

Stock Composition of Stikine and Taku Chinook and
Sockeye Inriver Fisheries 2014
- Sample Collection -

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

Project 57603

Final Report
February 2015

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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 and sockeye fisheries. A total of 1,221 tissue samples were collected from Chinook salmon harvested in the Taku River commercial fishery between the dates of May 4 and July 19, 2014. A total of 2,299 tissue samples were collected from sockeye salmon in this fishery between the dates of June 16 and September 11, 2014. The total number of samples obtained exceeded the minimum required by a substantial margin.

A total of 1,655 tissue samples were collected from Chinook salmon harvested in the Stikine River commercial fishery between the dates of May 5 and August 2, 2014. A total of 1,730 tissue samples were also collected from sockeye salmon in this fishery between the dates of June 16 and September 10, 2014. 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 2014 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 inriver 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 inriver fishery.*

Detailed Objectives: Collection of tissue samples from Chinook and sockeye in order to determine stock compositions in 2014 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

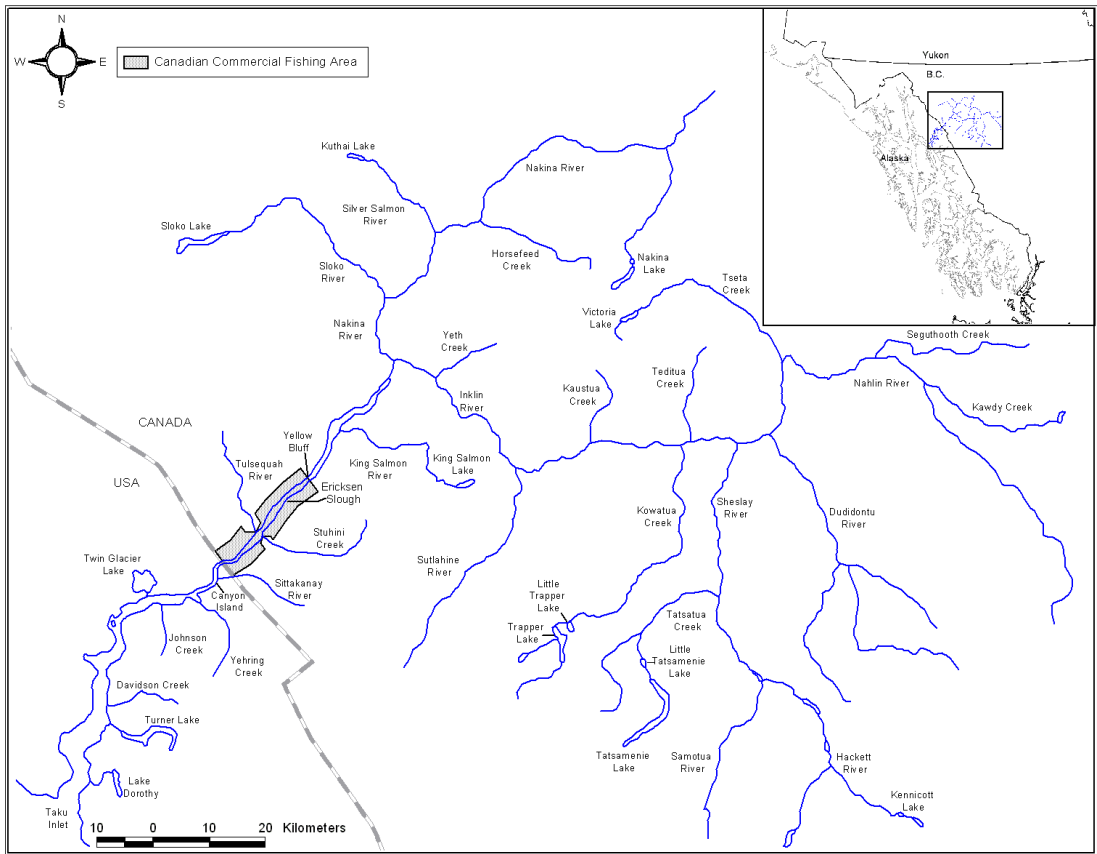


Figure 1. The Taku River drainage in British Columbia and Southeast Alaska.

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 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 maximise 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 sample²	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.

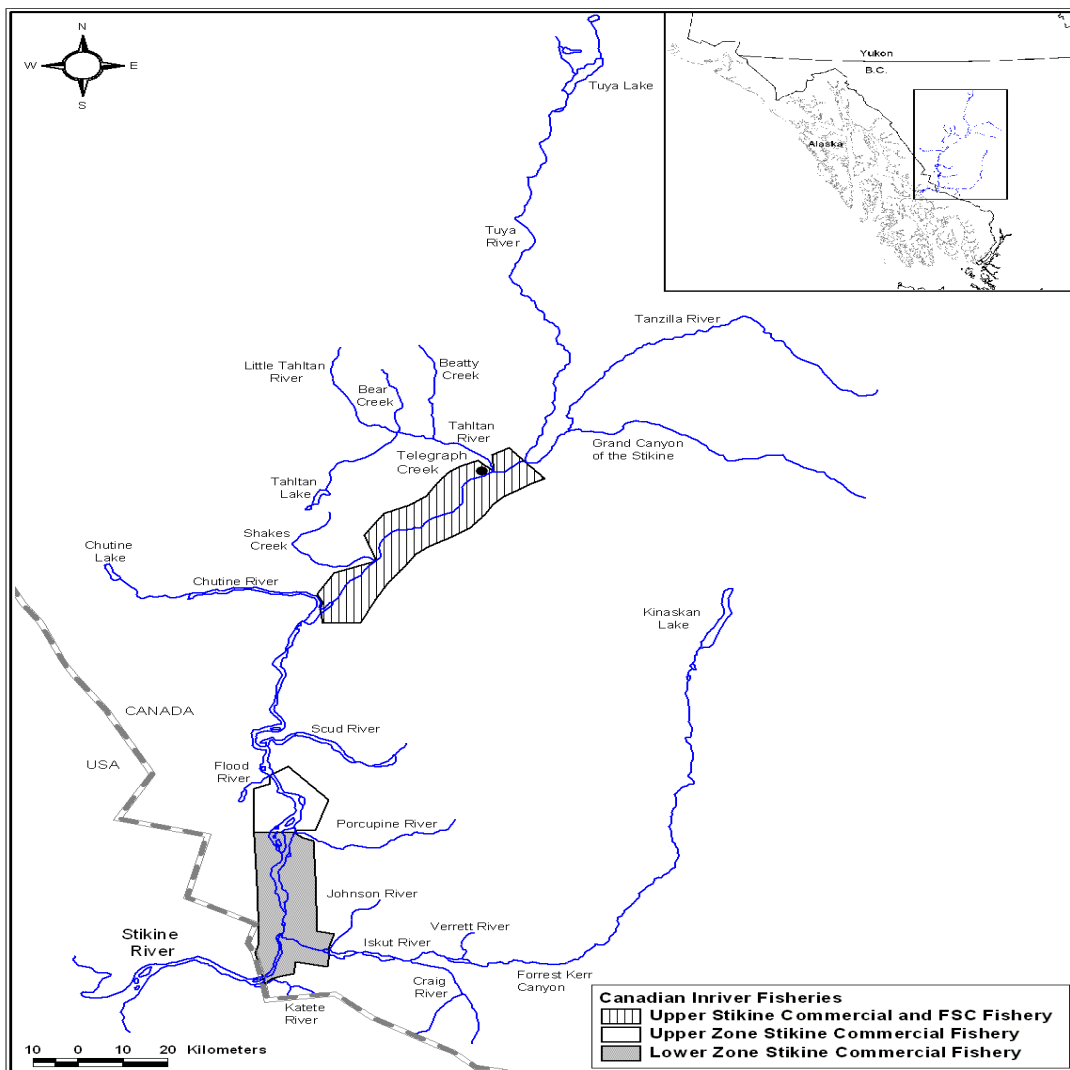


Figure 2. The Stikine River drainage in British Columbia and Southeast Alaska.

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

Collection of tissue samples from Chinook commenced on May 5, 2014 (statistical week 19) with the opening of the Chinook assessment fishery and concluded on July 19, 2014 (statistical week 29), during the directed sockeye fishery.

The Chinook fishery operated at a reduced assessment level for the early part of the season prior to the availability of an inseason run projection. It operated at an assessment level from statistical week 19 (starting May 4) and continued through week 21 (starting May 18) inclusive. Week 22 (starting May 25) operated at a reduced directed commercial fishery. Week 23 (starting June 1) was operated at an assessment level; there was no fishing in week 24. As presented in Table 2., the weekly sampling goal of 120 Chinook was exceeded for all but the directed fishery week (22) of the Chinook season; for this week, however, the sample still comprised a significant proportion of the catch, i.e. 29%.

The goal of 120 samples was also exceeded for the first two weeks of the directed sockeye fishery (which commenced on June 15, statistical week 25 and resulted in Chinook bycatch). The third to eighth weeks of the sockeye fishery had a total catch of 275 Chinook; tissue samples (159) were obtained from 58% of these.

The total catch of Chinook was 2,271 fish. A total of 1,221 samples were obtained over twelve weeks of fishing, accounting for 54% of the catch. The number of samples obtained more than doubled the minimum anticipated (840, based on seven weeks of fishing).

Sockeye

Collection of tissue samples from sockeye commenced on June 16, 2014 (statistical week 25) and concluded on September 11, 2014 (week 37) occurring over 13 weeks of fishing. A total of 2,299 tissue samples were obtained, amounting to 13% of the 17,648 sockeye caught (Table 2.). The goal of 125 samples was exceeded for each week of the directed sockeye fishery except for week 28 (100 samples).

Sampling continued for four more weeks after the directed sockeye fishery closed (week 34, starting August 19) as sockeye were being landed as bycatch in the directed coho fishery. For the first two of these weeks the target of 125 samples was exceeded; and samples were obtained from 91% (147) of the 161 sockeye caught in the following weeks, 36 and 37.

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 fishery, 2014 by statistical week.

Stat Week	Chinook Catch	Chinook DNA Obtained	Sockeye Catch	Sockeye DNA Obtained
18	-	-		
19	339	160		
20	273	153		
21	442	300		
22	201	58		
23	176	110		
24	-	-		
Sockeye Season				
25	280	131	1,215	200
26	285	150	1,495	200
27	98	68	1,094	300
28	113	69	2,311	100
29	29	22	1,854	200
30	27		3,163	200
31	6		2,445	200
32	2		2,799	200
33			178	152
34			600	200
35			330	200
36			148	139
37			13	8
38				
39				
Total	2,271	1,221	17,649	2,299

3.2 Stikine River

Collection of tissue samples from Chinook commenced on May 5, 2014 (statistical week 19) with the opening of the Chinook assessment fishery and concluded on August 2, 2014 (week 33), during the directed sockeye fishery. Collection of sockeye samples commenced on June 16, 2014 (week 26) and concluded on September 10, 2014 (week 37). 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 1,655 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 58% of the 2,853 Chinook caught in the assessment and commercial fisheries. In addition, approximately 328 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, 2014 by statistical week.

Stat Week	Chinook Catch	Chinook DNA Obtained^a	Sockeye Catch	Sockeye DNA Obtained^b
19	32	20 (41)		
20	61	100 (3)		
21	234	140 (4)		
22	315	200 (26)		
23	345	200 (65)		
24	459	200 (80)		
25	188	120 (75)	15	
Sockeye Season				
26	341	200 (20)	129	80 (200)
27	448	200 (14)	2,647	200 (200)
28	309	200	10,936	200 (150)
29	77	50	7,960	200 (100)
30	29	20	2,978	200 (200)
31	8	5	2,934	200 (200)
32	5		999	200 (90)
33	0		1,438	200 (20)
34	0		67	30 (50)
35	2		146	80
36			200	100
37			68	40
Total	2,853	1,655 (328)	30,502	1,730 (1,210)

^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 1,730 sockeye samples were collected from the commercial fishery, comprising 6% of the catch of 30,502 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. A total of 200 samples were collected in most of the weekly openings. The total number of samples obtained exceeded the minimum anticipated (875, based on seven weeks of fishing) by a substantial margin. An additional 1,210 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 \$47,903, very close to 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: 27,180; balance: \$-880)
- b) Site Support
 - i) travel: 0 (actual: \$1,240; balance: \$-1,240)
 - ii) materials and supplies: \$9,600 (actual: \$8,606; balance: \$994)
 - iii) repairs and maintenance: \$6,000 (actual: \$1,899; balance: \$4,101)
 - iv) fuel and propane: \$5,000 (actual: \$7,636; balance: -\$2,636)
 - v) work and safety gear: \$1,000 (actual: \$816, balance \$184)
 - vi) small tools and equipment: 0 (actual: 0)

Total: \$21,600 (actual: 20,197; balance: 1,403)
- c) Training
 - i) safety and health training: 0 (actual: 310; balance: \$-310)

Total: 0 (actual: 310; balance: \$-310)
- d) Overhead / indirect costs
 - i) office supplies: 0 (actual: 217; balance: \$-217)
 - ii) communications: 0 (actual: 0; balance: 0)

Total: 0 (actual: 217; balance: \$-217)
- e) Estimated value
 - i) **\$47,900** in cash (actual: **\$47,903**; balance: **\$-3**)

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

	TOTAL BUDGET	OTHER FUNDING	PSC N. FUND GRANT AMOUNT
ELIGIBLE COSTS			
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
Atlin Air (floatplane service)		10	1.6	\$800	12,800		12,800	8,332	4,468
Tsayta Air (floatplane service)		10	2	\$675	13,500		13,500	8,864	4,636
Pacific Western Helicopter								6,088	(6,088)
Boat charter								3,895	(3,895)
Insurance if applicable	rate	0%							
					sub total	-	26,300	27,180	(880)

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 27,180 (880)

Site / Project Costs	Detail (use additional page for details if needed)	Total	In-Kind & Cash	PSC Amount	PSC Expenditures	Balance
Travel (do not include to & from work)	vehicle fuel - Atlin, Telegraph Creek; meals & incid.	9,891	9,891		1,240	(1,240)
Small Tools & Equipment						-
Site Supplies & Materials	preservative, containers, provisions, etc	9,600		9,600	8,606	994
Equipment Rental						-
Work & Safety Gear		1,000		1,000	816	184
Repairs & Maintenance	boats, generators, communications equip, etc	6,000		6,000	1,899	4,101
Permits						-
Technical Monitoring						-
Other site costs	boat fuel, propane	5,000		5,000	7,636	(2,636)
Total Site / Project Costs		31,491	9,891	21,600	20,197	1,403

Project Budget Form (continued)

ELIGIBLE COSTS

BUDGET

OTHER
FUNDING

CONTRIBUTION
FUNDING

Training (e.g Swiftwater, bear aware, electrofishing, etc).					Total (PSC + In-kind + cash)	In-Kind & Cash	PSC Amount	PSC Expenditures	Balance
Name of course	# of crew	# of days							
safety and health training	4	2	300		2,400	2,400		310	
Total Training Costs					2,400	2,400	-	310	-

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

Office space; including utilities, etc.									
Insurance									
Office supplies					300	300		217	
Telephone & long Distance	satellite phone & internet				2,100	2,100			
Photocopies & printing									
Other overhead costs									
Total Overhead Costs					2,400	2,400	-	217	-

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	47,903	523

Budget Summary
(PSC + in-kind + cash)

	PSC Budget	Actual
Total Labour Costs	26,300	27,180
Total Site / Project Costs	21,600	20,197
Total Training Costs	-	310
Total Overhead Costs	-	217
Total Capital Costs	-	-
Project Total	47,900	47,903