

## **SF-2008-I-18: Improvements to the Harrison River Chinook key stream program: an alternative release strategy for hatchery-reared Harrison Chinook to improve CWT recoveries**

### **Introduction**

CWT releases of hatchery-reared Harrison River Chinook from Chehalis Hatchery had in past years been undertaken to provide estimates of brood exploitation and survival rates for this key stream stock. The release strategy was for fry to be fed and released at the 2g size in order to mimic the natural outmigration timing and size of naturally produced smolts. However, survival of such releases was poor, and recoveries insufficient to provide reliable estimates of exploitation and survival rates. Consequently, recoveries of CWT releases in the Chilliwack River (a nearby hatchery stock that originated from Harrison River stock, and experiences much higher survival rates) have had to be used as a surrogate to estimate brood exploitation and survival rates for the Harrison River stock. This information, in conjunction with a mark-recapture estimate for the Harrison, is used for forecasting abundance of Harrison returns. While this approach has provided the data necessary to use the Harrison as an exploitation and survival rate indicator stream, use of a surrogate is not ideal, and adds a considerable additional cost to this key stream program.

Experience with Chilliwack Chinook releases has shown that smolts >5g in size experience survival rates over four times those experienced by Harrison releases. Since both stocks outmigrate from the same general vicinity, rearing Harrison smolts to such a size may result in similar high survival rates. This would allow the Harrison key stream program to be run entirely within this system, and eliminate the need to conduct a full-scale deadpitch and creel survey in the Chilliwack River. The purpose of this project was to assess the feasibility of rearing ~200k Harrison juvenile Chinook to >5g size at the Chehalis Hatchery, for CWT marking and release by late May/early June. This study represents a continuation of a project funded in 2007 (SF-2007-I-31).

### **Project Implementation**

#### **Egg Collection and Rearing**

Approximately 404k Chinook eggs were collected from Harrison Chinook spawners between October 19 and November 1, 2007. Eggs were disinfected in an Ovadine solution for 10 min. They were then incubated in Heath and Atkins egg incubation trays receiving well water at temperatures ranging from 8.0-9.5°C. Eggs became completely eyed by December 3, 2007 (mean ATUs at eying, 318.58). Survival of green to eyed eggs was 74.5%, which is typical for this stock. Hatching began in mid-January. Shortly after hatch, and until ponding, alevins were given prophylactic treatments of Chloramine T twice a week. A total

of 294k Chinook were ponded between February 4 -26, 2008, representing 97.7% survival between the eyed stage and ponding.

### **Juvenile Rearing**

At ponding, juveniles weighed on average between 0.50 and 1.04g. Standard Capilano troughs were used for raising juveniles, which were fed Skretting Nutra HP fish food. Well water temperatures during this rearing period ranged from 7.5-8.0°C.

### **Adipose Fin Clipping and CWT Marking**

Marking of juveniles was conducted by members of the Chehalis First Nation. Fin clipping was conducted by hand, while CWT tagging was carried out using a Northwest Marine Technologies automatic tag injector. CWT marking and adipose fin clipping (100 %) was carried out from April 4-25, 2008. A total of 210k fish were CWT tagged. At the time of marking, fish weighed an average of 4.49g. After marking, juveniles were returned to their troughs for additional growth. After accounting for tag loss, a total of 208k CWT marked smolts were released between June 2-18, 2008 (Table 1). There were eight release groups, each represented by a unique CWT code. Group size ranged from ~26 to 28k.

### **Expenditures**

This project was under-budget by approximately \$2,100 Can. (Table 2). This was due primarily to lower than expected food and equipment costs.

### **Discussion**

For a second year, this project has demonstrated that it is feasible to rear Harrison Chinook at Chehalis Hatchery to a size >5g by the required release date of late May/early June. The project deliverables were clearly met, as over 200k smolts averaging 5.3 g were CWT marked and released into the Harrison River in 2008.

Historically, smolt releases of this stock were typically <3g in size, and showed a smolt to adult survival rate of ~0.6%. However, Chilliwack Chinook raised to a size of 5g, typically show a smolt to adult survival rate of ~2.5%. It is anticipated that Chehalis-reared fish reared to a similar size should experience similar survival rates, considering that the Chilliwack stock originated from the Harrison stock, both are geographically close, and both empty into the Fraser river. However, the true test of the success of this release strategy will be measured by the number of CWT marked fish that survive to be caught in fisheries, and return to the spawning grounds. Recoveries in fisheries should begin in the 2008 fishing season (jacks from the 2006 brood release), and will be monitored via the ongoing CDFO mark recovery program. Numbers of CWTs occurring in the Harrison escapement will be monitored via the annual CDFO mark-

recapture/deadpitch program in this system. An additional brood release using this release strategy is desirable in order to provide some estimate of annual variability in survival of such releases of Harrison Chinook. This will be important in order to decide whether this release strategy will provide adequate returns that would allow us to conduct all aspects of the Harrison key stream program entirely within the Harrison River. In 2009, the 2006 brood year large smolt releases will return as three year olds. This will represent the first year when significant recoveries of this release type can be expected (i.e. three year olds). This will also be the year when the first recoveries of the 2007 brood year releases should occur (jacks). Deadpitch effort will need to be increased from 2008 through 2012 in order to ensure adequate sampling of the 2006 and 2007 brood returns to allow accurate evaluation of this release strategy.

Table 1. Release information on Harrison Chinook large smolt releases in 2008 (BY 2007).

<b>CWT Code</b>	<b>Release Date</b>	<b>Adipose Fin Clip</b>	<b>CWT Releases</b>	<b>No. CWT Shed</b>	<b>Tag Loss Rate</b>	<b>Total Releases</b>	<b>Total Length (mm)</b>	<b>Weight (g)</b>
185501	June 2, 2008	100%	25,857	104	0.40	25,945	NA	5.6
185557	June 3, 2008	100%	25,630	311	1.20	25,941	NA	5.4
185558	June 3, 2008	100%	25,635	259	1.00	25,894	NA	5.5
185612	June 4, 2008	100%	25,727	260	1.00	25,987	NA	5.3
185709	June 6, 2008	100%	25,945	0	0	25,945	NA	5.3
185001	June 10, 2008	100%	25,530	415	1.60	25,945	NA	5.2
185040	June 16, 2008	100%	26,026	105	0.40	26,131	NA	5.1
185002	June 18, 2008	100%	27,829	0	0	27,829	NA	4.9
<b>Total</b>			<b>208,179</b>			<b>209,617</b>		

Table 2. Project expenditures, with anticipated versus actual costs.

	<b>Category</b>	<b>Item</b>	<b>Anticipated Cost</b>	<b>Actual Cost</b>	<b>Surplus</b>
<b>Direct Cost</b>	Labour				
		Ad-clipping and CWT marking 206k juvenile Chinook	\$13,000	\$13,449	-\$449
	Material and Supplies				
		CWT cutting tool	\$3,900	\$1,989	\$915
		fin-clipping scissors		\$996	
		200k Coded wire tags	\$17,000	\$16,228	\$772
		Skretting Fish Food	\$5,000	\$3,919	\$1,121
		Brokerage Fees	\$100	\$0	\$100
	Utilities/Miscellaneous				
		electrical power (water pumps, lights, etc.), Ovadine and Chloramine T disinfectant, disposable gloves, O <sub>2</sub> for smolt transport, other consumables	\$2,000	\$2,369	-\$369
	<b>Total</b>		<b>\$41,000</b>	<b>\$38,951</b>	<b>\$2,049</b>
<b>DFO In-kind</b>	Labour		\$21,791	\$21,791	\$0
	Utilities		\$2,000	\$2,000	\$0
	<b>Total</b>		<b>\$23,791</b>	<b>\$23,791</b>	<b>\$0</b>
<b>Grand Total</b>			<b>\$64,791</b>	<b>\$62,640</b>	<b>\$2,049</b>