

**Taku River Watershed
Coho Salmon Escapement and Adult Sampling Augmentation
2017**

**Final Report
February 2018**

**PSC NF-2017-I-27
DFO 57674**

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Executive Summary

In 2017 the Northern Endowment Fund provided Fisheries and Oceans Canada (DFO) with monies (along with additional monies to Alaska Department of Fish and Game) to augment the Taku River coho salmon assessment program. An inriver coho adult mark-recapture program is the primary tool utilized to assess Taku River coho run size, informed with results from an integral, but separate coho coded wire tagging (CWT) project. The DFO portion of this funding permitted the extension of the adult coho recapture effort for marked adults into October following the closure of the Canadian commercial fishery. This allowed an increased number of fish to be inspected for marks to strengthen the adult run estimate and the smolt estimate. In 2017 DFO implemented a live release test fishery in collaboration with the Taku River Tlingit First Nation (TRTFN) for three weeks in late September and early October. Six adipose clips (CWTs) were observed, three were recovered and 17 spaghetti tags recovered in this test fishery. This augments the 5 adipose clips observed and 183 spaghetti tags recovered in the commercial fishery.

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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. Then in the following year, returning adults are sampled for these tags using fishwheels and set gillnets operated near Canyon Island in the lower Taku River. At the same time, adults are tagged 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, adults are inspected for marks in the commercial fishery. Typically, the commercial fishery ceases in early September and it is necessary to obtain tag recoveries 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.

Coho salmon returning to the Taku River pass through an offshore troll fishery before entering inside waters where they encounter seine, drift gillnet, and recreational fisheries. After entering the river, the remaining coho salmon are harvested in a drift/set gillnet fishery in Canada.

The juvenile coho salmon portion of the mark-recapture experiment for estimating smolt abundance will be discussed further in the Pacific Salmon Commission (PSC) funded project report "*Taku River Coho Salmon Smolt Tagging Augmentation 2017*".

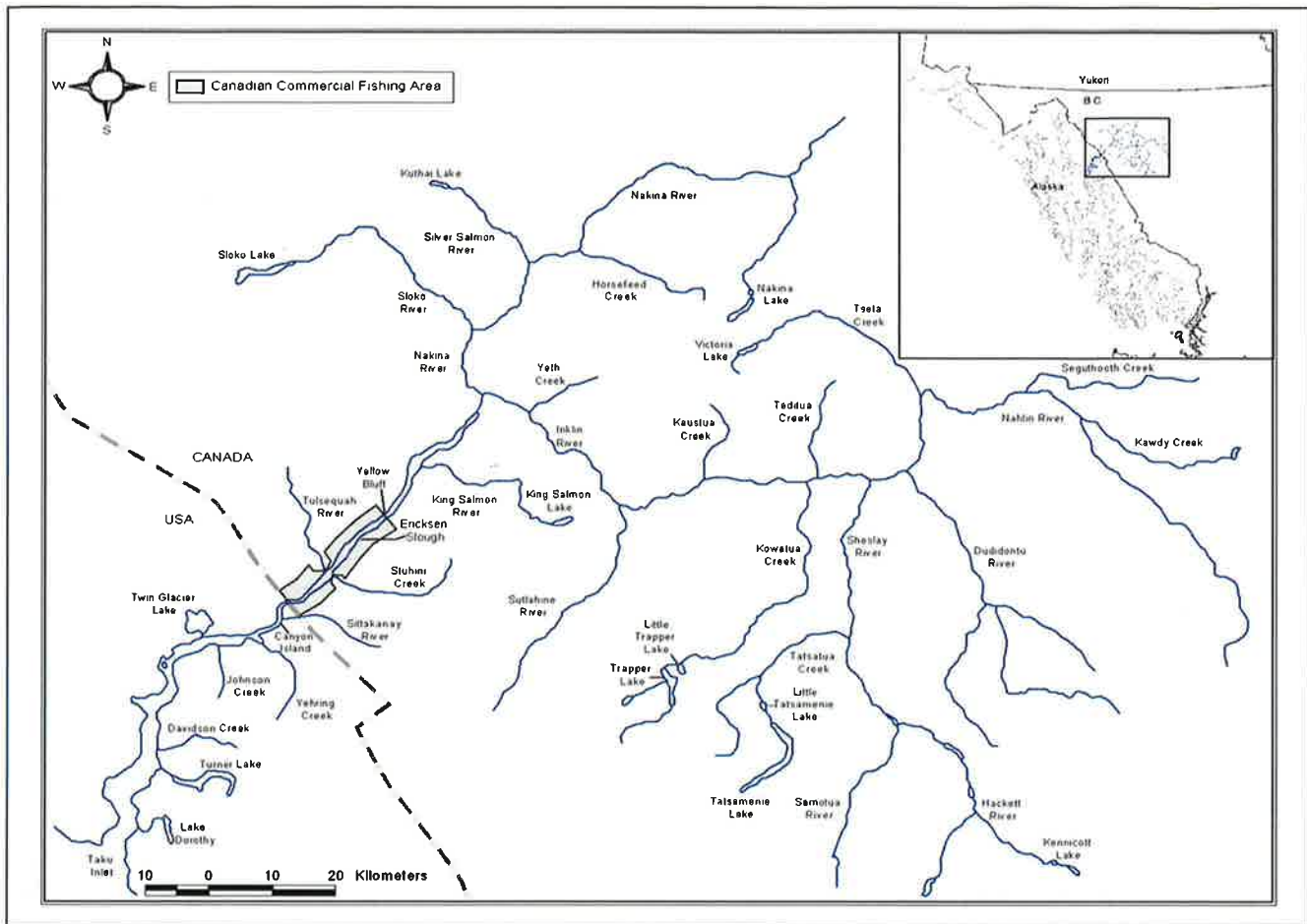


Figure 1. The Taku River watershed with the Canadian commercial fishing area highlighted in grey.

2.0 Objectives

The specific objectives for the project were to:

1. Estimate the escapement of adult coho salmon past Canyon Island annually between June and early October, such that the relative precision of the calculated 95% CI is $\leq 20\%$.
2. To boost both the recapture components of both the smolt mark-recapture study used to estimate the number of smolt which emigrated from the Taku River in 2016 and the joint Canada/U.S. adult mark-recapture study used to estimate the number of adults returning to the Taku River in 2017. This will be accomplished by capturing and sampling approximately 500 adult fish per week for marks (adipose clips and spaghetti tags) after the Canadian commercial fishery has ceased (anticipated to be early September) through the first week in October.

3.0 Methods

To estimate escapement of adult coho salmon to the Taku River, spaghetti tags are applied (Event I) to returning adults at the ADF&G fishwheel project at Canyon Island. As part of Event II of the mark-recapture study, Canadian commercial fishermen are required by licence to return recovered spaghetti tags. DFO personnel at the landing stations also sampled adult coho salmon for marks (adipose clips), spaghetti tags, age and size in the commercial fisheries on the Taku River in Canada from July into mid September.

Once the Canadian commercial fishery closed, DFO staff, in collaboration with contracted TRTFN fishermen, conducted a live release coho test fishery to inspect as many coho as possible for marks up to 4 October, the termination of the adult mark-recapture project. Two DFO river boats were utilized, each crewed by one DFO technician and one contracted TRT fisherman. One crew drift netted at “Roy’s Bar” and the other crew monitored a set net at “Home Eddy” each day from 17 September to 4 October for 3-4 wet net hours per method per day. Fish caught were immediately and carefully removed from the net, coho were placed in a tub filled with water and sampled for age, sex, length, presence/absence of an adipose clip and spaghetti tag. All fish were released back into the river.

Mark-recapture methodology is also used to estimate the abundance of coho salmon smolt emigrating from Taku River upstream of Canyon Island in 2016 (project partially funded elsewhere). Coho smolt were injected with coded wire tags and marked with adipose fin-clips in the spring of 2016 as part of Event I of a two-event mark-recapture experiment. Returning adult coho salmon in 2017 were inspected for marks in inriver fisheries and in the adult augmentation test fishery in 2017 as part of Event II for the smolt project. The marked fraction (number of fish missing adipose fins / total inspected) of coho salmon inspected will contribute to the estimation of the number of smolts that emigrated from the Taku River in 2016.

Heads recovered from adipose marked coho were sent to the ADF&G Mark Lab in Juneau, Alaska for CWT extraction and reading. Similar to CWT release data, the recovery data is stored in the ADF&G coded wire tag website (mtalab.adfg.alaska.gov). Once this data set is verified, it will be forwarded to and input into the Regional Mark Processing Centre website (www.rmpc.org).

4.0 Results and Discussion

Adult coho were sampled throughout the 2017 commercial fishery which commenced 26 June, first targeting sockeye and then following 20 August, targeting coho. A total of 7,726 coho were caught in these commercial fisheries; 2,984 (39%) were examined for marks (adipose clips) denoting presence of a CWT. Five marks were observed and three CWT heads were recovered.

A total of 183 spaghetti tags were also recovered in the commercial fishery in 2017. Based on commercial licence conditions that require fishermen to observe and return all spaghetti tags, it is assumed that the entire catch was examined for spaghetti tags.

The live release coho test fishery (sample augmentation funded through this project) took place from 17 September to 4 October. A total of 686 coho were caught and inspected (273 in drift and 413 in the set net). Six marks were observed, and heads were recovered from five of these marked fish. A total of 17 spaghetti tags were also recovered in the test fishery.

The new approach to the test fishery in 2017, utilizing DFO and TRTFN fishermen to conduct a live release fishery, was successful. Although the target of 500 adult fish per week was not achieved, it was realized that given the lower run size in 2017, and lower amount of experience that fishers had compared to past years delivery by experienced commercial fishermen, results were satisfactory. Based on catch results in 2017, and given the increased amount of experience and effort required to drift gillnet, it is not recommended to continue with drift gillnets in the test fishery in future years. Equivalent results with less effort and reduced risk can be gathered utilizing two set gillnets.

Based on all 2017 spaghetti tag data, it is estimated that approximately 65,700 adult coho had migrated into Canada by the end of the fishing season (PSC 2018). Subtracting the fishery catches, approximately 57,900 of these fish escaped to spawning areas. Mark/CWT data from the fisheries will be analyzed in the winter of 2017-18, and an estimate of the number of smolts that emigrated in 2016 will be generated for future publication.

Table 1. Total catches, Adipose clips observed and spaghetti tags recovered in 2017 by statistical week.

Statistical Weeks	Week Ending	Commercial Catch	Test Catch	Adipose Clips Observed	CW Tags Recovered	Spaghetti Tags Recovered
23	10-Jun					
24	17-Jun					
25	24-Jun					
26	01-Jul	0				
27	08-Jul	19				
28	15-Jul	39				
29	22-Jul	133				1
30	29-Jul	395				5
31	05-Aug	1,179		1	1	26
32	12-Aug	274		1		9
33	19-Aug	808				21
34	26-Aug	1,305		1	1	27
35	02-Sep	1,749		1		42
36	09-Sep	771				15
37	16-Sep	1,054		1	1	37
38	23-Sep		296	4	3	4
39	30-Sep		255	1	1	10
40	07-Oct		135	1	1	3
41	14-Oct					
Total		7,726	686	11	8	200

5.0 Budget Summary

The expenditures of Northern Endowment Funds related to this project amounted to \$44,350. The DFO portion of the funds amounted to \$31,125. The 10% holdback of \$3,113 is anticipated once the final project report is accepted by the Pacific Salmon Commission. A budget summary of expenditures can be referenced in Appendix B.

The TRTFN portion of the funds for this project amounted to \$13,225, and was delivered via contract directly between the PSC and the Taku River Tlingit First Nation.

6.0 Conclusion

The objectives of the project were delivered as follows:

1. Estimate the escapement of adult coho salmon past Canyon Island annually between June and early October, such that the relative precision of the calculated 95% CI is $\leq 20\%$.

Based on all 2017 spaghetti tag data (sample sizes augmented by this project), it is estimated that approximately 65,700 adult coho had migrated into Canada by the end of the fishing season (PSC 2018). Subtracting the fishery catches, approximately 57,900 of these fish escaped to spawning areas.

2. To boost both the recapture components of both the smolt mark-recapture study used to estimate the number of smolt which emigrated from the Taku River in 2016 and the joint Canada/U.S. adult mark-recapture study used to estimate the number of adults returning to the Taku River in 2017. This will be accomplished by capturing and sampling approximately 500 adult fish per week for marks (adipose clips and spaghetti tags) after the Canadian commercial fishery has ceased (anticipated to be early September) through the first week in October.

From 17 September to 4 October, a total of 686 coho were live caught /examined in a test fishery with six marks observed, five CWT heads and 17 spaghetti tags recovered. This augments the 2,984 coho examined from 2 July to 12 September in the commercial fishery, with five marks observed, three CWT heads and 183 spaghetti tags recovered.

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

7.0 Acknowledgements

Kirstie Falkevitch, Tori Knutson, Adam Brennan, and Shae Thomas of DFO sampled the commercial fishery and monitored the contract supported by this funding. Individuals fishing commercially and/or for Taku Wild captured coho and recovered tags. Logan O'Shea and Freedom Stone of Taku River Tlingit First Nation helped deliver the test fishery along with DFO personnel. Colleen Claggett and Julie Bradford (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). 2018. Preliminary estimates of transboundary river salmon production, harvest, and escapement and a review of joint enhancement activities in 2017. Transboundary Technical Committee Report.
- 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.

9.0 Appendices

Appendix A:
Daily catches, Adipose clips observed and spaghetti tags recovered.

Statistical Weeks	Date	Commercial Catch	Test Catch	Adipose Clips Observed	CW Tags Recovered	Spaghetti Tags Recovered
26	26-Jun					
26	27-Jun	0				
26	28-Jun	0				
26	29-Jun					
26	30-Jun					
26	01-Jul					
27	02-Jul	10				
27	03-Jul	9				
27	04-Jul					
27	05-Jul					
27	06-Jul					
27	07-Jul					
27	08-Jul					
28	09-Jul	18				
28	10-Jul	2				
28	11-Jul	3				
28	12-Jul	16				
28	13-Jul					
28	14-Jul					
28	15-Jul					
29	16-Jul	36				1
29	17-Jul	48				
29	18-Jul	49				
29	19-Jul					
29	20-Jul					
29	21-Jul					
29	22-Jul					
30	23-Jul	108				
30	24-Jul	95				2
30	25-Jul	85				1
30	26-Jul	107				2
30	27-Jul					
30	28-Jul					
30	29-Jul					
31	30-Jul	307				
31	31-Jul	303				3
31	01-Aug	307		1	1	7
31	02-Aug	262				16
31	03-Aug					
31	04-Aug					
31	05-Aug					
32	06-Aug	82				3
32	07-Aug	59		1		2
32	08-Aug	133				4
32	09-Aug					
32	10-Aug					
32	11-Aug					
32	12-Aug					
33	13-Aug	321				9
33	14-Aug	129				3
33	15-Aug	358				9
33	16-Aug					
33	17-Aug					
33	18-Aug					
33	19-Aug					
34	20-Aug	610				12
34	21-Aug	428		1	1	9
34	22-Aug	267				6
34	23-Aug					
34	24-Aug					
34	25-Aug					
34	26-Aug					

35	27-Aug	339				9
35	28-Aug	557				14
35	29-Aug	550				14
35	30-Aug	303				5
35	31-Aug			1		
35	01-Sep					
35	02-Sep					
36	03-Sep	481				10
36	04-Sep	290				5
36	05-Sep					
36	06-Sep					
36	07-Sep					
36	08-Sep					
36	09-Sep					
37	10-Sep	109		1	1	3
37	11-Sep	383				14
37	12-Sep	562				20
37	13-Sep	0				
37	14-Sep					
37	15-Sep					
37	16-Sep					
38	17-Sep		22			
38	18-Sep		28			
38	19-Sep		46	3	2	
38	20-Sep		43	1	1	1
38	21-Sep		63			3
38	22-Sep		46			
38	23-Sep		48			
39	24-Sep		57			3
39	25-Sep		55			1
39	26-Sep		37			2
39	27-Sep		26			1
39	28-Sep		2	1	1	
39	29-Sep		26			1
39	30-Sep		52			2
40	01-Oct		69			3
40	02-Oct		31			
40	03-Oct		18			
40	04-Oct		17	1	1	
40	05-Oct					
40	06-Oct					
40	07-Oct					
41	08-Oct					
41	09-Oct					
41	10-Oct					
41	11-Oct					
41	12-Oct					
Total		7,726	686	11	8	200

Appendix B: Expenditures

Fisheries and Oceans Canada - PSC Project Budget Financial Report

Name of Project and PSC#:

Taku River Coho Adult Augmentation, 2017 (NF-2017-lxx)

EXPENDITURES

Labour					
DFO Employee Salaries and Benefits					
Position	Expenditures		Approved Budget	Total Expenditure	Variance
DFO Technician EG-03	\$ 29,440.00		\$ 22,836.00		
			\$ 4,567.00		
Total Expended	\$ 29,440.00	Total Budget	\$ 27,405.00	\$ 29,440.00	\$ (2,035.00)
Subcontractors & Consultants					
Contract	Contract Amount Expended		Approved Budget	Total Expenditure	Variance
Total Expended	\$ -	Total Budget	\$ -	\$ -	\$ -
Total Labour Summary			\$ 27,405.00	\$ 29,440.00	\$ (2,035.00)
Site / Project Costs					
Item	Amount Expended		Approved Budget	Total Expenditure	Variance
Travel					
Small Tools & Equipment					
Site Supplies & Materials	\$ 1,685.00		3,720		
Equipment Rental					
Work & Safety Gear					
Repairs & Maintenance					
Permits					
Other costs					
Total Expended	\$ 1,685.00	Total Budget	\$ 3,720.00	\$ 1,685.00	\$ 2,035.00
Total Site / Project Summary			\$ 3,720.00	\$ 1,685.00	\$ 2,035.00
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	\$ 27,405.00	\$ 29,440.00	\$ (2,035.00)
Site / Project Costs	\$ 3,720.00	\$ 1,685.00	\$ 2,035.00
Training	\$ -	\$ -	\$ -
Overhead / Indirect Costs	\$ -	\$ -	\$ -
Capital Costs / Assets	\$ -	\$ -	\$ -
TOTAL	\$ 31,125.00	\$ 31,125.00	\$ -

PST Project Funding Grant Advance Amount Received	\$ (28,012.00)
PST Project Funding Grant Amount Remaining to be Paid	\$ (3,113.00)
Difference Between Grant Amount and Project Expenditures	\$ -

Project Manager Name

Aaron Foss

Project Manager Signature

[Signature]

Date

06 March 2018

DFO Responsibility Center Manager Name

Bill Wagh

DFO Responsibility Center Manager Signature

[Signature]

Date

Mar. 6 / 18

Appendix C: Photographs



Photograph 1. Fishery catches at landing station.



Photograph 2. Catch sampling at landing station.

