COLLECTION OF DNA BASELINE SAMPLES WITHIN THE YUKON RIVER DRAINAGE IN CANADA IN 2007

YUKON RIVER RESTORATION AND ENHANCEMENT PROJECT NUMBER CRE-78N-07

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ABSTRACT

The collection of Chinook salmon samples occurred at several sites on the Yukon River and its tributaries in 2007. The Fisheries and Oceans Canada (DFO) genetics laboratory in Canada and federal and state agencies in the United States have spent considerable time and resources developing the Yukon River Chinook and fall chum salmon Genetic Stock Index (GSI) baselines. This tool, when more fully developed, can be used determine the relative abundance of U.S. and Canadian stocks as fish migrate through Alaska to Canada as well as more detailed information on the origin of the Canadian commercial, subsistence, domestic, aboriginal, and sport fishery catches. When the Canadian Chinook salmon GSI baseline is more complete, DFO fisheries managers may have a more sophisticated management regime which provides harvesting opportunities while at the same time providing enhanced protection for populations with conservation concerns.

In 2007, a total of 190 Chinook DNA samples were collected on the Little Salmon River, Teslin River Mainstem, Yukon River Mainstem (Minto, and Yukon Crossing areas) and Upper Stewart River tributaries. The 2007 collection effort was directed primarily at priorities (i.e. deficiencies) identified within the Chinook salmon baseline. The Chinook salmon DNA collection effort in 2007 was hampered by the low run size.

In addition to the collection effort summarized in this report, DFO also coordinated the collection and transport GSI samples collected though other funding sources.

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1.0 INTRODUCTION

Chinook salmon are widely distributed throughout the Yukon River drainage, with spawning tributaries located from mouth of the river (i.e. Andreafsky River, Alaska) to the headwaters (i.e.Teslin River, British Columbia). There is a distinction between two types of Yukon River chum salmon with "summer chum" salmon spawning mainly in lower river tributaries located in Alaska while "fall chum" salmon migrate further upstream into mid and upper tributaries within Alaska as well a number of Canadian tributaries. The Fisheries and Oceans Canada (DFO) genetics laboratory in Canada and federal and state agencies in the United States have spent considerable time and resources developing the Yukon River Chinook and fall chum salmon Genetic Stock Index (GSI) baselines. This tool, when more fully developed, can be used to determine the relative abundance of U.S. and Canadian stocks as fish migrate through Alaska to Canada, as well as, more detailed information on the origin of the Canadian commercial, domestic, aboriginal, and sport fishery catches. When the Canadian Chinook salmon GSI baseline is more complete, DFO fisheries managers may have a more sophisticated management regime which provides harvesting opportunities, while at the same time, providing enhanced protection for populations with conservation concerns.

In order to fully utilize the GSI tool, a sufficient baseline of spawning populations must be sampled and maintained. Sampling Chinook salmon populations within the Yukon Territory has proven difficult due to the large number (>100) of genetically discrete spawning populations, large sample area, and the remote location of many of the populations. In addition, many of the easily sampled populations within the existing Chinook salmon GSI baseline need to be re-sampled to maintain an inventory of fresh samples. The Canadian fall chum salmon baseline is believed to be more complete because there are fewer genetically discrete spawning populations and the principal populations are believed to be within the existing GSI baseline.

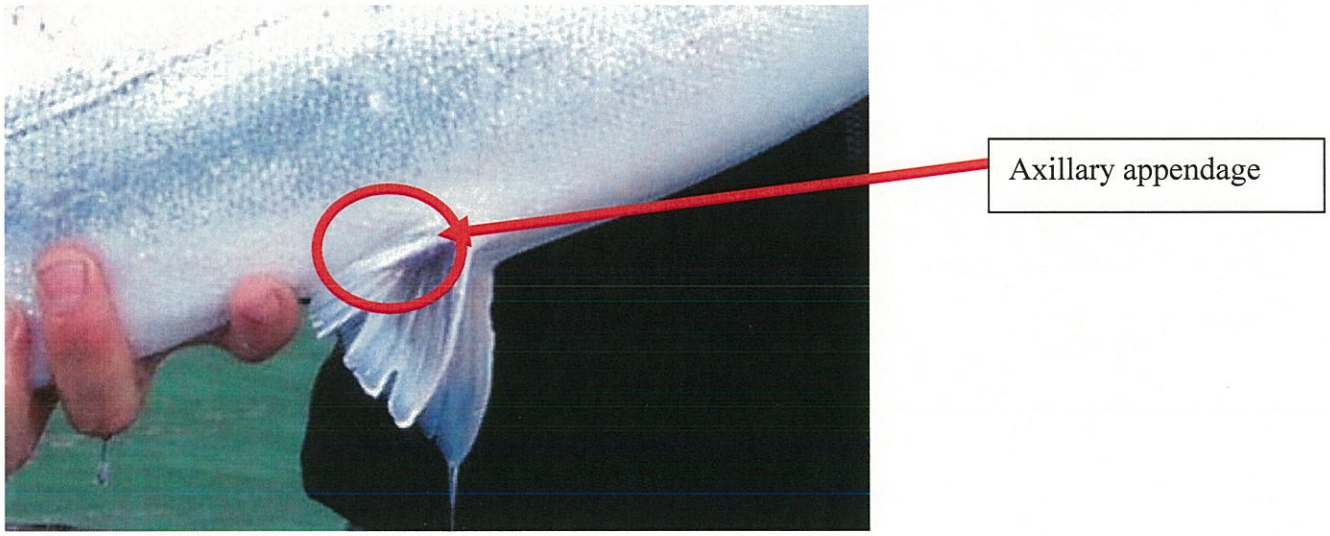
Funding for this program, CRE-78N-07, involved $ 35,000 (Canadian funds) provided by the Yukon River Panel through a contribution agreement with Fisheries and Oceans Canada (DFO) as well as an estimated DFO in-kind contribution of $ 5,200. A list of Chinook and fall chum salmon genetic baseline priorities has been developed by a sub-committee of the Canada/U.S. Joint Yukon River Technical Committee. The 2007 collection effort was directed primarily at priorities (i.e. deficiencies) identified within the Chinook salmon baseline. In addition to the collection effort summarized in this report, DFO also coordinated the collection and transport GSI samples collected though other funding sources.

2.0 MATERIALS AND METHODS

2.1 DNA Sample Collection

The collection of DNA samples was conducted by local contractors (i.e. consulting firms and a local resident) through contractual arrangements. All sampling was conducted under Scientific Collection Licenses issued by Fisheries and Oceans Canada. Fish were captured by using seines, gill nets, pike poles and angling. Only live fish or recently deceased fish with red gills were used for DNA samples. A portion[1] of the left and right axillary appendages, which are located at the base of the left and right pelvic fins, respectively was removed from each fish using guillotine clippers and placed in sample bottles containing 95% ethyl alcohol (see figure 1). The right and left samples were removed to facilitate the sharing of a complete set of the DNA samples collected between the Canadian and US genetics laboratories. DNA sample bottles were labeled with the following information: location of sample collection; name of the person or firm which collected the sample; and the date(s) the samples were collected.

Figure 1 Location of the axillary appendage.



[1] The instructions suggested removal of the axillary appendage as close to the base as possible using a sharp pair of scissors or the supplied guillotine clippers.

Table 1 Summary of the location sampled, contractors used and Scientific Collection License number issued.

Location	Contractor	Scientific Collection License Number
Little Salmon River	White Mountain Environmental Consulting	CL-07-59
Yukon River Mainstem	White Mountain Environmental Consulting	CL-70-59
Teslin River Mainstem	B. Mercer and Associates	CL-07-60
Upper Stewart River tributaries	Bruce Mitford	CL-07-58

3.0 RESULTS AND DISCUSSION

3.1 DNA Collection Effort in 2007

In 2007, Chinook and fall chum salmon GSI samples were collected during the course of this program (CRE-78N-07), DFO A-based programs, and a number of Restoration & Enhancement programs funded by the Yukon River Panel.

The 2007 Chinook salmon run size was well below average which made sample collection difficult. A total of 190 Chinook salmon samples were collected on the Little Salmon River, Teslin River Mainstem, Yukon Rive Mainstem (Minto and Yukon Crossing areas) and Upper Stewart River tributaries. A summary of the location and estimated number of samples collected with funding provided through CRE-78N-07 is presented in Table 2; the total number of Canadian DNA samples collected in 2007 was much higher that the total presented in Table 2 since this table summarizes only the samples collected under Yukon River Restoration and Enhancement Project number CRE-78N-07.

A summary of the Canadian Chinook and fall chum salmon DNA samples collected in 2007 using other funding sources is presented in Appendix 1.

Table 2 Summary of the Chinook salmon DNA samples collected in 2007.

Location	Estimated Number of Samples Collected
Little Salmon River	35
Teslin River Mainstem	41
Yukon River Mainstem: Minto (61) and Yukon Crossing (46)	107
Upper Stewart River tributaries	7

3.2 Budget Summary

A summary of the 2007 expenditures for CRE-78N-07 is presented in Table 3. The total amount of funds available from the Yukon Panel was $ 35,000. Since the program was conducted for approximately $ 33,000, the final payment of $2000.00 was not requested from the Yukon Panel.

Table 3 Summary of costs associated with CRE-78N-07.

Major Budget Category	Expenditure
1. Contract: B. Mercer & Associates-Teslin Mainstem Collection	$7,420.00
2. Contract: Bruce Mitford- Upper Steward tributaries Collection	$2,948.00
3. Contract: White Mountain Consulting- Mainstem Yukon Collection	$15,817.32
4. Contract: White Mountain Consulting- Little Salmon Collection	$5,498.00
5. Shipping and Materials	$496.84
6. Travel	$821.62
Total:	**$33,001.78**

ACKNOWLEDGEMENTS

The collection of Chinook salmon DNA samples in 2007 was complicated by low run strength and an overall lack of fish in spawning areas. The contractors who undertook the baseline collection for this project worked very hard under discouraging circumstances and their effort is greatly appreciated.

Chinook and fall chum salmon baseline DNA samples were also collected during the course of DFO A-based programs and other Yukon River Panel Restoration and Enhancement programs. The effort of Trix Tanner (Klondike River Chinook samples), Al Macleod (Fishing Branch fall chum samples), Jane Wilson (Blind Creek Chinook samples), Brian Mercer (Big Salmon Chinook samples), Heather Barnfield (Old Crow Chinook samples) and Ben Schonewille (Old Crow chum and coho samples) is greatly appreciated.

Appendix 1 Summary of the Chinook and fall chum salmon DNA samples collected in Canada in 2007 suing funding sources other than CRE-78N-07.

Chinook Collection

Location	Funding Source	Estimated # Samples Collected
Big Salmon River	CRE-41-07	75
Klondike River	DFO A-based	10
Blind Creek	CRE-37-07	50
Porcupine River: Aggregate sample at Old Crow)	CRE-28N-07	50

Chum Collection

Location	Funding Source	Estimated # Samples Collected
Fishing Branch River	DFO A-based	200
Porcupine River: Aggregate sample at Old Crow)	CRE-27-07	50