly as they relate to ECCs, addressing cumulative impacts associated with contaminants and with addressing sockeye salmon health. With reference to Exhibit 1048,⁵⁵⁷ which was an email that expressed some of the concerns with the regulations, Dr. Ross testified:

⁵⁵⁴ Transcript, June 7, 2011, pp. 71-72 (Dr. Robie MacDonald)

⁵⁵⁵ Transcript, June 14, 2011, p. 25 (Dr. Peter Ross)

⁵⁵⁶ Exhibit 1047 (Wastewater Systems and Effluent Regulations and Regulatory Impact Analysis Statement, March 20, 2010 [Canada Gazette])

⁵⁵⁷ Exhibit 1048 (Memo to R. Brown from R.W. Macdonald, *et al.* re Collective Thoughts on the Wastewater System Effluent Regulations, dated February 2010); Transcript, June 14, 2011, p. 23 (Dr. Peter Ross)

... Specifically, the proposed regulations cover the kinds of chemical constituents or activities thereof that we've been worried about for dozens, if not hundreds, of years by default, the suspended solids, total residual chlorine, de-ionized ammonia, and biological oxygen demand. But they do not, in looking at these four primary conventional pollutants, there is only fleeting mention of site-specific impacts and concerns, only fleeting mention of emerging chemicals of concern, such as the flame retardants or the pharmaceuticals. The reporting of monitoring data appears fairly elementary, and the effects monitoring ceases to be a requirement if there are no adverse impacts observed after a certain number of years. So I did have some concerns and in looking at government operations and the way in which we do science to look at the broader risk to the receiving environment associated with contaminants, **I think I hearken back to the question of cumulative impacts. These regulations were not designed to protect salmon. They were not designed to prevent cumulative impacts associated with multiple treatment plants. And they were not really designed to deal with the concerns that I have about bioaccumulation and biomagnifications food webs.**⁵⁵⁸

374. Dr. Ross recommended the use of the *Canadian Environmental Protection Act* ("CEPA").⁵⁵⁹ He testified:

...there are times when municipalities or regional governments get sort of blamed for these chemicals, but the fact of the matter is, Metro Vancouver or Capital Regional District did not produce these chemicals of concern. They're stewards of our waste, and as such, there's a heavy responsibility in terms of trying to have wastewater treatment practices that eliminate, potentially, 10,000 or 15,000 chemicals of potential concern in terms of sockeye. So **I think I would point to CEPA, the Canadian Environmental Protection Act, which has, as part of its direction, chemical regulation.** And PBDEs are a good case in point. PBDEs are starting to be regulated in terms of CEPA, so there is a chemical regulation side of things to prevent chemicals from getting into the wastewater stream at the beginning of the day.⁵⁶⁰

375. The FNC submits that endocrine disrupting contaminants and EECs may be a potential factor in the decline of FRSS and are a threat to their future sustainability. Given the limited data with respect to these contaminants, further research and monitoring is required and should be prioritized.

⁵⁵⁸ Transcript, June 14, 2011, p. 24 (Dr. Peter Ross). Mr. Van Aggelan also agreed with Dr. Ross's assessment, see Transcript, June 14, 2011, p. 26.

⁵⁵⁹ S.C. 1999, c. 33

⁵⁶⁰ Transcript, June 14, 2011, p. 31 (Dr. Peter Ross)

376. The FNC submits that a program involving contaminant and genetics research should be implemented as a priority to better understand how endocrine disrupting contaminants and EECs impact FRSS CUs along their migratory route. TEK should be welcomed as an essential component of this research.
377. The FNC further submits that given current and future challenges researching and monitoring EECs and endocrine disrupting contaminants, and their impact on FRSS and their habitats, a precautionary approach must be taken. This would involve, at a minimum, robust Wastewater System Effluent Regulations being implemented to ensure the appropriate discharge and monitoring is taking place. The FNC submits that a precautionary approach must include considerations of the entire ecosystem when regulating EECs and other endocrine disrupting contaminants under CEPA.

v) Recommendations: Data Collection

378. Another set of recommendations in Technical Report #2 involves collecting appropriate data and coordinating data collection amongst various government agencies as well as industry.⁵⁶¹ In his testimony, Don MacDonald testified:

...as we've been trying to collect and collate this information to support this analysis, what has become apparent, certainly was apparent in the past but it's certainly no different now, is that there are a number of organizations throughout the province [are] collecting different types of data for different types of purposes and that data is frequently held in various locations that are not all readily available. And it would be very helpful to be able to coordinate and it would be cost effective as well to coordinate the collection and collation of that type of information into a single database or at least databases that are readily available and that can talk to one another very easily so it doesn't require a lot of data translation steps.⁵⁶² Having this kind of coordination would allow everybody to have better access to data that can be used in a variety of different ways. For this type of evaluation like we're doing here but also for the other types of evaluations that we know monitoring data is required for. If it's in one place or it's readily available, it can be used for multiple purposes.⁵⁶³

⁵⁶¹ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), p. 141

⁵⁶² Transcript, May 9, 2011, pp. 61-62 (Don MacDonald)

⁵⁶³ Transcript, May 9, 2011, pp. 61-62 (Don MacDonald)

379. Don MacDonald also testified that First Nations should have access to the data.⁵⁶⁴ Other witnesses also provided recommendations to improve data on contaminants, including Dr. Ashley, who testified:

An organization like Metro [Vancouver] does have a variety of monitoring programs that falls under the general category of receiving environment monitoring, and an ambient monitoring program on the Fraser. But those programs tend to be for internal consumption and presentation at the Environmental Management Committee, and...they don't really get much farther than that. So what's really needed is cooperation amongst any of the polluters on the Fraser, Lower Fraser, such that there's some data sharing and it becomes more of a collaborative effort rather than just one agency meeting the regulatory requirement and then putting the reports on the shelf and not sharing them with the broader community.⁵⁶⁵

vi) Recommendations: Studying Cumulative Effects of Contaminants

380. Don MacDonald testified that embedded in Technical Report #2 recommendations was the idea that a cumulative effects monitoring program needed to be done to evaluate the interactive effects of contaminants, disease agents, and/or water temperatures during the migration of juvenile and adult salmon. He testified:

Sometimes when we look at these kinds of problems that emerge in the environment, we're looking for that one thing that explains all the effects that occur where, in fact, it's more the concept of the thousand cuts that is creating the problem. And so the **design of a cumulative effects monitoring program allows us to, one, look at all of the activities that are ongoing within the Fraser River basin, identify the types of changes in the characteristics of the ecosystem that are associated with each of those types of activities and collectively with those activities to develop some predictions about what the cumulative effects of all of these activities might be, and then allows one to then do some very structured or focused monitoring** that allows us to, one, determine what the characteristics are, the physical and chemical characteristics of the receiving water system so that we could evaluate exposure and effects but also importantly it allows us to evaluate the responses of the organisms that we're most concerned about, in this case, sockeye salmon. So we want to be able to make some hypotheses about what cumulative effects might be and then be able to design a sampling and monitoring program that actually is

⁵⁶⁴ Transcript, May 9, 2011, p. 62 (Don MacDonald)

⁵⁶⁵ Transcript, June 14, 2011, pp. 86-87 (Dr. Ken Ashley)

targeted on what those effects might be so that we're measuring the right things in the right places to be able to draw conclusions about what are the things that are actually affecting the declines of sockeye salmon that we've seen over the last 20 years and be able to hopefully understand whether creating these fairly atypical returns like we've had in 2009 that are difficult to explain right now with the data that we have available to us.⁵⁶⁶

381. **According to Dr. Robie MacDonald, the current toxicology work done by DFO does not address the cumulative effects of contaminants, or the non-lethal, sub-lethal effects of contaminants. He testified: “these are very difficult topics [they] are really the topics at the heart of whether or not these contaminants have an effect.”⁵⁶⁷ He also pointed out that contaminants have been shown to cause ecosystem health problems and therefore if they are not measured, we will be missing a piece of ecosystem health.⁵⁶⁸**
382. Dr. Ross, Dr. Robie MacDonald and Dr. Ashley also pointed out the difficulties for researching contaminants in DFO, particularly since the loss of the toxic chemicals program at DFO in 2005. Dr. Ross testified that “the contaminant file has been a difficult one for us, and it has been the general view that it has no real home within Fisheries and Oceans.”⁵⁶⁹

vii) Recommendations: Contaminant Monitoring

383. Technical Report #2 also set out a number of key recommendations regarding monitoring, including: that effluent monitoring programs for all industrial sectors be evaluated, and that routine monitoring programs for various fish habitats and fish health be developed in order to assess the effects of contaminant exposure on FRSS.⁵⁷⁰ Don MacDonald recommended that fish monitoring be conducted by First Nations living in the area and by those who are most impacted, testifying:

We're just developing sort of that capability in the Northwest Territories right now. We just had a traditional knowledge workshop where we brought together representatives of aboriginal organizations from throughout in that case the Slave River basin

⁵⁶⁶ Transcript, May 9, 2011, p. 60 (Don MacDonald)

⁵⁶⁷ Transcript, June 6, 2011, p. 18 (Dr. Robie MacDonald)

⁵⁶⁸ Transcript, June 5, 2011, p. 23 (Dr. Robie MacDonald)

⁵⁶⁹ Transcript, June 14, 2011, p. 91 (Dr. Peter Ross)

⁵⁷⁰ Exhibit 826 (Technical Report #2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, February 2011), pp. 140-141

and identified what needs to be monitored to evaluate in this case the cumulative effects of things like oil and gas development, tar sands development, sorry, oil sands development, hydropower operation in the Peace, system and other industrial discharges to the Peace-Athabasca system. And one of the strong recommendations that came out of that workshop was that this type of monitoring should be conducted by the people who are living in that area and who are most likely to be affected by the adverse – those adverse effects of the discharges into that system. Those are the resources that they're using every day and they're familiar with them every day. They're watching those resources every day. So it's a very reasonable suggestion to indicate that that kind of a model could be used in the Fraser River basin to provide the kind of cost savings. And I think there's two real advantages: one is there's a cost savings; but more importantly, I think that the quality and timeliness of the data is also likely to be enhanced by being able to have that data collected by the people who are right there observing the resource every day.⁵⁷¹

viii) Recommendations: Collaborating on Contaminant Research, Monitoring and Protection of FRSS Health

384. With respect to the recommendations regarding collaboration in Technical Report #2, Don MacDonald testified:

What I've tried to say here is that there's a very strong possibility that contaminants are a contributing factor [to FRSS decline]. If we are to have the information that we need to be able to determine whether or not contaminants are a contributing factor and to what extent they are a contributing factor, then we need to work through these recommendations that are listed on pages 140 and 141.

385. He went on to say that the governments: federal, provincial and First Nations, and interested organizations, regulated interests and academics should be involved in the process of designing, implementing and interpreting the results of monitoring and research, with the federal government playing a lead role in bringing together the organizations that need to be involved in the process. He stated that First Nations involvement would be essential component in implementing the Technical Report #2 recommendations.

386. Unfortunately, within federal government departments, it appears there is limited collaboration on the issue of toxic chemicals, and little collaboration with First Nations.

⁵⁷¹ Transcript, May 10, 2011, pp. 48-49 (Don MacDonald)

Dr. MacDonald testified that since the refocusing of the toxic chemicals program in 2005, toxicology of contaminants on fish has remained with DFO,⁵⁷² who have the expertise to do the marine side of toxic chemical work⁵⁷³ and expertise on genetics and other things on marine fish lives.⁵⁷⁴ He indicated that if Environment Canada was going to do research on contaminants as they relate to the decline of FRSS, they would be better served to do it in collaboration with DFO scientists.⁵⁷⁵ However, both Dr. MacDonald and Dr. Talbot, who is the Director of Aquatic Ecosystem Protection Research Division in the Water Science and Technology Division of Environment Canada, were unaware of whether toxic chemical and contaminant scientists or managers within Environment Canada and DFO discuss the work that each is doing on contaminants. Both described any communication as *ad hoc*, and unorganized.⁵⁷⁶

387. The FNC submits that Canada, including DFO and Environment Canada together with First Nations must coordinate data collection activities, monitoring and research on the impacts of contaminants on FRSS. First Nations have TEK that is essential in understanding fish health and health of fish habitat in their territories and this information should be incorporated into future programs and projects on contaminants.
388. The FNC submits that it is essential that a monitoring and research program for contaminants assess cumulative impacts on FRSS and FRSS habitats.
389. The FNC submits that in order to effectively evaluate and monitor potential impacts from contaminants on FRSS health and take appropriate protective measures, there must be a collaborative program that involves all levels of government including federal government departments involved in contaminant research, the provincial government and First Nations government, as well industry and ENGOs.

Recommendation: Canada must adopt a more precautionary approach to Emerging Chemicals of Concern (“ECCs”) and endocrine disrupting contaminants, including improved regulatory mechanisms.

⁵⁷² Transcript, June 6, 2011, p. 17 (Dr. Robie MacDonald)

⁵⁷³ Transcript, June 6, 2011, p. 23 (Dr. Robie MacDonald)

⁵⁷⁴ Transcript, June 6, 2011, p. 23 (Dr. Robie MacDonald)

⁵⁷⁵ Transcript, June 6, 2011, p. 24 (Dr. Robie MacDonald)

⁵⁷⁶ Transcript, June 6, 2011, p. 19 (Dr. Robie MacDonald and Dr. Andre Talbot)

Recommendation: DFO should implement a program combining genomics and contaminant research on FRSS, incorporating TEK of First Nations who live along the migratory route of FRSS as an essential component of the program.

Recommendation: DFO should develop and implement a robust research and monitoring program that addresses contaminants and cumulative impacts and that involves First Nations, the Province, local governments and ENGOs.

G. Climate Change

i) Introduction: Climate Change, En Route Loss, and Pre-Spawn Mortality

390. Dr. Hinch testified that climate change can be divided into three components: (1) the global issue of increased greenhouse gas emissions bringing an increase in air and water temperatures; (2) oceanographic atmospheric issues, including the Pacific decadal oscillation, in which the ocean switches between high to low productivity every 10 to 20 years; and (3) climate variability, including the el Niño Southern Oscillation, which occurs every five to seven years.⁵⁷⁷
391. Temperature is the “master biological factor for fish”: it controls everything from metabolism, to physiology, to behaviour, to feeding.⁵⁷⁸ Temperature can affect fish in a variety of ways – both acutely and chronically.⁵⁷⁹ In particular, critically high temperatures affect a fish’s metabolic ability to swim and its heart’s ability to perform, and may lead to these systems shutting down completely.⁵⁸⁰ In high, but not critically high temperatures, fish metabolize energy faster, thereby leaving them with limited energy stores.⁵⁸¹ In addition, during up-river migration where there is a proliferation of stressors and diseases occurring, higher temperatures allow such stressors and

⁵⁷⁷ Transcript, March 8, 2011, pp. 6-7 (Dr. Scott Hinch)

⁵⁷⁸ Transcript, March 8, 2011, p. 10 (Dr. Scott Hinch); see also Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), at p. 20, and Exhibit 406 (Environmental Watch Program Overview), p. 8

⁵⁷⁹ Transcript, March 8, 2011, p. 10 (Dr. Scott Hinch)

⁵⁸⁰ Transcript, March 8, 2011, pp. 47-48 (Dr. Scott Hinch)

⁵⁸¹ Transcript, March 8, 2011, pp. 47-48 (Dr. Scott Hinch)

diseases to be expressed more rapidly, and the combination of these factors can cause fish to perish.⁵⁸² Finally, underlying all of this is stress on the fish, which causes the build up of stress metabolites, and can also lead to mortality.⁵⁸³

392. In Technical Report #9, authors Dr. Hinch and Dr. Eduardo Martins set out to, first, review the largely peer-reviewed and published literature to look for associations between known climate variables and survivorship of FRSS at different life stages,⁵⁸⁴ and second, examine trends in ERL and PSM in the context of environmental variables.⁵⁸⁵
393. To provide a measure of context, Dr. Hinch explained that 13 of the past 20 years were record temperatures; he added that all the scientific literature and modeling suggest the warming will continue, the debate is only over the rate of warming.⁵⁸⁶ The Fraser River has experienced a warming of approximately 2 degrees compared with temperatures 60 years ago.⁵⁸⁷ Consistent with the findings in Technical Report #9, the FNC submits that changing thermal conditions have been one of the largest environmental challenges that migrating FRSS have had to deal with over the past 20 years.⁵⁸⁸
394. Based on their qualitative assessment and review of the state of knowledge on the effects of climate change related variables on FRSS survival at various life stages, Dr. Hinch and Dr. Martins conclude that:

... the survival of all life stages of Fraser River sockeye salmon, with the possible exception of eggs and alevins, may be declining due to trends in temperature (and the factors that correlate with temperature) in both marine and freshwater environments over the past 20 years. However, where data exist at the stock-level for some life history stages (e.g. eggs, alevin, adult migrants), the picture is complicated by

⁵⁸² Transcript, March 8, 2011, pp. 47-48 (Dr. Scott Hinch); see also Exhibit 406 (Environmental Watch Program Overview), p. 8 and Transcript, February 8, 2011, pp. 22-23 (David Patterson)

⁵⁸³ Transcript, March 8, 2011, pp. 47-48 (Dr. Scott Hinch); see also Exhibit 406 (Environmental Watch Program Overview), p. 8 and Transcript, February 8, 2011, pp. 22-23 (David Patterson)

⁵⁸⁴ Transcript, March 8, 2011, pp. 5-6 (Dr. Scott Hinch)

⁵⁸⁵ Transcript, March 8, 2011, pp. 5-6 (Dr. Scott Hinch)

⁵⁸⁶ Transcript, March 8, 2011, p. 9 (Dr. Scott Hinch)

⁵⁸⁷ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 5

⁵⁸⁸ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 5

stock-specific patterns indicating that the survival of some stocks may have been less impacted than that of others or not impacted at all.⁵⁸⁹

395. Dr. Hinch and Dr. Martins added that although warming, on its own, may not have resulted in large declines of FRSS, the cumulative impacts of climate change could have been substantial:

Although the recent warming may not have resulted in large declines in survival of individual life stages, the cumulative impacts of climate change on survival across life stages could have been substantial. Overall, the weight of the evidence suggests that climate change may have adversely affected survival of Fraser River sockeye salmon and hence has been a possible contributor to the observed declining trend in abundance and productivity over the past 20 years.⁵⁹⁰

396. The review and analysis conducted by Dr. Hinch and Dr. Martins, in addition to that undertaken to complete Technical Report #4, also confirms that the drastic differences between the low 2009 FRSS returns, as compared with the high 2010 returns, may be connected to climate change. The executive summary of Technical Report #9 states:

It also seems that inter-annual variability in climate conditions have contributed to the extreme variation in the abundance of returning adults that were observed in 2009 (much lower than average) and 2010 (much higher than average), as the years that those cohorts went to sea were characterized by unusually warm (2007) and cool (2008) SSTs, respectively.⁵⁹¹

397. Dr. Hinch expanded on this point during his testimony, noting:

...there was information provided [i.e. in Technical Report #4, Exhibit 1291] that suggests that in 2007, when the 2009 fish would have been heading into the early marine phase of their life, that they were encountering, in different locales along the coast, very poor growing conditions, which is consistent, then, with the poor returns that have been suggested by these other papers. Similarly, in 2010, the fish that left, they would have gone out in

⁵⁸⁹ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 3

⁵⁹⁰ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 3

⁵⁹¹ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 3

2008, and they would have encountered, given some of the results we've seen, the environmental data, that it was much more favourable growing conditions and survival conditions, again consistent with these papers **suggesting a link between climate variables and the survivorship in that stage of their life.**⁵⁹²

398. The findings of these researchers as to the effects of climate change on FRSS are consistent with many of the observations First Nations have been making as to the health of the salmon they have seen returning to their territories. Dr. Hinch referred to research he had conducted in St'at'imc territory, near Lillooet, about First Nations' perspectives on climate change and on the quality of salmon:

DR: HINCH... what was interesting was the perspective that the harvesters were believing that the fish were migrating in earlier than they normally would have been catching them and that the flesh quality was poor. They weren't able to dry them as effectively. And in the paper that we wrote, we suggested that what they might be perceiving is indeed some of the early migration of the Late Runs. And the flesh quality issues could well have to do with the fact that many of these fish are somewhat compromised physiologically and that flesh tissue could well be different than they're typically used to. And so I thought there was an interesting parallel going on between what some of our science was suggesting and what those observations were.

Q: And so that's an indication of how useful traditional ecological knowledge may be in beginning to inform our observations around climate change?

DR. HINCH: Yes, and it was certainly supporting what we had seen with not traditional knowledge, with western-based scientific approaches. And it was also interesting to get their perspectives on how they felt what the future held for them in terms of a warming future. And they all believed that things were going to change even more.⁵⁹³

399. Dr. Hinch testified that the pattern of ERL he observed is consistent with the telemetry data and his understanding of how populations cope with warming temperatures. The data showed that stocks that historically migrated under very high temperatures (i.e. Summer runs) were able to better cope with climate change, and that stocks that normally encounter cool temperatures (i.e. Late runs) don't cope as well when they

⁵⁹² Transcript, March 8, 2011, p. 26 (Dr. Scott Hinch)

⁵⁹³ Transcript, March 9, 2011, p. 77 (Dr. Scott Hinch)

encounter high temperatures for long periods of time.⁵⁹⁴ Dr. Hinch further testified that telemetry studies are indicating that, “in most cases... where we’re seeing a lot of mortality is often in areas where fishing is not occurring because the mortality is often occurring in lakes.”⁵⁹⁵

400. As a recommendation, Dr. Hinch noted that improvements are needed to in-season and post-season estimates of spawning migration mortality, including developing a better understanding and quantification of natural mortality occurring between the marine approach areas and the hydroacoustic facility at Mission.⁵⁹⁶
401. Dr. Hinch offered a number of practical recommendations for management actions that may improve FRSS survival during this time of climate variability and warming temperatures. These recommendations related to harvest management, habitat protection, education, regulation, and areas for further research. With regard to harvest management approaches, Dr. Hinch suggested that temperature conditions may lead to higher ERL and PSM in the future, requiring foresaking more opportunities for harvest in order to ensure minimum spawning escapement levels are achieved.⁵⁹⁷ In the absence of completely halting harvest, Dr. Hinch suggested management would need to shift when and where harvest occurs, and on which stocks or CUs.⁵⁹⁸
402. Dr. Hinch testified that with growing concerns about how temperature will affect survival of FRSS, DFO would need to consider stock or CU specific management.⁵⁹⁹ Further, CU specific management would need to be informed by a multi-CU approach to research.⁶⁰⁰ The FNC supports recommendations that managers act in a precautionary manner in the face of climate variability, and actively research, observe and consider

⁵⁹⁴ Transcript, March 8, 2011, pp. 40-42 (Dr. Scott Hinch); see also Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 5

⁵⁹⁵ Transcript, March 8, 2011, p. 49 (Dr. Scott Hinch)

⁵⁹⁶ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 55, Recommendation #3

⁵⁹⁷ Transcript, March 8, 2011, p. 57 (Dr. Scott Hinch)

⁵⁹⁸ Transcript, March 9, 2011, p. 16 (Dr. Scott Hinch)

⁵⁹⁹ Transcript, March 8, 2011, p. 59 (Dr. Scott Hinch); Transcript, March 9, 2011, p. 31 (Dr. Scott Hinch)

⁶⁰⁰ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 56, Recommendation #5

how the various FRSS CUs are responding to climate change, conduct CU-specific research and assessments as per the WSP, and implement CU specific management.

Recommendation: As a priority, DFO must commit the financial and human resources to maintain and improve stock assessment tools, including baseline data correlated to FRSS to understand and assess climate changes and its effect in the fresh and marine ecosystems (rearing lakes, streams, Fraser river, estuary) and marine (area surface temperature and salinity), including both the EWatch program and the State of the Oceans research.

403. Dr. Hinch also offered a number of habitat protection measures that could be put in place to assist or increase FRSS survival during high temperatures, including protecting thermal corridors and the deep, coldwater portions of lakes, which provide refuge areas for FRSS:

What you can do [to address climate change] is to ensure that you're protecting habitats that would otherwise be warming further, you could ensure that they don't warm any further. And certainly in some of the smaller streams and spawning areas, you can protect those and make sure riparian coverage and other objectives are met so that that doesn't happen. And as I mentioned yesterday, protecting lakes and lake environments. These are our best thermal refuges we have at the moment and the fish use them.⁶⁰¹

404. Habitat protection goes hand in hand with education, so the public must be made aware that lakes are critical habitat for thermal refuges.⁶⁰²
405. Dr. Hinch also recommended developing stream temperature flow management systems, implementing systems for heat recovery on effluents of large industrial facilities, restoring riparian vegetation to cool temperatures along narrow spawning streams, and allowing streams to flow across a larger area of their historical floodplain to reduce flows during incubation.⁶⁰³ The FNC submits that DFO, actively working with

⁶⁰¹ Transcript, March 9, 2011, p. 18 (Dr. Scott Hinch); see also Transcript, March 8, 2011, p. 57 (Dr. Scott Hinch)

⁶⁰² Transcript, March 9, 2011, p. 18 (Dr. Scott Hinch)

⁶⁰³ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 33

other levels of government, including First Nations, the Province, and municipalities, should prioritize and implement such habitat protection measures for FRSS.

406. There are numerous knowledge gaps that could help fisheries managers more accurately and observe and make better decisions around how FRSS are reacting to climate change. For example, Dr. Hinch noted that managers and policy makers need to develop a better understanding of how future climate change will affect temperatures and flows of spawning streams and rearing lakes, physical conditions of marine habitats, and the interaction of FRSS with their prey and predators.⁶⁰⁴
407. Dr. McKinnell also testified that more research was required on the effects of climate change.⁶⁰⁵ One of the challenges identified by Dr. McKinnell was that global climate assessments were not yet able to represent the finer scale climate within British Columbia or the Gulf of Alaska, and there was variability among the different climate models.⁶⁰⁶ He indicated that if one wanted a better answer as to the potential effects of climate change in British Columbia and in the marine environment, further research and understanding was required.⁶⁰⁷ Dr. McKinnell testified that current research focused on trying to understand the effects of climate variability on the survival and growth of salmon was “absolutely important.”⁶⁰⁸
408. Dr. Welch testified about some of the research that was being done in the marine environment to understand thermal limits and the distribution of sockeye salmon related to temperature. He noted that:

... the global warming models are predicting large-scale changes in the thermal – or the temperatures of the north Pacific, and if the sockeye maintain these thermal limits and migrate or move to avoid what's predicted to be a warming ocean by – with the most recent crop of global warming models, it's suggesting that their thermal habitat for at least parts of the year would be only found in the Bering sea, and potentially could be excluding – well, certainly excluding all of the Gulf of Alaska.⁶⁰⁹

⁶⁰⁴ Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 58, Recommendations #10

⁶⁰⁵ Transcript, July 6, 2011, p. 19 (Dr. Stewart McKinnell)

⁶⁰⁶ Transcript, July 6, 2011, p. 19 (Dr. Stewart McKinnell)

⁶⁰⁷ Transcript, July 6, 2011, pp. 19-20 (Dr. Stewart McKinnell)

⁶⁰⁸ Transcript, July 6, 2011, p. 20 (Dr. Stewart McKinnell)

⁶⁰⁹ Transcript, July 6, 2011, p. 57 (Dr. David Welch)

409. Dr. Welch testified that further research on the issue of thermal limits was required.⁶¹⁰
410. On a more specific level, Dr. Hinch testified that further research is needed on the early life stages of FRSS, and in particular their early coastal migrations, including temperature, or oceanographic conditions, salinity conditions, and how a fisheries may or may not contribute to enhance mortality there.⁶¹¹ David Patterson strongly supported this as an area of needed research noting “actual upstream out-migration is going to be one of the more sensitive or bottlenecks in the future in terms of climate change.”⁶¹²
411. Dr. Hinch suggested that, one of the central ways of learning more about the FRSS early life stages is to conduct further telemetry studies:

...the one [recommendation] that I'd want to leave the Commissioner with right now is, and I hope I've made the impression of **the value of understanding where fish are, and the only way we can really do that in any precise way is with telemetry. We have over the last ten years seen a lot of information gathered on adult migrations, and we know a fair bit now about where they are, where they go, and some of the factors that affect their survivorship during the – during the process. The climate is changing. The rivers are warming. We're only scratching the surface now under the current conditions. We don't know what the future holds in terms of how stocks are absolutely going to be affected by higher temperatures. The research that's going to inform management on that, in my view, is coming to an end because of the stopping of funding towards the telemetry systems.** I'm not saying this because it's self-serving. I mean, I have other things I can do. But certainly there's other individuals and agencies that have valued this information considerably.⁶¹³

412. Dr. Riddell also made strong recommendations that the telemetry work noted by Dr. Hinch above, be supported and continued. In response to questions from Commission Counsel as to what measures DFO and its partners should take in an effort to better understand juvenile outmigration, including specifically what's going on in Johnstone

⁶¹⁰ Transcript, July 6, 2011, pp. 57-58 (Dr. David Welch)

⁶¹¹ Transcript, March 8, 2011, pp. 59-60 (Dr. Scott Hinch); see also Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), pp. 54-55, Recommendations #1, #2, #4

⁶¹² Transcript, February 8, 2011, p. 20 (David Patterson)

⁶¹³ Transcript, March 8, 2011, pp. 59-60 (Dr. Scott Hinch); see also Exhibit 553 (Technical Report #9: A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis

Strait, and to better understand the health and abundance of FRSS during juvenile outmigration, Dr. Riddell testified as follows:

Well, actually, I and Dave Welch and Scott Hinch thought about that quite a bit this summer. The first thing I think we would recommend is a site in probably about a third of the way up Johnstone Strait, where you could find a way to monitor the rate of passage of the Fraser sockeye moving through Johnstone Strait. And the reason for that is there is sampling going on within the Strait that the Department is undertaking, and the criticism of that has always been that you're sampling the end of the run, that you don't know the portion of the run that you're sampling. And so you could mount a single site program, so a fixed location monitoring fish passing that location. Where we went was opposite Sayward in Johnstone Strait, and the intention was that in the very narrowest portion of Johnstone Strait you could use a purse seine during slack tide to sample the fish moving through the Strait, or you could even potentially use a DIDSON to look at smolts. Because what you need is an index of the abundance moving by on a day. That was the first place that we went to try and do something like that. And then David Welch is certainly promoting the idea that we need an improved sensor array at the north end of the Straits of Georgia, and that's doable because there is actually a fairly narrow section that's very deep. And so you probably could get a good measure of the fish moving through there. Right now there is a big gap of the POST arrays that we talked about. The last detection would really be at the top of Hornby, Denman over to Texada Islands, and they call that the northern Strait of Georgia line. I don't call that the Northern Strait. That's sort of central Strait to me. And you go from there right to the top of Queen Charlotte Sound. I believe that was about 16 days passage in our smolts this past summer. And so to really try to narrow down where we're losing Fraser sockeye smolts, we need to partition that big area. It's very difficult to work in Johnstone Strait, as I said. David does not think that you can actually work in the actual narrow channels because of the background noise. So we could get closer to the mouth of Johnstone Strait, but then we'd probably have to wait till the top of Johnstone Strait. But you could do more within the Strait of Georgia, and Juan de Fuca, we shouldn't leave that off. There is an array that's about two-thirds of the way out to sea through Juan de Fuca.⁶¹⁴

413. Dr. Hinch's, Dr. Martins' and Dr. Riddell's observations, conclusions, and recommendations regarding the effects of climate change and variability on FRSS were

of Interannual Trends in En Route Loss and Pre-spawn Mortality, February, 2011), p. 54, Recommendation #1

⁶¹⁴ Transcript, January 27, 2011, pp. 77-78 (Dr. Brian Riddell)

supported by many witnesses, both scientists and fisheries managers, throughout the course of the Inquiry.⁶¹⁵ For example, Mr. Sprout opined that climate change was a significant factor affecting the returns of FRSS. He testified:

...One [big problem], is climate change. There is something happening in the ocean that is affecting the survival of Pacific salmon, particularly southern stocks, more specifically Fraser sockeye. This phenomena is likely to persist and it is dramatically affecting the returns of Fraser sockeye...⁶¹⁶

ii) Climate Change and Predation

414. In Technical Report #8,⁶¹⁷ the authors consider how climate change intersects with other components of the FRSS ecosystems , including how climate change impacts predation:

... While temperature will have a direct influence on metabolic rates of sockeye salmon it also impacts other parts of the ecosystem, including the risk of predation. This is illustrated by Petersen and Kitchell (2001), who used oceanic, coastal and freshwater climate indices and simulations of bioenergetics of key predators (e.g., northern pikeminnow), and predicted that warmer climatic conditions can lead to an increase in predation rates in the range of 26–31%.⁶¹⁸

415. In answer to which predators would become an immediate or a significant concern to FRSS if there were warmer climate conditions, Dr. Trites testified:

... one of the consequences of warming oceans is that it's going to affect the food requirements of fish. And it's because it's going to raise their metabolic rates, they're going to have to eat more food to compensate for that. To require more food, they're either going to take greater risks to be out and be exposed to be eaten by other predators that also have increased feeding requirements, as well. so it's hard to say at this point who is going to come out the victor in all that, except there's a realization that all the fish are going to require more food, and that food has to come within that fish community.⁶¹⁹

416. In response to the same question, Dr. Villy Christensen, the other author of Technical Report #8 testified,

⁶¹⁵ See, for example, Transcript, March 4, 2011, p. 23 (Paul Sprout); Transcript, February 8, 2011, p. 20 (David Patterson); Transcript, July 7, 2011, p. 56 (Dr. Richard Beamish)

⁶¹⁶ Transcript, March 4, 2011, p. 23 (Paul Sprout)

⁶¹⁷ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011)

⁶¹⁸ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 11

⁶¹⁹ Transcript, May 5, 2011, pp. 6-7 (Dr. Andrew Trites)

We would expect that the impact of climate change would be most pronounced in freshwater and in coastal waters. So you would look for those predators as being the key predators. With regard to climate change, the river especially.⁶²⁰

iii) Climate Change and Contaminants

417. Some concern was raised at the hearings about the impact of climate change on the increase of non-point source contaminants in the aquatic environment. In response to a question about whether climate change and global warming was increasing legacy chemicals, such as PCBs, from snow pack in mountainous areas and from glaciers being deposited into the aquatic environment, Don MacDonald stated:

I haven't heard of that but logically that's what you would expect, given that a lot of this material was tied up in this – in the snow pack. As we reduce it, the snow pack, or reduce the mass of the glaciers, we would expect that those materials that were bound up in that material would end up ultimately in the aquatic ecosystem.⁶²¹

iv) Climate Change and Pathogens and Disease

418. Dr. Stewart Johnson testified about the potential interaction between increased water temperatures and pathogens and disease, stating:

I think that with – given all of those various climate change and other insults, that we must be aware that there are pathogens that could possibly cause disease under those – when water conditions are poor....I don't think it's necessarily increased susceptibility to pathogens or disease. What I think you see sometimes is not such – not very optimal water conditions, for example, which means that the pathogens that these fish are already carrying, or pathogens that they acquire once they enter the river, may have a different outcome than if the water conditions were perhaps more favourable.⁶²²

419. In response to how he would characterize the level of risk for FRSS from disease transmittal from sea lice and climate change, Mr. Price testified:

I'd say fairly high when conditions are not favourable for juvenile sockeye, and when combined with other factors, you know, in – with predictions of climate change and future warming of the

⁶²⁰ Transcript, May 6, 2011, p. 17 (Dr. Villy Christensen)

⁶²¹ Transcript, May 9, 2011, pp. 94-95 (Don MacDonald)

⁶²² Transcript, August 23, 2011, pp. 86-87 (Dr. Stewart Johnson)

oceans, you know, these predictions suggest that ocean conditions will likely not be favourable for salmon in the future. And so, combined with that, whether there are food limitations or, as Dr. Orr suggested, these other possible stressors, whether that's increasing predation risk, I don't think a pathogen such as sea lice are really going to be beneficial for these fish, and from what I've seen, lice levels are increasing on these fish over the years, and I believe the risk to be quite high.⁶²³

v) Climate Change and Increasing Variability

420. A number of witnesses discussed climate change specifically as it relates to variability and environmental change. They testified that climate change is leading to more environmental and temperature-related variabilities, indicating that we may be in for more “troubles” in the future and managers can best prepare by expecting the unexpected. Dr. Welch testified: “...environmental change has always been with us. It's likely to be increasing dramatically under the projections of global warming.”⁶²⁴ Dr. Reynolds stated:

...There is strong evidence that salmon can evolve quickly, and **environmental conditions are always changing and they have been, of course, for a very long time. We know they're going to continue to do so at an accelerated rate due to climate change and other impacts of humans as well as natural events.**⁶²⁵

421. Dr. Holt discussed the uncertainty around how different CUs may respond to variability from climate change. She testified:

CUs were established to maintain diversity so each CU will – may have a slightly different genetic, morphological, or life history characteristic. Those CUs that are of relatively small abundance right now may – may be specially adapted to increase their productivity under different scenarios that may happen with product – with climate change, whereas other ones may decline. So it's uncertain right now which of those CUs might survive through climate variability, climate change. It's not necessarily the case that it's the dominant ones that will – that have those specific characteristics that are adaptive to climate change conditions.⁶²⁶

⁶²³ Transcript, September 6, 2011, pp. 24-25 (Mike Price)

⁶²⁴ Transcript, October 25, 2010, p. 85 (Dr. David Welch)

⁶²⁵ Transcript, October 28, 2010, p. 18 (John Reynolds)

⁶²⁶ Transcript, December 6, 2010, p. 56 (Dr. Carrie Holt)

422. In response to a series of questions about the difficulty in indentifying a trend in the health of FRSS stocks given the effects of climate change, Dr. McKinnell and Dr. Beamish outlined that the trend in the Pacific Northwest appears to be variability. Dr. McKinnell testified:

The variability is certainly what we're seeing rather than the trend right now... and the variability might well be a trend... I think this relates to a point that Dr. Beamish relayed yesterday on Bill Ricker, he said – I believe he said expect surprises... Expect the unexpected. And so I think that's wise advice.⁶²⁷

423. Dr. Welch generally agreed with the evidence of Dr. McKinnell and Dr. Beamish as to variability being the current and future response associated with climate change.

vi) DFO's Role in Climate Change Research and Policy Development

424. Despite evidence about the likely impacts to FRSS and their ecosystems from changing climates and fluctuating temperatures due to climate change, DFO is not currently a leader with regard to climate research in Canada. Instead, the responsibility to conduct this research has been largely left to Natural Resources Canada and Environment Canada. Robin Brown, Division Head of Ocean Sciences,⁶²⁸ testified that because DFO was not a lead agency on climate change, it negatively affected the funding that was available to DFO Science to do climate change research in the marine environment. He testified:

One of the ways the department understands what its priorities are relative to other federal departments is whether it's allocated funding for this issue, so in times of stress, if you're not funded when other federal departments are for something like climate change, that tends to be taken as a bit of a signal that it's not important for the department to do that work.⁶²⁹

425. Mr. Brown expressed concerns about the lack of research on climate change. He agreed with the statement on page 1 of Exhibit 1393⁶³⁰ the Canadian biodiversity ecosystem status and trends report, where it stated:

⁶²⁷ Transcript, July 8, 2011, p. 64-65 (Dr. Stewart McKinnell)

⁶²⁸ Transcript, August 18, 2011, p. 67 (Robin Brown)

⁶²⁹ Transcript, August 18, 2011, p. 68 (Robin Brown)

⁶³⁰ Exhibit 1393 (Canadian biodiversity: Ecosystem status and trends, 2010)

Lessons have been learned from preparing this assessment. Canada's long-term climate and hydrological monitoring programs ensure the reliability and relevance of climate and water trends in areas where station coverage is good....Equivalent monitoring of biodiversity and ecosystems is rare... Relevant ecosystem level information is less available than decision-makers may realize.⁶³¹

426. Commission Counsel asked Mr. Brown a series of questions with respect to the 2005 Climate change risk assessment report.⁶³² This was a risk assessment done by DFO at the behest of the Treasury Board, to help make decisions regarding priorities. Ringtail pages 34 to 36 in the report set out a risk response section, including “Ecosystem and Fisheries Management Risks”; “Support and Enhanced Science Program.” Mr. Brown, when asked what had been done to support and enhance the science program in relation to the identified risk, said this:

Not a lot other than to identify these two research program areas, the Climate Change Science Initiative and the Ecosystem Research Initiative...So everywhere where it says “enhanced” there wasn't much enhancing going on....⁶³³

427. Mr. Brown was asked whether any new funding was given for areas that are said to be supported? He responded: “depending on how you calculate it, the science change initiative and SOG ERI were new programs with new money – well, new programs with a budget. The net spending I don't think went up a lot. So it was a repackaging more than infusion of new resources.”⁶³⁴
428. On page 8 of the risk assessment report was a heading entitled Climate Change/Variability. When Mr. Brown was asked what had been done under “priority areas for research”, he testified that DFO was developing regional ocean climate models with Environment Canada and were making significant progress.⁶³⁵
429. In answer to what strategies have been developed following the risk assessment, Mr. Brown discussed the Climate Change Science Initiative⁶³⁶ and its relationship to work in the SOG:

⁶³¹ Transcript, August 18, 2011, p. 69 (Robin Brown)

⁶³² Exhibit 1400 (Fisheries and Oceans Canada: Climate Change Risk Assessment Report)

⁶³³ Transcript, August 18, 2011, p. 69 (Robin Brown)

⁶³⁴ Transcript, August 18, 2011, pp. 69-70 (Robin Brown)

⁶³⁵ Transcript, August 18, 2011, pp. 70-71 (Robin Brown)

⁶³⁶ Transcript, August 18, 2011, pp. 69-70 (Robin Brown)

So there have been a couple of strategies. The Science Branch has allocated some money into something called the climate – Climate Change Science Initiative. And that has been combined with some climate change work in the ecosystem research initiatives, which in our region focused on the Strait of Georgia. So climate change has been embedded. There's some specific funding for climate change. It's not a lot but it's specific, and also embedded in our ecosystem research initiatives, particularly in the Strait of Georgia... In our region, and I think in some others, we chose to combine certain aspects of those things, so when we're looking at down-scaling climate models, well, it was kind of obvious to us that one of the places we might want to apply that is in the Strait of Georgia.⁶³⁷

430. Mr. Brown was also asked what work had been done on analysing climate change impacts on contaminant pathways, which was identified in the Risk Assessment report. Mr. Brown testified:

Some continued analysis and interpretation of some existing data, a fair bit of work in the Arctic, where these are considered to be large impacts. Not so much elsewhere... It's been a struggle for people who work in that area in the department across the country to make a kind of contribution they would like to make. So if Peter's [Dr. Peter Ross] frustrated, he wouldn't be the only one.⁶³⁸

431. He stated that the work done on these initiatives should be for FRSS, particularly if “we're going to look at what ... the future may hold for Fraser sockeye and many other species.”⁶³⁹

432. Finally, with respect to ongoing risk assessment resulting from climate change, referring to page 27 of Fisheries and Oceans Canada 2011 Corporate Risk Profile,⁶⁴⁰ Mr. Brown was asked whether DFO has developed a Policy Framework on Climate Change. He testified that, to his knowledge, it had not been developed.⁶⁴¹ Mr. Brown was only able to confirm the following:

there was some new allocation in the most recent budget for climate impacts adaptations. It is not a huge amount of money.

⁶³⁷ Transcript, August 18, 2011, p. 74 (Robin Brown)

⁶³⁸ Transcript, August 18, 2011, pp. 71-72 (Robin Brown)

⁶³⁹ Transcript, August 18, 2011, p. 74 (Robin Brown)

⁶⁴⁰ Exhibit 1402 (DFO Integrated Risk Management: 2011 Corporate Risk Profile as approved by the Departmental Management Committee, September 22, 2010), p. 27

⁶⁴¹ Transcript, August 18, 2011, pp. 77-78 (Robin Brown)

It's a relatively short-term program. To my knowledge, there is no cohesive interdepartmental national program.⁶⁴²

433. The FNC submits that most fisheries scientists and managers view climate change as a potentially serious factor driving the current and future sustainability of FRSS. Scientists were clear that climate change will drive variability in the ecosystems FRSS pass through, as well as interact with other stressors, such as predators, pathogens, sea lice and contaminants to affect the long term health of wild FRSS.
434. Despite the present and future threat of climate change on the health of FRSS clearly acknowledged in DFO's most recent risk assessments, from the testimony of Mr. Brown, DFO has not had the funding needed to do long term studies on how climate change will impact the future sustainability of FRSS or their ecosystems, nor does it appear to have a policy framework for dealing with climate change or any interdepartmental national program, that would coordinate and include other departments such as Environment Canada.⁶⁴³

Recommendation: DFO, in collaboration with First Nations, should develop and implement a policy framework for climate change that would address the impact of climate change on the long-term sustainability of FRSS.

Recommendation: DFO should develop an interdepartmental, multi-stakeholder research program that incorporates climate change, cumulative impacts and an ecosystem-based approach to science.

Recommendation: DFO should ensure that multi-year funding is available for climate change research, including funding for ecosystem-based science initiatives and the oceans climate modelling program.

⁶⁴² Transcript, August 18, 2011, p. 100 (Robin Brown)

⁶⁴³ Transcript, August 18, 2011, p. 78 (Robin Brown)

H. Cumulative Impacts

i) The General Consensus

435. First Nations have been concerned about cumulative impacts or multiple stressors affecting FRSS and their habitats for a very long time. At the commencement of the public hearings the FNC advised that the effects of cumulative impacts on FRSS was an area that required in-depth attention in this Inquiry and that care should be taken not to lose this difficult subject in the long list of impacts affecting FRSS.⁶⁴⁴
436. There are multiple stressors affecting FRSS throughout their life history, some of which are directly attributable to human activity (past and present), and some of which are potentially passed on through the genetic structure. It is difficult to assess whether these multiple and cumulative impacts are a direct cause of FRSS mortality. However, a holistic ecological perspective, embodied within First Nations' perspectives of management, and assisted by TEK, requires that the causes of decline, including the poor 2009 returns, be considered within a cumulative and multiple stress paradigm.
437. Cumulative impacts were considered as a hypothesis at the June 2010 PSC workshop. The PSC Workshop Expert Panel concluded that the available evidence for and against each of the nine hypotheses did not point to a single cause of either the poor returns of FRSS in 2009 or the long-term decrease in returns per spawner. Instead, the evidence suggested that multiple causal mechanisms very likely operate simultaneously on FRSS and that their effects may be additive, multiplicative (i.e., synergistic), or may tend to offset one another's effects.⁶⁴⁵
438. Early in the hearings, Dr. Mithiani testified to the importance of researching cumulative impacts to properly assess the risks to FRSS and to develop a policy response. She stated:

... And the other one was the whole idea of ecosystem science and the fact that you really needed to look at cumulative effects, and what does Science need to do in order to prepare for factoring in cumulative effects. So, for example, climate change with resource exploitation, the risk analysis that needs to go with it. You know, some of the work that needs to be done in terms of

⁶⁴⁴ Transcript, June 15, 2010, p. 74 (Submissions on behalf of FNC)

⁶⁴⁵ Exhibit 73 (Synthesis of Evidence from a Workshop on the Decline of Fraser River Sockeye, June 15-17, 2010, prepared for Pacific Salmon Commission), p. 5

what would the tradeoffs be. Can human use and biodiversity coexist, and if it does coexist, what kind of risk analysis we need to do for those...when we look at policy development, policy development in government takes about three years. But in order for Science to inform policy, Science needs to start much earlier on, because otherwise the science will not be aligned to the policy development. So it was really an opportunity [referring to ad hoc science working group]⁶⁴⁶ to look at some of these big issues...the cumulative effects, that is absolutely something that we need to do...⁶⁴⁷

439. A variety of other scientists also testified about the potential role that cumulative effects in the marine environment had in the 2009 poor return. Dr. Jim Irvine testified:

Well, what I would say, it would be – I think they got like a triple whammy. There is not a specific environment. This is something that, in my opinion, the – to have really anomalously low survivals as we did for the 2007 ocean entry year fish, it would have to be some sort of major catastrophe occurring at some specific location, and there's no evidence of that. So my presumption would be that it would be a cumulative effect of subnormal conditions at multiple life history phases of the fish, and it's a real anomaly. It's exactly the sort of thing that you expect to see occasionally in times of climate change.⁶⁴⁸

440. Both Don MacDonald and Dr. Peter Ross spoke about the need to look at contaminants, and particularly endocrine disrupting contaminants and ECCs in the context of other stressors. Don MacDonald testified:

We've recommended this development of cumulative effects monitoring program that would get at these multiple interactive effects of things like the water temperatures and pathogens and contaminants, and the other factors that are potentially adversely affecting the survival and reproduction of the sockeye salmon.⁶⁴⁹

441. Dr. Peter Ross testified:

So often sublethal effects of contaminants may not be evident, but when a secondary insult comes along like a virus, like climate change, like a food supply problem or other stress with regard to habitat destruction, that's where the contaminant influence may become a very significant contributing factor. In other words, the contaminants would predispose salmon to a secondary insult. So I

⁶⁴⁶ Exhibit 52 (List of DFO Scientists Who Attended a Brainstorming Session in October 2010)

⁶⁴⁷ Transcript, November 3, 2010, pp. 56-58 (Dr. Mithani)

⁶⁴⁸ Transcript, July 8, 2011, pp. 94-95 (Dr. Jim Irvine)

⁶⁴⁹ Transcript, May 9, 2011, p. 97 (Donald MacDonald)

think in that sense it's very important to [have] contaminant research placed in the guise of the real world of salmon habitat, of salmon life history, and understand how these contaminant stresses which are out there are contributing to population level impacts, and I would say that's not happening.⁶⁵⁰

442. Dr. Villy Christensen and Dr. Andrew Trites also wrote about the importance of considering cumulative impacts in Technical Report #8. They identified that an evaluative approach of cumulative impacts has not been actively pursued in British Columbia. They stated:

Single factors rarely explain ecological phenomena and are equally unlikely to explain the recruitment patterns for Fraser River sockeye salmon over the last decades. More often than not, explanations are found by evaluating the interplay of a wide-range of cumulative impacts, including atmospheric and oceanographic conditions, environmental productivity, nutrient runoff, diseases and parasites, food webs with their prey, competitors, and predators, and human impact through fisheries or other effects. Doing so is possible, and is something that fisheries science is experienced in doing under the banner of integrated fisheries management. Unfortunately, this approach has not been actively pursued in British Columbia to the detriment of being able to evaluate the role of predation and other factors in the decline of Fraser River sockeye salmon.⁶⁵¹

443. Other witnesses spoke about cumulative impacts in the freshwater environment, including Michael Crowe, Section Head for the Interior HMP in the Ecosystem Management Branch (formerly OHEB) at DFO. He testified that habitat management is about managing small issues, the cumulative impacts of logging, small developments and activities. He noted that you start seeing over time the cumulative incremental loss of riparian function, which is a contributor to fish and fish habitat.⁶⁵²
444. Corino Salomi, Area Manager for the Lower Fraser in the Ecosystem Management Branch, testified that cumulative impacts posed by urbanization and development was one of the "key items that impact fish habitat."⁶⁵³ He went on to testify about the various small developments that cumulatively affect FRSS habitat, and ultimately may be a potential contributor to the deterioration in FRSS health:

⁶⁵⁰ Transcript, June 14, 2011, p. 41 (Dr. Peter Ross)

⁶⁵¹ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 82

⁶⁵² Transcript, June 8, 2011, p. 6 (Michael Crowe)

⁶⁵³ Transcript, June 8, 2011, p. 70 (Corino Salomi)

It's no one thing, in most cases, that can be pointed to as causing declines of fish or impacts of fish. It's often the cumulative impacts. It's not just having no riparian standard; it's the road crossings that eliminate the riparian areas; it's the residential properties where individuals have removed some of the trees and the temperature of the stream has increased because of that; it's pollution that comes from run-off, or sediment that comes from run-off that enters the stream; it's intrusions into the riparian zone by various activities that might occur in an urban area; it's the often constant pressure that fish habitat and riparian zones receive from recreational activity, from development, from maintenance activities for things flooding. **It's all these things that, together, begin to degrade the overall health and then the quality of a stream and a fish habitat.**⁶⁵⁴

445. Dr. Kristi Miller-Saunders, along with Dr. Kyle Garver, also believe there was no single major factor causing the decline of FRSS.⁶⁵⁵ In speaking of her work on establishing whether there is a viral agent impacting FRSS, Dr. Miller-Saunders noted the potential impact of other factors, including highly variable ocean conditions, on the health of FRSS. She testified:

And it is my view that if you take a fish that is already compromised and you put that fish into an environment that is highly stressful, that doesn't have a lot of food, that may not be the optimum temperature, that may have other things like sea lice and other things that they are up against, that you could weaken a fish to the point that **...they simply can't take that level of stress.** And I do believe if we are able to demonstrate that this virus does cause disease and mortality in that early marine phase, and if it is activated under stress like it has been shown to be activated under stress in other species, this family of viruses, that there is a potential that it could be associated with high levels of mortality. That does not mean that it directly causes mortality. **But if you weaken an animal, you start with a weak animal and then you weaken it further by poor conditions in the environment, it is the accumulative effect of those stressors that likely causes the mortality that we are seeing in the early ocean environment.** That is really what my feeling is on it. I don't think that one factor all by itself has caused this decline.⁶⁵⁶

⁶⁵⁴ Transcript, June 8, 2011, pp. 70-71 (Corino Salomi)

⁶⁵⁵ Transcript, August 25, 2011, p. 29 (Dr. Kristi Miller-Saunders)

⁶⁵⁶ Transcript, August 25, 2011, pp. 29-30 (Dr. Kristi Miller-Saunders; Dr. Kyle Garver)

ii) Technical Report #6: Pulling it All Together

446. The final technical report prepared for the Inquiry was Technical Report #6: *FRSS: Data Synthesis and Cumulative Impacts*.⁶⁵⁷ David Marmorek, the project lead for this report, was qualified as an expert in aquatic ecology, including the effects of human activities on aquatic ecosystems, fish habitats and fish populations, environmental impact and ecological risk assessment, adaptive management, experimental design, decision analysis and modelling, and technical facilitation of interdisciplinary scientific workshops.⁶⁵⁸
447. The purpose or overall goal of Technical Report #6 was to: "...synthesize the results of Cohen Commission research projects into an assessment of the cumulative impacts of various factors potentially affecting the Fraser River sockeye fishery over the recent period of declining productivity."⁶⁵⁹ Then based on the available evidence, the authors of the report were tasked with determining whether a factor was unlikely (representing the lowest level of confidence), possible, likely, or very likely (representing the highest level of confidence) to have been a primary driving factor behind the overall pattern of declining productivity in FRSS.⁶⁶⁰
448. In Technical Report #6, the authors discussed the difference between the cumulative impacts assessment that was carried out for the Inquiry and cumulative impacts assessment done under the CEAA.⁶⁶¹ The key differences were described as follows:
- a. Project 6 was centred on a focal VEC – the productivity and recruitment of FRSS, rather than on an individual project, as is often the case under the a CEAA assessment.⁶⁶²
 - b. Project 6 was a retrospective investigation into the potential causes underlying the decline of FRSS, while a CEAA assessment of cumulative impacts is forward

⁶⁵⁷ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011); Exhibit 1897 (Errata Sheet for Exhibit 1896, September 13, 2011); Exhibit 1575 (Addendum: Implications of Technical Reports on Salmon Farms and Hatchery Diseases for Technical Report #6, July 29, 2011)

⁶⁵⁸ Transcript, September 19, 2011, p. 4 (David Marmorek)

⁶⁵⁹ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), Executive Summary, p. 1

⁶⁶⁰ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), Executive Summary, p. 2

⁶⁶¹ *Canadian Environmental Assessment Act*, S.C. 1992, c. 37

⁶⁶² Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 7

looking. With retrospective analyses, the purpose is to determine the magnitude and nature of cause-and-effect relationships, trying to understand the fundamental relationship between impact factors and VEC sustainability, with the ultimate goal being to provide strongly informed future management decisions. Normally, an environmental assessment is an exercise in determining different possible future scenarios and examining the potential impacts of actions taken today across those possible futures. Past actions cannot be changed and are only useful for discovering and calibrating cause-and-effect relationships among actions and VEC-consequences.⁶⁶³

- c. The project used relevant ecological regions as a study area including the Fraser watershed and estuary, the SOG, and the marine migratory route of FRSS.⁶⁶⁴
 - d. The analyses included a large range of factors hypothesized to be contributors to the decline of the VEC and these factors were all considered to potentially contribute to cumulative impacts on the VEC even though they differ substantially in type, timing and location of their primary effects.⁶⁶⁵
449. At the Inquiry, Mr. Marmorek outlined the method that was used to assess the cumulative impacts of various factors affecting FRSS. He discussed what sorts of independent analyses the project team conducted, including: (a) the retrospective analysis using existing published methods; (b) quantitative statistical analyses synthesizing data both within and across life history stages and going across all of these reports; and (c) adding their own recommendations to those outlined in other technical reports.⁶⁶⁶
450. It is important to emphasize that the Project 6 team did not independently assess the validity of any of the technical reports prepared for the Inquiry, but rather “carefully examined the methods that each of those authors used, and looked at the reviews.”⁶⁶⁷

⁶⁶³ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), pp. 6-7

⁶⁶⁴ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 7

⁶⁶⁵ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), pp. 7-8

⁶⁶⁶ Transcript, September 19, 2011, pp. 8-9 (David Marmorek)

⁶⁶⁷ Transcript, September 19, 2011, p. 9 (David Marmorek)

Mr. Marmorek stated that it was the responsibility of the reviewers to review each of the technical reports.⁶⁶⁸

451. The first steps in the method involved developing the team's approach for conducting a qualitative and quantitative analysis of the evidence, conducting a workshop with both the authors and reviewers of the technical reports, then working with the authors of each of the technical reports to get as much data regarding the various potential stressors affecting FRSS, as well as the productivity data. They then organized the data into a relational database for further analysis. The next step was conducting a retrospective ecological risk assessment or cumulative impact assessment based on each of the technical reports, and on evidence from the PSC workshop.⁶⁶⁹
452. As part of the assessment of the various stressors, the Report authors of Technical Report #6 looked at the candidate stressors affecting each life history stage, which are found in figure 3.3-1.⁶⁷⁰ They then built a conceptual model of the candidate stressors affecting each life history stage from the technical reports and from the workshop. They also looked at some of the potential interactions amongst these factors and how they could combine. Mr. Marmorek testified that "the en route mortality report [Technical Report #9] looked at combined interactions like temperature and pathogens, disease, harvest, all combining."⁶⁷¹ The point was to "list all the plausible mechanisms and then consider how those might have interacted, although we don't actually have very hard evidence on how they interacted."⁶⁷²
453. The authors then applied a weight-of-evidence approach to assess whether a stressor or a factor made a substantial contribution to the decline. This involved going through the following sets of questions or categories:
 - a. Plausible mechanism: Does the proposed causal relationship make sense logically and scientifically? Is it possible that the factor could harm fish?⁶⁷³

⁶⁶⁸ Transcript, September 19, 2011, p. 9 (David Marmorek)

⁶⁶⁹ Transcript, September 19, 2011, p. 7 (David Marmorek)

⁶⁷⁰ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 18

⁶⁷¹ Transcript, September 19, 2011, p. 11 (David Marmorek)

⁶⁷² Transcript, September 19, 2011, p. 11 (David Marmorek)

⁶⁷³ Transcript, September 19, 2011, p. 14 (David Marmorek)

- b. Exposure: Is there evidence that FRSS populations are, or have been, exposed to the causal factor?⁶⁷⁴
 - c. Correlation/Consistency: Is there evidence for association between adverse effects in FRSS populations and presence of the causal factor, either in time or space?⁶⁷⁵
 - d. Other Evidence: Is there other evidence that can be supportive of a causal factor in order to determine certain thresholds for adverse effects.⁶⁷⁶
 - e. Specificity: If there is a particular kind of effect or physiological response in the population that's caused by exposure to a certain stressor, can a specific physiological response be confirmed through lab or field experiments?⁶⁷⁷
 - f. Removal: Has the removal of the stressor led to an amelioration of the effects in the population? This relies on some contrast happening in that stressor.⁶⁷⁸
454. Each stressor was examined according to these categories and then organized in the decision tree, found at Figure 3.3-3 of the report.⁶⁷⁹ Mr. Marmorek testified:

[the report] goes through asking whether a given factor or hypothesized stressor passes various tests. So the first case is, is the mechanism plausible?...Then we moved to the exposure question, ...for many of the hypothesized stressors, we didn't have exposure data, and I should say for one of them we had no data, and that was for pathogens. So no conclusion was possible. So the middle box, there, when it comes to exposure, we had exposure data but it wasn't likely that the fish actually got exposed to those stressors...So if you get past that set of questions, you then follow the "Yes" box and you come down to, okay, so it looks like there was some exposure. Is there any correlation or consistency?... Now, in some cases, we got through that box and down to, yes, it looks like there was some correlation that was consistent with the hypothesis, and so we moved down to the bottom box and "Other Evidence"... So that's where the climate changes and changes in marine condition ended up being either possible or likely factors for some of the life history stages. They

⁶⁷⁴ Transcript, September 19, 2011, p. 16 (David Marmorek)

⁶⁷⁵ Transcript, September 19, 2011, p. 15 (David Marmorek)

⁶⁷⁶ Transcript, September 19, 2011, p. 16 (David Marmorek)

⁶⁷⁷ Transcript, September 19, 2011, p. 15 (David Marmorek)

⁶⁷⁸ Transcript, September 19, 2011, p. 15 (David Marmorek)

⁶⁷⁹ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 24

got all the way down to the bottom box. The predators, as far as returning adult salmon, there was some exposure data that looked some predators had increased over time, and so it looked like it might be possible but there really weren't good correlation analyses. So we ended up at the bottom without enough evidence to say anything other than it was a possible factor.⁶⁸⁰

iii) Key Conclusions

455. Mr. Marmorek testified that Technical Report #6 was really a synthesis of all the technical reports conducted during the Inquiry and that the team included all the people who worked on those reports. He went on to agree that despite different scientists being involved in producing the technical reports and attending the PSC workshop, the scientists generally agreed with one another.⁶⁸¹
456. The first conclusion that Mr. Marmorek identified as resulting from the retrospective cumulative impacts analysis conducted by the project team was that “to attribute causality, you need to look at the overall pattern of change in sockeye productivity within both Fraser and non-Fraser stocks.”⁶⁸² He testified that the first step (and one taken with regard to the Columbia River fish), is to determine at which life history stage the bottleneck is occurring, and then to consider what are the factors most correlated with that decrease in survival. He testified that one needs some contrast, either over space or time, in those stressors to be able to deduce which of those factors are most likely contributors.⁶⁸³ According to Mr. Marmorek, this has not been adequately done for FRSS.⁶⁸⁴
457. The second set of conclusions focused on the primary factors responsible for the long-term declines in overall FRSS productivity and the 2009 low returns. Mr. Marmorek testified that:

Marine conditions interacting with climate change during the coastal migration stage were the likely primary factors for the long-term decline over the last 20 years in Fraser River sockeye productivity, and that marine conditions were likely to be the primary factor responsible for the poor returns in

⁶⁸⁰ Transcript, September 19, 2011, pp. 16-17 (David Marmorek)

⁶⁸¹ Transcript, September 19, 2011, p. 43 (David Marmorek); Mr. Marmorek did identify that there were some interesting arguments about whether QCS or SOG were more important in 2007.

⁶⁸² Transcript, September 19, 2011, p. 8 (David Marmorek)

⁶⁸³ Transcript, September 19, 2011, p. 13 (David Marmorek)

⁶⁸⁴ Transcript, September 19, 2011, p. 13 (David Marmorek)

2009 in both the Strait of Georgia and Queen Charlotte Sound.⁶⁸⁵

458. With respect to the distinction between the conclusion that it was “very likely that marine conditions during the coastal migration life stage contributed to the poor returns observed in 2009,” as compared to the same conditions being only “likely” factors for the long term decline, Mr. Marmorek testified that there’s a lot more evidence on the marine factors for explaining what happened to the returns in 2009.⁶⁸⁶

459. He went on to testify:

With respect to the returning run of spawners from the mouth of the Fraser back to the spawning ground, climate change and en route mortality has definitely affected harvest and escapement, but not productivity measured as recruits-per-spawner, because that recruitment already includes harvest and en route mortality. It’s basically escapement plus harvest plus en route mortality. So that did not affect the overall trends in sockeye productivity. Other possible primary factors in the productivity declines include predation on adult sockeye as they come back to the mouth of the Fraser and climate change in the early life history stage from egg to smolt. **We were not able to draw any conclusion on diseases because of lack of data on the exposure of Fraser sockeye to diseases, and disease transmission from aquaculture we concluded was either unlikely or a possible primary factor depending on which of the two aquaculture reports one uses as evidence.**⁶⁸⁷

460. With respect to the conclusions about the role of climate change, Mr. Marmorek went on to explain that climate change and marine conditions overlap in a lot of ways, as outlined in Technical Report #9. He testified:

Climate change can affect conditions in the ocean in terms of food availability. Also Technical Report 4 talks about past changes in marine conditions and temperature, and looks at future changes in marine temperatures with climate change and discusses how some of the extreme past temperature years look a lot like the expected future years, say in 2080. So what we have is overlap there where climate change is likely to increase temperatures, and increased temperatures are likely to be bad for food production

⁶⁸⁵ Transcript, September 19, 2011, p. 8 (David Marmorek)

⁶⁸⁶ Transcript, September 19, 2011, p. 28 (David Marmorek)

⁶⁸⁷ Transcript, September 19, 2011, p. 8 (David Marmorek)

and changing the kinds of predators that sockeye are used to, all of which is not good for Fraser River sockeye.⁶⁸⁸

461. Mr. Marmorek also described the conclusions that were reached with respect to other factors, testifying:

All the other factors we considered to be unlikely to be primary factors responsible for the overall decline in productivity. For example, many of the freshwater habitat factors, though they may well have contributed to changes in some stocks in some years – so, for example, delayed density dependence appears to have been responsible for some declines and productivity in the Quesnel sockeye stock in some years, but was not a primary factor responsible for the overall decline across all the stocks. And finally, there are many gaps in existing information which make this whole process difficult, so both assessing the exposure as well as the correlation of those exposures with changes in productivity as well as having life-stage specific survival and condition information. So that led to some of the recommendations that we have.⁶⁸⁹

462. With respect to factors that did not make the primary contributor list, Mr. Marmorek pointed out two very important caveats: first, those factors that were marked as unlikely meant, that while they did not make it on to the primary factor list, they could still be contributory factors.⁶⁹⁰ Second, with respect to the relative importance of different stressor categories, particularly in the Freshwater environment, the report stated:

The strength of any conclusion that freshwater life stages are not as important as marine life stages can only be as strong as our belief that the assemblage of variables described above is a reasonably accurate representation of the freshwater component of the life history of Fraser River sockeye salmon.⁶⁹¹

463. Mr. Marmorek testified that this meant that:

... all of these results are only as good as the data that you put into them, and for the freshwater life history stage, there really weren't many datasets available within the time we had and may not be available, period. So, for example, we had to use air temperatures instead of lake or stream temperatures as a proxy

⁶⁸⁸ Transcript, September 19, 2011, pp. 28-29 (David Marmorek)

⁶⁸⁹ Transcript, September 19, 2011, pp. 8-9 (David Marmorek)

⁶⁹⁰ Transcript, September 19, 2011, p. 17 (David Marmorek)

⁶⁹¹ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 95

variable for freshwater conditions. So ideally, you would have a lot more data on freshwater conditions.⁶⁹²

464. Mr. Marmorek went on to testify that, because of lack of data, **no conclusion was possible for two factors: disease and Endocrine disrupting contaminants or ECCs.**
465. The report authors were only referring to contaminants that had measurements as outlined in Technical Report #2 (also referred to as Contaminants of Concern) and were not referring to endocrine disruptors and ECCs, which would “end up in the same place as disease or no conclusion possible.”⁶⁹³
466. With respect to disease and salmon farms, Mr. Marmorek was asked about two contradictory points on page 19 of the Addendum,⁶⁹⁴ where it stated that such diseases could be “possible” and “unlikely” contributors to the overall declines in FRSS. In response, he testified:

So our job here was to look over the work that Dill and Noakes did and look at what the implications of their conclusions were for our overall conclusions in Technical Report 6. It wasn't our job to try to reconcile them or read the 250 references that they referred to, only 25 of which they looked at in common, by the way. Anyway, so we basically said, well, if you took Dill's report as evidence, your conclusion would be that disease from salmon farm origin was a possible contributor to the overall declines in sockeye salmon. And if you took Noakes' report, your conclusion would be that that was unlikely.⁶⁹⁵

467. The FNC submit that it is reasonable to conclude that the density and location of open net pen finfish aquaculture along the migratory route of FRSS are potentially impacting the health and long-term sustainability of FRSS. The significance of that impact to the immediate and long-term exercise of s. 35 rights is of strong concern to First Nations and must be researched as a priority.

iv) Data Limitations

468. Starting on page 14 of Technical Report #6, there was a discussion of the Unknowns, Unknowables, Knowledge Gaps and Data Limitations. Section 3.2 of the Technical

⁶⁹² Transcript, September 19, 2011, p. 35 (David Marmorek)

⁶⁹³ Transcript, September 19, 2011, p. 17 (David Marmorek)

⁶⁹⁴ Exhibit 1575 (Addendum to Technical Report #6, July 29, 2011), pp. 18-19

⁶⁹⁵ Transcript, September 19, 2011, pp. 31-32 (David Marmorek)

Report lays out a summary of the data limitations encountered in the assessment and in the various Technical Reports.⁶⁹⁶ Mr. Marmorek highlighted the challenge of data limitations for assessing the stressors that FRSS are experiencing. He testified as follows:

when you want to determine at which life history stage bottlenecks are occurring, it's really helpful to have information on survival through each of those life history stages, and also the condition of fish for each of those life history stages. Now, you can't get that perfectly, it would be too expensive, but we could certainly have more information than we currently have. Then the second is, as we've just gone through that decision tree figure, there's gaps in the information on exposures and a shortage of quantitative analyses of correlation and consistency, which make it hard to get all the way down through that tree. You know, an example would be if we had information on diseases, we could say a lot more about the likelihood of that stressor actually being responsible for some of the declines that we've observed.⁶⁹⁷

469. Other data limitations outlined in Technical Report #6 include: incomplete time series of information (both within each stage of the life cycle and over multiple years), incomplete spatial coverage for all stocks, poor quality data (imprecise or inaccurate measurements), crude indicators that do not really reflect the condition of interest (e.g., air temperatures rather than the water temperatures where salmon eggs are incubating), and inconsistent methods of measurement.
470. For example, Mr. Marmorek testified that for smolt out-migration, they had a lower level of confidence in the data because there are no estimates of survival from the time that smolts leave a rearing lake to the time they get to the estuary. Therefore, it was difficult to know how that life history stage has changed over the period of interest.⁶⁹⁸
471. Mr. Marmorek also agreed that while they did not have the information to understand how a number of small non-lethal effects would have a cumulative effect over the life history,⁶⁹⁹ they did have some estimate of survival from spawners to fry in nine of 19 FRSS stocks. In examining these nine stocks, they looked at the patterns over time for that life history stage and found that the stocks haven't gone down, indicating that:

⁶⁹⁶ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 14

⁶⁹⁷ Transcript, September 19, 2011, pp. 18-19 (David Marmorek)

⁶⁹⁸ Transcript, September 19, 2011, pp. 21-22 (David Marmorek)

⁶⁹⁹ Transcript, September 19, 2011, p. 12 (David Marmorek)

for that life history stage that the cumulative effect of all the factors operating on at least those nine stocks, at least to the fry stage for seven of them, doesn't appear to have negatively affected their survival or caused a decrease in trend and survival over the last 20 years, which is the period of interest.⁷⁰⁰

472. Mr. Marmorek testified that this one example showed the “the power of having data that discretely summarizes the survival within each life history stage.”⁷⁰¹ He went on to point out that estimates of survival at each life history stage are important in order to capture delayed effects, such as when a fish acquires some disease in an earlier stage and survives, so it does not show a trend of decline, but later out at sea, the fish’s survival is affected. Unfortunately, there is only data on survival from spawners to fall fry, with little or no survival data for downstream migration, coastal migration, and returns except for a few acoustic tag studies.⁷⁰²
473. In addition, Mr. Marmorek identified that there were only estimates of spawning abundance and en-route mortality for about half of the 36 CUs, and juvenile production estimates for about one quarter of these CUs. The ideal would be to have “data that are intergenerational (i.e., across 40 years to provide a pre-decline base period), intra-generational (across life history stages and locations), and inter-stock (to explain why some have done well while others declined).”⁷⁰³
474. Other limitations identified in the Report include gaps in understanding, including not knowing how, where or when FRSS die. In most cases, mortality must be inferred indirectly based on information on the sockeye’s exposure to different stresses, but there are uncertainties in both fish migration patterns and the stresses experienced by each group of fish. Little is known about the potential impact that abundant predators may have on relatively rare prey.⁷⁰⁴
475. In his testimony, Mr. Marmorek also discussed the “Unknowables,”⁷⁰⁵ stating:

it's hard to know exactly how a salmon dies unless it ends up in a fishing net, a predator's stomach or there's some sort of massive

⁷⁰⁰ Transcript, September 19, 2011, p. 12 (David Marmorek)

⁷⁰¹ Transcript, September 19, 2011, p. 12 (David Marmorek)

⁷⁰² Transcript, September 19, 2011, pp. 12-13 (David Marmorek)

⁷⁰³ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 15

⁷⁰⁴ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), pp. 15-16

⁷⁰⁵ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 16

fish kill....so you can really only infer how a fish died indirectly by looking at strong contrasts across time, across stocks and across space. So ideally you have contrast in survival, and we have a lot of that because productivity trends are varied over time and over space. So then we can look at the contrast in stressors, but you're never going to know ultimately exactly how those fish died. **Even if you could measure all the stressors - and you can't - you're never going to have for all the coastal migration period full knowledge of all the predators, competitors, food supply contaminants, temperature, conditions, exactly. So that's essentially unknowable.** There is incomplete information. So you're going to have to make inferences based on contrasts. And it's really unknowable exactly how all of those stressors ultimately combine to hit that 1.0 mortality part on the graph we were looking at earlier.⁷⁰⁶

476. Mr. Marmorek testified that while filling data gaps is possible, as some of the research conducted during the course of the Inquiry demonstrated, there will always be unknowns and unknowables, and therefore humility and prudent management are recommended.⁷⁰⁷ He confirmed, however, that the cumulative impacts paradigm should play a role in the research projects that have been identified in the 23 recommendations in Technical Report #6, in order to cover some of the data gaps and that TEK had a role in cumulative impact paradigms.⁷⁰⁸
477. The FNC submits that the increasing prevalence of ERL in FRSS since the 1990s requires a precautionary and prudent approach when considering climate change together with the potential exposures to contaminants, including endocrine disrupting contaminants, pathogens and ECCs. While the MA is a management adjustment to this increasing loss of FRSS, it does not explain the cause of such loss or in any way solve the stressor that is having this lethal effect.

v) Recommendations: How to Research and Account for Cumulative Impacts on FRSS

478. The Report outlined 23 different recommendations, some of which were carried forward from some other technical reports.⁷⁰⁹ Mr. Marmorek went on to describe that some recommendations were bolded because from the team's perspective they were more important than others. However, in response to inquiries about how he would prioritize

⁷⁰⁶ Transcript, September 19, 2011, p. 20 (David Marmorek)

⁷⁰⁷ Transcript, September 20, 2011, pp. 71 and 76, 96-97 (David Marmorek)

⁷⁰⁸ Transcript, September 20, 2011, pp. 97-98 (David Marmorek)

the recommendations outlined in Technical Report #6, Mr. Marmorek testified that it was not up to him to make those determinations.⁷¹⁰ Rather he testified that “final prioritization is something that would have to go through a quite extensive process of thinking about the decisions that need to be made and [the] inputs to those decisions [that are] required...”⁷¹¹

479. Mr. Marmorek recommended that the four questions on page 107 of Technical Report #6 be used as the process for trying to prioritize the recommendations.⁷¹² Mr. Marmorek also agreed that First Nations, as rights holders, should be part of the prioritizing process.⁷¹³ He also testified as to the need for dialogue about priorities:

I think the things that are listed at the bottom of page 107 require dialogue amongst all of the interested parties, and I guess what I would suggest is that just as in, for example, the water-use planning process where there's a variety of stakeholder groups represented, as well as technical analyses that fed those discussions, that something roughly analogous would be helpful for doing this prioritization.⁷¹⁴

480. As part of his testimony about the recommendations, Mr. Marmorek described the two categories for making determinations about which recommendations had importance. One category, ‘explanatory importance’ means what's the relative ability of information within each of those rows, each of those life history stages, to explain what's going on. The other category, ‘relevance to management actions’, is how much would that information be used for actually making decisions on, say, harvest, habitat, hatcheries, hydro, etc. Using coastal migration as an example, he testified that:

we basically used those columns [categories] as a guideline for bolding certain portions. So if you go down a little further, to the section on coastal migration, everything's bolded, because we have, from our work and from the work done by the various technical reports, concluded**the coastal migration phase has a high level of explanatory importance. It's also highly relevant to management actions.**⁷¹⁵

481. During the hearings, Mr. Marmorek:

⁷⁰⁹ Transcript, September 19, 2011, p. 10 (David Marmorek)

⁷¹⁰ Transcript, September 19, 2011, p. 59 (David Marmorek)

⁷¹¹ Transcript, September 19, 2011, p. 40 (David Marmorek)

⁷¹² Transcript, September 19, 2011, p. 59 (David Marmorek)

⁷¹³ Transcript, September 20, 2011, p. 78 (David Marmorek)

- a. revised his “relevance to Management Action for Parental Spawning success and incubation” from “Low” to “High”;⁷¹⁶
 - b. agreed that the selection of the “strategically selected cross section of stocks” would need to be done by a broad spectrum of managers and stakeholders”;⁷¹⁷
 - c. agreed that prioritization of the research questions would be necessary for Recommendation #9;⁷¹⁸
 - d. that marine use planning that identifies potential areas of importance, areas of potential sensitivities, stressors and bottlenecks would be a useful management tool and a companion to Recommendation #9;⁷¹⁹
 - e. that the Relevance to Management actions for effects on the “Growth in the North Pacific and return to Fraser” could be medium or quite relevant”;⁷²⁰
 - f. opening and closing and placement of fisheries will increasingly need to be precautionary;⁷²¹
 - g. continued and potentially increased use of the management adjustment to respond to climate change;⁷²² and
 - h. that these recommendations were intended to address knowledge gaps related to the long-term declines in productivity of FRSS and not the management gaps addressed in Project 7.⁷²³
482. At the Cohen Commission Workshop, the participants agreed that a coordinated, multidisciplinary program should be implemented, focused on oceanographic and fisheries research programs in the marine.⁷²⁴ This marine work is the subject of Recommendation #9, which suggests a fully integrated oceanographic and ecological

⁷¹⁴ Transcript, September 20, 2011, pp. 78-79 (David Marmorek)

⁷¹⁵ Transcript, September 19, 2011, pp. 39-40 (David Marmorek)

⁷¹⁶ Transcript, September 20, 2011, p. 82 (David Marmorek)

⁷¹⁷ Transcript, September 20, 2011, p. 84 (David Marmorek)

⁷¹⁸ Transcript, September 20, 2011, p. 86 (David Marmorek)

⁷¹⁹ Transcript, September 20, 2011, pp. 75 and 87 (David Marmorek)

⁷²⁰ Transcript, September 20, 2011, p. 88 (David Marmorek)

⁷²¹ Transcript, September 20, 2011, p. 90 (David Marmorek)

⁷²² Transcript, September 20, 2011, p. 91 (David Marmorek)

⁷²³ Transcript, September 20, 2011, p. 91 (David Marmorek)

investigation of the SOG, the Strait of Juan de Fuca, Johnstone Strait and QCS and extending along the continental shelf to the Alaska border.⁷²⁵ Mr. Marmorek was asked who should participate in this research program, how it would be structured, and who would be responsible to organize or fund it. In answer, he testified:

So that question wasn't really part of our terms of reference, but I think the first thing would be to clearly set out the objectives for the research groups, so what decisions are you hoping to inform, what level of accuracy and precision is required for those decisions, and what's the level of – what are the scientific questions that helped to inform those decisions. So rather than just, you know, going out and doing a bunch of research. Logically, I think it would be led by the federal agencies responsible for Pacific salmon, so that would include DFO, NOAA Fisheries, Pacific Salmon Commission - I guess that's an international agency - and then they would get data and have participation from a whole bunch of others, so leading researchers, international organizations, like PICES, Alaska, Washington, Oregon, Idaho state fisheries agencies, First Nations, NGOs, provincial agencies, fish farmers. But it would be led, I think, by those federal agencies. That's just my, you know, off-the-cuff thinking on this.⁷²⁶

483. With respect to recommendations about data gathering and database improvements, Mr. Marmorek testified as follows:

the first thing is to have excellent data on Fraser River sockeye and non Fraser River sockeye productivity and stressors and to know exactly where those data came from, and then to design a database that way so that it facilitates answering the specific questions and making the specific decisions I describe earlier.⁷²⁷

484. Mr. Marmorek outlined that it could be the same agencies, DFO, NOAA, PSC, that would undertake the marine focused research program as they would have the most data and they could get access to other datasets. He also testified that the database created for Technical Report #6 was a reasonable start on addressing the data issues.⁷²⁸
485. In answer to questions about who should have access to the database, as well as who would be adding data to it, Mr. Marmorek testified:

⁷²⁴ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 104

⁷²⁵ Exhibit 1896 (Technical Report #6: FRSS: Data Synthesis and Cumulative Impacts, April 2011), p. 109

⁷²⁶ Transcript, September 19, 2011, pp. 38-39 (David Marmorek)

⁷²⁷ Transcript, September 19, 2011, p. 39 (David Marmorek)

⁷²⁸ Transcript, September 19, 2011, p. 39 (David Marmorek)

I think that past experience elsewhere has indicated that the people who are closest to collecting a particular kind of data. So let's say for example, the Okanagan First Nation and DFO collect Okanagan sockeye data, are the best ones to organize that information and then say we're happy with our analyses for this year and put that out, and then get that in a common framework. And then if there is some update to that, they discovered that there was an error, then they can update that information. I think then you can feel fairly assured that that information has been carefully checked, and then put into a centralized or integrated database, which I think should be publicly accessible. There are examples like that in the Columbia Basin, there's something called StreamNet where there's public access. There's also the Columbia Basin Fish and Wildlife Authority has a publicly accessible web accessible set of information. The key thing is it has to be carefully checked before it goes in there. And as far as being able to do analyses on the data, provided that it's – that data has been quality checked, I don't see any reason why anybody shouldn't have access to the full suite of data, and that will stimulate different kinds of analyses, which I think is healthy. The key thing is that what goes into it has to be carefully checked and so there has to be one group that's responsible for assuring that it is good quality.⁷²⁹

486. A number of witnesses also testified about the current state of cumulative impact assessment at DFO, as well as outlining how future research and management decisions could assist in understanding and addressing cumulative impacts on the long term health and sustainability of FRSS.
487. Robin Brown was asked whether the ability of DFO to assess cumulative impacts was still a gap, as had been identified in the 2006 CSAS Report on Aquatic Monitoring. In response, Dr. Brown testified that a very modest movement had been made, and outlined some of the challenges:

This is a very difficult research area in marine ecosystems and in ecosystems generally. Unlike the human health situation, where we have large sample sizes and long studies and we can partition if people in the population are dying of heart attacks at a certain rate, we have enough data to say well, it's partly genetics and it's partly your diet and it's partly your exercise regime. We can't do the equivalent analysis in marine ecosystems, so we know the cumulative effects are likely at play but figuring out which ones are important and how important they are is difficult.⁷³⁰

⁷²⁹ Transcript, September 19, 2011, p. 92 (David Marmorek)

⁷³⁰ Transcript, August 18, 2011, p. 59 (Dr. Robin Brown); referencing p. 30 of Exhibit 1394 (Aquatic Monitoring in Canada: A Report from the DFO Science Monitoring Implementation Team, May 2006)

488. Although during the Inquiry Canada raised the existence of a cumulative effect program in the Freshwater ecosystem, being led by David Patterson,⁷³¹ none of the projects appear to involve First Nations,⁷³² and according to the testimony of Dr. Robin Brown, there is limited cumulative impact work being done in the Marine environment. In his testimony, regarding a DFO Trends Report,⁷³³ Robin Brown agreed that cumulative impacts in the coastal zone were a knowledge gap requiring further study, as outlined on page 12 of the report.⁷³⁴ Robin Brown also agreed that the current state of affairs is reflected in two conclusions found at page 33 of the Trends Report, where it states: “These ecologically important habitats [Canadian Marine Ecosystems] are arguably the most likely to be directly impacted by cumulative impacts of human activities” and under Coastal Habitats, where it states: “There’s a paucity of structured and recurrent [sic] monitoring of these habitats and the majority of monitoring that does occur is targeted towards species of economic or other interests.”⁷³⁵
489. Michael Crowe identified some of the management decisions that failed to adequately protect against cumulative impacts on FRSS habitat. He discussed how DFO had moved to using Operational Statements to deal with potential HADDs, as it had not been able to keep up with the considerable number of development referrals. The challenge identified by Mr. Crowe was that docks could be placed on spawning grounds and in close proximity to fish rearing areas, and habitat managers would not have the ability to direct the dock’s location because they are not looking at the referrals. In addition, an individual is not compelled to determine whether their intended dock would be on a spawning ground. According to the same Operational Statement, a person is allowed to build a boathouse on the foreshore and remove trees, both of which are contrary to DFO’s objectives for protecting the foreshore and in-water habitat. With reference to this example, Mr. Crowe went on to testify:

So it's an operational statement that is problematic and, I mean, we're realistic here, and that's that there is more work than the Department can manage as a Habitat Management Program, and

⁷³¹ Transcript, August 18, 2011, p. 90 (Robin Brown); referencing Exhibit 1416 (Cumulative effects at multiple scales: Case studies of the development of habitat-population assessment tools using Fraser River salmon, 2011)

⁷³² Transcript, August 18, 2011, p. 99 (Robin Brown)

⁷³³ Exhibit 1344 (DFO 2010 Canadian Marine Ecosystem Status and Trends Report, June 2010)

⁷³⁴ Transcript, August 18, 2011, p. 28 (Robin Brown)

⁷³⁵ Transcript, August 18, 2011, p. 98 (Robin Brown)

we need to find ways to manage the elements of the lower risks spectrum of our business in an efficient and effective manner. But, yes, there's some operational statements we believe are continuing to contribute to the ongoing cumulative incremental harm to habitat...we can have these operational statements modified or deemed to not apply in our region. But...there is an administrative process within the Department that we go through to have those changes made.⁷³⁶

490. Some recommendations were made with respect to how management decisions could address cumulative impacts going forward. Mr. Marmorek agreed that research and management decisions, and conclusions regarding climate change and multiple stressors on FRSS, could be more helpful if nested within an adaptive management strategy.⁷³⁷
491. Mr. Marmorek agreed that marine use planning and mapping, such as the work being done by the CHN,⁷³⁸ was a reasonable approach to collecting evidence and making management decisions in the absence of data to prove causation from either scientific or legal perspectives.⁷³⁹ He agreed that given the time it might take to collect evidence of causation, it would be prudent management "to be mapping sensitive areas so we're very clear where we shouldn't be taking risks."⁷⁴⁰
492. Another witness, David Patterson, discussed how genomics research could be useful for addressing cumulative impacts. He testified:

[C]onceptually it's a bit of a shift, because we're now using the fish as an indicator of the environment and that habitat, as opposed to the other way around in the past. So we've done this successfully in other cases, looking at individual aspects of fish physiology and survival, so in this case we have a much broader ability to look at the whole organism response. It does show promise, although it takes a long time to go from that to actually being implemented as a management adjustment process. I've seen this many time and time again. It's difficult to go down that road...it will require work to get there.⁷⁴¹

⁷³⁶ Transcript, June 8, 2011, pp. 17-18 (Michael Crowe)

⁷³⁷ Transcript, September 20, 2011, p. 72 (David Marmorek)

⁷³⁸ Exhibit 1345 (Ocean and Way of Life Brochure and Haida Ocean and Way of Life Map, 2011); see also Exhibit 1911 (*Ban et al.*, Cumulative Impact Mapping: Advances, Relevance and Limitations to Marine Management and Conservation, using Canada's Pacific Waters as a Case Study, 2010)

⁷³⁹ Transcript, September 20, 2011, p. 75 (David Marmorek)

⁷⁴⁰ Transcript, September 20, 2011, pp. 75-76 (David Marmorek)

⁷⁴¹ Transcript, February 8, 2011, p. 32 (David Patterson)

493. The importance of addressing cumulative impacts through research and appropriate management decisions was outlined by Mr. Crowe, who noted some of the potential harms that could befall wild stocks if this isn't done:

When you look at salmon populations in North America, where have they collapsed? They've collapsed on the east coast and to the south of us through the western states. And we can point to factors such as fishing as a component of those collapses, but clearly it is development impacting habitat that has resulted in, in large part, to those populations, conservation units, being essentially eliminated....We have a situation, now, where we can reflect on what has happened before. I know that science papers 3 and 12 for this Commission were not able to make a strong, any correlation between population effects and any type of the indicators that were chosen for those studies. I'm not necessarily in agreement with the methods within those studies, and I feel that there was actually some mistakes made. So I don't agree with the findings. I think habitat clearly has an effect on the health of salmon populations... I suggest that the habitat management program with the Department of Fisheries and Oceans is here to try to protect what remains, to prevent another Cultus Lake circumstance which is, of course, devastating for that CU, but also has such substantial effects to fishing communities and fishermen and the economy. So my answer is, yes, we understand how development can occur—proceed in such a way to protect and conserve fish populations and stocks, but I do believe that means collectively we have to figure out better ways to manage the habitat that remains and restore some that's lost. **But it really is about managing the cumulative, incremental harms that occur over time, the thousands of little cuts that appear not to be a big deal but effectively, over time, do have a substantial effect.**⁷⁴²

494. The FNC submits that the conclusion of both the PSC Workshop report and Technical Report #6 supports our view that cumulative impacts were the cause of the poor 2009 return and are also responsible for the longer term decline of FRSS, with the primary cumulative stressors on the 2009 return occurring in the coastal and marine environments on migrating smolts. It is unknown whether the lethal effects on the 2007 outmigration occurred prior to or after arrival in the Gulf of Alaska or the Bering Sea. It is known that the smolts did not return as adult sockeye in 2009.
495. The FNC submits that the cumulative impacts that are of priority concern in the marine environment are the overlapping stressors of marine conditions (including poor food

⁷⁴² Transcript, June 8, 2011, pp. 72-73 (Michael Crowe)

supply in the SOG, HAB, and SST and water runoff in QCS), climate change, predation and contaminants (estuary and mouth). Although there is not yet sufficient scientific evidence to determine whether disease from fish farms, and endocrine disrupting contaminants and ECCs were primary contributors to the 2009 poor return and the longer term decline, we also submit that it is mandatory to apply a precautionary approach with regard to such impacts, while further data is being collected and further research is being conducted.

496. The FNC also submits that First Nations must be involved in developing research projects and priorities and conducting monitoring and data collection for cumulative impact assessment given their intimate familiarity with various CUs and the ecosystems they pass through. Scientists must work closely with First Nations on cumulative effects assessment projects, incorporating TEK wherever possible.
497. The FNC submits that, as a first step, prioritization of the recommendations in Technical Report #6 must be conducted through a dialogue process with all levels of government: the federal government, the Province, First Nations, as well as with those stakeholders including ENGOs and industry interested in contributing to the conservation and long term sustainability of FRSS. The FNC submits that the process for identifying the bottleneck and completing the prioritization outlined by Mr. Marmorek is a required and reasonable approach.
498. The FNC submits that once recommendations are prioritized, a clear plan for implementation must be developed, with clear timelines and benchmarks for each aspect of the plan.

Recommendation: An interdepartmental, multi-stakeholder research and science program should be developed that incorporates climate change, cumulative impacts, and ecosystem-based approaches to science.

Recommendation: DFO and First Nations should implement the process for determining the priority for research on cumulative impacts recommended on page 107 of Technical Report #6.

VI. POLICIES AND PRACTICES OF DFO

A. Understanding EBM and DFO's Ecosystem Approach to Science

499. First Nations have always employed a holistic or ecosystem-based approach to managing human activities within the various ecosystems in their traditional territories. As stated in *Into the Deep Blue: Marine Ecosystem Based Management*:

Coastal First Nations have been practicing 'ecosystem-based management' of the land and sea through countless generations. Our traditional resource management and enhancement practices sustain some of the richest cultures and societies on the planet. Respect for the land, sea, spirit world, and all living things, is at the heart of our interactions with nature. The knowledge that "everything depends on everything else" tells us that the wellbeing of our communities is intricately tied to the well-being of the land and sea. It is only in recent decades that this old way has become expressed in scientific terms called ecosystem-based management (EBM). In this last century, industrial-scale extraction of land and sea resources have depleted and threatened plants, animals and the places where they live. The management decisions that led to this depletion did not adequately consider impacts on the environment and relationships between plants and animals. EBM expresses modern recognition of the need to consider ecosystems when managing for resource use – First Nations have known this for millennia. We have been and are again at the forefront of ecosystem-based land and sea resource management in our traditional territories.⁷⁴³

500. During the Inquiry, many witnesses spoke about the importance of maintaining ecosystems in order to preserve FRSS for future generations. For example, Dr. Irvine testified:

So we [those who developed the Wild Salmon Policy] feel very strongly that we're in a period of changing environments, climate change, the way to ensure that we have wild salmon for our grandchildren is to ensure sufficient genetic diversity so that the fish are able to adapt to a changing environment. How do we do that? We do that by maintaining habitat and ecosystem integrity. Without the habitat and ecosystems, you really don't—you won't have the ability to develop the diversity within the fish.⁷⁴⁴

⁷⁴³ Exhibit 1346 (*Into the Deep Blue: Marine Ecosystem Based Management*; undated, Coastal First Nations Turning Point Initiative), p. 3

⁷⁴⁴ Transcript, November 29, 2011, pp. 53-54 (Dr. Jim Irvine)

501. The inadequacy of single species management has been recognized within DFO.⁷⁴⁵ For example, Mr. Whitehouse testified as to how a broader ecosystem approach would be needed as part of ensuring the long term sustainability of FRSS, stating “I think it's critical that we take a very holistic and ecosystem-based approach to evaluating where pressures [to FRSS] are. You need to be extremely forward looking around the type of processes that may represent change to Fraser sockeye.”⁷⁴⁶
502. One place where Canada showed some movement toward EBM is in the marine environment. In the preamble to Canada's *Oceans Act*, it states: “Canada holds that conservation, based on an ecosystem approach, is of fundamental importance to maintaining biological diversity and productivity in the marine environment.”⁷⁴⁷ The 2002 Oceans Strategy, which was developed in order to implement the *Oceans Act*, states: “Canada's Ocean Strategy is the Government of Canada's policy statement for the management of estuarine coastal and marine ecosystems.”⁷⁴⁸
503. Ms. Farlinger testified as to how the Ocean Strategy was a primary policy for assisting to bring EBM into DFO's management of salmon. Her evidence was:
- Canada's Ocean Strategy really is, once again, a policy document [that] flowed out of the... 1997 Oceans Act, and this really is the point at which DFO begins to document the concept of requiring an ecosystem approach to management. There are several places in the document that refer to it, but I won't go to them, but it really is the source of bringing that broader ecosystem thinking into the management in the salmon fishery...⁷⁴⁹
504. In Canada's Oceans Strategy, IM is outlined as the cornerstone of the governance approach, and is defined as establishing decision-making structures that consider both conservation and protection of ecosystems, while providing opportunities for creating wealth in ocean related economies and communities.⁷⁵⁰
505. In order to properly implement EBM or IM, the science informing management decisions must also apply an ecosystem approach. In 2007, DFO published the ESF Policy. Dr.

⁷⁴⁵ Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), p. 2

⁷⁴⁶ Transcript, February 2, 2011, p. 73 (Timber Whitehouse)

⁷⁴⁷ *Oceans Act*, S.C. 1996, c. 31

⁷⁴⁸ Exhibit 263 (Canada's Ocean's Strategy, 2002), p. v; Transcript, August 18, 2011, p. 51

⁷⁴⁹ Transcript, December 16, 2010, p. 7 (Sue Farlinger)

⁷⁵⁰ Exhibit 263 (Canada's Ocean's Strategy, 2002), p. v

Watson-Wright testified that the ESF Policy was developed in response to directions from DFO's SMB. The SMB had decided there were two overriding priorities for the science sector: one was to move, in an organized fashion, into ecosystems science, which led to the development of the ESF Policy; the second priority was making changes to human resources to reflect the first priority.⁷⁵¹

506. In the ESF Policy, ecosystem science is defined as a broad approach to studying relationship and interactions in the ecosystem. One of its purposes was to "integrate science outputs to provide a sound scientific foundation for policies and programs."⁷⁵² An ecosystem science approach was also cited as a means of changing the way DFO provides science support rather than just redistributing resources.⁷⁵³
507. The ESF Policy acknowledged that DFO Science cannot continue to focus primarily on information collection and analyses of those ecosystem components closely linked to individual activities. Rather, scientists must provide decision-makers with comprehensive ecosystem advice about how human activities may interact with other activities being undertaken in the same aquatic ecosystem, or take adequate account of major environmental drivers in the ecosystem.⁷⁵⁴
508. The ESF Policy sets out eight priority areas for ensuring science supports EBM, including: (1) setting clear objectives for monitoring and protection; (2) developing ecosystem indicators and reporting systems; (3) developing risk based frameworks; (4) generating integrated information for fisheries management; (5) identifying habitats of special importance and sensitivity; (6) considering impacts on aquatic biodiversity (SARA and invasive species); (7) understanding pathways of effects driving changes; and (8) understanding climate variability and impacts on resources.⁷⁵⁵

⁷⁵¹ Transcript, November 3, 2010, pp. 12-13 (Dr. Watson-Wright)

⁷⁵² Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), p. 1

⁷⁵³ Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), p. 2

⁷⁵⁴ Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), p. 2

⁷⁵⁵ Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), p. 2

509. Table 1 of the ESF Policy identifies how each of these priority areas were common to DFO program areas that require science support, including Oceans, Habitat Management, SARA and aquaculture.
510. The ESF Policy also identifies a number of high priority “management and policy challenges” related to implementing the ESF.⁷⁵⁶ (1) the development of risk assessment tools; (2) the development of performance evaluation of ecosystem indicators; (3) developing tools for evaluating decision-support rules; (4) operationalizing ecological regime shifts; (5) applying knowledge of productivity changes; (6) assessing the recovery potential of depleted species; (7) identifying key features of ecosystem structure and function; (8) and addressing knowledge access and spatial management methodologies.⁷⁵⁷
511. At the Inquiry, Dr. Watson-Wright said this about whether an ecosystem based approach was realistic given the state of science and the state of funding resources.

I do think it's realistic. It's not easy, but it's absolutely realistic and necessary to try to put all the information together for a given ecosystem in order to be able to make predictions, projections as to what might happen. We're ignoring 80 percent of the data in favour of focusing on one species. I don't think that's helpful, and we've learned that, that there are so many interactions that we don't know about. We have to try. This is not specific to Canada, either....[the] international science community is trying to develop the necessary knowledge, and every country is actually struggling with this right now, and with integrated marine special planning as well. So there's a whole international community that's working on this, and I would say it behoves us to continue to improve upon it. We can't just give up and say, "Oh, it's just too hard."⁷⁵⁸

512. Dr. Watson-Wright went on to testify:

So as I said, it's a move away from single activity management to integrated science for ecosystem-based management...In order to manage, in an integrated way, the science produced has to be done in an integrated way. So it includes priorities for a foreign ecosystem-based approach to the science including, you know, setting objectives, developing ecosystem indicators, risk-based

⁷⁵⁶ Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), p. 4

⁷⁵⁷ Exhibit 47 (A New Ecosystem Science Framework in Support of Integrated Management, DFO 2007), pp. 4-5

⁷⁵⁸ Transcript, November 3, 2010, p. 14 (Wendy Watson-Wright)

frameworks, and all of the things that are in the document [Referencing Exhibit 47].⁷⁵⁹

i) The Application of EBM and Ecosystem Approaches to Science by DFO

513. At the Inquiry, the SOG ERI was cited as an example of where DFO is attempting to apply an ecosystem based approach to science and EBM, which includes migrating FRSS.⁷⁶⁰ The SOG ERI was one of five ERIs launched by DFO in its five-year plan for 2008-2013.⁷⁶¹ Although the SOG ERI attempts to implement EBM in the marine environment, this has been challenging:

The funding envelope for the ERI program is \$2.3 million per year, for the five priority large marine ecosystems distributed over the DFO Regions. This funding envelope severely limits the capacity of the ERIs to the point that the typical project being funded in the Pacific Region (where the ERI is focused on the Strait of Georgia) has a budget of \$10,000-\$20,000 per year. This level of support is insufficient to ever meet the goals of Integrated Management.⁷⁶²

514. PNCIMA is another example of the implementation of EBM or IM in BC's marine environment, in an area which includes the migration route of juvenile and mature FRSS.⁷⁶³ PNCIMA was established under Canada's Ocean Action Plan, which established five LOMA initiatives in Canada.⁷⁶⁴ On December 11, 2008 the First Nations, represented by CFN and the NCSFNSS, signed a PNCIMA Collaborative Oceans Governance MOU with DFO. The Province and the Nanwakolas Council signed the MOU in September and October, 2010, respectively.⁷⁶⁵

515. According to a May 2011 PNCIMA Issues Output document, EBM is considered a key underpinning of the marine planning approach under PNCIMA, and the PNCIMA planning committee has been working on defining and applying a marine EBM framework to all values and activities.⁷⁶⁶ The PNCIMA Issues Output document also identified a number of outputs and tasks for implementing EBM, including: incorporating

⁷⁵⁹ Transcript, November 3, 2010, p. 12 (Wendy Watson Wright)

⁷⁶⁰ Transcript, February 2, 2011, pp. 81-82 (Timber Whitehouse)

⁷⁶¹ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 78

⁷⁶² Exhibit 783: (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 78

⁷⁶³ Transcript, August 18, 2011, p. 6 (Bruce Reid)

⁷⁶⁴ Transcript, August 18, 2011, p. 9 (Bruce Reid); Exhibit 1390 (Canada's Oceans Action Plan, 2005)

⁷⁶⁵ Exhibit 1385 (PNCIMA Issue Outputs and Tasks Review and Recommendations, February 14, 2011), p. 3

⁷⁶⁶ Exhibit 1385 (PNCIMA Issue Outputs and Tasks Review and Recommendations, February 14, 2011), p. 5

climate change considerations into EBM goals and objectives; identifying components of an integrated data network for access to key data sets by decision-makers and stewards; preparing a cumulative effects assessment framework for uses and activities that may affect ecosystem health, human well being and integrated management; developing an adaptive management plan, including ecological, socio-economic and governance indicators and a monitoring approach; and developing a process for incorporating First Nations' traditional knowledge and local knowledge into decision-making.⁷⁶⁷

516. At the Inquiry, Bruce Reid was asked to explain how the work on PNCIMA is related to the WSP. He identified common elements between the PNCIMA initiative and Strategy 4 of the WSP, including “gathering of information, identifying objectives and the principles of a planning process.”⁷⁶⁸ Mr. Reid identified one of the outcomes of the PNCIMA process, being the development of ecosystem objectives, or specific strategies for monitoring on a smaller geographical scale, such as the CU scale.⁷⁶⁹ He also identified some key lessons from PNCIMA that could be applied to the implementation of the WSP, including: that it takes time to establish relationships in the planning process; the importance of a governance structure for providing leadership on the planning process; and the need to have resources and a realistic and achievable work plan.⁷⁷⁰

ii) Challenges of implementing EBM (IM)

517. Technical Report #8 asked the question: would an explicit ecosystem based approach including predator-prey relationships make a difference for management of FRSS? The Report concluded that EBM entails developing an understanding for how the environment, humans, and other ecosystem components impact ecosystems, which is exactly where the assessment of FRSS falls short.⁷⁷¹
518. In Technical Report #8, Dr. Christensen and Dr. Trites identified a number of areas where DFO and Canada were challenged in implementing EBM. With respect to the WSP, they noted the following concerns: Strategy 3 calls for maintaining species

⁷⁶⁷ Exhibit 1385 (PNCIMA Issue Outputs and Tasks Review and Recommendations, February 14, 2011), pp. 9-10

⁷⁶⁸ Transcript, August 18, 2011, p. 8 (Bruce Reid)

⁷⁶⁹ Transcript, August 18, 2011, p. 8 (Bruce Reid)

⁷⁷⁰ Transcript, August 18, 2011, p. 8 (Bruce Reid)

⁷⁷¹ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 80

linkages with a focus on minimizing fishing impacts on non-target, associated or dependent species, including predators and scavengers, however, the Policy only mentions predators once; concepts such as predation, prey or food webs are not mentioned in the WSP; and while EBM calls for evaluating trade-offs [between ecological functioning and human activities] and their consequences, those trade-offs are not, in their view, addressed in the WSP.

519. As noted by Drs. Christensen and Trites, there is no indication or commitment that EBM or food web considerations are factored into the advice the PSC provides to Canada and the US on shared Pacific salmon stocks.⁷⁷²
520. Technical Report #8 cited a 2010 PICES Report, which concluded that overall, Canada had not moved very far towards EBM. The conclusion relies on a comparison of US and Canadian management completed by PICES. The comparison found that, out of 21 components of integrated multi-sector EBM, Canada only scored on its SARA policies. The US, on the other hand, had made progress on 11 of the 21 components.⁷⁷³ Although DFO has stated they are moving toward an EBM approach, one of key challenges for implementing EBM is that within the department, there is no single approach or definition of EBM being employed. In some circumstances, DFO uses Integrated Management,⁷⁷⁴ which Dr. Villy Christiansen and Dr. Trites identified as corresponding to what is “elsewhere is referred to as EBM.”⁷⁷⁵ However, at the Inquiry, Mr. Bruce Reid, who is Regional Manager at the EMB of DFO, distinguished between IM and EBM, with reference to Canada’s Ocean Action Plan.⁷⁷⁶ Mr. Reid defined IM as a way of managing and planning human activities so that those don't conflict with each other, and so ... those factors are considered in conservation and sustainable use to fisheries resources.⁷⁷⁷ He went on to testify:

Ecosystem-based management provides a framework for which integrated management can take place...ecosystem-based objectives and goals is a foundation of integrated management.⁷⁷⁸

⁷⁷² Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 79

⁷⁷³ Exhibit 783 (Technical Report #8: Predation on Fraser River Sockeye Salmon, February 2011), p. 79

⁷⁷⁴ Exhibit 263: (Canada’s Ocean’s Strategy)

⁷⁷⁵ Exhibit 783: (Cohen Commission Technical Report 8: Predation on Fraser River Sockeye Salmon), p.

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⁷⁷⁶ EXHIBIT 1390: (Canada's Oceans Action Plan)

⁷⁷⁷ Transcript, August 18, 2011, p. 5 (Mr. Bruce Reid)

⁷⁷⁸ Transcript, August 18, 2011, p. 38 (Mr. Bruce Reid)

521. A more recent document produced the by EMB and entered as evidence in the commission highlights the challenge of differing approaches EBM within DFO. Dr. Reid was referred to a presentation given at a meeting of DFO's Regional Management Committee in July 2011.⁷⁷⁹ The purpose of the presentation was to provide regional context and content to inform the development of a National Ecosystem Approach to Management.⁷⁸⁰
522. On slide 4 of the presentation, it states that DFO has no consistent agreed upon definition or framework to guide EAM implementation. It notes that Oceans uses both EAM and EBM, and interprets these as an "integrated or holistic approach to resource management that aims to maintain an entire ecosystem in a healthy, productive and resilient condition." On the other hand Fisheries uses the EAM as a broadening of a more specific management focus (i.e., fisheries) to include the consideration of some additional ecosystem characteristics.⁷⁸¹
523. Slide 11 of the presentation identified the differences between EBM and EAM. The Geographic scope of EBM was the ecosystem as a whole while EAM focuses on the management of an activity. The mandate of EBM is to identify principal ecosystem threats and determine how they can be minimized, whereas the mandate of EAM is to identify threats related to the focus of management, as well as consider some additional threats. Finally, the governance under EBM was identified as needing an overarching forum that coordinates decision-making to achieve objectives while under EAM, decision-making lies with each management sector and objectives are only achieved if sectors voluntarily collaborate and share information.⁷⁸²
524. In FNC's opinion, EAM, as is articulated in Exhibit 1386, is a limited approach that is only a small step up from single species management. FNC submits that that DFO must implement EBM that is holistic, integrated and collaborative.

⁷⁷⁹ Transcript, August 18, 2011, p. 7 (Bruce Reid); Exhibit 1386 (A DFO Framework for Applying an Ecosystem Approach to Management Strategic Directions Committee, July 28, 2011)

⁷⁸⁰ Exhibit 1386 (A DFO Framework for Applying an Ecosystem Approach to Management Strategic Directions Committee, July 28, 2011), slide 2

⁷⁸¹ Exhibit 1386 (A DFO Framework for Applying an Ecosystem Approach to Management: Strategic Directions Committee, July 28, 2011), slide 4

⁷⁸² Exhibit 1386 (A DFO Framework for Applying an Ecosystem Approach to Management: Strategic Directions Committee, July 28, 2011), slide 11

525. Slide 18 outlines next steps in moving forward with EAM, including establishing a process for regional-NHQ communication regarding EAM initiative and activities; analysing how current DFO approaches align with EAM and identifying regional program needs for EAM.
526. The FNC submits that DFO must consult and work collaboratively with First Nations in determining the approach to EBM that will be employed in management of the fisheries.

iii) Recommendations for moving forward: the need for EBM along the FRSS route in both the Freshwater and Marine

527. Dr. Christensen testified that the recommendations made in Technical Report #8 follow a plea for the implementation of EBM, given that single species management models are not adequate. A single species model of management considers the impact of the fisheries, but tends not to fully include the considerations of the ecosystem. He stated: “there's a strong scientific, almost consensus that, including these additional facts that will minimize the risk of failures. So that's where it comes in that we may see less failures if we understand the ecosystems better.”⁷⁸³
528. In his testimony, Dr. Christensen also agreed that EBM means we have to deal with food webs, disease, parasites, changing environmental condition. He testified: “the entry point for ecosystem-based management is that we are looking at an area, so that's where we start. We don't start with the food web.”⁷⁸⁴ Dr. Christensen went on to state:

We often have to be quite pragmatic about how we go about ecosystem analysis. That's one part of ecosystem-based management. And we may well in this case [referring to FRSS] look differently at the freshwater, the coastal zones and the open ocean. But it's necessary to try to integrate all of that information to get a full understanding of what happens to the Fraser River sockeye salmon.⁷⁸⁵

529. Mr. McFarlane, who is a DFO scientist emeritus and who studied marine life in the SOG for the last 30 years, testified that, “everybody is having a quantum leap forward in starting to consider this [EBM] and it's a good thing. I agree entirely with it.”⁷⁸⁶

⁷⁸³ Transcript, May 4, 2011, p. 28 (Dr. Villy Christensen)

⁷⁸⁴ Transcript, May 6, 2011, p. 22 (Dr. Villy Christensen)

⁷⁸⁵ Transcript, May 6, 2011, p. 23 (Dr. Villy Christensen)

⁷⁸⁶ Transcript, May 6, 2011, p. 24 (Mr. Sandy McFarlane)

530. Finally, in his testimony, former RDG for the Pacific Region Paul Sprout highlighted the need to move to management of ecosystems, in this case focusing on watersheds. He testified:

I think that if you think about some of the threats that are facing Pacific salmon, particularly climate change, and I would argue human population growth...I note that some of the documents submitted by the participants actually refer to these threats, the two I've just mentioned, as being the principal threats to Pacific salmon. Okay, both of those things, climate change and population growth are elements the DFO cannot address...certainly by itself. One is played out at a national/international level, and another is controlled by other parties, human population growth. So what I've argued for and what I think needs to be done is we need to think about watershed management where the agencies and interests, First Nations, and other parties that have an interest, come together to think about, for example, the stewardship of water which simultaneously looks at human consumption, industrial use and fish needs. I think that if we don't get at those things and find some way of balancing those competing interests, then I worry that if we rely exclusively on DFO's habitat policy, or the Wild Salmon Policy, that we will not get where we need to go. So I've argued for...a watershed governance approach that brings parties together to actually get at, more fundamentally, this issue of water management, in particular, and human population growth in the watersheds.⁷⁸⁷

531. The FNC submits that EBM, and an ecosystem based approach to science, as articulated under PNCIMA and in the EFS document respectively, must be implemented in the various ecosystems that FRSS pass through. EBM can be implemented within the Tier 1, Tier 2 co-management model.
532. The FNC submits that the application of EBM, required within the WSP, will look differently for the freshwater, coastal and open ocean habitat of FRSS.

Recommendation: DFO, working collaboratively with First Nations, should conduct research on how to assist managers to apply an EBM and adaptive management approach to FRSS, including: identification of the bottlenecks, and understanding and managing human behaviour, including the cumulative and multiple impacts/stressors along the FRSS migratory route and for all stages in FRSS life histories.

⁷⁸⁷ Transcript, December 16, 2010, pp. 36-37 (Paul Sprout)

B. Incorporation of Traditional Ecological Knowledge (TEK)

533. The CBD, to which Canada is a party, requires states to respect, preserve, maintain and promote the use and application of TEK. Article 8(j) provides as follows:

Each contracting Party shall, as far as possible and as appropriate: Subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge innovations and practices.⁷⁸⁸

534. TEK is a cumulative body of knowledge, practice and expertise handed down through generations by cultural transmission.⁷⁸⁹ It is dynamic knowledge that has evolved over time and continues to evolve today.⁷⁹⁰ First Nations' TEK is a holistic way of knowing that encompasses social, environmental, economic, cultural and spiritual elements, where humans are recognized as an intimate part of the natural world.⁷⁹¹ Like the scientific method, TEK involves observations, questions, hypotheses, experimentation, interpretation, and reporting.⁷⁹²

535. First Nations and academics have called for the use of "two-eyed seeing" as a description of how DFO and other organizations should strive to bring indigenous and western worldviews together.⁷⁹³ Dr. David Close, Assistant Professor in the Fisheries Centre and Department of Zoology at UBC, testified as follows:

I'm not saying that western science is much better or traditional knowledge is way better. I believe that we need to utilize both ways of knowing to move conservation forward. But I don't see that occurring here. I don't see funds going into different agencies to address traditional knowledge, and I don't see funds going into First Nations to build up capacity for science. How do we move these ways of knowing forward? And if traditional knowledge has

⁷⁸⁸ Exhibit 13 (Convention on Biological Diversity ("CBD"), June 5, 1992), Article 8(j)

⁷⁸⁹ Exhibit 224 (Knowledge Integration in Salmon Conservation and Sustainability Planning, March 2009) p. iv

⁷⁹⁰ Exhibit 155A (Considering ATK in the Implementation of the WSP, September 14, 2009), p. 3;

⁷⁹¹ Exhibit 155A (Considering ATK in the Implementation of the WSP, September 14, 2009), p. 3

⁷⁹² Exhibit 5 (Ways of Knowing PowerPoint presentation by Dr. David Close, October 2010), p. 7

⁷⁹³ See, for example, Exhibit 1263 (Integrative Science and Two-Eyed Seeing, March 3, 2010); see also Transcript, October 28, 2010, pp. 28-29 (Dr. David Close) and Exhibit 5 (Ways of Knowing PowerPoint presentation by Dr. David Close, October 2010)

been put out there as important, what are the weaknesses and strengths of both western science and traditional knowledge? And then we try to use that to tap into ways of moving forward. But right now I don't see that occurring within First Nations in Canada. It's a little bit better in the States. But it all takes funds and effort and working together as co-managers... But we do need to include both, and I think to move management forward we need both, and both of them need to be funded in First Nations and through DFO's management, and there needs to be a co-management effort.⁷⁹⁴

536. Neil Todd, the Operations Manager of FRAFS, echoed Dr. Close's sentiments when he testified to the connection between co-management and ensuring the incorporation of TEK:

...traditional ecological knowledge is integral to First Nations and it's integral to the management of salmon. That has to be brought to the table, and it can only be brought to the table through a joint management process whereby First Nations have relatively – can sit at a management decision-making table as equal partners in the management decision-making process. Therefore that's where I think joint management is absolutely critical to trying to ensure the survival, sustainability and hopefully flourishing of Fraser River sockeye salmon.⁷⁹⁵

537. Numerous scientists, both within and outside DFO (including Dr. Riddell, Dr. Welch, Dr. Hinch, Dr. Miller-Saunders, Dr. Irvine, Dr. Holt, Dr. Trites, Mr. Whitehouse, Mr. Macdonald, Mr. Lapointe, Mr. Marmorek, Mr. MacDonald and others) have testified about the importance of considering and including TEK in their work – whether such work is related to stock assessment, assessments of fish health, ecosystem based modelling and management, implementation of the WSP, or other matters.⁷⁹⁶ Numerous fisheries managers have also testified about their aspirations for true incorporation of TEK along side “western science”.⁷⁹⁷

⁷⁹⁴ Transcript, October 28, 2010, pp. 28-29 (Dr. David Close)

⁷⁹⁵ Transcript, June 28, 2011, p. 19 (Neil Todd)

⁷⁹⁶ Transcript, October 25, 2010, p. 11 (Mike Lapointe); Transcript, November 29, 2010, pp. 64-65 (Dr. Jim Irvine); Transcript, December 7, 2010, pp. 91, 93 (Dr. Carrie Holt); Transcript, February 3, 2011, pp. 51-52 (Timber Whitehouse and Dr. Brian Riddell); Transcript, July 8, 2011, p. 61 (Dr. David Welch); Transcript, March 9, 2011, p. 77 (Dr. Scott Hinch); Transcript, May 5, 2011, pp. 8-9 (Dr. Andrew Trites); Transcript, August 25, 2011, pp. 35-36 (Dr. Kristi Miller-Saunders); Transcript, May 10, 2011, pp. 69, 72 (Donald McDonald); Transcript, September 20, 2011, pp. 98-99 (David Marmorek)

⁷⁹⁷ Transcript, November 2, 2010, pp. 89, 114 (Susan Farlinger and Paul Sprout); Transcript, December 8, 2010, pp. 94-96 (Mark Saunders)

538. The WSP is one of the key policies in which DFO has recognized the need to incorporate TEK into management decisions. Amongst many others, Dr. Jim Irvine testified to the various ways that TEK could be useful to the work of implementing the WSP:

Q: Can you give some examples of how you would use Aboriginal Traditional Knowledge in the identification of CU's. DR. IRVINE: Sure. And as Dr. Riddell, he summarized the approach that was really developed by Drs. Holtby and Ciruna on the Identification of Conservation Units. And you will recall it started with kind of an overlay of maps, of zones, and then the next step is the inclusion of ecological information on the fish in particular areas. **So two examples were traditional knowledge, whether that be from First Nations, or people living in an area would be of use, would be on the distribution of fish within a watershed, and secondly on the timing of arrival into a watershed, or the timing of spawning.** So those were the sorts of information, the types of information that can be used to further differentiate or alter, you know, what would constitute a conservation unit. So those would be two examples.⁷⁹⁸

539. In a presentation entitled "Considering ATK [Aboriginal Traditional Knowledge] in the Implementation of the WSP", DFO noted that there is significant value within TEK that can aid fisheries scientists and managers including that it:

- a. Considers the ecosystem or "bigger picture" context;
- b. Provides broad trends in species and stock distribution, abundance, and seasonal behaviour patterns;
- c. Includes systemic observations with temporal scale that goes beyond most scientific studies;
- d. Can save time and money by guiding field work; and
- e. Can help determine baseline data.⁷⁹⁹

The presentation also noted that DFO needs to have a clear intent as to why TEK is collected and how it will be used, must seek the informed consent of First Nations prior to collecting or using their TEK and have mechanisms to follow up with First Nations

⁷⁹⁸ Transcript, November 29, 2010, pp. 64-65 (Dr. Jim Irvine)

⁷⁹⁹ Exhibit 155A (Considering ATK in the Implementation of the WSP, September 14, 2009), p. 4

communities to discuss how TEK is used, and that guiding principles for integrating TEK in decisions would be useful.⁸⁰⁰

540. Despite recognition from First Nations, academics, scientists and DFO managers alike, and despite many mentions of the need to include TEK in DFO's policies and guidance documents, very little progress has been made to incorporate TEK.⁸⁰¹ As Dr. Laura Richards, noted: "...I don't think, at this point, we've been able to really, you know, formalize any specific processes around traditional ecological knowledge. I think we're sort of, you know, aware of this, but it's been, I think, quite challenging for us, frankly, to try to figure out how to move forward on some of these pieces."⁸⁰² Mr. Sprout, Ms. Farlinger and Mr. Saunders similarly testified that they were not aware of any progress DFO had made in recent years in developing protocols with First Nations that would outline how TEK can be factored into science and decision-making processes.⁸⁰³ In short, the need to embrace TEK and the potential benefits are acknowledged, but the manner of doing so is much less clear. The FNC submits that increased co-management with First Nations is the clearest way to ensure that TEK is brought to the table and integrated into science and management decisions.
541. The FNC submits that First Nations, with support from DFO, should develop a set of best practices or guidelines for the use of TEK. Such best practices may incorporate ideas such as the need to: respect holders of TEK, specific community TEK protocols, and intellectual property rights; engage and collaborate early and sustain communication; seek consent to use TEK and collaborate in the assembly of the information; take the time to establish strong trusting relationships based on honesty, openness and sharing; ensure transparency and equity in access to information; provide a venue for stories and opportunities for sharing; consider TEK and western knowledge in a complementary manner; work on projects with common interest and benefit; explain what is being sought and why; and to recognize and address capacity concerns.⁸⁰⁴

⁸⁰⁰ Exhibit 155A (Considering ATK in the Implementation of the WSP, September 14, 2009), p. 9

⁸⁰¹ Transcript, February 3, 2011, pp. 51-52 (Timber Whitehouse and Dr. Brian Riddell)

⁸⁰² Transcript, November 4, 2010, pp. 113-114 (Dr. Laura Richards)

⁸⁰³ Transcript, November 2, 2010, pp. 89, 114 (Susan Farlinger and Paul Sprout); Transcript, December 8, 2010, p. 96 (Mark Saunders)

⁸⁰⁴ Exhibit 155A (Considering ATK in the Implementation of the WSP, Sept 14, 2009), p. 11; Exhibit 224 (Knowledge Integration in Salmon Conservation and Sustainability Planning, March 2009), pp. 24-32

542. The notion of developing TEK guidelines or best practices for use in DFO's Pacific Region was proposed several years ago, when First Nations fisheries consultants Fred Fortier and Dave Moore developed a document entitled "Draft Proposal for the Development of Guidelines for the Aboriginal Traditional Knowledge (ATK) Management of Fisheries Resources in DFO's Pacific Region."⁸⁰⁵ The authors recommended that a collaborative process be used wherein a team of First Nations would draft TEK guidelines that would feed into Tier 1 and 2 discussions.⁸⁰⁶ Mr. Saunders testified that the development of a protocol regarding how to implement TEK in the manner contemplated in the WSP was an initiative worthy of follow up and suggested that this might be something that a provincial First Nations organization, such as the FNFC, could do.⁸⁰⁷
543. In 2008 the FNFC expressed interest in moving forward with the development of such guidelines in a manner that allows for capacity to be developed and fostered in First Nations communities and allows First Nations to play a leadership role in developing the focus and outcomes.⁸⁰⁸ The FNFC has also had preliminary discussions about sponsoring a Centre for Expertise within DFO for TEK, and emphasized the need for funding.⁸⁰⁹
544. The FNC submits that in addition to supporting First Nations in developing guidelines or best practices for the use and incorporation of TEK, DFO should also look to and learn from the examples provided during the course of the Inquiry of successful partnerships and projects that embody "two-eyed seeing" such as:
- a. the Siska Study regarding the effects of contaminants on salmon,⁸¹⁰ and
 - b. the marine use planning undertaken by the First Nations communities of the CFN-Turning Point Initiative, where TEK from Elders and traditional resource harvesters has played a crucial role in informing these communities' ecosystem-

⁸⁰⁵ Exhibit 222 (Proposal for Development of Guidelines for Use of ATK Management of Fisheries Resources in DFO's Pacific Region, undated), p. 2; see also Transcript, November 29, 2010, pp. 41-42 (Mark Saunders)

⁸⁰⁶ Exhibit 222 (Proposal for Development of Guidelines for Use of ATK Management of Fisheries Resources in DFO's Pacific Region, undated), p. 2

⁸⁰⁷ Transcript, December 8, 2010, p. 96 (Mark Saunders)

⁸⁰⁸ Exhibit 223 (Email from Amy Mar to Brenda McCorquodale, August 7, 2008), p. 1

⁸⁰⁹ Exhibit 223 (Email from Amy Mar to Brenda McCorquodale, August 7, 2008), p. 1

⁸¹⁰ Exhibit 839 (Siska Salmon and Indigenous Peoples' Life Work, 2004)

based marine planning.⁸¹¹ They have documented: important places for fishing and gathering of different species; seasonal rounds for specific places highlighting when different species are harvested; traditional ways of managing and traditional ownership of marine resources and areas; methods used in fishing, gathering and preparing foods; important cultural and archaeological sites; travel and trade routes for people, and migration routes for animals; spawning and rearing areas for different marine animals; observed changes, or trends in species abundance and distribution over time – and all has been done in a manner that ensure that the information is shared in a confidential and respectful manner.⁸¹²

Recommendation: DFO should work with First Nations, including with the FNFC at a strategic level, to collaboratively develop guidelines and best practices for the use of Indigenous Knowledge and TEK in fisheries research and management, including the implementation of the WSP.

Recommendation: DFO Science should develop clear protocols with First Nations for the better and timely exchange of information and concerns related to salmon, in particular FRSS, including the application and integration of TEK to improve ecosystem understanding and research.

Recommendation: As a priority, DFO and First Nations must develop mechanisms for the application and integration of traditional ecological knowledge within science and management decisions.

⁸¹¹ Exhibit 1346 (Coastal First Nations Into the Deep Blue: Marine Ecosystem-based Management), p. 4

⁸¹² Exhibit 1346 (Coastal First Nations Into the Deep Blue: Marine Ecosystem-based Management), p. 4; see also Exhibit 1345 (Ocean and Way of Life Brochure, 2011)

C. Wild Salmon Policy

i) Overview

545. Canada released the WSP in June 2005, after six years of drafting, consultation, debate and review.⁸¹³ The policy began as a local initiative by a small group of concerned scientists and other staff within DFO, and evolved to become a national initiative involving not only government scientists and policy makers, but also First Nations, stakeholders, interested members of the public, and academics.⁸¹⁴ The WSP was developed at a time when DFO was faced with a variety of challenges including: Supreme Court of Canada decisions, varying ocean productivity, conservation concerns, habitat loss, internal agreements, new Canadian legislation governing species at risk,⁸¹⁵ shifts in global markets, and altered public expectations.⁸¹⁶ The policy was intended to provide “a blueprint for meeting these challenges”⁸¹⁷ and as a guide to how various statutory authorities should be implemented.⁸¹⁸
546. The clearly stated goal of the WSP is to “restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity.”⁸¹⁹ Such a goal was strongly supported by First Nations during the development of the WSP, and despite the implementation challenges, remains strongly supported by the FNC today. The WSP goes on to state that: “this policy goal will be advanced by safeguarding the genetic diversity of wild salmon populations, maintaining habitat and ecosystem integrity, and managing fisheries for sustainable benefits.”⁸²⁰ The WSP lays out a series of strategies and action steps to achieving its stated goal.

⁸¹³ Exhibit 96 (The successful completion of scientific public policy: Lessons learned while developing Canada's Wild Salmon Policy, 2008), p. 1

⁸¹⁴ Exhibit 96 (The successful completion of scientific public policy: Lessons learned while developing Canada's Wild Salmon Policy, 2008), p. 2

⁸¹⁵ Transcript, November 29, 2010, p. 41 (Dr. Brian Riddell): “We were also trying to develop the Wild Salmon Policy in advance of SARA [the *Species at Risk Act*] and that because if the Wild Salmon Policy is implemented correctly, then we shouldn't have to worry about SARA very often until Mother Nature gives us a blow like at Sakinaw Lake or something and that”; see also Transcript, December 2, 2010, p. 5 (Dr. Jim Irvine)

⁸¹⁶ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 1

⁸¹⁷ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 1

⁸¹⁸ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 5; see also Transcript, January 25, 2011, p. 45 (Jeff Grout), where he notes that the WSP will be “a key policy moving forward”.

⁸¹⁹ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. vi

⁸²⁰ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. vi

547. The WSP is founded on four guiding principles which, in the words of Mr. Marcel Shepert, the former Executive Director of the UFFCA, and a current First Nation member of the FRP of the PSC, are the **“pillars of the house that this policy is built on”**⁸²¹:
- a. conservation of wild salmon and their habitats is the highest priority in resource management decision-making;
 - b. resource management processes and decisions will honour Canada’s obligations to First Nations;
 - c. resource management decisions will consider biological, social, and economic consequences, reflect best science including ATK, also referred to as Traditional Ecological Knowledge or “TEK”, and maintain the potential for future generations to meet their needs and aspirations; and
 - d. resource management decisions will be made in an open, transparent and inclusive manner.⁸²²

The FNC submits that these four guiding principles must inform the continued implementation of the WSP in order for it to meet any success.

548. At several points within the WSP, the importance of honouring obligations to First Nations is underscored. In addition to being one of the guiding principles or pillars of the WSP, the policy notes that DFO seeks to manage fisheries in a manner consistent with Supreme Court of Canada decisions,⁸²³ and that the WSP shall be implemented in accordance with the guidance provided by the courts with respect to constitutional and legislative obligations to First Nations.⁸²⁴ In every action step DFO must honour its obligation to First Nations, including the obligation to consult and accommodate in good faith. The FNC submits that implementation of the WSP will help Canada meet its constitutional and legislative obligations to both conserve FRSS and accommodate the priority accorded s. 35 Aboriginal rights.

⁸²¹ Transcript, July 4, 2011, pp. 71-72 (Marcel Shepert); see also Exhibit 8 (Wild Salmon Policy), figure 1, which graphically represents the four guiding principles as the four pillars and fundamental principles

⁸²² Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 8-9

⁸²³ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 2

⁸²⁴ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 2

Recommendation: DFO must implement every action step of every strategy of the WSP in a manner that meets its obligations to First Nations and upholds the honour of the Crown.

ii) First Nations' Involvement in the Development of the WSP

549. DFO began, in the latter stages of the development of the WSP, to engage with First Nations to hear their views on the content of the draft policy. As Mark Saunders, the WSP Development Coordinator from April 2003 to June 2005, described:

...this is one of the first policies... that I believe was developed in such an open and transparent fashion. The several meetings that we had, we took great care to meet with both First Nations and stakeholders separately and then made efforts to bring First Nations into the larger multi-interest stakeholders' sessions. I think ...all of these consultations were held... in good faith in that everything that we – that we were in the draft policy were on the table and every – everything that was heard was very carefully considered in terms of subsequent drafts of the policy. **So there were at least two major sessions where we put a draft policy on the table and then came back and made significant changes to it. And also with that explanation of in cases where we didn't make changes the rationale for not doing so. So I think it's fair to say that – I mean, I think there was a high degree of understanding of this policy and engagement in its development with First Nations and stakeholders.**⁸²⁵

The FNC submits that while there were many challenges experienced during the development of the WSP, DFO's later efforts to use an open and transparent engagement with First Nations could, with earlier engagement, be a model for engagement on future development of DFO statutes, regulations, policies, and other strategic guidance documents.

550. Importantly, DFO recognized that the resources (both human and financial) required for inclusive strategic engagement were worth the cost as they resulted in a better-decision making process and in better fisheries management. As Pat Chamut, the former Assistant Deputy Minister and special Advisor on the WSP,⁸²⁶ testified:

⁸²⁵ Transcript, November 29, 2010, p. 42 (Mark Saunders)

⁸²⁶ Exhibit 100 (Witness Statement of Pat Chamut, November 16, 2010), p. 1

And even though consultation can be very difficult, time consuming and indeed tedious at times, it does provide us with much better decision-making. And I strongly believe that having the opportunity to look at a variety of factors and accept advice from people that are on the ground provides us with a better management plan, and we will all be the better for it, and the salmon resource will be the better for it, too.⁸²⁷

Recommendation: In the future development of fisheries related statutes, regulations, policies and other guidance documents, DFO should adopt a model of transparent, and meaningful engagement similar to that used in the development of the WSP, and provide sufficient time and resources for both DFO and First Nations to meaningfully engage.

iii) Implementation of the WSP: General Comments

551. During the development of the WSP, two common themes or concerns were raised by First Nations about the policy. First, they questioned whether DFO had the human and financial resources to implement the WSP.⁸²⁸ And second, they questioned whether DFO had the political will to implement the WSP.⁸²⁹ Unfortunately, throughout the course of this Inquiry, the Commissioner has heard that the answer to both questions is no; the resounding answer remains of concern to FNC. Despite having the promise of annual post-season reviews and a five year review to hold DFO accountable to implement the WSP, the state of the implementation of the WSP is, in Mr. Chamut's words, "disappointing".⁸³⁰
552. For First Nations, who had hoped that the passage of the WSP would bring about true on-the-ground changes to fisheries practices and management approaches, little change is felt; it is clear more transformation is needed. The issues are clearly systemic and challenging. When asked what kinds of changes to how pacific salmon fisheries were managed were contemplated in the WSP, Mr. Chamut explained:

⁸²⁷ Transcript, November 29, 2010, p. 68 (Pat Chamut)

⁸²⁸ Transcript, November 29, 2010, pp. 31-32 (Pat Chamut); see also Transcript, June 1, 2011, pp. 97-98 (Jeffrey Young)

⁸²⁹ Transcript, November 29, 2010, pp. 31-32 (Pat Chamut); see also Transcript, November 29, 2010, p. 52 (Dr. Jim Irvine): "So the first lesson is really that 'decision makers must be receptive to proposed changes'. So if you really want to have a policy that's going to be effective, if the senior decision-makers in Ottawa or wherever are not receptive to these changes, you're probably wasting your time"; and Transcript, June 1, 2011, pp. 97-98 (Jeffrey Young)

⁸³⁰ Transcript, November 29, 2010, p. 72 (Pat Chamut); see also Transcript, June 1, 2011 p. 82 (Jeffrey Young) who testified that DFO was not managing the fishery today in a way that's consistent with the objectives of the WSP.

I was anticipating, with the Wild Salmon Policy, that it would definitely not be the status quo when it comes to managing the resource on an annual basis, that we would end up with challenges ... to rebuild conservation units that are at low abundance, and that would require changes to the way in which fisheries are conducted, and I thought it would probably mean things like some seasonal closures in certain fisheries. I thought it might mean moving some fisheries from outer areas of the coast into more terminal areas, and particularly finding ways to fish more selectively... those sorts of things that I saw as being likely in the future to try and deal with the need to rebuild some of the stocks that were in need of much more care and attention.⁸³¹

553. The FNC submits that further efforts are required to bring fisheries management procedures into alignment with the goals of the WSP, including continued and enhanced exploration of (a) terminal or near terminal fisheries river fisheries on known stocks in the coastal areas and Fraser watershed; (b) selective harvesting methods; (c) seasonal closures as required to protect vulnerable CUs and; (d) improved stock assessment at a CU level.
554. The FNC believes that DFO must demonstrate a stronger commitment to implementing the goals and principles of the WSP through its scientific research agenda, its engagement processes, and its management actions. In addition, the FNC submits that all who have interests in the fishery can benefit from the implementation of the WSP, and the FNC supports the testimony of Dr. Brian Riddell, CEO and president of the Pacific Salmon Foundation and former Director of DFO Science,⁸³² in this regard, who stated:

...I think... a stronger commitment to really bring this [the WSP] to fruition over the next couple of years I think is really due. I'm quite concerned if we continue to go along without making progress and actually showing benefits to some of the discussions like we had this morning, that people will lose interest and they will not believe that the policy has any strength. So I think there really is an issue that we have to do. And there are benefits from doing it. I just find this very hard to understand, talking to various groups, that the fishing industry, in particular, here, has worked quite hard to get the sockeye certification. There were a strong set of conditions, and now we're discussing the pink certifications, and much of it relies on implementing the Wild Salmon Policy and better monitoring of the condition of the salmon resource. So those are

⁸³¹ Transcript, December 1, 2010, pp. 96-97 (Pat Chamut)

⁸³² Exhibit 108 (CV of Brian Riddell, March 19, 2009)

very strong benefits that we could get by succeeding in implementing this policy.⁸³³

Recommendation: DFO should bring fisheries management into alignment with the WSP, including continued and enhanced implementation of (a) terminal or near terminal river fisheries on known stocks in the coastal areas and the Fraser watershed; (b) selective fisheries in the marine and freshwater; (c) harvest closures as required to protect CUs; and (d) stock assessment measures that operate at a CU level.

iv) Implementation of the WSP: 6 Strategies

555. When the WSP was first passed, DFO admitted that “full implementation [of the WSP] will take time, in the order of 5 years.”⁸³⁴ Although “full implementation” of the WSP may be somewhat of a misnomer (as the FNC recognizes that the WSP is not a policy that can be “completed” but rather requires consistent collection of information on CUs and their habitats and ecosystems, continuous monitoring and assessment of such, establishment and active use of integrated strategic planning processes, and ongoing changes to fisheries management) the FNC submits that DFO has not been able to meet its commitment to gather the necessary information.
556. Strategy 1 requires a “systematic process to organize all Pacific salmon streams and lakes into geographic units for conservation and specification of the means to monitor abundance and distribution of Pacific salmon within those units over time.”⁸³⁵ (The unit of organization has now become known as “Conservation Units” or “CUs”.) The action steps under Strategy 1 require the identification of CUs (Action Step 1.1); development of criteria to assess CUs and identify benchmarks to represent biological status (Action Step 1.2); and the monitoring and assessment of CU status (Action Step 1.3).⁸³⁶
557. DFO has been greatly challenged to meet the requirements of Strategy 1, including: identifying FRSS CUs, developing methodologies (including classes of indicators such as (a) abundances, (b) distribution, (c) trends in abundance over time, and (d) fishing mortality relative to productivity, and establishing the metrics and benchmarks within

⁸³³ Transcript, June 2, 2011, p. 52 (Dr. Brian Riddell)

⁸³⁴ Exhibit 170 (Presentation to Regional Management Committee, WSP Implementation Strategy, August 9, 2005), p. 4; see also Transcript, December 2, 2010, pp. 45-46 (Mark Saunders)

⁸³⁵ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 16

⁸³⁶ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 16-19

each of the four classes of indicators)⁸³⁷ that can be used to assess the status of CUs. DFO has also been slow to prioritize which CUs may be in the amber and red zones (indicating that they are falling below the higher benchmark). Dr. Carrie Holt and Dr. Kim Hyatt, who have been actively involved in much of the work of Action Step 1.1, testified in December 2010 that DFO is still in the process of identifying CUs, and is challenged by the fact that only approximately 26 of the approximately 36 FRSS CUs, have sufficient information to allow them to complete the necessary status and trend assessments.⁸³⁸

558. Of particular concern for the FNC is that DFO does not have sufficient data to deal with the distribution indicators that were intended to form part of the assessment.⁸³⁹ Both conservation of wild salmon and providing First Nations with priority of access for FSC purposes, (the first two pillars of the policy) depend not only on abundance, but also on biological diversity (which includes the geographic distribution of the populations, the genetic differences, the life history variations, and the habitats that support these differences).⁸⁴⁰ The FNC is troubled by the fact that without consulting with First Nations DFO is both unable to properly account for and assess distribution metrics and, in December 2010, was contemplating a variety of simulators for these metrics. The most recent draft from Sue Grant and others who had been working on assessing and evaluating the trends in FRSS CU abundance, entitled *Evaluation of Uncertainty in Fraser Sockeye (Oncorhynchus nerka) Wild Salmon Policy Status Using Abundance and Trends in Abundance Metrics* dated August 25, 2011 identifies DFO's next steps with regard to Strategy 1:

The key next step, only recently identified by DFO and not specifically required for WSP implementation, is the development of a single status for each CU across benchmarks and metrics for Fraser Sockeye. To start this work, DFO held an internal workshop on June 10, 2011 to explore methods for aggregating status for Fraser Sockeye CUs. Future workshops and publications are expected as outcomes of this next step.

⁸³⁷ Transcript, December 2, 2010, pp. 77-79 (Dr. Carrie Holt); Transcript, December 2, 2010, p. 55 (Mark Saunders); Transcript, June 1, 2011, pp. 79-80 (Jeffrey Young)

⁸³⁸ Transcript, December 2, 2010, pp. 53-54, 57, 64 (Dr. Kim Hyatt); see also Exhibit 184 (Fraser Sockeye (*Oncorhynchus nerka*) Wild Salmon Policy Evaluation of Stock Status: State and Rate, 2010), abstract; see also Transcript, December 2, 2010, pp. 72-73 (Dr. Carrie Holt) where it was suggested that the current state of knowledge is that there are 39 FRSS CUs, 13 of which have data uncertainties.

⁸³⁹ Transcript, December 2, 2010, pp. 58, 65 (Dr. Kim Hyatt) and Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 16

⁸⁴⁰ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 2

Future work is recommended for the determination if distribution indicators are required for Fraser Sockeye status assessments. If statuses based on distribution indicators are deemed appropriate for these CUs, then modification of existing escapement enumeration study designs to meet the additional objective of assessing Fraser Sockeye distributional changes through time may be required. Development of appropriate benchmarks for distribution metrics will concurrently be required.⁸⁴¹

The FNC supports DFO's recent move to revisit the matter of using distribution indicators and strongly recommends that First Nations be a part of these discussions.

559. First Nations clearly articulated to DFO during the WSP development, and when it was first passed, that they expected to be consulted regarding the development of a preliminary list of CUs.⁸⁴² Despite that articulation from First Nations, and despite the WSP's numerous mentions of the need to honour obligations to First Nations, no nation-to-nation dialogue between DFO and First Nations regarding the preliminary list of CUs occurred.⁸⁴³ Nor has there been consultation with First Nations in regards to setting benchmarks.⁸⁴⁴ First Nations are the holders of vast and deep TEK about the populations of FRSS that pass through and return to the waters in their traditional territories; as such the FNC submits that DFO must engage in timely consultation with First Nations to gather and share information that could aide with the identification and assessment of the FRSS CUs and their benchmarks. DFO scientists such as Dr. Holt have recognized that this kind of engagement would be helpful, and that TEK, or other "less quantifiable information" could help tell the "overall story" for CUs.⁸⁴⁵
560. In addition, although monitoring of CUs as required by Action Step 1.3 occurs, in part, through general stock assessment programs, there isn't a specific plan for the carrying out of monitoring projects on specific CUs.⁸⁴⁶
561. In terms of monitoring the status of CUs, one of the ways in which the WSP may be considered as embodying a precautionary approach is that it allows for a substantial buffer between the lower benchmark (i.e. the area between the amber and red zones)

⁸⁴¹ Exhibit 1915 (Evaluation of Uncertainty in Fraser Sockeye (*Oncorhynchus nerka*) Wild Salmon Policy Status Using Abundance and Trends in Abundance Metrics, dated August 25, 2011), p. 98

⁸⁴² Transcript, December 7, 2010, p. 82 (Dr. Jim Irvine); see also Exhibit 213 (Minutes of Meeting (First Nations WSP Implementatoin Forum) held at Musqueam Hall on December 7, 2005)

⁸⁴³ Transcript, December 7, 2010, p. 88 (Dr. Jim Irvine and Dr. Carrie Holt)

⁸⁴⁴ Transcript, December 7, 2010, p. 90 (Dr. Carrie Holt)

⁸⁴⁵ Transcript, December 7, 2010, pp. 91, 93 (Dr. Carrie Holt)

and the level at which a species would be considered “at risk” by the COSEWIC. As explained by Dr. Holt:

The Wild Salmon Policy accounts for that [i.e. the need not to allow uncertainty in scientific knowledge to delay action] by allowing for a substantial buffer between the lower benchmark and a level that would be, for example, considered at risk by COSEWIC, so it allows for that uncertainty – we won't get down to that level, that COSEWIC level, because we've allowed for that buffer. So it's precautionary in that sense.⁸⁴⁷

562. Of the FRSS CUs that DFO has assessed, approximately 20 are noted, preliminarily, as being “in yellow or red” (referring to Figure 3 of the WSP, which outlines the benchmarks and biological status zones to be determined for each CU).⁸⁴⁸ The authors of Technical Report #3, who were tasked with evaluating the status of FRSS, noted that 15 of the 36 CUs have a “poor” population status and are distributed across all timing groups.⁸⁴⁹
563. When questioned about whether the CUs that been identified and assessed by various DFO scientists (including Ms. Grant and Mr. Cass), as well as the authors of Technical Report #3, and that were summarized in Exhibit 571 as having “poor”, red or amber status, could be DFO’s starting place for identifying priority CUs as per Action Step 4.1, Mr. Saunders agreed that this list “would be a place to start a conversation around priority conservation units.”⁸⁵⁰ Paul Ryall, former lead of DFO’s Salmon Team, however, preferred an approach where science staff continued to review the various potential lists, resolve differences between them, and then provided one list of all CUs.⁸⁵¹
564. The FNC submits that, given that CUs from a variety of different geographic locations and from all run timing groups have been assessed by DFO scientists and others as having poor, weak, red, or amber status, the prudent and precautionary approach, is for DFO to immediately engage with First Nations in the development of recovery plans (plans to protect and rebuild these weaker CUs) for all CUs with red and amber status.

⁸⁴⁶ Transcript, December 2, 2010, p. 59 (Mark Saunders)

⁸⁴⁷ Transcript, December 2, 2010, p. 80 (Dr. Carrie Holt)

⁸⁴⁸ Transcript, December 2, 2010, p. 73 (Dr. Carrie Holt); see also Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 17

⁸⁴⁹ Transcript, March 14, 2011, p. 70 (Mark Nelitz); see also Exhibit 562 (Technical Report #3: Evaluating the Status of Fraser River Sockeye Salmon and Role of Freshwater Ecology in their Decline, February 2011), p. ii; see also Exhibit 571 (Sockeye CU Assessment Scores, revised March 9, 2011)

⁸⁵⁰ Transcript, June 3, 2011 p. 102 (Mark Saunders)

⁸⁵¹ Transcript, June 3, 2011 pp. 101-102 (Paul Ryall)

Recommendation: DFO must prioritize and conduct research necessary to inform and implement the WSP, including improving genomics research at the CU level on stock identification and health.

Recommendation: As required by the WSP, DFO must secure core program funding (human and financial) to address the data weaknesses and gaps that impede its ability to assess the status of CUs. Such data collection must include the gathering and incorporation of TEK.

Recommendation: As required by the WSP, DFO must incorporate the distribution metric as one of the indicators to be used to assess the status of CUs and must work closely with First Nations to do so.

Recommendation: As required by the WSP, DFO must meaningfully engage with First Nations to finalize the list of FRSS CUs and identify priority CUs within that list.

Recommendation: In collaboration with First Nations, DFO must take immediate action to protect and rebuild CUs that have been assessed as having potentially poor, weak, red or amber status.

565. Strategy 2 requires the assessment of habitat status, and notes that “habitat management and protection require identification of the habitats necessary for the conservation of wild salmon and assessment of changes in their status over time”.⁸⁵² The action steps under Strategy 2 require the documentation of habitat characteristics

within CUs (Action Step 2.1); the selection of indicators and development of benchmarks for habitat assessments (Action Step 2.2); monitoring and assessment of habitat status (Action Step 2.3); and the establishment of linkages to develop an integrated data system for watershed management (Action Step 2.4).⁸⁵³

566. DFO has also been greatly challenged to meet the requirements of Strategy 2. Although some progress has been made towards identifying the elements of a framework for the monitoring of habitat status⁸⁵⁴ little work has been completed, and this strategy of the WSP has been largely starved of the human and financial resources required to carry out these tasks.⁸⁵⁵
567. In addition, there seems to be a lack of appreciation within DFO's HMP about the effect and application of the WSP to their work. As Mr. Saunders testified: "It has been a struggle to get recognition of the national – a linkage between the national regulatory – habitat regulatory program direction and whether or not the Wild Salmon Policy is sort of a recognized component and compatible with that overall program, but I'm not the – that's just an understanding that I have."⁸⁵⁶ The FNC submits that closer understanding of the importance of the WSP to all aspects of the regulatory framework for habitat management and enforcement is required.
568. Strategy 3 addresses the inclusion of ecosystem values and monitoring and notes that "a challenge for the WSP is the need for development of an ecosystem objective that is widely appreciated but difficult to quantify."⁸⁵⁷ The action steps under Strategy 3 require: the identification of indicators to monitor the status of freshwater ecosystems, and notes that "within two years, an ecosystem monitoring and assessment approach will be developed and integrated with ongoing assessments and reporting on the status of wild salmon" (Action Step 3.1); and the integration of climate and ocean information into annual salmon management processes, noting that "linking variations in salmon returns

⁸⁵² Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 20

⁸⁵³ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 20-22

⁸⁵⁴ Pressure indicators are those that force change on the environment (i.e., water extraction), and state indicators are the result of that force on the environment (i.e., stream discharge); see Transcript, December 3, 2010, pp. 6-7 (Heather Stalberg).

⁸⁵⁵ Transcript, December 2, 2010, p. 61 (Mark Saunders); Transcript, December 2, 2010, pp. 82-83 (Heather Stalberg); Transcript, December 3, 2010, pp. 8, 13-14 (Heather Stalberg); Transcript, June 1, 2011, p. 79 (Jeffrey Young)

⁸⁵⁶ Transcript, December 2, 2010, p. 61 (Mark Saunders); see also Exhibit 204 (WSP Strategy 2, Assessment of Habitat Status: The HMP Connection, November 24, 2008), p. 7

to changes in the marine ecosystem requires large-scale monitoring programs, extensive planning, and collaboration with domestic and international organizations” (Action Step 3.2).⁸⁵⁸ Many witnesses have testified in support of these continued priorities.

569. The amorphous nature of Strategy 3 has also proven challenging for DFO. Despite using the buzzword of “ecosystem management” and “ecosystem monitoring” in many DFO policies, guidelines and even organizational structures, there seems to be little clarity, even from those who have been involved in ecosystem management for close to 30 years, on how to implement Strategy 3. As Dr. Kim Hyatt testified:

Strategy 3, under the Wild Salmon Policy... it's a bit like smoke, it's everywhere. You know, you can see ecosystem elements, you can smell them and taste them, but if you try and actually get a hold of them and do something with them, you find that there's not enough substance to do that...⁸⁵⁹

In this way, to this stage, implementing Strategy 3 of the WSP has remained a largely conceptual exercise.⁸⁶⁰

570. EBM is not really about managing wild salmon and ecosystems, but about managing human influences on ecosystems and wild salmon within the context of natural influences that affect both. In addition, as noted by the FAO, EBM is a holistic approach that works toward a desired state of the ecosystem, rather than simply managing individual components to the exclusive benefit of people.⁸⁶¹ Often, DFO has shared authority for the activities that influence wild salmon, including harvest, hatcheries, aquaculture and habitat alteration. Given this, Dr. Hyatt recognized that ecosystem based values, objectives, indicators and eventually benchmarks need to be developed with a sector-specific context.⁸⁶²
571. Dr. Hyatt’s and Mr. Saunders’ evidence suggests that although DFO has undertaken a pilot of Strategy 3 in the Barkley Sound area, much more progress is required to

⁸⁵⁷ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 22

⁸⁵⁸ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 22-23

⁸⁵⁹ Transcript, December 3, 2010, pp. 19-20 (Dr. Kim Hyatt)

⁸⁶⁰ Exhibit 186 (WSP: Strategy 3 Implementation Approach, Presentation to Operations Committee, October 8, 2009), pp. 4-5, 8

⁸⁶¹ Exhibit 715 (The Will To Protect, October 2006), p. 17

⁸⁶² Exhibit 186 (WSP: Strategy 3 Implementation Approach, Presentation to Operations Committee, October 8, 2009), p. 5

implement ecosystem management.⁸⁶³ In particular, Dr. Hyatt suggested that the way to advance Strategy 3 is to engage with other governments, including First Nations, and stakeholders, since, as one moves from Strategies 1 and 2 into 3, 4 and 5, the “complexity of implementation increases, but the responsibility and authority [of DFO] to implement [the WSP] decreases.”⁸⁶⁴

572. Dr. Riddell noted that because the concept of implementing ecosystem values is a fairly broad topic, DFO needed to approach Strategy 3 from a more practical level, and would be well served by following the suggestions made by the David Suzuki Foundation and others on how to implement this Strategy.⁸⁶⁵

<p>Recommendation: DFO must work with First Nations to implement ecosystem based management and an ecosystem based approach to science, including TEK.</p>

573. Strategy 4 is intended to address the “demanding challenge in implementing the WSP”, i.e. “the establishment of an effective planning process that fully addresses the conservation of Pacific Salmon, meets the federal government’s obligations to First Nations, considers the needs of other Canadians, and involves those affected by decisions.”⁸⁶⁶ The action steps under Strategy 4 require: implementing an interim process for management of priority CUs (Action Step 4.1); and then designing and implementing a fully integrated strategic planning process for salmon conservation (Action Step 4.2).⁸⁶⁷ In our submission, this Action Step has largely been unexplored and given the synergistic relationship between FRSS and First Nations along their migratory route, this requires unique implementation tools.

574. Strategy 4 is truly where the rubber hits the road in terms of operationalizing the policy. Dr. Riddell testified that Strategy 4 would be the “key development” in making the whole WSP effective for the future.⁸⁶⁸ Additionally, as noted by Dr. Julie Gardner in a report entitled *Knowledge Integration in Salmon Conservation and Sustainability Planning: Towards Effective Implementation of Wild Salmon Policy Strategy Four*, of the six

⁸⁶³ Transcript, December 2, 2010, p. 61 (Mark Saunders); Transcript, December 3, 2010, p. 20 (Dr. Kim Hyatt); Transcript, December 3, 2010, p. 28 (Mark Saunders)

⁸⁶⁴ Transcript, December 3, 2010, p. 23 (Dr. Kim Hyatt)

⁸⁶⁵ Transcript, June 1, 2011, pp. 78-79 (Dr. Brian Riddell); see Exhibit 937 (Returning Salmon – Integrated Planning and the Wild Salmon Policy in BC, March 10, 2008)

⁸⁶⁶ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 20-22

⁸⁶⁷ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 26-27

strategies in the WSP, Strategy 4 is highly relevant to policy implementation, as this is the stage at which actions get spelled out by local and regional planning committees.⁸⁶⁹

575. In this strategy, DFO has recognized the importance of developing an inclusive, transparent approach to decision-making that acknowledges the importance of science, TEK, and social values and that respects existing legal obligations, including those owed to First Nations.⁸⁷⁰ Dr. Riddell described Strategy 4, and the WSP more generally, as being about working from the diversity up, or from the bottom up, meaning that DFO wanted to include communities that hold local knowledge and local understanding about what their long-term needs are going to be in particular areas and to have that advice be fed into DFO.⁸⁷¹ Jeffrey Young of the David Suzuki Foundation similarly testified that Strategy 4 is one of the ways of linking the local and independent components with upper levels within DFO.⁸⁷²
576. In essence Strategy 4 is about finding a way for DFO to receive “much more holistic environmental advice.”⁸⁷³ Dr. Riddell testified that what DFO was trying to present in Strategy 4 was “a message that the Department would listen to the advice coming from a consultative process on a regional basis and that they would take that to heart...”⁸⁷⁴
577. As noted at p. 29 of the WSP, DFO acknowledged that there will be two keys to success for a new planning structure:

First, given the central importance of First Nations salmon fisheries, **there will ideally need to be a high degree of support and participation by First Nations at all levels of the planning structure.** The role and the terms of reference for new multi-party committees within the structure will need to be carefully crafted in consultation with First Nations and other interests to meet this need. The Department recognizes that the provisions for participation of First Nations will need to respect their individual governance structures. Second, there will need to be a high degree of support and involvement of Provincial, Territorial and local government at both local and region-wide levels of the structure. Bringing the constitutional and administrative mandates

⁸⁶⁸ Transcript, June 1, 2011, pp. 77-78 (Dr. Brian Riddell)

⁸⁶⁹ Exhibit 224 (Knowledge Integration in Salmon Conservation and Sustainability Planning: Towards Effective Implementation of Wild Salmon Policy Strategy Four, March, 2009), p. ii

⁸⁷⁰ Exhibit 8 (Canada's Policy for Conservation of Wild Pacific Salmon, June 2005), p. 28

⁸⁷¹ Transcript, June 2, 2011, p. 50 (Dr. Brian Riddell)

⁸⁷² Transcript, June 2, 2011, p. 53 (Jeffrey Young)

⁸⁷³ Transcript, June 2, 2011, p. 50 (Dr. Brian Riddell)

⁸⁷⁴ Transcript, June 2, 2011, p. 50 (Dr. Brian Riddell)

of these other levels of government to manage land, water and waste to the table will dramatically enhance and improve the chances for success of strategic planning efforts. This will require strong efforts by the Department and others to build the necessary political will and commitment for these other levels of government to support and participate in the planning process.

578. The FNC submits that the integrated planning processes and structures envisioned under Strategy 4 of the WSP are much more than the multi-sectoral harvesting processes that currently exist, such as the IHPC. The IHPC is currently structured around a harvest objective, not an objective of preserving biodiversity or rebuilding fragile ecosystems.⁸⁷⁵ In addition, First Nations are not yet participating in the IHPC in a coordinated or mandated way.⁸⁷⁶ Functional Tier 1 and Tier 2 processes must be implemented before any integrated strategic planning process can become functional.
579. The FNC supports the five step planning procedure outlined in Appendix 2 of the WSP, but submits that such a procedure cannot be brought together in an *ad hoc* way. There must be time on the front end to ensure that any integrated strategic planning table is set with the proper participants and that the menu includes all of the necessary issues of dialogue. First Nations will also need technical capacity to participate in such processes and must have support to clarify and implement the Tier 1 and Two processes that could provide the required mandate.

Recommendation: DFO must work with First Nations in the development of the Integrated Planning Structure under Strategy 4 of the WSP, and employ this planning structure in accordance with Appendix 2.

580. Strategy 5 deals with annual program delivery and notes that “it will be left to annual operating plans to detail the specific short-term actions that actually implement the long-term strategy”.⁸⁷⁷ The action steps under Strategy 5 involve: the assessment of the status of CUs and populations, and notes that “DFO will assume a leadership role in partnerships to develop monitoring programs and assessments of wild salmon” and that priorities for detailed assessments should involve First Nations (Action Step 5.1); the planning and conducting of annual fisheries which will be documented in an annual IFMP (Action Step 5.2); the planning and implementation of annual habitat management

⁸⁷⁵ Transcript, February 1, 2011, pp. 12-13 (Pat Matthew)

⁸⁷⁶ Transcript, February 1, 2011, p. 8 (Pat Matthew); Transcript, February 11, 2011, p. 34 (Jeffrey Young)

activities including a shift from “being largely reactive, to being planned and strategically directed in order to protect habitat” (Action Step 5.3); the planning and implementation of annual enhancement activities (Action Step 5.4).⁸⁷⁸ Given the state of WSP implementation as noted above, the FNC submits that Strategy 5.1 (yearly delivery), is clearly not occurring.

581. Strategy 6 entails a performance review that includes both post-season reviews (Action Step 6.1) and regular reviews of the success of the WSP, the first one of which was to be conducted in 2010 (Action Step 6.2).⁸⁷⁹

582. Strategy 6 of the WSP was included to provide a measure of accountability and to provide an opportunity to assess DFO’s progress on the implementation of the WSP. As Mr. Chamut testified:

...it seemed that that was a very strongly held view by a number of individuals and I strongly felt and continue to strongly feel that it was important to provide – to build in the **sixth strategy**, which was this sort of performance review to **provide people with some confidence that there would be a review of the policy to see how it's operating five years out**, and secondly, my own personal motivation in putting that in was to serve as a really important **spur to the department, so that they knew that this was not an open-ended process and that it was going to be extremely important that they focus resources on the implementation of the policy knowing that it'll be embarrassing five years out if, you know, things haven't – if things prove that they haven't been properly implemented.**⁸⁸⁰

583. Dr. Riddell also strongly supported the inclusion of a requirement for periodic reviews within the WSP.⁸⁸¹ The five-year review required under Strategy 6 was meant to be both independent and transparent, and many envisioned that it would be conducted by people external to DFO, who could comment objectively on how DFO had performed in implementing the WSP.⁸⁸²

⁸⁷⁷ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 24

⁸⁷⁸ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), pp. 32-33

⁸⁷⁹ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 34

⁸⁸⁰ Transcript, November 29, 2010, pp. 31-32 (Pat Chamut)

⁸⁸¹ Transcript, June 1, 2011, p. 96 (Dr. Brian Riddell)

⁸⁸² Transcript, June 1, 2011, p. 96 (Dr. Brian Riddell); Transcript, June 1, 2011, pp. 96-97 (Jeffrey Young)

584. Despite the requirement of the policy that “an independent review of the success of the WSP in achieving its broad goals and objectives”⁸⁸³ be conducted within 5 years of the adoption of the policy (i.e. 2010); DFO chose, after the 5 year window had expired, to use internal review processes as opposed to the independent review and the components for such that were suggested by the PFRCC.⁸⁸⁴
585. In September 2011, during the last week of testimony, Susan Farlinger, the current RDG for the Pacific Region, testified that DFO had hired an independent consultant, Gardner Pinfold, to conduct a review of the WSP in an attempt to meet its obligations under Strategy 6 of the WSP.⁸⁸⁵ DFO set the evaluation framework that the consultant will be using to do the review.⁸⁸⁶
586. DFO’s avoidance of its own transparency and accountability process is troubling to the FNC; and we seek assurances that the WSP will undergo the required independent review in a process that includes mechanisms to seek and consider input from First Nations and stakeholders. Nothing less is required if resource management decisions are to be made in an open, transparent and inclusive manner.

v) Implementation of WSP: First Nations Involvement

587. Because the WSP doesn’t prescribe how much conservation is enough, it was understood that discussions regarding conservation objectives would have to occur once CUs were defined and biological status was assessed.⁸⁸⁷ It was made clear to the Minister that such discussions must include First Nations, as First Nations had to be consulted and actively engaged regarding the implementation of the WSP and that this would be a “bottom-up process”.⁸⁸⁸ As Mr. Saunders testified:

... there's a very strong interest from First Nations communities to be involved, as we heard in the previous panel, not just with the

⁸⁸³ Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 34

⁸⁸⁴ Exhibit 257 (Developing a Wild Salmon Policy Review Framework: Stakeholder Perspectives on Review Components, January 2010); see also Transcript, March 3, 2011, pp. 83-84 (Susan Farlinger and Paul Sprout); see also Transcript, December 3, 2010, p. 36 (Mark Saunders); Transcript, June 1, 2011, p. 96 (Dr. Brian Riddell)

⁸⁸⁵ Transcript, September 22, 2011, pp. 60-61 (Susan Farlinger); see also Exhibit 1916 (Wild Salmon Policy Final Work Plan, July 15, 2011)

⁸⁸⁶ Transcript, September 22, 2011, p. 61 (Susan Farlinger)

⁸⁸⁷ Transcript, November 29, 2010, p. 23 (Pat Chamut)

⁸⁸⁸ Transcript, December 1, 2010, p. 97 (Mark Saunders); Transcript, December 1, 2010, p. 102 (Mark Saunders)

development of the policy and the indicators but the implementation of it. And First Nations we have – First Nations are on the land. They're actually in these remote watersheds, they live there, they're very interested in having a role in providing status around habitat.⁸⁸⁹

588. Unfortunately the active engagement in the implementation of the WSP requested by First Nations has largely not occurred; instead DFO has returned to its own, primarily internal and technical processes, to work, albeit slowly, on Strategy 1. Mr. Shepert describes the fall-out as follows:

The Wild Salmon Policy was broadly supported by First Nations when it first hit the ground...[but] [t]here's been no move to more CU tighter management of the conservation units. I think the paper was sent away to some academic somewhere to develop benchmarks, which are the upper and lower thresholds. **I didn't see a lot of engagement with certainly the Upper Fraser First Nations and our technical staff in developing some of those benchmarks. They were done in a vacuum and then presented in a consultation format. So the meaningful input that First Nations sought in terms of the development of those things was not there...And then, of course, you've got the ecosystem indicators. I don't know anything about those anymore. They just seem to languish somewhere. I don't know if there's going to be more discussion about those or what they're going to look like. We certainly have a deep interest in developing those.** We are one of the indicators, as people. And if we're not healthy then certainly the fish aren't healthy and we've seen that. And then finally, of course, it's about how you're going to implement all of that stuff...there has been no discussion in terms of how to implement this stuff. We, in the Upper Fraser, for example, have developed a five, ten-year strategic plan based on watersheds. There are five watersheds in our area and those watersheds, we believe, are the key to managing the salmon that come from those areas....So the lack of engagement in the Wild Salmon Policy is very concerning to us.⁸⁹⁰

589. DFO maintains that First Nations have been engaged in the implementation of the WSP through the FRSSI.⁸⁹¹ First Nations, however, have concerns that the FRSSI model as it is currently implemented, does not go far enough to implement the WSP as it relies

⁸⁸⁹ Transcript, December 3, 2010, pp. 50-51 (Mark Saunders)

⁸⁹⁰ Transcript, July 4, 2011, pp. 71-72 (Marcel Shepert)

⁸⁹¹ Exhibit 756 (Ryall Response to FNC Questions, April 21, 2011), p. 1

predominantly on an aggregate-based approach and not a more detailed CU approach.⁸⁹²

vi) TEK and the WSP

590. During the development of the WSP, First Nations sought and obtained DFO's recognition to incorporate TEK along with science. But how to actually do that has proven to be a challenge. As Mr. Saunders testified, there have been a couple of attempts to develop proposals and guidelines for how to incorporate TEK but DFO has not made significant progress in this regard.⁸⁹³ A number of scientists have testified that TEK is a useful component for both research and management.

vii) Implementation of the WSP: Steps Forward

591. Throughout the hearings on the WSP, witnesses testified to a lack of time and resources to move ahead with the implementation of the WSP.⁸⁹⁴ Therefore, finally, in addition to the specific WSP implementation orientation recommendations noted above, the FNC submits that from an organizational perspective, three additional steps are required. First, as recommended by Mr. Chamut, Dr. Riddell, Mr. Young, and others, DFO must devote the necessary long-term and stable resources to implement the WSP. Mr. Chamut testified that \$30 to \$40 million would be a good start to support implementation of the WSP.⁸⁹⁵ Dr. Riddell testified that \$3 to \$5 million would be needed to fund an "intense effort to catch up" on WSP implementation, and that outside contractors knowledgeable about the WSP and its possibilities for implementation should be involved.⁸⁹⁶ In 2008, the David Suzuki Foundation suggested that, at least \$5 million a year for 5 years should be devoted to WSP implementation.⁸⁹⁷ The FNC that such implementation of the WSP will likely cost \$5 million per year.

⁸⁹² Transcript, July 4, 2011, p. 73 (Marcel Shepert); see also Exhibit 413 (Fraser River Integrated Sockeye Spawning Initiative, prepared by Ken Wilson, March 2009) pp. 4, 5, 7

⁸⁹³ Transcript, November 29, 2010, pp. 41-42 (Mark Saunders); see also Exhibit 222 (Proposal for Development of Guidelines for use of ATK Management in Fisheries Resources in DFO's Pacific Region)

⁸⁹⁴ Transcript, December 3, 2010, p. 31 (Dr. Kim Hyatt); Transcript, January 25, 2011, p. 45 (Barry Rosenberger)

⁸⁹⁵ Transcript, November 29, 2010, pp. 73-74 (Pat Chamut)

⁸⁹⁶ Transcript, December 1, 2010, p. 9 (Dr. Brian Riddell)

⁸⁹⁷ Exhibit 937 (Returning Salmon: Integrated Planning and the Wild Salmon Policy in BC, March 10, 2008), p. 2

Recommendation: DFO should allocate stable, long-term funding which, at a minimum should be approximately \$5 million per year for five years, to support implementation of the WSP.

592. Secondly, the FNC submits that appointing one or several champions within DFO who can bridge the strategies and oversee implementation of the WSP is required. The notion of one or several champions (i.e. a core group of dedicated people tasked with implementation of the WSP) was advocated by Mr. Chamut, Dr. Riddell, Mr. Saunders, Heather Stalberg, and the David Suzuki Foundation.⁸⁹⁸ The FNC submit that it is inappropriate to assume that the RDG alone, who is responsible for delivery all programs and activities within her region in accordance with assigned resources,⁸⁹⁹ could also take on this responsibility.

Recommendation: DFO should work with First Nations to identify a champion or a core group of dedicated people who will have the responsibility of effecting implementation of the WSP in a timely and comprehensive manner. Although the RDG may be a part of this core group of dedicated people, the RDG alone should not be responsible for this task.

D. Species at Risk Act (SARA)

i) Purposes of SARA

593. The purposes of the SARA are to prevent wildlife, including aquatic species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened.⁹⁰⁰ DFO has the responsibility, under SARA, for protecting aquatic species at risk and their habitat. DFO's area of responsibility includes the legal requirements to enforce automatic prohibitions; to develop recovery strategies, management plans and action plans within specified timelines; to identify and protect the critical habitat for endangered

⁸⁹⁸ Exhibit 937 (Returning Salmon: Integrated Planning and the Wild Salmon Policy in BC, March 10, 2008), p. 2; Transcript, November 29, 2010, pp. 73-74 (Pat Chamut); Transcript, December 3, 2010, p. 57 (Mark Saunders); Transcript, December 8, 2010, p. 65 (Heather Stalberg); Transcript June 1, 2011, p. 100 (Jeffrey Young); Transcript, June 2, 2011, pp. 6-7 (Dr. Brian Riddell and Jeffrey Young)

⁸⁹⁹ Transcript, November 1, 2010, p. 13 (David Bevan)

⁹⁰⁰ PPR 3 (Legislative Framework Overview, November 1, 2010), para. 30

or threatened species; and to conduct consultations within specified timelines.⁹⁰¹ SARA also provides First Nations with an opportunity to play a central role in the efforts to protect and recover species at risk at their habitats.⁹⁰²

ii) Listing Decision

594. The 2004 decision of whether or not to list the Cultus and Sakinaw populations of FRSS as endangered under SARA, was the first difficult SARA listing decision facing DFO.⁹⁰³ This decision was being considered at the same time as DFO was finalizing the WSP. The issues facing DFO in the listing decision, including questions about whether and how to implement weak stock management, and how to weigh the economic impacts of restricting fishing on certain populations of FRSS against the benefits (to biodiversity and otherwise) of protecting certain populations from exploitation are issues engaged by the WSP.⁹⁰⁴ In this way, the Cultus and Sakinaw listing decision provides useful insight into DFO's practices and procedures regarding such difficult issues and the lessons that must be learned.
595. The basic factual background to DFO's decision not to list Cultus FRSS as endangered under SARA is as follows. In September of 2002, concerned about the collapse of Cultus Sockeye, biologist Ken Wilson and Chief Doug Kelly of the Soowahlie First Nation wrote to COSEWIC requesting an emergency assessment of the status of Cultus Sockeye.⁹⁰⁵ In 2003, COSEWIC confirmed the endangered status of the Cultus population; and in February of 2004, COSEWIC made a request to DFO for emergency listing under SARA of two sockeye salmon populations: Sakinaw and Cultus.⁹⁰⁶ COSEWIC provided a detailed rationale, based on analysis done by DFO scientists, that there was imminent risk to the survival of these two populations.⁹⁰⁷ It was recognized

⁹⁰¹ PPR 3 (Legislative Framework Overview, November 1, 2010), para. 32

⁹⁰² Exhibit 907 (Effects of the Species at Risk Act on First Nations' Fisheries, March 29, 2006), p. 6; Transcript, May 31, 2011, p. 2 (Dr. John Davis)

⁹⁰³ Exhibit 888 (Memorandum to David Bevan re: SARA Listing Decision Process for Cultus and Sakinaw Sockeye, May 28, 2004)

⁹⁰⁴ Transcript, May 30, 2011, p. 10 (Dr. John Davis)

⁹⁰⁵ Exhibit 916 (Chronology, Cultus Lake Sockeye Recovery, revised May 26, 2011), p. 1; Transcript, May 30, 2011, p. 6 (Dr. John Davis)

⁹⁰⁶ Exhibit 887 (Memorandum for the Minister (Information Only): Emergency Listing Request for Two Sockeye Salmon Populations Under SARA, February 24, 2004), p. 1; Transcript, May 30, 2011, p. 5 (Dr. John Davis); see also Exhibit 916 (Chronology, Cultus Lake Sockeye Recovery, revised May 26, 2011), p. 1

⁹⁰⁷ Exhibit 887 (Memorandum for the Minister (Information Only): Emergency Listing Request for Two Sockeye Salmon Populations Under SARA, February 24, 2004), p. 1

that the Cultus population had collapsed primarily due to overexploitation, including directed and incidental catches in mixed-stock fisheries at levels above those that could be sustained.⁹⁰⁸

596. DFO decided not to list Cultus FRSS on an emergency basis, but rather to rely on the normal process under SARA, so that, Dr. Davis testified, DFO could consider and balance a range of socio-economic factors before deciding whether or not to list Cultus FRSS under SARA.⁹⁰⁹ Having decided not to pursue emergency listing of Cultus or Sakinaw under SARA, DFO had nine months under the “normal” SARA listing process to consult with First Nations and stakeholders and to conduct the necessary studies and assessments to make a decision as to listing or not.⁹¹⁰
597. One of the key questions facing DFO during the nine-month consultation process was, “what would be the implications of listing from the standpoint of weak stocks that are part of the mixed stock fisheries...”⁹¹¹ DFO’s Policy Branch, and consultants such as Gord Gislason produced a handful of socio-economic reports, which are now Exhibits 892A, 892B, 892C, 892D, 892E, 892F in this Inquiry, to address the question of the social and economic costs and benefits of listing these aquatic populations. Some of these reports anticipated that the lost benefits to fisheries from a decision to list Cultus and Sakinaw FRSS under SARA were estimated at \$125 million – a number picked up on by DFO to justify its ultimate decision that the costs of listing were too high.⁹¹²
598. Although Dr. Davis testified that DFO undertook “careful evaluations” of the impacts to the fishery from a listing decision;⁹¹³ he and others both within and outside of DFO recognized the many deficiencies in the content of and methods used in socio-economic impact reports developed by DFO and its consultants; and in the lack of transparency that went into this process.⁹¹⁴ The criticisms of the reports included:

⁹⁰⁸ Exhibit 885 (Response Statement for Sockeye Salmon, Cultus Population, April 21, 2004), p. 1

⁹⁰⁹ Transcript, May 30, 2011, p. 9 (Dr. John Davis)

⁹¹⁰ Transcript, May 30, 2011, pp. 11-12 (Dr. John Davis)

⁹¹¹ Transcript, May 30, 2011, p. 12 (Dr. John Davis)

⁹¹² Transcript, May 30, 2011, p. 24 (Dr. John Davis)

⁹¹³ Transcript, May 30, 2011, p. 13 (Dr. John Davis)

⁹¹⁴ See, for example, Transcript, May 30, 2011, pp. 24-26, 34, 41, 43-44, 57 (Dr. John Davis); Transcript, May 31, 2011, pp. 27-31 (Dr. John Davis); Exhibit 893 (Extinction by Miscalculation: The Threat to Sakinaw and Cultus Lake Sockeye, v. 1.0, November 19, 2004); Exhibit 894 (Email from John Davis dated November 4, 2004); Exhibit 899A (Biases in Legal Listing Under Canadian Endangered Species Legislation, 2007), p. 3; Exhibit 932 (Email thread between Mike Bradford and N. Schubert *et al.* re Cultus

- a. The analyses were over simplified;⁹¹⁵
- b. The analyses significantly overstated the economic impact of listing Cultus sockeye;⁹¹⁶
- c. The \$125 million figure was criticized as being a revenue number, not a net number;⁹¹⁷
- d. The analyses focused on the calculation of potential financial losses and the potential short-term negative impacts, and did not take into account even short-term benefits.⁹¹⁸ In particular, the analyses did not sufficiently consider the benefits of listing, including the benefits to First Nations whose cultures and livelihood depend on these sockeye; the benefits derived from the contribution that sockeye make to maintaining healthy ecosystems; the benefit of providing immediate fisheries opportunities to harvesters upstream of the migration route of Cultus sockeye; the benefit of recovery and rebuilding several sockeye stocks that co-migrate with Cultus sockeye.⁹¹⁹
- e. Though labelled socio-economic reports; the analyses did not adequately consider the social implications;⁹²⁰
- f. The analysts were not able to properly quantify First Nations' values;⁹²¹
- g. The analyses did not contemplate alternative harvest options; for example, the assumption in many of the reports was that listing would require complete fishery

Socio-Economic Analysis, ending October 7, 2004); Exhibit 917 (Email 2 of 3 Socio-Economic Analysis for Cultus Sockeye, undated); Exhibit 896 (Petition of Sierra Club re Decision Not to List Cultus and Sakinaw Lake Sockeye Salmon under SARA, June 10, 2005)

⁹¹⁵ Exhibit 892G (Cultus Sockeye Stock Assessment/Fisheries Management Work Group Review and Comments of "Financial Considerations Associated with Potential SARA Listing of Sakinaw & Cultus Lake Sockeye Presentation", October 7, 2004), p.1

⁹¹⁶ Exhibit 917 (Email 2 of 3 Socio-Economic Analysis for Cultus Sockeye, undated), p. 1

⁹¹⁷ Transcript, May 30, 2011, p. 25 (Dr. John Davis); Exhibit 893 (Extinction by Miscalculation: The Threat to Sakinaw and Cultus Lake Sockeye, v. 1.0, November 19, 2004), pp. 2-3

⁹¹⁸ Exhibit 896 (Petition of Sierra Club re Decision Not to List Cultus and Sakinaw Lake Sockeye Salmon under SARA, June 10, 2005), p. 4

⁹¹⁹ Exhibit 893 (Extinction by Miscalculation: The Threat to Sakinaw and Cultus Lake Sockeye, v. 1.0, November 19, 2004), pp. 1-2; Exhibit 896 (Petition of Sierra Club re Decision Not to List Cultus and Sakinaw Lake Sockeye Salmon under SARA, June 10, 2005), p. 5

⁹²⁰ Transcript, May 31, 2011, pp. 27-28 (Dr. John Davis)

⁹²¹ Transcript, May 31, 2011, p. 27 (Dr. John Davis)

closures (or exploitation rates of less than 5%) – an assumption that was not consistent with the Cultus Recovery Strategy;⁹²²

- h. The reports were not peer reviewed;⁹²³
- i. The reports failed to account for the potential of additional resources that would be available under a listing scenario; and⁹²⁴
- j. The reports gave little weight to the potential for DFO to mitigate or adapt to the constraints that might result from listing the populations.⁹²⁵

599. In addition, the reports were criticized for overstating the commercial and processing impacts of a listing decision, while at the same time making assumptions that First Nations would be hurt by a listing decision. As one critique noted:

While the analysis recognizes that FSC [food, social and ceremonial] opportunities for FNs [First Nations] upstream of the Fraser/Vedder confluence will not be affected by listing considerations it does not consider potential benefits of listing in upstream areas. Listing will increase the benefits to FN bands upstream of this area as a result of larger in river escapements that will allow these bands to access fish for FSC and/or sale; especially bands in more terminal locations that have not been able to harvest their FSC in recent years...⁹²⁶

600. First Nations' fears that DFO's headquarters' socio-economic assumptions for not listing Cultus would trump their concerns about the health of the salmon populations, proved to be justified.⁹²⁷ The FNC submits that DFO must increase its capacity to conduct

⁹²² Exhibit 893 (Extinction by Miscalculation: The Threat to Sakinaw and Cultus Lake Sockeye, v. 1.0, November 19, 2004), p. 3; Exhibit 896 (Petition of Sierra Club re Decision Not to List Cultus and Sakinaw Lake Sockeye Salmon under SARA, June 10, 2005), p. 4; Exhibit 917 (Email 2 of 3 Socio-Economic Analysis for Cultus Sockeye, undated), p. 1

⁹²³ Exhibit 896 (Petition of Sierra Club re Decision Not to List Cultus and Sakinaw Lake Sockeye Salmon under SARA, June 10, 2005), p. 5

⁹²⁴ Exhibit 892G (Cultus Sockeye Stock Assessment/Fisheries Management Work Group Review and Comments of "Financial Considerations Associated with Potential SARA Listing of Sakinaw & Cultus Lake Sockeye" Presentation, October 7, 2004), p. 1

⁹²⁵ Exhibit 892G (Cultus Sockeye Stock Assessment/Fisheries Management Work Group Review and Comments of "Financial Considerations Associated with Potential SARA Listing of Sakinaw & Cultus Lake Sockeye" Presentation, October 7, 2004), p. 1

⁹²⁶ Exhibit 892G (Cultus Sockeye Stock Assessment/Fisheries Management Work Group Review and Comments of "Financial Considerations Associated with Potential SARA Listing of Sakinaw & Cultus Lake Sockeye" Presentation, October 7, 2004), p. 4

⁹²⁷ Transcript, May 31, 2011, p. 25 (Dr. John Davis); Exhibit 909 (First Nation Consultation Summary for SARA Legal Listing Meetings of 10 Pacific Aquatic Species, May 25, 2004)

meaningful socio-economic analyses. Ms. Farlinger has testified that although DFO had taken steps to improve its capacity to do economic analyses, the question of considering the socio-economic implications to First Nations' fisheries remains a challenge for DFO.⁹²⁸

601. First Nations were outraged that DFO did not share with them, in an open and transparent way, the information they had gathered on the socio-economic impacts of a listing decision.⁹²⁹ They articulated to Dr. Davis that not sharing information was an infringement to their Aboriginal rights as they are affected by listing decisions and need to be aware of all the information.⁹³⁰

Recommendation: DFO working collaboratively with First Nations with the assistance of the FNFC, must develop a more robust understanding and policy framework for conducting socio-economic analyses. Such frameworks must be developed in collaboration with First Nations, economists, and social scientists, and must explore ways in which First Nations' values can be meaningfully considered.

Recommendation: DFO must collaboratively work with First Nations to conduct socio-economic impact and benefit assessments early in any decision making process. Such assessments must be shared with First Nations in a meaningful and timely way.

Recommendation: DFO must consult with First Nations on the methodologies, analysis, outcomes and recommendations of socio-economic analysis.

602. Further concerns arise from DFO headquarters' actions in relation to the Recovery Team. DFO failed to share the socio-economic analysis, in advance, with the members of the Recovery Team, a group established in 2003 as part of a pre-SARA implementation process, that was intended to be a SARA compliant body that would

⁹²⁸ Transcript, September 28, 2011, pp. 44-45 (Susan Farlinger)

⁹²⁹ Exhibit 894 (Email from John Davis re Minister's Office Briefing dated November 4, 2004), p. 1; Transcript, May 31, 2011, p. 31 (Dr. John Davis)

⁹³⁰ Exhibit 894 (Email from John Davis re Minister's Office Briefing dated November 4, 2004), p. 1

produce the recovery strategy for Cultus sockeye.⁹³¹ Shortly after members of the Recovery Team wrote to those tasked with overseeing the listing decision, noting their critique of the socio-economic analyses, the Recovery Team was disbanded.⁹³² As Neil Schubert, the former chair of the Recovery Team, testified: “I was quite surprised that a functioning group like that would be disbanded without some sort of interim process put in place to continue recovery activities or recovery planning.”⁹³³ Instead, the former Recovery Team was left to proceed on an *ad hoc* basis, without the resources to achieve many of the objectives that had been set out in the 2004 National Conservation Strategy for the Cultus Lake Sockeye Salmon (i.e. the Recovery Strategy).⁹³⁴ To avoid the chaos experienced by the Recovery Team and to ensure proper recovery strategies are implemented in the future, Mr. Schubert recommended the establishment of multi-stakeholder response teams, as per Strategy 4 of the WSP, that would be tasked with setting benchmarks and identifying timeframes for recovery of weak CUs.⁹³⁵

Recommendation: As part of the Tier 1 and 2 co-management process, DFO and First Nations should explore how to efficiently establish recovery team(s) (including Tier 3 working groups), either under Strategy 4 of the WSP or SARA to develop and oversee recovery initiatives.

603. Another perplexing element of DFO’s approach to the listing decision was the risk analysis it undertook. Using a risk table, DFO policy analysts rated the risks of two scenarios: (1) list; and (2) do not list.⁹³⁶ And, using non-scientific, qualitative analysis, DFO policy analysts rated the likelihood of harm and impact of the harm with regard to a number of different aspects including: (A) The Minister’s Freedom to Act; (B) No Recovery; (C) Extinction; (D) Commercial Fishing; (E) Aboriginal Food and Social Fishing; (F) Recreational Fishing; (K) Federal-Provincial [relations]; (L) Relations with Fishing Industry; (N) Legal; and (P) Compensation.⁹³⁷ Interestingly, although DFO appears to have considered risks to their relations with the fishing industry and with the

⁹³¹ Transcript, May 31, 2011, pp. 41, 74 (Neil Schubert)

⁹³² Transcript, May 31, 2011, p. 77 (Neil Schubert)

⁹³³ Transcript, May 31, 2011, p. 77 (Neil Schubert)

⁹³⁴ Exhibit 914 (National Conservation Strategy for the Cultus Lake Sockeye Salmon); Transcript, May 31, 2011, p. 81 (Neil Schubert)

⁹³⁵ Transcript, May 31, 2011, p. 82 (Neil Schubert); Transcript, June 1, 2011, p. 67 (Neil Schubert)

⁹³⁶ Exhibit 1332 (SARA and Potential Listing of 16 Aquatic Species, September 10, 2004) pp. 17-20

⁹³⁷ Transcript, July 8, 2011, p. 20 (Dr. John Davis); Exhibit 1332 (SARA and Potential Listing of 16 Aquatic Species, September 10, 2004) pp. 17-20

Province, it did not consider risks to its relationships with First Nations, to whom Canada owes constitutional duties to consult and accommodate.⁹³⁸ The results of the risk analysis show that if the Minister decided to list the populations under SARA, the anticipated risks to the Minister's freedom to act, the commercial fishing industry and DFO's relation with it, and federal-provincial relations were higher than if he didn't list.⁹³⁹ Whereas if the Minister decided not to list under SARA, there would be risks arising from responses of ENGOs, legal issues, international issues, and matters of Atlantic-Pacific consistency.⁹⁴⁰

604. The risk assessment appears to be nothing more than a numbers game, with the numbers pre-stacked against a decision to list. The lack of input from First Nations into the risk analysis, and the lack of transparency in how the risks were calculated or assessed is very troubling. When faced with these risks and uncertainties, DFO must meaningfully consult First Nations to understand their values and risk tolerances and to accommodate their interests and concerns. The FNC submits that DFO must develop a more thorough and transparent risk assessment process for weighing decisions as to whether or not to list a population under SARA.

Recommendation: DFO together with First Nations and interested stakeholders should develop a more robust and transparent process or framework to assess risks and uncertainties associated with fisheries management decisions, including decisions relating to listing populations under SARA and implementing the WSP.

605. In October of 2004, DFO Headquarters recommended against SARA listing Cultus and Sakinaw sockeye.⁹⁴¹ The potential effect of this recommendation was not the subject of consultation. In January of 2005, the Governor in Council made the decision not to list Cultus or Sakinaw as endangered under SARA.⁹⁴²
606. Given the lessons learned from the decision of the Governor in Council not to list Cultus FRSS under SARA, the FNC submits that DFO must work with First Nations to develop

⁹³⁸ Exhibit 1332 (SARA and Potential Listing of 16 Aquatic Species, September 10, 2004) p. 19

⁹³⁹ Exhibit 1332 (SARA and Potential Listing of 16 Aquatic Species, September 10, 2004) p. 19

⁹⁴⁰ Exhibit 1332 (SARA and Potential Listing of 16 Aquatic Species, September 10, 2004) p. 19

⁹⁴¹ Exhibit 1331 (Memorandum for the Minister re SARA Legal Listing Decision, September 13, 2004), p.

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⁹⁴² Transcript, May 30, 2011, p. 24 (Dr. John Davis); see also Exhibit 895 (Canada Gazette Part II, Vol. 139, no. 2, January 26, 2005), p. 114

a more robust policy framework for conducting socio-economic analyses.⁹⁴³ Such frameworks must be developed in collaboration with First Nations, and must explore ways for First Nations' values to be meaningfully quantified. The analyses must identify and measure the benefits as well as the costs of listing decisions, and explore a range of fisheries management, harvest and mitigation options. In addition, DFO must find a way to conduct socio-economic impact and benefit assessments much earlier in the listing process, share the analysis with First Nations, and meaningfully seek and address input on such analysis.⁹⁴⁴ The FNC submits that, as Dr. Davis testified, the way forward is to use more social science, and to receive more input from First Nations, in order to truly develop socio-economic impact analyses of fisheries decisions.⁹⁴⁵ DFO must meet the challenge of developing ways to account for non-use economic values.⁹⁴⁶

607. If a decision is made to list a species under SARA, DFO must develop and implement plans at a local level to engage First Nations to determine appropriate recovery measures. The FNC submits that consultation on proposed recovery plans for weak CUs is inappropriate for the multi-stakeholder harvest forums, such as the IHPC.⁹⁴⁷ Rather, as proposed in the submissions related to the WSP above, an umbrella recovery team for FRSS CU would be the most efficient way of streamlining this work going forward.

E. Habitat Management, Restoration, and Enforcement

i) Overview

608. DFO's habitat management and protection work is guided by several legislative and policy tools including: section 35 of the *Fisheries Act*, which is the primary habitat protection provision,⁹⁴⁸ section 36 of the *Fisheries Act*, which prohibits the unauthorized deposit of a deleterious substance into water frequented by fish and which is administered largely by Environment Canada,⁹⁴⁹ SARA,⁹⁵⁰ and the 1986

⁹⁴³ Transcript, May 30, 2011, p. 34 (Dr. John Davis); Transcript, September 28, 2011, pp. 45-46 (Susan Farlinger)

⁹⁴⁴ Transcript, May 31, 2011, p. 31 (Dr. John Davis)

⁹⁴⁵ Transcript, May 30, 2011, p. 43 (Dr. John Davis)

⁹⁴⁶ Transcript, May 30, 2011, p. 57 (Dr. John Davis)

⁹⁴⁷ Transcript, June 1, 2011, p. 60 (Neil Schubert)

⁹⁴⁸ PPR 8 (DFO's Habitat Management Policies and Practices, March 8, 2011), para. 9

⁹⁴⁹ PPR 8 (DFO's Habitat Management Policies and Practices, March 8, 2011), para. 12

⁹⁵⁰ PPR 8 (DFO's Habitat Management Policies and Practices, March 8, 2011), paras. 14-15

Habitat Policy, which is the “cornerstone” of the HMP and continues to guide DFO’s administration of the *Fisheries Act*’s habitat protection provisions.⁹⁵¹

609. The overarching objective of the 1986 Habitat Policy is to achieve a “net gain of the productive capacity of fish habitats”.⁹⁵² This objective is supported by the goals of “maintaining the current productive capacity of fish habitats supporting Canada’s fisheries resources...” and achieving “no net loss of the productive capacity of habitats” as well as “rehabilitat[ing] the productive capacity of fish habitats in selective areas where economic or social benefits can be achieved through the fisheries resource.”⁹⁵³
610. The 1986 Habitat Policy also speaks to the involvement of First Nations in habitat protection and rehabilitation and recognizes, in section 1.4, that First Nations could assume a “greater role in local fisheries management and environmental protection”; and notes that the Department is “prepared to cooperate with Native groups and the appropriate provincial or territorial fisheries agencies to develop programs, techniques and approaches to improve fish habitat management within their areas of interest” – a commitment reiterated in testimony from Rebecca Reid, the former Regional Director of OHEB.⁹⁵⁴

<p>Recommendation: DFO must work with First Nations to set priorities for habitat protection, and to carry out stewardship and habitat protection responsibilities.</p>
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ii) Slow Net Loss of Habitat

611. While DFO’s habitat management and habitat protection function are recognized as being “tremendously important”⁹⁵⁵ the evidence is replete with examples of how DFO is failing to meet its responsibilities. In Exhibit 715, a report by the David Suzuki Foundation entitled *The Will to Protect*, the problem of habitat loss is outlined in stark terms. It notes:

Habitat degradation and loss have contributed to the extirpation and decline of Pacific salmon in Canada and presents an

⁹⁵¹ PPR 8 (DFO’s Habitat Management Policies and Practices, March 8, 2011), paras. 20, 30

⁹⁵² Exhibit 260 (DFO Policy for the Management of Fish Habitat, October 1986), s. 2.1

⁹⁵³ Exhibit 260 (DFO Policy for the Management of Fish Habitat, October 1986), ss. 2.2 and 2.2.1 and 2.3

⁹⁵⁴ Exhibit 260 (DFO Policy for the Management of Fish Habitat, October 1986), s. 1.4; Transcript, April 4, 2011, pp. 54, 68 (Rebecca Reid)

⁹⁵⁵ Transcript, April 4, 2011, p. 53 (Jason Hwang)

increasing threat to their persistence. A 2006 review of the 87 salmon stocks actively assessed and managed by government found that more than 50 per cent (44) of these stocks were at least 25 per cent below target abundance, rapidly declining, or both. Habitat loss was regularly identified as a primary cause for these extinctions and catastrophic declines...⁹⁵⁶

612. Jason Hwang, the Area Manager for OHEB in the BC Interior Region, testified that while DFO's mandate in regards to habitat protection can be at odds with broader social desires or priorities, it exists for the public good.⁹⁵⁷ Mr. Hwang testified that it was critical for the government to set a very high bar for maintaining habitat and habitat protection and for maintaining the essence of the 1986 Habitat Policy.⁹⁵⁸
613. Despite the importance of habitat management, protection and rehabilitation, habitat practitioners both in the Pacific Region and in Ottawa have recognized that, from an operational level, Canada is not achieving no net loss.⁹⁵⁹ Instead, salmon in British Columbia are experiencing a "slow net loss of habitat", occurring from a number of different sources and for a number of different reasons.⁹⁶⁰
614. Although the 1986 Habitat Policy calls for "maintaining the productive capacity of fish habitats," and therefore suggests that DFO needs to compile a comprehensive baseline to provide it with a snapshot of the habitat values, development activities, pressures, and forecasts for the various watersheds that it could then use to go back and compare where we are today with where we were when the policy was established in 1986 – only limited efforts have been made towards completing this critical benchmarking work.⁹⁶¹ Chief Kim Baird of the Tsawwassen First Nation testified to the absurdity of trying to protect habitat when we don't have a proper baseline from which to measure progress:

...being in an urban area, habitat loss is of great concern. But what's also of great concern is **what are we benchmarking in relation to the environment?** I mean, it's getting to a point where we're valuing – valuing ditches as fish habitat because that's almost what's left to value, and I think we need to step back and take a broader look at what an ecosystem needs. And I have

⁹⁵⁶ Exhibit 715 (The Will to Protect – Preserving BC's Wild Salmon Habitat, 2006), p. vi

⁹⁵⁷ Transcript, April 4, 2011, p. 53 (Jason Hwang)

⁹⁵⁸ Transcript, April 4, 2011, p. 53 (Jason Hwang)

⁹⁵⁹ Transcript, April 4, 2011, p. 13 (Jason Hwang, Patrice LeBlanc); see also Exhibit 667 (No Net Loss of Fish Habitat: A Review and Analysis of Habitat Compensation in Canada, 2005), p. 344

⁹⁶⁰ Transcript, April 4, 2011, p. 28 (Jason Hwang)

⁹⁶¹ Transcript, April 5, 2011, p. 5 (Jason Hwang)

grave concern because it's everyone hires their own scientific experts, and it's in some ways, I think everyone talks past each other. **And so to me, I know that one of our elders who has passed on, who said that, "You know, to start benchmarking today's environment is not going to fix the problem, because so much loss of habitat has already occurred."**⁹⁶²

615. The action steps required under Strategy 2 of the WSP would likely have fed into this baseline work, however, as noted above, only limited progress has been made under that strategy. As Mr. Hwang testified, DFO still lacks an operationally-available methodology to measure fish habitat productivity on a detailed scale and to assess the impacts of habitat development referrals on a project-by-project basis.⁹⁶³

iii) Renewal of the 1986 Habitat Policy

616. DFO is currently in the process of reviewing or renewing the 1986 Habitat Policy. Such an update is required in order to bring the policy in line with DFO's emerging legal responsibilities including responsibilities to protect species at risk under SARA, responsibilities related to environmental assessments, obligations to consult with First Nations as outlined in major cases from the Supreme Court of Canada, as well as policy objectives such as pursuing EBM.⁹⁶⁴ DFO is currently undertaking internal consultations on how to update the policy, and committed to ensuring consultation with First Nations regarding any proposed changes to the policy.⁹⁶⁵

617. The FNC submits that DFO should undertake consultation with First Nations on the objectives, principles, and directions to be provided in any revised habitat policy. The FNC submits that the guidance provided in any revised habitat policy must be sufficiently clear and enabling so that DFO, and its partners, can ensure that they are achieving results that will provide for the sustainability of the resource in the long term.⁹⁶⁶ Further, the FNC submits that any revised habitat policy must include the recognition of Aboriginal rights, and the duty to consult with First Nations – a recommendation supported by Patrice LeBlanc, the Director of Habitat Management Policy and Practices

⁹⁶² Transcript, December 13, 2010, p. 71 (Chief Kim Baird)

⁹⁶³ Transcript, April 4, 2011, p. 28 (Jason Hwang)

⁹⁶⁴ Transcript, April 4, 2011, p. 10 (Patrice LeBlanc)

⁹⁶⁵ Transcript, April 5, 2011, p. 70 (Patrice LeBlanc)

⁹⁶⁶ Transcript, April 4, 2011, p. 11 (Jason Hwang)

Branch⁹⁶⁷ – and include measures to strengthen partnerships with First Nations to be involved in habitat protection and restoration activities in their traditional territories.

Recommendation: DFO must meaningfully consult with First Nations on the content (objectives, principles, and directions) of any proposed revisions to its 1986 Habitat Policy. Like the WSP, any renewed DFO habitat policy should include explicit recognition of Aboriginal title and rights and promote partnerships with First Nations in habitat protection and restoration activities.

Recommendation: DFO should provide both clearer policy guidance and enabling measures to protect and preserve FRSS habitat, including measures to properly assess habitat loss and gain according to ecological benefits, not simply habitat size.

Recommendation: DFO should actively pursue a government-to-government MOU with First Nations and the Province that encourages collaboration and efficiencies and clarifies roles and responsibilities regarding the protection, preservation and restoration of FRSS habitat, including water management.

iv) **Death by A Thousand Cuts**

618. In 2004, DFO launched its EPMP. Under the EPMP, habitat staff were to spend less time reviewing routine projects and more time reviewing higher risk and major projects.⁹⁶⁸ The EPMP was a decision based on what DFO could do with declining resources, and has led to a number of smaller or medium sized projects being “screened out” of DFO’s review processes.⁹⁶⁹ Mr. Hwang described the impact of the EPMP as follows: “[the EPMP] perhaps took a few things that we were looking at before off the plate and also, then, I guess, created a situation where **we don’t have a regulatory awareness** of that activity anymore.”⁹⁷⁰ Commenting on an observation on page 14 of

⁹⁶⁷ Transcript, April 5, 2011, p. 69 (Patrice LeBlanc)

⁹⁶⁸ PPR 8 (DFO’s Habitat Management Policies and Practices, March 8, 2011), para. 59

⁹⁶⁹ Transcript, April 4, 2011, p. 32 (Jason Hwang); Transcript, April 4, 2011, p. 33 (Rebecca Reid); see also PPR 8 (DFO’s Habitat Management Policies and Practices, March 8, 2011), at paras. 68-69

⁹⁷⁰ Transcript, April 4, 2011, p. 32 (Jason Hwang)

the Diagnostic⁹⁷¹ wherein some staff and managers had questioned whether the EPMP's increased focus on referrals from the larger industry groups and decreased focus on middle and smaller class operators was prudent, Mr. Hwang testified as follows:

I think **the concern that stems from this was that the smaller projects**, some of the projects that were framed as low risk **were perceived, understood, perhaps, to regularly result in small but cumulatively significant potentially habitat problems, and the concern was if we were going to take those out of the realm of DFO review and input we would have less opportunity to influence them hopefully in a way that would be positive for fish and fish habitat**. So the framing of this wasn't that it should be one over the other, necessarily, it was more of **a concern about if we're not going to do these smaller things that they may not result in the best possible results for the fisheries resource.**⁹⁷²

619. The FNC is concerned about the number of smaller and medium sized projects that individually or collectively have an impact on fish habitat that are no longer coming to the attention of DFO, but are instead being conducted according to operational statements that lay out general best practices. The FNC submits that the focus on large or high-risk projects alone overlooks the impacts that arise from cumulative impacts of small projects. In addition, the FNC submits that the EPMP places too much trust in developers to protect habitat, and that the reliance on operational statements reduces DFO's ability to hold proponents legally responsible for habitat destruction.⁹⁷³ Further, the FNC submits that while the EPMP recognized that there were other aspects of DFO's habitat work that were important, including stewardships and partnerships,⁹⁷⁴ insufficient attention has been paid to strengthening relationships with First Nations.
620. The FNC submit that the direction provided to DFO's habitat staff through the EPMP can be viewed as inconsistent with (or disconnected from) the WSP. In particular, the WSP contemplates predominantly environmental monitoring, including cumulative effects; the

⁹⁷¹ Exhibit 651 (EPMP Implementation Project Phase 1 Diagnostic, August 2007), p. 14

⁹⁷² Transcript, April 5, 2011, pp. 12-13 (Jason Hwang)

⁹⁷³ Exhibit 715 (The Will to Protect – Preserving BC's Wild Salmon Habitat, 2006), pp. 21-22; see also Transcript, June 2, 2011, p. 55 (Jeffrey Young)

⁹⁷⁴ Transcript, April 4, 2011, p. 33 (Rebecca Reid)

EPMP, on the other hand, is focused on “habitat compliance modernization” and efficacy – or streamlining.⁹⁷⁵

621. The CESD has reported that the implementation of the EPMP is one of the factors that led to a decrease in referrals.⁹⁷⁶ The referral process is critical in terms of evaluating the potential for a HADD, and considering the impact of any HADD on the exercise of Aboriginal title and rights.⁹⁷⁷ When a referral is processed by way of an operational statement, First Nations are not engaged in the review. The FNC submits that DFO must ensure that it is engaging with First Nations on all proposed developments, whether processed by way of operational statements, project-specific letters of advice, statutory authorizations, or through the environmental assessment process, in order to consider the impacts of any such actions or decisions on the exercise of Aboriginal title and rights.

Recommendation: DFO’s review of large or major projects must include better follow-up to determine whether habitat protection and enhancement goals have been achieved and maintained.

Recommendation: DFO should strengthen its ability to conduct consistent project and habitat monitoring and assessing, and should ensure that adequate resources and proper training are provided, and that standardized approaches to data management are developed.

Recommendation: DFO must secure and apportion increased budgets and human resources so as to place priority on habitat protection from risks associated with smaller and medium-sized projects, including cumulative impacts.

⁹⁷⁵ Exhibit 204 (WSP Strategy 2, Assessment of Habitat Status, the HMP Connection, November 24, 2008), p. 7

⁹⁷⁶ Exhibit 35 (2009 CESD Report), p. 21

⁹⁷⁷ Transcript, April 5, 2011, p. 69 (Patrice LeBlanc); for more information on the referral process, see PPR 8 (DFO’s Habitat Management Policies and Practices, March 8, 2011), para. 76

Recommendation: DFO should develop and utilize better consultation protocols and referral tools for proposed developments. These protocols must provide for meaningful consultation and accommodation of s. 35 Aboriginal rights, and hold proponents responsible for destruction to fish habitat and failure to adhere to mitigation measures.

v) Protection, Monitoring and Enforcement

622. Mr. LeBlanc confirmed that it would be useful for DFO to consult with communities, including First Nations communities, to ensure that they are involved in identifying priority areas for habitat protection measures.⁹⁷⁸ The FNC strongly endorses Mr. LeBlanc's suggestion, and submits that such a process is consistent with the WSP, and should form part of the implementation of Strategy 4.

Recommendation: DFO must consult with First Nations to identify and proactively protect priority habitat preservation and protection measures. Habitat preservation and protection requires improved understanding and use of EBM and TEK.

Recommendation: DFO should work with First Nations to identify, prioritize, protect and preserve sensitive habitat and ecosystems within the entire life cycle and migratory route of FRSS, including places of refuge.

623. Once DFO has determined whether or not a HADD is likely to occur and has consulted with First Nations to understand the potential impacts to the exercise of their Aboriginal title and rights, DFO must have at its disposal a sound methodology for follow-up monitoring to verify the accuracy of predicted impacts and to verify effectiveness of compensation measures.⁹⁷⁹ Unfortunately, as pointed out in the report of the CESD:

...streamlining in EPMP review process was intended to free up departmental resources for review of projects that pose a higher

⁹⁷⁸ Transcript, April 5, 2011, p. 71 (Patrice LeBlanc)

⁹⁷⁹ Transcript, April 5, 2011, p. 79 (Jason Hwang)

risk to habitat. For those projects that it has reviewed, however, the Department has little documentation to show that it monitored the actual habitat loss that occurred, whether habitat was protected by mitigation measure required as a condition for project approval, or the extent to which the project proponents compensated for habitat loss.⁹⁸⁰

624. Dave Carter, DFO's Regional lead of Habitat Monitoring, testified that habitat management staff spend approximately 5% of their time on monitoring.⁹⁸¹ In addition, Mr. Carter noted that the majority of such work is project monitoring, as opposed to ecosystem monitoring.⁹⁸² The FNC submits that DFO must strengthen its ability to conduct consistent project monitoring and ecosystem monitoring; this requires adequate resources, proper training, and standardized approaches to data management.⁹⁸³
625. The FNC submits that DFO must improve its ability to use the tools at its disposal to enforce against violations of habitat protection measures and to properly prioritize and resource this work. As Randy Nelson, DFO's Regional Director for C&P for the Pacific Region, testified, habitat cases are more complicated than average fisheries violations, involve more expertise, may require more personnel, and are often more time consuming.⁹⁸⁴ Mr. Nelson also testified that, the amount of time that C&P has been able to dedicate to enforcement of habitat protection measures has been reduced and no longer receives the attention it used to.⁹⁸⁵ The FNC submits that the habitat enforcement has not received sufficient emphasis or attention within C&P's priorities.
626. In *The Will to Protect*, the David Suzuki Foundation sets out several recommendations for how DFO can restore its will to protect fish habitat; the FNC supports these recommendations.⁹⁸⁶ The witnesses who testified on the subject of habitat enforcement also endorsed many of these recommendations.⁹⁸⁷ The recommendations include direction to, *inter alia*:
- a. Clarify government responsibilities (in relation to the enforcement of sections 35 and 36 of the *Fisheries Act*);

⁹⁸⁰ Exhibit 35 (2009 CESD Report), p. 12

⁹⁸¹ Transcript, April 6, 2011, p. 8 (Dave Carter)

⁹⁸² Transcript, April 6, 2011, p. 63 (Dave Carter)

⁹⁸³ Exhibit 681 (A Scoping of Aboriginal Implications of Renewal of the Fisheries Act, 1985) p. 35

⁹⁸⁴ Transcript, April 7, 2011, p. 42 (Randy Nelson)

⁹⁸⁵ Transcript, April 7, 2011, pp. 67-68 (Randy Nelson)

⁹⁸⁶ Exhibit 715 (*The Will to Protect – Preserving BC's Wild Salmon Habitat*, 2006), pp. 16-23

⁹⁸⁷ Transcript, April 8, 2011, pp. 34-36 (Randy Nelson, Manon Bombardier, Paul Steele)

- b. Establish enforceable conservation objectives;
- c. Require developers to provide more information on fish habitat and mitigation;
- d. Make those that destroy habitat pay for recovery;
- e. Implement a formal audit process for self-regulating industries;
- f. Make it easier to hold accountable those that harm fish habitat;
- g. Support community-based efforts to protect and restore salmon ecosystems; and
- h. Increase resources for habitat enforcement.⁹⁸⁸

627. Finally on the subject of habitat enforcement, Mr. Nelson testified that one of the skill sets that Aboriginal Fisheries Guardians bring to bear, from a habitat enforcement perspective, is in-depth knowledge of their traditional territories, and an intimate personal knowledge of the habitat and fish that swim through it.⁹⁸⁹ Chief Robert Mountain, an elected councilor of the Namgis First Nation, a hereditary Chief of the Mamalilikula First Nation, and an employee of the MTTC,⁹⁹⁰ who was himself an Aboriginal Fisheries Guardian, testified that he was trained to walk the streams, check for habitat degradation, and conduct rehabilitation projects.⁹⁹¹ The FNC submits that DFO should restore the Aboriginal Guardian Program, and implement a clear role for guardians in habitat enforcement and rehabilitation.

F. First Nations' Co-Management⁹⁹²

i) Rationale for Co-Management

628. First Nations have, for decades, expressed their goal to be active partners in the collaborative management of fisheries resources.⁹⁹³ First Nations have clearly articulated their requirement to be involved in all aspects of fisheries management,

⁹⁸⁸ Exhibit 715 (The Will to Protect – Preserving BC's Wild Salmon Habitat, 2006), pp. 16-26

⁹⁸⁹ Transcript, April 8, 2011, p. 84 (Randy Nelson)

⁹⁹⁰ Exhibit 301 (Witness Summary of Chief Robert Mountain, undated)

⁹⁹¹ Transcript, December 15, 2010, p. 83 (Chief Robert Mountain)

⁹⁹² First Nations' co-management describes a government-to-government relationship in which fisheries-related decisions are made jointly. In these submissions the terms co-management and joint management are used interchangeably.

⁹⁹³ Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010), p. 1

including: determining open and closed times⁹⁹⁴ and regulating harvest;⁹⁹⁵ setting escapement objectives;⁹⁹⁶ restoring and protecting fish habitat;⁹⁹⁷ developing recovery plans for species at risk;⁹⁹⁸ setting the agenda for future research work; conducting stock assessment programs;⁹⁹⁹ and monitoring and enforcing fisheries.¹⁰⁰⁰ In short, First Nations' vision of co-management is one that actively engages and respects DFO's and First Nations' rights and responsibilities in fisheries and aquatic resource management and decision making processes.¹⁰⁰¹

629. The FNC submits that responsibility to manage is an aspect of First Nations' Aboriginal title, and Aboriginal and Treaty rights to fish. As noted in the FNFC's *Co-management Discussion Paper* (prepared by the FNFC co-management staff for First Nations Communities and the FNFC-DFO Co-management Working Group in October 2010):

Co-management has been put forward at times both by First Nations and by DFO as a mechanism through which First Nations title and rights can be reconciled with current governance structures and processes. Broadly speaking, governments are looking to the collaborative and cooperative engagement of First Nations and other stakeholders in the management of resources, marine spaces, and watersheds. This move is part of a broad international dialogue that recognizes the inadequacies with current management practices.¹⁰⁰²

630. The inadequacies of DFO's management practices have been a concern for First Nations since the late 19th century. The FNC submits that it is inadequate management practices and the effects of such that led Canada to establish this Inquiry. Numerous witnesses in this Inquiry have recounted how the approaches currently being used for habitat and fisheries management are inadequate; or how the culture of decision-making within DFO has led to broad dissatisfaction with current practices. The FNC submits that co-management with First Nations is the paradigm shift that holds the promise of

⁹⁹⁴ Transcript, December 15, 2010, p. 31 (Chief Edward Newman)

⁹⁹⁵ Transcript, December 13, 2010, p. 39 (Chief Willie Charlie)

⁹⁹⁶ Transcript, July 4, 2011, pp. 21-22 (Marcel Shepert)

⁹⁹⁷ Transcript, June 28, 2011, p. 21 (Grand Chief Saul Terry)

⁹⁹⁸ Transcript, June 28, 2011, p. 22 (Russ Jones, Chief Nang Jingwas)

⁹⁹⁹ Transcript, February 3, 2011, pp. 64, 67, 73 (Gord Sterritt)

¹⁰⁰⁰ For example, Transcript, May 12, 2011, pp. 46-48 (Grand Chief Ken Malloway)

¹⁰⁰¹ Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010), p. 1

¹⁰⁰² Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010), p. 2

changing the course of fisheries management, and the sustainability of FRSS, for the better.

631. The international community has recognized the strength of co-management, noting that: “co-management holds great promise for **successful and sustainable fisheries worldwide**.”¹⁰⁰³ The FNC agrees and submits that First Nations’ management is the management of sustainability.
632. First Nations approach fisheries management from both a holistic perspective, and a local perspective.¹⁰⁰⁴ This holistic perspective allows for a greater appreciation of the myriad of ecosystem interactions occurring at all times, and avoids the blinders of adopting a species-specific approach. The local perspective brings together site specific knowledge, experiences and the ability to provide more efficient on the ground assessments of particular watersheds, habitats and potential impacts or stressors. The focus in the WSP on protecting populations of irreplaceable lineages (i.e., CUs), and on protecting and maintaining habitat for such populations,¹⁰⁰⁵ reflects what First Nations have always known: the importance of being stewards of all living things and treating everything as interconnected.
633. FRSS were sustainably managed until First Nations were pushed out of their traditional fisheries in the 19th century. First Nations understand full well that the key to FRSS sustainability is the preservation and management of all populations and their habitats. The current system of managing by four or five large aggregates is now being shown to be inimical to FRSS sustainability.
634. First Nations still live along the watercourses and spawning areas of FRSS. It is integral to their way of life that salmon come home to their territories so that they, the First Nations, may continue to exist. First Nations, as partners in the modern day management of FRSS, can bring their expertise, with the goal of long-term sustainability of FRSS. Although the FNC has made a number of detailed recommendations herein, we submit that a recommendation for DFO to truly engage in co-management is the one recommendation that holds the most promise for the sustainability of FRSS, its ecosystem, the fishery, and the people who rely on it.

¹⁰⁰³ Exhibit 1257 (Leadership, Social Capital and Incentives Promote Successful Fisheries, 2010) p. 3

¹⁰⁰⁴ Transcript, June 30, 2011, p. 63 (Russ Jones, Chief Nang Jingwas)

¹⁰⁰⁵ See, for example, Transcript, January 27, 2011, p. 86 (Dr. Brian Riddell)

635. In a 2010 paper prepared for DFO, entitled *An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region* consultant Dr. Julie Gardner sets out the “rationale for co-management”¹⁰⁰⁶ and lists the following potential benefits of co-management:

- a. Higher acceptability, legitimacy for government;
- b. Higher compliance with management measures, regulations;
- c. Less conflict;
- d. Improved relationships;
- e. More equitable management;
- f. Progress towards recognition of Rights and Title;
- g. Self-determination for First Nations;
- h. Better information for fisheries management;
- i. Improved effectiveness of fisheries management;
- j. Protection and enhancement of the resource;
- k. Tailoring to local circumstances;
- l. More efficient management, reduced costs for government;
- m. Community development for First Nations;
- n. Greater access to fisheries resources for First Nations;
- o. Learning opportunities.¹⁰⁰⁷

¹⁰⁰⁶ Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), p. iii

¹⁰⁰⁷ Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), pp. iii-iv, 4-6 (which had the objectives of providing DFO with a better understanding of co-management processes involving First Nations; outlining key issues related to DFO-First Nations engagement in these process; describing ways that DFO can work more

Kaarina McGivney, former Regional Director of DFO's TAPD,¹⁰⁰⁸ confirmed that the benefits listed by Dr. Gardner were all goals for DFO establishing a co-management regime.¹⁰⁰⁹

636. In related work prepared to assist First Nations in British Columbia in assessing their readiness to take on co-management of fisheries and aquaculture, freshwater habitats and marine environments, including EBM, Dr. Gardner wrote:

Co-management can support First Nations taking on their rightful role in decisions that affect their livelihood and culture. As a result, First Nations can benefit more fully from their rights to fish for food, social, and ceremonial use, as well as increased access to economic fisheries. More effective management through cooperation can lead to a healthier ecosystem and greater harvests all round.¹⁰¹⁰

637. DFO representatives tasked with the responsibility of developing co-management arrangements with First Nations of the Fraser watershed have testified that a co-management structure or agreement supported by a partnership relationship, would greatly assist DFO in meeting its legal responsibilities to First Nations, and that it would be useful for consultation processes to become embedded within that structure.¹⁰¹¹

Barry Huber, DFO's Aboriginal Affairs Advisor in the BC Interior¹⁰¹², put it this way:

Q: Would you agree that a clear collaborative management process that's worked out with First Nations would help you better meet your legal and constitutional obligations?

MR. HUBER: Definitely, yes.

Q: And would it help you better manage the fishery that's your responsibility to manage?

MR. HUBER: It would, yes.¹⁰¹³

collaboratively with First Nations to ensure coherent and effective fisheries management processes; and pointing out areas of future work).

¹⁰⁰⁸ Exhibit 1418 (CV of Kaarina McGivney)

¹⁰⁰⁹ Transcript, September 2, 2011, pp. 53-54 (Kaarina McGivney)

¹⁰¹⁰ Exhibit 1198 (Capacity for Co-Management of Fisheries and Aquatic Resources: A Discussion Document, March 2010), p. 2

¹⁰¹¹ Transcript, June 30, 2011, p. 67 (Barry Huber) and Transcript, September 28, 2011, pp. 54-55 (Susan Farlinger)

¹⁰¹² Exhibit 1178 (CV of Barry Huber)

¹⁰¹³ Transcript, June 28, 2011, p. 61 (Barry Huber)

638. In all of its dealings with First Nations, DFO is charged with upholding the honour of the Crown.¹⁰¹⁴ DFO has an obligation to consult with First Nations when it contemplates actions that have the potential to infringe the First Nations' exercise of their Aboriginal title, rights or treaty rights.¹⁰¹⁵ This important aspect of DFO's mandate is well understood by DFO's fisheries managers.¹⁰¹⁶ Given the strength of First Nations' claims to section 35 rights and the myriad of fisheries management decisions that hold the potential to infringe these rights or treaty rights, DFO has the obligation to deeply consult with First Nations. However, given the complexity of Fraser watershed salmon fisheries management decisions, it is often a challenge for DFO staff to know what constitutes sufficient or adequate consultation with First Nations.¹⁰¹⁷ The FNC submits that co-management would also lead to a more just fishery.¹⁰¹⁸

ii) Elements and Principles of Joint- or Co-Management

639. First Nations and DFO have both articulated that a meaningful co-management regime must:¹⁰¹⁹

- a. Respect the source of First Nations' and Canada's responsibilities and authority;¹⁰²⁰
- b. Be grounded in First Nations' inherent Aboriginal title and rights or treaty rights;¹⁰²¹
- c. Be a relationship of equal partners,¹⁰²²

¹⁰¹⁴ *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511; *R. v. Badger*, [1996] 1 S.C.R. 771, para. 41; *R. v. Marshall*, [1999] 3 S.C.R. 456

¹⁰¹⁵ *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511; see also PPR 1 (The Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery, October 1, 2010), pp. 9, 10, 14, 40, 42, 43, 55, 56, 58, 59, 61 and 62.

¹⁰¹⁶ Transcript, July 5, 2011, pp. 6-7 (Barry Rosenberger)

¹⁰¹⁷ Transcript, June 30, 2011, p. 67 (Barry Huber)

¹⁰¹⁸ Exhibit 1135 (The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982), p. 36; Transcript, June 27, 2011, pp. 87-88 (Dr. Douglas Harris)

¹⁰¹⁹ Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010), p. 3. The terms co-management and joint-management are used interchangeably throughout.

¹⁰²⁰ Transcript, June 30, 2011, p. 72 (Barry Huber)

¹⁰²¹ Transcript, July 5, 2011, pp. 67-68 (Ernie Crey); Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), p. v: "the extent and protection of aboriginal rights is the most fundamental consideration in engagement with First Nations"; Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010), p. 4

¹⁰²² Transcript, June 28, 2011, p. 14 (Neil Todd); Transcript, December 14, 2010, p. 36 (Dr. Ron Ignace); Transcript, December 14, 2010, p. 14 (Chief Fred Sampson)

- d. Be a relationship based on trust and open communication;¹⁰²³
 - e. Be a process that is grounded with “moral authority”;¹⁰²⁴
 - f. Be a process that leads to shared responsibility and stewardship of the fish and fish habitat;¹⁰²⁵
 - g. Be implemented at the appropriate scale;¹⁰²⁶ and
 - h. Be transparent and accountable.¹⁰²⁷
640. From the First Nations’ perspective, these elements can be found within the following “guiding principles” for co-management of fisheries resources:
- a. *First Nations Ownership:* First Nations title and rights arise from prior use and occupation of the land and ocean spaces, and include rights to utilize and manage aquatic resources;
 - b. *Shared Responsibility:* A central First Nations role in management is necessary, based on Aboriginal and Treaty title and rights;
 - c. *Scale:* Recognition that the proper title and rights holders are at the community level – in the Chiefs and community members of each nation;
 - d. *Conservation:* The protection, maintenance, and rehabilitation of aquatic resources, their habitats, and interconnected life support systems, take precedence in managing aquatic resources;
 - e. *Stewardship:* The use of aquatic species and their habitat should carry with it the responsibility to treat them with respect and ensure their continued and unimpaired use and enjoyment by future generations;

¹⁰²³ Transcript, June 28, 2011, p. 18 (Barry Huber); Transcript, December 14, 2010, p. 51 (Chief Thomas Alexis); Exhibit 295 (Co-Management Discussion Paper, revised October 25, 2010), p. 4

¹⁰²⁴ Transcript, November 2, 2010, p. 83 (Claire Dansereau)

¹⁰²⁵ Exhibit 295 (Co-Management Discussion Paper, revised October 25, 2010), p. 4; see also Transcript, December 14, 2010, pp. 49-50 (Chief Thomas Alexis)

¹⁰²⁶ Exhibit 295 (Co-Management Discussion Paper, revised October 25, 2010), p. 4; see also Transcript, December 14, 2010, pp. 50-51 (Chief Thomas Alexis)

¹⁰²⁷ Exhibit 295 (Co-Management Discussion Paper, revised October 25, 2010), p. 4; see also Transcript, December 14, 2010, p. 52 (Chief Thomas Alexis)

- f. *Trust*: Successful relationships are built on a foundation of mutual trust.
- g. *Transparency*: Decision making should be open and transparent;
- h. *Accountability*: Aquatic resource managers and users should be accountable for the results of their decisions and actions; and,
- i. *Communication*: Information must be shared with First Nation communities.¹⁰²⁸

641. The complexity of issues, parties and levels of engagement necessary to manage FRSS and protect habitat has been discussed in this Inquiry. For the FNC, and we submit, DFO, it is not a matter of “whether” co-management is necessary but rather “how”:

Different types of fisheries management decisions engage participants at different scales, and different fisheries interests and sectors tend to focus on different locations, from ocean to up-river. Scope and scale affects the extent to which decision-making responsibility can be shared. The complexity of processes related to these factors, combined with the diversity of DFO programs, makes it difficult to define the roles and responsibilities of various advisory and co-management bodies in relation to each other. The wide-ranging nature of migratory species such as salmon makes collaboration even more difficult. Given these challenges, it is not surprising that First Nations engagement in DFO’s multiple functions lacks integration. Directions to be explored include establishing co-management arrangements that work/link at a range of scopes and scales, and potential new regional agreements, including policies on consultation and dispute resolution. At the same time, complexity of engagement processes should not be regarded only as a problem. Complex systems have resilient qualities that can work in favour of effective, sustainable fisheries management.¹⁰²⁹

642. DFO recognizes that the implementation of co-management with First Nations “...will eventually encompass the sharing of authority for fisheries management”, resulting in a “shift from top-down, centralized management of the fisheries resource by the Department to a shared stewardship of the resource that includes the devolution of certain fisheries management authorities to resource users.”¹⁰³⁰ Mr. Huber testified that

¹⁰²⁸ Exhibit 295 (Co-Management Discussion Paper, revised October 25, 2010), p. 4; see also Transcript, December 14, 2010, pp. 50-52 (Chief Thomas Alexis)

¹⁰²⁹ Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), pp. vi-vii

¹⁰³⁰ Exhibit 1187 (An Integrated Aboriginal Policy Framework 2006-2010), p. 20; Transcript, August 19, 2011, p. 44 (Kaarina McGivney)

he uses this approach to guide his work in building a co-management structure with First Nations (i.e., through the Roadmap Initiative).¹⁰³¹ As part of the co-management regimes, First Nations welcome DFO's devolution of programs.¹⁰³²

643. In order to implement an efficient co-management governance structure, DFO, First Nations along the migratory route of FRSS, and the Province would benefit from clear governance structures (often referred to as government-to-government agreements and decision making structures) that efficiently outline the roles and responsibilities of provincial, regional and local governments and the various scales of decision making.¹⁰³³ The FNFC, together with many First Nations and FRAFS, have actively been pursuing co-management options that respect the differing concentrations or strengths of authorities inherent in First Nations governments and in DFO's organizational structure, and that can operate for decisions at various scales.

Recommendation: DFO and First Nations must together determine the elements and principles of co-management and establish the robust government-to-government structures that efficiently implement better management of the fisheries.

iii) Incentives for Co-Management

a) AFS

644. Following the Supreme Court of Canada's decision in *R. v. Sparrow*,¹⁰³⁴ in 1992, DFO introduced the Aboriginal Fishing Strategy ("AFS") in an attempt to provide for the management of the Aboriginal fishery in a manner consistent with the decision.¹⁰³⁵ In addition to harvesting opportunities, AFS Agreements provided some funding for certain

¹⁰³¹ Transcript, June 28, 2011, pp. 11-12 (Barry Huber); see also Exhibit 1178 (CV of Barry Huber); for more information on the Integrated Aboriginal Policy Framework, 2006-2010 see PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), paras. 61-65.

¹⁰³² Transcript, July 5, 2011, p. 49 (Marcel Shepert)

¹⁰³³ Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010) pp. 6-9

¹⁰³⁴ *R. v. Sparrow*, [1990] 1 S.C.R. 1075

¹⁰³⁵ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 86

fisheries management activities.¹⁰³⁶ At this time, DFO also introduced pilot sales agreements for some First Nations along the migratory route.¹⁰³⁷

645. Another key aspect of the early AFS implementation was the use of a 1993 Fraser Watershed Agreement between DFO and some two dozen First Nations within the Fraser watershed.¹⁰³⁸ The purpose of the Fraser Watershed Agreement was to provide for a coordinated approach to the conservation, protection and enhancement of fisheries, fish and fish habitats within the Fraser watershed. The language of the Fraser Watershed Agreement required First Nations to acknowledge the legitimacy of Canada's assumption of sovereignty and DFO's authority to manage their fisheries. For some First Nations, the requirement to recognize the Minister's authority without any recognition of First Nations' authorities for fisheries management decisions was reason not to sign.¹⁰³⁹
646. Mr. Huber described the process used to implement the Fraser Watershed Agreement as coercive and divisive:

...there was some wording in the agreement [the Fraser Watershed Agreement] that some of the First Nations didn't find acceptable, and the way the agreement was introduced – **the whole changeover in fact, after the Sparrow case, and while it was rather hastily introduced and, I guess you would say, coercively in my mind, in the sense that you had to sign this watershed agreement in order to get funding through AFS agreements.** So if you didn't agree with the content of the agreement or the process, then you were eliminated from the opportunity to access funds through the AFS program. **So some of the groups viewed this agreement as divisive because some of the members of their communities would sign on, and some, because of the disagreements, didn't.** So there's some validity I think to that concern.¹⁰⁴⁰

647. Barry Rosenberger, Area Director for the BC Interior Region, Canadian Chair of the FRP, and Chair of the FRIMT,¹⁰⁴¹ noted that some First Nations' decisions not to access

¹⁰³⁶ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 89

¹⁰³⁷ See Exhibit 1207 (Establishing a Fraser Watershed Process) for a summary of the tensions and difficulties arising from these efforts

¹⁰³⁸ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 97

¹⁰³⁹ Transcript, June 28, 2011, p. 9 (Grand Chief Saul Terry)

¹⁰⁴⁰ Transcript, June 28, 2011, p. 8 (Barry Huber)

¹⁰⁴¹ Exhibit 323 (CV of Barry Rosenberger)

AFS or AAROM program dollars for the reasons noted above, have posed challenges for First Nations' efforts to develop Tier 1 processes.¹⁰⁴² He also noted that this left some First Nations with less capacity than others, and some First Nations with weaker working relationships with DFO than others.¹⁰⁴³ This process has fostered distrust amongst First Nations and with DFO.¹⁰⁴⁴

648. Ms. McGivney testified that DFO had taken a "policy approach" to providing First Nations with access to fish for FSC purposes.¹⁰⁴⁵ She noted that when resource managers negotiate arrangements with First Nations regarding FSC access, they consider a number of factors including: population, other aquatic resources available to the First Nation and interest expressed in such (i.e., the fish basket principle), availability and access of other First Nations to those same species, and recent harvests.¹⁰⁴⁶ She testified that while resource managers receive mandates from the RDG as to the number of fish that can be included in such agreements, the actual FSC allocations are a result of the negotiations.¹⁰⁴⁷
649. The FNC disagrees. FSC allocations have not substantially changed since the 1990s and do not include significant allocations for social or ceremonial purposes. Many First Nations expressed challenges in obtaining sufficient FRSS to meet their FSC needs.¹⁰⁴⁸ The FSC allocations are primarily based on historical catch numbers and do not include collaborative DFO-First Nations assessments of need. The FNC submits that DFO must work with First Nations, including seeking the assistance of FNFC's FSC Working Group,¹⁰⁴⁹ to review FSC allocations and consider how priority of access for First Nations' needs will be realized while respecting conservation needs. In addition, the review must also consider the "social" and "ceremonial" needs of First Nations' communities.

¹⁰⁴² Transcript, January 25, 2011, p. 4 (Barry Rosenberger)

¹⁰⁴³ Transcript, January 25, 2011, pp. 4-5 (Barry Rosenberger)

¹⁰⁴⁴ Transcript, January 25, 2011, p. 5 (Barry Rosenberger); Exhibit 1207 (Establishing a Fraser Watershed Process); Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), p. 41

¹⁰⁴⁵ Transcript, August 19, 2011, p. 11 (Kaarina McGivney)

¹⁰⁴⁶ Transcript, August 19, 2011, pp. 4-5 (Kaarina McGivney)

¹⁰⁴⁷ Transcript, August 19, 2011, pp. 3-4 (Kaarina McGivney)

¹⁰⁴⁸ See, for example, Exhibit 297 (Witness Summary of Chief William Charlie), p. 2; Exhibit 292 (Witness Summary of Thomas Alexis), p. 2; Exhibit 291 (Witness Summary of Chief Fred Sampson), pp. 1-2

¹⁰⁴⁹ See Exhibit 1230 (Draft Workplan – Food, Social & Ceremonial Fisheries Working Group, January 10, 2010) and Exhibit 1194 (FNFC, section 35(1) FSC Fisheries Working Group Draft Terms of Reference)

650. With regard to how First Nations' allocations can be coordinated with ensuring that conservation needs are met, Mr. Shepert made the following suggestion:

...from my perspective, coming from the Upper Fraser, that the management regime, even allocation regimes are kind of turned on their head. I believe that a good functioning system has to start at the headwater and work its way down. That way you have the ability, because the inextricable relationship between the First Nation and the fish itself, that the management and the allocation hence has to start at the top, in other words, meeting the needs of the people. If you're talking about overall allocations of fish for food, social, ceremonial, and for economic purposes, it stands to reason to me in my way of thinking that it must start from the top. Because the people that are closest and linked to those watersheds know what it needs to for it -- to survive, because it's done that since millennia, but also, they're there. They're on the ground. So they would know how much food that they might need out of a particular run. And working in conjunction with DFO to get the science down straight, then you would be able to more accurately reflect. And I would say, by virtue, the sustainability would just fall from that. I don't know if that makes sense. If you need clarification, I'm prepared to do that. But that's kind of my thinking around this issue.¹⁰⁵⁰

b) Coastwide Framework

651. In *Our Place at the Table*, the First Nations Panel on Fisheries called for a change in how allocations to First Nations are determined:

The Panel's recommendation for a 50 per cent share as an interim step is an attempt to reconcile aboriginal and crown title and recognizes that First Nation rights to fisheries are at least as important as others in the commercial and recreational fishing sector. As aboriginal title is the underlying title, then putting it on a more equal footing in the interim is justified. This does not mean that all issues are resolved. The important point, however, is that we need something in place now that creates the conditions for positive changes in the future.¹⁰⁵¹

652. Ms. McGivney gave evidence about the Coastwide Framework ("CWF"), a document created by DFO, with the assistance of Aboriginal Affairs and Northern Development Canada ("AANDC"), that sets out fish allocations for First Nations and non-First Nations. Ms. McGivney described the CWF as follows:

¹⁰⁵⁰ Transcript, July 4, 2011, pp. 33-34 (Marcel Shepert)

¹⁰⁵¹ Exhibit 493 (Our place at the table: First Nations in the B.C. Fishery, May 2004), p. 75

The concept under the Coastwide Framework was to look at what the overall expectation was at the end of treaties in terms of what the actual allocations might be for First Nations versus non-First Nations, the expectation that we needed to work towards a fishery that had room for all within it and what the actual outcomes might be of aboriginal shares versus non-aboriginal shares. There was an element of looking at the changes within the treaty process and how fisheries arrangements were working within the fisheries within the treaty process and how those would integrate with other processes for managing aboriginal fisheries.¹⁰⁵²

653. Ms. McGivney further stated that the CWF had been developed in response to concerns that if First Nations' fish allocations in recent BC treaties were extrapolated, and all First Nations were to receive fish allocations of the size provided in treaties, this would curtail commercial and recreational fisheries.¹⁰⁵³ Ms. McGivney continued to note, however, that none of the materials available to DFO suggested that this would or should, in fact, be a concern.¹⁰⁵⁴
654. The CWF includes work that culminates in an "end-point percentage" for salmon and non-salmon fish, which is a stated percentage goal for the average total allowable catch that will be allocated to First Nations over the long term.¹⁰⁵⁵ The "end-point percentage" is currently being used to guide developments and changes to policies and programs that relate to allocations for First Nations access.¹⁰⁵⁶ Ms. McGivney testified that the contents of the CWF will inform existing DFO policies, programs, and initiatives including but not limited to: PICFI, AFS, economic opportunity fisheries, and treaty negotiations.¹⁰⁵⁷
655. The CWF was approved by the Minister but has not yet been the subject of consultation with First Nations.¹⁰⁵⁸ It is the FNC's understanding that the CWF is a draft prospective

¹⁰⁵² Transcript, August 19, 2011, p. 30 (Kaarina McGivney)

¹⁰⁵³ Transcript, August 19, 2011, pp. 33-34 (Kaarina McGivney)

¹⁰⁵⁴ Transcript, August 19, 2011, pp. 33-34 (Kaarina McGivney)

¹⁰⁵⁵ Transcript, August 19, 2011, pp. 35, 38 (Kaarina McGivney); see also *Ruling Re: Heiltsuk Tribal Council's Application for Production of FSC "Mandate Documents" and the Coastwide Framework Documents* dated September 20, 2011, and letter from Wayne G. Wouters, Clerk of the Privy Council and Secretary to the Cabinet dated September 22, 2011 certifying certain documents as containing confidences of the Queen's Privy Council for Canada

¹⁰⁵⁶ Transcript, August 19, 2011, pp. 38-39 (Kaarina McGivney); Transcript, September 2, 2011, pp. 88-90 (Kaarina McGivney)

¹⁰⁵⁷ Transcript, September 2, 2011, p. 90 (Kaarina McGivney, Julie Stewart)

¹⁰⁵⁸ Transcript, August 19, 2011, pp. 30-31 (Kaarina McGivney); Transcript, September 2, 2011, pp. 97-98 (Kaarina McGivney)

policy, the development of which is still in abeyance pending the completion of the Inquiry.¹⁰⁵⁹

656. During the Inquiry, Canada asserted that the CWF is protected by Cabinet confidence pursuant to subsection 39(1) of the *Canada Evidence Act*, and also protected by settlement privilege.¹⁰⁶⁰ Instead of producing the CWF, Canada disclosed a document entitled “Aboriginal Fisheries Framework” (“AFF”).¹⁰⁶¹ Ms. McGivney testified that the three-page AFF sets out a summary of the contents of the CWF.¹⁰⁶²
657. Given its inclusion of important “end-point percentage” information, the FNC submits that the CWF and AFF may, in part, be a response to the second recommendation in *Our Place at the Table*, wherein the First Nations Panel on Fisheries recommended: “as a starting point and as an interim measure, Canada take immediate steps to allocate to First Nations a minimum 50 per cent share of all fisheries, with the understanding that this may eventually reach 100 per cent in some fisheries.” The FNC submits that all work by Canada on developing end-point percentages and First Nations’ allocations must be the subject of in-depth consultation with First Nations. Furthermore, First Nations will require capacity to engage in such consultations and to address intertribal allocations amongst themselves.

Recommendation: Canada must conduct in-depth consultations with First Nations on its development of a percentage goal for the average total allowable catch that will be allocated to First Nations.

¹⁰⁵⁹ *Ruling Re: Heiltsuk Tribal Council’s Application for Production of FSC “Mandate Documents” and the Coastwide Framework Documents* dated September 20, 2011, para. 164 (<http://www.cohencommission.ca/en/pdf/LetterFromPCOAndRulingRePriviledgeAndHTCApplcationForDo cs.pdf#zoom=100>)

¹⁰⁶⁰ *Ruling Re: Heiltsuk Tribal Council’s Application for Production of FSC “Mandate Documents” and the Coastwide Framework Documents* dated September 20, 2011, para. 6; letter from Wayne G. Wouters, Clerk of the Privy Council and Secretary to the Cabinet dated September 22, 2011 certifying certain documents as containing confidences of the Queen’s Privy Council for Canada (<http://www.cohencommission.ca/en/pdf/LetterFromPCOAndRulingRePriviledgeAndHTCApplcationForDo cs.pdf#zoom=100>)

¹⁰⁶¹ Exhibit 1426 (Aboriginal Fisheries Framework)

¹⁰⁶² Transcript, August 19, 2011, pp. 34-35 (Kaarina McGivney)

Recommendation: Canada must provide the capacity for First Nations to determine intertribal allocations amongst themselves.

iv) Barriers to Change

658. First Nations are often confronting either a resistance or inability by DFO to shift from the ingrained top-down, centralized management structure that has been DFO's hallmark for decades. Speaking of the different culture he has encountered working with Parks Canada on the Gwaii Hanaas management model, Russ Jones, Technical Director/Policy Analysis/Project Manager of the Haida Fisheries Program, Commissioner on the PSC, and a council member on the FNFC,¹⁰⁶³ testified that: "...we've found considerable resistance and I think it has to do a lot with the structure of the Department of Fisheries and Oceans, this kind of top-down structure and also this willingness to kind of share power, which is a barrier to putting in place effective, whether they're institutions or committees, to work together."¹⁰⁶⁴ The FNC submits that DFO must commit to implementing its own policies, such as An Integrated Aboriginal Policy Framework and demonstrate the political and institutional will to truly acknowledge First Nations' joint authority, share responsibilities, and move on to the incremental sharing and devolution of management of the fisheries resources with First Nations.
659. A number of DFO and First Nations witnesses agreed that the two main policy barriers to developing an effective co-management framework for First Nations related to fisheries and aquatic resource management are:
- a. The principle that DFO cannot "fetter the authority" of the Minister; and
 - b. An inability for DFO to develop a process for the recognition of First Nations title and rights, or to lay out a transparent "strength of claim" standard assessment to evaluate asserted title and rights.¹⁰⁶⁵

¹⁰⁶³ Exhibit 1183 (CV of Russ Jones)

¹⁰⁶⁴ Transcript, June 28, 2011, pp. 43-44 (Russ Jones, Chief Nang Jingwas)

¹⁰⁶⁵ Exhibit 295 (FNFC Co-Management Discussion Paper, revised October 25, 2010) p. 11, see also Transcript, June 28, 2011, pp. 50-54 (Russ Jones, Chief Nang Jingwas, Barry Huber); Transcript, June 30, 2011, pp. 20-22 (Russ Jones, Chief Nang Jingwas, Neil Todd)

660. In addition, the historic and modern tensions between the roles and responsibilities of AANDC and DFO, as it relates to First Nations' use and management of aquatic resources, remains a significant policy and practice barrier to the proper and just management of FRSS.¹⁰⁶⁶
661. In response, the FNC submits that the Tier 1 and Tier 2 processes set out below offer a solution to each of these policy barriers and will serve to mediate the tensions between DFO and AANDC.
662. Both Colin Masson, the Element Lead of the PICFI Enhanced Accountability Program, and Mr. Huber, who are actively involved in pursuing co-management initiatives with First Nations testified that in their interactions with First Nations they proceed on the basis that First Nations hold strong *prima facie* claims of Aboriginal rights throughout the Fraser watershed. Furthermore, Mr. Masson and Mr. Huber noted that they see the need to openly discuss and recognize such rights. For example, Mr. Huber testified that "...on the Fraser, the [First Nations] groups I deal – have dealt with, **I just assume they have a strong strength of claim. It's obvious to me they do.**"¹⁰⁶⁷
663. Mr. Masson described a process wherein those who were actively engaged in meetings with First Nations on a range of issues, including catch monitoring, were instructed to leave off the agenda issues relating to Aboriginal title and rights. In one of his reports, Mr. Masson described how in collaborative relationships all issues should be on the table. Under the heading "Collaboration" in the report entitled *First Nations Catch Monitoring and Reporting: Preliminary Considerations, Standards and Recommendations*, DFO authors Mr. Masson and David Lightly note:

Respectful communication recognizes the responsibility of the parties to clearly identify issues, positions and interests to themselves and to one another. Compelling and underlying issues should be openly shared and explored together to enable a collective understanding and acknowledgement of the priorities held by each. **Collaborative relationships may have issues which cannot be resolved, but have no issues which cannot**

¹⁰⁶⁶ Exhibit 1135 (The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982); Transcript June 27, 2011, p. 88 (Dr. Douglas Harris)

¹⁰⁶⁷ Transcript, June 30, 2011, p. 98 (Barry Huber)

be acknowledged and discussed (thus avoiding “the elephant in the room”).¹⁰⁶⁸

664. When asked about this reference to “the elephant in the room”, Mr. Masson replied:

In many situations, an underlying and fundamental concern that I’ve begun to appreciate from First Nations is their concern about rights and title and jurisdiction. And these are issues that the Department of Fisheries doesn’t have the authority or the mandate to define, and so forth. So quite often the Department ends up not wanting to discuss them at all, not even wanting them on the agenda, and this makes it very difficult to in discussions with First Nations to kind of get beyond that, and talk about the matter at hand, and talk about the ways we can collaborate together. And so when we talk about the elephant in the room, it’s this issue that we have no mandate to deal with, no mandate to resolve. It’s a much broader issue than we can possibly address. But what we were suggesting in this paper was at the very least we should allow it airtime, acknowledge that it exists, and then move on.¹⁰⁶⁹

665. Commenting on an earlier version of the report, Ms. McGivney had questioned specific references Mr. Masson had included in the section on “Collaboration” that referred to “constitutionally protected communal rights” of First Nations, developing a “common understanding of collaboration” and being “willing to seek and commit to collaborative solutions to common problems.”¹⁰⁷⁰ Ms. McGivney’s evidence is an indication of how far senior DFO officials will go to avoid recognition of, or even reference to, First Nations’ rights.

666. Certain DFO employees have testified that the message they are bringing back to senior managers about the importance of recognizing Aboriginal rights in order to advance the collaborative relationship are falling on deaf ears. As Mr. Masson testified: “the point that we were trying to make in this document [Exhibit 860] about the importance of collaboration and collaborative approach within interactions with First Nations was being missed.”¹⁰⁷¹

667. Communications received from Area Directors, such as Mr. Rosenberger, and the Director of TAPD, Ms. McGivney, is that DFO does not have any mandate to address

¹⁰⁶⁸ Exhibit 860 (First Nations Catch Monitoring and Reporting: Preliminary Considerations, Standards and Recommendations, November 2009), p. 13

¹⁰⁶⁹ Transcript, May 12, 2011, p. 62 (Colin Masson)

¹⁰⁷⁰ Exhibit 862 (Email thread between C. Masson and K. McGivney re First Nation FSC Catch Monitoring and Reporting, ending October 4, 2009), pp. 1-2

Aboriginal title and rights.¹⁰⁷² As Mr. Rosenberger explained, from the Area Directors' perspective, DFO is "looking at processes to try to resolve on... a management basis, not on a strength of claim basis."¹⁰⁷³

668. It appears that DFO's official approach to dealing with Aboriginal title and rights is to avoid the "elephant in the room". The FNC submits that when the "elephant" is long-standing rights protected by s. 35(1) of the *Constitution Act, 1982*, which have attendant obligations on the part of Canada, avoidance is dishonourable, unacceptable, and inefficient. The cost is to continue a dysfunctional governance structure that can only result in increased conflict and litigation.

v) Small Steps Forward

669. At a special workshop in support of building the Fraser River and Marine approach co-management process in March of 2010, Ms. Farlinger stated that co-management and consultation will be more effective if First Nations and DFO can develop processes to understand each others' information and perspectives.¹⁰⁷⁴ Ms. Farlinger went on to explain to the First Nations present at the workshop that it was DFO's intention to build an effective process to consult and collaborate on designing a plan at a strategic and operational level that would, in essence, be a collaborative management structure.¹⁰⁷⁵ Ms. McGivney, who also attended the March 2010 workshop, testified that TAPD shared the intention to build an effective process to consult and collaborate and to create a collaborative management structure.¹⁰⁷⁶
670. In an exchange with counsel for the FNC in September 2011, Ms. Farlinger expanded on her March 2010 comments regarding the need to build a collaborative management structure:

Q: ...Would you agree that the road to co-management through the roadmap and the forum and all the outgoing work, and the efforts under the Wild Salmon Policy are really a process of DFO incrementally sharing responsibility with First Nations and finding

¹⁰⁷¹ Transcript, May 12, 2011, p. 64 (Colin Masson)

¹⁰⁷² Transcript, January 25, 2011, pp. 8-9 (Barry Rosenberger); July 4, 2011, p. 66 (Barry Rosenberger); July 5, 2011, pp. 6-7 (Barry Rosenberger); Transcript, September 2, 2011, p. 52 (Kaarina McGivney)

¹⁰⁷³ Transcript, January 25, 2011, p. 15 (Barry Rosenberger)

¹⁰⁷⁴ Exhibit 1751 (Consultation and Accommodation Workshop March 30-31, 2010), p. 8

¹⁰⁷⁵ Exhibit 1751 (Consultation and Accommodation Workshop March 30-31, 2010), pp. 8-9

¹⁰⁷⁶ Transcript, September 2, 2011, p. 60 (Kaarina McGivney)

a place at the table for them in the ongoing management of the fisheries?

MS. FARLINGER: I think that the evolution of the co-management processes happening on a continuum, which largely has to do with everyone bringing their authorities to the table; that is, DFO and the First Nations, and figuring out what the interaction is between those authorities and sharing information and, therefore, knowledge and – in that process. The extent – the end point I can't identify.¹⁰⁷⁷

671. The FNC submits that what is needed to advance co-management is:¹⁰⁷⁸
- a. explicit recognition of Aboriginal title and rights and treaty rights or the willingness to proceed on the basis of a strong strength of claim;
 - b. clarity among First Nations, and between First Nations and Canada, on the elements and principles of co-management;
 - c. the incremental sharing of management responsibility with First Nations governments and devolution of authority to First Nations over certain aspects of fisheries management;¹⁰⁷⁹
 - d. a clear commitment from Canada of its willingness to negotiate and implement co-management with First Nations;¹⁰⁸⁰
 - e. dedicated resources in the short, medium and long-term to ensure that the co-management process (currently the Roadmap Initiative) is brought to fruition;¹⁰⁸¹
 - f. a champion within DFO to see the Roadmap Initiative and the resulting co-management arrangement through to completion;¹⁰⁸²

¹⁰⁷⁷ Transcript, September 28, 2011, pp. 58-59 (Susan Farlinger)

¹⁰⁷⁸ See also: Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), p. viii where Dr. Gardner summarizes the enabling factors that will lead to successful co-management.

¹⁰⁷⁹ Transcript, September 28, 2011, pp. 58-59 (Susan Farlinger); Exhibit 1187 (An Integrated Aboriginal Policy Framework 2006-2010), p. 20

¹⁰⁸⁰ Transcript, July 4, 2011, pp. 10-11, 62-63, 78 (Ernie Crey)

¹⁰⁸¹ Transcript, January 25, 2011, p. 10 (Barry Rosenberger); Transcript, June 28, 2011, pp. 74-76 (Barry Huber, Russ Jones, Chief Nang Jingwas, Neil Todd)

¹⁰⁸² Transcript, June 28, 2011, pp. 74-76 (Barry Huber, Russ Jones, Chief Nang Jingwas, Neil Todd)

- g. the development, resourcing and successful use of Tier 1 and 2 processes prior to investing more reliance on Tier 3 processes such as the ISDF;
- h. a commitment from DFO to, as an immediate sign of good faith and incentive, increase First Nations representation on the FRP to a minimum of 50 percent; and
- i. support for capacity building and meaningful involvement of individual First Nations and Tribal Councils as well as First Nations fisheries organizations such as the FNFC, FRAFS, UFFCA, FVAFS, among others that build and provide technical expertise, and policy advice to First Nations.

vi) Tiered Governance and Management Processes

672. The notion of a tiered process to inform the management of migratory fish stocks was first proposed by First Nations' leaders in the mid 1990s, and was expanded upon in the First Nations Panel Report, *Our Place at the Table*.¹⁰⁸³ Tier 1 of the three-tier process involves discussions and organizational relationships among First Nations.¹⁰⁸⁴ Tier 2 involves First Nations and the Federal government.¹⁰⁸⁵ And Tier 3 involves First Nations, the Federal and Provincial governments, and third parties.¹⁰⁸⁶ The concept of Tier 1, 2 and 3 processes are now well understood by First Nations and most fisheries managers within DFO.¹⁰⁸⁷
673. A cornerstone of co-management is a functioning Tier 1 process.¹⁰⁸⁸ In *Our Place at the Table*, the First Nations Panel noted that "it is incumbent on First Nations themselves to establish truly effective governance and communications systems amongst themselves."¹⁰⁸⁹ The Panel noted that such systems require resources, and importantly incentives (such as increased allocation and access to commercial fisheries) if they are

¹⁰⁸³ Exhibit 493 (*Our Place at the Table*), p. 2; see also Exhibit 1202 (*Working Models for Fisheries Collaborative Management*) pp 1-2.

¹⁰⁸⁴ Exhibit 493 (*Our Place at the Table*), p. 2

¹⁰⁸⁵ Exhibit 493 (*Our Place at the Table*), p. 2

¹⁰⁸⁶ Exhibit 493 (*Our Place at the Table*), p. 2

¹⁰⁸⁷ See, for example: Transcript, November 2, 2010, p. 91 (Paul Sprout)

¹⁰⁸⁸ Transcript, July 5, 2011, pp. 26, 39 (Marcel Shepert); Transcript, June 28, 2011, p. 88 (Russ Jones, Chief Nang Jingwas); Transcript, March 4, 2011, p. 62 (Paul Sprout, Susan Farlinger)

¹⁰⁸⁹ Exhibit 493 (*Our Place at the Table – First Nations in the BC Fishery, 2004*), p. 2; see also Transcript, September 2, 2011, pp. 53-54 (Kaarina McGivney) wherein Ms. McGivney stated that it would be better if First Nations could resolve issues themselves, without DFO having to act as arbitrator.

to get off the ground.¹⁰⁹⁰ Mr. Jones noted that one of the pitfalls of the Fraser Watershed Agreement was that First Nations didn't have enough time amongst themselves to discuss the Agreement and the implications arising from it.¹⁰⁹¹

674. Tier 1 processes related to FRSS are forming. The provincial First Nations fisheries organization is the FNFC, which was borne of the BC First Nations Fisheries Action Plan.¹⁰⁹² The FNFC is mandated by three First Nations political organizations, the UBCIC, the BC Assembly of First Nations, and the FNS.¹⁰⁹³ The FNFC works with and on behalf of First Nations in British Columbia to protect and reconcile Aboriginal title and rights as they relate to the fisheries and the health and protection of aquatic resources and provide technical and policy assistance. Its objectives are as follows: (a) advance and protect First Nations title and rights related to fisheries and aquatic resources, including priority access for food, cultural and economic purposes; (b) support First Nations to build and maintain capacity related to fishing, planning, policy, law, management, and decision-making at a variety of scales (local, regional, national, international); (c) facilitate discussions related to the development of a BC-wide First Nations-based collaborative management framework that recognizes and respects First Nations jurisdiction, management authority and responsibilities.¹⁰⁹⁴
675. On the watershed level, FRAFS, which was established in 1994 and is made up of First Nations and DFO representatives, carries out a mandate to: (a) assist DFO in its communications with Fraser River First Nations on fisheries issues; (b) assist Fraser River First Nations in understanding and interpreting information provided to them by DFO; and (c) assist Fraser River First Nations to communicate among themselves and develop positions and initiatives in regard to fisheries issues.¹⁰⁹⁵ FRAFS employs two

¹⁰⁹⁰ Exhibit 493 (Our Place at the Table, First Nations in the BC Fishery, 2004), pp. 2, 3

¹⁰⁹¹ Transcript, June 28, 2011, pp. 15-16 (Russ Jones, Chief Nang Jingwas)

¹⁰⁹² Exhibit 1189 (BC First Nations Fisheries Action Plan, Preparing for Transformative Change in the BC Fishery); Exhibit 1191 (Commitment to Action and Results FNFC-DFO, May 26, 2010); Transcript, February 1, 2011, pp. 22-24 (Pat Matthew); Transcript, June 28, 2011, pp. 34-35, 80 (Russ Jones, Chief Nang Jingwas); Transcript, November 2, 2010, p. 87 (Susan Farlinger); see also PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), paras. 306-310;

¹⁰⁹³ Exhibit 1189 (BC First Nations Fisheries Action Plan, Preparing for Transformative Change in the BC Fishery); Transcript, February 1, 2011, pp. 22-24 (Pat Matthew)

¹⁰⁹⁴ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 307

¹⁰⁹⁵ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 313

- consulting biologists who participate in various fisheries management committees, and joint technical committees, and provide technical expertise to various First Nations.¹⁰⁹⁶
676. FRAFS has been assisting in the coordination of the Fraser Forum process, which is a bilateral process between First Nations and DFO to discuss annual operational plans for the fishery.¹⁰⁹⁷ The Fraser Forum process led to the Roadmap Initiative discussed below. The other watershed based organization is the ITO, which was established in 2009 to implement the 1989 Inter-Tribal Fishing Treaty Between Indian Nations – A Treaty of Mutual Purpose and Support.¹⁰⁹⁸ The ITO is a political organization comprised of a “federation of various Nations” that operates on a nation-to-nation level.¹⁰⁹⁹
677. On a local level, many First Nations participate through tribal councils, or otherwise, in AAROM organizations aimed at developing First Nations capacity to be involved in fisheries management, such as the UFFCA in upper Fraser, the SFC in the mid Fraser, and the newly formed LFFA in the lower Fraser.¹¹⁰⁰ First Nations and tribal councils also develop direct bilateral relationships with DFO.
678. At a strategic level, First Nations political leaders have recently emphasized the importance of a government-to-government relationship between the FNLC and the Minister of Fisheries and Oceans, and have suggested that such a relationship should be formalized in an MOU that outlines mutual commitments to work together on areas of shared interest and importance.¹¹⁰¹ MOUs between Canada and the FNLC have been entered into on a number of matters, including health and housing.¹¹⁰²
679. The proposed MOU between FNLC and the Minister of Fisheries could, amongst other things, help to better inform decisions made at DFO Headquarters. It is clear from the evidence related to the SARA Cultus and Sakinaw listing decision, DFO’s assumption of

¹⁰⁹⁶ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 314; Transcript, February 1, 2011, pp. 22-24 (Pat Matthew)

¹⁰⁹⁷ Transcript, February 1, 2011, pp. 22-24 (Pat Matthew)

¹⁰⁹⁸ PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 311; Transcript, February 1, 2011, pp. 22-24 (Pat Matthew)

¹⁰⁹⁹ Transcript, December 14, 2010, pp. 20-21 (Grand Chief Saul Terry); PPR 18 (Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010), para. 311

¹¹⁰⁰ Transcript, February 1, 2011, pp. 22-24 (Pat Matthew)

¹¹⁰¹ Exhibit 1961 (FNLC Letter to Min. Keith Ashfield, July 13, 2011)

¹¹⁰² See, for example, Exhibit 1963 (First Nations Health Plan MOU, November 27, 2006) and Exhibit 1964 (British Columbia Tripartite First Nations Health: Basis for a Framework Agreement on Health Governance, July 26, 2010)

authority for the regulation of aquaculture, and the process used to develop IFMPs, that key decisions that have the potential to infringe s. 35 Aboriginal rights, are being made in Headquarters without adequate information or consultation.

680. Mr. Jones described the need for a Tier 2 process between First Nations and the federal government or DFO, to design a co-management program that's acceptable to First Nations and the Crown, and that is consistent with the directions provided from the courts.¹¹⁰³ He noted that if this solid mutual understanding on the content of co-management is not developed from the beginning, the result may not be what either group had hoped for.¹¹⁰⁴
681. Ms. Farlinger and Mr. Rosenberger both confirmed that functioning Tier 1 and 2 processes on the Fraser watershed would assist both DFO and First Nations to engage in both strategic and operational discussions.¹¹⁰⁵ In particular, Mr. Rosenberger noted that Tier 1 and 2 processes would assist in all pre- and in-season management processes, including setting escapement objectives and coordinating fishing plans among various harvest sectors.¹¹⁰⁶ Pat Matthew, the Fisheries Management Coordinator for the SFC,¹¹⁰⁷ echoed the call for a coordinated Tier 1 process for First Nations to avoid DFO's balancing of individual First Nations' interests against each other, and to gain efficiencies.¹¹⁰⁸ Mr. Rosenberger agreed that it would be useful to ensure there was a commitment from DFO and First Nations to develop the Tier 1 and 2 processes necessary, and to devote the human resources required, to accomplish this task.¹¹⁰⁹
682. Mr. Rosenberger also noted the importance of taking a "scale-based" approach to consider at which levels DFO should be engaging with First Nations about harvest management decisions.¹¹¹⁰ One of the challenges facing First Nations and DFO is the different approaches each takes to the scale of decision making. For First Nations, authority rests largely with Chiefs and Tribal Councils at the local level; whereas DFO is

¹¹⁰³ Transcript, June 28, 2011, pp. 15-16 (Russ Jones, Chief Nang Jingwas)

¹¹⁰⁴ Transcript, June 28, 2011, pp. 15-16 (Russ Jones, Chief Nang Jingwas)

¹¹⁰⁵ Transcript, November 2, 2010, pp. 87-88 (Susan Farlinger); Transcript, January 25, 2011, pp. 9-10 (Barry Rosenberger)

¹¹⁰⁶ Transcript, January 25, 2011, pp. 2-3 (Barry Rosenberger)

¹¹⁰⁷ Exhibit 378 (CV of Pat Matthew)

¹¹⁰⁸ Transcript, February 2, 2011, pp. 81, 84 (Pat Matthew)

¹¹⁰⁹ Transcript, January 25, 2011, pp. 9-10 (Barry Rosenberger)

¹¹¹⁰ Transcript, January 25, 2011, pp. 2-3 (Barry Rosenberger)

unwilling or unable to negotiate allocations, fishing plans, or set escapement goals on a bilateral level with local First Nations.¹¹¹¹

683. Finally, Mr. Jones, Ms. Farlinger, and Mr. Huber, among other witnesses, acknowledged the importance of having functioning Tier 1 and Tier 2 processes before engaging in Tier 3 processes involving other resource users.¹¹¹² There are numerous examples in the evidence where DFO has unsuccessfully moved first to engage all stakeholders in Tier 3 processes, before successfully developing functional working Tier 1 and Tier 2 governance processes.¹¹¹³ Inevitably, such a rush to Tier 3 processes will inevitably fail, as in its haste, DFO avoids addressing the fundamental issues, in particular how First Nations' constitutional rights will be recognized and respected within decision-making structures. Instead of steamrolling ahead to Tier 3 processes such as the IHPC, or the various committees of the ISDF,¹¹¹⁴ First Nations have been emphasizing to DFO, and the FNC now submits, that Tier 1 and 2 structures must be established before Tier 3 structures can be expected to lead to positive change.¹¹¹⁵
684. Without effective Tier 2 processes in place, First Nations are often reluctant to take a seat at the table in multi-stakeholder processes.¹¹¹⁶ Effective Tier 2 processes must be properly established and working before multi-party processes can succeed.¹¹¹⁷ As Mr. Jones explained:

...what First Nations have found in existing processes is that you're put in the position of giving tacit approval to decisions that undermine First Nations rights and responsibilities. I think in a way it's almost discrimination through equality. So First Nations do have rights under the Constitution that are acknowledge, prior rights, to the fishery. And by forcing First Nations to participate with other groups on an equal basis you're not recognizing that prior right which is quite different than the privilege, which is given to resource users to participate in fisheries. They might be licences for commercial fisheries or

¹¹¹¹ Transcript, January 25, 2011, pp. 6-7 (Barry Rosenberger); see also Exhibit 295 (FNFC Co-management Discussion Paper, revised October 25, 2010) pp. 6-9

¹¹¹² Transcript, June 28, 2011, pp. 15-16 (Russ Jones, Chief Nang Jingwas); Transcript, November 2, 2010, pp. 87-88 (Susan Farlinger); Transcript, June 28, 2011, p. 47 (Barry Huber)

¹¹¹³ Transcript, June 28, 2011, p. 88 (Russ Jones, Chief Nang Jingwas); Exhibit 1202 (Working Models for Fisheries Collaborative Management, April 18, 2006), pp. 57-64

¹¹¹⁴ Transcript, July 4, 2011, p. 39 (Marcel Shepert)

¹¹¹⁵ Transcript, January 25, 2011, p. 32 (Jeff Grout)

¹¹¹⁶ Transcript, June 28, 2011 p. 46 (Barry Huber)

¹¹¹⁷ Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), p. 25

licences for recreational fisheries. It doesn't also allow the depth of discussion around governance. So because of First Nations ownership of land, their prior occupation of the area, if you don't allow a discussion. Those issues often can't be discussed in the same room that you're talking about, about licences and access to the resource. I think it's also because of the obligations of the Crown, a fiduciary obligation from the Crown, to protect those rights from First Nations. That's another reason why you have to have separate processes for addressing some of these key issues.¹¹¹⁸

685. Dr. Davis also testified that given the constitutional status of Aboriginal rights and the fact that the Crown is in a fiduciary relationship with First Nations, First Nations cannot simply be treated like all other stakeholders:

...of course we have the responsibilities under the Constitution and under the special provisions for First nations that have to be respected. So it would be difficult for me to stand here and argue that you have to treat First Nations exactly the same way that you treat everyone else. There's a special responsibility, and there's in fact an obligation on the Department to consult and to respect those kinds of fiduciary responsibilities. So that is a somewhat different aspect of things. But there is also a need to try when we're making decisions to bring all the different people to the table. And that's why I think the Department is very interested in local area management and trying to develop approaches to coastal resource planning and management that involved people who really are part of the equation and part of the decision about what you do in a given place.¹¹¹⁹

686. The FNC submits that DFO should devote the necessary resources and provide the necessary incentives to encourage First Nations to continue to develop Tier 1 processes. DFO should devote the necessary resources to allow DFO and First Nations together to continue to develop Tier 2 processes necessary to lead to a more harmonious management of the fishery. As Tier 1 and Tier 2 processes are established, existing and future Tier 3 processes (including the IHPC, the FRP, the Integrated Management of Aquaculture Committees, and the Integrated Strategic Planning processes suggested within Strategy 4 of the WSP) must be re-structured to recognize and respect the Tier 1 and 2 processes. DFO's goal of getting First Nations and stakeholders into rooms to reach consensus has not worked and will not work until reliable Tier 1 and 2 structures are in place.

¹¹¹⁸ Transcript, June 28, 2011, pp. 45-46 (Russ Jones, Chief Nang Jingwas)

¹¹¹⁹ Transcript, May 30, 2011, pp. 71-72 (Dr. John Davis)

Recommendation: As a priority, DFO should dedicate human and financial resources in the short and long-term to negotiate and implement Tier 1 and 2 co-management structures for FRSS. Initial agreements should seek to clarify the Tier 1 and 2 structures for co-management (government-to-government decision-making processes) for Fraser River salmon, including FRSS, and clarify the advisory role of Tier 3 processes.

Recommendation: As part of the negotiations of the Tier 1 and 2 processes DFO and First Nations should review Canada's structure for participation in the PSC and the FRP and change it to better become: (a) a meaningful in-season decision making process that is responsive to First Nations' rights and responsibilities to FRSS; (b) flexible (tuned to in-season variability) and precautionary; and (c) able to resolve disputes in a timely and inexpensive way.

Recommendation: DFO must re-structure Tier 3 advisory processes (such as the IHPC), so that they recognize and respect Tier 1 and 2 processes.

Recommendation: As part of its commitment to co-management with First Nations, DFO must continue to help build capacity within First Nations for those aspects of fisheries management that are more efficiently delivered at the local level.

a) Roadmap Initiative: A Clear Signal

687. DFO and a growing number of First Nations are currently investing considerable time, effort and resources into the Roadmap Initiative, which is aimed at developing a regional co-management agreement for Fraser salmon that will better meet the needs and objectives of both First Nations and DFO.¹¹²⁰ The Roadmap Initiative is designed to be driven by the First Nations and DFO participants, who will ultimately be responsible for building, negotiating, endorsing and implementing a regional co-management agreement.¹¹²¹ Participants have recognized that ultimately, development of this co-

¹¹²⁰ Exhibit 1220 (Overview of the Fraser River Salmon Roadmap Initiative, undated), p. 1

¹¹²¹ Exhibit 1220 (Overview of the Fraser River Salmon Roadmap Initiative, undated), p. 3

management agreement will require the active engagement and support of First Nations leadership, as well as senior DFO officials.¹¹²²

688. At this stage of the Roadmap process, both DFO and First Nations have been seeking clarity on each others' visions and goals for co-management.¹¹²³ Currently, there is uncertainty on whether DFO is truly prepared for, or committed to co-management, what the scales of co-management might be (i.e. what decisions would be made at what level of authority), and what the timeline for implementing co-management might be.¹¹²⁴ To this end, at a recent Roadmap meeting held in Campbell River on June 22 and 23, 2011, First Nations requested the parties use a MOU or LOU that will outline mutual commitments to negotiate co-management of a regional Tier 2 agreement for Fraser River salmon.¹¹²⁵ A clear signal from DFO and First Nations, in the form of an MOU or LOU, may provide the incentive required to build the Tier 1 process which is the necessary backbone for joint management in Tier 2 processes. Without this political will, the building blocks of co-management will never be stable, and a state of limbo will continue.¹¹²⁶ While all parties must remember that Tier 2 processes take time, it is useful to set reasonable timeframes and mechanisms for accountability.

689. Mr. Huber and Mr. Todd, who have been active participants in the Roadmap Initiative, testified that with the proper leadership (i.e., a champion within DFO who has the ear of Ottawa, and a champion within First Nations who has the ear of political leadership), as well as sufficient funding, and potentially a timeline, Tier 1 and Tier 2 co-management arrangements could be solidified.¹¹²⁷ Mr. Huber testified to the "momentum" that is now building within the Roadmap Initiative, and to his hopes that an agreement on co-management would be entered into within the next short while.¹¹²⁸ The FNC submits that it is in the best interests of FRSS that such momentum is given a priority.

Recommendation: In a manner similar to Health Canada and Parks Canada, the Minister of DFO should seek to reach a MOU with the First Nations Leadership Council

¹¹²² Exhibit 1220 (Overview of the Fraser River Salmon Roadmap Initiative, undated), p. 3

¹¹²³ Transcript, July 4, 2011, pp. 54-55 (Barry Rosenberger); Transcript, July 4, 2011, pp. 19, 62-63 (Ernie Crey)

¹¹²⁴ Transcript, July 4, 2011, pp. 62-63 (Ernie Crey)

¹¹²⁵ Transcript, July 4, 2011, pp. 62-63 (Ernie Crey)

¹¹²⁶ Transcript, June 30, 2011, p. 14 (Russ Jones, Chief Nang Jingwas)

¹¹²⁷ Transcript, June 28, 2011, pp. 74-76 (Barry Huber, Neil Todd)

¹¹²⁸ Transcript, June 28, 2011, pp. 11, 25 (Barry Huber)

(UBCIC, First Nations Summit and the AFN), the FNFC, and the Province to formalize a commitment and process to work together at a strategic government-to-government level on areas of shared interest and importance in the fisheries, including FRSS.

b) Opportunities for Change

690. DFO must stop making decisions by itself, especially those it does not have the knowledge or expertise to make. It must extend a welcome hand to First Nations and be willing to change.

For co-management to work, both DFO and First Nations need sufficient resources to implement and engage in co-management, and capacity needs to be strengthened... political will and benefits occurring, and the last factor, capacity, have a circular relationship. Many of the factors are moot if political will to provide the necessary capacity is lacking. Political will is more likely to exist if the parties are experiencing benefits, but realizing benefits depends on the investment of resources... the key may be to get enough of the enabling factors in place so that co-management begins to provide its effectiveness and benefits to the parties...¹¹²⁹

691. From the FNC's perspective, it is fair to summarize the longstanding efforts of First Nations to achieve recognition of their rightful place at the table as managers within co-management regimes as inspired by the following benefits:

- a. conservation/right relations with the irreplaceable and widely distributed lineages of FRSS, including protection and enhancement of salmon habitat in fresh and marine waters;¹¹³⁰
- b. protection and enhancement of priority opportunities to achieve FSC requirements, including increased selective fisheries;
- c. recognition and respect for First Nations' title, rights and responsibilities to actively manage fisheries on behalf of future generations;
- d. enhancement of First Nations' economic opportunities, including increased terminal or near terminal river fisheries on known stocks in the coastal areas of the Fraser River watershed.

¹¹²⁹ Exhibit 972 (An Overview of Issues Concerning First Nations and DFO Co-management of Fisheries in the Pacific Region, Draft, April 2010), pp. viii and ix

692. As discussed in a 2004 report completed for DFO and Fraser First Nations on creating a watershed process, one barrier to change is DFO putting itself in the position of arbitrator. DFO often finds or sees itself as an arbitrator, trying to help First Nations make decisions about the trade-offs between escapement goals, and allowing for limited harvest.; or making decisions amongst competing interests. The FNC submits that DFO is not trained to accept this role and it would be best left for First Nations to resolve.¹¹³¹
693. There are numerous exhibits, which the FNC has provided to the Commissioner, as examples of co-management models. The goal in doing so was to illustrate that there are useful and helpful examples on how such co-management models are being formed and used. While it is quite likely that the model used for Fraser River salmon, including FRSS, will be unique, the FNC submits that DFO should not be afraid to move forward.
694. Finally, the likelihood and cost of continued conflict if DFO and First Nations to not find acceptable co-management relationships should be a powerful disincentive to keep the Roadmap Initiative momentum going. FRSS cannot wait until these matters are resolved in courts. DFO must act responsibly and honourable to engage with First Nations as governments, for the sustainability of the fisheries resources, including FRSS.
- a. Not need to wait for treaties (There are mechanisms for resolving First Nations participation in Tier 1, 2 and 3 processes without waiting for treaties; it's really a matter of understanding the rights and responsibilities.¹¹³² "The fish don't wait [for treaties or formalized relationships]"¹¹³³)

Recommendation: DFO must enhance its support for First Nations and Tribal Councils, as well as First Nations' regional and provincial fisheries organizations (e.g. FRAFS, FNFC), through stable, multi-year AAROM, AFS, or PICFI agreements, or other funding and capacity measures.

¹¹³⁰ Transcript, January 27, 2011, p. 86 (Dr. Brian Riddell)

¹¹³¹ Exhibit 1207 (Establishing a Fraser Watershed Process)

¹¹³² Transcript, January 25, 2011, pp. 12-13 (Barry Rosenberger)

¹¹³³ Transcript, January 25, 2011, p. 13 (Barry Rosenberger)

Recommendation: Relying on the Roadmap Initiative, DFO should immediately secure the mandate and resources to meaningfully engage in discussions and negotiations with First Nations along the migratory route of FRSS to clarify the Tier 1 and 2 agreements necessary for co-management. DFO should confirm this commitment to meaningfully negotiate government-to-government co-management with First Nations in a LOU which sets reasonable goals and time frames.

Recommendation: Canada and First Nations must together develop improved and transparent consultation processes that can be implemented collaboratively, including: (a) determining whether strength of claim analysis must be done in order for the parties to reach mutually agreeable consultation processes. If so, getting these done; (b) streamlining Federal/Provincial/First Nation processes that address aspects that potentially affect fish and therefore s. 35 rights. For e.g. water allocations and management, industrial development, (including aquaculture, gravel, etc.); and (c) identifying accommodation options for the potential infringements to the exercise of s. 35 rights to FRSS – including both mitigation and compensation options.

G. Harvest Management

i) Introduction

695. During the pre-season, decisions are made within DFO as to spawning escapement targets, exploitation rates, management priorities, and conservation constraints.¹¹³⁴ Much of the pre-season work is about reviewing various scenarios and determining the harvest rules, thereby helping prepare decision-makers for in-season complexities.¹¹³⁵

¹¹³⁴ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 210

¹¹³⁵ Transcript, January 17, 2011, p. 7 (Jeff Grout); Transcript, January 18, 2011, p. 23 (Mike Lapointe); Transcript, January 20, 2011, p. 12 (Mike Lapointe);

Mike Lapointe, Chief Biologist for the PSC,¹¹³⁶ has described this pre-season work as “contingency planning.”¹¹³⁷

696. In addition to providing the FRP with its escapement plan, during the pre-season, DFO develops the escapement goals, pre-season forecasts and the MA.
697. In-season management, because it can account for the actual returns and not just projected returns, is the key to successful prosecution of sustainable fisheries.¹¹³⁸ In-season management of FRSS occurs in an environment full of uncertainties including uncertainty regarding estimates of fish health and abundance, regarding existing and future environmental conditions, regarding future economic and social conditions of the fisheries, and regarding future management objectives.¹¹³⁹
698. Given that a person’s responsibilities, experiences, values, and risk tolerances will result in different reactions and responses to uncertainties, the FNC submits that it is crucial for DFO to improve First Nations consultation, on a bi-lateral or Tier 2 level, to get real input into how to respond to such uncertainty.

ii) From Aggregate Based Management to CU Specific Management

699. IFMPs, which are approved by the Minister, have become the primary in-season management tool through which DFO’s policies related to conservation and sustainable use, harvest, collaborative governance of the fisheries, fisheries planning, and monitoring are applied to the prosecution of fisheries.¹¹⁴⁰ As such, IFMPs are supposed to incorporate biological and socio-economic considerations that are factored into harvest decisions.¹¹⁴¹

¹¹³⁶ Exhibit 328 (CV of Michael Lapointe)

¹¹³⁷ Transcript, January 20, 2011, p. 12 (Mike Lapointe)

¹¹³⁸ Transcript, February 7, 2011, p. 75 (Ken Wilson)

¹¹³⁹ Transcript, January 25, 2011, pp. 24-25 (Barry Rosenberger)

¹¹⁴⁰ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 10; see also Transcript, January 17, 2011, pp. 6-7 (Jeff Grout) and Exhibit 317 (Pacific Region – Integrated Fisheries Management Plan – Salmon, Southern BC, June 1, 2009 to May 31, 2010)

¹¹⁴¹ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para.

700. However, the IFMPs, like most FRSS harvest management tools and processes, do not operate at a CU level.¹¹⁴² Rather, the management plans for prosecution of fisheries and escapement of FRSS are generally approached at an aggregate level, with some exceptions.¹¹⁴³ The four management aggregates, or run-timing groups, are the (1) Early Stuarts; (2) Early Summers; (3) Summers; and (4) Lates.¹¹⁴⁴
701. DFO's management of FRSS assumes that exploitation rates on each CU are the same for all CUs within the group. And DFO assumes that if it manages the dominant CUs to protect the weak CUs, it can protect all of the CUs within the aggregate.¹¹⁴⁵ However, each CU can sustain different rates of harvest and such rates of harvest change annually and may change even more as climate change and other stressors increase.¹¹⁴⁶ Many First Nations and some fisheries biologists have questioned how aggregate management and the setting of aggregate escapement goals that are applied to a mixture of stocks with different productivities can protect the weaker stocks from over-harvest.¹¹⁴⁷
702. Part of implementing the WSP is understanding what would be the best aggregation of the stocks or CUs.¹¹⁴⁸ The run-timing aggregates currently used were developed and agreed to by Canada and the United States under the PST at a time when the United States' share of the fishery was approximately 50%; it is currently only 16.5%.¹¹⁴⁹ One of the issues with the current set of management groups is that they were set with certain assumptions about timing and distribution, and as our ability to observe and note the stocks or CUs improve, and as the stocks themselves evolve and change, our understandings of the make-up of the management groups changes, as does our faith in the assumptions.¹¹⁵⁰ Over fifteen years ago, the then Senior Biologist of the PSC, Dr. Jim Woodey, recommended that the countries revisit the composition of the run timing

¹¹⁴² PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), paras. 37-39

¹¹⁴³ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), paras. 37-39

¹¹⁴⁴ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010)

¹¹⁴⁵ Transcript, January 21, 2011, pp. 22-24 (Barry Rosenberger)

¹¹⁴⁶ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 45

¹¹⁴⁷ Transcript, February 7, 2011, p. 47 (Ken Wilson)

¹¹⁴⁸ Transcript, January 21, 2011, p. 19 (Barry Rosenberger)

¹¹⁴⁹ Transcript, January 18, 2011, p. 96 (Mike Lapointe); see also Transcript, January 19, 2011, p. 103 (Mike Lapointe)

¹¹⁵⁰ Transcript, February 7, 2011, p. 56 (Mike Staley)

aggregates and modify the stocks included in each group to better reflect their run timing and to improve management control.¹¹⁵¹

703. Although the WSP does not preclude fisheries operating on an aggregate basis, it does note that increased attention to all of the CUs within the aggregate will likely require significant changes to current management practices.¹¹⁵² When asked where DFO is at in terms of the “significant changes to current management practices” that the WSP states will be required, Mr. Rosenberger could point to few changes. Instead, he noted the science processes underway to define CUs and their benchmarks, the development of a “Fraser Rivery Sockeye Escapement paper”.¹¹⁵³ The FNC submits that much more concrete management changes must be implemented to manifest the change in *status quo* required by the WSP.
704. The FNC submits that updating the run timing groups to ensure accuracy and assist in the implementation of CU-based management required by the WSP is a priority management step going forward. This must be included in the renegotiation of Annex IV of Chapter 4 of the PST. Mr. Rosenberger testified that Canada is under no obligation to stay where it is currently in terms of the number of timing groups and their composition, and can manage to a finer suite of distinction.¹¹⁵⁴ Given this, the FNC submits that DFO, with assistance of First Nations, should analyse whether the current number and composition of the run-timing groups is accurate and appropriate, or whether a re-organization or dis-aggregation of the run-timing groups may lead to improved management at the CU level.¹¹⁵⁵

Recommendation: DFO, and First Nations, should together (a) reconsider the current number and composition of the run-timing groups; (b) conduct analyses of the management impacts and implication of moving stocks from one timing group to another; and (c) consider whether re-organization or dis-aggregation of the run-timing groups may lead to improved management at the CU level, and to better protecting s.35 Aboriginal rights.

¹¹⁵¹ Exhibit 413 (FRSSI Report prepared by Ken Wilson for UFFCA, March 2009), p. 5

¹¹⁵² Exhibit 8 (Canada’s Policy for Conservation of Wild Pacific Salmon, June 2005), p. 33; Transcript, January 21, 2011, pp. 20-21 (Barry Rosenberger)

¹¹⁵³ Transcript, January 21, 2011, pp. 20-21 (Barry Rosenberger)

¹¹⁵⁴ Transcript, January 21, 2011, p. 19 (Barry Rosenberger)

¹¹⁵⁵ Transcript, September 28, 2011 (Susan Farlinger)

iii) FRSSI and Setting Escapement Goals

705. Prior to the 2003 fishing season, DFO initiated a review of its rebuilding strategy to address growing concerns about its appropriateness during a time of reduced productivity and dwindling abundance of FRSS.¹¹⁵⁶ The mandate of the review process was to incorporate new information, integrate emerging policies such as the WSP, and establish a formal framework for setting escapement targets.¹¹⁵⁷ The FRSSI was the result.¹¹⁵⁸ While some within DFO describe FRSSI as a pilot of the WSP, Dr. Riddell has testified that FRSSI does not address the WSP in a full sense;¹¹⁵⁹ and the FNC agrees.
706. As Michael Staley, a member of the FRP Technical Committee of the PSC and technical advisor to FRAFS and other First Nations and First Nations organizations,¹¹⁶⁰ explains in his Report, *Fraser River Sockeye Spawning Initiative (FRSSI): A Review for the Cohen Commission*, FRSSI is a process to develop guidelines for setting annual escapement and exploitation targets for FRSS.¹¹⁶¹ As a framework for assessing long-term harvest goals, FRSSI is both a model and a process.¹¹⁶²
707. The FRSSI model works by conducting a 48-year forward-simulation to consider how stocks would respond to a range of different management options or harvest rules (also referred to as TAM Rules).¹¹⁶³ Each simulated scenario is based on several important assumptions about the biology and behaviour of FRSS stocks. These assumptions include: characteristics of the spawner-recruit model; level of accuracy in implementing allowable mortality rates; and amount of non-harvest during up-river migration.¹¹⁶⁴ One of the main assumptions underlying the FRSSI analysis is that the number of recruits (adult returning fish) is determined in large measure by the number of spawners that produced them.¹¹⁶⁵ It is extremely important to precautionary management and

¹¹⁵⁶ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 3

¹¹⁵⁷ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 3

¹¹⁵⁸ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 3

¹¹⁵⁹ Transcript, June 1, p. 84 (Dr. Brian Riddell)

¹¹⁶⁰ Exhibit 401 (CV of Mike Staley)

¹¹⁶¹ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 4

¹¹⁶² Transcript, January 17, 2011, p. 34 (Jeff Grout); Transcript, February 7, 2011, p. 8 (Al Cass)

¹¹⁶³ Transcript, January 17, 2011, p. 34 (Jeff Grout); Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), pp. 6, 21

¹¹⁶⁴ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 21

¹¹⁶⁵ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 11; Exhibit 413 (Fraser River Integrated Sockeye Spawning Initiative, prepared by Ken Wilson, March 2009), p. 1

understanding uncertainties to emphasize that there is a high degree of variability and uncertainty about the spawner-recruit relationship.¹¹⁶⁶

708. Each year, the FRSSI model is used to examine a range of alternative escapement strategies for each management group. A shortlist of three to five options for each run-timing group is selected based on pre-season expectations.¹¹⁶⁷ These options are then presented for review during the annual pre-season consultations.¹¹⁶⁸
709. As explained by Jeff Grout, DFO's Regional Resource Manager,¹¹⁶⁹ DFO's intent with FRSSI was to layout long-term harvest plans that could be used for the run timing aggregates that took into account the maintenance and protection of the CUs in those groups.¹¹⁷⁰ Whether a model that is based on aggregates can properly account for and protect its component CUs is a question that many involved in the FRSSI process have raised. The Marine Conservation Caucus, for example has expressed concerns about the quality of the FRSSI analysis and whether it's adequately getting at an understanding of the impacts at an aggregate harvest level to component stocks.¹¹⁷¹ First Nations have similarly expressed such concerns about aggregate-based management and have not received proper response from DFO. As Mr. Matthew testified:

...right now the FRSSI model is based on large aggregates of stocks, of which management measures are applied. Cut-off points, harvest plans, escapement benchmarks, they're all based on these large aggregates, and for us that's a serious problem in terms of trying to protect our interest around individual stocks, and we've asked DFO, "Can you describe to us how you're going to accommodate the modelling for individual stocks in your FRSSI plans?" and they have not been able to do that.¹¹⁷²

710. The goal of the FRSSI process is often described as trying to find a balance between the objectives of (1) ensuring spawner abundance and production for individual stocks; and (2) accessing the catch related benefits.¹¹⁷³ This balancing is also referred to as the policy choices of trading off harvest benefits against providing protection to individual

¹¹⁶⁶ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 11

¹¹⁶⁷ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 24

¹¹⁶⁸ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 24

¹¹⁶⁹ Exhibit 316 (CV of Jeff Grout)

¹¹⁷⁰ Transcript, January 17, 2011, p. 34 (Jeff Grout)

¹¹⁷¹ Transcript, June 1, 2011, p. 82 (Jeffrey Young)

¹¹⁷² Transcript, February 1, 2011, pp. 14-15 (Pat Matthew)

stocks; of trading off short-term gains against long-term benefits; and of trading off stability in catch against maximizing opportunity.¹¹⁷⁴

711. Fundamentally, the question of harvest management and setting escapement goals under FRSSI is a question of trying to balance the various values and management objectives of those at the table. The values each bring to the table will affect their views on potential solutions. As Mr. Wilson eloquently testified:

I agree we all bring different values to this table. And those values will change the way we view the optimum solution. If you believe that conservation is our primary obligation and that each and every CU needs to be conserved, you'll take a different approach than if your primary obligation is to sustain a commercial fishery. As I understand it, **we have a clear commitment to conservation under the Wild Salmon Policy. We need to address that obligation. We have obligations to First Nations, which are not necessarily adequately addressed within the context of the FRSSI model since stocks from large geographic areas can all decline at the same time. We can still meet our escapement goals but we're not fundamentally honouring our commitment. Those values all need to be expressed and addressed in the process of setting TAM rules for stocks and aggregates. And it's my concern that they're not, so I think it's absolutely true that we bring different values to the table depending on where we're at. Most of the people at the table harvest fish. That's what they do. If you don't harvest fish, then your optimum solution might be quite different because you'll value other things. You'll value the opportunity to go look at the spawning grounds full of fish in the Shuswap or you'll value First Nations' catches in remote areas of the watershed. And different TAM rules will accomplish those objectives to a different degree and will weight the solution different ways.**¹¹⁷⁵

712. DFO's perspective is often observed as a trade-off between conservation/biodiversity vs. harvest, in an uncertain world.¹¹⁷⁶ The FNC submits the trade-off should not be between biodiversity on the one hand, and sustainable fisheries on the other. Sustainable fisheries require a degree of biodiversity; and further, sustainable fisheries require maintaining First Nations fisheries in their traditional locations. As Mr. Staley testified:

¹¹⁷³ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 17

¹¹⁷⁴ Exhibit 398 (2008 Collaborative Development of Escapement Strategies for Fraser River Sockeye: Summary Report 2003-2008), p. 25

¹¹⁷⁵ Transcript, February 7, 2011, pp. 65-66 (Ken Wilson)

¹¹⁷⁶ Transcript, February 7, 2011, p. 74 (Al Cass)

I'm not certain it's a tension between biodiversity and sustainable fisheries. I think sustainable fisheries require a degree of biodiversity. I think your question is how much of a degree. Again, going back to my experience with people that I've worked with throughout the watershed who are in many of the communities, exist and reside on the CUs and not by accident do they live on those areas. They're there because of the fish. And perhaps some argue the fish are there because of them but is that that – maintaining sustainable fisheries requires maintaining their fishery where they are accustomed to practising it. So diversity and sustainable fisheries are one in the same to them.¹¹⁷⁷

713. Mr. Wilson testified that viewing the FRSSI process as a trade-off between maximizing economic benefits while minimizing biological harm is not the correct question, as it sets up for a “lose/lose situation”; rather, at the escapement goal, the question should be framed in the context of what is best to promote healthy, biodiverse CUs in a changing and venerable ecosystem.¹¹⁷⁸ Mr. Wilson’s getting back-to-basics approach and belief that what’s good for the fish, will also benefit those who rely upon the fish is consistent with First Nations’ approaches to management; and strongly supported by the FNC.

Recommendation: In setting escapement goals, through FRSSI or otherwise, DFO must be committed to strengthening weak and at-risk CUs. DFO should explicitly recognize that preserving biodiversity and conducting sustainable fisheries are twin aims, not trade-offs.

714. The FRSSI model uses a TAM rule set at a maximum 60%. It is hoped that the maximum mortality rate will avoid or minimize collateral damage to small or weak CUs when the management groups are in higher or healthy abundance. Mr. Staley testified that the 60% number was a “somewhat arbitrary number” based on what is believed to be the lower range of harvest that average or recent FRSS productivity, on a coast-wide basis, can sustain.¹¹⁷⁹ Mr. Wilson also expressed doubt as to whether a 60% TAM Rule was sufficient to protect weak and unmodelled stocks.¹¹⁸⁰ Mr. Staley testified that given declines in productivity of FRSS and environmental changes, the 60% TAM Rule may no longer be appropriate, and that further research may be warranted to consider whether some of the unmodelled stocks within an aggregate are falling below an acceptable

¹¹⁷⁷ Transcript, February 7, 2011, p. 75 (Mike Staley)

¹¹⁷⁸ Transcript, February 7, 2011, pp. 72-73 (Ken Wilson)

¹¹⁷⁹ Transcript, February 7, 2011, p. 48 (Mike Staley)

¹¹⁸⁰ Transcript, February 7, 2011, p. 51 (Ken Wilson)

benchmark.¹¹⁸¹ The FNC submits that the 60% TAM Rule must be examined to determine whether it is sufficient to protect weak and unmodelled CUs within the run-timing aggregates, and robust enough to take into account future uncertainties.

Recommendation: DFO should, with the assistance of First Nations, thoroughly examine and evaluate whether the 60% TAM Rule is sufficient to protect weak and unmodelled CUs within the run-timing aggregates.

715. Currently, there are only 19 stocks with sufficient escapement and return data to allow incorporation into the FRSSI simulation model.¹¹⁸² While the 19 stocks may represent approximately 90% of the catch, they represent less than 50% of the FRSS CUs, and, as Mr. Wilson testified, each and every one of those CUs needs to be protected through management.¹¹⁸³ Furthermore, the 19 modelled stocks do not correspond one-to-one with the CUs of the WSP.¹¹⁸⁴
716. One of the key problems with relying on data from 19 stocks to represent the approximately 37 FRSS CUs is that the stocks for which there are data tend to be the more abundant and productive stocks; and it is impossible to know whether the stocks for which little or no data are available have productivities similar to or very different from those stocks for which data are available.¹¹⁸⁵ Mr. Staley notes that the inconsistencies between the modeled stocks and CUs will remain a challenge for some time and recommends that, in the meantime, there be a method for reconciling and associating the modeled stocks with CUs, both for the purpose of stock management and for the implementation of the WSP.¹¹⁸⁶ The FNC supports this recommendation.

Recommendation: DFO should, with the assistance of First Nations, develop a method for reconciling and associating the 19 FRSSI modelled FRSS stocks with the FRSS CUs and expanding the modelled stocks in order to support WSP implementation and better ensure sustainable fisheries.

¹¹⁸¹ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 26; Transcript, February 7, 2011, pp. 49, 54, 63-64 (Mike Staley)

¹¹⁸² Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 6

¹¹⁸³ Transcript, February 7, 2011, pp. 41-42 (Ken Wilson)

¹¹⁸⁴ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 8

¹¹⁸⁵ Exhibit 413 (Fraser River Integrated Sockeye Spawning Initiative, prepared by Ken Wilson, March 2009), p. 4; see also Transcript, February 7, 2011, p. 41 (Ken Wilson)

¹¹⁸⁶ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 9

717. The FRSSI process is intended to encourage First Nations' participation.¹¹⁸⁷ However, while some First Nations' technical staff participated in some of the FRSSI workshops, they were not in a position to provide guidance to DFO on policy issues.¹¹⁸⁸
718. Although Mr. Rosenberger testified that one does not need to understand the way that the FRSSI model works in order to participate in the FRSSI process,¹¹⁸⁹ the First Nations feel otherwise. In order to meaningfully participate in the FRSSI process, First Nations must have both the technical capacity to understand the models and options for revising such models, and the operational capacity to consider uncertainties, understand the risks, and provide helpful direction, including harvest objectives. This is supported by Mr. Ryall, Mr. Grout, Mr. Wilson, Mr. Matthew and Rob Morley who testified that in order for sophisticated harvest management processes to be effective, the participants must have the technical capacity to understand how their values are being incorporated into the model, and what the results mean for them.¹¹⁹⁰ In addition, Mr. Wilson and Mr. Staley noted that participants in the FRSSI process need to trust that those who are developing and using the FRSSI model have their best interests at heart.¹¹⁹¹
719. To address the problems associated with participation in the FRSSI process, Mr. Staley recommended that more effort be made in communicating with harvesters, particularly First Nations, and managers/technicians on the issues arising from FRSSI.¹¹⁹² In particular, Mr. Staley recommended that DFO utilize more hands-on workshops to explain how the FRSSI model works.¹¹⁹³ The FNC submits that DFO should continue to assist First Nations and other harvesters in developing the technical capacity to understand the FRSSI model. This may be pursued by improving communications processes, offering hands-on workshops, or other methods.

¹¹⁸⁷ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 5; Transcript, February 7, 2011, p. 8 (Al Cass)

¹¹⁸⁸ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 5; see also Exhibit 756 (Ryall Response to FNC Questions, April 21, 2011), pp. 1-2

¹¹⁸⁹ Transcript, January 17, 2011, p. 79 ((Barry Rosenberger)

¹¹⁹⁰ Transcript, January 25, 2011, pp. 34, 46 (Jeff Grout); Transcript, February 7, 2011, p. 79 (Rob Morley); Exhibit 413 (Fraser River Integrated Sockeye Spawning Initiative, prepared by Ken Wilson, March 2009), p. 6; Exhibit 756 (Ryall response to FNC Questions, April 21, 2011), pp. 2-3

¹¹⁹¹ Transcript, February 7, 2011, pp. 79-80 (Ken Wilson, Mike Staley); Transcript, February 1, 2011, pp. 13-14 (Pat Matthew)

¹¹⁹² Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), pp. 5, 25

¹¹⁹³ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), p. 25

Recommendation: DFO should aim to increase the understanding and reliability of the FRSSI model by improving its FRSSI communications processes, offering hands-on workshops, and providing support for the development of technical capacity amongst First Nations.

720. One of the key criticisms of the FRSSI model is that it is based on the notion of stationarity, the concept that historical data can be used to predict the future, and that we can look at the past and say the assumptions that we can draw from analyzing past data will be consistent moving into the future.¹¹⁹⁴ Given changes to productivity over time, Mr. Wilson has questioned whether notions of stability and stationarity are still relevant, or ought to be informing the models used to aid management:

...my concern has to do with the variance in the quality of the data from stock to stock and the way those data are used to enlighten us about what might happen in the future. These are historical data and so we're essentially looking through a very limited frame of reference backwards at a set of information and trying to understand how the world might work in a way that's consistent with those data. But it's one thing to, you know, fit a model to historical data, it's another altogether to forecast the future. And in evaluating harvest policy, that's really the problem, we're setting the model. We're trying to understand how this policy applied into the future for 48 years, how we will manage the risks and benefits that are associated with that management policy, and I think there's a high degree of uncertainty that may not be adequately reflected in the model.¹¹⁹⁵

721. The FNC submits that the FRSSI model, as currently applied, faces several other limitations, including: (1) that it only represents mixed stock, not terminal or near terminal river fisheries; and (2) that it has limited powers to evaluate impacts of changing future productivity.¹¹⁹⁶ Mr. Staley noted that the FRSSI model only represents mixed stock fishing, and does not currently have the capacity to account for a combination of mixed stock and near terminal river fisheries.¹¹⁹⁷ However, Mr. Staley noted that DFO could use the FRSSI model to explore some of the sensitivities of mixed as opposed to terminal fisheries.¹¹⁹⁸ The FNC submit that DFO, with the assistance of First Nations,

¹¹⁹⁴ Transcript, February 7, 2011, pp. 60-61 (Ken Wilson)

¹¹⁹⁵ Transcript, February 7, 2011, pp. 41-42 (Ken Wilson)

¹¹⁹⁶ Transcript, February 7, 2011, pp. 18-19 (Al Cass)

¹¹⁹⁷ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), pp. 15, 32; see also Transcript, February 7, 2011, p. 54 (Mike Staley)

¹¹⁹⁸ Exhibit 400 (FRSSI: A Review for the Cohen Commission, October 2010), pp. 16, 32

should consider the various ways in which the FRSSI model could be used to predict or simulate changing fisheries, including terminal or near terminal fisheries.

Recommendation: DFO should, with the assistance of First Nations, develop a model that simulates a variety of fisheries beyond the mixed stock fishery, including increased terminal and near terminal river fisheries on known stocks in the coastal areas and Fraser River watershed. Whether or not this could be an extension of the FRSSI model will need to be considered.

722. Another limitation with the FRSSI model is that it only looks at controlling or influencing the status of FRSS population through harvest management; it doesn't have any way of considering other methods such as habitat protection or enhancement that may affect productivity and therefore influence status.¹¹⁹⁹
723. Whether it's through the FRSSI model, or other fisheries management models (currently being developed by SFU using finer scale escapement objectives and the possibility of delivering fish to some of the terminal areas),¹²⁰⁰ the FNC submits that DFO should consider how it can best utilize or improve the models to set minimum abundance levels by geographic areas to sustain CU and protect First Nations' FSC fisheries. Mr. Wilson agreed that one possibility would be to add an objective to the FRSSI model that there be a sufficient delivery of a quantum of fish by geographic region to ensure, for example, that First Nations fisheries were able to access fish.¹²⁰¹

Recommendation: In the FRSSI model and other management models, DFO must include objectives that ensure sufficient fish are delivered to specific geographic areas, thereby promoting biodiversity and ensuring First Nations' food, social and ceremonial requirements are met.

724. The FNC submits that the use of FRSSI and other management models for assessing stock health, abundance, productivity and geographic distribution, must be developed with active participation by First Nations who are fully informed about the implications of the options, uncertainties and risks.

¹¹⁹⁹ Transcript, February 7, 2011, p. 84 (Rob Morley)

¹²⁰⁰ Transcript, January 21, 2011, p. 25 (Jeff Grout); see also Exhibit 337 (Southern Boundary Restoration and Enhancement Fund Project Concept 2008) and Transcript, February 3, 2011, pp. 40-41 (Dr. Brian Riddell)

iv) Pre-Season Forecasting

725. The pre-season forecast provides information on the range of FRSS returns expected and the probability of those returns occurring.¹²⁰² DFO forecasts 19 stocks, that are rolled up into 4 aggregates based on run timing.¹²⁰³ Sometimes the forecasted stocks directly relate to CUs, but other times multiple CUs are contained within one of the 19 forecasted stocks.¹²⁰⁴ These 19 stocks represent between 95 to 98 percent of the total abundance of sockeye in the Fraser watershed.¹²⁰⁵ Given that no one model performs best across all of the 19 forecasted stocks, DFO uses a range of different models to generate its forecasts.¹²⁰⁶ One of the models used is a biological model, which is based on paired stock-recruit data, and which can also incorporate environmental variables such as SST, or Fraser River discharge.¹²⁰⁷ Other models used include naïve models, which forecast abundance based on time series data.¹²⁰⁸
726. Prior to 2010, forecasts were based solely on assumptions about historical returns. DFO has now made changes to the way it conducts pre-season forecasting so that it considers not only the historic levels of returns (i.e. long-term average productivity), but also the returns since the late 1990s (i.e. recent productivity), and the possibility that the poor returns seen in years such as 2009 will continue.¹²⁰⁹ As Sue Grant, DFO's Program Head for Sockeye and Pink Analysis and Fraser River Stock Assessment,¹²¹⁰ testified, the changes made to forecasting in 2010, so that there were three different tables for three different assumptions was a valuable change and aided in framing and explaining the uncertainties in the forecasts.¹²¹¹

¹²⁰¹ Transcript, February 8, 2011, pp. 91-93 (Ken Wilson)

¹²⁰² Transcript, January 17, 2011, p. 29 (Jeff Grout)

¹²⁰³ Transcript, January 26, 2011, p. 1 (Sue Grant)

¹²⁰⁴ Transcript, January 26, 2011, p. 1 (Sue Grant); see also Exhibit 340 (Pre-Season Run Size Forecasts for Fraser River Sockeye and Pink Salmon in 2009, May 2009), pp. 6-7, Tables 1-2

¹²⁰⁵ Transcript, January 26, 2011, p. 3 (Sue Grant)

¹²⁰⁶ Transcript, January 26, 2011, p. 14 (Sue Grant)

¹²⁰⁷ Transcript, January 26, 2011, p. 5 (Sue Grant)

¹²⁰⁸ Transcript, January 26, 2011, p. 5 (Sue Grant)

¹²⁰⁹ Transcript, January 17, 2011, pp. 29-30 (Jeff Grout); Transcript, January 26, 2011, pp. 20-21 (Sue Grant)

¹²¹⁰ Exhibit 350 (CV of Sue Grant)

¹²¹¹ Transcript, January 26, 2011, pp. 33-34 (Sue Grant)

727. As in-season data becomes available, pre-season forecasts become less and less useful.¹²¹² For this reason, DFO and the FRP are to focus their management on the assessment of actual returns, and not on pre-season forecasts.¹²¹³
728. As Mr. Lapointe testified, two thirds of the variations in returns cannot be explained, so there is definitely room to improve our forecasting methods.¹²¹⁴ There are legitimate questions whether DFO (or any regulator) can do pre-season forecasting of salmon abundance effectively.¹²¹⁵ Some of the options for what can be done, as noted by Dr. Randall Peterman, the Canada Research Chair in Fisheries Risk Assessment and Management at SFU,¹²¹⁶ include: (1) Improving (a) in-season monitoring; (b) updating forecasts in-season; (c) linking in-season decisions to those updated forecasts; (2) increasing monitoring of the ocean environment by way of satellites, at-sea sampling, tagging programs, etc.; (3) conducting more research on the links between ocean and salmon survival rates; (4) reducing loss of fish due to harvesting or en-route mortality; (5) considering comparisons between weather forecasting and pre-season forecasting of salmon abundance; and (6) reducing expectations about accuracy of forecasts of salmon abundance.¹²¹⁷
729. The FNC submits that the central challenge with forecasting is not that the forecasts are “inaccurate” *per se*, but rather that the uncertainties associated with the forecasts (including uncertainties in the escapement data, recruit data, variables in inter-annual survival, in model forms, and in future survival)¹²¹⁸ are downplayed or poorly communicated.¹²¹⁹ In addition, the forecasts tend to be oversimplified and used by the public as an indicator of likely returns, as opposed to their purpose which is to show the range of returns that could come back – which could vary, for example, from 3.6 million returns, to 36.6 million.¹²²⁰

¹²¹² Transcript, January 26, 2011, p. 48 (Sue Grant)

¹²¹³ Transcript, January 17, 2011, p. 31 (Jeff Grout)

¹²¹⁴ Transcript, January 20, 2011, p. 14 (Mike Lapointe)

¹²¹⁵ Exhibit 334 (Peterman, Can we do pre-season forecasting effectively? If not, what can we do instead? undated)

¹²¹⁶ Exhibit 749 (CV of Randall Peterman, February 9, 2011)

¹²¹⁷ Exhibit 334 (Peterman, Can we do pre-season forecasting effectively? If not, what can we do instead? undated), p. 16, Table 5

¹²¹⁸ Transcript, January 26, 2011, p. 10 (Sue Grant)

¹²¹⁹ Transcript, January 26, 2011, pp. 47-48 (Sue Grant)

¹²²⁰ Transcript, January 26, 2011, pp. 47-48 (Sue Grant)

Recommendation: DFO should improve the way it communicates pre-season forecasts, their meaning, and their associated uncertainties.

730. In addition, Ms. Grant testified that there are certain key areas for data improvement to the forecasts. She identified a need for further research to understand the various mechanisms driving FRSS survival (both in the marine and freshwater environments).¹²²¹ She also noted that utilizing more indicator stocks, as opposed to simply relying on the Chilko stock, which only tells part of the story, would improve DFO's ability to conduct forecasting.¹²²² Finally, she testified that further work is required to "dis-aggregate" the 19 forecasted stocks so that individual CUs could be considered.¹²²³

Recommendation: DFO must develop the data to dis-aggregate the 19 forecasted stocks, so that individual CUs can be considered and forecasts can be better aligned with that of the WSP.

v) Management Adjustments

731. The MA was designed by DFO to increase the likelihood of meeting spawning escapement targets, with one of its intentions being to compensate for the bias in the relationships between the escapement estimates in the lower river (at the Mission hydroacoustic facility) and those in the upper Fraser river.¹²²⁴ Practically speaking, the MA is a number of fish that is added to the escapement target; the figure acts as buffer in the escapement target and accounts for en route mortality.¹²²⁵
732. There are several different kinds of MA models: some use river temperature data, some use river temperature and flow information, and another has quadratic form.¹²²⁶ Others use environmental inputs (such as water temperature, flow, historical discrepancies

¹²²¹ Transcript, January 26, 2011, pp. 6-7 (Sue Grant)

¹²²² Transcript, January 26, 2011, p. 8 (Sue Grant)

¹²²³ Transcript, January 26, 2011, p. 73 (Sue Grant)

¹²²⁴ Transcript, January 27, 2011, pp. 93-94 (David Patterson); see also PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 123

¹²²⁵ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para.

124

¹²²⁶ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para.

135

between Mission and the spawning grounds, incidental mortality, and other factors).¹²²⁷

The FRP decides which MA models will be used for which run-timing aggregates.¹²²⁸

733. David Patterson, DFO's Program Head for EWatch, explained the MA model as follows:

...the MA model itself, what it does is it uses both environmental data, temperature and flow, as well as biological data such as run timing, to predict the difference between estimates. From that prediction from that model, we can then transform the difference between estimates to calculate actual numeric value of the foregone catch that's needed to achieve your spawning escapement target.¹²²⁹

734. Mr. Patterson agreed, as a point of clarification, that the key difference between the MA and the DBE is that the DBE is a calculation that's done post-season, when managers are trying to figure out what the run size actually was (i.e. it is a backwards looking number); whereas the MA is a prospective number that managers use to try to imagine what buffers are needed to achieve a particular escapement target.¹²³⁰ While, the MA does not identify the possible causes of the difference between abundance estimates at Mission and on the spawning grounds it is responsive to the changing environmental or ecological factors.¹²³¹

735. Recognizing that the key drivers influencing spawning migration mortality include, *inter alia*, water temperature, high flow, and water quality,¹²³² in order to predict the number of fish that make it to Mission that will in fact reach their spawning grounds, DFO uses environmental monitoring of Fraser River temperature and discharge levels to evaluate and forecast the influence of fresh water conditions on salmon migratory success.¹²³³ The data used in the MA is collected from DFO's EWatch.

736. In early June, EWatch generates long-range forecasts of lower Fraser River summer temperature and flow conditions using relationships between winter snowpack

¹²²⁷ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 136

¹²²⁸ Transcript, January 27, 2011, p. 100 (David Patterson)

¹²²⁹ Transcript, January 27, 2011, p. 96 (David Patterson)

¹²³⁰ Transcript, January 27, 2011, p. 94 (David Patterson)

¹²³¹ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 125

¹²³² Transcript, January 27, 2011, p. 97 (David Patterson)

¹²³³ PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 126

accumulation, summer air temperatures and river environmental conditions.¹²³⁴ Fraser River water temperatures are provided by real-time data-loggers placed at sites throughout the Fraser Basin operated by EWatch and Water Survey of Canada.¹²³⁵

737. Mr. Patterson testified that it was important to maintain a full dataset of environmental conditions in the river, and that the benefits of temperature monitoring to in-season management and also to “spin-off work” regarding assessing the impacts of climate change.¹²³⁶ The FNC submits that DFO and its partners must ensure that it continues to collect the necessary information that informs the MA models.
738. The FNC submits that the MA is a necessary tool that DFO must continue to use, and refine, as it helps fisheries be prosecuted in a precautionary manner and may continue to assist managers to make necessary adjustments for climate change. Without employment of a MA, managers risk under-estimating ERL and therefore failing to meet escapement needs. As Mr. Patterson testified:

Underestimates of in-river loss can lead to conservation concerns with too few fish reaching spawning grounds due to excess catch, whereas overestimates of in-river loss can result in foregone catch. Therefore, management of the Fraser River sockeye salmon fishery would benefit from identifying MA models that produce the most precise and unbiased prediction of in-river loss.¹²³⁷

739. Patterson succinctly testified that one of the worst decisions management could make would be to not apply a MA at all, regardless of how precise or biased it may be.¹²³⁸ It is the FNC’s submission that continued use and refinement of the MA, together with further education about its necessity, is absolutely critical for both the short and long term sustainability of the FRSS and the prosecution of fisheries in a precautionary manner.

Recommendation: Canada, including DFO and its partners, must secure budgets for and continue to collect the necessary data to inform and improve the MA models. This includes improving both the EWatch program and the State of the Oceans research so

¹²³⁴ Transcript, January 27, 2011, p. 98 (David Patterson); see also PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 130

¹²³⁵ Transcript February 8, 2011, pp. 12, 22-23 (David Patterson); see also PPR 5 (Overview of Fraser River Sockeye Salmon Harvest Management, November 9, 2010), para. 130

¹²³⁶ Transcript February 8, 2011, p. 14 (David Patterson)

¹²³⁷ Transcript February 8, 2011, pp. 5-6 (David Patterson)

¹²³⁸ Transcript February 8, 2011, p. 7 (David Patterson)

that reliable baseline data correlated to FRSS is maintained and improved including, baseline data regarding fresh water (rearing lakes, streams, Fraser river, estuary) and marine (area surface temperature and salinity.)

Recommendation: DFO must continue to employ and refine the MA, and to educate First Nations and stakeholders about its usefulness.

vi) Stock Assessment

740. Stock assessment data is the critical basis for developing fisheries management objectives.¹²³⁹ In the absence of solid stock assessment data, fisheries managers are faced with so many uncertainties that it is difficult for them to meet management's basic escapement goals.¹²⁴⁰ Over the course of this Inquiry, numerous witnesses including Dr. Riddell, Mr. Sprout, Mr. Whitehouse, Ms. Grant, and others have testified to the fundamental importance of stock assessment data. Ensuring that the stock assessment budget is not reduced any more, was one of the key recommendations made by former RDG, Mr. Sprout.¹²⁴¹ As noted by Dr. Riddell, although there may be increased costs to support stock assessment programs, the costs of not doing such work are much higher:

I've always told people that you may not provide enough funds but you've got to keep in mind that just not spending the money here has other costs. And many times these costs are borne by other people. Now, they may be the fishers in the ocean, they may be First Nation fishers, but the absence of information does have a cost and it can be substantial and frequently, much more than the cost of acquiring the data.¹²⁴²

The FNC supports Mr. Sprout's and Dr. Riddell's recommendations that stock assessment programs receive the support they require, and for the reasons set out more fully below, submits that stock assessment programs are critical to ensuring that DFO and other managers of the fisheries have the necessary information to make informed and precautionary fisheries decisions.

¹²³⁹ Transcript, February 2, 2011, p. 30 (Dr. Brian Riddell)

¹²⁴⁰ Transcript, February 2, 2011, p. 30 (Dr. Brian Riddell)

¹²⁴¹ Transcript, December 16, 2010, p. 73 (Paul Sprout)

¹²⁴² Transcript, February 2, 2011, p. 30 (Dr. Brian Riddell)

741. Stock assessment data is used for a myriad of pre-, in-, and post-season purposes including: to understand population dynamics and production of different stocks; to develop run-size forecasts; and to develop post season estimates of total return and look to implications for TAC.¹²⁴³ As it relates to FRSS, DFO currently conducts escapement enumerations on the spawning grounds, estimations at specific juvenile life history stages including fry assessments and smolt assessments on particular systems, limnological assessments, and tagging programs.¹²⁴⁴ DFO also works to evaluate and interpret the data collected in these programs.¹²⁴⁵
742. DFO has also added some components to its basis stock assessment program including: verification components for in-season management so that they can better assess/estimate in-season run strength using the Qualark site to validate the numbers received from the Mission site; additional acoustic tagging programs in marine and freshwater environments to help to understand the dynamics associated with run timing and mortality in-river; and improvements to the EWatch Program, which provides estimates of potential loss rates due to mortality or environmental conditions.¹²⁴⁶
743. Dr. Riddell testified that DFO needs an integrated stock assessment platform throughout the Fraser Basin.¹²⁴⁷ Timber Whitehouse, the Area Chief of the BC Interior Fraser River Salmon Stock Assessment Program,¹²⁴⁸ also testified that in considering the development of an integrated stock assessment platform or network, DFO needs to be forward looking, and seek to understand where the pressures on fish production are coming from, what the impacts from and drivers of climate change may be, and to incorporate the information learned into management practices.¹²⁴⁹ First Nations support the development of an integrated stock assessment platform, and have approached DFO to have their assessment methods and tools incorporated into a network of projects to monitor the fish as they move through the system.¹²⁵⁰ The FNC submits that the development of such an integrated stock assessment platform or network is a necessary

¹²⁴³ Transcript, February 2, 2011, p. 29 (Timber Whitehouse)

¹²⁴⁴ Transcript, February 2, 2011, pp. 4-8 (Timber Whitehouse)

¹²⁴⁵ Transcript, February 2, 2011, p. 3 (Timber Whitehouse)

¹²⁴⁶ Transcript, February 3, 2011, pp. 39-40 (Timber Whitehouse)

¹²⁴⁷ Transcript, February 3, 2011, p. 45 (Dr. Brian Riddell)

¹²⁴⁸ Exhibit 379 (CV of Timber Whitehouse)

¹²⁴⁹ Transcript, February 2, 2011, p. 73 (Timber Whitehouse)

¹²⁵⁰ Transcript, February 3, 2011, p. 64 (Gord Sterritt)

step in ensuring that managers have the data needed to make reasoned decisions in an age of changing production and environmental conditions.

Recommendation: DFO, in partnership with First Nations, should prioritize and identify stock assessment programs for FRSS CUs.

Recommendation: DFO should develop an integrated stock assessment platform or network to better enable managers to have access to the data required to make reasoned decisions in an ever changing environment.

744. First Nations have been seeking more involvement in stock assessment programs in their territories, to both support their co-management aspirations, and to collect and provide data that First Nations require about the number and health of the fish passing through the watershed.¹²⁵¹ This information aids DFO and First Nations in assessing whether and how they can meet FSC needs.¹²⁵² Mr. Sterritt testified about the importance of stock assessment tools and programs such as the in-season abundance and health indicator project, a fishwheel operated in Northern Shuswap territory:

I think it's [the in-season abundance and health indicator project] useful in that it fills in a gap. We have FSC fisheries where we do collect data in some parts of the watershed and within our area, but we don't – we can't rely necessarily on that data that is collected in-season. ...So what we're trying to do is we're hoping to fill in the gaps and inform our fisheries, as well as other fisheries from other First Nations and commercial opportunities within the river ...that that's where we see the information, the usefulness of that fish wheel. Filling in the gaps above Mission, above the canyon and trying to address some missing fish issues.¹²⁵³

745. The FNC submits that DFO must assist First Nations in developing the technical capacity to conduct stock assessment programs in their territories. This could become a

¹²⁵¹ Transcript, February 3, 2011, pp. 66, 71 (Gord Sterritt); see also Exhibit 387 (Email from Gord Sterritt to Timber Whitehouse re: DFO STAD Activities in NStQ Territories for 2009, May 5, 2009)

¹²⁵² Transcript, February 3, 2011, p. 71 (Gord Sterritt)

¹²⁵³ Transcript, February 3, 2011, p. 69 (Gord Sterritt)

more cost effective method for DFO to gather data, and would strengthen the working and co-management relationships between First Nations and DFO.¹²⁵⁴

Recommendation: DFO must have sufficient budgets and direction to support and encourage First Nations' active involvement in stock assessment programs, including those that are more efficiently delivered at the local level.

746. Based on the testimony provided by Dr. Riddell and Mr. Whitehouse, the FNC submits that three specific elements of the existing stock assessment program are critical:
- a. the collection of escapement information, which Mr. Whitehouse noted is the “backbone upon which the rest of management is really built”;¹²⁵⁵
 - b. telemetry work to understand where losses due to environmental conditions are occurring in river and in marine environments;¹²⁵⁶ and
 - c. the Qualark program which serves as a verification on Mission.¹²⁵⁷

Recommendation: As a priority, DFO must maintain and improve its in-season assessments of run size, health, CU make up, and spawning escapement information including: test fisheries, the Mission Hydroacoustic facility, the Qualark Program, escapement data, and genomics and telemetry research at CU level, including fish health.

747. In addition, during his testimony, Dr. Riddell noted three emerging areas that required both science research and stock assessment work, including:
- a. Investigations into downstream survival of smolts leaving the rearing lakes;
 - b. Investigations into early marine survival, including what's limiting early marine survival in the first few months at sea, and how FRSS are actually utilizing the SOG and not into Queen Charlotte Strait; and
 - c. Investigations into the utilization of freshwater habitats and spawning grounds.¹²⁵⁸

¹²⁵⁴ Transcript, February 3, 2011, pp. 67, 73 (Gord Sterritt)

¹²⁵⁵ Transcript, February 2, 2011, p. 72 (Timber Whitehouse)

¹²⁵⁶ Transcript, February 3, 2011, pp. 42-43 (Timber Whitehouse)

¹²⁵⁷ Transcript, February 3, 2011, p. 43 (Dr. Brian Riddell)

748. Dr. Peterman and Dr. Brigitte Dorner also supported further research into estimations of juvenile abundance, either as outmigrating smolts or fall fry – and noted that these additional long-term data sets were needed to permit attribution of causes of future changes in salmon population to mechanisms occurring either in freshwater or marine regions.¹²⁵⁹ The FNC submits that DFO should pursue these additional science and stock assessment areas identified by Dr. Riddell, Dr. Peterman, and Dr. Dorner.
749. Finally, the FNC submits that while enhancing DFO's abilities to do stock assessment on FRSS is essential, this should not be done at the expense of stock assessment programs for other species, including Coho or Chinook. For, as Dr. Riddell and Mr. Whitehouse testified, if DFO loses the capacity to be able to inform management as to the status of other species, DFO may need to institute an increasing amount of fisheries closures due to the uncertainties around the status of co-migrating species.¹²⁶⁰

Recommendation: As a priority DFO must commit the financial and human resources to maintain and improve stock assessment tools, including: (a) those that provide reliable and real time accuracy in season assessment of both the run size, health and stock composition by CU make up of the adult returns and the spawning escapement; (b) salmon status throughout life history at level of CUs (egg to fry to smolt to adult returning), including the priority of developing baseline data on smolt out migration into the marine environment, including estuary, and the Strait of Georgia and along the coastal and ocean migratory route for all CU; and (c) where necessary, and after consultation with First Nations, priority or proxies for CUs should be determined with due consideration of those that may be in the “red” or “amber” benchmark category.; (d) baseline data correlated to FRSS to understand and assess climate changes and its effect in the fresh and marine ecosystems (rearing lakes, streams, Fraser river, estuary) and marine (area surface temperature and salinity), including both the EWatch program and the State of the Oceans research.

¹²⁵⁸ Transcript, February 2, 2011, p. 71 (Dr. Brian Riddell)

¹²⁵⁹ Exhibit 748 (Technical Report #10: Fraser River Sockeye Production Dynamics, February 2011), Recommendation 4

¹²⁶⁰ Transcript, February 2, 2011 (Timber Whitehouse); Transcript, February 3, 2011, p. 51 (Dr. Brian Riddell)

vii) Decision Making and Advisory Processes, including the IHPC

750. The IHPC is intended to provide an opportunity for different interests (including First Nations, representatives from the CSAB, and the SFAB) to come together, provide input on the IFMP and work on fishing plans, and identify potential conflicts.¹²⁶¹ The IHPC is an advisory process, not a decision making process,¹²⁶² the Minister has ultimate authority for approving the IFMP. The IHPC meets approximately four times a year.¹²⁶³
751. The IHPC suffers from the lack of a coordinated process to ensure First Nations representation.¹²⁶⁴ Although Mr. Matthew attends for the SFC, Mr. Shepert attends from the Upper Fraser, Don Hall attends for the Nuu-chah-nulth, and Murray Ned has recently begun attending the South Coast IHPC meetings as an observer from the Lower Fraser,¹²⁶⁵ such attendees do so in a technical capacity and do not carry mandates to negotiate the content of the IFMP with other sectors.¹²⁶⁶ Most of the witnesses who testified in regards to the IHPC noted that First Nations were under-represented at the IHPC, and they were sympathetic to First Nations' calls for a coordinated, Tier 1 approach to assist the IHPC table.¹²⁶⁷ The difficulty in not having mandated First Nations represented at Tier 3 processes, such as the IHPC, is that First Nations attendees are then not in a position to meaningfully contribute to the discussions or help make difficult decisions.¹²⁶⁸
752. A primary reason First Nations are not currently attending the IHPC is that they will not negotiate the protection and exercise their s. 35 Aboriginal rights, particularly their priority s. 35 FSC rights, with other stakeholders.¹²⁶⁹ Like Mr. Jones, Mr. Matthew testified to the inappropriateness of requiring First Nations to engage with DFO and other parties in a multi-stakeholder forum regarding their fishing objectives:

I guess the issue with the IHPC for First Nations is that it's what's called a third-party process, and **many First Nations believe that**

¹²⁶¹ Transcript, January 17, 2011, p. 18 (Jeff Grout)

¹²⁶² Transcript, February 1, 2011, pp. 4-5 (Pat Matthew)

¹²⁶³ Transcript, January 17, 2011, p. 12 (Jeff Grout)

¹²⁶⁴ Transcript, February 1, 2011, p. 8 (Pat Matthew)

¹²⁶⁵ Transcript, February 1, 2011, p. 10 (Pat Matthew)

¹²⁶⁶ Transcript, February 2, 2011, pp. 80-81 (Pat Matthew)

¹²⁶⁷ Transcript, February 1, 2011, p. 8 (Pat Matthew); Transcript, February 1, 2011, p. 9 (Gerry Kristianson); Transcript, February 11, 2011, p. 34 (Jeffrey Young); Transcript, January 21, 2011, pp. 47-48 (Jeff Grout); Transcript, January 25, 2011, p. 33 (Jeff Grout)

¹²⁶⁸ Transcript, January 17, 2011, p. 77 (Barry Rosenberger)

¹²⁶⁹ Transcript, February 2, 2011, p. 81 (Pat Matthew)

their interests around fisheries management should be represented in a government-to-government fashion with DFO or some other form of federal government, and in a bilateral fashion. And that's one of the, I guess, issues with First Nations attending to this process is it may not be the appropriate place they believe to have their Aboriginal rights interests dealt with in a fashion with DFO.¹²⁷⁰

753. Although DFO insists that the IHPC is not the location to discuss Aboriginal rights, the fisheries management decisions in the IFMP have potential impacts on the exercise of Aboriginal and treaty rights, and therefore require consultation and, where appropriate, accommodation. The FNC submits that given the nature of the decisions made in the IFMP, and the fact that the IFMP guides the decision making process that occurs in-season at the FRP, it is critical that First Nations have an opportunity, on a Tier 1 level, to discuss these issues with DFO. The IHPC process as it currently stands assumes that Tier 2 discussions have already occurred, but as Mr. Matthew testified, this is not the case:

... one of the problems with the IHPC is that there's an understanding, and I believe it's in the terms of reference, that those discussions about First Nations fishing rights or their interest around conservation and management will have taken place at other venues before the IHPC, with DFO in a bilateral sense in that they're already taken care of in another situation, and that those things should not be discussed at the IHPC. But the problem in that is where the IHPC is meant to discuss the IFMP in which their conservation measures and, I guess, fishing plans, those sorts of things, are in the document that have potential impact in how they're dealt with to First Nations fishing interests. So there's all kinds of...problems with the purpose and intent of the IHPC as First Nations are concerned.¹²⁷¹

754. DFO has recognized the difficulty for First Nations to come to these processes when they are still trying to have their rights affirmed.¹²⁷² Mr. Rosenberger testified that DFO would like to see a process developed, through the Roadmap Initiative, that would allow First Nations representatives to feed into representative processes like the IHPC, or the FRP, or other management processes.¹²⁷³ The FNC submits that the challenges of securing meaningful First Nations representation at the IHPC underscores the

¹²⁷⁰ Transcript, February 1, 2011, p. 11 (Pat Matthew)

¹²⁷¹ Transcript, February 1, 2011, pp. 20-21 (Pat Matthew)

¹²⁷² Transcript, January 17, 2011, p. 78 (Barry Rosenberger)

¹²⁷³ Transcript, January 21, 2011, pp. 48-50 (Barry Rosenberger)

importance of developing and properly resourcing Tier 1 and Tier 2 processes, as discussed in full above.

755. Another challenge with or critique of the IHPC process and the IFMP itself is the lack of attention that is paid to conservation. Mr. Matthew testified that the concept of conservation cannot and should not be separated from a discussion about harvest:

Q ...The question was: Do you think the IHPC is too heavily weighted in favour of harvesting?

MR. MATTHEW: I do. **I don't think you can separate conservation from harvest, and as I mentioned earlier, most of the discussion at the IHPC is about harvesting and harvest opportunities. I don't hear a lot of the discussion being about how the sectors are going to develop conservation plans or measures within their own groups to protect stocks of concern. Those are identified in the IFMP, but I don't hear a lot of discussion about how, in particular, each sector is going to do that at the meetings.** I guess the only thing that I hear or discussed a lot is about harvesting. And the pilot projects that DFO and sectors work on, including our own, are really about how to reorganize the fishery in terms of share-based fishing, those sorts of things, the administration of the fishery. Those pilot projects aren't about conservation. They don't describe, within their fishing plans, how they're going to protect stocks, what data they're going to collect to do that in the marine areas, or in other areas. Our fishery, our commercial fishery, had, in the last couple years, in Kamloops Lake, DFO forced us to collect DNA and scale data, manage our fishery in a selective manner to protect weak stocks, and we've attempted to do that. And I don't see those same measures being applied or talked about at the IHPC.¹²⁷⁴

756. Mr. Young also testified to the need for DFO to more closely align the IFMP with the WSP and to identify within the IFMP, the CUs that are in the red zone, and to spell out, in a measurable form, the conservation planning that will take place.

...it's my belief that conservation objectives are the first priority in terms of fisheries planning, and that if DFO is more clear about exactly what conservation objectives they were prioritizing and going to meet in a year, it would be a lot easier for us to evaluate – and participants, I think, to evaluate and IFMP or issues that come up at the IHPC more easily.

Q Can you give me an example of what you would be looking for?

¹²⁷⁴ Transcript, February 1, 2011, pp. 12-13 (Pat Matthew)

MR. YOUNG: I think the Wild Salmon Policy provides a fairly clear direction in terms of defining conservation for the purposes of fisheries management. So, for example, identifying conservation units and limit and target reference points ... sorry, lower and upper benchmarks for each conservation unit. For example, if we have identified conservation units that are in the red zone, specific conservation planning needs to be undertaken and knowing that that's the policy and that's the requirement of DFO for fisheries planning, I think it would be a lot more effective kind of framework for participants to discuss how we best meet those objectives.¹²⁷⁵

757. Mr. Young added that although DO has made some improvements to the IFMP and is now including some conservation objectives for some stocks, many of these conservation objectives are general and hard to measure, and are not included in a comprehensive way, as contemplated by the WSP.¹²⁷⁶

Recommendation: DFO must include within the IHPC advisory process efforts to improve the understanding of the WSP and to develop measures to sustain and protect CUs, including the use of selective fishing methods. Specific and measurable conservation objectives consistent with the WSP must be included in the IFMP.

758. There is a lack of clarity regarding what happens with the IFMP after the IHPC completes its advisory function, and a lack of transparency regarding what is ultimately provided to the Minister in relation to the IFMP.¹²⁷⁷ The FNC remains concerned that Tier 2 processes developed between DFO and First Nations, as well as the existing Tier 3 processes, such as the IHPC, may continue to be undercut by lobbying that occurs after the IHPC meetings have closed. For example, in 2009, when Minister Shea approved the IFMP, she made the following telling notation: "need to ensure we maximize opportunities for commercial fisheries."¹²⁷⁸ Although only the Minister could provide an explanation as to why she made such a notation, the FNC is concerned that such a comment reflects a prioritizing of certain commercial interests over DFO's management priorities of, first, ensuring conservation, and second, honouring its obligations to ensure First Nations have priority access to fish for FSC purposes. The

¹²⁷⁵ Transcript, February 11, 2011, pp. 36-37 (Jeffrey Young)

¹²⁷⁶ Transcript, February 11, 2011, p. 37 (Jeffrey Young)

¹²⁷⁷ Transcript, February 1, 2011, pp. 34-35 (Pat Matthew)

¹²⁷⁸ Transcript, January 17, 2011, p. 84 (Barry Rosenberger); see Exhibit 326 (Briefing Note to Minister, Pacific Region – Pacific Regions Approval of 2009-2010 Integrated Fisheries Management Plans for Salmon in Northern and Southern BC, May 28, 2009) or Exhibit 327 (Briefing Note to Minister – Approval

FNC finds it troubling and revealing that the Minister did not indicate a need to ensure that DFO maximize spawning escapement, or maximize opportunities for First Nations FSC access. This is of particular import, given that the 2009 FRSS season was alarmingly poor.

Recommendation: As an immediate sign of good faith and incentive, DFO must increase First Nations representation on the FRP to 50 percent of the Canadian caucus. To build the necessary accountability, First Nations representatives should be appointed to the FRP using Tier 1 processes.

759. The primary in-season decision-making process for the prosecution of fisheries on FRSS is the FRP. The FRP oversees the commercial harvest of FRSS and pink salmon in the FRP waters, and is responsible for developing fishing plans, in-season decision rules, and in-season harvest regulation within FRP waters.¹²⁷⁹ Mr. Shepert and Grand Chief Malloway are the current First Nations “representatives” on the FRP. The term representative, however, is misleading as there is no mechanism for First Nations representatives on the FRP to be accountable to First Nations on the Fraser River.¹²⁸⁰ Both the current Canadian Chair of the FRP, Mr. Rosenberger, and the past Chair, Mr. Sprout, have expressed views that First Nations representation at the FRP should be increased.¹²⁸¹ In February of 2009, Mr. Sprout indicated during a PSC meeting that First Nations representation on the FRP should be increased to 50%, and that such increased participation should reflect the diversity of the Fraser watershed and of the interests that were being brought forward.¹²⁸² Mr. Sprout and Ms. Farlinger confirmed this remains their recommendation today.
760. First Nations in British Columbia have made numerous calls for a FRP representative process. Given the importance of the decision-making powers of the FRP, the FNC submits that First Nations voices must be meaningfully heard and considered. The FNC submits that First Nations representation at the FRP should not be *ad hoc*, but rather

of 2009-2010 IFMPs for Salmon in Northern and Southern BC, with attachments, May 14, 2009) for the asterix

¹²⁷⁹ PPR 4 (Overview of the Pacific Salmon Treaty and the Pacific Salmon Commission, October 18, 2010), p. 23

¹²⁸⁰ Transcript, February 2, 2011, p. 78 (Pat Matthew)

¹²⁸¹ Transcript, January 25, 2011, pp. 27-28 (Barry Rosenberger)

¹²⁸² Transcript, January 25, 2011, pp. 27-28 (Barry Rosenberger)

that representatives should be appointed using Tier 1 structures, and the FRP number of First Nation appointments on the panel be more representative.

viii) Revisioning Fisheries: Moving to Terminal and Near Terminal River Fisheries

761. Through its policies (such as the WSP, the Selective Fishing Policy, and the Aboriginal Fisheries Policy), and its programs (such as PICFI and the Allocation Transfer Program), DFO has recognized that if it hopes to prosecute fisheries now and into the future, it must shift from the old ways of doing business, and must undertake sustainable fisheries. As recognized by Associate Deputy Minister David Bevan, managing fisheries to protect weaker stocks is one such move:

Q ...Now, the question that I would have for you is would you agree that the same view applies with respect to weak stock management of Fraser River sockeye? And what I mean by that is if the Department of Fisheries ...wants to be a conservation organization, it could stop all fishing of all Fraser stocks, but would you agree that the people of Canada do not want to stop all fishing of all stocks on the Fraser River to protect the weak stocks?

BEVAN: As noted by the Deputy, it's the ministers, and the government, and parliamentarians that provide us with broad policy guidance. **We are charged on behalf of Canadians to manage the ocean spaces, aquatic ecosystems and the fisheries resources to sustain an economic activity, but also, as I said, it has to be sustainable.** So I don't think that people want us to shut down all activities in order to create a oceans park that nobody gets to use and that we, therefore, preserve it. **And I think what we are looking at is the balanced approach between maintenance of biodiversity and maintenance of the ecosystem so that today's generation and future generations will have an opportunity to have an economic activity and to sustain themselves in other ways, it's not just money, on those resources. We don't believe we can actually do that with the old models. The old models, we have seen not just in the Pacific, we have seen that when we fish too hard and simplify populations, that they become very susceptible to ecological shock and then they're gone and no longer able to sustain communities, et cetera. So we have learned, and we are supported in this process by ministers and that, to us, is where we receive the mandate from the public through a process that's supported through Parliament.** We, of course, as Mr. Sprout, has gone – has explained, we have dialogued with people with a wide variety of views and we try to come to a balanced approach that looks at that. **So we haven't gone out**

and done a poll as to whether or not weak stock management is your preference. We know that there are certain people who want to go back to the old way of doing business. We don't think that in the current environmental conditions that would be sustainable for any length of time and that it would be a problem for future opportunities, anyway. So it's not a model that we would recommend and it's not where we are at this time. So no polls were done, but I think in terms of the collective views that we have received from stakeholders in our broad consultations, that we have landed on the right balance.¹²⁸³

762. The need to look for innovative options to manage fisheries and fishing impacts that would optimize spawning escapement and encourage a greater sharing of the fisheries benefits, was identified by the FRST, and its representatives, including Dave Barrett, Dave Moore, Craig Orr, and Mr. Wilson, in their discussion paper *Beyond the Fraser Mixed Stock Fishery: Options for Voluntary Implementation*.¹²⁸⁴ One of the suggestions advocated by the FRST, back in 2007, was the voluntary reshaping of the fisheries using cooperative terminal and selective fisheries to harvest stronger stocks while avoiding stocks of concern. As has been noted by many witnesses in this Inquiry, including the Director of PICFI, Julie Stewart, Mr. Rosenberger, Mr. Jones, and others, DFO must continue to move away from mixed stock fisheries (i.e. the "old way of doing business") towards more terminal fisheries that will put less pressure on weak stocks.¹²⁸⁵ As noted by Ms. Stewart, and Ms. Farlinger, and others, moving to in-river terminal fisheries, supported by PICFI, is very much tied to DFO's implementation of the WSP, and is a solution to "the mixed stock fishery problem."¹²⁸⁶
763. PICFI is aimed, in part, at achieving environmentally sustainable and economically viable commercial fisheries, where conservation is the first priority, and First Nations aspirations to be more involved in commercial fisheries are supported.¹²⁸⁷ As noted in DFO's 2010 evaluation of PICFI: "Moving towards a terminal fishery for salmon should lead to significant benefits from increased selectivity and lower costs of capture."¹²⁸⁸ Stewart testified as follows:

¹²⁸³ Transcript, November 2, 2010, pp. 75-76 (David Bevan)

¹²⁸⁴ Exhibit 348 (Beyond the Fraser Mixed Stock Fishery, draft, June 29, 2007)

¹²⁸⁵ Transcript, July 5, 2011, pp. 65-66 (Barry Rosenberger); Transcript, August 19, 2011, pp. 11-12, 91 (Julie Stewart); Transcript, June 30, 2011, p. 29 (Russ Jones, Chief Nang Jingwas)

¹²⁸⁶ Transcript, September 22, 2011, p. 64 (Susan Farlinger); Transcript, August 19, 2011, p. 59 (Julie Stewart); Transcript, January 25, 2011, p. 46 (Jeff Grout)

¹²⁸⁷ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 3

¹²⁸⁸ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 5

...There is the element of providing some economic opportunity for First Nations, but primarily the idea of having in-river fisheries is to provide for a more sustainable way of fishing, by allowing for movement of the catch effort into the inland and avoiding weak stocks. Right now, coastal fisheries are often influenced by the fact that there are weak stocks that need to be avoided. And so fishing cannot happen until those weak stocks have moved through, and that affects the viability of the commercial salmon industry. With a move to a defined share kind of a approach, which is buttressed by enhanced accountability, so catch reporting and catch monitoring so everybody knows what everybody is catching, that provides flexibility to move the activity of catching the fish to the inland areas, and so it allows for better business planning. It allows for better conservation. It allows for flexibilities for the coastal industry and the inland industry to mesh together and to work together collaboratively to maximize the fishery, really.¹²⁸⁹

764. Ms. Stewart also noted that the PICFI program lays the foundation for greater certainty for all industry participants, by working together on a harvest strategy to maximize the value of commercial fisheries within the context of sustainability.¹²⁹⁰
765. In addition, from the FNC's perspective, one of the important aspects of PICFI is that it begins to respond to some of the recommendations made in *Our Place at the Table* regarding increasing First Nations' shares of the fishery, and therefore represents an attempt to address the marginalization of First Nations in commercial fisheries – both historically and in more modern times.¹²⁹¹ On this point, Mr. Jones testified as follows:

...the reason...we identified this in *Our Place at the Table* - and, you know, I've worked with the Haida Nation and other First Nations for 20 years, and every meeting you go to, that's what I hear, is basically we've lost access to the fishery. You know, we used to be ... fishing communities where our young people would learn from, you know, going out with their father or their grandfather. And **the licensing regime that's been put in place...particularly on the Coast...has excluded First Nations through that fishery and it's been through a kind of a market mechanism. This PICFI program is a way of trying to redress... some of those policies and how they affected... the access of my people to the fishery.** Of course, in the Fraser, you know, we heard from Dr. Harris that this happened a hundred years ago, you know, when the weirs were made illegal, right, and

¹²⁸⁹ Transcript, August 19, 2011, p. 58 (Julie Stewart)

¹²⁹⁰ Transcript, September 2, 2011, p. 39 (Julie Stewart)

¹²⁹¹ As explained in exhibit 1747 (Fishing for a Better Future, August 2011), p. 5, both the Davis Plan in 1969 and the Mifflin Plan in the late 1990s marginalized First Nations in commercial fisheries.

the sale of fish was made illegal, we were limited to a food, social, ceremonial fishery. So these steps that the department has taken through the PICFI program are the first step to addressing those longstanding injustices. And they're also – they have to continue, or we will be basically just – we won't be able to resolve some of these longstanding issues. **By identifying 50 percent, we're saying that this is kind of a significant share of the existing fishery. PICFI is a first step, but as I mentioned, that's a sunset program. It ends in March 2012. We had a meeting with First Nations - this is First Nations from the Coast and from the Interior - in June 2nd and 3rd in Richmond where we talked about the PICFI program and where we're going and there was support from all 55 representatives attended for renewal of the PICFI program. We're looking for a little over \$400 million basically to go into continuing the efforts that are started, efforts towards co-management but also efforts towards retiring licences and quota and transferring those to First Nations.** And, Mr. Commissioner, it would make a great deal of difference if you saw the benefit of that and made some clear recommendations about a continuation, you know, of those kinds of efforts that, you know, have started.¹²⁹²

766. The FNC submits that the PICFI program is a direct attempt from DFO to respond to one of the recommendations from *Our Place at the Table* and should be continued.
767. Increasing First Nations' participation in commercial fisheries is consistent with the wishes of the majority of British Columbians. In an independent public survey completed for the FNFC in November 2010, 69% of respondents supported the right of First Nations to sell fish for economic purposes.¹²⁹³
768. Terminal fisheries are a benefit to all as they support the protection of biodiversity needed to facilitate sustainable fisheries. During interviews conducted to support DFO's evaluation of PICFI, First Nations informants representing primarily marine fisheries generally expressed a willingness to accommodate an in-river salmon fishery, given an equitable balance of PICFI support through alternative species.¹²⁹⁴ During this Inquiry, the Commissioner has heard testimony from First Nations that support the transfer of a share of salmon harvest from the mixed stock commercial fisheries to First Nations in-river known stock fisheries.¹²⁹⁵ As noted by Mr. Jones and others, First Nations have

¹²⁹² Transcript, June 28, 2011, pp. 63-66 (Russ Jones, Chief Nang Jingwas)

¹²⁹³ Exhibit 1196 (Replacement FNFC Public Perception Audit, November 10, 2010), p. 10; Exhibit 1747 (Fishing for a Better Future, August 2011), p. 13

¹²⁹⁴ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 20

¹²⁹⁵ Transcript, July 5, 2011, pp. 81-82 (Ernie Crey, Marcel Shepert)

largely supported DFO's commitment, through PICFI, to move towards more terminal and near terminal fisheries and have recognized that an incremental, long term approach to transfer of fisheries access is necessary.¹²⁹⁶

769. In *Our Place at the Table*, the First Nations Panel estimated that \$500 million would be needed to achieve 50% share in fishery for First Nations.¹²⁹⁷ Although Ms. Stewart couldn't say what percentage of the commercial fishery DFO intended to move to terminal areas and open up for First Nations enterprises, she confirmed that DFO has spent approximately \$86 million to date towards licence relinquishments.¹²⁹⁸ So far this has result in DFO acquiring 224 signed relinquishment agreements.¹²⁹⁹ Progress towards securing First Nations access, however, has been slower than anticipated.¹³⁰⁰
770. Through PICFI and ATP, First Nations in the lower Fraser (Chehalis and Skowlitz), mid Fraser (Siska), Thompson (SFC), Okanagan (Okanagan Nation Alliance), Chilko and Quesnel (NSTC), have had the opportunity to become involved in demonstration commercial fisheries that allow an opportunity to test the best fishing locations and selective methods, develop networks of buyers, acquire the necessary infrastructure, and train staff.¹³⁰¹ Mr. Rosenberger testified that good strides had been made in the last year or so, in particular in the Shuswap and Thompson region with regard to terminal fisheries, and that further work was needed to continue assessing the best harvest method.¹³⁰² Mr. Grout noted that, at this stage, further capacity was required to allow terminal fisheries to flourish.¹³⁰³
771. Given that two of the years in which PICFI was operating were years of very low returns, and therefore did not provide for commercial fishing opportunities First Nations, most CFEs have had only limited opportunities to start these operations. Commercial terminal

¹²⁹⁶ Exhibit 1747 (Fishing for a Better Future, August 2011), p. 5

¹²⁹⁷ Transcript, September 2, 2011, pp. 45-46 (Julie Stewart); Exhibit 493 (Our Place at the Table – First Nations in the BC Fishery, 2004), p. 4; Exhibit 1747 (Fishing for a Better Future, August 2011), pp. 1, 8

¹²⁹⁸ Transcript, September 2, 2011, pp. 45-46 (Julie Stewart)

¹²⁹⁹ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 7

¹³⁰⁰ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 7

¹³⁰¹ Exhibit 1747 (Fishing for a Better Future, August 2011), pp. 17-18; Transcript, February 23, 2011, pp. 31-32 (Jeff Grout); Exhibit 1425 (Near Terminal Commercial Fisheries Development Program 2007 Final Report, April 2008); Exhibit 1424 (PICFI-Okanagan Nation Alliance – Pilot Demo Fisheries 2010-2011, March 15, 2011)

¹³⁰² Transcript, January 25, 2011, pp. 36-37 (Barry Rosenberger)

¹³⁰³ Transcript, January 25, 2011, p. 37 (Jeff Grout)

fisheries are, in this way, still very much in their early days.¹³⁰⁴ Ms. Stewart, Ms. Farlinger, and Mr. Bevan all testified that work will continue to be done to assess the viability and profitability of terminal fisheries.¹³⁰⁵ Ms. Farlinger testified:

Part of the reallocation to First Nations to support their increased involvement in the fishery, including the salmon fishery, has included demonstration fisheries in the in-river, in the Fraser River. And demonstration fisheries are intended to be just that, to test how successful those fisheries could be. First of all, meeting conservation objectives, so avoiding mixed stock fisheries, providing additional economic access to First Nations, and thirdly, I guess, whether they can be viable or profitable as an economic exercise. And so the PICFI projects as set out were intended to test those objectives. So what we would eventually do is take that information and provide it to decision-makers in terms of whether this would be permanently implemented, whether this would be continued for some time, or whether it would not go any further at the moment. So that decision, as the Deputy said, has not been made. But the exercise at this point is really to test out the feasibility of those fisheries on both a conservation and an economic scale.¹³⁰⁶

The goal is to ensure the fisheries can provide economic opportunities for communities – not indefinite support from DFO.¹³⁰⁷

772. During workshops held in June 2011, 55 First Nations representatives recommended the continuation of PICFI.¹³⁰⁸ The consensus of those who participated in the workshops, as well as the focus groups and interview sessions associated with DFO's evaluation of PICFI was that there is a continued need for PICFI.¹³⁰⁹ Following the workshops, in August 2011, the Economic Access Working Group of the FNFC released its report, *Fishing for a Better Future*, calling for a continuation of PICFI, and making the business case for its renewal.¹³¹⁰
773. In *Fishing for a Better Future*, the FNFC notes that there is a continued need for PICFI as DFO has been slow to transfer access to commercial fisheries for First Nations to participate. The authors note the many benefits of PICFI, including:

¹³⁰⁴ Transcript, August 19, 2011, p. 21 (Julie Stewart)

¹³⁰⁵ Transcript, August 19, 2011, p. 23 (Julie Stewart), Transcript, September 22, 2011, p. 63 (Susan Farlinger)

¹³⁰⁶ Transcript, September 22, 2011, p. 63 (Susan Farlinger)

¹³⁰⁷ Transcript, September 2, 2011, p. 45 (Julie Stewart)

¹³⁰⁸ Exhibit 1747 (*Fishing for a Better Future*, August 2011)

¹³⁰⁹ Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 15

- a. that it supports several of the goals identified by First Nations, such as sustainability (conserving fish and their habitats to account for the well-being of present and future generations), food security (ensuring opportunities to fish for FSC purposes and adequate fish to meet community needs), meeting economic needs (achieving, as an interim measure a 50% share of all commercial fisheries), management (recognizing First Nations' rights to manage and protect fisheries resources and habitat), and accountability (holding managers and users accountable for their decisions and actions);¹³¹¹
- b. that allocation transfers through buy-backs can reduce the potential for conflict between Aboriginal and non-Aboriginal communities by minimizing the impact of allocation change on non-Aboriginal fishers;¹³¹²
- c. that it can result in savings to Canada;¹³¹³
- d. that it enhances regional economies;¹³¹⁴
- e. that it improves fisheries management;¹³¹⁵
- f. that it provides social benefits to First Nations;¹³¹⁶ and
- g. that it may aid in reducing new court challenges, as it demonstrates a commitment by the Crown to address the question of access;¹³¹⁷

774. Some of the successes of PICFI to date include:

- a. Securing access: a broad range of commercial licences have been secured, converted to communal licenses and distributed to CFEs and such allocations have assisted communities, put First Nations fishers to work, and developed enthusiasm and interest in many communities;¹³¹⁸

¹³¹⁰ Exhibit 1747 (Fishing for a Better Future, August 2011)

¹³¹¹ Exhibit 1747 (Fishing for a Better Future, August 2011), p. 3

¹³¹² Exhibit 1746 (PICFI Evaluation, August 31, 2010), p. 15

¹³¹³ Exhibit 1747 (Fishing for a Better Future, August 2011)

¹³¹⁴ Exhibit 1747 (Fishing for a Better Future, August 2011)

¹³¹⁵ Exhibit 1747 (Fishing for a Better Future, August 2011)

¹³¹⁶ Exhibit 1747 (Fishing for a Better Future, August 2011)

¹³¹⁷ Exhibit 1747 (Fishing for a Better Future, August 2011), p. 2

¹³¹⁸ Exhibit 1747 (Fishing for a Better Future, August 2011), p. 9

- b. Encouraging collaboration between First Nations;¹³¹⁹
- c. Developing experience in comprehensive business planning;¹³²⁰
- d. Enhancing First Nations' capacity to engage in on-going fisheries co-management;¹³²¹ and
- e. Increasing accountability through the introduction of traceability requirements.¹³²²

775. The FNC submits that the successes PICFI has delivered to date should be supported, and the recommendations made by the FNFC in *Fishing for a Better Future* for the renewal of PICFI be accepted. As numerous witnesses testified, terminal or near terminal fisheries are still in their infancy. The FNC submits that in the interests of ensuring the conservation of FRSS in a manner contemplated by the WSP and promoting longer term sustainable fisheries, the PICFI program must be continued.

Recommendation: DFO, working collaboratively with First Nations, should conduct research and develop methods for designing and evaluating stock production frameworks (e.g., FRSSI) and fisheries regimes (mixed stock, known stock, including terminal and near terminal river fisheries and quota fisheries).

Recommendation: DFO, working collaboratively with First Nations, should develop evaluation frameworks to assist in the cost benefit analysis of various stock production and fisheries regimes.

Recommendation: Given the requirements for conservation and biodiversity, and the priority obligation for First Nations' FSC, there should be continued and improved efforts

¹³¹⁹ Exhibit 1747 (*Fishing for a Better Future*, August 2011), p. 9

¹³²⁰ Exhibit 1747 (*Fishing for a Better Future*, August 2011), p. 9

¹³²¹ Exhibit 1747 (*Fishing for a Better Future*, August 2011), p. 9

¹³²² Exhibit 1747 (*Fishing for a Better Future*, August 2011), p. 10

to explore and implement with First Nations terminal and near terminal river fisheries on known stocks in the coastal areas and Fraser watershed.

Recommendation: In the manner initiated under PICFI, DFO must continue to work with First Nations to develop capacity (method and options) for conducting terminal and near terminal river fisheries on known stocks.

Recommendation: DFO must renew PICFI, which will otherwise sunset in March 2010, to continue efforts made to date and better ensure a stable prosperous transition from mixed stock to known stock fisheries.

H. Fisheries Monitoring, Catch Reporting, and Enforcement

i) Fisheries Monitoring and Catch Reporting

776. Sound fisheries management is based, among other things, on sound catch data. Fisheries monitoring and catch reporting allows DFO to have a much improved assessment of the numbers of fish returning, those that are harvested, and those that escaped the fisheries; this information is one component that aids DFO in determining what the status of individual CUs may be in order to better meet the goals of the WSP.¹³²³
777. Historically, fisheries monitoring and catch reporting has been an area that has bred a great deal of mistrust and tension. For First Nations, one of the historical concerns about fisheries monitoring and catch reporting has been a fear about how the numbers

¹³²³ Transcript, May 11, 2011, p. 33 (Matthew Parslow); Transcript, May 11, 2011, p. 51 (Lester Jantz)

would be used by DFO.¹³²⁴ Some have even noted that, as it relates to monitoring and catch reporting, BC's salmon fisheries are suffering from a "crisis of confidence."¹³²⁵

778. DFO employees involved in resource management, fisheries monitoring and catch reporting, such as Les Jantz and Mr. Masson, as well as Ms. Farlinger, have testified that often this distrust is a product of a lack of understanding or a lack of knowledge of the types of monitoring that are occurring in separate fisheries, including First Nations' FSC and economic opportunity fisheries, commercial fisheries, and recreational fisheries.¹³²⁶ As Mr. Masson testified:

I think the expectation of some of the clients out there is that we need to have monitoring of every fishery every day. And when they're out, as an example, when they're out on a sport fishery and they see an FSC boat drift by with a net and there isn't any monitoring in place, they use that as an opportunity to suggest that there's no monitoring in place for that particular fishery. So when in fact there may be monitoring, it might be in another section of the river on that particular day. So I think a lot of it's associated with a level of some lack of knowledge of what the actual catch program is all about.¹³²⁷

In this way, the distrust is often based on false assumptions and stereotypes as opposed to reality.

779. The lack of information and distrust exists not only among the fishing communities, but also, occasionally, within DFO. For example, there are instances of fisheries officers within DFO's C&P using their own anecdotal information to question the systematic fishery monitoring and catch reporting methods that the Resource Management branch utilizes.¹³²⁸ Clearly there is a need to align the understandings about catch monitoring of

¹³²⁴ Transcript, May 11, 2011, pp. 62-63 (Lester Jantz)

¹³²⁵ Exhibit 855 (Charting our Course, Fishery Monitoring in the Pacific Region, April 2011), letter from M&C Panel Chair

¹³²⁶ Transcript, May 11, 2011, p. 70 (Lester Jantz); Transcript, May 12, 2011, p. 4 (Colin Masson); Transcript, September 22, 2011, pp. 20-21 (Susan Farlinger)

¹³²⁷ Transcript, May 11, 2011, p. 60 (Lester Jantz)

¹³²⁸ Transcript, May 11, 2011, p. 29 (Matthew Parslow); Transcript, May 18, 2011, pp. 60-61 (Randy Nelson); see also, for example, Exhibit 849 (Email thread between S. Evers *et al.* re Sockeye #s returned to water, ending August 13, 2009), p. [REDACTED]

fisheries officers with those of the resource managers who are actively involved in this work.¹³²⁹

780. The FNC submits that increasing the awareness, understanding and knowledge about the fisheries monitoring and catch reporting programs and methods currently being used is crucial to overcoming this “crisis of confidence”. Such understanding must be developed within fishing communities, the public, and DFO. This recommendation has been supported and advocated by DFO resource managers.¹³³⁰

Recommendation: DFO should continue to improve the awareness, understanding and knowledge of governments about the fisheries monitoring and catch reporting programs and methods currently being used in all fisheries.

781. Efforts from organizations such as the M&C Panel of the ISDF, the FRST, and the FVAFS are taking the first steps to bring the various fishing groups together to improve the level of knowledge about the catch monitoring programs currently operating in these areas.¹³³¹ From that basis of understanding, the M&C Panel has begun to develop operating principles and guidelines for monitoring and catch reporting that will meet the goals of being consistent and transparent, as well as even-handed in their approach, as outlined in Exhibit 855, *Charting Our Course*.
782. The framework proposed in *Charting Our Course*, which emphasizes the need for transparency and consistency, addresses one of Mr. Jantz’s observations, notably that the absence of a consistent and transparent approach to catch monitoring leads to finger pointing: “Groups are continually pointing fingers at other fishers, other sectors for the level of monitoring that goes on in their fisheries. We hear it on a regular basis. So having some consistency and transparency in how catch monitoring programs are delivered is very important.”¹³³²

¹³²⁹ Transcript, September 22, 2011, p. 23 (Susan Farlinger); see also Transcript, September 2, 2011, p. 51 (Kaarina McGivney) “there’s been recognition that the silos that have been there in the past are not the best way for the Department to operate...”

¹³³⁰ Transcript, May 11, 2011, p. 69 (Lester Jantz, Matt Parslow); Exhibit 850 (Monitoring and Compliance Observations in the Lower Fraser Fishery, October 21-22, 2009)

¹³³¹ Transcript, May 12, 2011, p. 4 (Grand Chief Ken Malloway)

¹³³² Transcript, May 11, 2011, p. 24 (Lester Jantz); see also Transcript, September 22, 2011, pp. 20-21 (Susan Farlinger)

783. Although *Charting Our Course* refers to using “consistent standards to determine monitoring and reporting requirements [that] will be established for all fisheries,”¹³³³ there is, at the same time, recognition in this document that not all fisheries are the same, that they operate at different scales, and at different regimes with different levels of risks, and may therefore require different levels of monitoring.¹³³⁴
784. The FNC submits that DFO should meaningfully consider the Fisheries Monitoring and Catch Reporting Framework presented in *Charting Our Course*,¹³³⁵ as well the Monitoring Standards and Information Requirements it suggests,¹³³⁶ recognizing that the framework and standards have been developed collaboratively by a cross-sectoral group of fishers. This recommendation has been supported by Mr. Jantz who also testified that resources would be required to further this work.¹³³⁷

Recommendations: DFO should implement the Fisheries Monitoring and Catch Reporting Framework, Monitoring Standards and Information Requirements, Strategies, and Next Steps recommended in the ISDF’s *Charting Our Course*.

785. Both Mr. Jantz and Mr. Parslow testified that the fisheries monitoring and catch reporting programs currently in place in the lower and middle Fraser River were “fairly reliable,” offer “fairly good coverage,” and provide “fairly good estimates” of First Nations’ catches.¹³³⁸ When asked to quantify their estimates, both testified that DFO is receiving 90% of First Nations’ catch in the lower and middle Fraser River.¹³³⁹ This is consistent with the observations made by Karl English in Technical Report #7, Exhibit 718, and with the testimony of Grand Chief Ken Malloway.¹³⁴⁰
786. Mr. Jantz testified that the intense First Nations fishery in the mid Fraser River has a “very structured and sophisticated” fisheries monitoring and catch reporting program in

¹³³³ Exhibit 855 (*Charting our Course, Fishery Monitoring in the Pacific Region*, April 2011), p. 7

¹³³⁴ Exhibit 855 (*Charting our Course, Fishery Monitoring in the Pacific Region*, April 2011), p. 10; see also Transcript, May 12, 2011, p. 13 (Colin Masson)

¹³³⁵ Exhibit 855 (*Charting our Course, Fishery Monitoring in the Pacific Region*, April 2011), p. 7

¹³³⁶ Exhibit 855 (*Charting our Course, Fishery Monitoring in the Pacific Region*, April 2011), p. 10

¹³³⁷ Transcript, May 11, 2011, p. 37 (Lester Jantz)

¹³³⁸ Transcript, May 11, 2011, pp. 15-16, 20, 36-37 (Lester Jantz); Transcript, May 11, 2011, p. 16 (Matthew Parslow)

¹³³⁹ Transcript, May 11, 2011, p. 52 (Matthew Parslow); Transcript, May 11, 2011, p. 19 (Lester Jantz)

¹³⁴⁰ Exhibit 718 (*Technical Report #7: Fraser River Sockeye Fisheries and Fisheries Management and Comparison with Bristol Bay Sockeye Fisheries*, February 2011), pp. 29-32; see also Transcript May 12, 2011, p. 23 (Grand Chief Ken Malloway)

place, that involves verification, validation and periodic evaluations of the harvest information received.¹³⁴¹ Mr. Parslow similarly noted that on the lower Fraser River, the FVAFS, an independent organization that oversees monitoring of approximately 23 First Nations fisheries from Port Mann to Sawmill Creek, was doing very important catch monitoring work with and for DFO.¹³⁴²

787. The FNC submits that the Commissioner should find as a fact that the current levels of fisheries monitoring and catch reporting in First Nations fisheries along the Fraser River are more than sufficient to provide fisheries managers with an adequate estimate of the numbers of fish returning, those that are harvested, and those that escaped the fisheries.

Recommendation: When allocating budgets and priorities, DFO can proceed on the basis that the level of fisheries monitoring and catch reporting currently undertaken in First Nations fisheries along the migratory route of the FRSS is more than sufficient.

788. First Nations have been encouraging increased catch reporting for years – noting that the best way to overcome distrust of each others' numbers is to be as complete, open and transparent with the catch reporting as possible. Grand Chief Ken Malloway testified as follows:

Q: We've heard some concerns about incentives for First Nations to under-report. Grand Chief Ken Malloway, what was your response to that type of assertion that there's an incentive for First Nations to under-report their catch?

Grand Chief Malloway: Well, that's something that's been around for quite a few years. I guess the first time that I came across it was in 1985 when I was reading a DFO report about the previous year's fishery and the fellow that wrote the report says, "Well, we ask the Indians how many fish they got and then we double it because they lie." And that struck me as being quite a statement. But Sam Douglas and I talked about it and what we had been talking about at the time was that eventually getting into treaty talks. And we felt it was very, very important to give a true account of the numbers of fish that we caught because eventually we're going to be in treaty talks and we want to have true numbers. We don't want to under-report and say we caught 250,000 fish when we caught 500,000 or a number like that because it would come

¹³⁴¹ Transcript, May 11, 2011, pp. 16, 19 (Lester Jantz)

¹³⁴² Transcript, May 11, 2011, pp. 19-20, 53 (Matthew Parslow)

back and bite us when we're in treaty talks. **So we felt it was very important to give a true number. And so we've been telling each other that and our employees that work for us that our monitors, we keep reinforcing it with them, that we have to give a true number and we have to be credible. There's always somebody monitoring our monitors. There's folks that come in and watch our monitors and observe what's going on. So we've been adamant with our monitors that they have to report the true numbers and we've been also adamant with the fishers that they have to give a true account.**¹³⁴³

789. When it comes to economic opportunity fisheries, First Nations on the lower Fraser have also been willing to adhere to whatever reporting commitments DFO imposed. As Grand Chief Malloway testified:

...We've been under a microscope for years, even prior to 1992 when we signed our first AFS agreement to sell fish. We were under the microscope before then, but especially since then. So we've never ever been opposed to counting every fish. We want to be able to justify our fishery and to say that every fish is being counted, that it is accurate 100 percent.¹³⁴⁴

790. Although First Nations have been willing to submit to the 100% catch reporting requirement for their economic opportunity fisheries in order to address any concerns about their fisheries head on, they are nonetheless concerned about the discrepancy between the level of monitoring and catch reporting required in First Nations' economic opportunity fisheries as opposed to that in commercial fisheries. Grand Chief Malloway testified as follows:

Well, I guess, folks in First Nations areas that I've talked about, they would like to see more even-handed treatment from DFO, as far as enforcement goes and catch monitoring. The compliance in the Fraser Valley fishery is very high and has been very high for a while now. But we, from time to time, hear that when we were on a planning committee call trying to plan a chum fishery, I asked DFO, I said, "How much fish did Area 29 commercial fishermen get two days ago when they went out?" And the answer from DFO was, "We don't know." No, she said, "We don't have a solid number because less than half of them called in their numbers." That doesn't happen in our fishery but it happened there. That was two years ago. So we'd like to make sure that catch monitoring is

¹³⁴³ Transcript, May 12, 2011, pp. 50-51 (Grand Chief Ken Malloway)

¹³⁴⁴ Transcript, May 12, 2011, p. 23 (Grand Chief Ken Malloway)

done on an even-handed basis and that there be measures taken to make sure that compliance is high in all sectors.¹³⁴⁵

791. In First Nations' economic opportunity fisheries, 100% fishery monitoring is required; while in several commercial fisheries 35% fishery monitoring is recognized as a suitable sample to generate a high quality estimate.¹³⁴⁶ DFO justifies the increased monitoring and reporting requirements for First Nations economic opportunity fisheries on the basis that FSC fishing is not separated out from economic opportunity fishing.¹³⁴⁷
792. In 1989, the Stó:ló Nation Society established the FVAFS as the catch monitoring group for the majority of the lower Fraser First Nations – to monitor both FSC and economic opportunity fisheries.¹³⁴⁸ Since the early 1990s, FVAFS has operated independently from First Nations political organizations, and has made efforts to maintain an arm's length distance, such that it can be free from political influence.¹³⁴⁹ The FVAFS' objectives are to assist DFO and First Nations to preserve the sustainability of the fisheries resources by keeping accurate numbers and data on all fisheries.¹³⁵⁰ FVAFS employs 40-60 catch monitors, who ensure that accurate data is being collected from First Nations fisheries operating from Port Mann Bridge to Sawmill Creek. The FVAFS monitors supervise between 20 and 25 access points or landing sites along the lower Fraser River to ensure that fish are counted.¹³⁵¹ In FSC fisheries, monitors speak with between 50% to 60% of the fishers; and in economic opportunity fisheries, the monitors speak with all fishers and count every fish.¹³⁵² Catch information and DNA samples are provided to DFO within 24 hours of the fishery.¹³⁵³ FVAFS also ensures that its monitors are independent from those they are monitoring, such that monitors will not record the catches of fishers to whom they are related.¹³⁵⁴

¹³⁴⁵ Transcript, May 12, 2011, p. 44 (Grand Chief Ken Malloway)

¹³⁴⁶ Transcript, May 11, 2011, pp. 61-62 (Dr. Robert Houtman)

¹³⁴⁷ Transcript, May 11, 2011, pp. 62-63 (Lester Jantz)

¹³⁴⁸ Transcript, May 12, 2011, p. 46 (Grand Chief Ken Malloway); see also Exhibit 858 (FVAFS Catch Monitoring Program 2010)

¹³⁴⁹ Transcript, May 11, 2011, pp. 53-54 (Matthew Parslow); Transcript, May 12, 2011, pp. 23-24, 46-47 (Grand Chief Ken Malloway); see also Exhibit 1011A (Response to Area E – BCFSC Questions by Karl English, April 20, 2011), p. 1

¹³⁵⁰ See Exhibit 858 (FVAFS Catch Monitoring Program 2010)

¹³⁵¹ Transcript, May 12, 2011, p. 48 (Grand Chief Ken Malloway)

¹³⁵² Transcript, May 12, 2011, p. 48 (Grand Chief Ken Malloway)

¹³⁵³ Transcript, May 12, 2011, p. 48 (Grand Chief Ken Malloway)

¹³⁵⁴ Transcript, May 11, 2011, pp. 53-54 (Matthew Parslow); Transcript, May 12, 2011, p. 50 (Grand Chief Ken Malloway)

793. The FNC submits that organizations such as FVAFS, whose important work has been recognized by DFO,¹³⁵⁵ should be encouraged. DFO should continue to reach out to those First Nations that are not yet operating catch monitoring programs, or who have strained relationships with DFO in this area. These recommendations are consistent with the testimony and recommendations of Mr. Parslow.¹³⁵⁶ The FNC further submits that providing long-term funding for such organizations will aid them to better train and retain the qualified individuals who serve as monitors.¹³⁵⁷

Recommendation: DFO should continue to enhance capacity in First Nations organizations to the conduct monitoring, catch reporting and enforcement. Synergies between this work and protection and preservation work should be encouraged.

ii) Fisheries Enforcement

794. DFO organizes its C&P activities into three pillars. Pillar one consists of public education and shared stewardship activities, including classroom education, promotional campaigns and the engagement of community partners, First Nations and other fishing sectors.¹³⁵⁸ Pillar two consists of monitoring, control and surveillance activities aimed at detecting and deterring illegal activities.¹³⁵⁹ And pillar three consists of major cases and special investigations.¹³⁶⁰
795. Randy Nelson, DFO's Regional Director for C&P for the Pacific Region, testified to the importance of developing and fostering relationships between C&P officers and all the user groups.¹³⁶¹ The FNC submits that it is through those relationships and the development of understanding among user groups, and between those user groups and C&P that compliance can be increased. Unfortunately, some First Nations, especially along the lower Fraser River, feel that C&P officers are heavy handed, aggressive, provocative¹³⁶² – and have not paid sufficient attention to truly undertaking meaningful

¹³⁵⁵ Transcript, May 11, 2011, p. 53 (Matthew Parslow)

¹³⁵⁶ Transcript, May 11, 2011, p. 20 (Matthew Parslow)

¹³⁵⁷ Transcript, May 11, 2011, p. 54 (Matthew Parslow)

¹³⁵⁸ Transcript, May 17, 2011, pp. 59-60 (Randy Nelson); see also PPR 13 (DFO Policies and Programs for Fisheries Enforcement, April 19, 2011), para. 66

¹³⁵⁹ Transcript, May 17, 2011, pp. 59-60 (Randy Nelson); see also PPR 13 (DFO Policies and Programs for Fisheries Enforcement, April 19, 2011), para. 74

¹³⁶⁰ Transcript, May 17, 2011, pp. 59-60 (Randy Nelson); see also PPR 13 (DFO Policies and Programs for Fisheries Enforcement, April 19, 2011), para. 97

¹³⁶¹ Transcript, May 17, 2011, p. 64 (Randy Nelson)

¹³⁶² Transcript, May 18, 2011, p. 82 (Scott Coultish)

Pillar 1 activities. Mr. Nelson also recognized that C&P used to do a better job at education, stewardship and relationship building.¹³⁶³

796. The FNC submits that over the last approximately five years, C&P has demonstrated an over-emphasis on intelligence based policing and major case operations, and insufficient attention to relationship building with the various fishing communities and the public, improving understanding, and shared stewardship activities.

Recommendation: C&P should direct more of its attention at Pillar 1 activities such as public education, shared stewardship, and relationship building with First Nations.

797. Another way of bettering relationships with fishing communities, especially First Nations communities, is to re-invigorate the Aboriginal Guardian Program in the Pacific Region. Aboriginal guardians are trained and play a role not only in enforcement matters, but often also in habitat management, stock assessment, and catch monitoring.¹³⁶⁴ In addition, Aboriginal guardians bring with them their knowledge and experience of working in and with First Nations communities and in this way contribute to bettering the relationship between C&P and First Nations. It appears as though DFO is considering reviewing and implementing changes to the Aboriginal Guardian Program.¹³⁶⁵ The FNC submits that DFO, in consultation with First Nations, should restore the Aboriginal Guardian Program; this has been suggested by First Nations leaders and supported by C&P officials including both Mr. Nelson and Mr. Coutlish, as well as by the RDG.¹³⁶⁶

Recommendation: In consultation with First Nations, DFO should restore the Aboriginal Guardian Program.

798. The FNC is concerned about C&P's methods for ranking its operational priorities, and the analysis and information that is used in its determination of the areas on which to focus. Although, according to C&P, it uses (1) priorities articulated in the speech from the throne and other broad policy announcements; (2) the broad objectives of the national business plan for ecosystems and fisheries management; (3) regional priorities

¹³⁶³ Transcript, May 17, 2011, p. 59 (Randy Nelson)

¹³⁶⁴ PPR 18 (DFO Policies and Programs for Aboriginal Fishing, December 2, 2010), pp. 60-61

¹³⁶⁵ Exhibit 695 (C&P Priorities Statement F2010-11 National & Pacific Region, May 27, 2010), p. 2

¹³⁶⁶ Transcript, May 12, 2011, p. 54 (Grand Chief Ken Malloway); Transcript, May 18, 2011, p. 85 (Scott Coulth); Transcript, May 17, 2011, p. 87 (Randy Nelson); Transcript, September 28, 2011, p. 65 (Susan Farlinger)

that are validated through an “integrated risk management” process; and (4) detachment level workplans to set their priorities;¹³⁶⁷ the FNC queries the rigour of such processes, and notes that none appear to involve consultation with First Nations, stakeholders, or the public.

799. Through this process, DFO has identified the following priorities for its activities: (1) Aquaculture; (2) Aboriginal Fisheries; (3) SARA; (4) Canadian Shellfish Sanitation Program; (5) Habitat Compliance; (6) Commercial Fisheries; (7) Recreational Fisheries; (8) Marine Safety & Security (tied for 7); (9) International Obligations (tied for 7); (10) Non-consumptive activities; (11) Oceans.¹³⁶⁸
800. The FNC is concerned that Aboriginal Fisheries ranks so high on C&P’s list of activity priorities, especially when areas such as habitat compliance, and oceans commercial fisheries and recreational fisheries (ranked #5, #11, #6, and #7, respectively) are not receiving the same level of attention or prioritization from C&P. This is especially troubling since from 2000 to 2010, in the Lower Fraser the occurrence level is higher for domestic/recreational fishers than it is for Aboriginal fishers, and in the South Coast, the occurrence level is higher for both domestic/recreational fishers and domestic/commercial fishers than it is for Aboriginal fishers.¹³⁶⁹ Despite this fact, C&P has not undertaken intelligence projects on recreational or commercial fisheries.¹³⁷⁰ C&P in the Pacific Region spend approximately 5% to 600% more time on Aboriginal Fisheries (as a percentage of their work effort) than any of the other 5 regions.¹³⁷¹
801. The FNC is also concerned about the reduced amount of time C&P is spending on enforcing habitat protection measures and regulations.¹³⁷²

¹³⁶⁷ PPR 13 (DFO Policies and Programs for Fisheries Enforcement, April 19, 2011), pp. 21-23

¹³⁶⁸ Exhibit 695 (C&P Priorities Statement F2010-11 National & Pacific Region, May 27, 2010), p. 3

¹³⁶⁹ Exhibit 866 (Commission Counsel’s Information Request Directed to Randy Nelson and DFO’s Responses, April 20, 2011), Q6, p. 48 (PDF)

¹³⁷⁰ Transcript, May 17, 2011, p. 30 (Scott Coultish)

¹³⁷¹ Exhibit 866 (Commission Counsel’s Information Request Directed to Randy Nelson and DFO’s Responses, April 20, 2011), Q2(a)(i), p. 16 (PDF)

¹³⁷² Transcript, May 18, 2011, p. 42 (Randy Nelson); see also Exhibit 866 (Commission Counsel’s Information Request Directed to Randy Nelson and DFO’s Responses, April 20, 2011), Q4, pp. 33-37 (PDF)

Recommendation: C&P should adopt an open and transparent way of setting its activity priorities. Such priorities should reflect conservation concerns, and in particular those that present the greatest risk to fish and fish habitat.

802. Mr. Nelson testified that, during the course of the Inquiry, too much attention was focused on the question of whether fish was being sold illegally.¹³⁷³ The FNC agrees. The Commissioner is mandated to investigate and make findings of fact regarding the current state of FRSS and the causes of decline of FRSS, as well as to consider the policies and practices of DFO with respect to FRSS in order to develop recommendations for improving the future sustainability of the FRSS fishery.¹³⁷⁴ In other words, this Inquiry is largely focused on seeking recommendations to improve conservation of FRSS and the sustainability of the fishery. As recognized by DFO officials, if a fish is caught legally, and has been accounted for, the sale of that fish in and of itself does not raise a conservation concern.¹³⁷⁵ Given that the sale of legally caught and accounted for fish is not a conservation concern, the FNC submits that the Commissioner need not focus attention on the matter of alleged illegal sales of FSC fish.
803. That said, the FNC anticipates that certain participants in this Inquiry may focus on this subject of alleged illegal sales of FSC fish, and may make recommendations for increased resourcing for C&P to address this issue. The FNC strongly disagrees with any recommendation for increased Pillar 3 activities directed at the matter of illegal sales of FSC fish.
804. The FNC submits that intelligence led policing projects and audits, such as Project Ice Storm,¹³⁷⁶ have revealed **no evidence or proof** that fish caught in the FSC fishery is illegally sold.¹³⁷⁷ And audits such as Project Ice Storm have not shown that any offences occurred with respect to illegal sale of fish.¹³⁷⁸ It should be clear that it is not an offence for an Aboriginal person, or anyone else, to process, store and move fish.¹³⁷⁹

¹³⁷³ Transcript, May 18, 2011, p. 78 (Randy Nelson)

¹³⁷⁴ Terms of Reference for the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River

¹³⁷⁵ Transcript, May 18, 2011, p. 67 (Scott Coultish); Transcript, July 5, 2011, p. 80 (Barry Rosenberger)

¹³⁷⁶ Project Ice Storm is described in PPR 13 (DFO Policies and Programs for Fisheries Enforcement, April 19, 2011) at pp. 58-59

¹³⁷⁷ Transcript, May 18, 2011, pp. 46, 47, 78 (Scott Coultish)

¹³⁷⁸ Transcript, May 18, 2011, p. 45 (Scott Coultish)

¹³⁷⁹ Transcript, May 17, 2011, p. 28 (Randy Nelson)

805. Mr. Coultish testified that C&P officers thought that because of the handling, packaging and storing of the fish found in cold storage and audited in Project Ice Storm, that the fish was being illegally sold.¹³⁸⁰ However, under cross-examination, Mr. Coultish conceded that other explanations were possible for why the fish was held in, and from time to time moved out of, cold storage, including that it was being eaten by First Nations community members.¹³⁸¹
806. The FNC is concerned that assumptions held by C&P officers as to why fish were being held in cold storage is based, not on in-depth understandings of First Nations' preparation and the extensive use of FSC fish, nor on independent study and analysis, but rather on C&P officers' "gut instincts" or feelings.¹³⁸² For example, Rob Melvin, the C&P analyst who wrote the Project Ice Storm Report assumed that cold storage of FSC fish was inconsistent with First Nations' patterns of use of FSC fish,¹³⁸³ and yet C&P has not studied this issue, nor spoken with First Nations to better understand their patterns of use of FSC fish. Mr. Coultish testified that C&P analysts, such as Mr. Melvin, do not need a direct linkage or experience with the community they are analysing.¹³⁸⁴ The FNC strongly disagrees. The FNC submits that increased attention to Pillar 1 type relationship building and thereby the development of a better understanding of the fishing communities C&P is policing would aid and inform any Pillar 2 or Pillar 3 work DFO undertakes. If intelligence-led policing is meant to be a "structured process which involves gathering and analysing intelligence, identifying and targeting problems and evaluating results,"¹³⁸⁵ then it is imperative for C&P to engage with First Nations to gather a better understanding of the ways in which FSC fish are prepared, stored, and used, in advance of making any costly, prejudicial and wrong assumptions.
807. Mr. Coultish testified that by far the majority of First Nations who fish on the Fraser river comply with legislation.¹³⁸⁶ The FNC agree, but note that this evidence is completely

¹³⁸⁰ Transcript, May 18, 2011, p. 47 (Scott Coultish)

¹³⁸¹ Transcript, May 18, 2011, p. 48 (Scott Coultish)

¹³⁸² Transcript, May 17, 2011, p. 11 (Randy Nelson)

¹³⁸³ Transcript, May 18, 2011, pp. 70-71 (Scott Coultish); Exhibit 870 (Operational Intelligence Assessment – Project Ice Storm, November 27, 2006)

¹³⁸⁴ Transcript, May 18, 2011, pp. 81 (Scott Coultish)

¹³⁸⁵ PPR 13 (DFO Policies and Programs for Fisheries Enforcement, April 19, 2011), p. 55

¹³⁸⁶ Transcript, May 18, 2011, p. 95 (Scott Coultish)

inconsistent with Mr. Coultish's earlier claim, relying on Exhibit 871, that 97% of all FSC fish harvested in the lower Fraser River is illegally sold.¹³⁸⁷

808. Exhibit 871 is the record of a three-day workshop held in April 2010 and attended by approximately 21 C&P officers, the purpose of which was to conduct work planning for the intelligence and investigations unit within C&P. Under the heading "Issues to Consider" on page 6 of Exhibit 871 is the notation "97% of FSC harvest in LFR is thought to be sold (DFO staff comments)". There is no indication of which staff members made this comment, and there has been no opportunity to cross-examine anyone other than Mr. Coultish and Mr. Nelson on this issue. Under cross-examination, Mr. Nelson testified that he did not agree with the 97% number and emphasized that this does not mean that 97% of First Nations are selling their fish.¹³⁸⁸ Mr. Coultish testified that this number derives from C&P staff comments and is based on their activities and participation in investigations and enforcement.¹³⁸⁹ The FNC submit that this number is not grounded in any clear data or analysis and, like many of the other assumptions of C&P officers revealed in the course of this inquiry is likely grounded more in gut feelings and misconceptions about the scope and nature of FSC fisheries than actual information. The FNC submits that the allegation that 97% of FSC fish is illegally sold is purely speculative and, in the absence of any evidence to support that claim, ought not be given any weight.
809. The FNC submits that groundless estimates made by C&P officials in such a public forum do great harm to the relationships between First Nations and C&P, and also harm the relationships between First Nations and other users of the resource. As Mr. Crey testified:

Q: I'm going to turn to the sale of FSC fish. Mr. Crey, I believe you were here for the hearings on enforcement. One of the CMP [sic] witnesses, Scott Coultish, stated that he believed that close to 97 percent of all FSC fish is sold. What's your reaction to that statement?

MR. CREY: Well, I was here that day and I left this building very unhappy with that allegation. I think it's groundless. I think it's opinion. I've looked after the Stó:lo fishery along with the chiefs

¹³⁸⁷ Transcript, May 17, 2011, p. 33 (Scott Coultish); Transcript, May 17, 2011, p. 78 (Scott Coultish)

¹³⁸⁸ Transcript, May 18, 2011, pp. 78-79 (Randy Nelson)

¹³⁸⁹ Transcript, May 17, 2011, p. 11 (Randy Nelson); Exhibit 870 (Operational Intelligence Assessment – Project Ice Storm, November 27, 2006), p. 6

and actually working closely with the Department of Fisheries and Oceans from 1992 to about 2003 and I myself have fished in the Lower Fraser fishery starting as a young boy of 12 at Hope and every summer since 1984 I've gone home to fish at Cheam. That's where I fish. All the fishermen I know look after their families and their communities and for someone to make a remark like that without any foundation, without any direct evidence, hurt. It hurt the community. When that story hit the *Globe & Mail* I got – I stopped counting the number of phone calls. We go and fish. We fish for our children. We fish for our elders, we fish for our communities. And to have something like that in publication, especially from the mouth of someone working in the department, people that we've worked hard with to improve our working relationship with, that damaged the relationship. Now, I've been left and I'm doing it every day working hard to say look, don't let us let that careless remark interfere with and bring to an end the really important work we're trying to do with people like Barry [Rosenberger] here, whom I have the utmost respect for, and many of the other people like Barry Huber and some of the other DFO employees you see sitting back here. With a lot of difficulty, Mr. Commissioner, I had to go home and work hard to keep this relationship back on track, along with our hereditary chief Ken Malloway. Anyway, the word today from our community is we haven't given up. We're going to keep this working relationship on track. We're going to try to keep it positive, in spite of remarks like that, that are so damaging. People need to understand that our children go to the public school system and the colleges and universities in the Fraser Valley. When a careless remark like that happens and it's happened in the past when my children have come home from school, they've had to fight their way home. They've been spat on.¹³⁹⁰

810. The FNC is concerned about the detachment of C&P from the rest of DFO's branches through the introduction of the line reporting relationship. The FNC submits that it is crucial that C&P officers develop a deeper understanding of the work of other branches within DFO, including and especially resource managers who are involved in catch monitoring programs. The FNC submits that a line reporting relationship, which focuses on ensuring that C&P officers are reporting to people who have enforcement backgrounds,¹³⁹¹ should not be valued over a matrix management model, which focuses on the integration of the various departments of DFO. In addition, the FNC is concerned that the institution of line reporting as led to increased silo-ing within DFO and has impeded the sharing of information necessary to ensuring DFO is meeting its objectives. For example, the FNC is concerned that without the elimination of line reporting,

¹³⁹⁰ Transcript, July 5, 2011, pp. 78-80 (Ernie Crey)

attitudes such as that expressed by Mr. Coultish, that C&P should be provided funding and then left alone,¹³⁹² will flourish.

Recommendation: DFO should re-integrate C&P as part its matrix management model and eliminate the line reporting relationship.

I. Commercial Fishing

i) Allocation

811. Jeff Grout, who is DFO's current chair of both the IHPC and DFO's Salmon Working Group, and is involved in drafting conditions of licence and managing intra-sectoral allocation as well as dealing with inter-sectoral allocation, defined allocation as follows:

At the highest level, allocation refers to how the resource is shared between conservation objectives, and then also harvest by various participants. So there are elements of conservation and that would be fish that are going to the spawning grounds and then harvest by First Nations, recreational, and commercial harvesters.¹³⁹³

812. Mr. Grout went on to describe the difference between inter-sectoral allocation and intra-sectoral allocation. Inter-sectoral allocation is how harvest will be allocated among First Nations, recreational and commercial harvesters. Intra-sectoral is how harvest might be shared within a sector, for example within the commercial sector between the eight commercial salmon fleets.¹³⁹⁴

813. According to Mr. Grout, salmon allocation is guided by DFO's Allocation Policy, which has been in place since 1999.¹³⁹⁵ The implementation of the policy is the responsibility of DFO managers, staff, Mr. Grout and others.¹³⁹⁶ There are seven fundamental principles within the Allocation Policy that guide how the Department intends to allocate the resource, and with respect to how the principles in DFO's Allocation Policy relate to First Nations, Mr. Grout testified as follows:

¹³⁹¹ Transcript, May 17, 2011, p. 73 (Randy Nelson)

¹³⁹² Transcript, May 17, 2011, p. 83 (Scott Coultish)

¹³⁹³ Transcript, February 23, 2011, p. 2 (Jeff Grout)

¹³⁹⁴ Transcript, February 23, 2011, p. 3 (Jeff Grout)

¹³⁹⁵ Exhibit 264 (Department of Fisheries Allocation Policy for Pacific Salmon, October 1999), p.

¹³⁹⁶ Transcript, February 23, 2011, p. 3 (Jeff Grout)

Conservation is the top priority in managing the resource, and as it says there [Exhibit 264, p. 15], conservation won't be compromised in terms of achieving salmon allocation targets. After conservation needs are met, First Nations food, social and ceremonial requirements, and treaty obligations are first in priority. The next point restates the common property nature of the resource, managed by the government on behalf of all Canadians, for both present and future needs. Makes the key point that it does not imply open access, nor does it imply equal access. Minister has the discretion in allocating the resource. The next point on recreational allocation recognizes the priority for recreational fisheries after conservation and First Nations needs are met, from principles 1 and 2, to provide recreational priority for directed fisheries on chinook and coho salmon. And then the second piece that relates to Fraser sockeye in particular is: Predictable and stable opportunities for sockeye, pink and chum salmon. And the policy lays out in further detail what that entails in terms of specific sharing arrangements. Moving then on to commercial salmon allocation, after conservation, priority access for First Nations, the commercial sector has an allocation of 95 percent of the combined commercial/recreational harvest of sockeye, pink and chum, recognizing the historical reliance on those species. There can also be commercial harvest of chinook and coho when abundance permits. And the sixth point is around selective fishing, and encouraging the move to selective fishing, setting aside a proportion of the commercial TAC in some of the early years to explore some alternative gears, harvest technologies. And then over time commercial allocations favouring those that can demonstrate their ability to fish selectively. And then finally in point (7), refers specifically to commercial intra-sectoral allocation among the commercial fleets, and these allocations are established on a coast-wide basis by gear....¹³⁹⁷

814. Under cross examination, Mr. Grout confirmed that: Principle 1, conservation, was the starting point for overall allocation and was a legal requirement under the *Fisheries Act*, and that Principle 2, which relates to food, social and ceremonial requirements and treaty obligations, was a legal requirement and not simply a principle.¹³⁹⁸ The FNC submits that those two allocations are legal requirements under the *Fisheries Act* and The Constitution and as such should guide all harvest opportunities.
815. The FNC also submits that DFO must ensure it enhances its educative role, and help ensure that commercial harvesters understand the legal allocation priorities and that “common property nature of the resource” does not mean open or equal access.

¹³⁹⁷ Transcript, February 23, 2011, pp. 6-8 (Jeff Grout)

¹³⁹⁸ Transcript, February 28, 2011, pp. 68-69 (Jeff Grout)

Recommendation: DFO must improve and implement conservation measures, and meet First Nations' food, social and ceremonial requirements and treaty obligations as allocation priorities in all fisheries management decisions.

ii) DFO Management Initiatives following the Allocation Policy

816. There have been a variety of management initiatives undertaken by DFO since the Allocation Policy was initiated. These were outlined in Mr. Grout's response to a question by the Commissioner about how various initiatives fit together between 1999 and 2011, and how fisheries management is evolving. Mr. Grout testified:

There's a series or progression of moving forward in terms of reforming or looking at potential reforms to the fishery. So we start with the Allocation Policy in 1999, which remains in effect. We have a number of issues, though, and around the reform of the fishery that have been identified, and the paper talks about some of the background. So this is the paper at Tab 27 [Exhibit 269] talks about a number of the changing conditions around the fishery. And it summarizes some of the points that came from the Pearce/McRae Report [Exhibit 729] and also the First Nations report in the previous years [Our Place at the Table, Exhibit 493]. From there, the Department has been working to explore some of the ways that some of the elements that are laid out in the discussion paper around Pacific fisheries reform might be implemented in some of our fisheries...

The Allocation Policy, itself, and the principles therein are the over-arching framework within which we're managing salmon. The principles outlined in this paper [Exhibit 269] are outlining the ways we're trying to implement the vision outlined under Pacific fisheries reform, consistent with the principles we already have in the Allocation Policy.¹³⁹⁹

iii) Demonstration Fisheries and Individual Transferable Quotas/Share-Based Management

817. Mr. Grout explained how demonstration fisheries fit into the evolving nature of fisheries management after 2005. He states:

From 2005 to present, we've looked at demonstration fisheries, potentially, as a way to explore how we might implement elements of what's discussed in that Pacific Fisheries Reform paper. And depending on the year, we've had different proposals made for

¹³⁹⁹ Transcript, February 23, 2011, pp. 37-38 (Jeff Grout)

different species in different areas, and 2008 fits into this part of the puzzle as a year when we were looking at a proposal from three fleets in the south, Area B, D and H at a potential demonstration of how they might manage their shares for Fraser Sockeye, consistent with some of the directions we were trying to take with reforming the fishery...¹⁴⁰⁰

818. Mr. Grout discussed the nature of demonstration fisheries and DFO's desire to move toward SBM and/or ITQs. Exhibit 463, a 2009 information-only Memo for the Deputy Minister, outlined the management approach planned for continued expansion of share-based demonstration projects with commercial salmon fleets for 2009.¹⁴⁰¹ Mr. Grout agreed with Commission counsel's proposition that "the memo suggests a progression and increased effort over time on the part of the Department to work up and develop this trial use of SBM models."¹⁴⁰²
819. In response to Commission counsel asking whether DFO was committed to moving to an SBM management approach for the salmon fishery, Mr. Grout answered: "I think that's a vision that is outlined in the Pacific Fisheries Reform and we're looking for ways that we can move forward with identifying how SBM can work for salmon."¹⁴⁰³ He went on to explain that the intention of demonstration fisheries was to explore how to implement SBM,¹⁴⁰⁴ that demonstrations allowed DFO to explore a broad range of issues in "an incremental way, make adjustments and adaptations to the programs as we essentially learn by doing."¹⁴⁰⁵
820. The impediments identified by Mr. Grout in moving forward with SBM and/or ITQs were as follows:
- a. while in other parts of the world, SBM fisheries have been conducted on species where the TAC can be fixed in advance for the season. For FRSS the TAC changes throughout the season.¹⁴⁰⁶

¹⁴⁰⁰ Transcript, February 23, 2011, p. 37 (Jeff Grout)

¹⁴⁰¹ Transcript, February 23, 2011, p. 34 (Jeff Grout)

¹⁴⁰² Transcript, February 23, 2011, pp. 38-39 (Jeff Grout)

¹⁴⁰³ Transcript, February 23, 2011, p. 49 (Jeff Grout)

¹⁴⁰⁴ Transcript, February 23, 2011, p. 50 (Jeff Grout)

¹⁴⁰⁵ Transcript, February 23, 2011, pp. 51-52 (Jeff Grout)

¹⁴⁰⁶ Transcript, February 23, 2011, p. 50 (Jeff Grout)

- b. **it is not yet clear how the shares can transfer between different fleets and eventually, potentially to First Nations and inland areas and how the First Nation fisheries are part of that framework.** ¹⁴⁰⁷
- c. around ITQs, themselves, there are a number of different ways you could implement a SBM program. I mentioned pooling arrangements before, where groups of vessels can come together to access a share. **There's potentially a communal basis for doing that. For example, First Nations that have a share may be able to licence individual harvesters to fish that share, for example, under a treaty arrangement.** ¹⁴⁰⁸
- d. There's a whole range of different ways that an ITQ can be designed, including limited transferability, or limits to how much transferability that can be in place. So there's different ways you can set up these ITQ styles of arrangements and different potential implications of how you might do that. ¹⁴⁰⁹
821. **DFO's approach toward SBM was described as working with willing fleets and with First Nations, as well as relying somewhat on PICFI to help with some of the obstacles around implementation.** ¹⁴¹⁰
822. However, Mr. Grout stated there were important considerations from others not directly involved in the projects, including recreational First Nation harvesters who have views on how SBM might affect their fisheries in the future. He cited the example of recreational harvesting in the marine area where there was an ITQ-style fishery for Area B and H. In 2010, the fisheries were open for longer periods of time, but fewer vessels were going out. And in the past, recreational harvesters have been used to shored openings, or shore tour openings where the commercial fleet is out and then they disappear for a period of days and they, in their words, get the water to themselves. ¹⁴¹¹
823. **A concern was also identified for First Nations in marine areas who are relying on commercial vessels to help with FSC harvests. Mr. Grout identified the concern**

¹⁴⁰⁷ Transcript, February 23, 2011, p. 50 (Jeff Grout)

¹⁴⁰⁸ Transcript, February 23, 2011, p. 50 (Jeff Grout)

¹⁴⁰⁹ Transcript, February 23, 2011, pp. 50-51 (Jeff Grout)

¹⁴¹⁰ Transcript, February 23, 2011, p. 51 (Jeff Grout)

¹⁴¹¹ Transcript, February 23, 2011, p. 51 (Jeff Grout)

that if First Nations are fishing a quota style arrangements for the entire week, it might provide less time for getting out to fish for their band's FSC needs.¹⁴¹²

824. Although Mr. Grout suggests demonstrations, including demonstrations for SBM and ITQs, are a way for the Department to explore a broad range of issues in an incremental way and make adjustments and adaptations to programs,¹⁴¹³ the FNC submits that SBM/ITQ demonstrations in other Pacific fisheries have led to permanent change without adequate consultation or consideration of First Nations' rights and interests. Exhibit 496 highlights this concern with respect to the halibut fishery.¹⁴¹⁴
825. First Nations' concerns with the Department's move to ITQs was outlined in *Our Place at the Table*.¹⁴¹⁵ **The report recommended a moratorium be placed on the further introduction of individual property rights regimes such as Individual Fishing Quotas [also known as ITQs] unless First Nations' interests including allocations in those fisheries are first addressed.** The reasons cited for the moratorium on ITQs were: ITQ regimes have been established with little or no consultation with First Nations and often against the wishes of First Nations; the Federal and Provincial governments have recognized that these changes have a negative effect on treaties by increasing settlement costs; ITQs also have other effects, such as reducing employment, increasing the costs to individuals entering the fishery, and corporate concentration.¹⁴¹⁶ In *Our Place at the Table*, the First Nations Panel on Fisheries recommended that further introduction of these programs must await the accommodation of First Nations' interests.¹⁴¹⁷

¹⁴¹² Transcript, February 23, 2011, p. 51 (Jeff Grout)

¹⁴¹³ Transcript, February 23, 2011, pp. 51-52 (Jeff Grout)

¹⁴¹⁴ Exhibit 496 (Announcement by the Minister, DFO, February 15, 2011 and letter from First Nations Summit in response re ITQs in Pacific Halibut Fishery, February 16, 2011)

¹⁴¹⁵ Exhibit 493 (*Our Place at the Table – First Nations in the BC Fishery, 2004*) was prepared by the First Nation Panel on Fisheries, which was appointed in 2004 by a steering committee made up of leaders of the First Nations Summit and BC Aboriginal Fisheries Commission. The Panel was asked to articulate a vision for future fisheries management and allocation and to identify what principles would help to achieve that vision. The Panel was also asked to describe a workable framework for management that would provide some certainty to users in terms of access and use of fisheries resources. The Panel held public hearings in seven First Nation communities in February and March 2004 at Kamloops, Prince Rupert, Smithers, Prince George, Fort Rupert, Nanaimo and Chilliwack.

¹⁴¹⁶ Exhibit 493 (*Our Place at the Table – First Nations in the BC Fishery, 2004*), p. 77

¹⁴¹⁷ Exhibit 493 (*Our Place at the Table – First Nations in the BC Fishery, 2004*), p. 77

826. Mr. Grout confirmed that he was aware that a number of First Nations have concerns about ITQs.¹⁴¹⁸ He also confirmed that he was aware of the recommendation made by First Nations in *Our Place at the Table*. In response to the stated concerns, he suggested that “ITQs may assist FSC allocation because if you have a system where your commercial TAC is less likely to be exceeded, that can help with the performance of your conservation, as well as food, social and ceremonial objectives.”¹⁴¹⁹
827. Mr. Grout was not prepared to commit that the department would not move forward on ITQs until issues raised by First Nations were addressed.¹⁴²⁰ All he did state was that the Department was “continuing to work to try and provide opportunities to access those FSC allocations”¹⁴²¹ and “was continuing to purchase licenses from commercial licence holders to provide increased opportunities for economic purposes for First Nations.”¹⁴²²
828. The FNC submits that First Nations continue to have concerns about the implications of implementing ITQs through demonstration fisheries. First Nations are particularly concerned about implementing ITQs when there are unresolved issues relating to FSC allocations and re-allocation for First Nation Economic Opportunities. Despite Mr. Grout’s testimony that ITQs may assist with meeting FSC objectives and that the Department was working to provide opportunities to access FSC allocations and increase economic opportunities, the FNC submits that there are too many unresolved issues that the Department must resolve before moving forward with ITQs. Therefore, before further demonstration projects of ITQs proceed, First Nations need to be properly consulted, and if necessary, accommodated.

Recommendation: No further share-based quotas, including ITQs should be implemented or expanded on FRSS until First Nations have been properly consulted and outstanding allocation priorities have been properly addressed.

iv) Selective Fishing

829. During the Inquiry, selective fishing was described as: “the ability to avoid non-target species or stocks, and if we encounter them in fisheries, having the ability to release

¹⁴¹⁸ Transcript, February 28, 2011, p. 86 (Jeff Grout)

¹⁴¹⁹ Transcript, February 28, 2011, pp. 85-86 (Jeff Grout)

¹⁴²⁰ Transcript, February 28, 2011, p. 88 (Jeff Grout)

¹⁴²¹ Transcript, February 28, 2011, p. 92 (Jeff Grout)

¹⁴²² Transcript, February 28, 2011, p. 93 (Jeff Grout)

them alive and unharmed...”¹⁴²³ First Nations have been using selective fishing methods since time immemorial as a conservation strategy and are continuing to pursue this strategy.¹⁴²⁴

830. Dr. Brent Hargreaves described the reasons why selective fishing strategies were pursued both internationally and in Canada.¹⁴²⁵ With respect to the application of selective fishing to FRSS, he stated:

...I think we can jump forward a couple of decades and realize that there are many stocks of Fraser sockeye that are in poor condition, that have been probably over-exploited or at least have declined to the point that there are conservation risks for those. So selective fishing was seen as one avenue of selectively harvesting the stocks that we have less conservation concerns for and allowing us to harvest those surplus stocks while protecting the stocks that are of lower abundance.¹⁴²⁶

831. Gordon Curry testified: “Where we have issues of by-catch in fisheries that are restricting our ability to fish on target stocks that are abundant, such as abundant portions of the Fraser sockeye stocks, there are other species that we are looking for solutions to be able to avoid them or find gear methods that we can release them alive and unharmed.”¹⁴²⁷
832. As part of Canada’s approach to selective fishing, DFO developed the Selective Fisheries Program,¹⁴²⁸ which was actively pursued by the Department until 2002 when the CFAR program ended. Since 2002, some selective fishing initiatives have continued, particularly with First Nations.¹⁴²⁹
833. Mr. Curry testified that there are various levels to implementing selective fishing, with reference to the Department’s Selective Fishing Policy:

¹⁴²³ Transcript, February 21, 2011, p. 6 (Gordon Curry)

¹⁴²⁴ Transcript, December 14, 2010, pp. 7, 13, 31, 33, 39 (Chief Fred Sampson, Dr. Ron Ignace, Chief Thomas Alexis)

¹⁴²⁵ Transcript, February 21, 2011, pp. 6-7 (Dr. Brent Hargreaves)

¹⁴²⁶ Transcript, February 21, 2011, p. 7 (Dr. Brent Hargreaves)

¹⁴²⁷ Transcript, February 21, 2011, p. 6 (Gordon Curry)

¹⁴²⁸ See Exhibit 439 (Selective Fisheries Policy and Practice, January 1999)

¹⁴²⁹ Transcript, February 21, 2011, p. 71 (Dr. Brent Hargreaves)

One of the first strategies that we use, and I would reference within the selective fishing policy, principle number 4,¹⁴³⁰ lays it out in a way that we look at this whole – **I guess the implementation of selective fishing is really there's four orders of how we look at this, from the perspective of the least harm to potential by-catch. The first order is to avoid the non-target fish or the by-catch as the first order. If you don't encounter it, it's out there swimming, it's still alive and doing well. So if we can avoid it – we do that by predominantly using time and area. So if you're fishing in a place where your stocks of concern don't exist, you're doing fine. You aren't encountering them, you don't have to do anything, you're on the target species. That's the best strategy.**¹⁴³¹

834. Mr. Curry then went on to describe gear design to be able to avoid certain species as by-catch as a second order of selective fishing. The third order or strategy was described as releasing alive and unharmed from the water, with the fourth order or strategy being techniques used onboard a vessel.¹⁴³²

835. Mr Curry went on to explain how the first order strategy, involving time and area, could be implemented. He testified:

So an example of the first strategy of time and area, an example of that would be, for instance, in a First Nations fishery. If a First Nation is fishing in a terminal area right near the spawning grounds of a particular target sockeye that they're fishing, they're fishing very selectively on a species being sockeye, but also to the level of a stock within a group of stocks within the Fraser River. So that's a very selective fishery.¹⁴³³

v) Selective Fishing and Commercial Harvesters

836. Both Mr. Curry and Dr. Hargreaves identified buy-in from the commercial industry as a challenge in implementing selective fishing, both past and present. Mr. Curry testified that support for selective fishing is mixed among commercial harvesters: "...many individuals and representatives have buy-in and are favourable to making changes" but also indicated there are many others that don't.¹⁴³⁴

¹⁴³⁰ Exhibit 266 (Policy for Selective Fishing in Canada's Pacific Fisheries, January 2001), p. 9

¹⁴³¹ Transcript, February 21, 2011, pp. 8-9 (Gordon Curry)

¹⁴³² Transcript, February 21, 2011, pp. 8-9 (Gordon Curry)

¹⁴³³ Transcript, February 21, 2011, p. 8 (Gordon Curry)

¹⁴³⁴ Transcript, February 21, 2011, p. 97 (Gordon Curry)

837. In answer to the question of whether the commercial fishing industry does not buy into selective fishing industry wide, Mr. Curry testified:

there are some very, very committed individuals, committed to selective fishing and looking for solutions. And some of the area harvest committees that I've worked with have a real strong component of individuals that want the tools and ability to adjust their fisheries to be able to solve some of these issues. There are others that are not as strategic as those....¹⁴³⁵

838. Both Mr. Curry and Dr. Hargreaves testified about resistance from commercial harvesters to DFO's imposition of selective fishing methods, including the use of selective grids in seine boats, which Mr. Curry described as a "very compelling selective fishing tool."¹⁴³⁶ According to Mr. Curry, the resistance by some commercial harvesters to selective fishing included pressuring other industry members who were supportive of selective fishing methods.¹⁴³⁷ He testified: "there's certainly a lot of pressure out there to resist change from some sectors."¹⁴³⁸ Dr. Hargreaves testified:

I would agree with Gord that there was in some cases pretty strong resistance. I think one of the outcomes from that was that when the department agreed to let the area harvest associations decide whether they would proceed with using their TAC in their particular, you know, the troll TAC or the seine TAC to proceed with selective fishing almost in every case that the answer was no, we won't do that. We'd rather keep the TAC and not use it for selective fishing.¹⁴³⁹

839. In answer to cross-examination by Counsel for GILLFSC, Dr. Hargreaves agreed that selective fishing is a critical initiative in terms of the management and harvest of the future fishery of this province. Dr. Hargreaves confirmed that DFO has not been pursuing further funding of selective fishing among commercial harvesters, stating: "I think industry has to take some ownership of this and invest themselves, and we haven't seen that."¹⁴⁴⁰

840. He went on to testify as to how selective fishing fits within the Department's implementation of WSP:

¹⁴³⁵ Transcript, February 21, 2011, pp. 66-67 (Gordon Curry)

¹⁴³⁶ Transcript, February 21, 2011, p. 67 (Gordon Curry)

¹⁴³⁷ Transcript, February 21, 2011, p. 67 (Gordon Curry)

¹⁴³⁸ Transcript, February 21, 2011, p. 67 (Gordon Curry)

¹⁴³⁹ Transcript, February 21, 2011, pp. 67-68 (Dr. Brent Hargreaves)

¹⁴⁴⁰ Transcript, February 21, 2011, p. 72 (Dr. Brent Hargreaves)

I believe that this is a significant tool in the toolbox for managing and conserving salmon. I believe for other things, for example, the Wild Salmon Policy, is extremely important too, to conserve and manage salmon properly...I'm looking forward, as a scientist, and what I see is more and more and more constraints being put on as we move particularly towards the conservation unit strategy under Wild Salmon Policy, that right now we are still managing in basically a traditional sense of we have fisheries that are operating on aggregates of CUs. So we're not operating a fishery on a particular CU. We're basically saying there's a group of conservation units of different stocks that are coming through, four main aggregates in the Fraser River, for example, that have a whole bunch of different conservation units within it. And as we go down the path that I see, which is more and more issues around the conservation of different CUs, it's going to become more and more difficult for us to manage in that traditional way. Selective fishing can bridge that gap and maybe even solve it.¹⁴⁴¹

841. He went on to agree with the proposition from counsel for GILLFSC that with the implementation of the WSP, selective fishing becomes a more and more urgent matter to be refined and in a state to implement.¹⁴⁴²

vi) Selective Fishing and First Nations

842. Mr. Curry and Dr. Hargreaves both testified that the Department has had very good buy-in from First Nations when it comes to selective fishing practices and projects.¹⁴⁴³ Mr. Curry testified that DFO have tried a number of First Nation selective fishing demonstration projects:

We've tried a number of projects in inland areas, but what we're looking at doing is taking licences that the Department has purchased from individual licence holders in the commercial fleet. These are licences that have not been reissued and are held in the Department's inventory. And we have two primary programs that have been accessing or purchasing licences, the Allocation Transfer Program, the ATP program, and also the Pacific Integrated Commercial Fisheries Initiative which started in 2007. So we're purchasing licences from commercial fleets. We're using the shares associated with those licences of salmon to provide to demonstration projects in the inland areas of the Fraser. So we've had projects in the Thompson area, parts of the mainstem [sic] and the Fraser, the Siska, in the Lower Fraser, in the Harrison River, with Chehalis and Skowlitz. Chilko and Quesnel have been

¹⁴⁴¹ Transcript, February 21, 2011, p. 72-73 (Dr. Brent Hargreaves)

¹⁴⁴² Transcript, February 21, 2011, p. 75 (Dr. Brent Hargreaves)

¹⁴⁴³ Transcript, February 21, 2011, p. 108 (Dr. Brent Hargreaves); p. 109 (Gordon Curry)

other locations where these projects have been located in the Fraser watershed.¹⁴⁴⁴

One of the First Nation initiatives, River to Plate,¹⁴⁴⁵ was identified by Mr. Curry as a demonstration project in the upper Fraser.¹⁴⁴⁶

843. Two immediate benefits of selective fisheries include: (a) increased conservation of weak stocks; and (b) increased abilities of DFO and First Nations to work together. The conservation, together with assisting First Nations in terminal and in-river areas of increasing abilities of DFO and First Nations to meet their FSC requirements.¹⁴⁴⁷ Another benefit of the Selective Fishing Program was the improved working relationship that was developed between DFO and First Nations. Mr. Curry testified:

...a lot of the First Nations projects were very effective and we had good working relationships. And the Aboriginal sector also worked on pulling together education and training materials and workshops that also went out to communities throughout the province to increase the exposure of selective fishing and the importance of it, whether it was through videos, as well as pamphlets, pamphlets they created to get out to their communities, and so on, as well as the workshop. So it was a very good working relationship.¹⁴⁴⁸

844. However, Mr. Curry identified funding as one of the challenges for pursuing selective fishing initiatives with First Nations. In responding to cross examination by counsel for FNC, Mr. Curry stated:

...they [First Nations and Recreational Harvesters] don't have the ability to take a portion of the catch, sell it and have the resources available to do this work. So then you have to look at strategies of where can you find the resources in terms of what pots of money are out there that are available to secure in order to carry on this work. And that's obviously a much more difficult thing to do than if you have something that's set aside.¹⁴⁴⁹

845. The FNC submits that like in-river terminal or near terminal fisheries that selective fishing, particularly with First Nations, should be part of the implementation strategy of the WSP. The FNC submits that given the benefits of selective fishing for achieving

¹⁴⁴⁴ Transcript, February 23, 2011, pp. 31-32 (Jeff Grout)

¹⁴⁴⁵ Exhibit 450 (From River to Plate 2009 – An Implementation Update and 2008 Activities Report)

¹⁴⁴⁶ Transcript, February 21, 2011, p. 104 (Gordon Curry)

¹⁴⁴⁷ Transcript, February 21, 2011, pp. 104-105 (Gordon Curry)

¹⁴⁴⁸ Transcript, February 21, 2011, p. 98 (Gordon Curry)

conservation goals, for potentially meeting FSC needs, and for building and strengthening collaborative relationships, there should be continued exploration of what selective and in-river terminal and near terminal fisheries projects can be created with First Nations. The FNC also submits that the Department should require the use of selective fishing practices amongst commercial harvesters when the method has proven to be effective through testing.

Recommendation: DFO must increase its use of license conditions to require commercial harvesters to use selective fishing methods.

J. Aquaculture (Regulation and Management)

i) The *Morton* Decision

846. First Nations in BC have lived with finfish and shellfish aquaculture in their territories for over 30 years.¹⁴⁵⁰ In 2009, when the BC Supreme Court (in the decision of *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136) mandated a shift in management responsibilities for aquaculture from the Province to Canada, First Nations saw this court-mandated shift as an opportunity for DFO to address their longstanding concerns regarding the potential impacts to their s.35 rights from fish farms.¹⁴⁵¹ In addition, First Nations treated the changes brought about in 2009 as an opportunity to raise, once again, their concerns about the risks created by this industry, and to remind authorities that, in many cases, it is First Nations that bear such risks.¹⁴⁵²
847. While DFO acknowledged the need to consult with First Nations regarding the development of any new regulatory regime for aquaculture, they had not discharged those obligations prior to issuing the first one-year licence. When DFO applied to the BC Supreme Court to extend the timing for the transfer of jurisdiction, one of the reasons noted for requiring further time, was a need to consult with First Nations. In his affidavit, sworn on November 17, 2009, Trevor Swerdfager, then Director General of DFO's Aquaculture Management Directorate, stated the following:

¹⁴⁴⁹ Transcript, February 21, 2011, pp. 99-100 (Gordon Curry)

¹⁴⁵⁰ Exhibit 1657 (FN Perspectives on a Management Framework for Aquaculture in BC, April 2011), p. 4

¹⁴⁵¹ Transcript, August 31, 2011, p. 7 (Trevor Swerdfager); see also Exhibit 1240 (First Nations' Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 1

¹⁴⁵² Exhibit 1240 (First Nations Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 9

Finally, as noted in the resolutions of the BC First Nations Fisheries Council, First Nations are highly interested in the aquaculture domain in British Columbia and have very clear expectations that they would be effectively consulted in the development of any new regulatory regime established pursuant to the *Morton* decision. There are 203 First Nations in BC we expect may be interested in these consultations. These expectations have been conveyed to be personally by First Nation leaders during workshops held in Vancouver and Campbell River this past June [2009] and to other officials DFO [sic] as well as our Minister in writing since that time.¹⁴⁵³

848. He also swore that any lack of consultation, or perceived lack of consultation or opportunity to provide input would be “unlikely to engender support for the new [aquaculture management] regime and could create legal risks imperilling the entire regulation on the grounds that First Nations in particular were not adequately consulted in its development.”¹⁴⁵⁴

ii) First Nations’ Concerns About the Regulation of Aquaculture

849. The FNC is concerned that DFO has not responded to the numerous concerns First Nations have raised over the last two years since the *Morton* decision, and prior about, *inter alia*:

- a. how wild salmon and their habitats will be protected;
- b. how their Aboriginal title and rights will be recognized within the regulatory and management structures for aquaculture; and
- c. how they can play a role as co-managers in relation to aquaculture.

850. The FNC submits that DFO’s approach to the management of aquaculture, and First Nations’ involvement in such, underscores the need for a more cohesive co-management approach. For this reason, the FNC submits that the narrative of engagement between DFO and First Nations, from the time of the release of the *Morton* decision to the present, is informative and relevant to the Inquiry.

851. In September 2009, the FNFC received a mandate from both the FNS and the UBCIC to engage with DFO and advocate for the engagement of First Nations at the Nation and

¹⁴⁵³ Exhibit 1641 (Affidavit of Trevor Swerdfager, sworn November 17, 2009), para. 51

community level in aquaculture management, regulation and decision-making.¹⁴⁵⁵ The usefulness of the strategic level of engagement on broad policy matters should not be underscored. Both the FNS and the UBCIC passed resolutions confirming the FNFC's mandate. In particular, these resolutions affirmed a set of principles endorsed by First Nations leaders, that:

- a. First Nations “**recognize and respect each other’s autonomy** and support each other in exercising our respective title, rights and jurisdiction”;
- b. “First Nations need to be **engaged from the most initial discussions when farm sites** are being considered within our territories”;
- c. First Nations require “**input into the day-to-day management** of the aquaculture industry, as these decisions directly or indirectly impact on our communities, our title and rights, as well as our ways of life”;
- d. First Nations “require **engagement in the science** that guides decision-making on the management and regulation of the aquaculture industry”;
- e. “as the inherent stewards of our respective territories, we recognize the need to be **involved in the monitoring and compliance** of the industry”; and
- f. First Nations commit to working together to “ensure that any actions taken in respect of the aquaculture industry are **respectful of our rights, title, lands, waters, and resources**, are **consistent with our common cultural belief systems**, and **improve our overall quality of life.**”¹⁴⁵⁶

852. DFO asserted that given the timing of the *Morton* decision, it had limited time to consult with First Nations and others regarding the potential regulatory changes.¹⁴⁵⁷ Given this, the FNFC and DFO co-hosted nine meetings in First Nations’ communities in February and March 2010. These meetings were intended to be an opportunity for DFO to seek input and guidance from First Nations as to the priorities of the proposed federal PAR,

¹⁴⁵⁴ Exhibit 1641 (Affidavit of Trevor Swerdfager, sworn November 17, 2009), para. 52

¹⁴⁵⁵ Exhibit 1638 (BC First Nations Statement of Solidarity on Aquaculture, Sept 18, 2009); Exhibit 1639 (BC First Nations Statement of Jurisdiction on Aquaculture, Sept 18, 2009); Exhibit 1647 (FN Summit Resolution 0909.06); Exhibit 1648 (FN Summit Resolution 0909.07)

¹⁴⁵⁶ Exhibit 1638 (BC First Nations Statement of Solidarity on Aquaculture, Sept 18, 2009); Exhibit 1648 (FN Summit Resolution 0909.07)

and to facilitate some initial dialogue with respect to the nature and the development of the PAR.¹⁴⁵⁸ These meetings were recognized as just being a first step in the dialogue.¹⁴⁵⁹ Andrew Thomson, Director of the Aquaculture Management Division in the Pacific Region, testified that these meetings were “extraordinarily valuable” and noted that First Nations attendees provided input into the drafting of the PAR and into other aspects of aquaculture management.¹⁴⁶⁰

853. Following the community meetings, the FNFC produced a report entitled *First Nations Views on a Proposed Federal Aquaculture Regulation for British Columbia*.¹⁴⁶¹ The Report is a synthesis and interpretation of the concerns that were raised by First Nations participants at the community meetings and was intended to provide guidance to DFO. The Report organized the comments heard at the community meetings into ten overarching themes:

- a. The need for DFO to acknowledge First Nations’ rights and title;
- b. The importance of conserving and restoring wild stocks (including FRSS) and their habitats;
- c. The need to develop improved processes for the co-management of aquaculture, which should include the introduction of an area-based management approaches;
- d. The need to incorporate the recognition of Aboriginal title into the issuance of tenures and licences;
- e. The need to improve transparency;
- f. The need to base management decisions on science and comprehensive environmental assessments;

¹⁴⁵⁷ Transcript, August 30, 2011, p. 25 (Andrew Thomson)

¹⁴⁵⁸ Transcript, August 30, 2011, p. 93 (Andrew Thomson); Exhibit 1240 (First Nations’ Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 2

¹⁴⁵⁹ Transcript, August 30, 2011, p. 93 (Andrew Thomson); Exhibit 1240 (First Nations’ Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 2

¹⁴⁶⁰ Transcript, August 30, 2011, p. 24 (Andrew Thomson)

¹⁴⁶¹ Exhibit 1240 (First Nations’ Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010)

- g. The need to conduct a regulations review and implement adaptive management;
- h. The need for broader and inclusive monitoring;
- i. The need to more stringent enforcement; and
- j. The need to build capacity for improving management and for increased meaningful participation from First Nations.¹⁴⁶²

854. Mr. Thomson confirmed that the themes listed in *First Nations Views on a Proposed Federal Aquaculture Regulation for British Columbia* were familiar interests and concerns, which he had heard uttered by many of the participants at the community meetings.¹⁴⁶³

855. With regard to the first theme noted above, First Nations articulated that the acknowledgment of their rights and title was fundamental, and should inform all other components of the PAR. Further, First Nations were clear that they were seeking a co-management role with DFO in governing and managing aquaculture activities.¹⁴⁶⁴

856. As explored below, the FNC submit that the six principles enunciated in the twin resolutions from the UBCIC and the FNS, as well as the ten themes identified by the FNFC in *First Nations Views on a Proposed Federal Aquaculture Regulation for British Columbia* have not been substantially addressed by DFO in its plans for the management of aquaculture in British Columbia. The FNC submits that DFO must actively accommodate these concerns within their plans for the management of aquaculture. The FNC submits that the recognition of these themes and principles will help to lead to incremental co-management by First Nations over aquaculture.

Recommendation: DFO should adopt the six principles articulated in the First Nation Summit's and the UBCIC's Resolutions, as well as the themes outlined in the *First Nations Views on a Proposed Federal Aquaculture Regulation for British Columbia* and actively address them within their plans for the management of aquaculture in BC.

¹⁴⁶² Exhibit 1240 (First Nations' Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), pp. 6-7

¹⁴⁶³ Transcript, August 30, 2011, p. 6 (Andrew Thomson); see also Exhibit 1240 (First Nations' Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 8

¹⁴⁶⁴ Exhibit 1240 (First Nations' Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 5

857. Following the community meetings, and as DFO progressed towards its assumption of jurisdiction for the regulation of aquaculture (in December 2010), it became clear that DFO was intending to roll-over or grandfather the existing aquaculture licences that had been issued by the Province. Many individual First Nations wrote to DFO to express their concerns about DFO's proposals to roll-over existing aquaculture licences.¹⁴⁶⁵ Many First Nations, such as the Shishalh Nation, put DFO on notice that **"to uphold the honour of the Crown and meet your constitutional duties, DFO is required to consult the Shishalh Nation about all existing (potential roll-overs) and proposed new aquaculture licences."**¹⁴⁶⁶
858. The FNC submits that the rushed and *ad hoc* approach DFO used in relation to its decision to roll-over aquaculture licences, demonstrates a failure to truly appreciate, address, and accommodate the concerns that First Nations had been raising during the community meetings, and otherwise, about the regulation of aquaculture.
859. Prior to making the decision to roll-over existing licences, DFO did not query whether: (1) the Province's siting criteria addressed current concerns or scientific information; or (2) whether the Province had properly applied the siting criteria used to determine the appropriate location of fish farms, which require, *inter alia*, that, (a) aquaculture operations be located at least 1km in all directions from a First Nations reserve, unless consent is received; (b) an appropriate distance from areas of "sensitive fish habitat" as determined by DFO; and (c) not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries.¹⁴⁶⁷ DFO did not query whether the Province had undertaken consultation with First Nations regarding the placing of such farms within their traditional territories or along the migratory route of FRSS; DFO simply assumed that the siting criteria provided a sufficient buffer to protect wild salmon and that they had been applied properly.¹⁴⁶⁸
860. Since the first roll-over decision, DFO has not undertaken any comprehensive studies to address First Nations' concerns regarding the location, size, and number of fish farms

¹⁴⁶⁵ Transcript, August 31, 2011, p. 3 (Trevor Swerdfager)

¹⁴⁶⁶ Exhibit 1654 (Response to Proposed Aquaculture Regulations from Shishalh First Nation, August 24, 2010), p. 1

¹⁴⁶⁷ See Exhibit 1589 (Draft Finfish Aquaculture Application Form), p. 5

¹⁴⁶⁸ Transcript, September 1, 2011, pp. 100-101 (Andrew Thomson)

along the migratory route of FRSS, or the cumulative impacts of such.¹⁴⁶⁹ It appears DFO is awaiting the outcome of this Inquiry before it will take any such action. The FNFC submits that this inaction is cause for concern and demonstrates that DFO is not engaging in good faith consultation and has not yet begun to meaningfully address First Nations' concerns about the existence and location of fish farms in their territories.

Recommendation: With the assistance of the DFO-FNFC Joint Aquaculture Working Group, DFO should develop and implement a consultation protocol, that: (a) identifies the potential impacts, concerns and interests of First Nations (building on the work already completed by the FNFC as outlined in Exhibit 1240); (b) identifies possible accommodation (avoidance, mitigation and compensation) options; (c) identifies the roles of DFO, the Province, First Nations and Industry going forward in the assessment of potential impacts and benefits, mitigation measures and accommodations options; (d) identifies First Nations and organizations who wish to participate, including First Nations along the FRSS migratory route, FRAFS and FNFC; (e) identifies the research studies that will be undertaken, including any strength of claim analysis, impact/benefit analysis, independent scientific research, and any relevant socio-economic analysis, including cost-benefit work; (f) sets out a timeline for the completion of the studies; (g) identifies how Industry must contribute to the cost of this work; and (h) identifies a facilitator to oversee implementation of the consultation process.

861. In August of 2010, the FNFC wrote an open letter to Mr. Swerdfager, providing DFO with both general and specific feedback on the content of the then proposed PAR. The FNFC again noted: (a) its concerns with the consultation process undertaken; (b) the need for First Nations to play a key role in decision making in area-based management; (c) that the draft PAR still contained no mention of First Nations' title and rights; and (d) that there needed to be meaningful follow up to the 60-day window for engagement regarding the PAR.¹⁴⁷⁰ The FNFC also raised several specific concerns regarding the content of the PAR, including that in the proposed PAR DFO was only referring to the benefits First Nations may receive from the aquaculture industry while failing to mention First Nations' many concerns. The FNFC wrote as follows:

¹⁴⁶⁹ Transcript, August 31, 2011, p. 8 (Trevor Swerdfager)

¹⁴⁷⁰ Exhibit 1656 (FNFC Letter to DG Aquaculture Management, August 27, 2010)

...it is offensive to FN that in the opening statement only positive statements are made with respect to FN engagement in aquaculture. There is a total lack of recognition of rights and title, of issues and concerns which have been raised repeatedly by FN with respect to many aspects of the current aquaculture management system. The repeated emphasis in the opening statement about FN receiving benefits from aquaculture companies totally misses the point of the significant issues and concerns which have been repeatedly raised by FN with respect to the aquaculture industry.¹⁴⁷¹

862. Further, the FNFC is concerned that First Nations' central concern, i.e., that aquaculture operations result in infringements to their title and rights, has not been addressed by DFO. The FNFC wrote:

...the Opening statement references many FN receiving funding or program support from aquaculture companies. This statement, put into a positive light, totally missed the point that FN have asserted rights and title upon which aquaculture activities infringe. FN should not have to strike deals after the fact with companies, they should be dealing up front in a decision-making capacity which protects and accommodates their asserted rights and title and allows them a jurisdictional role, not one in which they are fighting for scraps from the industry profits.¹⁴⁷²

863. Around this time FNFC also wrote to Deputy Minister Claire Dansereau to advise of the numerous challenges involved in its work with DFO on the aquaculture file, including the lack of DFO representatives on the joint FNFC-DFO AWG; the lack of progress on a workplan for the AWG; and the lack of capacity provided to the FNFC to assist in engagement. Brenda McCorquodale, former Executive Director of the FNFC, wrote that "this leaves the Council concerned that DFO is leaving a trail which looks like consultation and engagement, without the substance of providing adequate capacity and resources for First Nations to prepare and advance important input into these initiatives."¹⁴⁷³
864. Rather than deal with concerns raised by First Nations in a substantive way in the PAR, DFO decided to articulate the details of its management plan for aquaculture through licence conditions and in further policies and management plans that were to be developed through engagement with First Nations. In an October 20, 2010 letter to

¹⁴⁷¹ Exhibit 1656 (FNFC Letter to DG Aquaculture Management, August 27, 2010), p. 5

¹⁴⁷² Exhibit 1656 (FNFC Letter to DG Aquaculture Management, August 27, 2010), p. 5

¹⁴⁷³ Exhibit 1655 (Email dated August 27, 2010)

UBCIC President Grand Chief Stewart Phillip, Minister Gail Shea stated that “it is the Department’s intent to fund First Nation engagement in the development of the operational policies needed to manage the industry on an ongoing basis and to develop effective First Nation engagement mechanisms.”¹⁴⁷⁴ Given the Minister’s commitment, First Nations expected that DFO’s aquaculture staff would work closely with them throughout the process of drafting and finalizing the aquaculture policies to explore matters in more depth.¹⁴⁷⁵

865. On December 18, 2010, despite the concerns raised by First Nations, DFO rolled-over all existing aquaculture licences.¹⁴⁷⁶ The FNC submits that DFO’s failure to meaningfully consult, including its failure to require that the aquaculture industry complete a comprehensive study to address First Nations’ concerns regarding the siting, size, and number of fish farms within their territories and along the migratory route of FRSS, or the cumulative impacts of such farms combined with other stressors, remains an outstanding concern.

Recommendation: DFO should continue to only grant one-year extension of the licences rolled over by DFO in December, 2010, until the consultation is completed and accommodations have been reached to address potential impacts.

iii) First Nations’ Views on Integrated Management of Aquaculture Plans

866. In January and February 2011, DFO sought to receive feedback from First Nations on its proposed tool for the IM of aquaculture – IMAPs. To this end, the FNFC prepared a discussion paper entitled *Planning for the Development of Integrated Management of Aquaculture Plans and an Advisory Committee Process for Aquaculture*¹⁴⁷⁷ listing several considerations for First Nations, assisted DFO in organizing six community information sessions, and summarized the views and concerns expressed at these

¹⁴⁷⁴ Exhibit 1703 (Letter from Minister Shea to Grand Chief Stewart Phillip, October 20, 2010), p. 3

¹⁴⁷⁵ Exhibit 1240 (First Nations’ Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 16

¹⁴⁷⁶ Transcript, August 30, 2011, pp. 24-25 (Andrew Thomson); PPR 20 (Aquaculture Regulation in BC, July 28, 2011), para. 122; see also Transcript, August 31, 2011, pp. 10-11 (Andrew Thomson)

¹⁴⁷⁷ Exhibit 1241 (Planning for the Development of Integrated Management of Aquaculture Plans and an Advisory Committee Process for Aquaculture: Considerations for British Columbia First Nations, January 24, 2011)

sessions into a report entitled *First Nations Perspectives on a Management Framework for Aquaculture in British Columbia*.¹⁴⁷⁸

867. As detailed in the written reports, and as stated in the meetings, First Nations are concerned with DFO's plans to proceed with IMAPs that are based on the model of the IFMP and the associated IHPC process. In a letter to Mr. Swerdfager, Chief Allan Claxton, Chair of the FNFC, wrote as follows:

DFO needs to clearly understand that **most BC First Nations view the current IHPC processes as dysfunctional, and the Fisheries Council as well as other First Nations organizations in BC have urged DFO to make numerous changes to these processes.** Some of these changes include: increasing the number of seats available on IHPC processes for First Nations; developing a bilateral table at which DFO and First Nation sit down together to specifically address any issues relating to rights and Title; the need for Canada to provide adequate funding (travel, fees, and technical support) for BC First Nations participation (which cannot be expected to be absorbed through the already fully allocated AAROM program); and that First Nations expect to be engaged in science, research, and enforcement, especially with respect to areas where they identify their traditional knowledge should play an important role in management or where there is a high potential of rights infringement. DFO, aware of these concerns, should not be duplicating fundamental structural problems and systemic discrimination which are inherent in other fisheries management processes within the new management regime for aquaculture.¹⁴⁷⁹

868. The FNFC also made a number of recommendations regarding IMAPs, including that:
- a. DFO and the Province need to ensure that adequate capacity and resourcing and adequate timelines for First Nations engagement are built into the planning and management for aquaculture and other issues that have the potential to impact First Nations' title and rights;
 - b. DFO and First Nations should establish a governance mechanism that engages First Nations as an authority with jurisdiction related to aquaculture management;

¹⁴⁷⁸ Exhibit 1657 (First Nations' Perspectives on a Management Framework for Aquaculture in BC, April 2011)

¹⁴⁷⁹ Exhibit 1656 (FNFC Letter to DG Aquaculture Management, August 27, 2010), p. 3

- c. the process related to the management of aquaculture needs to incorporate effective Tier 1, Tier 2, and Tier 3 elements;
 - d. ecosystem units for management of aquaculture should be developed that will link in the future to more broad IFMP development and should facilitate area-based joint management;
 - e. either a separate IMAP, or discrete sections of an IMAP, is needed to relate to the unique factors of each of the aquaculture regions;
 - f. DFO should move to align the management regions for other species with the joint management regions developed for aquaculture management;
 - g. Strong Tier 1 and 2 process at the BC-wide scale should support joint management related to science and policy development;
 - h. First Nations and DFO should begin immediately to develop an assessment of the true costs of First Nations participation in the management of aquaculture, and these costs should be borne by the proponents of aquaculture through licensing fees, and incorporated into the cost of doing business;
 - i. DFO should support First Nations in the development of Marine Use Plans, and the incorporation of those plans into the development of IMAPs; and
 - j. DFO and First Nations should collaboratively develop success criteria and indicators to be incorporated into IMAPs, which will give a fulsome picture of the success of the IMPA and management of the aquaculture industry over the short and long term.¹⁴⁸⁰
869. The FNC submits that the IMAP related recommendations outlined in *Planning for the Development of Integrated Management of Aquaculture Plans and an Advisory Committee Process for Aquaculture* should be implemented.

¹⁴⁸⁰ Exhibit 1241 (Planning for the Development of Integrated Management of Aquaculture Plans and an Advisory Committee Process for Aquaculture: Considerations for British Columbia First Nations, January 24, 2011), pp. 3-5

Recommendation: DFO should implement the recommendations outlined in *Planning for the Development of Integrated Management of Aquaculture Plans and an Advisory Committee Process for Aquaculture*.

Recommendation: DFO must nest the proposed IMAP approach to aquaculture within the government-to-government Tier 1 and Tier 2 process. Through the Tier 1 and 2 processes, and with the assistance of the FNFC, DFO and First Nations will develop a structured and resourced multi-step process that allows First Nations to appoint representatives, discuss management plans bi-laterally, and engage with other stakeholders in an integrated process.

iv) DFO's Latest Policies

870. In the summer of 2011, without meeting with First Nations to engage in the development and drafting of the policies, DFO disclosed for the first time, through the processes established in the Inquiry, a number of its draft policies, including *Ecosystem-Based Approach to Aquaculture Management*,¹⁴⁸¹ *British Columbia Aquaculture Regulatory Regime Identification and Management of Environmental Impacts of Under [sic] the British Columbia Aquaculture Regulatory Regime*,¹⁴⁸² *Aquaculture Licensing Approach*,¹⁴⁸³ *Integrated Management of Aquaculture Plans (IMAP) Guidance*,¹⁴⁸⁴ and other policies on issues of central concern to First Nations. Given Minister Shea's October 2010 commitment to support First Nations' involvement in the development of operational policies, and the fact that the joint FNFC-DFO AWG was established to aid in this regard, the FNFC was shocked to discover that the draft policies exhibited during the course of the Inquiry were not shared in advance with the FNFC or with First Nations more broadly. Further, in stark contrast to the Minister's commitment, Mr. Thomson testified that he did not see the process of developing policies as being a "collaborative" process between DFO and First Nations – but rather that DFO had chosen to take a "blank slate" approach and to draft the policies internally prior to taking them forward to

¹⁴⁸¹ Exhibit 1602 (Ecosystem-Based Approach to Aquaculture Management, undated)

¹⁴⁸² Exhibit 1601 (British Columbia Aquaculture Regulatory Regime Identification and Management of Environmental Impacts of Under [sic] the British Columbia Aquaculture Regulatory Regime, June 29, 2011)

¹⁴⁸³ Exhibit 1600 (Aquaculture Licensing Approach, June 29, 2011)

First Nations for consideration and input.¹⁴⁸⁵ The FNC submits that DFO's commitment to develop and provide resources for effective First Nations engagement in the development of operational policies needed to manage the aquaculture industry must be acted upon.

871. In sum, there has been no real progress to address the substantive concerns and interests raised by First Nations regarding finfish farms.¹⁴⁸⁶ Chief Mountain testified to the general lack of responsiveness, including a lack of interest in First Nations' TEK, that he and his people have experienced with regard to fish farm issues:

...Around the year 1999/2000/2001, where there was a noticeable increase in these fish farms from 1,000 – a 100,000 fish to up to 500,000 or 600,000 fish, we noticed, and our traditional knowledge holders, our clam diggers, our fishermen, and people who lived out in the village, noticed a lot of changes out there to deal with all our resources, clam beds, shellfish, ground fish, and it was brought to the attention of the leadership back then. So there's a big change that traditionally everybody would notice because they live out in the territory and they're on the grounds every day and fishing every day. That's their life. And they've noticed all those changes, and it's been documented and a lot of this information is brought to DFO and they do know.

Q Do you feel that DFO has been responsive to these communications?

CHIEF MOUNTAIN: No. We bring our concerns forward, and it's the same old thing when we meet with them: "We'll come back to you," or, "We'll ask our superiors what to do," and but we do not usually hear anything back and there's no action taken.¹⁴⁸⁷

872. The FNC submits that meaningful involvement of First Nations in the review and application of the siting criteria and in considering the potential impacts of existing fish farms along the FRSS migratory route is required. The evidence presented in this Inquiry clearly establishes that finfish farms may impact on wild salmon, including FRSS and therefore could infringe s. 35 rights.

¹⁴⁸⁴ Exhibit 1604 (Integrated Management of Aquaculture Plans (IMAP) Guidance, undated)

¹⁴⁸⁵ Transcript, September 1, 2011, pp. 93-94 (Andrew Thomson)

¹⁴⁸⁶ Exhibit 1240 (First Nations' Views on a Proposed Federal Aquaculture Regulation for BC, May 7, 2010), p. 1

¹⁴⁸⁷ Transcript, December 15, 2010, p. 25 (Chief Robert Mountain)

873. The FNC further submits that First Nations' involvement in the development of the regulatory regime for aquaculture, including, but not limited to the development and drafting of operational policies, revisions to licence conditions, and input into IMAPs and the processes to be used to develop IMAPs is essential for the just management of the industry.

Recommendation: DFO must meaningfully consult with First Nations on all proposed aquaculture regulations, policies, and licence conditions. Industry should pay for such consultations.

874. The FNC submits that the history of DFO's engagement with First Nations on recent aquaculture issues demonstrates that while policy and technical organizations, such as the FNFC, have been effective in informing First Nations about DFO's regulatory plans and seeking their input on proposed changes,¹⁴⁸⁸ a coordinated Tier 1 and Tier 2 process is required. Mr. Swerdfager agreed with the basic concept of needing to do Tier 1 and 2 work to advance the management of aquaculture.¹⁴⁸⁹
875. In addition, representatives from the aquaculture industry, such as Clare Backman, the Director of Environmental Compliance and Community Relations for Marine Harvest Canada, also agreed that more structure and certainty as to industry's relation with First Nations would be welcome.¹⁴⁹⁰ Mr. Backman agreed that having a written protocol between the aquaculture industry, First Nations, and DFO as to how to conduct necessary research and assess potential risks associated with aquaculture operations would be a good next step to help bring some certainty of operations to industry.¹⁴⁹¹
876. Given DFO's acknowledgement of the need to develop Tier 1 and 2 structures to advance the management of aquaculture, and industry's willingness and desire to gain certainty in regards to its relationship with and obligations towards First Nations, the FNC submits that DFO should encourage and participate in the development of a consultation protocol with First Nations (and industry) that seeks to address First Nations' concerns about the impacts of fish farms on the exercise of their title and rights

¹⁴⁸⁸ Transcript, August 31, 2011, p. 6 (Andrew Thomson) wherein he testified that the work with FNFC on aquaculture issues has been useful and should continue.

¹⁴⁸⁹ Transcript, August 31, 2011, p. 110 (Trevor Swerdfager)

¹⁴⁹⁰ Transcript, September 8, 2011, pp. 92, 96 (Clare Backman)

¹⁴⁹¹ Transcript, September 8, 2011, p. 96 (Clare Backman)

and identifies ways to mitigate such impacts; identifies the roles of DFO, the Province, First Nations and the industry in the regulation, management, monitoring and enforcement of aquaculture operations; and identifies studies that should be undertaken to assess the impacts on FRSS from fish farms. This work needs to proceed.

877. Further, the FNC submits that DFO must continue to use one-year renewals of existing licences until the outstanding consultation and accommodations have been reached. These licences should include the obligation to participate in research studies, including the experimental removal or relocation of the farms.

Recommendation: First Nations' participation in the management and governance, economic opportunities, science and research, and monitoring and enforcement of fish farms must be encouraged and funded. DFO should work closely with First Nations to develop capacity, including trained staff and associated resources required to effectively enforce aquaculture regulations and licenses.

VII. CONCLUSIONS

878. The FNC submits that our recommendations, together with a robust process for ensuring their implementation in a timely and meaningful manner is the way forward for the sustainability of FRSS.
879. This Inquiry was struck with the recognition that we are facing significant uncertainties and changing times, ecologically, socially, legally, politically and economically. In such a situation the *status quo* cannot suffice. The FNC offers its submissions and recommendations for change with the aim of finding a better way forward and of improving the sustainability of FRSS for future generations. Collaboration amongst governments (Canada, the Province and First Nations) and stakeholders must recognize the reality of change and find governance and management systems that are responsive and adaptive.

Recommendation: Given the time and resources invested in the Inquiry, there must be an implementation process for the Commissioner's Recommendations that includes ongoing oversight and accountability. The options identified include: (a) tripartite Government Committee with Federal, Provincial and First Nation appointed representatives charged with evaluating the implementation of the recommendations on an annual basis, including receiving submissions from First Nations and stakeholders; (b) Auditor General oversight/ parliamentary committee which reports annually to Parliament; and/or (c) continued judicial oversight by Justice Cohen.

All of which is respectfully submitted this 17th day of October, 2011.



Brenda Gaertner



Anja Brown



Leah Perce



Crystal Reeves