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*Hydraulics Component Overview of the BC Hydro Fish Entrainment Study.*

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Abstract

Fish entrainment occurs when resident fish are passed through a dam’s internal workings, resulting in displacement and possibly injury or death. The overall objective of the study is to combine both hydraulic and biological research in order to develop general methods to assess fish entrainment risk. The parameters of concern from a hydraulic point of view include the velocity field within a reservoir, as well as the thermal structure and how it is affected. Overall, there are four sites of interest: Mica Dam (MCA), Revelstoke Dam (REV), Hugh Keenleyside Dam (HLK), and Aberfeldie Dam. Computational fluid dynamic models have been constructed for MCA, REV, and HLK, but require verification. Therefore, in the summer of 2010, field work studies measuring the velocity and thermal regime of the HLK dam forebay near Castlegar, BC were undertaken. This presentation focussed on temperature data collected in the thermally stratified forebay, revealing fluctuations that were attributed to dam operations and/or internal seiching. Further investigations of oscillatory frequencies revealed periods of 3.5 days, 24 hrs, 14 hrs (related to diurnal fluctuations) and 6 hrs. Several theoretical internal seiche periods were calculated by choosing several upstream boundaries related to major bends and narrows in the reservoir. The theoretical results were fairly well related to the observed periods. Critical discharge, the point above which flow will be pulled from all temperature layers, was examined. This is an important factor to consider in dam operations when considering selective withdrawal and its effect on fish entrainment risk.