

Stave Falls Project Water Use Plan

Monitoring Program Terms of Reference

- **Addendum 1 to SFLMON#4 Limited Block Load as Deterrent to Spawning dated June 2005**

July 30, 2007

Addendum # 1 July 30, 2007 to: SFLMON#4 Limited Block Load as Deterrent to Spawning, dated June 2005

Background

This monitor was to be completed in Years 1 and 2 of the Stave River Monitoring Program, however, due to variable inflow conditions during the monitoring period, only a portion could be completed. Although good data has been collected to date, and some inferences have been drawn regarding some of the monitor's management questions, there still remain a number of unaddressed issues. In the work done to date, results have shown a clear link between use of limited block load procedures and deterrence to spawning. The link however, was not as strong as expected, nor has it been fully quantified. It would appear however, that chum salmon in the Stave River will take advantage of any opportunity, no matter how fleeting, to spawn in whatever is presented to them. Two key uncertainties remain:

1. What is the duration of the limited block load operation (measured in hours within a given day) needed to fully deter chum spawning in high elevation areas, and how does deterrence relate to the duration of operation.
2. For those that do manage to successfully spawn during the limited block load operation, what is the density of eggs that are laid, and is that density time dependent (i.e., the longer the operation, the greater the egg count).

Both uncertainties need to be addressed in order to fully quantify the impact of the limited block load operation on reproductive success of chum salmon.

The uncompleted work is to be moved forward into Year 3 of the monitoring program.

Methodology

The crew will continue collecting data as described in the TOR, but with the following modifications:

- To capture the development of redds as the density of spawners peaks, redd density and area surveys will be conducted on successive days during the early to middle portion of the spawning season (October 15 – November 4).
- Egg presence and egg pocket surveys will be undertaken once a redd has been established and the pockets have been covered by a burial mound. The egg presence and egg pocket surveys will be done at redds of various sizes in order to establish and egg pocket vs. redd size relationship. If significant, the relationship will be used to extrapolate total number of stranded egg pockets based of redd density and redd size data.
- From the literature, the average egg density for a given pocket will be determined. A subset of egg pockets will be surveyed for an egg count and compared to published data to validate the average count. If there is sufficient data, the egg pocket counts will be related to the duration of the most recent limited block load operation.

Every attempt will be made to collect redd data following various limited block loading operations from 2 to 20 hours. It should be noted here that tidal influences on river stage can significantly confound the downstream effects of the limited block load operation, and the flexibility with which different block load durations can be implemented is dictated by prevailing hydrological conditions.

Multiple Regression Model Fitting:

The TOR specifies a modeling exercise to determine the suitability of spawning habitats at various flows to address the concern that mid channel areas could become unsuitable at higher turbine releases (> 100 cms). This component however, was deemed unnecessary as chum salmon were observed spawning in all wetted habitats, regardless of hydraulic condition. It would appear that the abundance of chum salmon that spawn in the Stave River is so great that it saturates all accessible habitats. In lieu of the proposed hydraulic model, a multiple linear regression model was developed to better understand the interplay between generation and tidal factors and how they impact water level in the river. This was deemed to be of greater value in assessing the merits of the WUP proposed limited block load operation

Spawner escapement (DFO), operational discharge (BC Hydro), tailwater elevation (BC hydro) and Fraser River elevation (WS Canada) data were collected in 2005 and 2006 from which a multiple regression model developed. The model revealed that both the operational discharge and the Fraser River were significant contributors to tail water elevation variation. Additional data is to be collected in the 2007 year to confirm the reliability of the regression model so that it maybe used in conjunction with the egg data to evaluate the impact various limited block load operational alternatives.

Schedule

To date, only 35% of the resources allocated to this monitor have been utilised. This uncompleted work is to be shifted over to year three of the overall WUP program.

Revised costs for the Limited Block Load as Deterrent to Spawning

Program Total	86,315
Inflation Adjustment 2%	92,277