

Stock Composition of Stikine and Taku Chinook and  
Sockeye In-river Fisheries 2013  
- Sample Collection -

*(A study supported by the Northern Fund through the Pacific Salmon Commission)*

Final Report  
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Bill Waugh, Peter Etherton, Ian Boyce and Sean Stark  
Fisheries and Oceans Canada  
100-419 Range Road  
Whitehorse, Yukon Territory  
Y1A 3V1

## Executive Summary

*This report documents the results of the Stock Composition of Stikine and Taku Chinook and Sockeye In-river Fisheries project supported by the Northern Fund of the Pacific Salmon Commission.*

A total of \$43,427 (CAD) of Northern Fund monies was used to carry out the collection of DNA samples from Stikine and Taku River Chinook and sockeye fisheries. A total of 554 tissue samples were collected from Chinook salmon harvested in the Taku River commercial fishery between the dates of June 17 and July 16, 2013. A total of 2,324 tissue samples were also collected from sockeye salmon in this fishery between the dates of June 17 and September 12, 2013. The total number of sockeye samples obtained exceeded the minimum required by a substantial margin. Chinook sampling was well below the target due to no directed commercial Chinook fishery in 2013.

A total of 1,321 tissue samples were collected from Chinook salmon harvested in the Stikine River commercial fishery between the dates of May 6 and August 06, 2013. A total of 1,644 tissue samples were also collected from sockeye salmon in this fishery between the dates of June 23 and August 29, 2012. The total number of samples obtained exceeded the minimum required by a substantial margin.

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# 1.0 Introduction

**Objective:** Collection of genetic stock identification samples from lower Stikine and Taku in-river commercial fisheries in 2013 for the following purpose and goals.

**Purpose:** Eventual determination of reliable post-season estimates of the weekly stock compositions for Chinook and sockeye in the lower Stikine and Taku in-river commercial fisheries.

**Goal:** Eventual processing of genetic stock identification samples from Chinook by examining Pacific Salmon Commission standardized microsatellite loci; eventual processing of DNA samples collected from sockeye for microsatellite/major histocompatibility complex loci and possibly single nucleotide polymorphism (SNP) loci.

Improved inseason stock specific management of Transboundary River salmonids is required to meet stock specific spawning goals and harvest shares. The techniques available at this time for sockeye include scale pattern analysis (SPA), egg diameters, and brain parasite prevalence, each of which has significant drawbacks; the techniques available for Chinook are even more limited. Except for egg diameter, which is limited to one stock only, these techniques have limited inseason utility. Transboundary Chinook arrangements established in 2005 specifically required the development of inseason capability by 2008. While this project will focus on collection of samples for post-season estimates of weekly stock compositions, the long term goal is to have inseason capability. In addition, improved stock composition estimates will permit the compilation of stock recruitment data which will be used to establish biologically based escapement goals for particular stocks of interest (e.g. Tatsamenie sockeye).

This proposal addresses one of the top priorities of the Transboundary Panel for 2009 Northern Fund Proposals; namely “*projects that improve the in-season stock identification for Alsek, Stikine and Taku Chinook and sockeye salmon*”. Although we are not yet at the point of conducting inseason stock identification, post season analysis of samples collected over time will provide insight into what stocks would be expected to be migrating through the fisheries at different times.

This proposal directly addresses the following strategic objective of the Northern Fund:

- “*improve the Parties ability to better manage the stocks and fisheries in the region (e.g. by developing methods to more accurately estimate inseason run sizes; to improve stock assessment capability; and to acquire the necessary information in a more timely fashion).*”;

It also addresses aspects of the Transboundary Chinook arrangements reached in February 2005 which includes the following provisions:

- *Management of Stikine and Taku Chinook salmon will take into account the conservation of specific stocks or conservation units when planning and prosecuting their respective fisheries. To avoid over-harvesting of specific components of the run, weekly guideline harvests will be developed by apportioning their allowable harvest over the total Chinook season based on historical weekly run timing. The project will provide information to assess the run timing of various stocks or stock groupings through the in-river fishery.*
- *By 2008, the Parties agree to develop and implement through the Committee an agreed Chinook stock identification program to assist in the management of Stikine and Taku Chinook salmon.*

**Detailed Objectives:** Collection of tissue samples from Chinook and sockeye in order to determine weekly stock compositions in 2013 lower Stikine and Taku in-river commercial fisheries such that the estimated proportion of a given stock is accurate within 10%, 90% of the time.

The following stocks are of interest:

**Stikine sockeye**

1. Tahltan Lake
2. Chutine River / Lake
3. Mainstem Stikine River (Butterfly Creek to Tahltan River)
4. Scud River (Butterfly Creek to Flood River)
5. Porcupine River / mainstem Stikine (Flood River to international border)
6. Iskut River / Verret River
7. Craig River

**Stikine Chinook**

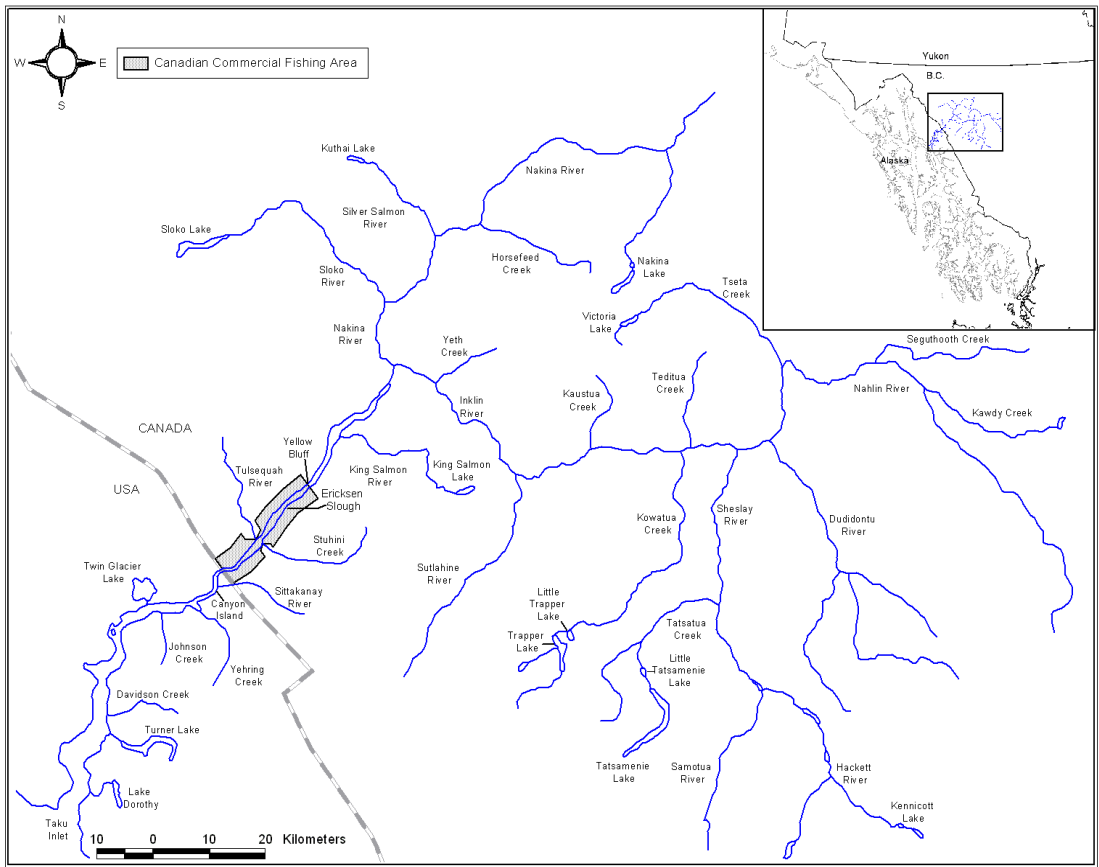
1. Tahltan River
2. Shakes / upper Stikine River
3. Chutine River
4. Christina Creek / mainstem Stikine
5. Craig River / mainstem Iskut River
6. Verret River / upper Iskut River

**Taku sockeye**

1. Mainstem Taku and Nakina rivers
2. Kuthai Lake
3. Little Trapper Lake
4. Tatsamenie Lake
5. Hackett River
6. Dudidontu River / Nahlin River
7. King Salmon Lake

**Taku Chinook**

1. Nakina River
2. Nahlin River / Tseta Creek
3. Dudidontu River
4. Upper Sheslay River / Hackett River
5. Tatsatua River
6. Kowatua River



**Figure 1. The Taku River drainage in British Columbia and Southeast Alaska.**

## 2.0 Methods

Following the sampling protocol developed by the Transboundary Technical Committee (see Pacific Salmon Commission report TCTR (07)-02), axillary appendages were excised from Chinook and sockeye harvested in lower Stikine and Taku in-river commercial fisheries and preserved in alcohol. The following parameters were used in selection of sample size to ensure an adequate sample was retained for future analysis:

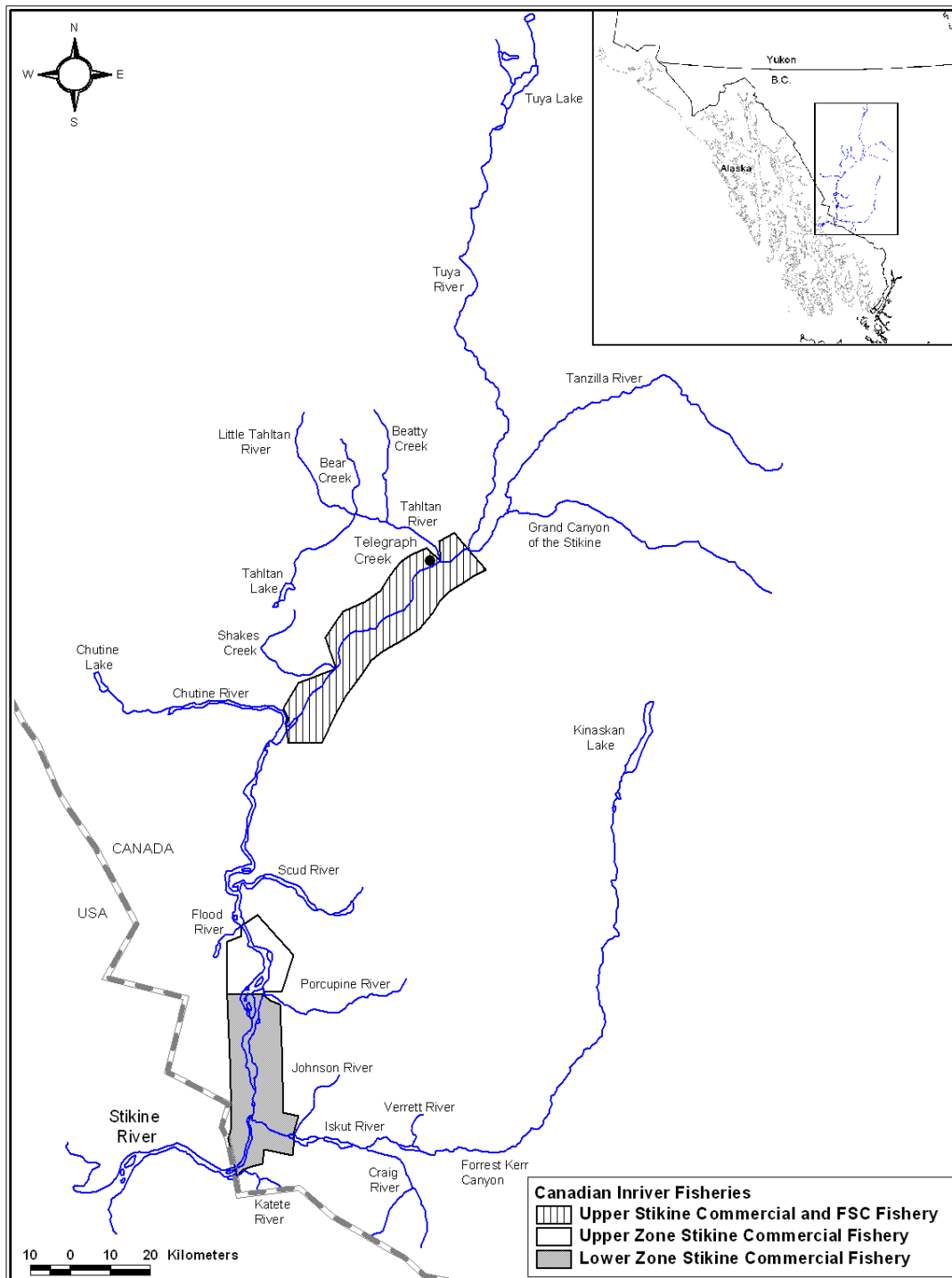
*Probability of a Type 1 error (a): 0.10*

*Absolute Precision (p): +/- 0.10*

**Table 1. Weekly sample targets.**

	<b>Number of stocks</b>	<b>Potential maximum weekly catch (N)<sup>1</sup></b>	<b>Target sample (n)</b>
<b>Stikine sockeye</b>	7	30,000	125
<b>Stikine Chinook</b>	6	1,500	120
<b>Taku sockeye</b>	7	5,000	200
<b>Taku Chinook</b>	6	1,500	150

<sup>1</sup> Based on professional judgment and historic catches – note that requisite sample size (n) does not vary with population size (N) except in cases where there is a finite population correction i.e.  $n/N$  in greater than 0.1.



**Figure 2. The Stikine River drainage in British Columbia and Southeast Alaska.**



Two field crews of two technicians each were involved in the sample collection on the Taku and Stikine rivers beginning in mid-June and early May respectively. There was no directed Taku Chinook fishery operating in 2013; Stikine Chinook were sampled from early May until late August; Chinook catches were sampled in both the Taku and Stikine directed sockeye fishing periods. Sockeye sampling took place from mid-June until late August on the Stikine and mid-September on the Taku. There were bi-weekly re-supply / crew change events for the duration of the project. On the Taku River, samples were obtained primarily from two landing stations, Cranberry and Mosquito Point. On the Stikine River, samples were obtained from the Great Glacier Salmon landing station and processing plant. Additional samples were collected from the Stikine River Chinook tagging study and the lower Stikine River sockeye test fishery. Samples were stored in ethyl alcohol, in 125 or 150 ml bottles with the required shipping and handling information. Samples are to be shipped to the Molecular Genetics Lab at the Pacific Biological Station for storage and eventual analysis, pending funding.

## **3.0 Results and Discussion**

### **3.1 Taku River**

Collection of tissue samples from Chinook commenced on June 17, 2013 (statistical week 25) with the opening of the directed sockeye commercial fishery and concluded on July 16, 2013 (statistical week 29). The directed commercial Chinook fishery was not operational in 2013 due to a pre-season forecast that suggested that the escapement goal would not be met. It was further decided that the assessment fishery (typically used to provide tag recovery information when the directed fishery is not operational) would not be prosecuted.

The goal of 150 Chinook samples was achieved for the second and third weeks of the directed sockeye fishery (which commenced on June 16, statistical week 25 and resulted in Chinook bycatch). The sampling target for Chinook in the first and later weeks of the sockeye fishery was not achieved due to limited availability of Chinook (i.e. small catches). The total commercial catch of Chinook (non-directed) was 1,232 fish. A total of 554 samples were obtained over five weeks of directed sockeye fishing, accounting for 45% of the catch.

Collection of tissue samples from sockeye commenced on June 17, 2013 (statistical week 25) and concluded on September 12, 2013 (statistical week 37). A total of 2,324 tissue samples were obtained, amounting to 9% of the 25,014 sockeye caught (Table 2.). The goal of 200 samples was achieved for all weeks of the directed sockeye fishery. Sampling continued for four more weeks after the directed sockeye fishery closed (statistical week 34, starting August 18) and sockeye were being landed as bycatch in the directed coho fishery. For the first two of these weeks the target of 200 samples was achieved; and samples were obtained from weeks 36 and 37 (starting September 1 and 8, respectively) but below the weekly sample objective.

**Table 2. Catches of Chinook and sockeye salmon and associated tissue samples in the Taku River commercial fishery, 2013 (by statistical week).**

<b>Stat Week</b>	<b>Chinook Catch</b>	<b>Chinook DNA Obtained</b>	<b>Sockeye Catch</b>	<b>Sockeye DNA Obtained</b>
<b>Sockeye Season</b>				
25	283	134	651	200
26	307	152	611	200
27	390	152	897	199
28	187	91	766	199
29	59	25	7,688	200
30	2		5,380	200
31	4		5,214	200
32			1,721	199
33			870	200
34			535	200
35			530	200
36			98	99
37			53	28
38				
39				
<b>Total</b>	<b>1,232</b>	<b>554</b>	<b>25,014</b>	<b>2,324</b>

### **3.2 Stikine River**

Collection of tissue samples from Chinook commenced on May 6, 2013 (statistical week 19) with the opening of the Chinook commercial fishery and concluded on August 29, 2012 (statistical week 35), during the directed sockeye fishery. Collection of sockeye samples commenced on June 23, 2013 (the first week of the directed sockeye fishery, statistical week 26) and concluded on August 06, 2013 (statistical week 32). Additional Chinook and sockeye DNA samples were collected on a weekly basis from the Kakwan Chinook tagging site (located approximately 20 km downstream from the commercial fishery grounds) and from the sockeye test fishery (conducted on the commercial fishing grounds).

A total of 1,321 Chinook samples were obtained from the commercial fishery (Table 3). The weekly sampling goal of 120 samples was met for all of the weekly commercial fishery openings that yielded relatively large catches. The sample amounted to approximately 37% of the 3,575 Chinook caught in the commercial fishery. In addition, approximately 353 samples were collected from the Kakwan tagging site.

**Table 3. Catches of Chinook and sockeye salmon and associated tissue samples in the Stikine River commercial and test fisheries and Chinook tagging site, 2013 by statistical week.**

<b>Stat Week</b>	<b>Chinook Catch</b>	<b>Chinook DNA Obtained<sup>a</sup></b>	<b>Sockeye Catch</b>	<b>Sockeye DNA Obtained<sup>b</sup></b>
19	49	12 (45)		
20	66	33 (24)		
21	329	135 (53)	1	
22	204	114 (54)	1	
23	451	147 (52)	1	
24	575	152 (53)	21	
25	196	107 (14)	25	
<b>Sockeye Season</b>				
26	722	173 (11)	1,691	182
27	626	261 (30)	7,350	211
28	290	139 (17)	6,005	182 (277)
29	16	15	913	136 (280)
30	26	22	2,621	199 (260)
31	11	8	2,394	195 (123)
32	9	3	2,452	203 (162)
33	4		594	169 (79)
34	1		98	74 (0)
35			147	93 (83)
36				
37				
<b>Total</b>	<b>3,575</b>	<b>1,321 (353)</b>	<b>24,314</b>	<b>1,644 (1,264)</b>

<sup>a</sup>: numbers of samples are close approximations; values in parentheses are additional samples from tagged fish captured at Kakwan Point, located 20 km downstream from commercial fishing grounds;

<sup>b</sup>: numbers of samples are close approximations; values in parentheses are additional samples from the test fishery located within the commercial fishing grounds

An approximate total of 1,644 sockeye samples were collected from the commercial fishery, comprising 7% of the catch of 24,314 sockeye. The weekly sampling goal of 125 fish was achieved for each week of the fisheries associated with a catch of more than 400 sockeye. The total number of samples obtained exceeded the minimum anticipated (875, based on seven weeks of fishing) by a substantial margin. An additional 1,264 samples were collected in the sockeye test fishery.

### 3.1 Budget and Project Operations

Scheduling and operations went as planned.

As presented in Appendix 2, the expenditure of Northern Funds amounted to \$43,427, \$4,473 under the amount granted (\$47,900). A hold back of \$317.14 is due DFO upon acceptance of the final report by the Pacific Salmon Commission. A summary of expenditures in relation to forecasted amounts is as follows:

- a) Personnel
  - air charters and travel: 26,300 (actual: 29,256; balance: -2,956)
  
- b) Site Support
  - materials and supplies: 9,600 (actual: 5,541; balance: 4,059)
  - repairs and maintenance: 6,000 (actual: 4,000; balance: 2,000)
  - fuel and propane: 5,000 (actual: 4,630; balance: 370)
  - work and safety gear: 1,000 (actual: 0; balance 1,000)
  
- c) Estimated Value
  - **\$47,900** in cash (actual: **\$43,427**; balance: **\$4,473**)

## 4.0 Conclusion

The project objectives were largely achieved, with the number of tissue samples collected from Chinook and sockeye salmon on the Stikine and sockeye on the Taku rivers in excess of the minimum required. Chinook salmon samples on the Taku River fell short of the target due to no directed commercial or assessment fishery in 2013. Contingent upon funding for sample processing, fishery managers in both Canada and the U.S. will benefit by being able to identify the timing and exploitation rates of the different sockeye and Chinook stocks through the lower reaches of the Stikine and Taku rivers. Improved management will benefit stakeholders in both Canada and the U.S. Though results from this project will be retrospective, they will have the potential to continue to lay the groundwork for the use of genetic stock identification as an inseason management tool.

## **Appendix 1: Photographs**



Photograph 1. Drift gillnet fishing, Transboundary river.



Photograph 3. Tissue sample collection - Chinook salmon.



Photograph 4. Fish landing station, Transboundary river, from float plane.



Photograph 5. Landing fish, Transboundary river.

## **Appendix 2: Financial Summary**



# Project Budget Form

**Name of Project:** Stock composition of Stikine and Taku inriver fisheries - sample collection

	<b>TOTAL</b>	<b>OTHER</b>	<b>PSC</b>
<b>ELIGIBLE COSTS</b>	<b>BUDGET</b>	<b>FUNDING</b>	<b>N. FUND GRANT</b>

**Labour Wages & Salaries**

Position	# of crew	# of work days	hrs per day	rate per hour	Total (In-kind & cash + PSC Amount)	In-Kind & Cash	PSC Amount	Actual Expenditures	Variance
DFO Stock Assessment Biologist Bi-3	1	16	7.5	39.00	4,680	4,680			
DFO Fishery Technician EG-4	2	25	7.5	32.00	12,000	12,000			
DFO Fishery Technician EG-3	2	25	7.5	29.00	10,875	10,875			
Person Days (# of crew x work days)				<b>sub total</b>	27,555	27,555	-	-	-

**Labour - Employer Costs ( percent of wages subtotal amount )**

	rate	20%		<b>sub total</b>	5,511	5,511	-	-	-
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Subcontractors & Consultants	# of crew	# of work days	hrs per day	rate per hour					
Air Charters & Travel					26,300		26,300	29,256	(2,956)
					-		-		-
Insurance if applicable									
					<b>sub total</b>	-	26,300	29,256	(2,956)

Volunteer Labour	# of crew	# of work days	hrs per day						
Skilled									
Un-skilled									
Insurance if applicable									
					<b>sub total</b>				
<b>Total Labour Costs</b>					59,366	33,066	26,300	29,256	(2,956)

**Site / Project Costs** Detail (use additional page for details if needed)

Travel (do not include to & from work)	vehicle fuel - Atlin, Telegraph Creek; meals & incid.	9,891	9,891		
Small Tools & Equipment					
Site Supplies & Materials	preservative, containers, provisions, etc	9,600		9,600	5,541
Equipment Rental					
Work & Safety Gear		1,000		1,000	-
Repairs & Maintenance	boats, generators, communications equip, etc	6,000		6,000	4,000
Permits					
Technical Monitoring					
Other site costs	boat fuel (20 drums of fuel at \$250 ea)	5,000		5,000	4,630
<b>Total Site / Project Costs</b>		31,491	9,891	21,600	14,171

## Project Budget Form (continued)

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ELIGIBLE COSTS

BUDGET

OTHER  
FUNDING

PSC  
N. FUND  
GRANT

Training (e.g Swiftwater, bear aware, electrofishing, etc).				Total (PSC + In-kind + cash)	In-Kind & Cash	PSC Amount	Actual Expenditures	Variance
Name of course	# of crew	# of days						
safety and health training	4	2	300	2,400	2,400			
<b>Total Training Costs</b>				<b>2,400</b>	<b>2,400</b>	<b>-</b>	<b>-</b>	<b>-</b>

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

Office space; including utilities, etc.								
Insurance								
Office supplies				300	300			
Telephone & long Distance		satellite phone & internet		2,100	2,100			
Photocopies & printing								
Other overhead costs								
<b>Total Overhead Costs</b>				<b>2,400</b>	<b>2,400</b>	<b>-</b>	<b>-</b>	<b>-</b>

**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.

<b>Total Capital Costs</b>								
<b>Project Total Costs</b>				<b>95,657</b>	<b>47,757</b>	<b>47,900</b>	<b>43,427</b>	<b>4,473</b>

**Budget Summary**

(PSC + in-kind + cash)

	Total
<b>Total Labour Costs</b>	59,366
<b>Total Site / Project Costs</b>	31,491
<b>Total Training Costs</b>	2,400
<b>Total Overhead Costs</b>	2,400
<b>Total Capital Costs</b>	-
<b>Project Total</b>	<b>95,657</b>

*Project Balance	4,472.86
Hold Back (not deposited)	4,790.00
Owed to DFO as of Oct. 24/13	<b>(317.14)</b>

\*Note: Includes obligations not yet invoiced i.e. air charters, maintenance