

Final Project Report

**Early Migration and Rearing Life Histories for Coldwater River
Coho, Chinook, and Steelhead and the Contribution to Adult
Recruitment from Rearing in the Coldwater, Nicola, and Thompson
Rivers**

PSC File No. SF-2008-H-12

Prepared for:

Pacific Salmon Commission
Southern Boundary Restoration and Enhancement Fund
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September 2009

This project report consists of three sections:

1. **Section 1:** Project Summary
2. **Section 2:** Project Financial Report
3. **Section 3:** Technical Report: Linking Freshwater Migration and Rearing Habitats Through LA-ICPMS of Interior Fraser Chinook and Coho Salmon Juveniles (Year 2). J.M. Shrimpton, K. Rezansoff, K.H. Telmer, G.J. Glova, N.L. Todd. August 2009.

Section 1: Project Summary

ACKNOWLEDGEMENTS

We would like to acknowledge the Southern Fund for contribution of funds, and the Pacific Salmon Commission staff for their patience in waiting for this much delayed report, it is very much appreciated.

BACKGROUND

It is generally believed that a portion of the Coldwater River populations of Interior Fraser coho (Endangered, COSEWIC), early run chinook (stock of concern), and Thompson steelhead rear in freshwater environments outside of the Coldwater River. Nicola Tribal Association (NTA) collaborated with R. Bailey, Fisheries and Oceans, Interior Stock Assessment Division (DFO StAD), with biological support from LGL Ltd, to develop a strategy to improve the effectiveness of monitoring the production of juvenile salmon in the Coldwater River. Several critical information gaps were identified, one of those being the need for *“an improved understanding of early migration and rearing life histories for Coldwater chinook, coho, and steelhead, and determination of the relative contribution that various rearing habitats in the Coldwater, Nicola, and Thompson Rivers make to adult recruitment to the Coldwater.”*

In 2007 the NTA started to address this information gap by testing the feasibility of using micro-element laser ablation technology to determine freshwater rearing histories of adult salmon returning to the Nicola basin. This technique involved laser ablation analysis of otoliths collected from adult salmonids spawning in the Coldwater River, and matching the elemental signatures with those from an analysis of water samples collected from specific habitats between the Coldwater and lower Thompson. This is a recently proven method to differentiate fish movements between streams for slimy sculpin and Arctic grayling populations in several tributaries of the Williston Reservoir (Clarke et al. 2007).

The second year of the project (2008), funded by the Pacific Salmon Commission Southern Fund, is to augment the results from 2007 with additional water and otolith sampling at the same sites and for the same fish species to improve the utility of the findings and prepare a technical report. Repeated measures over two years will provide sufficient sample sizes and an indication of variability in the results between years. It will also allow for a more reliable assessment of the overall conclusions of the applicability of laser ablation in identifying critical rearing habitat for salmonids in major systems.

OBJECTIVES AND RESULTS

- 1. Further determine the feasibility of using laser ablation techniques to discern differences in trace element depositions on otoliths among adult chinook and coho salmon, and steelhead.*

The laser ablation technology was successful and shows promise for determining life history characteristics and migratory behaviours of fish. Our 2007 project suggested that coho and chinook juveniles remained in the Coldwater River until smolting and migrating out to sea. The calculations for the 2008 otolith samples gave a different result. The 2007 data were re-examined and the otolith to water chemistry relationships recalculated, resulting in a consistent and robust conclusion concerning early rearing life histories for samples from both 2007 and 2008.

- 2. Use information on freshwater life histories to determine the relative importance of rearing environments between the Coldwater, Nicola and lower Thompson to Coldwater origin salmonids.*

In those otoliths (fish) sampled large variations were shown throughout the elemental signatures during the freshwater life stage, proving that there is movement among rivers and tributaries which differed in the elemental signatures. From the results overall it is concluded that of the otolith samples from chinook and coho spawning in the Coldwater River in 2007 and 2008, few of those fish spent their entire freshwater rearing life stages (swim-up to smolt) in the Coldwater River.

- 3. Use information on freshwater life histories to guide future decision-making for protection and restoration of critical habitats in the Nicola and Coldwater watersheds, and potential enhancement measures.*

This project, in combination with the re-examined 2007 work, has resulted in providing important information which will guide future decision-making for protection and restoration of critical habitats in the Nicola and Coldwater watersheds.

POST-SCRIPT

Actual expenditures to complete this project were less than forecast at the time of writing the proposal, which has enabled us to analyze additional archived otolith samples. The results of these analyses are not necessary to meeting the objectives of this project. However, this additional information will contribute to a future peer reviewed publication by the report authors, with credit going to the Southern Fund.

Section 2: Project Financial Report Summary

Overall this project came in significantly under budget compared to the estimated costs in the proposal written in the fall of 2007. We were able to capitalize on our 2007 study to a much greater extent than was anticipated. Consequently the LGL (G. Glova) budget allocation turned out to be much higher than needed. Additionally, the cost for an anticipated graduate student did not materialize and an unanticipated, substantial in-kind contribution from UNBC (Mark Shrimpton) in report writing and analysis was provided. Consequently, we were able to provide for analysis of a number of archived samples (see Project Summary – Post Script) and still return \$7,123.00 of Southern Fund money.

For this project in-kind funding was provided by the Nicola Tribal Association (NTA) for collection of Coldwater River coho and chinook heads during carcass recovery projects (180 people days). Up to 15 days of wages for project coordination was also budgeted as in-kind; only four days, for a total of \$704.00 of this time was used. Total in-kind for this project is \$26,624.00 (without Mark Shrimpton's extra report writing time).

Section 2: Project Financial Report Spreadsheet

Project Budget Form

Name of Project:

Early Migration and Rearing Life Histories for Coldwater River Coho, Chinook, and Steelhead and the Contribution to Adult Recruitment from Rearing Habitats in the Coldwater, Nicola and Thompson Rivers

ELIGIBLE COSTS

BUDGET

OTHER FUNDING

CONTRIBUTION FUNDING

Actual Expenditure

Variance

% Var

Labour

Wages & Salaries

Position	# of crew	# of work days	hrs per day	rate per hour	Total (PSC + In-kind + cash)	In-Kind & Cash	PSC Amount	Actual PSC Exp.	Variance from PSC Amt	% Var
NWSFA Techs ck & co otoliths	6	30	8	\$18	\$25,920	\$25,920		-		
NWSFA Program Manager	1	2	8	30	\$480		\$480		(480.00) ¹	-100%
NWSFA Project Coord	1	20	8	22	\$3,520	\$704	880	880.00	-	0%
Person Days (# of crew x work days)		52			sub total \$29,920	\$26,624	\$1,360	880.00	(480.00)	35%

Labour - Employer Costs (percent of wages subtotal amount)

								-	-	
	rate	15%			\$204		\$204	132.00	(72.00) ¹	-35%
	rate							-	-	
					sub total \$204		\$204	132.00	(72.00)	-35%

Subcontractors & Consultants	# of crew	# of work		rate per hour						
		days	hrs per day							
N. Todd Tech Advisor	1	3	8	45	\$1,080		\$1,080	1,294.00	214.00 ²	20%
G. Glova - project scientist	1	11	7.5	120	\$9,900		\$9,900	2,995.00	(6,905.00) ³	-70%
lab -- otolith analysis					\$5,200		\$5,200	8,875.00	3,675.00 ⁴	71%
lab -- water analysis					\$1,000		\$1,000	384.00	(616.00) ⁵	-62%
	rate	0%						-	-	
sub total					\$17,180	-	\$17,180	13,548.00	(3,632.00)	-21%
Volunteer Labour										
Skilled										
Un-skilled										
Insurance if applicable	rate	0%								
sub total					-	-	-	-	-	n/a
Total Labour Costs					\$45,368	\$26,624	\$18,744	14,560.00	(4,184.00)	-22%
Site / Project Costs										
	Detail (use additional page for details if needed)									
Travel (do not include to & from work)	water sample & carc; grad stud airfare, accomm				\$3,800		\$3,800	860.00	(2,940.00) ⁶	-77%
Small Tools & Equipment					\$0			-	-	
Site Supplies & Materials								-	-	
Equipment Rental					\$0					

Total Labour Costs	45,368
Total Site / Project Costs	3,950
Total Training Costs	-
Total Overhead Costs	2,179
Total Capital Costs	-
Project Total	51,497

1st advance	12,435.00
2nd advance	-
3rd advance	-
Total advances	12,435.00
less actual \$ spent	17,750.00
Difference	5,315.00
Amt due/(owed to PSC)	5,315.00
	agrees with financial statement

NOTES:

¹Program Management for two days was not needed. As a result of those wages not being spent the employer costs (15%) were also below the proposed amount.

²N Todd, Technical Advisor: spent more time reviewing and editing final drafts, and as a result his final bill was slightly more than proposed.

³G Glova, Project Scientist: allocated amount much higher than required.

⁴Lab, otolith analysis: over spent as a result of under spending from G. Glova; analysis of archived otolith samples.

⁵Lab, water samples: fewer water samples than 2007, cost less than anticipated.

⁶The graduate student proposed to participate was unavailable, and so the majority of the travel budget remained unspent.

⁷Shipping/courier: less spent than anticipated.

Section 2: Technical Report – *Linking Freshwater Migration and Rearing Habitats Through LA-ICPMS of Interior Fraser Chinook and Coho Salmon Juveniles (Year 2).*

J.M. Shrimpton, K. Rezansoff, K.H. Telmer, G.J. Glova, N.L. Todd. August 2009.

* Double click on image below to view entire report (64 p) *

**Linking freshwater migration and rearing habitats through
LA-ICPMS of interior Fraser Chinook and coho salmon
juveniles (Year 2)**

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Pacific Salmon Commission Southern Fund

prepared by:

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on behalf of the

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August 2009

