2012 Yukon River Chinook Salmon Subsistence Sampling: (HCR, RBY, FYU)

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Abstract

The Yukon River is home to many native village communities which depend on subsistence harvest for their livelihood. This research project sampled the subsistence-harvest from the communities of Holy Cross, Anvik, Galena, Ruby and Fort Yukon on the Yukon River. This project focused on the Chinook salmon *(Oncorhynchus tshawytscha*) for biological information, scale samples and genetic tissue. The research data collected will serve to better understand the stock biology and composition of salmon that are harvested in these communities. The age-sex-length (ASL) and genetic data from this research project will help to rebuild the Canadian origin of the Chinook salmon run by determining the proportion of Canadian origin stocks. The Fisheries Biologist contacted the Tribal Councils in the respective communities and asked for their assistance with recruiting local fisherman to collect a sample size of 200, taken in the proportion to the actual harvest for each village. In 2012, nineteen subsistence fishermen/fisherwomen were trained to collect biological samples; 425 samples were obtained and analyzed. Various gear types and mesh sizes were used in each community to harvest the subsistence catch. Because of the poor Chinook salmon return and restrictions in fishing time, no samples were collected in Holy Cross and samples sizes were low (> 100) for Anvik, Galena and Ruby. Fort Yukon exceeded its target sample size with 259 Chinook salmon samples. Providing technical fishery sampling training to subsistence fishers within each of these communities will better facilitate future research within this region and provide local commercial and subsistence users with a meaningful role in the fishery research in the region. ASL and genetic sampling are tools which will continue to provide insight on this valuable resource for years to come.

Key Words: subsistence harvest sampling, Chinook salmon, Yukon River.

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Introduction

For over a decade, the Chinook salmon *(Oncorhynchus tshawytscha)* run on the Yukon River has been a stock of concern and more recently a stock of yield concern (ADF&G, 2013). Due to the conservation concerns for the declining number of Chinook salmon, the commercial harvest has been greatly reduced or nonexistent since the late 1990's (JTC, 2012). Since the late 1970's, subsistence fishers in Alaska and Canada have harvested on average 50,000 Chinook salmon with 58% of the total harvest coming from districts Y3, Y4, and Y5. The subsistence harvest has become the larger, more consistent component of the Yukon River Chinook salmon harvest. However, subsistence fisheries are becoming increasingly restricted as the stock continues to struggle. Providing escapement into the United States and Canada, and allowing for subsistence harvest are the first and second priorities legally backed by the Pacific Salmon Treaty (Pacific 2009). Subsistence harvests have state and federal legal priority over commercial harvests. Data historically collected in the commercial harvest is now absent, increasing the need for subsistence harvest data to appropriately characterize the stock composition of the harvest.

Sustainable salmon management strategy relies heavily on salmon run information (run timing and abundance, age, sex, length, and stock composition) obtained from escapement projects and commercial and subsistence harvests. Both decreased funding for gathering salmon escapement information and downward trends in commercial harvests have put constraints on this crucial information. This project provides critical data and samples adding to the age-sex-length database characterizing the total U.S and Canadian Yukon origin Chinook salmon runs. This in turn, aids in creating the brood year tables. This information is essential to form the basis of the spawner-recruit models used to estimate past and future run productivity as well as setting escapement goals. Because of the variability in Chinook salmon runs, annual monitoring is necessary to update brood tables.

Objective

To representatively collect 200 samples from the subsistence-harvested Chinook salmon in Holy Cross, Ruby and Fort Yukon for age, sex, length, girth, and genetic tissues.

Methods

The project aimed to characterize the annual age, sex, and size of the Chinook salmon subsistence harvest in the US portion of the Yukon River. The grab sample design (Geiger et al., 1990) used by the Lower Kuskokwim ASL sampling program since 2005 (Molyneaux et al., 2010) guided the sample design. This method assumes that large sample sizes collected in the "grab" sample strategy was influenced by the availability of fish and samplers through time and locations. Large sample sizes in a given time period will imply large harvests with many opportunities to collect samples from either the sampler's own harvests or those of others. Samples will therefore be self-weighting by gear, over the time period, and by the area that the participants are harvesting. The assumption is that if participants make consistent search efforts (each day of weekly subsistence periods) more samples will be collected on days when more fish are harvested.

In recent years, the total number of Chinook salmon entering the Yukon River has diminished. Because of this, managers reduced the time subsistence fishers are allowed to fish. An individual

sampler's harvest varies based on many factors: subsistence opening/closure times, abundance and timing of the run and changing household needs. In order to assure that the goal of 200 samples is reached, five to seven subsistence fishers were contracted in each region. In addition, in consultation with ADF&G, Anvik and Galena were added to the sampling project in an effort to try to guarantee that the 200 samples were reached in case of tragedy within a certain village, weather/highwater affecting fishing in a certain area, or poor salmon runs. Spreading out the sampling efforts between subsistence fishers ensures that samples will be representative of the different gear type used in those areas. To ensure that sampling effort is proportional to harvest through time, contracted subsistence fishers are not limited to a sample size. Instead, it was requested that they fully sample every Chinook salmon that is caught for subsistence. They were compensated for every fish sampled, provided quality control measures were met.

Starting in early June, the PI contacted the Tribal Councils in the respective communities and asked for their assistance with recruiting local fisherman to collect samples. A preseason training session was held in each village by the PI to familiarize the fishers with the protocols for sampling. The PI returned to the villages during the beginning of the fishing season to assist the subsistence fishers with sampling and to provide quality control by assuring that sampling methods were being followed accurately. All sampling methods were detailed in a workbook included in each subsistence fishers sampling kit for reference during sampling. Sampling kits included: sampling workbook, notebooks, data sheets, pencils, forceps, scale cards, measure tape, meter stick, ethanol, vials, clippers, squirt bottle and clipboard.

Chinook salmon were sampled from the subsistence catch to characterize the sex ratio, age and length (ASL) of subsistence-caught salmon, as well as to collect genetic tissue for stock of origin estimates. Sampling methods followed routine procedures outlined by the ADF&G protocols (Molyneaux 2010). Samples were taken as soon as possible after fish are caught and prior to or during cutting (processing). Local fishermen were trained to collect three scales from the preferred area above the lateral line on the left side of the fish, which were mounted on pre-printed gum cards for age determination. Length was measured from mid eye to tail fork to the nearest 1 mm. Girth was measured around the fish in front of the dorsal fin to the nearest 1 mm. Sex was visually determined from external morphological characteristics combined with internal examination of the fish during processing. An axillary process fin was clipped from each fish for genetic information. This fin clip was placed in an individually numbered vial filled with ethanol and specifically segregated and identified to individual fish. Data sheets included capture methods, mesh size, location, date, fish number, scale card number and genetic vial numbers, which were recorded according to coordinated protocols with agency partners. Scales were processed and aged by the ADF&G aging lab. Genetic samples were processed and analyzed by the ADF&G Gene Conservation Lab to determine stock of origin. Sampling crews collected heads from all fish with a clipped adipose fin, which may have contained a coded wire tag inserted at the Whitehorse Hatchery in Canada. Tag recovery forms were completed for all fish with clipped adipose fins and heads and data sent to the appropriate location.

Results

This project is primarily a data collection project and serves to bolster the Yukon River Chinook salmon samples to ADF&G for processing, analysis and archiving. Preliminary data is usually included with this report; however, due to the small samples sizes, data from several different

projects is needed to add to the robustness of the data. Final data from this project will be reported in the annual ADF&G reports. The ADF&G reports are still in prep at the writing of this report.

Samples were collected from the villages of Anvik, Galena, Ruby and Fort Yukon (Figure 1). Twenty one households from five communities were recruited and trained for this project to sample their subsistence caught Chinook salmon for ASL, girth and genetic tissue for the 2012 season. Eleven of those twenty one households from four communities were successful in harvesting and sampling fish for a total of 425 samples (Table 1). This low number of participants and low sample size is due to the low return of Chinook salmon and increased fishing regulations. No samples were collected from the fishermen in Holy Cross due to restrictions in time allotted to fish and restrictions in mesh size.

The number of samples obtained per sampler ranged from 1-147 with an average of 36 Chinook salmon sampled. There were 409 samples sent to ADF&G for ageing and 276 (63%) were able to be aged (Kyle Schumann, ADF&G, personal communication). Regeneration and absorption were the most common reason for these scales to be unreadable. Tissue samples were of excellent quality with 406 out of the 422 samples (96%) used for genetic analysis (Nick Decovich, ADF&G, personal communication).

Various gear types and mesh sizes were used in each community to harvest the subsistence catch (Table 2). Fishers were restricted from using mesh larger than 7.5 inches on the Yukon River, per regulations set by the Board of Fisheries and Federal Subsistence Board. Most of the fish sampled in Anvik, Galena and Ruby were caught with the 7.5” mesh net while in Fort Yukon, all of the fish were caught with a fishwheel.

Discussion

A record low number of Chinook salmon that was projected to enter the Yukon River this year had managers imposing restrictions on fishing time before the salmon entered the river. The first pulse of Chinook salmon that enter the Yukon River are generally comprised of more than half Canadian bound fish. Due to the escapement goals and the Treaty in place, reaching the Canadian escapement goals was a top priority. Managers opted to eliminate the chance for Alaskan subsistence fishers to fish on the first pulse of Chinook salmon. In Holy Cross, further restrictions to 6” maximum mesh size eliminated the fishers that were recruited for this study because they did not have this type of gear. These actions had the desired effect in reducing the number of Chinook salmon that were harvested for subsistence use, however this also reduced the number of samples that were available for this study. Fort Yukon sampled more fish than in years past, likely due to the timing of the closure for the first pulse, where fishermen were actually catching fish before the closure was in place.

Due to the restrictions that were put in place this year, the number of samplers was very small. This is a concern for the project having representative samples. The project has a certain number of samples that they can pay for. This amount must be weighed against the number of people that are recruited to sample so that the project gets the necessary samples while staying within the constraints of the budget. This is a difficult balance. This project would benefit by having

monies available in the case of ‘oversampling’ in an effort to ensure that the required amount of samples are achieved.

Sample quality was good for this project. For genetic analysis, only 14 samples were removed from the data set and only 3 of these were due to human error. Age determination from collected scales are the most difficult to obtain. The majority of the scales that were rejected from this sample set were due to regeneration and absorption. More scales are absorbed on fish as they move up the river and start to decompose. This was observed by the larger amount of absorbed scales in the Fort Yukon samples. More time is needed to spend with the samplers in the future to educate them on the sample quality while actually sampling fish.

Results from the data collection seem to be a representative sample of ASL and genetic stock composition from District 3, 4 and 5. From these data, and other data collected throughout the years by TCC, Yukon area managers have a better idea of Chinook salmon run timing, size of Chinook salmon, and stock of origin. Providing technical fishery sampling training to subsistence fishers within each of these communities will better facilitate future research within this region and provide local commercial and subsistence users with a meaningful role in the fishery research in the region. ASL and genetic sampling are tools which will continue to provide insight on this valuable resource for years to come.

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Table 1: Number of samplers in each community along with sample sizes.

Village	# of People Trained	# of People who Sampled	Sample size
Holy Cross	5	0	0
Anvik	5	3	80
Galena	4	2	46
Ruby	2	2	46
Fort Yukon	3	3	253
	19	10	425

Table 2: Fishing gear and sample sizes in each village.

Village	Gear	Sample Size
Anvik	Drift Gillnet 6"	8
Anvik	Drift Gillnet 7.5"	10
Anvik	Set Gillnet 6"	12
Anvik	Set Gillnet 7.5"	50
Galena	Set Gillnet 6"	1
Galena	Set Gillnet 7.5"	29
Ruby	Set Gillnet 5.5"	6
Ruby	Set Gillnet 6"	1
Ruby	Set Gillnet 7.5"	39
Fort Yukon	Fishwheel	253

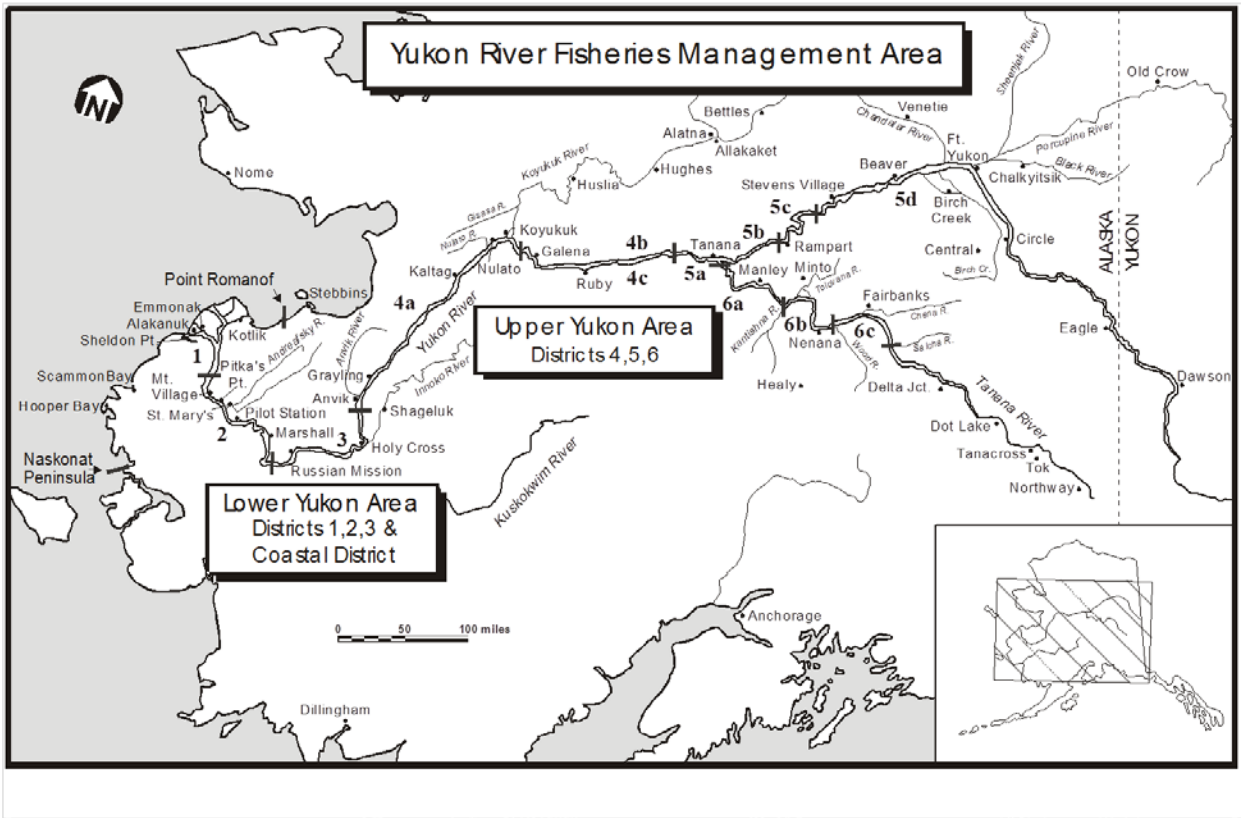

Figure 1: Map of the Yukon River Fisheries Management area with fishing districts shown.

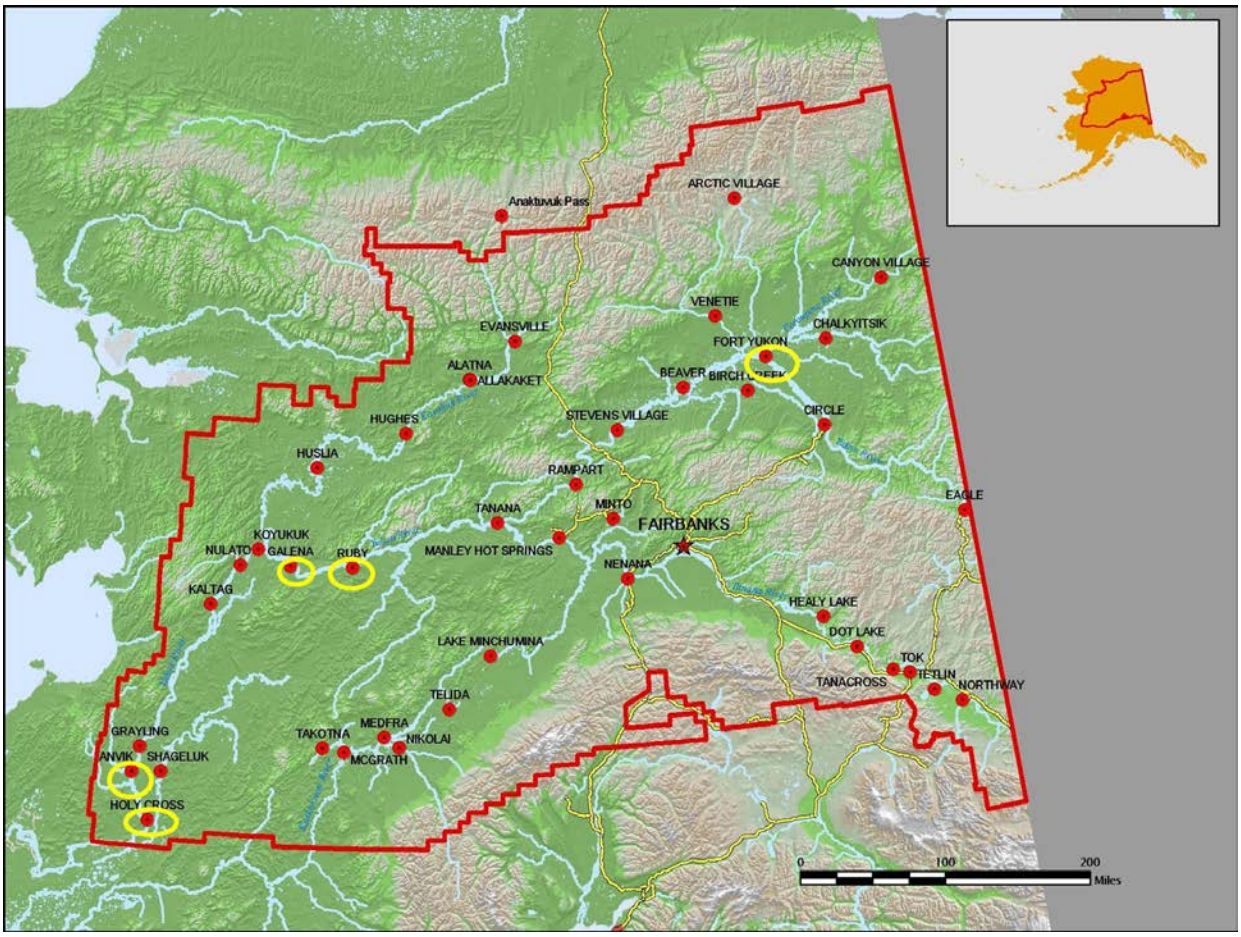

Figure 2: A map of the Tanana Chiefs Conference area outlined in red with the villages that had recruited fishermen for subsistence harvest sampling circled in yellow.