

Ruby Salmon Data Collection Project, 2010

Yukon River Restoration and Enhancement Fund  
Yukon River Panel Project URE-04-10

By:

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## **Abstract**

Management of the Chinook salmon fishery is difficult due to the mixed stocks of salmon, commercial and subsistence fishing, the many tributaries and the vast expanse of the Yukon River. As a result, several controversies and concerns have arisen over time about allocation of the fishery based on the size of salmon runs year to year, the relative stock composition of the run, and the potential decreasing size of this species over time in the Yukon River. The biological sampling objectives of this proposed research are a direct attempt to address these concerns by producing a locally specific data set to be included with other geographical data to evaluate run size and genetic stock identification river-wide. Information such as age, sex, and length (ASL), genetics, run timing, and harvest data are very useful to state and federal managers to reconstruct the salmon runs, assess trends over time and implement management decisions to maintain the resource and meet treaty obligations with Canada. The Tanana Chiefs Conference (TCC), in conjunction with the Ruby Tribal Council (RTC), utilized Subsistence fishermen to collect Chinook salmon samples with the use of 1 fish wheel on the south bank and with the use of set gillnets (north bank and south bank). The Chinook salmon data collection from the subsistence fishery began June 28 and ended July 16. 267 Chinook salmon samples were collected from both the fish wheel and set nets on north and south banks of the Yukon. Genetic fin clips were taken from 260 of the Chinook salmon. Data collection occurred during the subsistence windowed fishing schedule for Yukon River District 4 (Y-4). Data analysis was performed by ADF&G and these data are included in the ADF&G Region III ASL database and are available to the public.

## **Introduction**

Current sampling programs (e.g., Yukon River District 1) are designed to assess Yukon River Chinook salmon (*Oncorhynchus tshawytscha*) harvests by age, sex, length (ASL), and stock composition (via genetic sampling). Data from the Yukon River District 4 subsistence harvest, which includes the communities of Nulato, Galena, and Ruby, can contribute insight into stock-specific harvest estimates. Subsistence harvest samples from Ruby in 2010 will add to the ASL and stock composition estimates of the total District 4 harvest. In past years there has been more sampling activity in this region. Typically the nearest commercial harvest samples were used to estimate stock composition. There has been very limited to no commercial fishing for Chinook salmon within the past few years. In some districts the subsistence harvest is generally greater than the commercial

harvest, and gear types used may be different, introducing a potential sampling bias. Further, as subsistence harvests increase compared to other harvests, these samples will become more important to the composite database.

Ruby is located in the Yukon River District 4 (Y-4) and the Chinook salmon subsistence harvest from 2008 was approximately 637 fish which is down from 1,700 fish in 2007. The five year average (2003-2007) Chinook salmon subsistence harvest in Ruby is 1,068 fish and prior to 2003, the five year average (1998-2002) was 1,846 Chinook salmon harvested for subsistence use. The latter is slightly higher because there were no subsistence fishing restrictions from 1995-1999 (B. Busher, 2007, 2009).

In 2008, the District Y-4 (without the Koyukuk River) Chinook salmon subsistence harvest estimate was 10,619 fish (Busher et al., 2009), approximately 28.5% of the total estimated Yukon River subsistence catch for Chinook salmon.

In 2007, ADF&G coordinated a cooperative subsistence sampling data effort with the community of Ruby to take ASL and genetic fin clips from 300 Chinook salmon harvested in Ruby with set gillnets and fish wheels. The Ruby Tribal Council supported and wished to expand on the data collection by also measuring weight and girth on both river banks. Chinook salmon size appears to be decreasing on the Yukon River (Bigler et al., 1996; Hyer and Schleusner, 2005), thus raising concerns in subsistence communities. The 2007 genetic stock identification (GSI) preliminary results show 16% of the Ruby subsistence harvest was of Canadian-origin, compared to approximately 46% Canadian near Nulato (this community utilizes drift nets) located about 100 miles downstream of Ruby (ADF&G, unpublished data). Preliminary age class data was fairly even at, 26% 4-year old, 38% 5-year old, and 36% 6-year old (ADF&G unpublished data).

Preliminary age class data for 2008 is as follows: 6.5% 4-year old, 69.2% 5-year old, 18.7% 6-year old, and 5.6% 7-year old (ADF&G unpublished data). Age data for 2009 is currently unavailable.

## **Objectives**

- 1.) To collect age, sex, length, weight, and girth data as well a genetic tissue samples from subsistence Chinook salmon caught with fishwheels and set nets, the two types of gear used in this area.
- 2.) To better understand stock biology and composition of the Ruby harvest throughout subsistence windows.

## **Methods**

Technicians were hired locally to sample subsistence caught Chinook salmon from both the north and south banks of the Yukon River. Two sites (north and south banks) are needed to alleviate bank orientation discrepancies among salmon stocks in the mixed stock fishery of the Yukon River. Similar to fall chum salmon (*O. keta*), Chinook salmon

bound for Canada are thought to preferentially swim on the north bank of the river, while Tanana River stocks are generally caught on the south bank (Scribner et al., 1998).

Chinook salmon were sampled as soon as possible after capture. Three scales were removed from the “preferred area” on the left side of the fish, approximately two rows above the lateral line. Scales were mounted on pre-printed gum cards. Age will be estimated from all collected fish by examining scale annuli at the ADF&G aging laboratory (Bales, 2007).

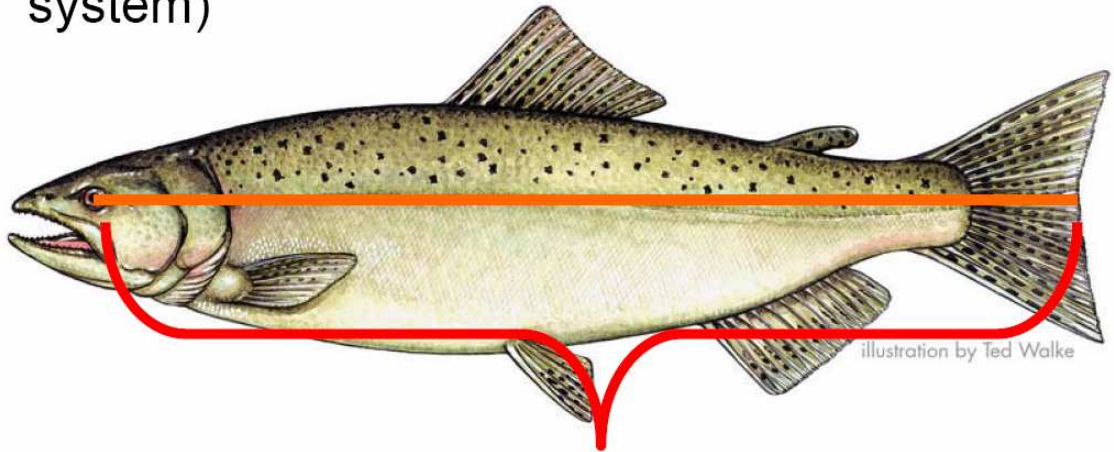
Length was measured to the nearest 5mm from mid-eye to fork of the tail (Figure 1) and tip of snout to fork of tail (Figure 2). Girth was measured to the nearest 5mm using a QM2000™ circumference measuring tape. Girth is measured anterior of the dorsal fin in an approximate right angle to the lateral line of the salmon (Figure 1). Girth was measured while fish were suspended from a weighing scale hook. Weight was measured by free suspension of the fish from a scale hook and recorded to the nearest 0.5 oz. Sex was determined by external morphological characteristics or internal examination of gonads. A maximum of 30 fish per day was sampled during entire subsistence harvest for scales and morphometric data. Sample collection over the course of the entire run was essential as the proportion of Canadian fish contributing to certain pulses may vary with time and ensures random sampling of all Chinook salmon populations migrating up the river. In addition, sampling crews collected heads from all fish with a clipped adipose fin, which presumably contain a coded-wire-tag from the Whitehorse hatchery in Canada. Tag recovery forms will be completed for all fish checked for adipose fin clips.

The axillary process (located at the upper anterior base of the pelvic fin) was clipped from each fish (up to 250 samples over the course of the run) and placed in individually labeled vials filled with 95% ethanol. Samples were shipped to ADF&G’s Gene Conservation Laboratory and will be genotyped for at least 26 SNP loci. Stock composition estimates will then be generated.

All morphometric data, scale samples, and genetic tissue collections were matched to associated data, such as sampling date, specific location etc. and recorded in Rite-in-Rain binders. Data and samples were submitted to ADF&G at the end of Chinook salmon run.

## Measuring the Length of the Chinook (mid-eye to fork of tail)

- Measure to the nearest 5 millimeters (the metric system)

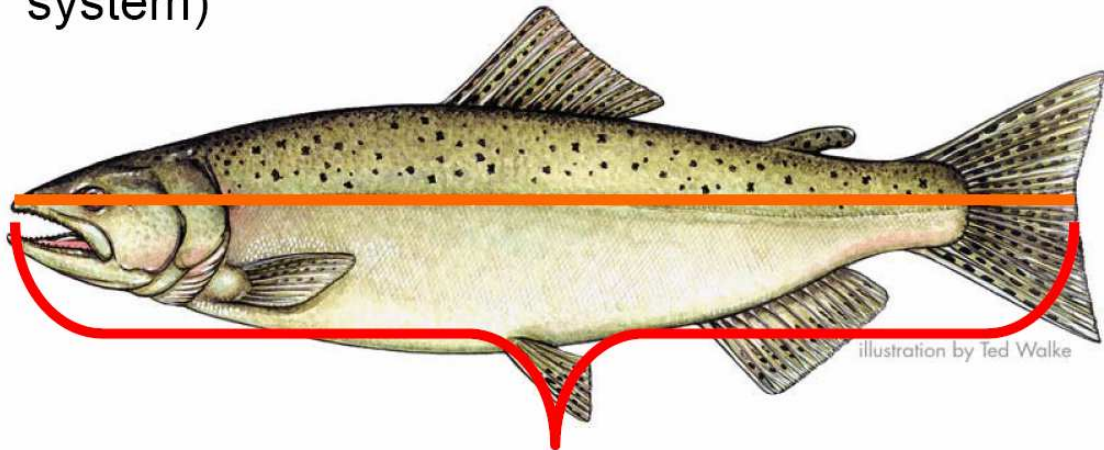


Length from mid-eye to fork of tail

**Figure 1.** Diagram of a Chinook salmon showing the location of mid-eye to fork of tail measurements (orange line).

## Measuring the Length of the Chinook (tip of snout to fork of tail)

- Measure to the nearest 5 millimeters (the metric system)

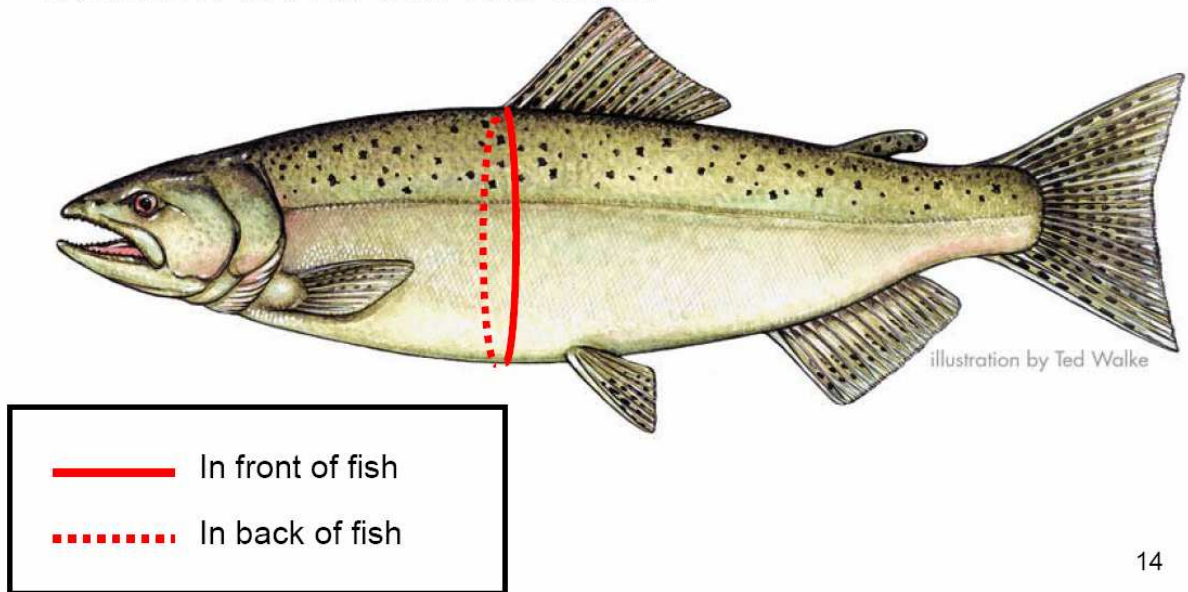


Length from tip of snout to fork of tail

**Figure 2.** Diagram of a Chinook salmon showing the location of tip of snout to fork of tail (orange line) measurements.

# Measuring the girth (circumference) of the Chinook salmon

- Measure to the nearest 5 millimeters (the metric system) along the red lines



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**Figure 3.** Diagram of a Chinook salmon showing the location of girth (red line) measurements.

## Results and Discussion

The first data were recorded on June 28 with eight Chinook salmon caught by the south bank fish wheel and ten caught from a 6-inch set gillnet also from the south bank. The total Chinook salmon sample size collected for the North bank was 49, all were caught from a set gillnet, utilizing various mesh sizes, from Big Eddy (located approximately twenty miles above Ruby). The total Chinook salmon sample size collected from the South Bank was 218, which consisted of 83 from the fishwheel and 135 from the set net. The last Chinook salmon data were collected on July 16.

The sample size goal of  $n=250$  was obtained. A total of 267 ASL samples were collected but only 260 genetic fin clips were taken.

The genetic fin clip samples were shipped to the ADF&G on September 15. The scale cards were sent October 6. The ADF&G is still in the process of analyzing the genetic fin clips. The ADF&G will send the analyzed data back to Tanana Chiefs Conference when completed.



The 2010 genetic stock identification (GSI) preliminary results are not ready. Of the 265 scales taken only 155 fish were aged. Only the fish with complete paired data were aged and the rest of the scales were not aged due to regeneration which is a condition that renders accurately aging the scales very difficult. Preliminary age class data consists of the following age class percentages: 25.8% 4-year old, 58.7% 5-year old, and 11.6% 6-year old, and 3.8% 7-year old (ADF&G unpublished data).

### **Acknowledgements**

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