Nulato River Chinook Genetic Collection

R&M# 37-12

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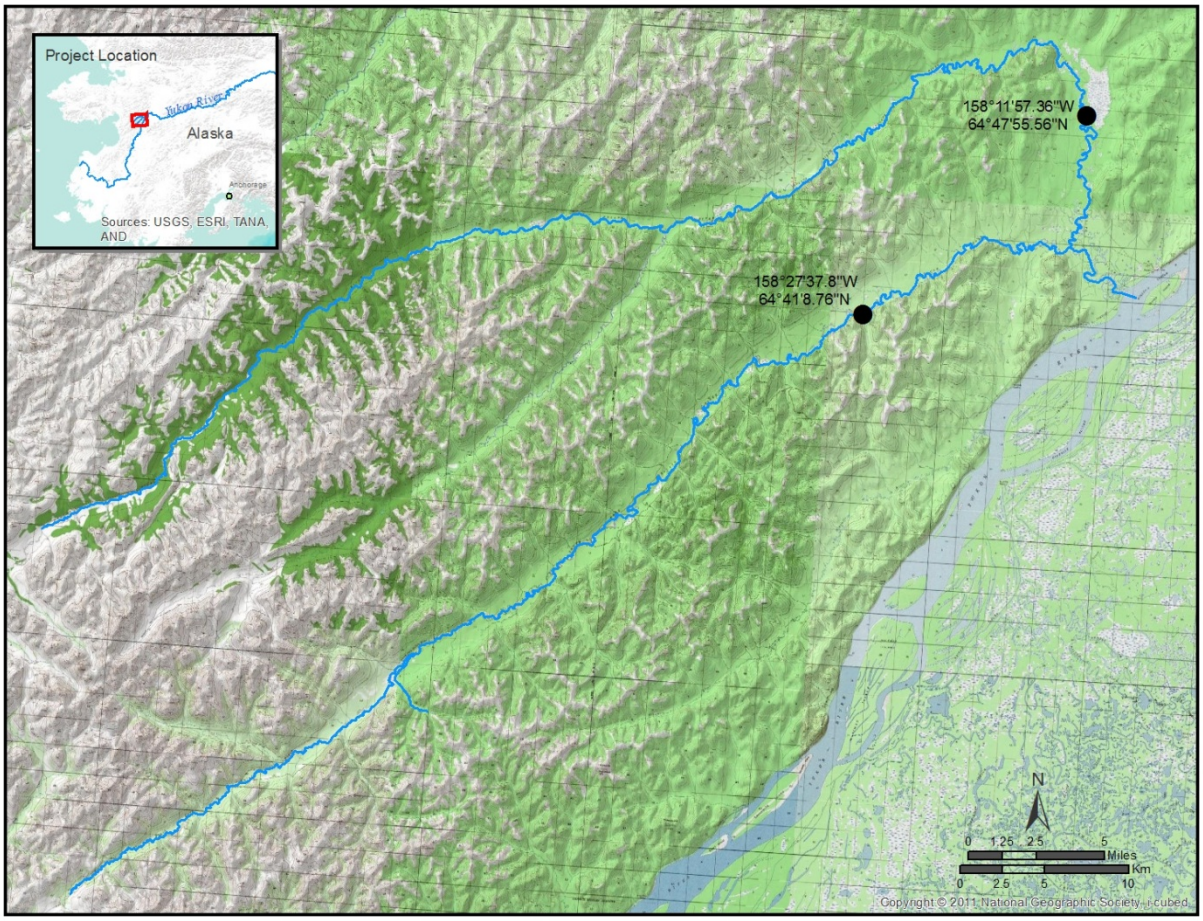
Introduction: **:** The Nulato River is a very productive system for Chinook salmon, which contribute to the subsistence and commercial fisheries harvest in the Yukon River drainage. The Nulato River has been documented, with tower counts, to have large escapements of Chinook salmon (as high as 4,766). In a tagging study 1.7% (2003) and1.5% (2004), of the tagged Chinook salmon returned to the Nulato River compared to 1.1% for both years at the Tozitna River (Eiler et al. 2006). An aerial based Chinook salmon Sustainable Escapement Goal (SEG) was set for both forks of the Nulato River in 2001 (800 for the North and 500 for the South) and then combined and converted into a range of 940-1,900 in 2005. However, no genetic samples have been taken from the Nulato River Chinook salmon spawning population to incorporate into the genetic baseline for the Yukon River. Chum salmon tissue samples from the Nulato River are well represented so are not included in this proposal. The United States and Canada Yukon River Joint Technical Committee (JTC) has provided a list of prioritized streams from which tissues are needed to fill data gaps in the Yukon River genetic baseline and the Nulato River was rated as one of the highest priorities from which to collect samples. These genetic collections will help establish the baseline for genetic analysis to better describe salmon harvests and relative contributions of individual stocks. A thorough genetic baseline will help conserve salmon stocks and help achieve the goals of ADF&G's sustainable salmon and escapement goal policies.

Summary:
Collecting samples from this population will aid in the identification of genetic stocks of Chinook salmon where knowledge of their migration patterns will be vital to improve stock specific estimates at the mouth of the Yukon River. Analyzing this stock will help fill in the current knowledge gap. In addition to GSI sample collections, age, sex, and length (ASL) data was collected. This project used local hires for transportation to the sample sites and to aid the PI in collection of samples. All samples were sent to ADF&G Gene Conservation Lab and ADF&G ageing lab for analysis.

Objectives:
The objective of this study was to collect a maximum of 200 biopsy samples from Chinook salmon, *Oncorhynchus tshawytscha,* in the Nulato River to add to the genetic stock identification (GSI) baseline database of the Yukon River Fishery. This objective specifically relates to R&M Funding priority a) Assess and achieve fishery management objectives, subcategory a) Develop and expand the genetic baseline for Yukon salmon stocks.

Study Area:



The Nulato River mouth is located just downstream from the community of Nulato on the Yukon River. It is approximately 480 river miles from the mouth of the Yukon River. The Nulato River is highlighted in this diagram showing both the North Fork and the South Fork. The GPS points are the farthest upstream locations that the boat traveled in both forks.

Licenses and Permits: A permit for the collection of Chinook salmon genetics on the Yukon River and its tributaries was issued to Nick Decovich at ADF&G Gene Conservation Lab and included the PI, Paige Drobny.

Methods:

Operation:
We arrived in Galena on August 5 and were transported to the Nulato River with a locally hired jet boat. Sampling commenced on August 5 and ended on August 9, 2012. Collection was done with a rod and reel or dipnet and released live and also from carcasses. Upon capture fish were immediately processed. Biopsy samples approximately 9 mm (1/3 inch) in length were taken from the axillary process of each adult Chinook salmon and preserved in 100 % ethanol alcohol. Samples were sent to the ADF&G Gene Conservation Laboratory for single nucleotide polymorphism (SNP) analysis. ASL data was also collected. Between three and five scales were

taken from the preferred region (left side and two rows above the lateral line on a diagonal from the posterior insertion of the dorsal fin to the anterior of the anal fin) of each fish and sent to ADF&G aging lab for age analysis. The sex of each fish was determined using external morphological characteristics and the length from the mid-eye to the fork of the caudal fin of each fish was measured and recorded.

Results: A total of 66 Chinook salmon were sampled for age, sex, length and genetic tissue on the Nulato River. The majority of fish were captured by rod and reel (48 fish), while only 15 carcasses were sampled and three fish were captured with a dipnet. Females accounted for 36.4% of Chinook salmon captured. Females had an average length of 816.4 mm and male average length was 710.6 mm. Ages and genetic tissues will be analyzed by ADF&G labs and published separately. Raw data is included in Appendix A.

Discussion: The collection of Chinook salmon genetics in tributaries of the Yukon River is important for the management of this fishery. Each tributary presents a different set of difficulties in catching and collecting this important information. The Nulato River is relatively easy to access given its proximity to Nulato village but the river itself is fraught with several features that make it difficult to navigate. A few short miles upriver, the Nulato River breaks into two forks. Each fork is, in places, narrow and tightly winding and littered with large debris and logjams. The water was low and dropped while we were there, preventing us from heading up the South fork the last day. The North fork had a large log jam that had to be sawed out and then we were eventually turned around when the stream separated into many shallow channels and the jet boat could not go up any of them.

The 2012 Chinook salmon return was also very low and late. We consulted with ADF&G biologist Mike Parker, who did an aerial survey of the river in late July and received GPS points of areas with groups of Chinook salmon. The North fork prevented us from going to the areas that were found via aerial surveys though we did find fish below the area that the aerial survey did not find. The majority of the fish that were captured by this project were still in great condition, bright red, and had not yet spawned (Figure 1). The aerial survey had seen fish in a poorer quality state so the fish captured in this project may have moved in after the aerial survey was completed and were spawning in a lower part of the river.

Figure 1. Photo of a bright red Chinook salmon caught by rod and reel in the Nulato River, Alaska, 2012.

Most of the fish that were sampled were caught by rod and reel. Despite the fact that the aerial survey saw lots of fish in a poor state, only about a quarter of the fish we sampled were carcasses. The swift moving water, combined with the large amount of debris likely hindered the collection of Chinook salmon carcasses. The rod and reel method was the most efficient way to sample fish. However, this method is not without its drawbacks. The larger fish are easier to catch and there were an abundance of very small Chinook salmon that we could see but not catch by this method. This definitely will skew the length and sex ratios. Also, it was hard to gage mortality by capturing fish in this manner. Fishing from an anchored boat in swift water makes holding the fish in the water for revival time difficult. Most of the time we did see the captured fish return to its redd. Despite its drawbacks, rod and reel is an efficient way to sample fish in these difficult to sample locations.

References:

Eiler, J.H., T.R. Spencer, J.J. Pella and M.M. Masuda. 2006. Stock composition, run timing, and movement patterns of Chinook salmon returning to the Yukon River basin in 2003. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-AFSC-163, 104p.

Appendices:

Appendix A: Sample dates, sex and length of Chinook salmon sampled on the Nulato River.

Sample Date	Sex	Length
8/5/12	F	735
8/5/12	M	667
8/5/12	M	645
8/5/12	M	673
8/5/12	M	695
8/5/12	F	840
8/5/12	M	813
8/5/12	F	830
8/5/12	M	679
8/6/12	M	656
8/6/12	M	702
8/6/12	M	618
8/6/12	M	675
8/6/12	M	660
8/6/12	M	741
8/6/12	F	803
8/6/12	M	730
8/6/12	F	875
8/6/12	M	736
8/6/12	F	762
8/6/12	F	850
8/6/12	F	912
8/6/12	F	765
8/6/12	M	632
8/6/12	M	773
8/7/12	F	898
8/7/12	M	805
8/7/12	M	649
8/7/12	F	N/A
8/7/12	M	671
8/7/12	M	791
8/7/12	M	843
8/7/12	F	860
8/7/12	M	758
8/7/12	M	745
8/7/12	M	627
8/7/12	M	770

8/7/12	M	675
8/7/12	M	767
8/7/12	M	556
8/7/12	M	810
8/8/12	M	736
8/8/12	M	670
8/8/12	F	811
8/8/12	M	768
8/8/12	M	686
8/8/12	F	875
8/8/12	M	733
8/8/12	F	826
8/8/12	M	554
8/8/12	M	585
8/8/12	M	820
8/8/12	F	716
8/8/12	F	793
8/8/12	F	860
8/9/12	F	732
8/9/12	F	790
8/9/12	F	801
8/9/12	F	750
8/9/12	M	720
8/9/12	M	775
8/9/12	M	723
8/9/12	F	850
8/9/12	M	673
8/9/12	M	840
8/9/12	F	842