

# **Increased Hatchery Production and Coded Wire Tagging of Interior Fraser Coho**

Final Report to the Pacific Salmon Commission's Southern Endowment Fund Committee

**April 2019**

**Jennifer Sandher**

Fisheries and Oceans Canada  
Salmonid Enhancement Program  
200-401 Burrard St.  
Vancouver, B.C.  
V6C 3S4

## **Report Prepared For:**

Pacific Salmon Commission  
Restoration and Enhancement Fund  
600-1155 Robson Street  
Vancouver, BC.  
Canada V6E 1B5

## **INTRODUCTION**

The 2005 Pacific Salmon Commission (PSC) Report of the Expert Panel on the Future of the Coded-Wire-Tag Recovery Program for Pacific Salmon (PSC Tech. Report No. 18) identified shortcomings of coho indicator stocks due to low tag recoveries (Hankin et al. 2005). With the prolonged low marine survival rates of Southern B.C. (SBC) coho and subsequent reduction in fisheries, the coho stocks in SBC fail to obtain sufficient recoveries of coded-wire tags (CWTs). In addition to the increased sampling already implemented as part of the CWT improvement program directed towards coho, increasing the number of CWT's applied to coho will provide better information regarding marine survival, distribution and exploitation rates of SBC coho.

## **PROJECT OBJECTIVES**

The primary objective of this project is to increase the total number of CWT coho released from BCI hatcheries to 250K from the current level of 130K (25K currently SEF funded), which will be able to meet fishery recovery precision requirements for Pacific Salmon Treaty (PST) implementation. Year 1 included the collection of the 2016 broodstock. Year 2 involved the rearing and tagging of these 2016 brood coho, as well as the collection of the 2017 broodstock. Year 3 involved the transport and release of the 2016 brood coho, the rearing and tagging of the 2017 brood coho, and the collection of the 2018 brood coho.

## **METHODS**

Adult coho salmon are captured by Spius Creek hatchery staff upon return to their spawning rivers in the summer or fall. Adult coho are held at the hatchery, either in concrete ponds or in circular fiberglass tubs until they are ready to be spawned. This determination is made by the fish culturists, who check the females to ensure that the eggs are loose, the belly is soft, and the ovipositor is distended. Eggs are gathered by incising the belly of the female and collecting them in a disinfected container. Milt is then added from one or two males to fertilize the eggs. Water is added to the fertilized eggs, after which they are disinfected in a solution of Ovadine and water for 10 minutes. It is at this stage that fish culturists must conduct bulk fecundity sampling to try to ensure that egg targets are met.

Fertilized eggs are placed into the incubation container, which may be a Heath Tray, Atkins cell, or bulk box. Fungal treatments are conducted on eggs, usually using Parasite-S. Coho eggs typically require approximately 400-500 accumulated thermal units (ATUs) prior to hatching (Billard & Jensen, 1996). All eggs are incubated at Spius Creek hatchery on a mix of surface and well water. Surface water supply at Spius is very cold in the winter (approximately 1°C), which allows for a natural, delayed development of the embryo. When the eggs are close to emerging or just emerged, they are transported by truck to Chilliwack River hatchery for ponding and rearing. This move is required as there is not adequate water supply at Spius Creek for rearing beyond the alevin stage.

Fish health monitoring occurs continuously throughout the early rearing period, with prophylactic and antibiotic treatments used as required. The Salmonid Enhancement Program (SEP) veterinarian is

available to diagnose any fish health issues that may arise and works closely with all hatcheries to ensure that fish are healthy prior to marking and release.

Once the additional juveniles are moved to Chilliwack, they are reared for approximately 12 months. The coho at Chilliwack will be coded wire tagged with unique codes so that they can be differentiated from the Coldwater coho reared at Spius hatchery.

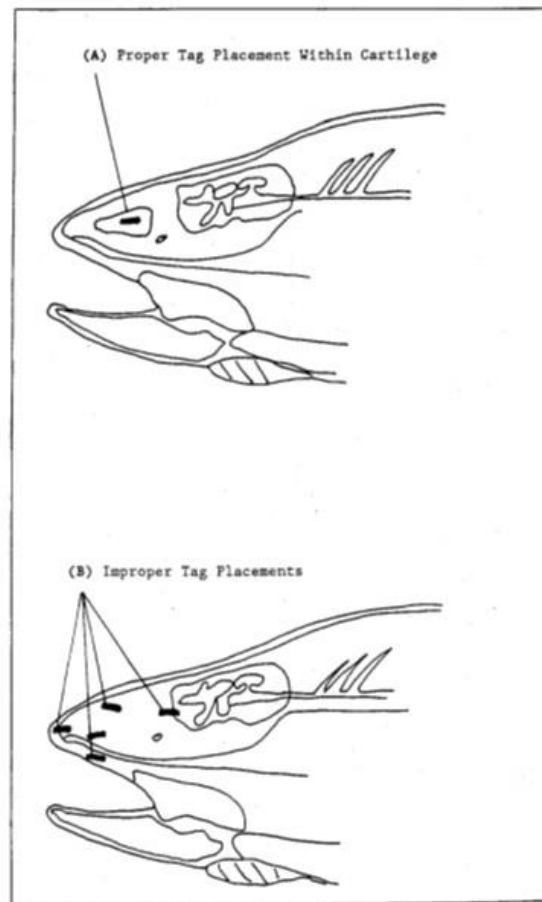
The procedures used to implant the CWTs into juvenile coho are documented in detail by Nichols & Hillaby (1990). Juveniles must not be fed for 48 hours prior to marking and tagging, as this reduces the output of ammonia and excretory by-products associated with stressful fish handling. Juvenile coho are transported to the tagging area in small batches and placed into a holding tank prior to being anaesthetized using Tricaine methanesulfonate (TMS). Following anaesthetization, the adipose fin of each juvenile salmon is excised using a set of surgical scissors, after which it is placed nose-first into a Mark IV CWT machine for tag insertion in the nasal tissue. Fish size-grading will occur at fin clipping to ensure that the appropriate sized head mold is used for fish size. Typically, there are 2 or 3 Mark IVs operating simultaneously, often with different sized head molds. Tagged fish are passed through a quality control device (QCD) to ensure successful tag implantation.

Tag placement and retention is monitored in 3 ways. A small group of tagged fish will be retained at the end of each tagging day for a 24 hour retention check the following day. In many instances, small checks will be conducted on a more immediate basis to ensure quality control. In addition to the 24 hour retention check, a larger group of at least 500 fish is kept for up to 30 days to conduct a longer term retention check (Table 2). Finally, to ensure proper tag placement, one tagged smolt is euthanized and dissected every hour, with the tag placement observed (Figure 1).

Detailed operational procedures may vary slightly by facility, but generally follow the practices as described by Nichols & Hillaby (1990).

Following tag application, the fish will continue to be reared until their release date approached. The fish will be transported by truck back to the Coldwater River for release. Given the location of the Coldwater River situated in between Spius and Chilliwack, and its proximity to the Coquihalla Highway, the transport back to the river from the remote site will not be significantly longer than other transports and releases conducted by hatcheries in Southern BC (approximately 1.5 hours).

**Figure 1** - Proper coded wire tag placement (Nichols & Hillaby, 1990)



## RESULTS

The tub installation by the Canadian Department of Fisheries and Oceans (CDFO) experienced contract delays, and the tubs are currently being installed. 136,127 2017 brood Coldwater coho were AdCWT'd (12.3% tag loss rate) in August 2018 at Chilliwack hatchery, for release in the spring of 2019.

Approximately 245,000 2018 brood Coldwater coho are on hand at Spius hatchery. Approximately 135,000 of these fry will be transported to Chilliwack hatchery in the spring of 2019 for rearing and tagging prior to their release in 2020.

It is too early to be able to assess the ultimate success of this project. This project represents the first step in a complex process that requires fishery and escapement sampling to recover CWTs. Even upon completion of the 2018 spawning and catch year, there are still cohorts that have yet to return from the years of expanded tagging.

## APPENDIX

### Financial Expenditure Summary

Details of expenditures registered in the DFO financial system at fiscal year-end.

<b>Funding Total</b>	<b>\$ 49,627</b>
----------------------	------------------

DFO Casual Hire Salary (Chilliwack and Spius)	\$ 12,392
CWTs	\$ 17,577
CWT equipment, Supplies and Fish Food	\$ 17,270
Laboratory Costs - disease screening	\$ 1,500
<b>Total Costs</b>	<b>\$ 48,739</b>

<b>Balance (refunded to PSC)</b>	<b>\$ 888</b>
----------------------------------	---------------

## REFERENCES

Hankin, D.G. (Chair), J.H. Clark, R.B. Deriso, J.C. Garza, G.S. Morishima, B.F. Riddell, and C. Schwarz. 2005. Report of the expert panel on the future of the coded wire tag recovery program for Pacific salmon. Pacific Salmon Commission Technical Report No. 18. 230 pp

Billard, R., and J.O.T. Jensen. 1996. Gamete removal, fertilization and incubation. Pages 291- 363 In: W. Pennell and B.A. Barton, Editors. Developments in Aquaculture and Fisheries Science V. 29: Principles of Salmonid Culture. Elsevier, Amsterdam.

Nichols, T.L., and J.E. Hillaby. 1990. Manual for Coded-Wire Tagging and Fin-Clipping of Juvenile Salmon at Enhancement Operations Facilities. Prepared under contract #90SB.FP501-7-0060/A to Supply and Services Canada by Streamline Consulting Services Limited