

Taku River Coho Salmon Smolt Tagging Augmentation 2017

Final Report
February 2018

PSC NF-2017-I-28
DFO 57662

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

Executive Summary

The Northern Endowment Fund provided monies to Fisheries and Oceans Canada (DFO) and Alaska Department of Fish and Game (ADF&G) to augment the 2017 Taku River coho smolt tagging program. The funding to DFO permitted the operation of an additional smolt trap line, as well as beach seining efforts, upstream of traditional lines. An additional 11,232 fish were captured as a result of this effort of which an estimated 2,566 coho and 7,508 Chinook contributed to the final tagged number. Overall the project contributed 15% of the total Taku River salmon smolts tagged with coded wire tags in 2017.

Table of Contents

1.0 INTRODUCTION	4
2.0 OBJECTIVES	5
3.0 METHODS	6
4.0 RESULTS AND DISCUSSION	7
5.0 BUDGET SUMMARY	10
6.0 CONCLUSION	10
7.0 ACKNOWLEDGEMENTS	11
8.0 LITERATURE CITED.....	11
9.0 APPENDICES.....	11

List of Tables

Table 1. Total smolt trap sets and catches in the uppermost trap line by year.	8
---	---

List of Figures

Figure 1. The Taku River watershed; smolt trapping area in Canada roughly coincides with the Canadian commercial fishing area highlighted in grey	5
Figure 2. Approximate locations of smolt trapping sites on the Taku River (Bull Slough to Mosquito Point).....	7
Figure 3. Smolt trap catch rates in the upstream trap line, 2017.	9
Figure 4. Daily smolt catch by DFO crew in upper trapline and by beach seining, 2017.	9
Figure 5. River level measurements taken at the gauge located in the Taku River canyon, 2017 versus 2007-16 average.	10

List of Appendices

Appendix A: Smolt Trapping Results.....	12
Appendix B: Expenditures.....	14
Appendix C: Photographs.....	17

1.0 Introduction

The Taku River produces the largest run of coho salmon (*Oncorhynchus kisutch*) and Chinook salmon (*Oncorhynchus tshawytscha*) in British Columbia north of the Skeena River, and in all of Southeast Alaska (McPherson et al. 1998a; Yanusz et al. 1999).

Each spring since 1991, coho salmon smolts have been tagged with coded wire tags (CWTs) as they emigrate from the Taku River. In the following year, returning adults pass through an offshore troll fishery before entering inside waters where they encounter seine, drift gillnet, and recreational fisheries. After entering the river, coho salmon are harvested in a drift/set gillnet fishery in Canada. All of these fisheries are sampled for the presence of CWT. Also in the lower Taku River near Canyon Island, additional fish are captured for CWT inspection using fishwheels and set gillnets operated by Alaska Department of Fish and Game (ADF&G). At the same time, adult coho are tagged with spaghetti tags as part of a two event mark-recapture study to estimate the inriver abundance and sampled for age, sex, and length composition data. A short distance upriver in Canada, coho adults are inspected for both types of marks in the commercial fishery. Typically, the commercial fishery ceases in early September and it is necessary to obtain tag ratio through a scientific fishing licence or a live release fishery. Data gathered from these efforts has provided estimates of inriver abundance and escapement since 1987, estimates of harvest, exploitation, survival, smolt abundance, and total run since 1992, and run forecasts since 1996. These combined efforts along with adult sampling programs in the various marine fisheries allow detailed stock assessment analyses including annual estimates of escapement necessary to refine escapement goals and forecast runs. Improved escapement goals and run forecasts along with in-season abundance estimates allow implementation of abundance-based management.

This report presents results of the DFO component of the joint Canada/U.S. Taku River coho salmon smolt tagging augmentation project. Funding from the Northern Endowment Fund (NEF) in 2017 enabled DFO to add a third minnow trap line to the project to bolster the capture of coho salmon smolts receiving coded wire tags. The ADF&G component of the project, additional smolt capture and the application of CWT to all smolts captured by both parties, and the production of a smolt estimate, will be presented in ADF&G publications and reports.

The adult coho salmon portion of the mark-recapture experiment which assists in estimating smolt abundance was also conducted jointly by DFO and ADF&G. The DFO portion of this project is presented in the Pacific Salmon Commission (PSC) funded project report "*Taku River Coho Salmon Escapement and Adult Sampling Augmentation 2017*". The coho smolt estimate is prepared by ADF&G.

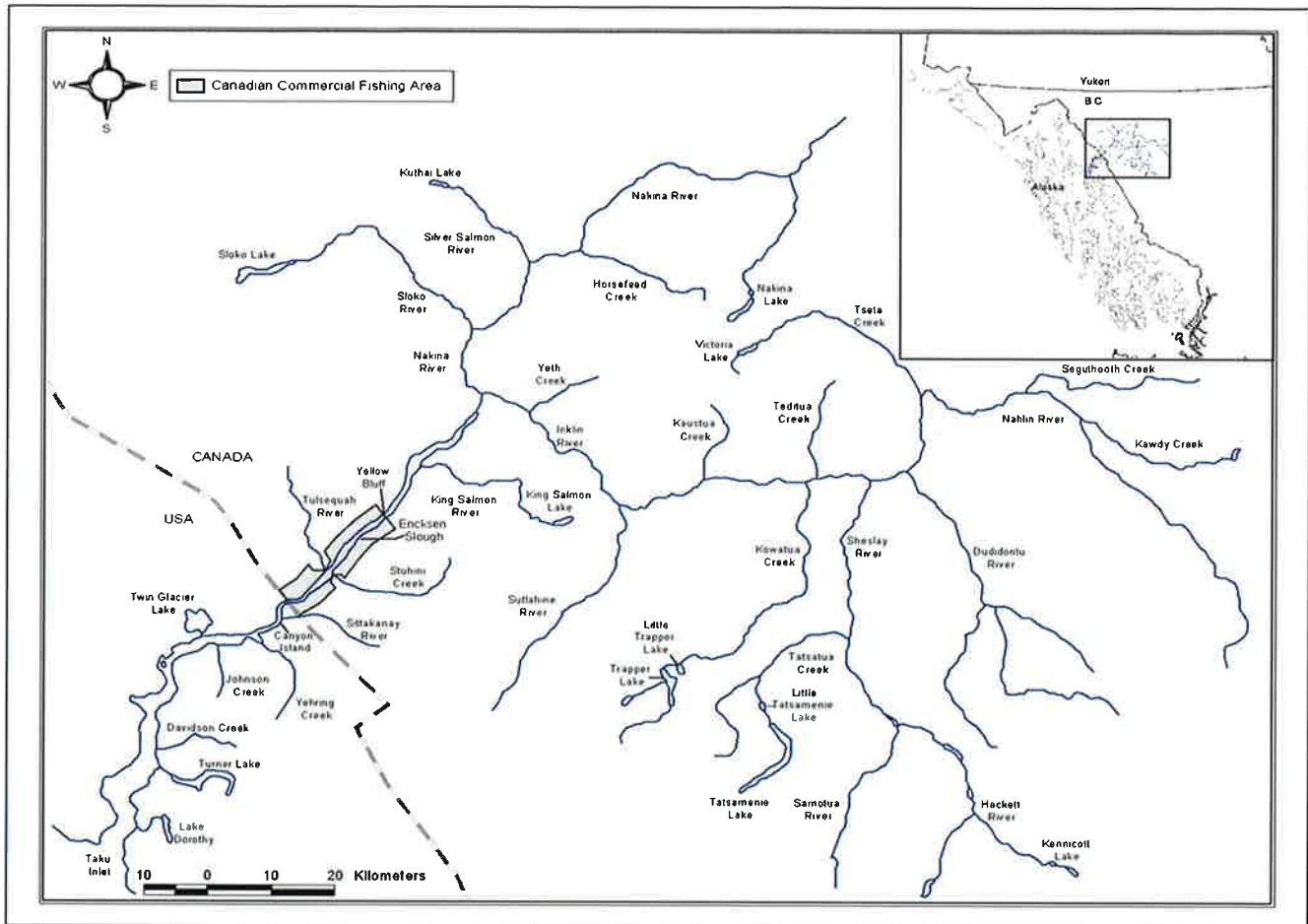


Figure 1. The Taku River watershed; smolt trapping area in Canada roughly coincides with the Canadian commercial fishing area highlighted in grey

2.0 Objectives

The project objectives from the joint DFO/ADF&G NEF proposal are listed below. The DFO contribution is to provide increased smolt capture through the operation of a coho smolt trap line on the Taku River in Canada upstream of Cranberry Point (the “upper” line) and to provide assistance with seine netting. The purpose of this was to boost the mark component of the smolt mark-recapture study which will be used to estimate the number of coho smolt that emigrate from the Taku River in 2017. Concurrently, ADF&G operated trap lines and tagged all smolt downstream of Cranberry Point. The objectives will be fully reported on through ADF&G publications and reports.

1. Estimate the number of coho salmon smolt (>75 mm FL) leaving the Taku River that originated from above Canyon Island annually, such that the relative precision of the calculated 95% CI is $\leq 25\%$.

2. Estimate the marine harvest in sampled salmon fisheries of adult coho salmon that originated from above Canyon Island in the Taku River via recovery of CWTs annually, such that the relative precision of the calculated 95% CI is ≤ 30 .
3. Estimate the mean lengths of coho salmon smolt (>75 mm FL) captured near Canyon Island annually such that the precision of the calculated 95% CI is ≤ 2 mm of the point estimate.
4. Estimate the mean weight of coho salmon smolt to the nearest 0.1 g annually such that the precision of the calculated 95% CI for the mean is ≤ 0.5 g of the point estimate.

3.0 Methods

DFO smolt trapping operations were based out of the DFO field facility located at Ericksen Slough on the Taku River upstream of the Tulsequah / Taku River confluence. Flat bottom river boats (4.9-5.5 meters) powered with jet drive outboards (30-60 hp) were used to access capture locations. Gee type wire minnow traps (9" x 14.5") were employed for the capture of smolts in the first portion of project and are best for the capture of coho smolts at lower water levels. The traps were baited with Chinook or coho salmon roe obtained from Taku River commercial and test fisheries. Traps were placed in and around natural woody debris locations out of the main river current throughout the capture area. Traps were tied off and marked with flagging tape and checked a minimum of once per day depending on catch rates. Minnow trapping becomes less effective for fish capture at high water levels due to less access to natural woody debris that is out of the main river current, so the project switched to seine nets as the primary method of smolt capture. Either a 6' x 60' or 6' x 80' seine net was employed at specific river bar locations conducive to beach seining. The crew "walked" the seine net down the river bars and then pursed the seine back to the bank of the river to catch smolts. Smolts were then hand dipped from within the bight of the seine and placed into a water filled bucket. The beach seining method works best for the capture of Chinook smolts at variable water levels.

Captured smolts were held in a 100 litre cooler in the boat filled with river water. Coolers were refreshed with fresh river water regularly to keep oxygen levels appropriate. Captured smolts were transported to the ADFG "smolt camp", a wall tent camp located below the U.S border, for processing each day. Species identification and accurate counts did not occur until tag application; as such the catch totals presented in Appendix A are approximations. All coded wire tagging operations were conducted by ADF&G.

The first minnow traps were set on 15 April and fished continuously until 12 May. Traps were not checked on 11 May to accommodate a DFO field crew change. After 12 May beach seining became more effective and the DFO crew joined ADF&G crew to help them with seining as the exclusive capture method employed until the end of the project on 24 May (Appendix 1). Beach seining continued until the gravel bars were no longer accessible due to rising water levels.

The number of trap sets per day averaged 62 (range 28 to 81). Trapping extended from Bull Slough to Mosquito Point (Figure 2). Beach seining was conducted along gravel bars between the Tulsequah River and "Jet Bar" (upstream of Cranberry Island) (Figure 2).

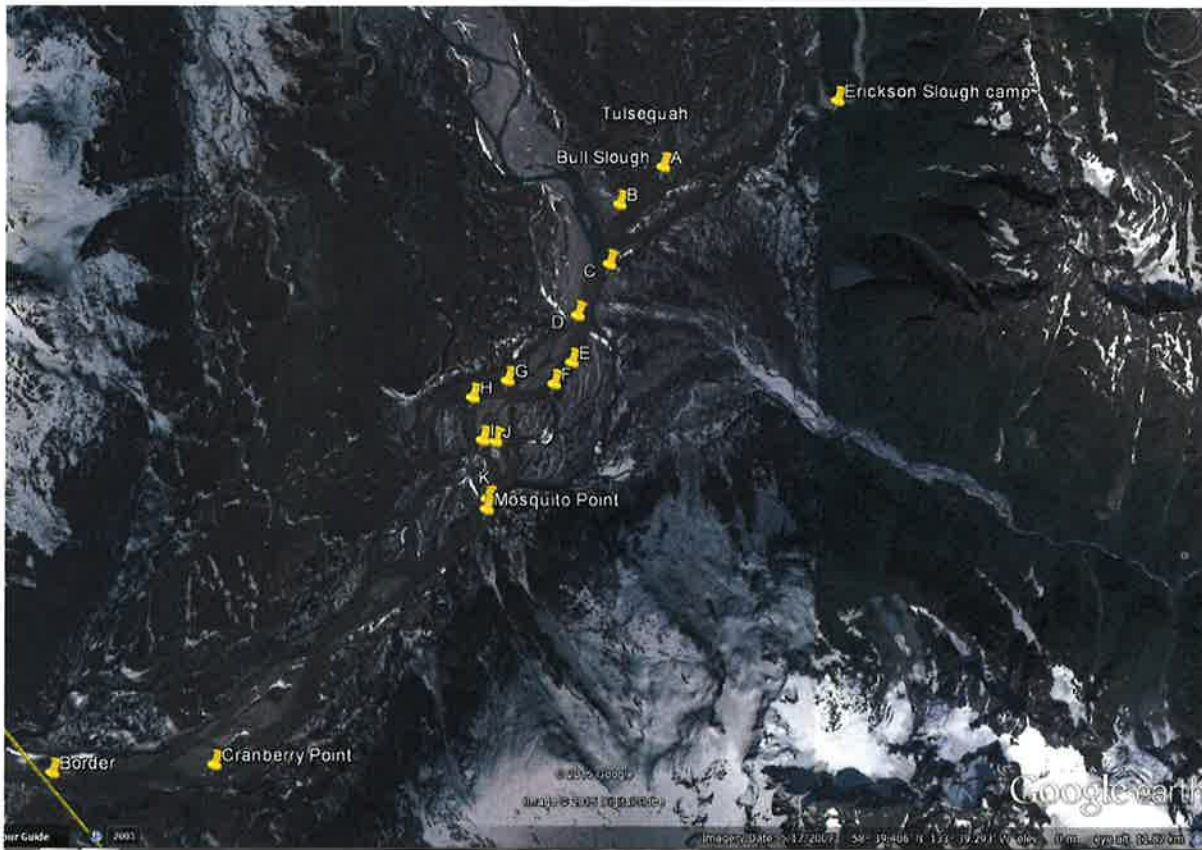


Figure 2. Approximate locations of smolt trapping sites on the Taku River (Bull Slough to Mosquito Point).

4.0 Results and Discussion

There were a total of 1,671 trap sets in the Canadian trap line and 5,632 smolts were captured. Trap catches were below the recent 5 year average; with CPUE at 77% of average (Table 1). Daily CPUE data is presented in Figure 3. Peak minnow trap catches occurred on 5 May; catches dropped steadily thereafter as the spring freshet progressed (Figure 3). Trapping efforts were suspended earlier than past averages (Figure 3) as beach seining has proven more effective later in the project. Beach seine pulls in 2017 (n=211) captured an additional estimated 5,600 smolts (Appendix A).

Table 1. Total smolt trap sets and catches in the uppermost trap line by year.

Year	Trap Sets	Catch of Chinook and Coho	CPUE
2006	2,823	24,260	8.59
2007	2,750	5,889	2.14
2008	4,157	18,122	4.36
2009	3,058	9,513	3.11
2010	3,286	23,433	7.13
2011	2,737	18,138	6.63
2012	2,383	7,375	3.09
2013	1,926	3,150	1.64
2014	592	578	0.98
2015	1,930	20,690	10.72
2016	1,459	7,822	5.36
2017	1,671	5,632	3.37
2012-16 Average	1,658	7,923	4.36
2017 vs. Average	101%	71%	77%

The joint ADF&G and DFO project captured a total of 75,033 smolts, of which 67,292 were tagged. The 7,741 fish captured but not tagged were due to non-target species or size requirements for tagging not being met. Based on ADF&G accounting during tag application, 17,139 (25%) of the total number tagged on the lower Taku (all trap lines combined) were coho and 50,153 (75%) were Chinook salmon. Assuming that this species apportionment ratio applies equally to the upper DFO trap line, DFO contributed catches to final tag numbers comprised of 2,566 coho and 7,508 Chinook. This does not include catches that were non-target species or failed to meet size requirements.

Coho trapping success is heavily influenced by river level, and smolt abundance varies significantly from year to year depending on escapement levels and survival rates which are affected by environmental conditions. The Taku River water level gauge data from Canyon Island was not available until 19 May, but anecdotal information suggests that water levels rose early and stayed above average for the smolting period. Spawning escapement for the two primary coho brood years, 2014 and 2015, was respectively above (124,171) and below (60,178) both the ten year average of 88,207 and the MSY escapement point goal of 70,000 (PSC, 2017).

Details of the downstream trapping effort, as well as tag application, will be documented in a separate report by ADFG.

Tag codes for coho salmon will be stored in the ADF&G coded wire tag online database (<http://mtalab.adfg.alaska.gov/>). Once this data set is verified, it will be forwarded to and entered into the Regional Mark Processing Centre website (www.rmhc.org). Marked adult fish returning from this year's project will be intercepted in 2018 by marine gillnet, troll and sport fisheries in Alaska, and inriver commercial, aboriginal, test and sport fisheries in Canada.

Mark/CWT data from the commercial and test fisheries will be analyzed in the winter of 2017-18; an estimate of the number of smolts that emigrated in 2016 will be generated for future publication in the ADF&G Sport Fish report series.

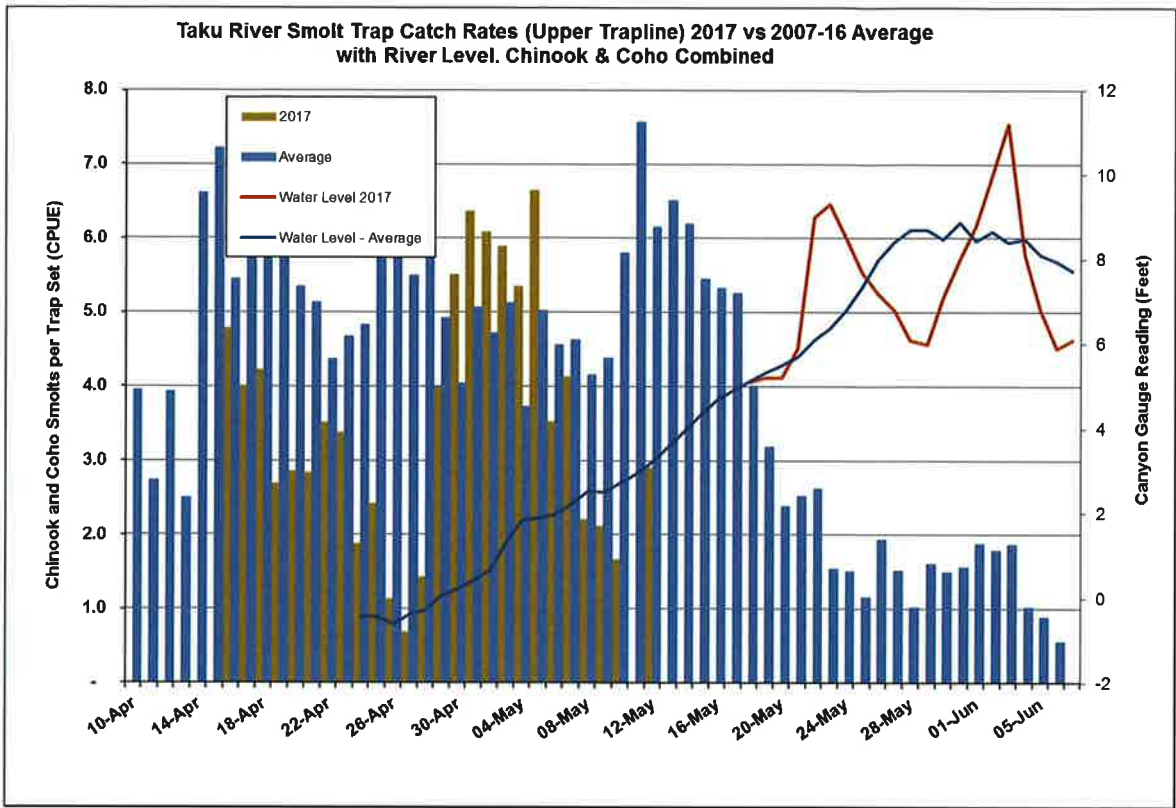


Figure 3. Smolt trap catch rates in the upstream trap line, 2017.

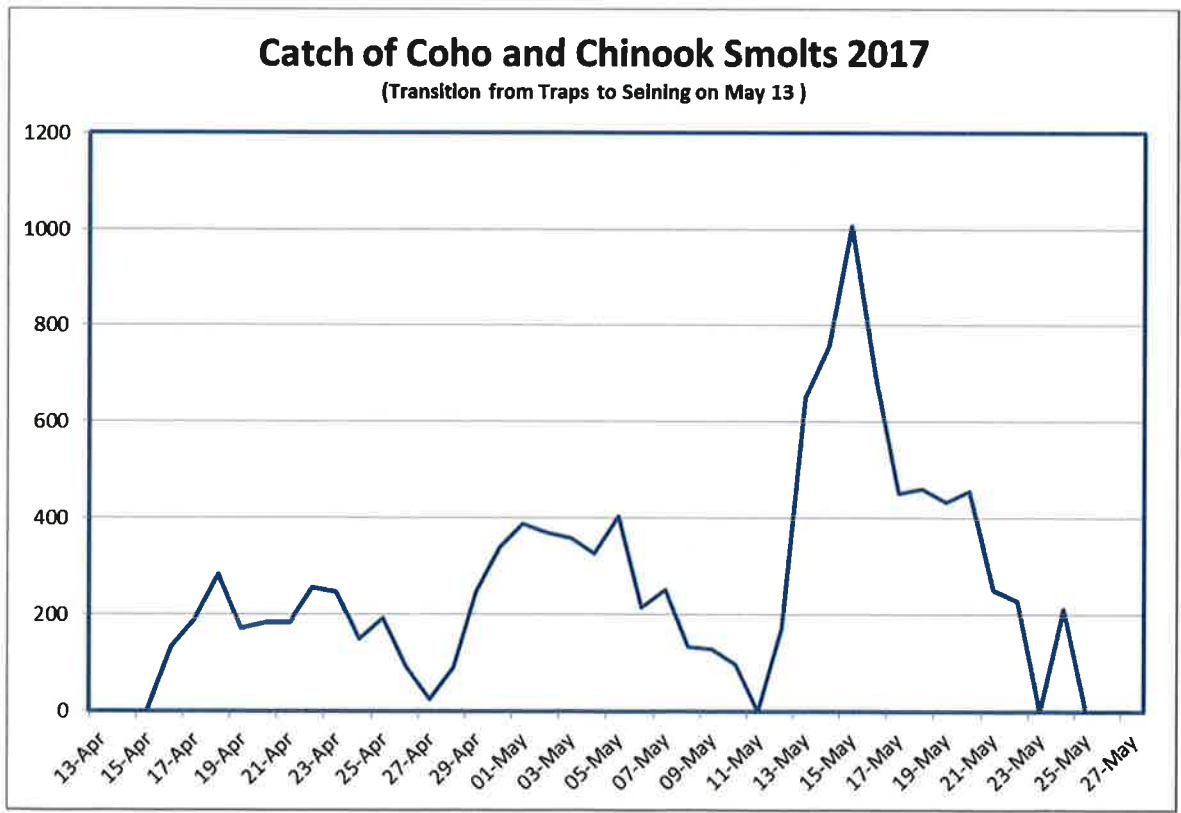


Figure 4. Daily smolt catch by DFO crew in upper trapline and by beach seining, 2017.

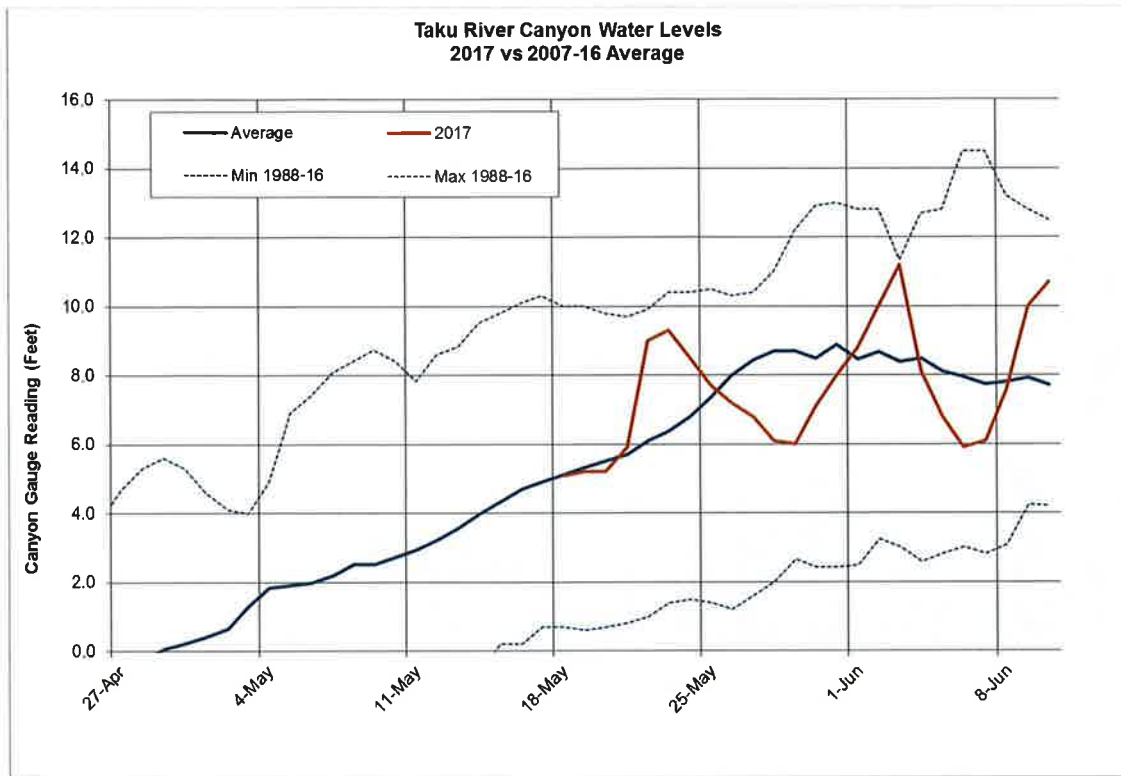


Figure 5. River level measurements taken at the gauge located in the Taku River canyon, 2017 versus 2007-16 average.

5.0 Budget Summary

The Northern Endowment Fund allocation of \$77,855 was fully expended. The acceptance of this report by the Pacific Salmon Commission is intended to allow the release of the 10% holdback of allocated funds (\$7,786). A budget summary of expenditures can be referenced in Appendix B.

6.0 Conclusion

The project scheduling and operations went as planned. DFO fully met its obligations in assisting with the achievement of the objectives of this joint Canada/U.S. project. Reporting on the balance of the objectives will be completed by ADF&G (e.g. Jones et. al. 2012).

The activities supported by this project significantly contribute to the assessment of current productivity, abundance, and exploitation of Taku River coho salmon.

7.0 Acknowledgements

Kirstie Falkevitch, Mathieu Ducharme, Tori Knutson and Teresa Bachynski of DFO conducted the smolt trapping supported by this funding. Colleen Claggett and Kylie Townend (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.
- Yanusz, R. J., McPherson, S. A., and D. R. Bernard. 1999. Production of coho salmon from the Taku River, 1997-1998. Alaska Department of Fish and Game, Division of Sport Fish, Fishery Data Series Report 99-34, Anchorage.
- PSC (Pacific Salmon Commission). 2017. Preliminary estimates of transboundary river salmon production, harvest, and escapement and a review of joint enhancement activities in 2017. Transboundary Technical Committee Report.
- Jones III, E. L., D. J. Reed and A. D. Brandenburger. 2012. Production of coho salmon from the Taku River, 2003–2007. Alaska Department of Fish and Game, Fishery Data Series No. 12-12, Anchorage.

9.0 Appendices

Appendix A: Smolt Trapping Results

	Effort		Catch		Total
	Trap Sets	Seines	Trap	Seine	
15-Apr					0
16-Apr	28	0	134	0	134
17-Apr	47	0	188	0	188
18-Apr	67	0	283	0	283
19-Apr	64	0	172	0	172
20-Apr	64	0	183	0	183
21-Apr	65	0	184	0	184
22-Apr	73	0	256	0	256
23-Apr	73	0	246	0	246
24-Apr	80	0	150	0	150
25-Apr	80	0	193	0	193
26-Apr	81	0	92	0	92
27-Apr	35	0	24	0	24
28-Apr	64		91		91
29-Apr	62		247		247
30-Apr	62		341		341
01-May	61		388		388
02-May	61		371		371
03-May	61		359		359
04-May	61		326		326
05-May	61		405		405
06-May	61		215		215
07-May	61		252		252
08-May	61		134		134
09-May	61		129		129
10-May	59		98		98
11-May	59		0		0
12-May	59		171		171
13-May		21		649	649
14-May		21		756	756
15-May		23		1007	1007
16-May		19		695	695
17-May		16		451	451
18-May		16		460	460
19-May		21		434	434
20-May		24		456	456
21-May		17		252	252
22-May		16		228	228
23-May					0
24-May		17		212	212
25-May					0
27-May					0
Total	1,671	211	5,632	5,600	11,232

Note: Catch figures are approximations; actual values obtained during CWT application.

Appendix B: Expenditures

Fisheries and Oceans Canada - PSC Project Budget Financial Report

Name of Project and PSC#:

Taku River Coho Smolt Tagging Augmentation, 2017 (NF-2017-I28)

EXPENDITURES

Labour

DFO Employee Salaries and Benefits

Position	Expenditures	Approved Budget	Total Expenditure	Variance
DFO Technician EG3	\$ 48,454.67	\$ 44,640.00		
	\$ 6,388.00	\$ 8,928.00		
		\$ -		
		\$ -		
		\$ -		
Total Expended	\$ 54,842.67	Total Budget \$ 53,568.00	\$ 54,842.67	\$ (1,274.67)

Subcontractors & Consultants

Contract	Contract Amount Expended	Approved Budget	Total Expenditure	Variance
Air Charter (~8 flights)	\$ 11,414.75	11,760		
Total Expended	\$ 11,414.75	Total Budget \$ 11,760.00	\$ 11,414.75	\$ 345.25
Total Labour Summary		\$ 65,328.00	\$ 66,257.42	\$ (929.42)

Site / Project Costs

Item	Amount Expended	Approved Budget	Total Expenditure	Variance
Travel	\$ 2,113.17	\$ 2,145.00		
Small Tools & Equipment	\$ 1,218.64	\$ 630.00		
Site Supplies & Materials	\$ 2,832.29	\$ 2,520.00		
Equipment Rental				
Work & Safety Gear	\$ 2,471.98	\$ 1,103.00		
Repairs & Maintenance	\$ 1,266.46	2,000		
Permits				
Other costs	\$ 1,695.04	4,129		
Total Expended	\$ 11,597.58	Total Budget \$ 12,527.00		
Total Site / Project Summary		\$ 12,527.00	\$ 11,597.58	\$ 929.42

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					
Item	Amount Expended		Approved Budget	Total Expenditure	Variance
Office space, including utilities, etc.					
Insurance					
Office supplies					
Telephone & long Distance					
Photocopies & printing					
Indirect/overhead costs					
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		\$ -	Total Budget	\$ -	\$ -
Total Overhead / Indirect Summary				\$ -	\$ -

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

Financial Report

Categories	Approved Budget (PSC Grant)	Project Expenditures	Variance
Labour	\$ 65,328.00	\$ 66,257.42	\$ (929.42)
Site / Project Costs	\$ 12,527.00	\$ 11,597.58	\$ 929.42
Training	\$ -	\$ -	\$ -
Overhead / Indirect Costs	\$ -	\$ -	\$ -
Capital Costs / Assets	\$ -	\$ -	\$ -
TOTAL	\$ 77,855.00	\$ 77,855.00	\$ -

PST Project Funding Grant Advance Amount Received	\$ (70,069.00)
PST Project Funding Grant Amount Remaining to be Paid	\$ (7,786.00)
Difference Between Grant Amount and Project Expenditures	\$ -

Project Manager Name

Aaron Foss

Project Manager Signature

[Signature]

Date

09 March 2018

DFO Responsibility Center Manager Name

Bill Daugh

DFO Responsibility Center Manager Signature

[Signature]

Date

Mar 9/18

Appendix C: Photographs



Photograph 1. Smolt trap set in off-channel area.



Photograph 2. Smolt trap catches showing bait.