SF-2007-I-31: 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.

Project Implementation

Egg Collection and Rearing

Approximately 435k Chinook eggs were collected from Harrison Chinook spawners between October 12 and November 2, 2006. 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, 2006 (mean ATUs at eying, 303.87). Survival of green to eyed eggs was 68.6%, 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 288k Chinook were ponded between January 22 and February 18, 2007, representing 98.2% survival between the eyed stage and ponding.

Juvenile Rearing

At ponding, juveniles weighed on average between 0.48 and 0.62g. 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 3 to May 1, 2007. A total of 207k fish were CWT tagged. At the time of marking, fish weighed an average of 3.14g. After marking, juveniles were returned to their troughs for additional growth. A total of 205k CWT marked smolts were released between May 23 and June 5, 2007 (Table 1). There were seven release groups, each represented by a unique CWT code. Group size ranged from ~25 to 52k. Average size at release ranged from 5.5-6.6g in weight, and 82-85 mm total length (Table 1).

Expenditures

This project was under-budget by approximately $7,300 Can. (Table 2). There were several reasons for this. The original cost estimate for CWTs was based on the assumption that the order would be made on a 'stand-alone' basis, i.e. at the 'list' price. However, we were able to add this order to a larger CDFO tag order that qualified for a price reduction. Food costs estimates were more than double what the required food actually cost. Other costs were slightly overestimated as well, including the labour cost of fin-clipping and CWT marking.

Discussion

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 5.9 g were CWT marked and released into the Harrison River in 2007.

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, 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. Of course, additional releases using this release strategy will be necessary in order to provide some estimate of annual variability in survival of such releases of Harrison Chinook. This will be necessary before a decision can be made as to 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.

Table 1. Release information on Harrison Chinook large smolt releases in 2007 (BY 2006).

CWT Code	Release Date	Adipose Fin Clip	CWT Releases	No. CWT Shed	Tag Loss Rate	Total Releases	Total Length (mm)	Weight (g)	Condition Factor
186030	May 23, 2007	100%	24,493	443	1.78	24,936	83.4	6.3	1.07
186031	May 24, 2007	100%	25,699	347	1.33	26,046	81.6	6.0	1.08
186032	May 30, 2007	100%	25,782	163	0.63	25,945	85.0	6.6	1.06
185221	May 31, 2007	100%	25,812	140	0.54	25,952	84.1	6.3	1.05
185242	June 1, 2007	100%	25,899	59	0.23	25,958	81.8	5.5	1.00
185263	June 4, 2007	100%	25,965	21	0.08	25,986	82.4	5.8	1.03
184922	June 5, 2007	100%	51,746	154	0.30	51,900	82.8	5.5	1.07
Total			**205,396**			**206,723**			

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

	Category	Item	Anticipated Cost	Actual Cost	Surplus
Direct Cost	Labour				
		Ad-clipping and CWT marking 206k juvenile Chinook	$13,000	$12,297	$703
	Material and Supplies				
		CWT cutting tool	$3,900	$2,256	$765
		fin-clipping scissors		$880	
		200k Coded wire tags	$19,000	$16,751	$2,250
		Skretting Fish Food	$7,100	$3,422	$3,678
		Brokerage Fees		$105	-$105
	Utilities/Miscellaneous	electircal power (water pumps, lights, etc.), Ovadine and Chloramine T disinfectant, disposable gloves, O_2 for smolt transport, other consumables	$2,200	$2,200	$0
	Total		**$45,200**	**$37,910**	**$7,290**
DFO In-kind	Labour		$22,189	$22,189	$0
	Utilities		$2,200	$2,200	$0
	Total		**$24,389**	**$24,389**	**$0**
Grand Total			**$69,589**	**$62,299**	**$7,290**