2014 Yukon River Chinook Salmon Subsistence Sampling: (Anvik, Galena, Ruby, Fort Yukon)

Yukon River Panel
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Abstract

The Yukon River is home to many native communities which depend on subsistence harvest for their livelihood. This research project aimed to sample the subsistence-harvest from the communities of Anvik, Galena, Ruby and Fort Yukon on the Yukon River. This project focused on 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 2014 preseason projection for the Chinook salmon run was poor. The PI contacted all subsistence samplers that had previously helped out with this project and had shown an excellence in obtaining samples. Thirteen returning subsistence fishermen agreed to collect biological samples should fishing be allowed. Because of the poor Chinook salmon return, no subsistence fishing was allowed along the entire length of the Yukon River. Two samplers were successful in sampling and 118 samples were obtained and analyzed with 4 samples coming from Galena from confiscated fish and 114 samples from Fort Yukon from an ADF&G approved test fishery. Male and female Chinook salmon caught in Fort Yukon were primarily age 5 (1.3) and the samples were 36.2% female. All fish sampled from Fort Yukon were caught with a set net, 6” or less. The three fish aged from Galena were all age 6 (1.4) with 2 males and 1 female sampled. Providing technical fishery sampling training to subsistence fishers within each of these communities will better facilitate future research within this region and provide local subsistence users with a meaningful role in the fishery research in the region. The data generated from this project 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 and harvest pressure, annual monitoring is necessary to update brood tables.

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

Table of Contents

Page

List of Tables

Page

List of Figures

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, although subsistence fisheries are becoming increasingly restricted as the stock continues to struggle. Subsistence harvests have state and federal legal priority over commercial harvests. Data historically collected in the commercial harvest is now absent such that subsistence harvest data are needed to appropriately characterize the stock composition of the harvest. Additionally, the subsistence harvest in these districts can be comprised of a large proportion of Canadian-origin Chinook salmon (35% in Y4 in 2012 and 61-95% in Y5 in 2012), though the proportion varies from year to year (e.g. from 30% to 39% in Galena, years 2008-2012) (*S. Schmidt, ADF&G, personal communication*).

Sustainable salmon management strategy relies heavily on salmon run information (run timing and abundance, age, sex, length, and stock composition) obtained from escapements 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 will provide critical data and samples, adding to the age-sex-length database characterizing the Canadian-origin Chinook salmon run, in turn aiding 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 and harvest pressure, annual monitoring is necessary to update brood tables.

This project also directly involves subsistence user participation. This public involvement directly addresses the 2014 Restoration & Enhancement "Near Term Priorities" under the Stewardship Category, Management Category 12: Involve and educate users and non-users in communities to increase their capacity to maintain and protect salmon stocks and habitat (Priority ranking 1). Under the Stewardship Category, this project directly addresses the management need to "build community capacity through community education and hands-on training". In the 2013 subsistence sampling project 5 communities were included, 24 fisherman were trained how to sample and 8 fisherman provided ASL and genetic samples.

Objective

The objective of this project is to representatively collect 200 samples from the subsistence-harvested Chinook salmon in Anvik, Galena, Ruby and Fort Yukon for age, sex, length, 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 and Wilbur, 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. 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. This project was funded prior to the announcement that subsistence fishing would be closed for the duration of the Chinook salmon run unless the run came back stronger than anticipated. The approach to this project changed in light of this information. The PI did not travel to the communities to train the subsistence fishers, but instead sent sampling kits to outstanding samplers from previous years (thirteen samplers; five in Anvik, three in Galena, two in Ruby and three in Fort Yukon) with a sampling booklet included in their kit to remind them of the correct sampling methods. This was done to ensure that this project was still in place to collect this valuable information if the opportunity arose. All samplers were compensated for every fish sampled, provided quality control measures were met. Sampling kits included: sampling workbook, notebooks, data sheets, pencils, forceps, scale cards, measure tape, meter stick, ethanol, vials, clippers, squirt bottle and clipboard. Every fish caught for subsistence by the contracted fishermen was fully sampled.

Chinook salmon were sampled from the subsistence catch to characterize the age, sex ratio 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. Samplers 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

Sampling kits were sent to thirteen returning fisherman who have been working on this project since its inception in 2009 between the four communities. Samples were collected from the villages of Galena and Fort Yukon by two samplers (Figure 1). A total of 118 samples were collected (Table 1). There were four fish sampled in Galena which were confiscated from an illegal harvest and given to the Elder center and sampled by their cook. There were 114 fish sampled in Fort Yukon, which was the result of ADF&G allowing a short windowed test fishery that allowed the community to share in a few fish. No samples were collected from the fishermen in Anvik or Ruby due to restrictions.

There were 105 (92%) samples that were able to be aged from Fort Yukon and three (75%) from Galena. Male and female Chinook salmon caught in Fort Yukon were primarily age 5 (1.3) and the samples were 36.2% female. Males had a length range of 393-975 mm and females from 346-907mm. Both males and females ages ranged between age 3 (1.1) and age 6 (1.4). All fish sampled from Fort Yukon were caught with a set net 6” or less. The three fish aged from Galena were all age 6 (1.4) with 2 males and 1 female sampled. The method of capture is unknown. The genetic tissue samples were of excellent quality with all of the 114 samples from Fort Yukon used for genetic analysis. Preliminary results show the sample to be mostly (~95%) Canadian fish. Galena samples were not analyzed due to the low sample size.

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. 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.

Discussion

The 2014 Chinook salmon run was the lowest on record and as such, subsistence fishing was completely shut down. The preseason projection was for no subsistence fishing so this project scaled back to save money while also having sampling kits in place in case the run came in stronger than the projection and fishing restrictions were relaxed. The low number of participants and low sample size reflects this change. Despite the preseason projection, this project continued to build upon its years of community capacity building and bridging the gap between managers and the subsistence fishers. The importance of having sampling equipment and subsistence

fishers in place and ready to sample at a moment's notice is invaluable. While the target number of samples was not obtained for any district, the fact that any samples were obtained is a direct result of all the previous years' work and dedication of its subsistence fishers.

Sample quality was good for this project. Despite the PI not doing an in person training session preseason, the samples were still of high quality. The two people that collected samples this year have been doing this for many years. Having that consistency in samplers in imperative in years like this so that when the opportunity arises like it did, there are people along the river that are ready to take samples.

The use of this data is still extremely important for fisheries managers. From these data, and other data collected throughout the years by the PI and Tanana Chiefs Conference, Yukon area managers have a better idea of Chinook salmon run timing, size of Chinook salmon, and stock of origin. This also gives the managers feedback on whether management actions had the desired effect or not. 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. The data generated from this project 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 and harvest pressure, annual monitoring is necessary to update brood tables.

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Table 1: Fort Yukon and Galena, Chinook salmon subsistence harvest age and sex composition and mean length (mm), 2014 (courtesy of ADF&G).

			Brood Year (Age)																							
			2011		2010		2010		2009		2009		2008		2008		2007		2007		2006		2006			
Sample Dates	Sample		1.1		1.2		2.1		1.3		2.2		1.4		2.3		1.5		2.4		1.6		2.5		Total	
(Stratum Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
7/16- 7/28,	105	Male	6	5.7	22	21.0	0	0.0	33	31.4	0	0.0	5	4.8	1	1.0	0	0.0	0	0.0	0	0.0	0	0.0	67	63.8
(Ft. Yukon)		Female	5	4.8	4	3.8	0	0.0	17	16.2	0	0.0	11	10.5	1	1.0	0	0.0	0	0.0	0	0.0	0	0.0	38	36.2
		Subtotal	11	10.5	26	24.8	0	0.0	50	47.6	0	0.0	16	15.2	2	1.9	0	0.0	0	0.0	0	0.0	0	0.0	105	100.0
		Male Mean Length	422		614		-		705		-		908		665		-		-		-		-			
		SE	7.13		6.27		-		9.44		-		32.14		-		-		-		-		-			
		Range	393-446		566-688		-		615-840		-		792-975		665-665		-		-		-		-			
		n	6		22		-		33		-		5		1		-		-		-		-			
		Female Mean Length	413		588		-		697		-		835		765		-		-		-		-			
		SE	17.27		14.51		-		12.10		-		14.52		-		-		-		-		-			
		Range	346-446		550-620		-		623-795		-		780-907		765-765		-		-		-		-			
		n	5		4		-		17		-		11		1		-		-		-		-			
6/22,	3	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	66.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	66.7
(Galena)		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	33.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	33.3
		Subtotal	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0
		Male Mean Length	-		-		-		-		-		830		-		-		-		-		-			
		SE	-		-		-		-		-		30.00		-		-		-		-		-			
		Range	-		-		-		-		-		800-860		-		-		-		-		-			
		n	-		-		-		-		-		2		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		860		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		860-860		-		-		-		-		-			
		n	-		-		-		-		-		1		-		-		-		-		-			
	108	Male	6	5.6	22	20.4	0	0.0	33	30.6	0	0.0	7	6.5	1	0.9	0	0.0	0	0.0	0	0.0	0	0.0	69	63.9
		Female	5	4.6	4	3.7	0	0.0	17	15.7	0	0.0	12	11.1	1	0.9	0	0.0	0	0.0	0	0.0	0	0.0	39	36.1
Total		Total	11	10.2	26	24.1	0	0.0	50	46.3	0	0.0	19	17.6	2	1.9	0	0.0	0	0.0	0	0.0	0	0.0	108	100.0

Table 1 cont.

All Data		Male Mean Length	422		614		-		705		-		886		665		-		-		-		-		
Combined		SE	7.13		6.27		-		9.44		-		27.27		-		-		-		-		-		
No Stratification		Range	393-446		566-688		-		615-840		-		792-975		665-665		-		-		-		-		
		n	6		22		-		33		-		7		1		-		-		-		-		
		Female Mean Length	413		588		-		697		-		838		765		-		-		-		-		
		SE	17.27		14.51		-		12.10		-		13.41		-		-		-		-		-		
		Range	346-446		550-620		-		623-795		-		780-907		765-765		-		-		-		-		
		n	5		4		-		17		-		12		1		-		-		-		-		
	108	Male	6	5.6	22	20.4	0	0.0	33	30.6	0	0.0	7	6.5	1	0.9	0	0.0	0	0.0	0	0.0	0	0.0	69	63.9
Weighted		Female	5	4.6	4	3.7	0	0.0	17	15.7	0	0.0	12	11.1	1	0.9	0	0.0	0	0.0	0	0.0	0	0.0	39	36.1
Total		Total	11	10.2	26	24.1	0	0.0	50	46.3	0	0.0	19	17.6	2	1.9	0	0.0	0	0.0	0	0.0	0	0.0	108	100.0
		95% C.I. (± %)		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
		Male Mean Length	422		614		-		705		-		886		665		-		-		-		-		
		SE	7.13		6.27		-		9.44		-		24.51		0.00		-		-		-		-		
		Range	393-446		566-688		0-0		615-840		0-0		792-975		665-665		0-0		0-0		0-0		0-0		
		n	6		22		-		33		-		7		1		-		-		-		-		
		Female Mean Length	413		588		-		697		-		838		765		-		-		-		-		
		SE	17.27		14.51		-		12.10		-		13.31		0.00		-		-		-		-		
		Range	346-446		550-620		0-0		623-795		0-0		780-907		765-765		0-0		0-0		0-0		0-0		
		n	5		4		-		17		-		12		1		-		-		-		-		

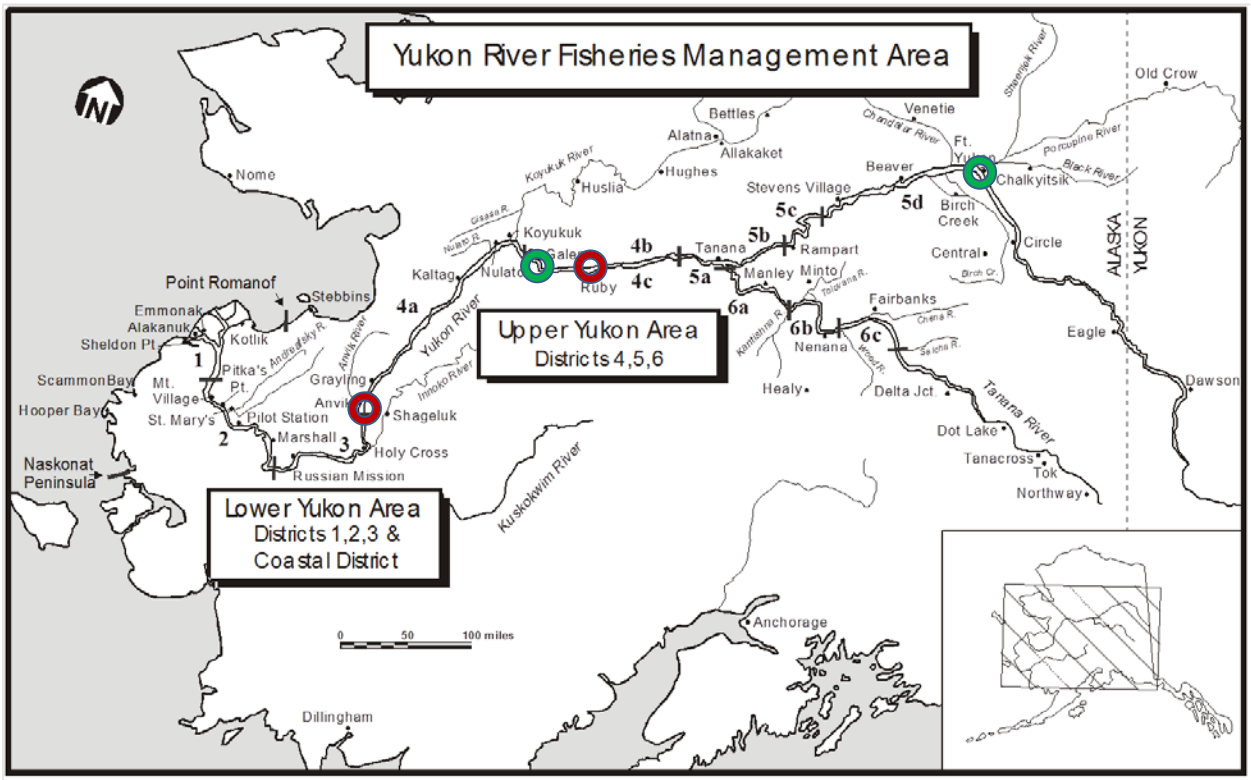

Figure 1: Map of the Yukon River Fisheries Management area with fishing districts shown. Communities involved in this project are circled. Galena and Fort Yukon are circled in green to designate communities where samples were obtained this year.