August 28, 2017

Attention: British Columbia Utilities Commission

Re: Recommendation regarding the cost to ratepayers of terminating the Site C project

In January 2014, my Master of Science thesis research was published, which is entitled, "Comparing and Mapping Ecosystem Service Use Across Interest Groups in the Upper Peace River Watershed." Based upon my research findings I recommend that the Site C dam not precede any further, as it would hinder the future well-being of regional human inhabitants, as well as threatened significant biodiversity values identified in the area of the Peace River Valley proposed with a large hydro dam and reservoir. The cost to ratepayers of terminating the project would be negligible compared to the costs associated with the loss of significant ecosystem services (including intangible cultural ecosystem services not considered during economic assessments) and biodiversity values.

Background Information

Ecosystem services have been broadly described as the activity, function, condition or process of natural ecosystems that benefit and sustain human life (Daily, 1997; Mace, Norris, Fitter, 2011) and that have value for people (Chan et al., 2012). Ecosystem services are categorized as provisioning (e.g. food, water, shelter), regulating (e.g. climate mitigation, pollination), cultural (e.g. recreation, aesthetic) or supporting services (e.g. nutrient cycling, photosynthesis) (MEA, 2005). Provisioning, regulating and cultural ES are sustained by supporting ES, and all are intricately linked to biodiversity. Biodiversity is the diversity of life on Earth, which is experiencing global declines at an alarming rate (Cardinale et al., 2012; Isbell et al., 2011; Hooper et al, 2012). The Millennium Ecosystem Assessment (MEA) (2005) (a report involving the work of 1360 experts worldwide), suggests that we have lost more biodiversity in the past 50 years than in any other time in human history, resulting in many negative consequences including changes in ecosystem function and the resulting ES that are deemed necessary for human well-being. It is also suggested that up to 60% of global ES evaluated are being degraded, overused, or lost to unsustainable anthropogenic activities (MEA, 2005). If current threats to biodiversity loss are not alleviated, humans could find themselves in a mass extinction crisis within a few centuries (Barnosky et al., 2011).

General MSc Thesis Research Findings

One main ES hotspot location was identified in the UPRW, which extends along the Peace River from Hudson's Hope to the mouth of the Halfway River (see Figure 1); this is where the Site C development is also meant to occur Research findings confirm that multiple interest groups surveyed use all ES researched within this hotspot, i.e. food (personal gardens/crops/livestock), wood collection, ornamental resources, spiritual/religious, aesthetic/scenic landscapes, recreation, fish (for food), wild edible plants (natural medicines), freshwater, scientific/educational, sense of place, purposefully viewing wildlife, historical/cultural heritage, inspiration, hunting/trapping. Results also demonstrate that the top three ES indicators reported as being used the most in the ES hotspot across all interest groups were cultural ES (i.e. aesthetic/scenic values, recreation opportunities, and spiritual/religious), which have been largely disregarded during decision making processes for Site C as one cannot place an economic value on these intangible services. The high importance of cultural ES compliments other studies that also found similar results in terms of CES ranking highest for what matters most across differing interest groups (e.g. Bryan, Raymond, Crossman, & King, 2010; Iceland, Hanson, & Lewin, 2008; Raymond et al., 2009). This suggests that the continuation of neglecting non-monetary CES used by diverse interest groups in the Peace River Valley will exclude the values that matter the most to many people regionally; this is unjust.

Natural riparian corridors (such as where Site C development is occurring) can harbor the most biological diverse, dynamic and complex habitats within the Earth's terrestrial landscape (Naiman, Decamps & Pollack, 1992). Through wildlife and vegetation inventories completed as part of the Canadian Environmental Assessment process for Site C, numerous provincially listed at-risk or regionally important species (mammals, birds, butterflies, fish) have been identified within the Site C flood zone (Hilton & Simpson, 2013; Hilton, Simpson, Andrusiak, & Albrecht, 2013; Hilton, Simpson, & Guppy, 2013; Mainstream Aquatics Ltd, 2012; Simpson et al., 2013), close to 200 rare plants have been identified (Hilton, Andrusiak, Krichbaum, Simpson, & Bjork, 2013), in addition to two red-listed and 15 blue-listed rare ecological communities and several sensitive ecosystems (e.g. 3965 ha of wetlands, 7 tufa seeps, 1 marl fen, 2667 ha grasslands, 1135 ha old growth forests). Given that the ES hotspot occurs along a major river corridor in the

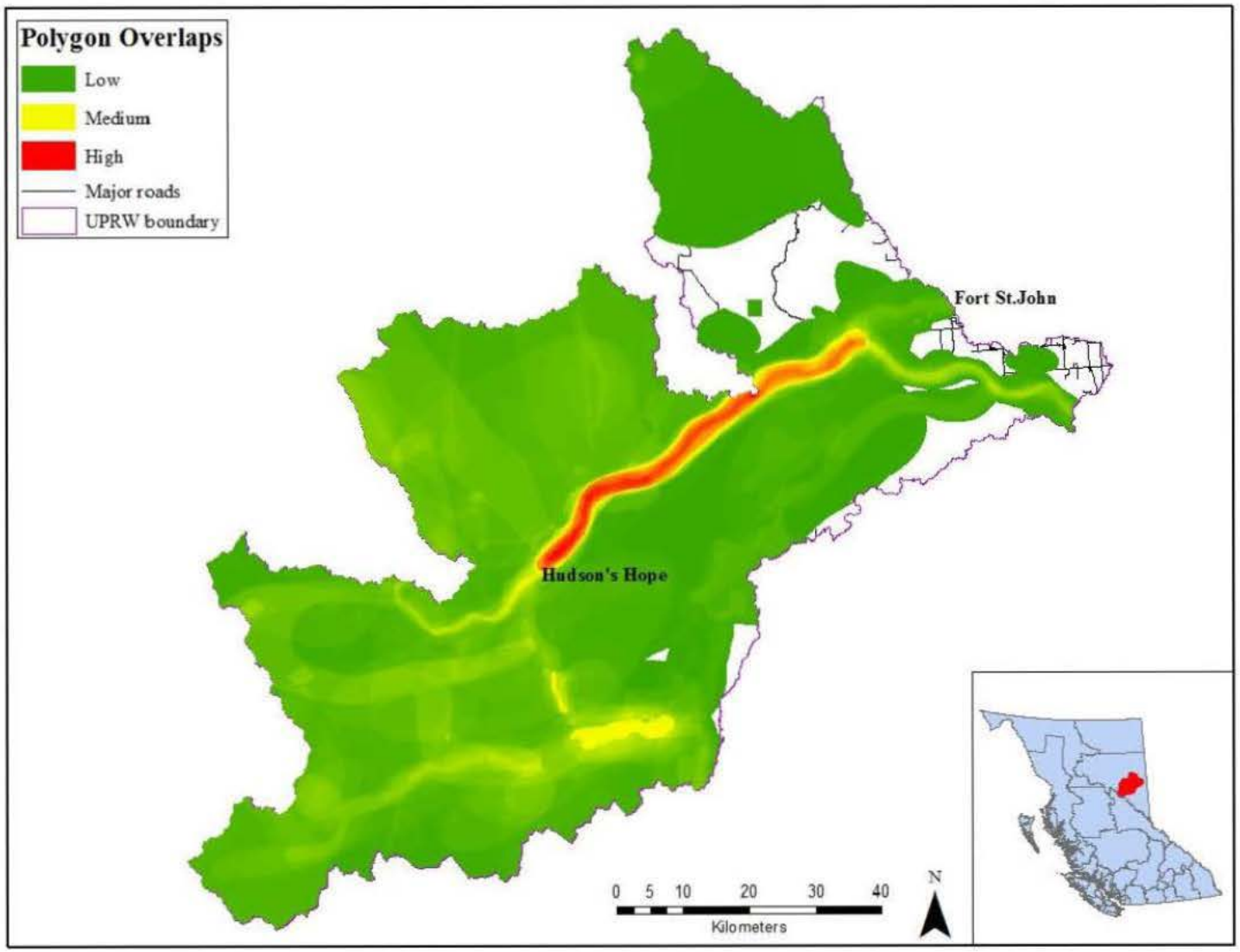

Figure 1. Overlapping polygons for all cultural and provisioning ecosystem services depicted across all eight interest groups within the Upper Peace River Watershed. Areas in red indicate those locations most highly used in the ecosystem for its services.

watershed, it is presumed that the ES hotspot could be one of the most biological diverse and complex habitats within the UPRW. Freshwater ecosystems may be the most endangered ecosystem in the world and it is of the utmost importance to protect them (Dudgeon et al., 2005). The United Nations (2001) reports that dams and their associated reservoirs have many negative impacts on freshwater biodiversity including: habitat fragmentation; changing turbidity levels that species are adapted to; trapping silt in reservoirs depriving downstream habitats of nutrients/mineral; removing woody debris that creates habitat downstream; fostering of exotic species that replace native species; cessation of normal river flooding impacting biodiversity; impacts of multiple dams leads to cumulative effects such as further contributions to habitat fragmentation leading to of further separation of populations in a shrinking habitat lost to growing reservoirs.

Recommendations Based Upon Research Findings

Protecting areas most important for ES delivery (ES hotspots), as well as those areas most important for biodiversity are of critical importance for maintaining human well-being (Anderson et al., 2009; Diaz et al., 2006, Daily, 1997). The long-term financial benefits of conserving nature and ES in the Peace River Valley can greatly exceed the short-term cost of nature protection (Cimon-Morin et al., 2013) and short-term costs of cancelling Site C construction contracts. Based upon my research findings I recommend that in order to maintain the long-term well-being of residents within the UPRW, the ES hotspot area (where Site C is set to occur) be protected from any further developments. Protecting the ES hotspot area in addition to significant biodiversity values would enable people within the region (across all interest groups) to continue to receive the multiple ES benefits that the Peace River provides. BCUC must consider the intangible ecosystem services in assessments, even though they do not have a quantifiable economic value. I also request that if BCUC chooses not to consider this submission during the Site C inquiry, that BCUC inform me of their reasons for doing so.

Sincerely,

Rachel Darvill, BSc. Biology, MSc. Environment and Management

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