Weaknesses Noted by the Expert Panel on Original Proposal

Issue #1 - Literature Review

Expert Panel Comment: The literature on fishing livelihoods was limited.
Tracking Change Response: The literature on fishing livelihoods is extensive and could not be cited completely in the proposal. "Fishing livelihoods" are generally defined as livelihoods that are substantially dependent on fishing for subsistence and/or income; the relevance of this concept to small-scale or artisanal fisheries is well developed in relation to marine systems. A livelihood approach considers: "the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household"[i]. (Social capital is also considered here to include cultural capital). The Tracking Change research team embraces this fishing livelihoods lens as it enables us to holistically investigate the interconnections between ecological changes and those social, economic and cultural implications and associated responses of Indigenous and local fishing communities. A fuller understanding of the breadth and significance of the livelihoods lens for understanding small-scale (artisanal) fisheries can be found here[ii]. We are in the process of making explicit our contributions to the literature on watershed governance through a proposal for a special issue of *Sustainability* that will feature outcomes from the first three years of research.

Expert Panel Comment: The literature on watershed governance was limited, particularly as related to the role of local and traditional knowledge in watershed governance.
Tracking Change Response: There is a very large literature on watershed governance that could not be covered in detail in the proposal. A broader discussion on many aspects of this literature can be found here[iii]. We have cited a great deal of this literature already in the proposal (e.g., by scholars Berkes, Colding, Gadgil, Johannes, Scoones etc.). Although a concern was raised in the review that we are not dealing explicitly with governance, knowledge produced from "tracking change" can inform and must inform decision-making in diverse ways and at different scales. (i.e., monitoring for its own sake is of little value to community partners). Our research team is comprised of academic experts in Indigenous governance (i.e., Val Napoleon), co-management and adaptive governance (i.e., Fikret Berkes, Derek Armitage). Our project is also comprised of numerous institutions involved in the governance of the Mackenzie River Basin at various scales including community-regional-government-territorial government-Mackenzie River Basin Board. Many aspects of our community led projects and graduate student projects are explicit in their focus on issues of stewardship, management and broader themes of governance (See our website for more information on these projects: www.trackingchange.ca). We are in the process of making explicit our contributions to the literature on watershed governance through a proposal for a special issue of *Development and Change* that will feature outcomes from the first three years of research.

Expert Panel Comment: Some concepts used were undefined.
Tracking Change Response: There were numerous concepts used in the proposal that we could not adequately define due to lack of space (e.g., tipping points etc.). The reviewers specifically asked a question about the use of the conceptual framework of "variability and adaptation" or our use of "variability and change". These are interrelated. The social-ecological systems approach considers variability and change as inherent and characteristic of all complex systems. Our proposal was based on the informed assumption that communities living in freshwater ecosystems for many generations have adapted to natural variability and change in various ways (i.e., flexibility in timing

and location of seasonal and annual fish harvest). Their capacity to adapt, or ensure resilient, to new changes brought on by climate change and resource development is part of what is considered in our research program. A fuller discussion on these concepts can be found here [iv].

Issue # 2 – Global Partnership

Expert Panel Comment: The partnership between the three basins should be equitable.
Tracking Change Response: The partnership between the research in the Mackenzie, Mekong and Amazon basins is based on recognition that much can be learned from previous research in the latter two basins about the role of local and traditional knowledge in watershed governance (See work of co-applicants Berkes, Huntington, Silvano, Lopes, Baird and Manorom). There is also much opportunity for communities and researchers working in the Mekong and Amazon to learn from those living and working in the Mackenzie. For example, our research in the Mackenzie have been instructive in demonstrating how Indigenous rights are recognized in water governance (e.g., the NWT Water Stewardship Strategy) and local and traditional knowledge can be meaningfully considered in ongoing monitoring. We underemphasized this latter dynamic in the proposal, as we did not assume (as much historical research has), that knowledge and expertise from the north (i.e., in OECD countries) should flow south to "lesser developed" regions.

Expert Panel Comment: Not clear what has been learned in the Mekong / Amazon that is instructive for the Mackenzie.
Tracking Change Response: This comment speaks to the focus of the research itself; although there has been over a decade of research with fishers in the Amazon and Mekong, the specifics of how that research can inform monitoring of change and watershed governance in the Mackenzie River Basin has been little explored. To date, we are finding the research in all three basins is instructive in different ways. Much of these insights are methodological. For example, can Indigenous and other fishers / communities evidence changes in biodiversity in the Mackenzie River Basin as have the fishing villages in the Mun River Basin?) To what extent can the social networks and knowledges associated with fishing livelihoods catalyze social actions to protect the Mackenzie River Basin as it has in the Mun River Basin? To what extent are large-scale multi-jurisdictional institutions such as the Mekong River Commission / Mackenzie River Basin Board responsive or unresponsive to local and traditional knowledge? Insights are forthcoming in publications.

Issue #3 – Methodological Approach

Expert Panel Comment: More explanation of methods needed.
Tracking Change Response: Due to the scale of the project, we were not able to define the methods in detail in the original proposal. Many specific methods have developed in collaboration with community partners. More details about the specific methods used can be found on the website under "Community-Based Research Toolbox", "Community-Based Research Summary Report" and for specific graduate student projects under "Graduate Student Projects'.
www.trackingchange.ca

Expert Panel Comment: Linking Outcomes at the Global Scale.
Tracking Change Response: The research team aims to bring together the local and traditional knowledge of fishers in three of the largest freshwater ecosystems globally. The research team is

addressing this objective in two ways. **(1)** First, community-based research is underway in each of the three basins led by community partners and/or graduate students. For example, over 29 communities are currently involved in projects in the Mackenzie River Basin, 12 communities in the Tapajos sub-basin of the Amazon and more than 12 in the Mun River sub-basin of the Mekong. As outcomes of this research emerge, we are attentive to the patterns of change that are unique to each place (e.g., community or sub-basin) and those which seem similar or synergistic with changes occurring in other places. Through this bottom-up process, we are able to understand how local scale changes are in fact regional or global in scale (e.g., they are global because they are common to all three basins). **(2)** A second approach to understanding how local knowledge matters at global scales is by examining larger scale stressors or those common in all three basins (e.g., climate change, hydroelectric development). Specifically, we are investigating patterns in how, and to what extent, these stressors impact fishing livelihoods and freshwater ecosystems in all three basins (e.g., how are fishing livelihoods affected by hydro-electric development in the Peace sub-basin; how is this similar or different that the experience of those living in the Mekong).

Expert Panel Comment: There are a variety of questions about the research team.
Tracking Change Response: The team includes many Indigenous research partners and governments. To date we have been successful in addressing themes on youth and gender (e.g., two Youth Knowledge Fairs involving over 60 Indigenous youth) that were a noted concern in the review. We have two graduate research projects dealing with the issue of gender. We have also been successful at recruiting and supervising graduate students (i.e., there are 17 to date).

Issue #5 – Budget

We have been successful at managing the budget. The concerns raised by the reviewers have not been hurdles to our success to date.

Issue #6 – Research Team

Expert Panel Comment: There are limitations to the research team.
Tracking Change Response: We have addressed the limitations noted about the research team. Specifically, we have added an important co-applicant (Dr. Kanokwan Manorom) to the research team and an institution in Thailand (Ubon Ratchathani University). These were to have been part of our initial proposal, however, the complexity of the SSHRC website/system proved to be a barrier to their signing on in time for proposal submission. We have also added other co-applicants (academics) to the research team to help with the supervision of graduate students. We are in the process of adding three other co-applicants to help address the perceived gap in the research team related to water governance. Among these is Dr. Cristiana Seixas (Campinas University of Brazil) who is well published on questions of fishing livelihoods and institutions.

Midterm Review Committee Comments:

Midterm Review Committee – "More information on the Amazon and Mekong case studies and have the project team flesh out more how these are connected to the larger project, noting that there appears to be a significant amount of information provided on the BC* case study".
Tracking Change Response: As discussed in our original proposal, the majority of work to date

has developed in the Mackenzie River Basin. Many outcomes are also emerging and forthcoming related to the other two basins through the work of graduate students. By the end of the project we anticipate having at least 20 graduate students completed with 10 having focused on the Mackenzie, 5 in each of the Amazon and Mekong basins and five focused on two or more basins. With respect to research in Thailand, we have already funded three students based in Ubon Rathchathani University in Thailand, and 2 based in Canada (University of Alberta / Royal Roads University) and 1 based part-time at Ubon Ratchathani University (and University of Wisconsin Madison).

1) Akarath Soukhaphon - Knowing the River: Utilizing Traditional Knowledge to Shape New Discourses in the Age of Dams (University of Wisconsin Madison / Ubon Ratchathani University);
2) Amabael D'Souza - The Impact of Hydroelectric Development on Rural Communities in the Mun River (University of Alberta);
3) Carrie Oloriz - Local Fishers Knowledge in Governance in the Lower Mekong and Fraser Basins (Royal Roads University).
4) Phongthep Bukla - Fishery Resources and Knowledge Management Through Empowerment of Local Wisdom in the Mun and Mekong Rivers (Ubon Ratchathani University);
5) Sirasak Gaja-svasti (Toe) - Fish Consumption in the Context of Community Change in the Tributaries of the Mun River
6) Wanapa Wongpinit - Gender and Indigenous Knowledge on Fisheries in the Mun River and Si Phan Don in Southern Laos (Ubon Ratchathani University)

Complete theses from five of the six students (above) will be available by August 2018; we anticipate these will each include 1-2 publications in peer-reviewed journals from each thesis.

We have only funded 1 student to date in Brazil due to a significant administrative lag-time in moving funding to our Brazilian partner institution (i.e., due to lack of capacity in English and other limitations, it took 1.5 years for the partner institution in Brazil to review and signoff on the sub grant paperwork from the University of Alberta). The student is:

> Carolina Tavares de Freitas - Arapaima fisheries co-management: an alternative to conciliate biodiversity conservation with human well-being in the Amazon region? (Universidade Federal do Rio Grande do Norte, Brazil)

This gap and lag in research in Brazil will be addressed in the second phase (Year 4-6) of the project (i.e., we are in the process of hiring three graduate students living in / or who are doing fieldwork in the Tapajos sub-basin of the Amazon in Brazil.

** We assume by the BC case study that the reviewers are referring to the Mackenzie River Basin and not to British Columbia only.*

Mid-Term Review Committee: The committee noted that the governance structure appears to be functioning well for the BC* case. The committee would like more information about the governance structure for the other cases in order to better understand how the projects are decided, at what level partners have input into the project, and how these cases are all connected to the overarching project.

Tracking Change Response: The decision-making process about Tracking Change project activity in the Mekong and Amazon is less complex than in the case of the Mackenzie. This is due to our having fewer partners in Brazil and Thailand and fewer partnerships with local governments in

these regions. Decisions about project activities in these regions works as follows: The academic leads in Brazil and Thailand make decisions about which projects should be funded in their own regions respectively. As per the Memorandum of Understanding for Tracking Change and the sub-grant agreements to their institutions, sub-projects in Brazil and Thailand necessarily must address the objectives of the Tracking Change project. The leads inform the Principal Investigator and Traditional Knowledge Steering Committee (TKSC) of their decisions. Although the leads in Brazil and Thailand are academics (and not local fishers), they are informed by the communities with whom they are collaborating. In the case of the lower Mekong, Baird/ Manorom have been informed by community partners including members of the "Assembly of the Poor" about what kinds of projects would be most useful. Silvano/Lopes make decisions about what projects are funded in the lower Amazon and are informed by the village chiefs/headmen with whom they have been working for over a decade. The Principal Investigator (Parlee) also liaises with the leads in these regions on a quarterly basis and has made two site visits to the Mekong (i.e., villages in the Mun River Basin) and one site-visit (to date) to the Tapajos River watershed in the Amazon. Finally, in the interests of ensuring community-community networking and communication, our Global Knowledge Symposium in Thailand, and that forthcoming in the Tapajos River watershed in Brazil, provides opportunities for community to share knowledge about their projects and plan other research activities.

** We assume by the BC case study that the reviewers are referring to the Mackenzie River Basin and not to British Columbia only.*

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[i] Ellis F. (2000) Rural livelihoods and diversity in developing countries. Oxford: Oxford University Press. p. 10.

[ii] Allison, E. H., & Ellis, F. (2001). The livelihoods approach and management of small-scale fisheries. *Marine policy*, *25*(5), 377-388.

[iii] Thornton, T. F., and A. Maciejewski Scheer. 2012. Collaborative engagement of local and traditional knowledge and science in marine environments: a review. *Ecology and Society* **17**(3): 8. http://dx.doi.org/10.5751/ES-04714-170308.

Begossi, A. (2014). Ecological, cultural, and economic approaches to managing artisanal fisheries. *Environment, development and sustainability*, *16*(1), 5-34.

Haggan, N., Neis, B., & Baird, I. G. (Eds.). (2007). *Fishers' knowledge in fisheries science and management* (pp. 35-40). Venice: UNESCO Publishing.

[iv] Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global environmental change*, *16*(3), 253-267.