

Feasibility Trial for Use of a DIDSON to Enumerate Spring Chinook Passage in the Klickitat River

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Escapement of spring Chinook in the Klickitat River is currently estimated from annual redd counts, which are summed and multiplied by a fish-per-redd expansion factor. However, uncertainty exists in this procedure, in part because the expansion factor is one estimated from data obtained in the Yakima River, not the Klickitat. It would be informative to obtain an escapement estimate from an alternative methodology, which could be used to estimate a Klickitat-specific fish-per-redd ratio. A dual identification sonar (DIDSON™; Sound Metrics Corporation, Seattle, Washington) was proposed for this purpose. A DIDSON is a sort of “acoustic video camera” which uses echoes from simultaneously emitted sets of sound waves to generate electronic images. In 2008, we tested the capabilities of a long range (LR) DIDSON to produce video files from which to enumerate fish passage events in the Klickitat River. The DIDSON was positioned at a site approximately 300 m upstream of the ladder to the Klickitat Fish Hatchery (river km 69), so as to visualize salmon/steelhead migrating upstream for natural spawning. The instrument was programmed to produce continuous files, with the field of view alternating between the near shore 10 m and the far shore 20 m, so as to cover the entire width of the river. The experience indicated that our positioning of the instrument was not ideal, with some fish apparently passing undetected beneath the sound beams on the near shore side. We also encountered technical/software “glitches”, which caused loss of files during protracted periods between technician visits. Most importantly, we observed dramatic loss in resolution of the images caused by turbulence and high sediment loads during the spring freshet in May-June. Based on this experience, we have modified placement and operational protocols for a new study. In 2009, we propose to change the study site to the upstream end of the Castile Falls Fishway, where we will enumerate escapement of spring Chinook to the upper basin of the Klickitat. We will operate a DIDSON-S to observe fish as they exit the Fishway, and a DIDSON-LR to observe the incidence of fallback over the check dam. Both sonars will be operated at their respective high frequency, programmed to record continuous 60-min files on a 24 hours/day, 7 days/week basis. The sonars will be operated from no later than the first of May until the end of August 2009. Visits to the site will be made twice weekly over this period to assure proper functioning of the instruments and to download recorded files – which will be transferred to a central server for storage. The DIDSON files will be processed and read to obtain hourly and daily estimates of net upstream migration, and the data will be summed to obtain an estimate of total escapement. The data will also be analyzed to illustrate any diurnal pattern to movement (observations in 2008 indicated that passage occurred primarily during the dawn and dusk hours), and will be compared to flow measurements from the USGS “Klickitat River Above West Fork” river gauge #14107000, located within a km upstream of the Fishway outlet. Following completion of redd surveys in the fall of 2009, the escapement estimate will be divided by the total redd count to obtain a fish-per-redd expansion factor.