

Taku River Coho Salmon Escapement and Smolt Tagging Augmentation 2011

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

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Executive Summary

This report documents the Taku River coho salmon escapement and smolt tagging augmentation project, specifically, application of coded-wire tags to emigrating juvenile coho and sampling of immigrating adults.

The Northern Fund provided monies to augment the 2011 Taku River coho assessment program. This permitted the operation of an upstream smolt trapline. Although coho specific figures are not available, the upstream trapline caught approximately 18,000 chinook and coho smolts, accounted for 49% of the total catch. The Northern Fund monies also assisted with the extension of the recapture effort for marked adults into September and early October, when commercial fishing activity was minimal or non-existent. Approximately 43% of the commercial fishery catch and all of the test fishery catch were examined for adipose-clips. Approximately 12,500 fish were examined for floy tags in these fisheries, close to the upper end of the objective criteria range. Heads retrieved from marked fish were sent to Juneau, Alaska for coded-wire tag extraction.

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1.0 Introduction

The Taku River produces the largest run of coho salmon *Oncorhynchus kisutch* and chinook salmon *Oncorhynchus tshawytscha* north of the Skeena River in British Columbia and in Southeast Alaska (Figure 1; McPherson et al. 1998a; Yanusz et al. 1999).

Each spring since 1991, coho salmon smolt have been tagged with coded wire tags 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 in-river abundance and sampled for age, sex, and length composition data. A short distance upriver, in Canada, adults are inspected in the commercial fishery. Typically the commercial fishery ceases in late August and it is necessary to obtain tag ratio through a scientific fishing licence or a catch and release fishery. Data gathered from these efforts has provided estimates of in-river 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 in-river 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 exposed to a drift/set gillnet fishery in Canada.

2.0 Objectives

In cooperation with Alaska Department of Fish and Game (ADF&G), Department of Fisheries and Oceans Canada (DFO) personnel operated a coho smolt trapline on the Taku River just upstream of the Canada/U.S. border. Captured coho were tagged with coded-wire tags (CWTs) and marked with adipose fin clips. This will boost the mark component of the smolt mark-recapture study which will be used to estimate the number of coho smolts that emigrated from the Taku River in 2011.

DFO personnel will sample adult fish for marks (adipose clips), floy tags, age and size in the commercial fishery just upstream of the Canada/U.S border from July into early October. Additional gillnetting and sampling will be conducted after the commercial fishery ceases, in order to augment the recapture component of the smolt mark-recapture study used to estimate the number of smolts which emigrated from the Taku River in 2010.

3.0 Methods

A mark-recapture experiment was used to estimate the abundance of coho salmon smolt emigrating from Taku River upstream of Canyon Island in 2011 (Figure 1). Smolt were tagged with CWTs and marked with adipose fin-clips in 2011 as part of Event I of a two-event mark-recapture experiment. Adult coho salmon were inspected for marks in in-river fisheries as part of Event II for the 2010 emigration year.

As in past years, smolt trapping operations were based out of a camp located just downstream of the Canada/U.S. border near Canyon Island, to implement the marking event. Start up date is dictated

by river ice-out, which was early in 2011; the first traps were set on April 8. Smolt from all traplines were transported to the smolt camp for processing each day. All healthy chinook smolt ≥ 50 mm fork length (FL) and coho smolt ≥ 75 mm FL captured each day were tranquilized with a buffered MS 222 solution, had their adipose fin excised, and then were injected with a CWT. Each CWT was formed by cutting a 1.1 mm section of wire from a spool stamped with a unique numeric code; each spool contained enough wire for approximately 10,000 or 30,000 tags.

Smolts were captured using minnow (smolt) traps; some beach seining was also conducted. Three trap lines were operated daily, serviced two to three boats carrying two individuals. The number of sets on the upstream trapline averaged 64 (range 6 to 95). Traps were checked at least once per day. When catches were high, traps were checked twice per day with priority placed on those traps that produced the highest catches during the first check. Traps were baited with salmon roe collected from Taku River chinook and coho salmon in the in-river Canadian commercial and test fisheries. Trap lines extended from the Tulsequah River confluence to the Yehring Creek confluence. All chinook and coho salmon smolt marked with CWTs were released back into the river. Before release each morning, tag retention checks of 100 fish from each tag code were made. After release, the holding net pens were emptied and checked for any overnight mortalities.

Coho salmon that had been CWTd as smolts in 2010 were recaptured as adults as they returned to the Taku River to spawn. This was “Event II” of the mark-recapture experiment for estimating smolt abundance. Adult coho salmon caught in the in-river commercial and catch and release tag recovery gillnet fisheries were inspected for missing adipose fins (July to early October). DFO staff and contractors sampled these adults and recorded the associated data. The marked fraction (fish missing adipose fins) of coho salmon captured in the gillnets will contribute to the estimation of the number of smolts that emigrated from the Taku River in 2010. Likewise, adult coho returning in 2012 will be inspected for marks applied in 2011.

As part of “Event II” of the mark-recapture study for estimating escapement of adult coho salmon, DFO paid \$5 for each floy tag returned from the in-river commercial fishery; in addition recovery of floy tags was stipulated in licence conditions. After commercial fishing ceased, catch and release gillnetting was conducted by Taku Wild, a non-profit company owned by the Taku River Tlingit First Nation (TRTFN), on a contract basis. Not only does this data contribute to an estimate of the number of smolts that emigrated in 2010, recovery of floy tags permits the estimation of the number of adults returning to the Canadian portion of the Taku River drainage in 2011.

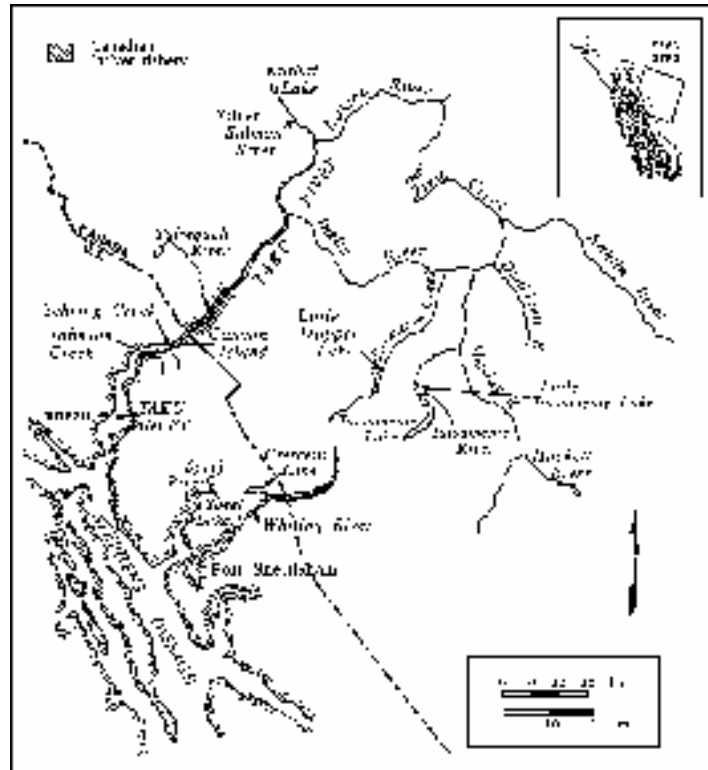


Figure 1. The Taku River drainage.

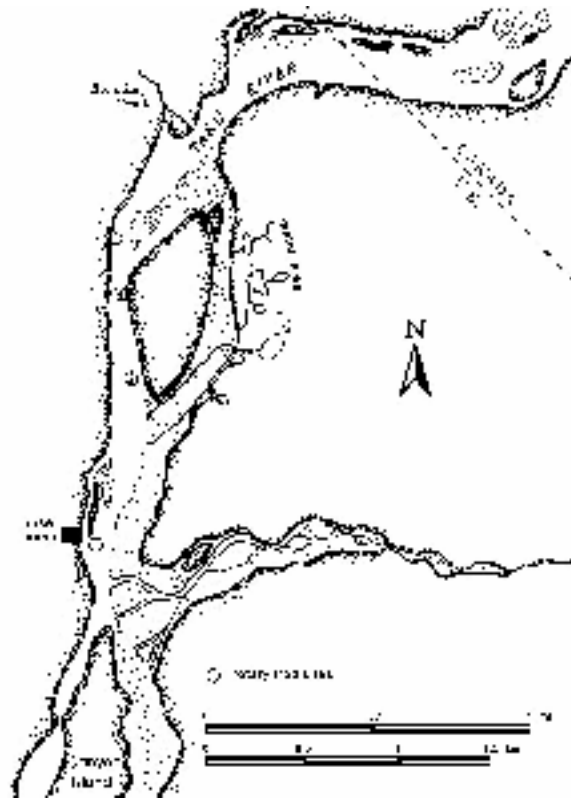


Figure 2. Location of central portion of smolt trapping area on Taku River near Canyon Island.

4.0 Results and Discussion

The first traps were set on the upper line in 2011 on April 9 and the last on May 25 (Appendix 1). A limited amount of supplemental beach seining was conducted.

A total of 37,256 smolts were captured (all traplines combined); approximately 14,700 of these were coho. The upstream trapline contributed 18,138 smolts (49%) to the total catch. Species identification did not occur until tag application, by which time catches from each trapline had been pooled, but it is believed that the contribution of the upstream trapline to the coho specific total was similar to this percentage. There were a total of 7,101 trap sets; the upstream trapline accounted for 2,824 (40%) of these. Tables 1 and 2 summarize the trap sets and catches since 2006. For the upstream trap line, total sets were 12% below average; this was primarily due to the fact that trapping was effectively halted by May 20 due to high river levels. Notwithstanding, catches on the upper trapline (18,138 smolts) were 12% above average. Peak catches occurred from late April through mid-May, dropping significantly thereafter and then ceasing altogether as the river level rose.

Year	Lower	Middle	Upper
2006	3,201	2,625	2,823
2007	2,357	2,188	2,750
2008	3,736	3,795	4,157
2009	2,621	3,116	3,058
2010	3,677	3,198	3,286
2011	2,284	1,993	2,824
2006-10 Average	3,118	2,984	3,215
2011 vs. Average	73%	67%	88%

Table 1. Total sets by trapline by year.

Year	Lower	Middle	Upper
2006	26036	21723	24,260
2007	10475	8550	5,889
2008	20690	17367	18,122
2009	9985	9695	9,513
2010	22604	15712	23,433
2011	12024	7094	18,138
2006-10 Average	17,958	14,609	16,243
2011 vs. Average	67%	49%	112%

Table 2. Total catch by trapline by year.

In 2011 smolt crews were able to get an early start due to the relatively early ice-out. The spring freshet was late, starting in late May, but of above-average intensity.

The catch rate for coho salmon, 2.1 smolts per trap set, was below to the recent the five-year average of 2.6. This was likely influenced to a degree by the above average river levels in late May. However smolt abundance varies significantly from year to year depending on escapement levels and environmental conditions. The below average CPUE may indeed be reflective of below average abundance; the two escapements which would have contributed to the 2011 smolt population were average and below average. However, it will not be possible to determine how many smolts emigrated until the recapture portion of the study is completed after the marked fish return in 2012.

Tag release codes for coho salmon will be stored into the Alaska Department of Fish and Game's (ADFG) coded wire tag website (www.taglab.org). Once this data set is verified, it will be forwarded to and inputted into Regional Mark Processing Centre website (www.rmpc.com). Returning marked fish from this year's project will be intercepted in 2012 by marine gillnet, troll and sport approach water fisheries, primarily in Alaska, and Taku River commercial, aboriginal, test and sport fisheries in Canada.

Adult coho were sampled in the commercial fishery which commenced in April, targeting first chinook, then sockeye and finally coho. A total of 8,460 coho were caught; 3,601 (43%) were examined for marks (adipose clips) denoting presence of a CWT. Forty-three marks were observed; as anticipated, CWT recovery was not possible since commercial fish were headed prior to being landed. Based on the commercial licence conditions and the \$5 reward offered for each floy tag it can be assumed that the entire catch was examined for tags. A total of 177 floy tags were recovered.

The mark/floy tag recovery efforts were continued through the use of a scientific licence issued, in conjunction with a contract, to Taku Wild. This effort took place from August 14 to October 5. A total of 4,002 coho were caught and inspected for marks and floy tags. A total of 53 marks were observed, and 82 floy tags recovered. Heads were recovered from the marked fish and sent to Juneau via float plane for CWT extraction. As with CWT release data, the CWT recovery data will be stored into the ADFG coded-wire tag website (www.taglab.org), and the Regional Mark Processing Centre website (www.rmpc.com).

Based on floy tag data, it is estimated that 83,349 adult coho migrated past Canyon Island in 2011 (PSC 2012). Subtracting in-river fishery catch, an estimated 70,857 escaped to spawning areas. CWT data from fishery catches will be analyzed in the winter of 2011-12; an estimate of the number of smolts that emigrated in 2011 will be available in the spring of 2012, for future publication in a joint ADF&G/DFO report.

Figure 4. Smolt catches in the upstream trapline, 2011.

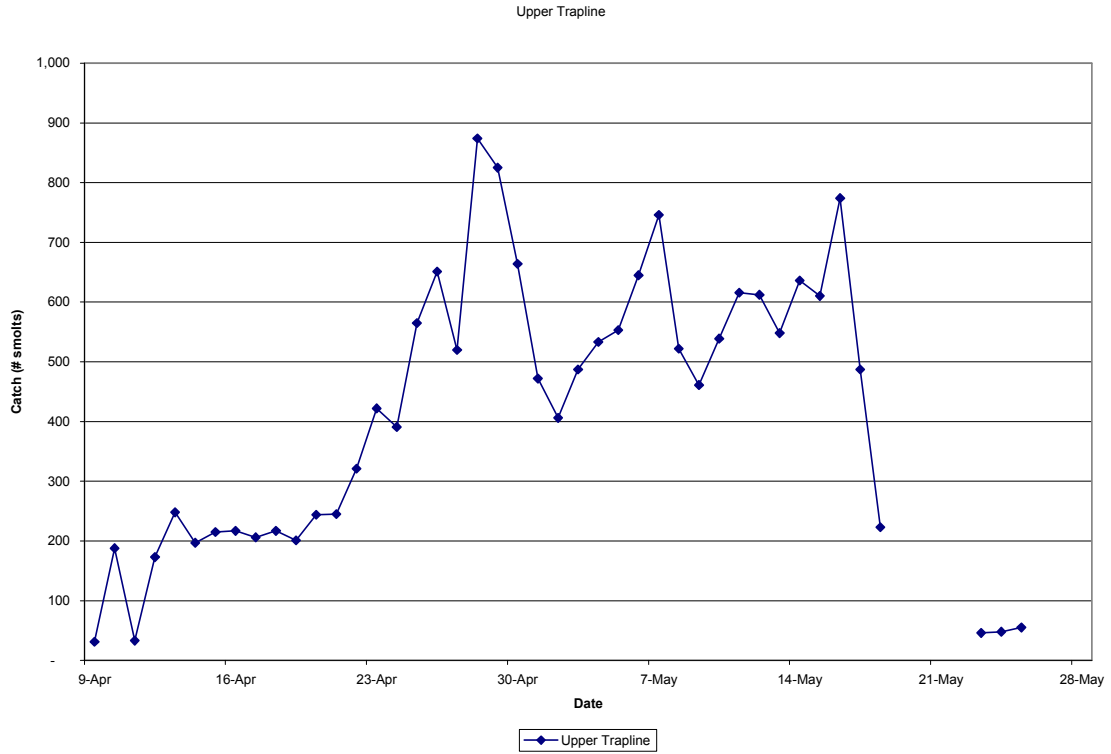
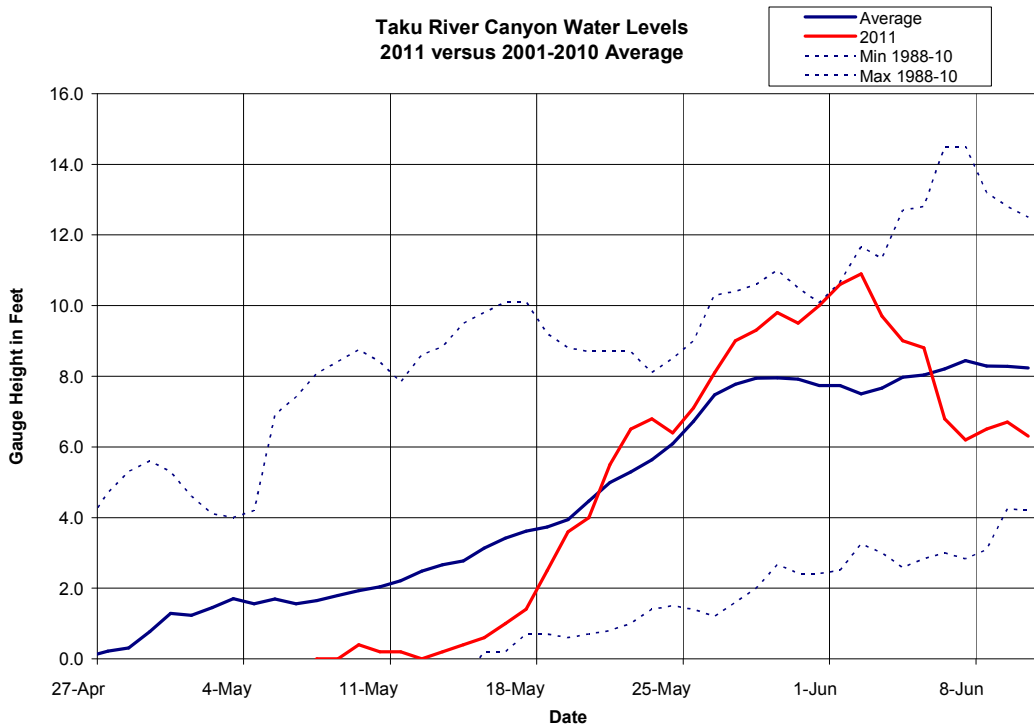


Figure 5. River level measurements taken at the gauge located in the Taku River canyon, 2011 versus 2001-10 average.



4.1 Budget and Project Operations

As presented in Appendix 2, the expenditures of Northern Funds to date amount to \$44,748. Additional expenditures are anticipated pending receipt of the final 10% of the budget total, i.e. \$4,978. The greatest expenditure was in the labour category. Health and safety training was covered off in-kind. Casual hires rather than contractors / consultants conducted much of the sampling. A summary of Fund expenditures in relation to budgeted amounts is as follows:

a) Labour

- i) service contracts: 26,435 (actual: 12,136; balance: 14,300)
- ii) wages and salaries: 0 (actual: 13,043)

Total: 26,435 (actual: 25,179; balance: 1,256)

b) Site / Project Costs

- i) travel: 1,500 (actual: 2,110; balance: -610)
- ii) facilities (tools and misc. equipment): 2,064 (actual: 207; balance: 1,857)
- iii) equipment (repairs and maintenance): 3,500 (actual: 3,748; balance: -248)
- iv) consumables (fuel and groceries): 12,950 (actual: 10,451; balance: 2,499)
- v) work and safety gear: 800 (actual: 1,434; balance: -634)

Total: 20,814 (actual: 17,951; balance: 2,863)

d) Overhead / Indirect Costs

- i) office supplies, phone, internet: 1,580 (actual: 1,618; balance: -38)

d) Training Costs

- i) health and safety training: 950 (actual: 0)

e) Estimated value

- i) **\$49,779** in cash (actual to date: **\$44,748**; balance: **\$5,031**)

5.0 Conclusion

The upstream trapline contributed significantly to the project, accounting for 49% of the total catch.

The proportion of the commercial fishery catch examined for marks (43%) was above the objective criteria of 30%.

The total number of adults examined for floy tags in commercial and test fisheries (12,462) was close to the upper end of the objective criteria range of 4,000 to 14,000 fish.

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

6.0 Acknowledgements

Kirstie Falkevitch, Mark McFarland, Natasha Ayoub, Jassin Godard, Julie Bernier, Mike Lake, and Manon Fontaine of DFO conducted the smolt trapping and/or fishery sampling supported by this funding. Commercial and test fishers, along with landing station operators, provided catch and obtaining tag recovery information. Colleen Claggett, Rhonda Hickey, and Marnie Barteaux of DFO assisted with administration and accounting.

7.0 Literature Cited

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Appendix 1: Smolt Trapping Results

Location: Taku Smolt
Year: 2011
Trapline: Upper Trapline

DATE	Total Traps Checked	Cum. Total Traps	Total Fish	Cum. Total Fish	Comments
9-Apr	6	6	31	31	
10-Apr	26	32	188	219	
11-Apr	13	45	33	252	
12-Apr	35	80	173	425	
13-Apr	38	118	248	673	
14-Apr	39	157	197	870	
15-Apr	43	200	215	1085	
16-Apr	44	244	217	1302	
17-Apr	45	289	206	1508	
18-Apr	53	342	217	1725	
19-Apr	66	408	201	1926	
20-Apr	66	474	244	2170	
21-Apr	68	542	245	2415	
22-Apr	68	610	321	2736	
23-Apr	71	681	422	3158	
24-Apr	78	759	391	3549	
25-Apr	79	838	565	4114	
26-Apr	83	921	651	4765	
27-Apr	84	1005	520	5285	
28-Apr	84	1089	874	6159	
29-Apr	84	1173	825	6984	
30-Apr	90	1263	664	7648	
1-May	87	1350	472	8120	
2-May	85	1435	406	8526	
3-May	77	1512	487	9013	
4-May	95	1607	533	9546	
5-May	66	1673	553	10099	
6-May	83	1756	645	10744	
7-May	81	1837	746	11490	
8-May	81	1918	522	12012	
9-May	73	1991	461	12473	
10-May	68	2059	539	13012	
11-May	81	2140	616	13628	
12-May	82	2222	612	14240	
13-May	62	2284	548	14788	
14-May	66	2350	636	15424	
15-May	81	2431	610	16034	
16-May	81	2512	774	16808	
17-May	79	2591	487	17295	
18-May	70	2661	223	17518	
19-May	76	2737		17518	Flood- no count
20-May	-	2737	335	17853	seine
21-May	-	2737		17853	
22-May	-	2737		17853	
23-May	20	2757	46	17899	
24-May	19	2776	48	17947	
25-May	48	2824	55	18002	
26-May	-	2824	136	18138	seine
27-May	-	2824		18138	
28-May	-	2824		18138	