
Nechako Fisheries Conservation Program
Terms of Reference (2013-2014)

March 2013

Prepared by:
Nechako Fisheries Conservation Program

TABLE OF CONTENTS

<u>REMEDIAL MEASURES</u>	<u>PROJECT MANAGER</u>	<u>PAGE</u>
RM13-2 Summer Temperature Management	RTA	2
RM13-8 Flow Control	RTA	8
RM13-8A NFCP Flow Discrepancy	RTA	11

MONITORING

M13-1 Chinook Spawner Enumeration	DFO	13
M13-2 Chinook Carcass Recovery	DFO	16

APPLIED RESEARCH

No applied research projects proposed for 2013/2043

BACKGROUND

Annual NFCP activities over the period 2012-2017 are guided by a 5-year plan which was approved in June, 2012. The proposed 2013-2014 program will involve annual baseline activities. Measurement of redd residency time for adult Chinook and the ensuing juvenile assessments has been deferred until 2014 and 2015 open circles in Table 1) in keeping with a unanimous NFCP decision (Decision Record 2012/13 - 1) and which is consistent with the intent of and scheduling of the previous 5-yr plan (2007-2012) for expanded chinook evaluations every 5 years. The redd residency time project is scheduled the year prior to fry emergence and juvenile outmigration estimation so as to maximize the accuracy of the juvenile counts which are scaled by the adult estimates (Table 1).

Table 1. Proposed projects to be undertaken by the NFCP in 2013/2014 in relation to activities specified in the 5-year plan for 2012-2017.

	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
REMEDIAL MEASURES					
Summer Temperature Management	●	●	●	●	●
Habitat Structure Removal	●		●	●	●
Flow Control	●	●	●	●	●
Flow Discrepancy Project	●	●	●	●	●
MONITORING					
Enumeration	●	●	●	●	●
Residency Time			○		
Carcass Recovery	●	●	●	●	●
Juvenile Outmigration				○	
Physical Data Collection				○	
Fry Emergence				○	
Substrate Quality and Composition					
Outstanding NFCP Reports	●				
Web-site Maintenance	●	●	●	●	●

○ = deferred by one year

RM13-2 SUMMER TEMPERATURE MANAGEMENT

1.0 OBJECTIVE

The objective of the Summer Temperature Management Project is to moderate elevated water temperatures during sockeye migration by manipulating the timing and volume of reservoir water, through Skins Lake releases, into the Nechako River.

Gate changes at the Skins Lake Spillway are used to manage flows throughout the year, and water temperatures in the Nechako River from 20 July to 20 August. The goal is to keep water temperatures in the Nechako River at Finmore (upstream of the Stuart River confluence) at or below 20 °C.

2.0 RATIONALE

Cooler water temperatures optimize sockeye salmon survival during the migration period (mid July to mid August). The 1987 Settlement Agreement defines specific water temperature targets and protocol using computer modelling and weather forecasts to effectively reduce temperature related risks during the migration period.

Nechako River water temperatures are managed by scheduling large releases from the Skins Lake Spillway with the goal to maintain mean daily water temperatures at or below 20°C in the Nechako River upstream of the Stuart River. Decisions on flow releases from the Skins Lake Spillway are facilitated using a computer-based program and decision protocol as specified in the Settlement Agreement.

3.0 METHODS

3.1 Field Data Collection

Daily field operations involve collection of water temperature, air temperature, river stage, and meteorological data in the Nechako River basin, at a number of sites. Minimum and maximum water temperatures will be collected daily from recorders maintained in the Nechako River at Bert Irvine's (Water Survey of Canada (WSC) data collection platform), the Nechako River at Fort Fraser (upstream of Nautley River), the Nechako River at Finmore (upstream of Stuart River) and in the Nautley River. River stages will be collected daily for the Nautley and the Nechako River below Cheslatta Falls and at Vanderhoof, (from the WSC data collection platforms from the real time internet web site) and used to determine daily river flows at all three locations.

3.2 Weather Forecasts

World Weather Watch, based on data available from the Prince George Atmospheric Environmental Survey weather station, will provide meteorological forecasts. These data, in conjunction with satellite data, will be used each day to develop 5-day meteorological forecasts. These forecasts will be forwarded to Triton each day and entered into a computer database for use in the water temperature forecast model. Each file contains the previous day's observed data and the 5-day meteorological forecasts for the study area.

3.3 Temperature Predictions

The flow and temperature models are run each day with the new data to predict Nechako River water temperatures based on 5-day meteorological forecasts. The data used include observed water temperatures, observed flows and the current 5-day meteorological forecast. The models are then run to predict the expected water temperatures in the Nechako River at the Stuart confluence over the next 5 days. Changes to the releases at Skins Lake Spillway are made based on the results of daily modelling runs.

3.4 Flow Release Decisions

In order to achieve the required responsiveness of the system to moderate water temperatures at Finmore, it is necessary to 'surcharge' the Murray and Cheslatta Lake system in advance to establish a higher 'base' flow through the lake system. Flows at Cheslatta Falls are typically increased from approximately $56.6 \text{ m}^3 \cdot \text{s}^{-1}$ to $170 \text{ m}^3 \cdot \text{s}^{-1}$ by July 15 by increasing Skins Lake Spillway releases from early July levels to $227 \text{ m}^3 \cdot \text{s}^{-1}$ on July 11 and controlling the Spillway so that flows at Cheslatta Falls reach a minimum of $170 \text{ m}^3 \cdot \text{s}^{-1}$ on July 15. A 5-day lead in release time is required for temperature controls at Finmore because it takes about 5 days for a change in releases at SLS to have an effect at Finmore. Flows are then regulated at Skins Lake Spillway to maintain flows at Cheslatta Falls between $170 \text{ m}^3 \cdot \text{s}^{-1}$ and $283 \text{ m}^3 \cdot \text{s}^{-1}$ as typically required during the period July 20 to August 20. Decisions to increase or decrease flows between these limits are made based on the decision protocol discussed below or as influenced by the timing of sockeye runs for any particular year.

The predicted water temperature data produced by the models is used to arrive at decisions on the necessity for flow releases from the Skins Lake Spillway in excess of the summer 'base' flow. These decisions are made by following a decision "Protocol", defined in the Settlement Agreement on Page 4, Sub-Clause 5, and described in Chapter 2 "Methods", of Envirocon Technical Memorandum 1941/C, (summarized below).

The "Protocol" structures the procedure to be followed in arriving at a decision to release additional flows from the Skins Lake Spillway. Essentially, release decisions are reached

by analyzing 3 trends developed using both predicted and observed temperature data. The trends analysis is necessary because of the generally decreasing accuracy of the meteorological forecasts from 1 to 5 days in the future. The 3 trends can best be explained by reference to Table 1 and the following summary:

- i. the observed trend; developed from observed mean daily water temperatures measured in the Nechako River above the Stuart River each day (b_0, c_0). The difference in observed water temperatures for the last two days is extrapolated over the next 5 days to determine the observed water temperature trend.
- ii. the predicted trend; developed from the predicted water temperatures for the previous day and the following five days ($c_s, c_1, c_2, c_3, c_4, c_5$). These data represent the predicted trend.
- iii. the forecast trend; developed from the difference between the current five-day and previous five-day predictions for the same calendar days (c_3 and b_4 , c_2 and b_3 , c_1 and b_2). The differences between forecasted data on coincident dates for the next 3 days only are averaged and added to the 5th day predicted temperature to determine the trend in forecasted temperatures.

Each day, predicted water temperatures for the 5-day forecast period will be checked and the 3 trends calculated. If 2 of the 3 trends indicated that the water temperature in the Nechako River at Finmore may exceed 19.4°C (67.0°F) then Rio Tinto Alcan is directed to increase the release. When this occurs the current day's release will be revised and the flow and temperature simulations re-run using the modified flow regime. Results of each day's final computer run will be subsequently used to initialize water temperatures for the following day's computer simulations.

The following release criteria will be used with the three trends identified above to determine timing and magnitude of the Skins Lake Spillway release:

1. When 2 of the 3 trends show an increase in water temperature in the Nechako River above the Stuart River, and these trends show that potentially the water temperature could exceed 19.4°C (67.0°F), increase the Skins Lake Spillway release according to criteria 2 and 3 below.
2. Operate Skins Lake Spillway such that flow in the Nechako River below Cheslatta Falls ranges between $170 \text{ m}^3 \cdot \text{s}^{-1}$ (6,000 cfs) and $283 \text{ m}^3 \cdot \text{s}^{-1}$ (10,000 cfs) as required and flow in the Nechako River above the Stuart River does not exceed $340 \text{ m}^3 \cdot \text{s}^{-1}$ (12,000 cfs).
3. At any time of release, increase Skins Lake Spillway from the current level to $453 \text{ m}^3 \cdot \text{s}^{-1}$ (16,000 cfs) directly to achieve the flow changes in the Nechako River as fast as possible.
4. During cooling periods when 2 of 3 trends in forecasted water temperatures are

decreasing and these trends indicate that potentially the water temperature could drop below 19.4°C (67.0°F) within the forecast period (5 days), reduce the Skins Lake Spillway release from the current level to 14.2 m³·s⁻¹ (500 cfs).

Table 1. Daily Operations to Manage Water Temperatures in the Nechako River above Stuart River.

Date	11-Jul	12-Jul	13-Jul	14-Jul	15-Jul	16-Jul*	17-Jul	18-Jul	19-Jul	20-Jul
Fifth Day's Predicted Water Temperature @ Date + 4 Days								a5	b5	c5
Fourth Day's Predicted Water Temperature @ Date + 3 Days							a4	b4	c4	
Third Day's Predicted Water Temperature @ Date + 2 Days						a3	b3	c3		
Second Day's Predicted Water Temperature @ Date + 1 Day				a2	b2	c2				
Current Day's Predicted Water Temperature @ Date			a1	b1	c1					
Previous Day's Calculated Water Temperature @ Date - 1 Day		as	bs	cs						
Previous Day's Recorded Water Temperature @ Date - 1 Day			ao	bo	co					
Current Day's Release @ Date				ra	rb	rc				

→	observed trend
- - - →	predicted trend
- - - - -	forecast trend

* The current day (i.e., the day of operation) for this example is July 16.

Skins Lake Spillway releases are typically decreased to $14.2 \text{ m}^3 \cdot \text{s}^{-1}$ (500 cfs) within 3 days prior to the end of the water temperature control period (August 20) unless observed water temperatures in the Nechako River above Stuart River are in excess of 20°C (68°F) and are predicted to increase based on meteorological forecasts. The release is to be maintained at $14.2 \text{ m}^3 \cdot \text{s}^{-1}$ to ramp down the flows in the Nechako River below Cheslatta Falls to at or above $31.1 \text{ m}^3 \cdot \text{s}^{-1}$ by early September (usually on or before September 6). This approach has been implemented since the full effects of Skins Lake Spillway release changes cannot be achieved at the Stuart River confluence within the 5 day forecast period as a result of the flow routing time through the Cheslatta-Murray Lakes system and the Nechako River. Reducing the Skins Lake Spillway release prior to August 20 optimizes water use for both the NFCP annual water allocation and for Alcan's power production.

4.0 PROJECT ORGANIZATION

It is proposed that Mr. Dave Warburton act as the Project Manager. Triton will run the modelling program and request SLS release changes as required.

5.0 DELIVERABLES

The main product for this project is the daily release decisions for the Skins Lake Spillway made during the sockeye migration period in the Nechako River (July 10 to August 20). Daily records of all data collected in the field, all meteorological forecasts and water temperature predictions and water release decisions will be maintained at Triton's office in a database, and made available on request. These records will be included in data appendices in an annual report on the project. The results of the program will be submitted to the committee in a draft report by December 15, 2013 and a final report submitted by December 31, 2013.

6.0 BUDGET

6.1 2013/2014 Summer Temperature Management

The budget for the 2013/2014 Summer Temperature Management Program includes 109.5 person days and \$15,910 in disbursements. A breakdown of staffing requirements and disbursements is presented in the following tables.

RM13-2 SUMMER TEMPERATURE MANAGEMENT

PERSONNEL	LOCATION/TASK	DAYS
Physical Scientists	Office	50
Technicians	Field	52
Office Support	Office	2
Support Staff	Report Production	4.5
	Final Report Review	1
TOTAL		109.5

DISBURSEMENTS	QUANTITY	UNIT	UNIT COST	
			(\$)	TOTAL
Weather Network - Meteorological Forecasts	1	Project	6,000	\$6,000
Equipment Supplies (thermo chart paper)	1	Project	500	\$500
Airfares	2	Project	630	\$1,260
Technician Vehicle Expenses	52	Day	100	\$5,200
Vehicle Rental	2	Day	160	\$320
Boat Rental	1	Project	1,500	\$1,500
Printing/Photocopying	1	Project	250	\$250
Communications	1	Project	320	\$320
Freight	1	Project	160	\$160
Misc. Equipment	1	Project	100	\$100
Report Production	1	Project	300	\$300
TOTAL				\$15,910

RM13-8 FLOW CONTROL

1.0 OBJECTIVE

The primary objectives are to determine the necessary adjustments to the Skins Lake Spillway release to meet the objectives for flow control in the Nechako River by monitoring Skins Lake Spillway releases and river flows and ensuring that the annual water allocation from the Nechako Reservoir is fully utilized.

2.0 RATIONALE

The Technical Committee is responsible for managing the release of the annual water allocation to the Nechako River during each annual water year (April 1 to March 31). The proposed activities will provide the necessary technical support to the Technical Committee to permit them to arrive at decisions regarding flow releases from the Skins Lake Spillway in order to fulfil this mandate.

During the spring and early summer of 1988, considerable effort was expended estimating the effect of different flow releases from the Skins Lake Spillway, in concert with different estimated inflow hydrographs from the Cheslatta-Murray Basin, on flows in the Nechako River below Cheslatta Falls. One of the primary results of this work was that due to the variable nature of the contributions of flow from the Cheslatta-Murray basin, little benefit could be realized in terms of maintaining a stable regime downstream from Cheslatta Falls by attempting month-to-month regulation of flows from the Skins Lake Spillway. However, some work will be necessary to: (a) choose the exact timing of increased flow releases following the start of the 2011/2012 water budget year (April 1); (b) choose the monthly flow regime to be followed throughout the spring and summer; and (c) following the cessation of the cooling flow period in August, calculate the remainder of the water budget and set the flow for the rest of the year.

3.0 WORK PLAN

Prior to April 1, the Nechako River will be assessed for ice conditions and the progression of break-up. The timing of the increase in release above the winter release from Skins Lake Spillway will be dependent on these river ice conditions. Flows will be increased after April 1 (typically mid to late April) to a constant level (approximately $49 \text{ m}^3 \text{ s}^{-1}$) that will be maintained until the cooling flow period in July. The exact timing of the April release will be determined following road-based inspections at different locations along the Cheslatta Murray system to determine ice conditions. Following the cessation of the cooling flow period in August, the remainder of the water budget will be calculated and the flows for the rest of the year will be set.

Activities under this project will be required on a periodic basis during the spring freshet period, from late March to late June. Typically, work will be required over a period of 2 to 3 days immediately prior to the beginning of each calendar month. During this period, flows will be estimated, recommendations made to the Technical Committee, and the Technical Committee's decisions communicated to Rio Tinto Alcan. For the remainder of the year, recorded releases from Skins Lake Spillway and flows in the Nechako River below Cheslatta Falls will be obtained on a monthly and bi-weekly basis (daily during the summer water temperature management project), respectively. A summary of these flows will be forwarded to the Technical Committee on a monthly basis.

Mean daily releases from Skins Lake Spillway and mean daily flows recorded at the WSC gauging station (#08JA017) in the Nechako River below Cheslatta Falls will be tabulated on a monthly basis. These data will be included in a report to be presented to the Technical Committee for review.

Should a discrepancy be observed in the fall (October) between measurements at the Skins Lake Spillway and at the WSC gauging station, it is proposed that the Water Survey of Canada under the direction of the Technical Committee, investigate the source of the discrepancy. This will be done by measuring the discharge at the site established in Reach 1 of the Nechako River between Cheslatta Falls and Bert Irvine's.

4.0 PROJECT ORGANIZATION

It is proposed that Mr. Dave Warburton act as the Project Manager and that Triton Environmental Consultants Ltd. conduct the work.

5.0 DELIVERABLES

A summary of Skins Lake Spillway releases and flows in the Nechako River will be delivered to the Technical Committee on a monthly basis. The results of the work on this project will be documented in a formal report. This report will summarize observed mean daily releases from Skins Lake Spillway and flows at the WSC gauging station below Cheslatta Falls. A draft report will be completed by May 15 and the final report by June 30, 2013.

6.0 BUDGET

6.1 2013/2014 Flow Control

The budget for the 2013/2014 Allocation of Flows includes 22.5 person days and \$3,410 in disbursements. A breakdown of staffing requirements and disbursements is presented in the following tables.

RM13-8 FLOW CONTROL

PERSONNEL	LOCATION/TASK	DAYS
Engineer	Office	12
Support Staff	Office	3
Senior Fisheries Biologist	Ice Survey	1
Trapper	Ice Survey	1
Support Staff	Report Production	4.5
Project Director	Final Report Review	1
TOTAL		22.5

DISBURSEMENTS	QUANTITY	UNIT	UNIT COST (\$)	TOTAL
Communications	1	110	110	\$110
Ice Survey	1	3,000	3,000	\$3,000
Report Production	1	300	300	\$300
TOTAL				\$3,410

RM13-8A NFCP FLOW DISCREPANCY

1.0 OBJECTIVE

The objective is to determine the cause of the discrepancy between gauge readings from the Skins Lake Spillway and the Nechako River below Cheslatta Falls monitoring stations.

2.0 RATIONALE

Should a flow discrepancy become apparent during the 2013/14 water year, a field investigation will be undertaken to investigate the discrepancy between gauge readings from the two monitoring stations.

3.0 WORK PLAN

Should a flow discrepancy become apparent in 2013/14, additional field data on the discrepancies will be collected. It is suggested that these measurements be investigated independently of the parties to the 1987 Settlement Agreement.

4.0 PROJECT ORGANIZATION

It is proposed that Mr. Clyde Mitchell act as Project Manager for this work and that the work be conducted by Mr. Mitchell and the Water Survey of Canada.

5.0 DELIVERABLES

If required, a project memorandum reporting the findings of the field analysis will be provided within 1 month of the completion of the field work.

6.0 BUDGET

6.1 2013/2014 Water Budget Allocation

The budget for the 2013/2014 Flow Discrepancy includes 9 person-days and \$10,000 in disbursements for the contingency project. A breakdown of person-power requirements and disbursements is presented in the following tables.

RM13-8A NFCP FLOW DISCREPANCY

PERSONNEL	LOCATION	DAYS
Physical Scientist – Review of documents related to Skins Lake Spillway rating curves.	Office	5
Physical Scientist – Contingency for field evaluation of observed flow discrepancy	Field	4
TOTAL		9

DISBURSEMENTS	TOTAL
Field evaluation	\$ 10,000
TOTAL	\$ 10,000

M13-1 ADULT CHINOOK SPAWNER ENUMERATION

1.0 OBJECTIVE

The purpose of this project is to provide an accurate estimate of the size, timing and distribution of the Nechako River Chinook spawning escapement. Helicopter counts of chinook spawners will be conducted using methods consistent with previous years so as to allow year-to-year population comparison. However, the schedule for the flights will be consistent with the 5-year plan, specifically 5 weekly helicopter flights conducted throughout September and the first week of October.

2.0 RATIONALE

Knowledge of the population size is required to assess achievement of the Conservation Goal, as defined in the 1987 Settlement Agreement. The adult spawner enumeration project provides an annual estimate of the spawning escapement of Nechako River chinook salmon.

3.0 WORK PLAN

3.1 Nechako River Aerial Estimate

Five helicopter counts will be conducted on the Nechako River from Cheslatta Falls to Vanderhoof on a weekly basis, beginning the first week of September. Counts will be conducted in a downstream direction since this has been found to maximize visibility. The target day for the weekly flights will be Wednesday, and the tentative schedule of flights for 2013 is September 4, 11, 18, 25, and October 2. However, the flights may be conducted on Tuesday or Thursday if it appears that weather conditions will be better for conducting the observations.

On each flight, two observers will independently record spawner counts for each section. The highest count obtained by the two observers for each section will be used for the escapement estimate. This procedure is based on the assumption that an experienced observer is more likely to miss counting a fish than to count an object that is not a fish. To maintain consistency each section will only be counted once. Chinook will be counted and categorized as on redds, migrating/holding and carcasses. Following the area under the curve (AUC) method, the estimate will be calculated using fish on redds only. Total live fish estimates will provide information on run timing. The location of major spawning areas will be identified.

The AUC method will be utilized, as it is considered the most accurate, reliable and cost-effective method of enumerating spawning salmon from aerial counts. The total number

of spawners is equal to the area under a spawner-date curve divided by the 'survey life' or the average time that a fish resides in the area that was surveyed.

3.2 Residence Time

As outlined in the previous NFCP 5-year plan (2007-2012), there is low sensitivity of spawner estimates to the observed variations in residency time. Residence time was measured in 2009 to optimize the accuracy of the spawner estimate in anticipation of 2010 juvenile surveys. The estimate was 9.8 days, slightly below the long-term average of 10.6 days. During 2014, residence time will be measured so as to optimize the accuracy of fry/spawner and juvenile/spawner estimates that will be obtained in 2015.

4.0 DELIVERABLES

The data collected will be entered into a database and a technical report detailing the methods used and presenting the size, distribution and timing of the spawning population will be prepared. The draft report will be submitted to the NFCP Technical Committee by March 31, 2014.

5.0 PROJECT ORGANIZATION

It is proposed that DFO be responsible for this program and that Byron Nutton be the Project Director/Manager. Since spawner enumeration is the primary method of assessing the success of the Conservation Goal, representatives of Rio Tinto Alcan and the DFO who are experienced in aerial enumeration will conduct the overflights, analyze the data and write the report.

6.0 OUTSTANDING REPORTS

This year all of the following outstanding reports will be finalized:

REPORT NUMBER	TITLE	STAGE OF COMPLETION
M95-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M96-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M97-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M98-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M99-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M00-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M01-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M02-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M03-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M04-1	Nechako and Stuart Rivers Chinook Spawner Enumeration	
M05-1	Nechako River Chinook Spawner Enumeration	
M06-1	Nechako River Chinook Spawner Enumeration	
M07-1	Nechako River Chinook Spawner Enumeration	
M08-1	Nechako River Chinook Spawner Enumeration	
M09-1	Nechako River Chinook Spawner Enumeration	
M10-1	Nechako River Chinook Spawner Enumeration	
M11-1	Nechako River Chinook Spawner Enumeration	
M12-1	Nechako River Chinook Spawner Enumeration	

7.0 BUDGET

7.1 2013/2014 Adult Chinook Spawner Enumeration

The budget for the 2013/2014 Adult Chinook Spawner Enumeration Project includes \$30,000 for disbursements (mostly helicopter flights) and \$8,000 for professional time (16 days).

7.2 Outstanding Report Production

There is no budget allocated for the Outstanding Report Production Project as this was accounted for during previous years.

M13-2 CHINOOK CARCASS RECOVERY

1.0 OBJECTIVE

The purpose of the program is to collect biological data on size, sex, age, life history and egg retention of Nechako River Chinook salmon.

2.0 RATIONALE

Fish length and age data obtained from scales will reflect the relative production of different Chinook year classes. To retain a full database, it is necessary for these programs to continue in their entirety. This information is required for interpretation of enumeration results, as it will indicate which brood years have contributed to the spawning population. Egg retention data may serve as an indirect indicator of population or migration stresses and the quality of the spawning habitat.

3.0 WORK PLAN

Carcass recovery will be performed in two sample runs in order to collect carcasses from the early and late portions of the run-timing. Timing of these sample runs will be determined based on timing of die-off, as observed during the helicopter flights conducted for the Adult Enumeration project.

The Nechako River carcass recovery will be performed from Cheslatta Falls downstream to Vanderhoof. Sampling effort will be divided between the upper, middle and lower sections of the river in proportion to the distribution of spawners, which is to be determined from the helicopter observations conducted for the Adult Enumeration project. A thorough search for dead chinook salmon will be made including the examination of side channels. In deep-water areas, carcasses will be recovered using long handled gaffs. To facilitate carcass recovery and biological sampling a two person crew will be used. One person will operate the boat and the other person will observe and recover carcasses.

A target of 200 scale samples will be set for the Nechako River. These will be evenly split between male and female spawners. Upon recovery, carcasses will be measured for postorbital-hypural length. Egg retention in both spawned and unspawned females will be recorded. Ten scales will be removed from each fish to permit determination of total age. In addition, the anterior dorsal fin ray will be collected to provide a more accurate estimate of ocean residence.

4.0 DELIVERABLES

The results of this work will be added to the existing database. An interpretation of the data will indicate the contribution of parent brood years, compare 2012 data with previous years' results, and interpret ageing results in order to extract life history information. A draft report will be submitted to the NFCP Technical Committee by March 31, 2014.

5.0 PROJECT ORGANIZATION

It is proposed that DFO be responsible for this program and that Byron Nutton (DFO Section Head, Habitat Management) be the Project Director/Manager. Local staff or consultants who are experienced in carcass recovery and sampling techniques will conduct the project.

6.0 OUTSTANDING REPORTS

This year the following report will be finalized:

REPORT NUMBER	TITLE	STAGE OF COMPLETION
M11-2	Nechako River Chinook Carcass Recovery	inc
M12-2	Nechako River Chinook Carcass Recovery	inc

7.0 BUDGET

7.1 2013/2014 Chinook Carcass Recovery

The budget for the carcass recovery program includes a contract valued at \$18,000, disbursements valued at \$1,000 and 8 person-days valued at \$4,000 for a total budget of \$23,000.