

Report Title: Fraser River Sockeye Salmon Habitat Analysis: Lower Fraser and Strait of Georgia

Reviewer Name: John Reynolds

Date: 13 January 2011

**1. Identify the strengths and weaknesses of this report.**

This report is reasonably comprehensive, especially given the tight timeline. The maps are a real strength, packed with information and readily understandable, though the print is readable only after zooming in on the electronic version. A weakness is lack of detail in some sections, including any indication of uncertainty in the information, as outlined in my detailed report below. My review is hampered by the fact that the draft that was sent lacks references. This makes it difficult to evaluate the evidence for many of the assertions.

**2. Evaluate the interpretation of the available data, and the validity of any derived conclusions. Overall, does the report represent the best scientific interpretation of the available data?**

The interpretations seem fine. I did not notice any tables of data, which would be helpful as Appendices to enable analyses. Overall, this preliminary draft seems to be on the right track.

**3. Are there additional quantitative or qualitative ways to evaluate the subject area not considered in this report? How could the analysis be improved?**

I did not notice any statistical analyses. Instead, the report relies on visual representations of data through the many graphs and maps. I would have liked to see statistical analyses of area-specific changes in habitat quality versus area-specific changes in sockeye productivity.

**4. Are the recommendations provided in this report supportable? Do you have any further recommendations to add?**

Yes, especially given that many of the indicators of human activity have not worsened over the period of 1990-2010, whereas sockeye aggregate stock productivity has been declining since about 1992.

**5. What information, if any, should be collected in the future to improve our understanding of this subject area?**

Long-term monitoring of habitat quality, based on a statistically defensible and biologically meaningful design.

**6. Please provide any specific comments for the authors.**

See below.

## **Review of Fraser River Sockeye Salmon Habitat Analysis: Lower Fraser and Strait of Georgia**

**John D. Reynolds**

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This preliminary draft has some incomplete sections and no references, so my review needs to be considered in that light. I feel that this is on track to be a solid report, assembling a large amount of information in the time available. The graphics in the maps are excellent.

This draft needs a good proof-reading for missing words and so-on. Citations do not appear in the text until Section 2 on habitat use by sub-basins. I hope that the final draft will use authors' names and years rather than numbers, so we can tell easily which papers these are.

Fig. 1. The resolution in the legend is too small for me to be able to read it, even when zoomed in.

The Executive Summary takes up one-third of the report. It is so long relative to the rest of the report that part-way through I was concerned that I was into the main body of the text, with very little detail. If the report is going to retain these proportions, it would help to have some sort of header that helps readers know where they are. To be fair to the authors, a great deal of text appears with the maps, so in terms of content the balance is better, but I'd still suggest reducing the Executive Summary.

The paper mentions pulp mill effluents, but does not mention sewage treatment effluents. Arguably, both may be outside the scope of the terms of reference since pollution is the subject of a separate report. But if one is mentioned, the other should be too.

It would be good to mention that predators, such as pinnipeds, are the subject of a different report. I have forgotten which report is covering non-mammalian predators, such as hake and Humboldt squid, but the Commission should make sure these are tackled somewhere. Also, this report has some information on plankton but does not discuss food per se. This is critical for the Commission to consider. If this is not the report that should have covered it, then a cross-reference should be provided to the report that does.

In terms of recommendations, what about programs to re-connect lost off-channel habitats, create more natural floodplains by moving dikes, and so-on?

p. 3. The six objectives do not map directly onto the ones described in the Scope of Work, but they are probably close enough.

The habitat use maps (3 A-D) are very impressive. They summarize a lot of information with literature citations in a very clear manner (if readers zoom in enough to read them).

p. 8. Habitat use and movements by Harrison sockeye are very important, because this population has been bucking the trend of decline by other stocks. So we really need as much detail in this section as possible, including not only literature citations but also an indication of uncertainties or conflicting or patchy information. For example, do we really know for sure that no Harrison River sockeye migrate out through the top of Georgia Strait? I understand that DFO surveys have found the fish off the west coast of Vancouver Island, but more information about the evidence for how they get there would be helpful. Are the DFO surveys on both sides of Vancouver Island clear about this? Is there agreement about the data in the two surveys and their interpretation? This section needs both more detail and critical appraisal of the evidence.

I did not see any mention of Cultus Lake predators or changes in lake quality, including an explanation of why the salmon are not using most of the beaches anymore. This is important because the Commission has already heard views expressed that even if the mixed-stock fishery issue were fixed, the lake's carrying capacity will not support a rebound of this stock. Not everyone agrees. This technical report should provide the critical evidence on this.

p. 9. I will send a detailed report by DFO biologist Al Stobbart that will be useful for information about Upper Pitt Lake spawning tributaries.

p. 10 bottom. We really need references and lots of detail about the surveys that are referred to concerning Harrison sockeye habitat use.

p. 11. It would be nice to see the figures on proportions of fish that use the northern or southern routes past Vancouver Island.

p. 12. With one exception, the list of human indicators of development looks quite reasonable given the time available, and the accompanying maps are packed with useful data and good explanations. The exception concerns river gravel mining. This is a huge issue in the mainstem of the Fraser, especially in the "Gravel Reach", and it seems like an odd omission from this list. While most of this activity occurs outside the window when sockeye are in the river, that is true for dredging too, yet that topic is discussed.

p. 16. The discussion of contaminants and water quality, which includes two maps, should be cross-referenced to the Commission's report that deals specifically with that subject.

Map 14: Non-indigenous species. The increase in the total number of species is striking, but so is the apparent stability of the number of non-native freshwater fishes since 1930. I cannot think of another case where non-native species have not increased in the past 50 years. I doubt that this is real, and worry that it's an artifact of lack of new information.

p. 23. I hope the Commission takes note of the case for a more unified vision and integrated approach in management. The final report of the BC Pacific Salmon Forum (Hon. John Fraser, Chair) made a similar recommendation, with a particular emphasis on watershed governance. It would be worth mentioning that with reports like that,

implementation of such a vision would not need to start from scratch.

The federal Species at Risk Act is mentioned only twice in passing. Is it politically incorrect to suggest that the federal government might want to consider protecting wild salmon and their habitats under this Act? The Committee on the Status of Endangered Species (COSEWIC) has recommended a few wild salmon populations for protection, but these have been turned down.

There is currently discussion of the potential for creating a provincial endangered species act. It would be interesting to consider whether this might be helpful in protecting salmon and their habitats.