Title: Site-level identification and characterization of thermal refugia in the Nicola and Coldwater Rivers

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Abstract: The study of Pacific salmon (*Oncorhynchus spp.*) life histories has revealed remarkable spatial and temporal complexity in habitat use among different sub-populations. Although Pacific salmon have a long history of surviving disturbance (e.g. floods, droughts and glaciers), more recent stresses resulting from increasing stream temperatures, reduced instream flow and physical habitat degradation have many fisheries scientists concerned for their future. In the Nicola and Coldwater Rivers, near Merritt, BC, stream temperatures at monitoring stations annually exceed temperature thresholds for salmon survival. These high stream temperatures occur in summer months during the spawning migration of Chinook Salmon (*O. tshawytscha*), and during critical rearing times for juvenile Chinook, Coho (*O. kisutch*) and Steelhead (*O. mykiss*).

Fisheries managers and scientists working in the Nicola Watershed expect that fish are able to survive these warm-water conditions due to the presence of thermal refugia (i.e. cool water habitats) created by groundwater upwelling and groundwater-surface water interaction (hyporheic exchange). This project will use several different techniques to identify and characterize the environmental conditions associated with thermal refugia. Initial site identification has already begun using a UAV-based aerial thermal infrared camera. Based on cool-water signatures displayed in these images, sites will be selected for installation of streambed groundwater monitoring wells as well as site-level arrays of temperature loggers.