

Taku River Watershed – Nahlin River Chinook Salmon Sonar Enumeration 2018

Final Report
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PSC NF-2018-I-16
DFO 57907

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Executive Summary

The Northern Endowment Fund provided monies to carry out the 2018 Nahlin River Chinook salmon (*Oncorhynchus tshawytscha*) sonar enumeration project within the Taku River drainage. This permitted the operation of an ARIS sonar unit from 01 June to 27 July with extrapolation to end of run estimated as 30 July 2018. An estimate of 1,931 large (>659 mid-eye fork length) Chinook salmon returned to the Nahlin River drainage over this period.

A total of 288 Chinook salmon tissue samples were obtained from the lower Taku River through a separate live capture drift gillnet project and were analyzed for genetic stock identification. Preliminary results show that 30% of lower Taku River Chinook samples are from the Nahlin stock group (combined Nahlin, Dudidontu, and Tseta stocks).

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1.0 Introduction

The purpose of this project was to enumerate and accurately estimate the escapement of large (>659 mm mid-eye to fork length (MEF)) Chinook salmon, *Oncorhynchus tshawytscha*, to the Nahlin River using sonar technology. Genetic analysis of tissue samples gathered in the lower Taku River allowed us to estimate the contribution of Nahlin River Chinook to the entire Taku River drainage Chinook population.

The Nahlin River is located in northwestern British Columbia about 160km south of Atlin, British Columbia, and comprises the headwaters of the Taku River. The Taku River drains to the Pacific Ocean in Southeast Alaska near Juneau (Figure 1; McPherson et al. 1998). The Taku River historically produces the largest run of Chinook salmon in Southeast Alaska, as well as the largest run in British Columbia north of the Skeena River. Based on genetic stock identification (GSI) to date and past aerial survey data, the Nahlin River is the second most important Chinook tributary in the Taku River drainage after the Nakina River, supporting approximately one third of the total annual returns to the Taku River.

Fisheries and Ocean Canada (DFO) retained Metla Environmental Inc (MEI) as a contractor to deliver this project in 2018, following their successful delivery of the project in 2016 and 2017.

In 2018, as a benefit of this project, the count of large Chinook salmon through the Nahlin River sonar site was used in combination with a concurrent Alaska Department of Fish and Game (ADF&G) Chinook radio telemetry project to provide a mark-recapture estimate of drainage wide Taku River Chinook salmon abundance (PSC 2018).

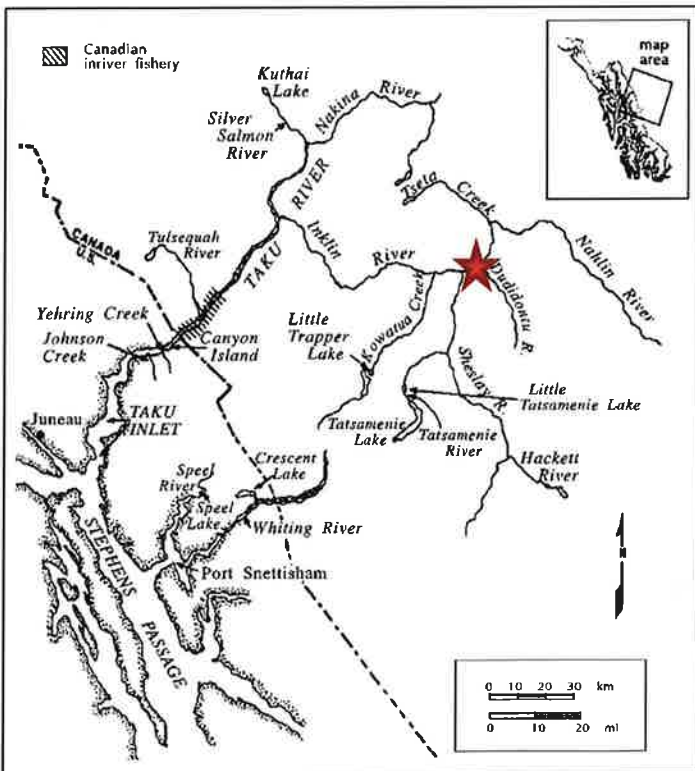


Figure 1. The Taku River drainage with the sonar location identified by the red star.

2.0 Objectives

The objectives of this project were to accurately estimate of the escapement of large Chinook salmon to the Nahlin River and accurately estimate of the contribution of Nahlin River Chinook salmon stocks to the Taku River drainage wide return in 2018.

3.0 Methods

The project was based out of a field camp approximately three kilometers upstream from the confluence of the Sheslay and Nahlin Rivers (Figure 1). Project supplies and materials were transported by aircraft from Atlin, BC, to a remote airstrip located along the Nahlin River near the confluence of the Nahlin and the Sheslay Rivers. A riverboat was used to transport staff and materials to the project location. The camp consisted of plywood floor wall tents adjacent to the weir site.

DFO supplied MEI with an ARIS multi beam sonar unit for the project. The sonar unit was installed in combination with a partial weir on river right and a small deflection weir on river left to direct migrating fish into the ensounded portion of the channel (Appendix C). MEI operated and maintained the project from 01 June through 27 July (Appendix 1), the majority of the Chinook salmon migration. Sonar counts were expanded to cover the tail end of the run through 30 July 2018.

Sonar files for the entire project duration were read by the contractor on site (no sub-sampling). Species apportionment sampling was not conducted as part of this project. All targets larger than 659 mm mid-eye to fork length were assumed to be large Chinook salmon, with no ability to distinguish between smaller Chinook salmon and co-migrating sockeye salmon. The contractor has invested significant effort into developing relationships between sonar length, true total length, and mid-eye to fork length for this project, as well as developing rationale for size based apportionment (internal DFO files).

Water level and water temperature data were collected daily.

Chinook salmon tissue samples for GSI were collected through the ADF&G Wright River drift gillnet project on the lower Taku River. This project was live capturing Chinook salmon for application of spaghetti tags and radio transmitters as part of a drainage wide mark-recapture and telemetry project. Samples were pooled by statistical week for analysis from 28 April (statistical week 17) to 30 June (statistical week 26). Samples were provided to DFO and were processed at the DFO Molecular Genetics Lab in Nanaimo, BC.

4.0 Results and Discussion

This year was the third year that this project covered the majority of the Chinook salmon migration period. The project was successfully conducted in 2017 and 2016, and a sonar feasibility study was conducted in 2015.

The 2018 final total estimate of large Chinook salmon past the Nahlin sonar site is 1,931. The first Chinook salmon passed the sonar on 01 June, consistent with past run timing. The run peaked on 04 July and tapered to sonar removal on 27 July. The counts for the remainder of the run were extrapolated based on the run counts of the last 10 days the sonar was recording. Extrapolated counts for these 3 days estimate that a total of 8 Chinook salmon passed after sonar removal, and the run was estimated to be complete by 30 July (Figure 2).

The Nahlin River water levels in 2018 were highest near the beginning of the project (02 June) and tapered for the remainder of the project (Figure 3). Nahlin River water levels, similar the Taku River drainage as a whole, were well below normal in 2018 and very conducive to this project. Comparisons to the two most recent years, also low water years in a historical sense, are also presented in Figure 3.

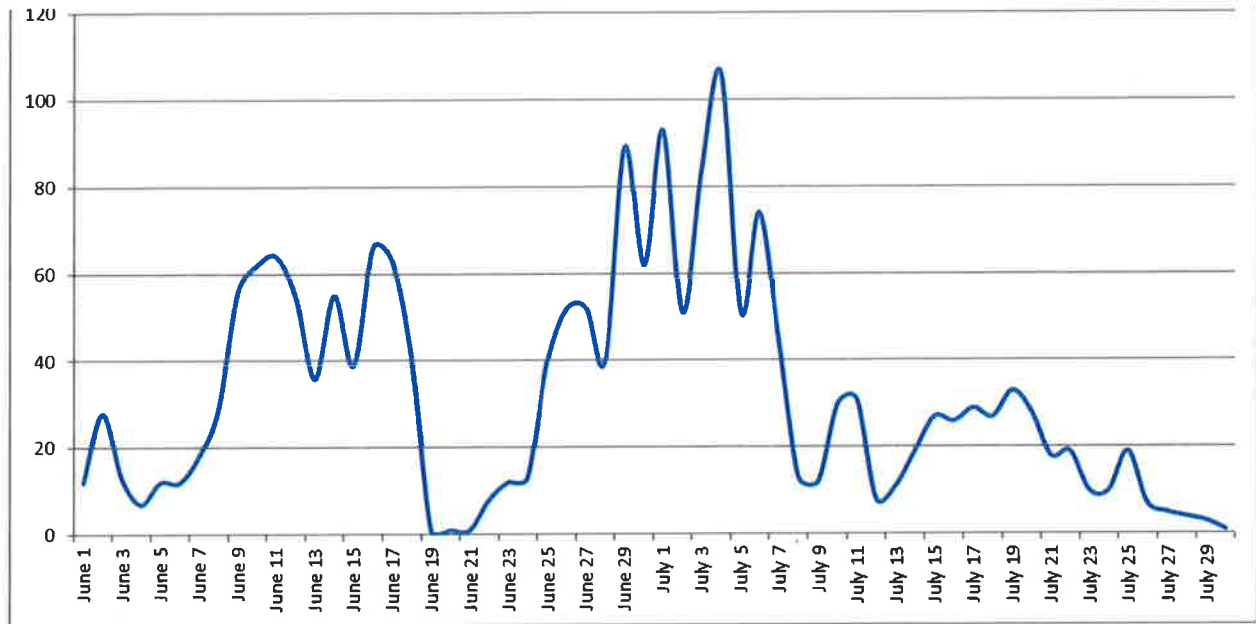


Figure 2. Nahlin River daily sonar count of large Chinook salmon, 2018.

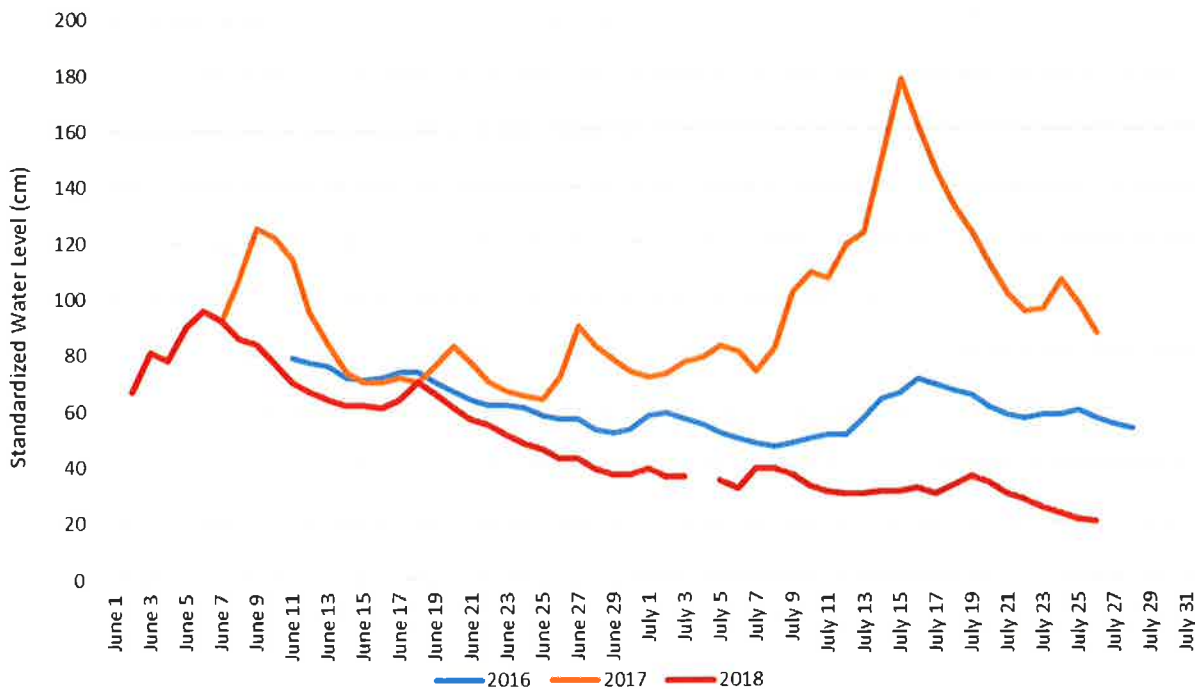


Figure 3. Nahlin River daily water levels at project location, 2016, 2017, and 2018 in red.

The number of Chinook salmon tissue samples obtained for GSI in 2018 from the Wright River drift gillnet project, pooled by statistical week, are found in Table 1. SW23 remained outstanding at the time of report preparation.

Table 1. Chinook salmon tissue samples collected and analyzed from the Wright River drift gillnet project on the lower Taku River in 2018 by statistical week.

Statistical Week	Chinook Samples Obtained	Chinook Samples Analyzed
17	3	18
18	16	
19	18	18
20	50	45
21	44	44
22	34	34
23	38	Pending
24	27	27
25	27	27
26	31	31
Total	288	244

Based on preliminary GSI results from 2018 samples, the Nahlin Chinook salmon group (combined Nahlin River, Dudidontu River, and Tseta Creek stocks) comprised an unweighted average weekly contribution of 30%, while all other Taku stocks comprised the remaining 70%.

Table 2. Weekly Chinook salmon stock composition of Nahlin stocks in the lower Taku River based on GSI, 2018.

Statistical Week	Stock	
	Nahlin Group (Nahlin, Dudidontu, Tseta)	Other
17-18	10%	90%
19	40%	60%
20	50%	51%
21	75%	25%
22	28%	73%
23	TBD	TBD
24	7%	93%
25	22%	78%
26	8%	92%
Average	30%	70%

5.0 Budget and Project Operations

As presented in Appendix B, the expenditures of Northern Funds amounted to \$119,047. This is \$4,553 less than the amount budgeted. The entirety of the 10% holdback of \$12,360 is not anticipated, rather the remainder outstanding is \$7,807 once this final project report is accepted by the Pacific Salmon Commission.

6.0 Conclusion

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

1. Chinook salmon were enumerated using sonar from 01 June to 27 July on the Nahlin River in the upper Taku River drainage.
2. Lower Taku River Chinook samples were collected and analyzed for genetic stock identification.

The activities supported by this project contribute to accurate estimates of the escapement of large Chinook salmon to the Nahlin River and the stock composition of returns to the entire Taku River drainage. They are also integral in the estimation of drainage wide Chinook salmon runs in the Taku River in combination with radio telemetry projects and mark-recapture methodology.

7.0 Acknowledgements

Metla Environmental Inc., Brian Mercer, David McDonald, and Carolyn Knapper conducted the sonar project supported by this funding under contract with DFO. Colleen Claggett of DFO assisted with 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. 1998. 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). 2018. Preliminary estimates of transboundary river salmon production, harvest, and escapement and a review of joint enhancement activities in 2018. Transboundary Technical Committee Report.

9.0 Appendices

Appendix A: Daily Sonar Count of Large Chinook Salmon.

Date	Daily	Cumulative	
1-Jun	12	12	sonar begins counting
2-Jun	28	40	
3-Jun	13	53	
4-Jun	7	60	
5-Jun	12	72	
6-Jun	12	84	
7-Jun	18	102	
8-Jun	29	131	
9-Jun	56	187	
10-Jun	62	249	
11-Jun	64	313	
12-Jun	55	368	
13-Jun	36	404	
14-Jun	55	459	
15-Jun	39	498	
16-Jun	66	564	
17-Jun	63	627	
18-Jun	40	667	
19-Jun	1	668	
20-Jun	1	669	
21-Jun	1	670	
22-Jun	8	678	
23-Jun	12	690	
24-Jun	13	703	
25-Jun	40	743	
26-Jun	52	795	
27-Jun	52	847	
28-Jun	40	887	
29-Jun	89	976	
30-Jun	62	1038	
1-Jul	93	1131	
2-Jul	51	1182	
3-Jul	84	1266	
4-Jul	106	1372	
5-Jul	51	1423	
6-Jul	74	1497	
7-Jul	44	1541	
8-Jul	13	1554	
9-Jul	12	1566	
10-Jul	30	1596	
11-Jul	31	1627	
12-Jul	8	1635	
13-Jul	11	1646	
14-Jul	19	1665	
15-Jul	27	1692	
16-Jul	26	1718	
17-Jul	29	1747	
18-Jul	27	1774	
19-Jul	33	1807	
20-Jul	28	1835	
21-Jul	18	1853	
22-Jul	19	1872	
23-Jul	10	1882	
24-Jul	10	1892	
25-Jul	19	1911	
26-Jul	7	1918	
27-Jul	5	1923	sonar stops counting
28-Jul	4	1927	extrapolated count
29-Jul	3	1930	extrapolated count
30-Jul	1	1931	extrapolated count

Appendix B: Expenditures

Fisheries and Oceans Canada - PSC Project Budget Financial Report

Name of Project and PSC#:

Taku Nahlin Chinook Enumeration, 2018 (NF-2018-I-16)

EXPENDITURES

Labour					
DFO Employee Salaries and Benefits					
Position	Expenditures		Approved Budget	Total Expenditure	Variance
	Salary				
	Benefits		\$ -		
	Salary				
	Benefits		\$ -		
	Salary				
	Benefits		\$ -		
Total Expended	\$ -	Total Budget	\$ -	\$ -	\$ -

Subcontractors & Consultants					
Contract	Contract Amount Expended		Approved Budget	Total Expenditure	Variance
Contractor	\$ 107,700.00		113,100		
Total Expended	\$ 107,700.00	Total Budget	\$ 113,100.00	\$ 107,700.00	\$ 5,400.00
Total Labour Summary			\$ 113,100.00	\$ 107,700.00	\$ 5,400.00

Site / Project Costs					
Item	Amount Expended		Approved Budget	Total Expenditure	Variance
Travel					
Small Tools & Equipment					
Site Supplies & Materials	\$ 4,192.59				
Equipment Rental					
Work & Safety Gear					
Repairs & Maintenance	\$ 856.22				
Permits					
Other costs					
Total Expended	\$ 5,048.81	Total Budget	\$ -	\$ 5,048.81	\$ (5,048.81)
Total Site / Project Summary			\$ -	\$ 5,048.81	\$ (5,048.81)

Training Costs					
Item	Amount Expended		Approved Budget	Total Expenditure	Variance
Name of course					
Total Expended	\$ -	Total Budget	\$ -	\$ -	\$ -
Total Training Summary			\$ -	\$ -	\$ -

Fisheries and Oceans Canada - PSC Project Budget Financial Report

Overhead / Indirect Costs				Total Expenditure	Variance
Item	Amount Expended		Approved Budget		
Office space; including utilities, etc.					
Insurance					
Office supplies					
Telephone & long Distance					
Photocopies & printing					
Indirect/overhead costs (GSI Analysis)	6297.78		10,500		
Administration and financial management					
(If the PSC contribution to Indirect costs exceeds 20% of the total PSC grant submission of back-up documentation justifying the expense is required).					
Total Expended	\$ 6,297.78	Total Budget	\$ 10,500.00	\$ 6,297.78	\$ 4,202.22
Total Overhead / Indirect Summary			\$ 10,500.00	\$ 6,297.78	\$ 4,202.22

Capital Costs / Assets (Value > \$250.00)				Total Expenditure	Variance
Item	Amount Expended		Approved Budget		
Total Expended	\$ -	Total Budget	\$ -	\$ -	\$ -
Total Capital Cost / Asset Summary			\$ -	\$ -	\$ -

Financial Report

Categories	Approved Budget (PSC Grant)	Project Expenditures	Variance
Labour	\$ 113,100.00	\$ 107,700.00	\$ 5,400.00
Site / Project Costs	\$ -	\$ 5,048.81	\$ (5,048.81)
Training	\$ -	\$ -	\$ -
Overhead / Indirect Costs	\$ 10,500.00	\$ 6,297.78	\$ 4,202.22
Capital Costs / Assets	\$ -	\$ -	\$ -
TOTAL	\$ 123,600.00	\$ 119,046.59	\$ 4,553.41

PST Project Funding Grant Advance Amount Received	\$ 111,240.00
PST Project Funding Grant Amount Remaining to be Paid	\$ 7,806.59
Difference Between Grant Amount and Project Expenditures	\$ -

Project Manager Name Aaron Foos

Project Manager Signature



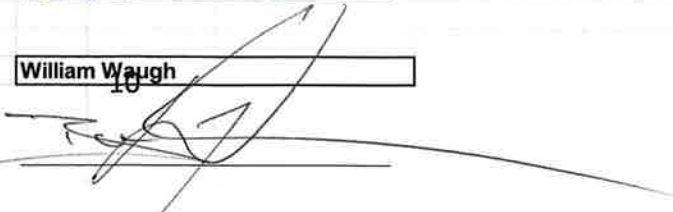
Date

15 March 2019

DFO Responsibility Center Manager Name

William Waugh

DFO Responsibility Center Manager Signature



Appendix C: Photographs



Photograph 1. 2018 Sonar and partial fence, note low water levels.



Photograph 2. Sonar work station.



Photograph 3. Nahlin River partial fence and sonar.