

Stock Composition of Stikine and Taku Chinook and
Sockeye Inriver Fisheries 2015
- Sample Collection -

(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 results of the Stock Composition of Stikine and Taku Chinook and Sockeye Inriver Fisheries project supported by the Northern Fund of the Pacific Salmon Commission.

A total of \$47,900 Cdn of Northern Fund monies was used to carry out the collection of DNA samples from Stikine and Taku River Chinook (*Oncorhynchus tshawytscha*) and sockeye (*Oncorhynchus nerka*) fisheries. A total of 1,348 tissue samples were collected from Chinook salmon harvested in the Taku River assessment and commercial fisheries between the dates of May 4 and July 28, 2015. A total of 2,470 tissue samples were collected from sockeye salmon in these fisheries between the dates of June 22 and September 24, 2015. The total number of samples obtained exceeded the minimum required by a substantial margin.

A total of 1,340 tissue samples were collected from Chinook salmon harvested in the Stikine River commercial fishery between the dates of May 4 and August 11, 2015. A total of 2,530 tissue samples were also collected from sockeye salmon in this fishery between the dates of June 22 and September 4, 2015. As in the Taku fisheries, 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 inriver commercial fisheries in 2015 for the following purpose and goals.

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

Goal: Eventual processing of genetic stock identification samples from Chinook salmon by examining Pacific Salmon Commission standardized microsatellite loci; eventual processing of DNA samples collected from sockeye salmon 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 inriver fishery.*

Detailed Objectives: Collection of tissue samples from Chinook and sockeye in order to determine stock compositions in 2015 lower Stikine and Taku inriver 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

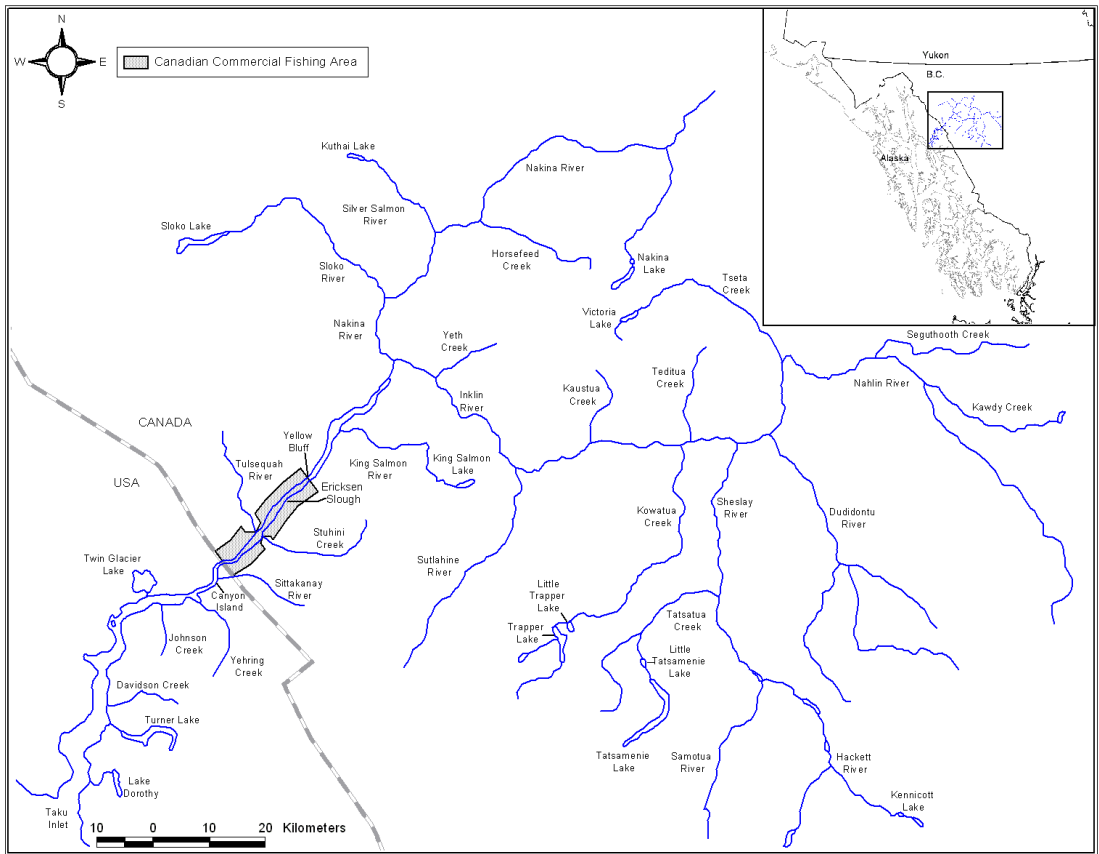


Figure 1. The Taku River drainage in British Columbia and Southeast Alaska.

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 inriver commercial/assessment fisheries and preserved in alcohol. As in previous years, the following parameters were used in the selection of sample size:

Probability of a Type 1 error (a): 0.05

Absolute Precision (p): +/- 0.125

The current Transboundary Technical Committee standards are:

Probability of a Type 1 error (a): 0.1

Absolute Precision (p): +/- 0.10

The sample targets are sufficient the revised standards on a bi-weekly basis. Attempts were made to exceed the targets.

On the Taku River, only “large” Chinook, i.e. Chinook greater than 659mm mid-eye to fork length, were sampled. This was done for the first time in 2014 in order to maximize the benefit for Chinook fishery management. On the Stikine River, Chinook of all sizes were sampled.

Table 1. Weekly sample targets.

	Number of stocks	Potential maximum weekly catch (N) ¹	Minimum sample ²	Target sample (n)
Stikine sockeye	7	30,000	116	125
Stikine Chinook	6	1,500	111	120
Taku sockeye	7	5,000	116	125
Taku Chinook	6	1,500	111	120

¹ 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.

² Based on Tortora, R.D. 1978. A note on sample size estimation for multinomial populations. Amer. Statistician 32: 100-102.

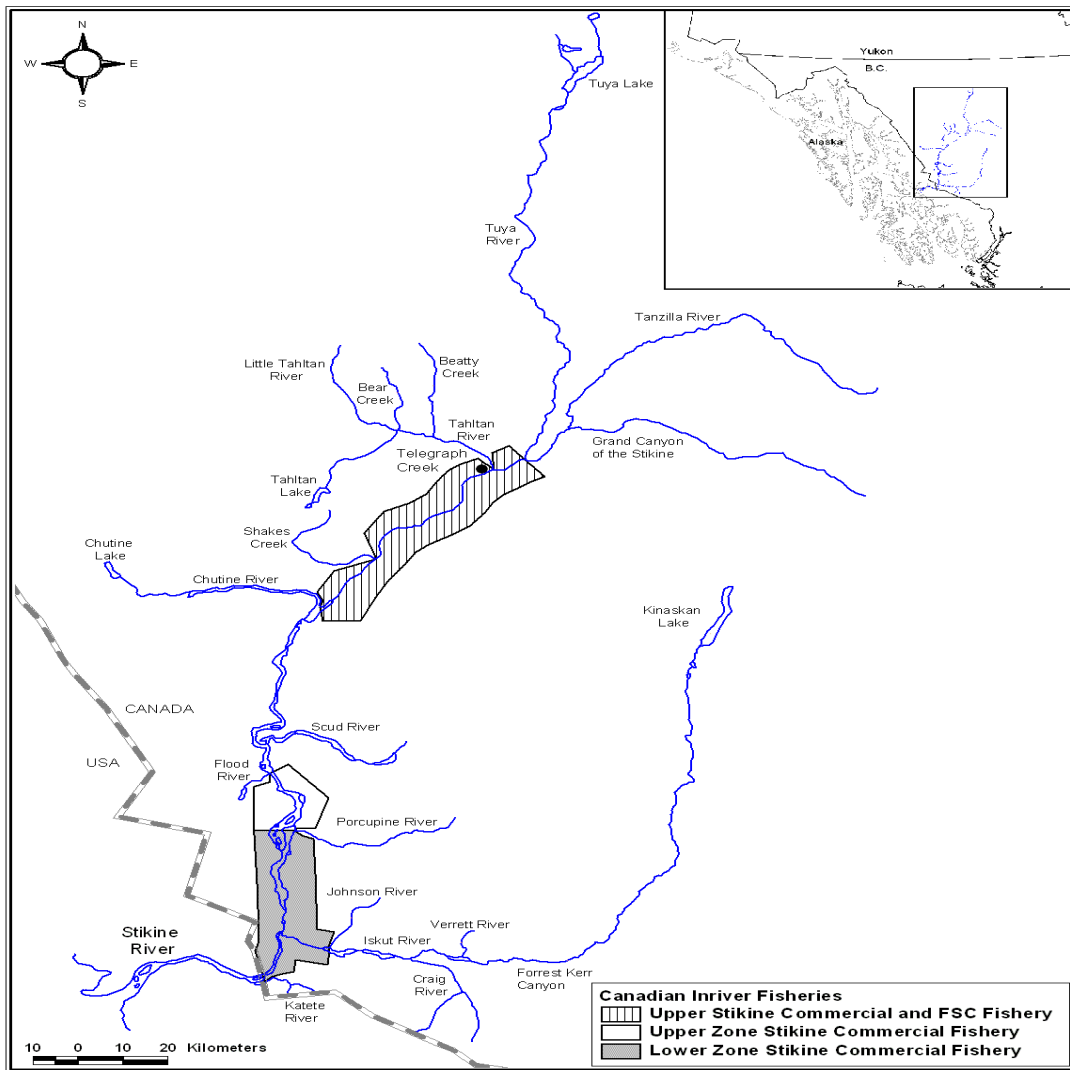


Figure 2. The Stikine River drainage in British Columbia and Southeast Alaska.

Two field crews of two technicians each were involved in the sample collection on the Taku and Stikine rivers beginning in early May. The Chinook fisheries operated from early May until mid-June; Chinook catches continued into directed sockeye fishing periods. Sockeye sampling took place from the mid-June until mid-September. 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

Chinook salmon

Collection of tissue samples from Chinook salmon commenced on May 4, 2015 (statistical week 19) with the opening of the Chinook assessment fishery and concluded on July 28, 2015 (statistical week 31), during the directed sockeye fishery.

The Chinook fishery operated at an assessment level for the season due to a low inseason run projection that would not allow for a directed fishery. It operated at an assessment level from statistical week 19 (starting May3) and continued through week 25 (starting June 14) inclusive. As presented in Table 2, the weekly sampling goal of 120 Chinook was exceeded for all but week 25 of the Chinook season where 97 samples were collected. For this week, however, the sample still comprised a significant proportion of the catch, i.e. 92%.

The goal of 120 samples was also exceeded for the first week of the directed sockeye fishery (which commenced on June 21, statistical week 26 and resulted in Chinook bycatch). The second to sixth weeks of the sockeye fishery had a total catch of 518 chinook; tissue samples (245) were obtained from 47% of these.

The total catch of Chinook salmon was 2,225 fish. A total of 1,348 samples were obtained over thirteen weeks of fishing, accounting for 61% of the catch. The number of samples obtained more than doubled the minimum anticipated (840, based on seven weeks of fishing).

Sockeye salmon

Collection of tissue samples from sockeye salmon commenced on June 22, 2015 (statistical week 26) and concluded on September 24, 2015 (week 39) occurring over 13 weeks of fishing. A total of 2,470 tissue samples were obtained, amounting to 12% of the 19,796 sockeye caught (Table 2.). The goal of 125 samples was exceeded for each week of the directed sockeye fishery (weeks 26-33).

Sampling continued for six more weeks after the directed sockeye fishery closed (week 33, starting August 9) as sockeye were being landed as bycatch in the directed coho fishery and then the coho test fishery. For the first three of these weeks the target of 125 samples was exceeded; and samples were obtained from 89% (142) of the 159 sockeye caught in the following weeks, 37 to 39.

As was the case with Chinook, the total number of samples obtained more than doubled the minimum anticipated (875, based on seven weeks of fishing).

Table 2. Catches of large Chinook (greater than 659mm mid-eye to fork length) and sockeye salmon and associated tissue samples in the Taku River commercial and assessment fisheries, 2015 by statistical week.

	Stat Week	Chinook Catch	Chinook DNA Obtained	Sockeye Catch	Sockeye DNA Obtained
		Comm & test	-	Comm & test	
Test/assessment Chinook	19	147	145		
	20	261	165		
	21	298	139		
	22	232	174		
	23	151	144		
	24	163	155		
	25	105	97	6	
Directed Sockeye	26	350	84	653	200
	27	244	64	751	200
	28	155	99	586	200
	29	68	55	1,109	200
	30	25	21	3,317	200
	31	18	6	4,862	200
	32	6		1,598	200
	33	2		1,686	200
Directed Coho	34			1,622	200
	35			2,286	200
	36			1,161	336
	37			116	91
Test Coho	38			25	25
	39			18	18
	Total	2,225	1,348	19,796	2,470

3.2 Stikine River

Collection of tissue samples from Chinook commenced on May 4, 2015 (statistical week 19) with the opening of the directed Chinook fishery and concluded on August 11, 2015 (week 33), during the directed sockeye fishery. Collection of sockeye samples commenced on June 22, 2015 (week 26) and concluded on September 4, 2015 (week 36). 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 within the Lower Stikine commercial fishing grounds).

A total of 1,340 Chinook samples were obtained from the commercial and assessment fisheries (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 29% of the 4,557 Chinook caught in the commercial and assessment fisheries. In addition, approximately 295 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 assessment fisheries and Chinook tagging site, 2015 by statistical week.

		Stat Week	Chinook Catch	Chinook DNA Obtained ^a	Sockeye Catch	Sockeye DNA Obtained ^b
Directed Chinook			Comm & test		Comm & test	
		19	85	20 (20)		
		20	112	57 (8)		
		21	61	31 (12)		
		22	283	150 (17)		
		23	409	150 (55)	1	
		24	464	194 (41)	3	
		25	776	240 (66)	24	
Directed Sockeye	Test/assessment Sockeye	26	1074	184 (36)	1,536	178 (169)
		27	662	82 (39)	3,933	235 (424)
		28	355	81 (1)	9,165	355 (361)
		29	151	79	9,555	176 (276)
		30	77	44	7,846	200 (168)
		31	23	15	6,804	174 (16)
		32	9	7	2,675	170 (85)
		33	10	6	4,124	278 (90)
		34	2		2,688	169 (45)
Directed Coho		35	4		2,974	220 (16)
		36			1,520	369
		37			677	
		Total	4,557	1,340 (295)	53,525	2,530 (1,650)

^a: 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;

^b: 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 2,530 sockeye samples were collected from the commercial and test fisheries, comprising 5% of the catch of 53,525 sockeye. The weekly sampling goal of 125 fish was exceeded for each week of the sockeye fishery. The total number of samples obtained exceeded the minimum anticipated (875, based on seven weeks of fishing) by a substantial margin. An additional 1,650 samples were collected in the sockeye assessment 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 \$47,811, which was just under the amount budgeted (\$47,900). A summary of Fund expenditures in relation to budgeted amounts is as follows:

- a) Personnel
 - i) consultants and sub-contractors (i.e. air charters): \$26,300 (actual: 26,242; balance: \$58)

- b) Site Support
 - i) travel: 0 (actual: \$0;)
 - ii) materials and supplies: \$9,600 (actual: \$10,389; balance: \$-789)
 - iii) repairs and maintenance: \$6,000 (actual: \$5,602; balance: \$398)
 - iv) fuel and propane: \$5,000 (actual: \$2,136; balance: \$2,864)
 - v) work and safety gear: \$1,000 (actual: \$630, balance \$370)
 - vi) small tools and equipment: 0 (actual: \$246, balance \$-246)

Total: \$21,600 (actual: \$21,569; balance: \$31)
- c) Training
 - i) safety and health training: 0 (actual: 0)
- d) Overhead / indirect costs
 - i) office supplies: 0 (actual: 0)
 - ii) communications: 0 (actual: 0)

Total: 0 (actual: 0)
- e) Estimated value
 - i) **\$47,900** in cash (actual: **\$47,811**; balance: **\$89**)

4.0 Conclusion

The project objectives were achieved, with the number of tissue samples collected from Chinook and sockeye salmon on the Stikine and Taku rivers well in excess of the minimum required. 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 specific 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. Although results from this project will be retrospective, they 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

ELIGIBLE COSTS	TOTAL BUDGET	OTHER FUNDING	PSC N. FUND GRANT	AMOUNT
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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	PSC Expenditures	Balance
DFO Stock Assessment Biologist BI-3	1	3	7.5	45.00	1,013	1,013			
DFO Senior Fishery Technician EG-5	2	6	7.5	36.00	3,240	3,240			
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)					sub total	27,128	27,128	-	-

Labour - Employer Costs (percent of wages subtotal amount)

rate	20%	sub total	5,426	5,426	-	-	-
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Subcontractors & Consultants	# of crew	# of work days	hrs per day	rate per hour	Total	In-Kind & Cash	PSC Amount	PSC Expenditures	Balance
Taku air charters		10	1.6	\$800	12,800		12,800	12,919	(119)
Stikine air charters		10	2	\$675	13,500		13,500	10,500	3,000
Boat charter								2,823	(2,823)
Insurance if applicable	rate	0%							
sub total					26,300	-	26,300	26,242	58

Volunteer Labour	# of crew	# of work days	hrs per day	rate per hour	Total	In-Kind & Cash	PSC Amount	PSC Expenditures	Balance
Skilled									
Un-skilled									
Insurance if applicable	rate	0%							
sub total									

Total Labour Costs 58,853 32,553 26,300 26,242 58

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				246	(246)
Site Supplies & Materials	preservative, containers, provisions, etc	9,600		9,600	(789)
Equipment Rental				2,567	(2,567)
Work & Safety Gear		1,000		1,000	370
Repairs & Maintenance	boats, generators, communications equip, etc	6,000		6,000	398
Permits				-	-
Technical Monitoring				-	-
Other site costs	boat fuel, propane etc	5,000		5,000	2,864
Total Site / Project Costs		31,491	9,891	21,600	21,569

Total Site / Project Costs 31,491 9,891 21,600 21,569 31

Project Budget Form (continued)

ELIGIBLE COSTS					BUDGET	OTHER FUNDING	CONTRIBUTION FUNDING		
					Total (PSC + In-kind + cash)	In-Kind & Cash	PSC Amount	PSC Expenditures	Balance
Training (e.g Swiftwater, bear aware, electrofishing, etc).									
Name of course	# of crew	# of days							
safety and health training	4	2	300		2,400	2,400			
Total Training Costs					2,400	2,400	-	-	-
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									
Total Overhead Costs					2,400	2,400	-	-	-
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.									
Total Capital Costs									
Project Total Costs					95,144	47,244	47,900	47,811	89

Budget Summary

(PSC + in-kind + cash)				Balance	\$ 89.06
		PSC Budget	Actual	Initial Payment	\$ 43,110.00
Total Labour Costs		26,300	26,242	10% holdback	\$ 4,790.00
Total Site / Project Costs		21,600	21,569		
Total Training Costs		-	-		
Total Overhead Costs		-	-		
Total Capital Costs		-	-		
	Project Total	47,900	47,811		