

Taku Nahlin Chinook Sonar 2016

(A study supported by the Northern Fund under the auspices of the Pacific Salmon Commission)

Final Report
February 2017

PSC NF-2016-I-47
DFO 57907

Bonnie Huebschwerlen and Ian Boyce
Fisheries and Oceans Canada
100-419 Range Road
Whitehorse, Yukon Territory
Y1A 3V1

Executive Summary

This report documents the Taku River Chinook salmon sonar project, specifically, enumerating returning Chinook salmon to the Nahlin River.

The Northern Fund provided monies to carry out the 2016 Nahlin River Chinook salmon (*Oncorhynchus tshawytscha*) sonar enumeration project within the Taku River drainage. This permitted the operation of an ARIS sonar unit from June 9 to July 21, 2016. From July 22 to July 27, 2016, the project was funded By Fisheries and Oceans Canada. A preliminary estimate of 2,160 Chinook salmon returned during this period.

A total of 382 Chinook salmon tissue samples were obtained from the in-river live capture fishery analyzed for genetic stock identification. The results indicate that 26.5% of the samples are from the Nahlin stock group.

Table of Contents

1.0 INTRODUCTION	1
2.0 OBJECTIVES	2
3.0 METHODS	2
4.0 RESULTS AND DISCUSSION	2
5.0 BUDGET AND PROJECT OPERATIONS.....	5
6.0 CONCLUSION.....	6
7.0 ACKNOWLEDGEMENTS.....	6
8.0 LITERATURE CITED	6
9.0 APPENDICES.....	6

List of Tables

Table 1. Catches of Chinook salmon and associated tissue samples collected and analyzed in the Taku River in 2016 by statistical week.	4
Table 2. Weekly Chinook stock composition in the Taku River based on GSI, 2016.....	5

List of Figures

Figure 1. The Taku River drainage with the sonar location highlighted with the red star. 1	
Figure 2. Daily Sonar Count, 2016.....	3
Figure 3. Daily water levels, 2016	4

List of Appendices

Appendix 1: Daily Sonar Count of Large Chinook Salmon.	7
Appendix 2: Expenditures	8
Appendix 3: Photographs.....	11

1.0 Introduction

The purpose of this project was to enumerate the escapement of Chinook salmon to the Nahlin River using sonar technology and the analysis of GSI data from in-river fisheries.

The Taku River produces the largest run of Chinook salmon *Oncorhynchus tshawytscha* in British Columbia north of the Skeena River, and in Southeast Alaska (Figure 1; McPherson et al. 1998a; Yanusz et al. 1999). The Nahlin River (into which both the Dudidontu River and Tseta Creek drain) is located in the headwaters of the Taku River drainage system approximately 160km from Atlin, British Columbia.

Based on Genetic Stock identification (GSI) and aerial survey data, the Nahlin River is the second most important Chinook tributary in the Taku River drainage, supporting approximately one third of the total annual return.

An accurate escapement estimate for approximately one third of the total Chinook salmon production will be enhanced by coupling the count with GSI data from the lower Taku River; thereby permitting an estimate of contribution of Nahlin Chinook salmon.

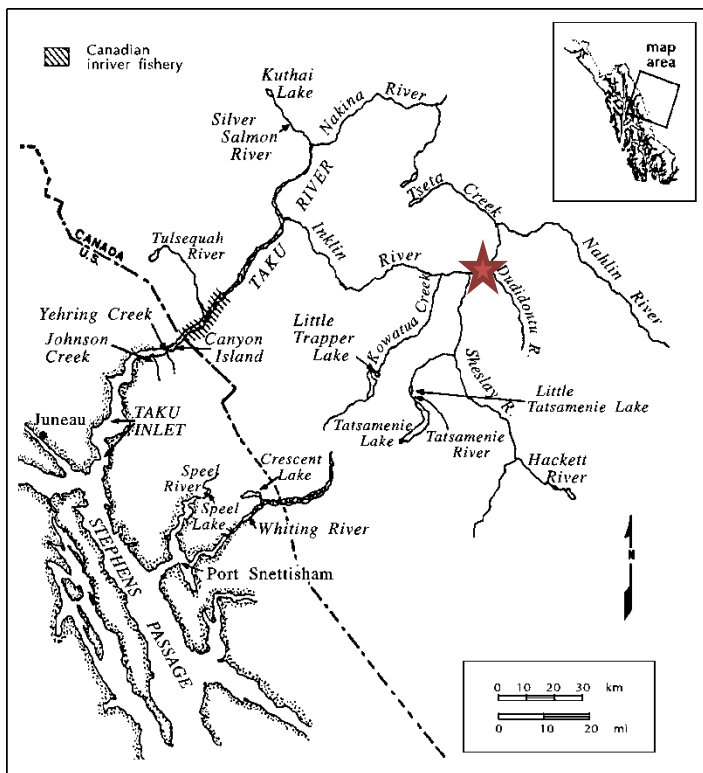


Figure 1. The Taku River drainage with the sonar location highlighted with the red star.

2.0 Objectives

The objective of this project was to estimate the Nahlin Chinook escapement and contribution through the genetic stock identification (GSI) of the 2016 returns.

Metla Environmental Inc, the contractor that carried out the project operated a sonar unit on the Nahlin River to estimate the escapement of Chinook salmon to the Nahlin River system.

Personnel installed, operated and maintained a partial weir and ARIS sonar unit along with a partial deflection weir on the Nahlin River to enumerate fish passage during the entire Chinook salmon migration.

3.0 Methods

Multi beam ARIS sonar technology was used to estimate the abundance of large Chinook salmon (> 659mm mid-eye to tail fork) returning to the Nahlin River system during the salmon migration period.

Sonar operations were based out of the field camp provided by the contractor located at the sonar/weir site approximately three kilometers upstream from the junction confluence of the Sheslay and Nahlin Rivers (Figure 1).

Fisheries and Oceans Canada (DFO) supplied the ARIS sonar unit. Metla Environmental Inc supplied the field camp consisting of wall tents with plywood floors and weir materials. Supplies, materials and a riverboat were transported to Atlin via truck and trailer, then by plane to a landing strip. From the landing strip, a boat transported the materials upstream for the final 3km leg to the project location. During a period of low water when it was impossible and dangerous to use a boat, a helicopter was chartered to transport materials to the sonar site.

Partial weirs were constructed on both sides of the river to deflect migrating fish into a corridor in the deepest part of the river. Large Chinook salmon were identified by length measurement to distinguish between smaller Chinook and co-migrating sockeye. Water level and temperature was also collected.

GSI samples were collected from in-river sampling and processed at the DFO Molecular Genetics Lab in Nanaimo, BC to assess the contribution of Nahlin Chinook to in-river fisheries.

4.0 Results and Discussion

2016 was the first year that this project took place although there was a feasibility study done in 2015. The contractor purchased supplies and transported materials into the remote location via truck, plane and boat. The sonar was operational from June 9 to July 27 (Appendix 1).

It is estimated that 2,162 of the fish ensouffied were large Chinook salmon. Based on run timing it was expected that Chinook would begin arriving in the first week of June. As the sonar was not operational until June 10, it is possible that the first part of the run was missed (Figure 2). There was an early peak of fish June 11 and another from June 30 to July 8 before tapering off at the end of the run (Figure 2).

Peak water level was during the project set up and the lowest was July 9 before it rose again from several days of rain peaking July 16 (Figure 3).

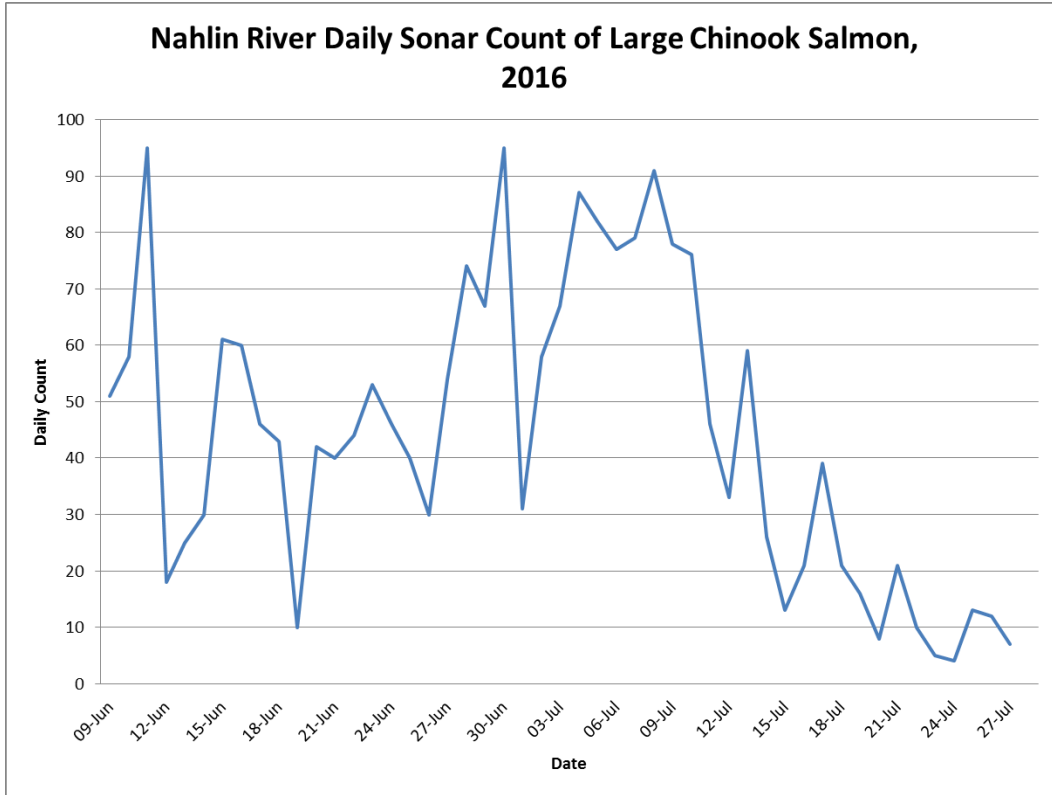


Figure 2. Daily Sonar Count, 2016.

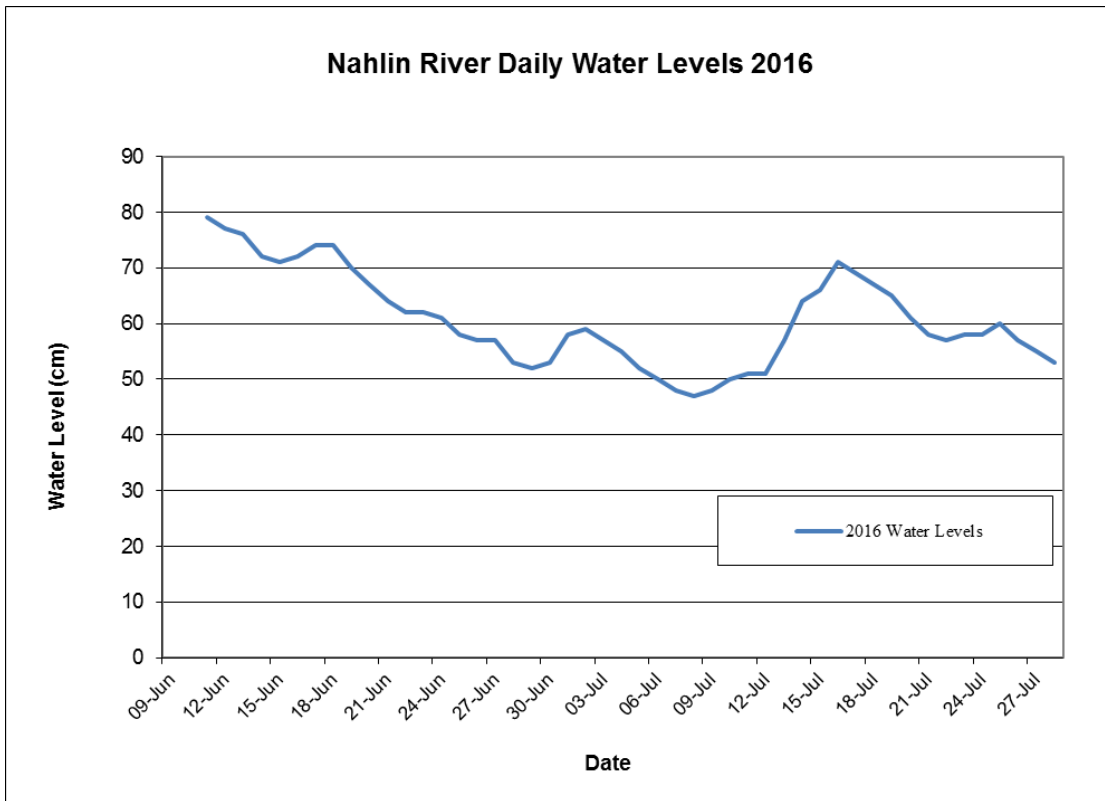


Figure 3. Daily water levels, 2016

Weekly stock contributions for Chinook salmon in the Taku River Wright River driftnet fishery that took place from April 28 (Statistical Week 18) to June 29 (Statistical Week 27) are found in Table 4 for 2016.

Table 1. Catches of Chinook salmon and associated tissue samples collected and analyzed in the Taku River in 2016 by statistical week.

Stat Week	Chinook Samples Obtained	Chinook Samples Analyzed
18	8	8
19	11	11
20	41	40
21	69	69
22	66	65
23	30	29
24	71	71
25	47	47
26	34	34
27	9	8
Total	386	382

In 2016, the Nahlin Chinook group (stocks from Nahlin River, Dudidontu River, Tseta Creek) comprised an average weekly contribution of 26.5%, while all other Taku stocks was 73.5%.

Table 2. Weekly Chinook stock composition in the Taku River based on GSI, 2016.

Statistical Week	Stock	
	Nahlin Group	Other
	Nahlin, Dudidontu, Tseta	
18-20	37.5%	62.5%
21	32.7%	67.3%
22	28.4%	71.6%
23	21.9%	78.1%
24	26.0%	74.0%
25	25.9%	74.1%
26-27	13.4%	86.6%
Average	26.5%	73.5%

5.0 Budget and Project Operations

As presented in Appendix 2, the expenditures of Northern Funds amounted to \$89,455. The 10% holdback of \$8,945 is anticipated once the final project report is accepted by the Pacific Salmon Commission.

A summary of Fund expenditures in relation to budgeted amounts is as follows:

Description	Budget	Expenditure	Balance
Labour Costs-Contract	61,855	81,434	(19,579)
Site/Project Costs	10,600	0	10,600
Training Costs	0	0	-
Overhead Costs-lab	10,000	8,021	1,979
Capital Costs	7,000	0	7,000
Grand Total	\$ 89,455	\$ 89,455	\$ 0

The service contract included both administration and some site/project costs; this contributes to the higher contract amount versus the lower overhead/ site project amount per line item. The total cost of the project amounted to \$130,000 but the amount over and above the PSC support was covered by DFO internally as an in-kind contribution.

The cost of this project was higher than expected due to unexpected challenges with transporting materials and supplies to the remote location which required the use of a helicopter. Also, the initial contract was extended to ensure that the tail end of the Chinook run was enumerated.

6.0 Conclusion

The planned and actual deliverables of the project were as follows:

1. Chinook salmon was enumerated using sonar from June 9 to July 27 on the Nahlin River in the upper Taku River drainage.
2. Inriver fishery samples were collected and analyzed for genetic stock composition.

The activities supported by this project will contribute to accurate estimates of the escapement of large Chinook salmon to the Nahlin River and the stock composition of the returns to the Taku River drainage.

7.0 Acknowledgements

Metla Environmental Inc. Brian Mercer, David McDonald and Christine Bylenga conducted the sonar project supported by this funding. Colleen Claggett and Julie Bradford of DFO assisted with the financial administration and accounting for this project.

8.0 Literature Cited

McPherson, S. A., D. R. Bernard, S. K. Kelley, P. A. Milligan, and P. Timpany. 1998a. Abundance of Chinook salmon in the Taku River in 1997. Alaska Department of Fish and Game, Division of Sport Fish, Fishery Data Series Report 98-41, Anchorage.

PSC (Pacific Salmon Commission). 2017. Preliminary estimates of transboundary river salmon production, harvest, and escapement and a review of joint enhancement activities in 2016. Transboundary Technical Committee Report.

9.0 Appendices

Appendix 1: Daily Sonar Count of Large Chinook Salmon.

Date	Daily	Cumulative
07-Jun	0	0
08-Jun	0	0
09-Jun	51	51
10-Jun	58	109
11-Jun	95	204
12-Jun	18	222
13-Jun	25	247
14-Jun	30	277
15-Jun	61	338
16-Jun	60	398
17-Jun	46	444
18-Jun	43	487
19-Jun	10	497
20-Jun	42	539
21-Jun	40	579
22-Jun	44	623
23-Jun	53	676
24-Jun	46	722
25-Jun	40	762
26-Jun	30	792
27-Jun	54	846
28-Jun	74	920
29-Jun	67	987
30-Jun	95	1082
01-Jul	31	1113
02-Jul	58	1171
03-Jul	67	1238
04-Jul	87	1325
05-Jul	82	1407
06-Jul	77	1484
07-Jul	79	1563
08-Jul	91	1654
09-Jul	78	1732
10-Jul	76	1808
11-Jul	46	1854
12-Jul	33	1887
13-Jul	59	1946
14-Jul	26	1972
15-Jul	13	1985
16-Jul	21	2006
17-Jul	39	2045
18-Jul	21	2066
19-Jul	16	2082
20-Jul	8	2090
21-Jul	21	2111
22-Jul	10	2121
23-Jul	5	2126
24-Jul	4	2130
25-Jul	13	2143
26-Jul	12	2155
27-Jul	7	2162

Appendix 2: Expenditures

Project Budget Form

Page 1 of 2

Name of Project: Taku Nahlin Chinook Sonar 2016

ELIGIBLE COSTS					BUDGET	OTHER FUNDING	CONTRIBUTION FUNDING		
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	PSC Actual Expenditures	PSC Variance
DFO Stock Assessment Biologist Bi-3	1	5	7.5	39	1,463	1,463			-
DFO Stock Assessment Biologist Bi-2	1	21	7.5	37	5,828	5,828			-
DFO Fishery Technician EG 4 (includes OT)	1	21	7.5	29	10,568	10,568			-
									-
									-
									-
Person Days (# of crew x work days)		47		sub total	17,858	17,858	-	-	-
Labour - Employer Costs (percent of wages subtotal amount)									
	rate	20%		sub total	3,572	3,572	-		-
Subcontractors & Consultants									
	# of crew	# of work days	hrs per day	rate per hour					
Aircraft Charter					12,000		12,000		12,000
Contract Biologist	1	39	8	38	17,895		17,895		17,895
Sonar Technicians	2	44	8	37	31,960		31,960		31,960
Project Contract								81,349	(81,349)
Insurance if applicable	rate	0%							
	114			sub total	61,855	-	61,855	81,349	(19,494)
Volunteer Labour									
	# of crew	# of work days	hrs per day						
Skilled									
Un-skilled									
Insurance if applicable	rate	0%							
				sub total					
Total Labour Cost					83,284	21,429	61,855	81,349	(19,494)
Site / Project Costs									
Detail (use additional page for details if needed)									
Travel (do not include to & from work)					1,500		1,500		1,500
Small Tools & Equipment					2,000		2,000		2,000
Site Supplies & Materials					3,500		3,500		3,500
Equipment Rental							-		-
Work & Safety Gear					800		800		800
Repairs & Maintenance					1,000		1,000		1,000
Permits					300		300		300
Technical Monitoring							-		-
Other site costs					1,500		1,500		1,500
Total Site / Project					10,600	-	10,600	-	10,600

Project Budget Form (continued)

ELIGIBLE COSTS

BUDGET

OTHER CONTRIBUTION
FUNDING FUNDING

				Total (PSC + In-kind + cash)	In-Kind & Cash	PSC Amount	Actual Expenditures	Variance
Training (e.g Swiftwater, bear aware, electrofishing, etc).								
Name of course	# of crew	# of days						
				-	-			
			Total Training Costs	-	-	-	-	-

Overhead / Indirect Costs (not to exceed 20% of PSC Amount)

Office space; including utilities, etc.								
Insurance								
Office supplies								
Telephone & long Distance					-			
Photocopies & printing								
Other overhead costs	Admin Overhead @ 3% / 20%			2,817	2,817			
GSI analysis - 500 samples @ 20/sample				10,000		10,000	8,106	1,894
			Total Overhead Costs	12,817	2,817	10,000	8,106	1,894

Capital Costs / Assets

Detail (use additional page for details if needed)

Assets are things of value that have an initial cost of \$250 CAN or more and which can be readily misappropriated for personal use or gain or which are not, or will not be, fully consumed during the term of the project.

solar panels, battery bank, laptop(s), tents, tripods, weir material				7,000		7,000		7,000
sonar unit, weir material				28,000	28,000			
				-				
				-				
			Total Capital Costs	35,000	28,000	7,000	-	7,000
			Project Total Costs	141,701	52,246	89,455	89,455	-

DFO Budget Summary
(PSC + in-kind + cash)

	Total	1st payment	\$ 80,509.50
		10% holdback	\$ 8,945.50
Total Labour Costs	83,284	Total	\$ 89,455.00
Total Site / Project Costs	10,600		
Total Training Costs	-		
Total Overhead Costs	12,817		
Total Capital Costs	35,000		
Project Total	141,701		

Appendix 3: Photographs



Photograph 1. Sonar.



Photograph 2. Sonar work station.



Photograph 3. Nahlin River partial weir and sonar.