Geomorphic Controls on Physical Habitat Variability in a Hydropeaking System. \*A. Tamminga, H. Buehler, L. Winterhalt, and B. Eaton, University of British Columbia, Department of Geography (tamminga@geog.ubc.ca; presentation).

The hydropeaking operation of the Pocaterra Dam on the Kananaskis River, AB has resulted in decadal-scale geomorphic changes and daily flow reversals that have impacted fish habitat. Analysis of historical air photos combined with reach-scale predictions of channel width changes from physically based modeling demonstrated variable responses at sites throughout the 40km of river studied; sites nearest the dam widened, sites farther downstream narrowed, and there was a general pattern of channel planform simplification and backchannel abandonment. Two-dimensional hydrodynamic modeling of select reaches showed that peaking significantly reduces weighted usable area, with low flows limiting adult habitat and high flows limiting younger life stages. These effects were primarily controlled by the morphological character of the reach, and did not decline with distance from the dam. To build on these findings, planned research will focus on integrating morphodynamics and physical habitat variability by using high resolution bathymetric maps to determine contemporary low-flow depth and mesohabitat distributions. These spatial patterns will be interpreted in the context of historical channel changes as predicted by theoretical models to determine how geomorphic controls drive reach-scale morphology and constrain micro- and meso-habitat development. This framework will then be used to set up two-dimensional morphodynamic models that link the effects of altered flow regime with sediment transport patterns to test how changing morphology under different conditions can affect hydraulic attributes at high and low flows. This research will provide a mechanistic understanding of the multi-scale linkages between geomorphology and fish habitat on the Kananaskis River.