

## **“Refinement of three-dimensional computational mesh in the confluence of two rivers”**

### **Abstract:**

BC Hydro (a crown corporation owned by the government and people of British Columbia) provides BC population with reliable, affordable and clean electricity throughout the province. At the same time, they are enrolled in the Fish and Wildlife Compensation Program, a partnership between BC Hydro, the Province, Fisheries and Oceans Canada, First Nations and public stakeholders to conserve and protect wildlife impacted by the construction of BC Hydro dams ([https://www.bchydro.com/toolbar/about/sustainability/environmental\\_responsibility/compensation\\_programs.html](https://www.bchydro.com/toolbar/about/sustainability/environmental_responsibility/compensation_programs.html)). Two of their operational sites are Hugh L. Keenleyside Dam (HLK, Columbia River) and Brilliant dam (BRD, Kootenay River). The water level fluctuations in both rivers have a negative impact on fish spawning, hatch periodicity and hatch success due to exposure of fry and young. A previous study conducted by Golder Associates Ltd. quantified the fluctuations in water level, especially in the key spawning areas, as a function of BRD and HLK discharges. In the vicinity of the confluence of the two rivers, a bathymetric model and a finite element mesh, calibrated and analyzed for sensitivity were used to produce a 2D flow solution.

The target of this project is to provide more insightful and accurate modelling. The first step is to create a 3D computational mesh that leads to a better representation of the river's terrain. The current 2D mesh was obtained from the bathymetry data by dividing the river area into small elements around each measured point with certain depth. Building the 3D mesh out of the 2D bathymetry data is a difficult task, further complicated by the ragged geography. In particular, the elements' size and distribution must be optimized near the riverbed and in narrow areas. MATLAB/Octave will be used for computation and VU for visualization of the mesh sections.