



University  
of Victoria

Graduate Studies

Notice of the Final Oral Examination  
for the Degree of Master of Science

of

**JAMIE JOYCE EDWARDS**

BSc (University of Victoria, 2014)

**“Building the Capacity for Watershed Governance”**

Department of Geography

Friday, March 6, 2020

10:00 A.M.

David Turpin Building

Room A140

Supervisory Committee:

Dr. Michele-Lee More, Department of Geography, University of Victoria (Supervisor)

Dr. Deborah Curran, School of Environmental Studies, UVic (Outside Member)

External Examiner:

Dr. Sarah Wolfe, School of Environment, Resources and Sustainability, University of Waterloo

Chair of Oral Examination:

Dr. Stephen Lindsay, Department of Psychology, UVic

## Abstract

BC Hydro's Water Use Planning (WUP) process is one of the world's most comprehensive hydroelectric dam operational reviews and has served as a model to revise hydropower operating plans with the participation of an inclusive range of stakeholders, rights holders, and the use of up-to-date scientific information, that meets social and environmental goals alongside economic targets. In 2000, BC Hydro initiated a WUP process in the Jordan River watershed. This watershed hosts a wide diversity of water users, including active resource industry stakeholders (mining, forestry, and hydropower), Indigenous rights holders, and rural community citizens; which is representative of watersheds in British Columbia with established WUPs. BC Hydro finalized the Jordan River WUP in 2003, which focuses on establishing critical freshwater flows for fish habitat and achieving specific recreational values of the local community. However, numerous other issues still remain that were beyond the scope of the WUP process, including water quality concerns that were continually brought up by citizens during the consultative process of the WUP. In addition to these concerns, biological monitoring following the implementation of the WUP suggests that contamination from an inactive copper mine has affected and altered sensitive water quality parameters for a healthy Pacific salmon habitat in Jordan River. Yet, there has not been an extensive water quality study conducted that examines the spatial or seasonal water quality extents of the mining contamination in Jordan River, specifically copper. Consequently, fourteen years after the creation of the WUP, local advocates are still struggling to have their concerns heard by the entity responsible for freshwater flow, BC Hydro, alongside federal and provincial government agencies. Advocates are calling for the creation of a watershed-based group as a mechanism for having greater influence in water planning and governance processes. This study explores the research question: if and how has the WUP process contributed to creating watershed governance capacity? This social science thesis project employs a mixed-methods approach using both quantitative and qualitative data. The study includes a document review of relevant water governance literature and focuses on examining the freshwater quality of the Jordan River. Water quality samples were collected over a five-week period from five sites on the Jordan River beginning in September and concluding in October of 2015 during the most sensitive periods of salmon spawning activity in the lower reaches of the Jordan River. Spatial and seasonal water quality trends were identified, and analysis concluded that copper is the primary

contaminate affecting the productivity of a healthy salmon habitat in the Jordan River. Acid mine drainage (AMD) processes were identified throughout the water quality data and are strongly influenced by the proximity of existing mine waste piles sourced from an abandoned copper mine, and unnatural anthropogenic flows from the three BC Hydro dams present in the Jordan River system. The final stage of the research project focuses on assessing the adaptive capacity in the watershed to address the issues of concern outlined in the WUP. There is a current movement to create watershed organizations that are formally supported through new legislation in British Columbia, but questions remain about the capacities of these watershed communities to sustain such a formal institution and if these watershed communities are ready to successfully implement a local watershed governance model. The Gupta et al. (2010) six adaptive capacity dimensions provide a logical framework to explore if these capacities are present such that it could be expected that local watershed organizations would be effective as society adapts to more watershed-based governance approaches. Thirteen semi-structured interviews were conducted from October 2016 to February 2017. Interviews and observational data focused on the WUP process and prospective and current members of the Jordan Watershed Round Table (JWRT). The research evaluated whether these six adaptive capacity dimensions are present in watershed communities that have been subjected to water management processes, specifically the WUP program. Overall, the research concluded that the WUP has contributed to some adaptive capacity for watershed governance in the Jordan River, specifically on building the adaptive capacity dimensions: variety, learning capacity, room for autonomous change, leadership, and resources within the JWRT.