2011 Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative
Project Final Product[1]

Biological Sampling of Yukon River Salmon

by:

Paige Drobny
Tanana Chiefs Conference
122 1st Avenue
Fairbanks, AK 99709

and

Chris Stark
Bering Sea Fishermen's Association
110 W.15th Avenue, Unit A
Anchorage, AK 99501

May 2011

1 *Final products of AYK Sustainable Salmon Initiative-sponsored research are made available to the Initiatives Partners and the public in the interest of rapid dissemination of information that may be useful in salmon management, research, or administration. Sponsorship of the project by the AYK SSI does not necessarily imply that the findings or conclusions are endorsed by the AYK SSI.*

Abstract

The Toklat River has seen chum salmon escapement numbers as high as 158,000 with an average of 31,243 but has seen a decline in recent years. This project was a continuation of this long term monitoring project recently vacated by Alaska Department of Fish and Game (ADF&G). Total chum salmon, *Oncorhynchus keta*, counts were 1652 in 2008, 2350 in 2009 and 3554 in 2010. Age, sex and length (ASL) samples were collected in 2009 only. Monitoring on this spawning site needs to continue as well as expand to areas closer to the mouth where some salmon have been spotted to determine if spawning grounds have changed in recent years.

The Nenana River coho study is one of the two long term Yukon coho salmon monitoring projects. A primary goal for this project has been to gather enough information on Nenana River coho salmon escapement such that a biological escapement goal (BEG) can be established for coho salmon.

For the past decade, the Chinook salmon (*Oncorhynchus tshawytsch)* run on the Yukon River has been a stock of yield concern (Howard et al., 2009). Chinook harvest data, which has been historically collected in the commercial harvest, is now diminished or absent. Because of this, data describing the subsistence harvest are needed to appropriately characterize the harvest (historically subsistence harvest data was not a priority due to the ease and volume of commercial harvest data collections). For this project, subsistence fishers were hired and instructed on how to collect biological samples from the Chinook salmon that they caught. The villages that sampled Chinook salmon in 2009 were Nulato, Galena, mainstem Yukon River above Hess Creek and Fort Yukon and in 2010, Holy Cross, Anvik, Bishop Mountain and Tanana were added to the 2009 communities that were sampled. In 2009, 25 subsistence fishers from four communities on the Yukon River were hired to sample their entire catch of Chinook salmon for ASL, girth and genetic information and 1283 samples were obtained and analyzed. In 2010, 2754 Chinook salmon samples were collected by 26 subsistence fishers in eight communities along the Yukon River. It is crucial that sampling continues in order to monitor changes in the structure of the run amidst changing regulations.

Key Words: Toklat River, chum salmon, Nenana River, Chatanika River, coho salmon, Yukon River, Chinook salmon, subsistence harvest sampling.

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Introduction

Toklat surveys

Monitoring the chum salmon, *Oncorhynchus keta,* spawning grounds on the Toklat River has been a long term chum salmon survey project since 1974 (JTC, 2011). Escapement estimates on the Toklat have been as high as 158,000 with an average of 31,243 (JTC, 2011). In the past, this monitoring project has been managed by Alaska Department of Fish and Game (ADF&G), but has been recently vacated due to funding shortfalls. Recent low escapement numbers highlighted the need to continue monitoring this once highly productive spawning site for chum salmon.

Nenana surveys

The project's goal has been to gather enough escapement information on Nenana River coho and fall chum salmon such that an escapement goal can be established for coho salmon. Surveys have been conducted alternately by ADF&G, TCC and BSFA since 1993 (ADF&G, 1999). Though an escapement goal has not been formulated for the Nenana coho salmon to date, it was agreed during the most recent escapement goal review by ADF&G, that during the next escapement goal review process (starting in 2012) a Nenana River coho salmon escapement goal would be given formal review by ADF&G staff.

Subsistence harvest sampling of Chinook salmon

For the past decade, the Chinook salmon run on the Yukon River has been a stock of yield concern (Howard et al., 2009). Due to the conservation concerns for the declining number of salmon, the commercial harvest has been greatly reduced or nonexistent since the late 1990's, prior to which commercial catches averaged greater than 100,000 Chinook salmon per year (JTC, 2011). Since the late 1970's, subsistence fishers have, on average, harvested about 50,000 Chinook salmon, less during weaker runs. Due to declines in the commercial harvest, the subsistence harvest has become the larger, more consistent and sometimes only component of the Yukon River Chinook salmon harvest; however, subsistence fisheries are becoming increasingly restricted as stocks continue to struggle. Subsistence harvests have state and Federal legal priority over commercial harvests. Data historically collected in the commercial harvest is now diminished or absent such that subsistence harvest data are needed to appropriately characterize the harvest (historically subsistence harvest data was not a priority due to the ease and volume of commercial harvest data collections).

Sustainable salmon management strategy relies heavily on salmon stock information (run timing and strength, age, sex, length, and genetics) obtained from commercial and subsistence harvests. Both decreased funding for gathering salmon escapement information and downward trends in commercial harvests have put constraints on and led to the inability to collect this crucial

information. The Tanana Chiefs Conference (TCC) will continue to work with and employ local Yukon resident fishers to collect subsistence Chinook salmon harvest samples in the Yukon River. This project will provide opportunities to involve subsistence users in information collection and management of their fisheries whereby building capacity.

Objectives

1. Continue Toklat River fall chum salmon escapement ASL data collections.
2. Continue Nenana River coho salmon escapement surveys and ASL collections.
3. Sample subsistence harvests of Chinook salmon from the Yukon River drainage in the communities of Nulato, Galena, mainstem Yukon River above Hess Creek, Fort Yukon, and Eagle to characterize the ASL of subsistence-caught salmon, as well as to collect genetic tissue for stock of origin estimates.

   This objective was successful in sampling Nulato, Galena, mainstem Yukon River above Hess Creek and Fort Yukon. Eagle was not sampled with this project due to another project that sampled the subsistence harvest for disease while also collecting ASL information. We assisted in the data collection in Eagle and had access to the ASL information for data comparison but that data is not included in this report.
4. Collect genetic samples from Chinook, chum, and coho salmon from Koyukuk River and Tanana River drainages.

   In conjunction with ADF&G, planning was performed each year to collect genetic samples on a couple of tributaries. However, due primarily to low returns for Chinook salmon and a lack of time and funding, no genetic samples were collected from either chum or Chinook salmon.

Methods

Objective 1

In order to address objective one, escapements and ASL were monitored for fall chum in the Toklat River from 2008-2010. A total of 150 chum salmon were sampled for ASL. Coho salmon in the study area were also enumerated. Run timing of chum salmon was monitored on the mainstem of the Yukon River in conjunction with previous year's escapement timing to determine when the salmon will reach the study area. Once it was determined the fish were in the Toklat River, aerial surveys were performed with an R-44 helicopter to enumerate chum and coho salmon and to determine peak spawning time at which point a foot survey would commence. Aerial surveys flew all channels in the traditional survey area and there were two surveyors (Figure 1). The counts from the two surveyors were averaged for each channel and reported.

The foot survey followed all of the channels in the traditional survey area. Live and carcass chum and coho salmon were counted separately by at least two individual surveyors. The reported number is an average of the surveyors' counts. Age, length and sex were determined from chum salmon carcasses in the main channel on the Toklat River. A minimum of five vertebrae from each fish were removed from carcass fish and sent to ADF&G for aging.

Objective 2

The Nenana River coho salmon stock monitoring project's primary task has been to estimate the adult coho salmon returning to spawn in seven spring creeks, all tributaries to the Nenana River which flows into the Tanana River 80km (50 miles south of Fairbanks, AK) 160km (100 miles) above its Yukon River confluence. These surveyed coho spawning streams are all the known and documented coho spawning tributaries to the Nenana River. The survey streams are small, primarily spring feed, clear and reasonable accessible. The eight Nenana River tributaries monitored are Julius Creek main-stem, Wood Creek, Clear Creek, Glacier Creek, Seventeen-mile Slough (Otter Creek), Teklanika Tributary (Old Main Nenana), Lignite Creek, and June Creek. These streams likely represent greater than 95% of the total number of Coho in the Nenana River basin. The remaining 5% are very small (10's of fish) stocks which may spawn in tributaries to the Teklanika River which joins the Nenana a dozen kilometers above the Nenana-Tanana confluence.

The general study design is similar to those used in previous TCC and BSFA Nenana River salmon surveys (Headlee 1997; VanHatten 1998a, VanHatten 1998b). Field surveys, early (late September), mid (early October), and late (mid-October) of Otter, Julius and Lignite Creeks were used to document the status of the run timing, relative numbers in specific locations. When the run is in, most all the coho are holding very near the spawning reaches. Total counts were completed when field survey information indicated that most all coho salmon were on/near coho spawning redds/reaches. Visual counts of adult salmon in Nenana River tributaries were made from boats, helicopter and/or on foot. Otter, Julius, Glacier, Wood and Clear Creeks' salmon counts were usually conducted from a helicopter. Lignite Creek, June Creek (both near Healy) and early surveys were foot or boat surveys. When total counts were made all streams were surveyed from their Nenana River confluence upstream to a point where adult fish passage is blocked (usually by beaver dams). All highest survey counts are considered total escapement counts within the index stream for that year.

Data collection included number of coho salmon and chum salmon adults sighted, date, and specific location within each stream, yielding run timing, strength, and species composition information. Ground surveys also provided the opportunity to gather age, sex and length (ASL) samples from captured fish and carcasses. Angling gear and nets were used to capture a portion of the live adult coho population to gather ASL data (few carcasses are generally available due to predation and late season ice conditions).

When ground surveys indicated that most of the run had entered spawning streams, aerial surveys were employed. Aerial surveys of larger tributaries were conducted using a Robertson 44 helicopter owned and operated by Quicksilver Air of Fairbanks. A typical survey of all index streams took about 3-4 hours, round trip from Fairbanks. Global Positioning System (GPS) was used to locate and map holding and spawning areas. A digital video was taken of all large schools for later analysis and verification of counts. For the past decade, one aerial survey per year was enough to successfully fulfill the aerial counting component because of knowledge about run timing learned from previous years and in-season ground survey information. Local knowledge (guides, sport fishermen), agency fisheries reports and remote information (stream flow gauges) provided some real time information as well.

Information and summary estimates are provided to ADF&G, Commercial Fisheries Division and subsequently reported in the Annual Management Reports, Yukon Area. ADF&G processed the scale samples.

Chatanika River salmon foot surveys have undertaken every year since 1999 by BSFA staff and sporadically over the years by ADFG staff (Habitat and Sport fish divisions). Minnow traps baited with salmon eggs, dip nets and snorkeling techniques have all been employed as the situation demanded to assess presence or absence of juvenile fish. Total stream survey distance varies annually depending on water level which determines fish access to stream habitat. Generally surveys covered 20km of stream bed, beginning at the upper most extent of accessible stream habitat. These in-stream foot surveys and minnow trapping efforts are intended to monitor the salmon (juvenile rearing and adult spawning activity) habitat use of areas upstream the Davidson ditch diversion dam which was removed in 2001, thus allowing salmon access to the area. Juvenile and adult salmon had not been noted or documented above the dam prior to the summer of 2002.

All surveys in all years were undertaken by the Chris Stark, fisheries biologist for BSFA accompanied on occasion by technicians for ASL collections and training.

Objective 3

Chinook salmon ASL information and genetic samples were collected by local subsistence fishers recruited from the communities of Nulato, Galena, mainstem Yukon River above Hess Creek and Fort Yukon in 2009 (Figure 2). In 2010, Holy Cross, Anvik, Bishop Mountain and Tanana were added to the 2009 communities that were sampled. Sampling was done by contracted subsistence fishermen trained by the PI. All Chinook salmon that were caught for subsistence by the contracted fisherman was fully sampled.

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

sampling 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, ethanol, vials, clippers, squirt bottle and clipboard.

ASL & Genetic Sampling Procedures

Sampling methods followed routine procedures outlined by ADF&G protocols (DuBois and Molyneaux 2000). Samples were collected 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 was mounted on pre-printed gum cards. Length was measured from mid eye to tail fork to the nearest 5mm. Girth was measured around the fish in front of the dorsal fin. Sex was visually determined from external morphological characteristics combined with internal examination of the gonads during processing.

An axillary process fin was clipped from each fish and placed in individually numbered vials filled with genetic grade ethanol and specifically segregated and linked to individual fish. Sampling crews collected heads from all fish with a clipped adipose fin, which may contain 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. Data sheets included capture methods, mesh size, location, date, fish number, scale card number and genetic vial numbers were recorded according to coordinated protocols with agency partners (Appendix 1). 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.

Sample Design

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 2010) guided our 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 in 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.

Results

Objective 1

Annual and progress reports have been filed with the funding agency every year. The results are reported to ADFG and presented at relevant fisheries meetings concerning Yukon River chum and coho salmon. These reports describe, in tabular, graphic and written detail include sampling dates, all field and lab data and summaries.

Chum salmon and coho salmon were enumerated in the Toklat River study area from 2008-2010. An aerial survey was performed on the Toklat River survey area on October 16, 2008. A total of 825 chum and 20 coho were seen on October 16, 2008. The foot survey and vertebrae sampling was conducted from October 21-24, 2008. A total of 1589 live chum slmon and 63 chum carcasses were counted along with 201 live coho salmon and 0 coho carcass (Table 1). Due to the lack of carcasses, no vertebrae samples were taken in 2008.

On October 20, 2009, an aerial survey of the Toklat River study area was completed. A total of 648 live chum salmon and 29 live coho salmon were counted. The foot survey was performed November 6-8, 2009. Live chum salmon totaled 1556 and chum salmon carcasses numbered 794 in the survey area (Table 3). Coho salmon counts totaled 137 for live coho and no coho carcasses were observed. Vertebrae were collected from 150 chum salmon on the mainstem of the Toklat River with 40% of the salmon sampled being female (Table 4). The lengths ranged from 480 mm to 655 mm. The average length for males was 573.2 mm and the average length for females was 552.5 mm. The ages ranged from three to seven years old with the 4 year olds being the most represented age class at 62.6%. The three year old and five year olds age classes were next representing 14% and 16% respectively.

In 2010, ADF&G staff performed the Toklat River chum salmon aerial survey on October 31 under TCC supervision and budget. Live chum salmon numbered 2968 and 586 chum carcasses were counted throughout the survey area (Table 3). 84 coho salmon were counted and 7 coho carcasses were found. Vertebrae were attempted to be collected at the same time but due to scavenging of carcasses, no vertebrae samples were taken and no subsequent foot survey was performed.

Objective 2

Annual and progress reports have been filed with the funding agency every year. The results are reported to ADF&G and presented at relevant fisheries meetings concerning Yukon River coho salmon. These reports describe, in tabular, graphic and written detail include sampling dates, all field and lab data and summaries.

Aerial surveys have been flown in an R-44 helicopter in October-November to enumerate Coho escapement in Otter, Julius, Wood, Clear, and Glacier Creeks, Seventeen Mile Slough and the old Nenana River portion of the Teklanika River. These surveys yielded a combined Coho salmon escapement which can then be compared to the historic average escapements (data from 1993 to the present) (Skaugstad, 1994). The foot and aerial surveys have been undertaken in the same fashion and by the same surveyor for the past decade. In general, the Nenana coho escapement has remained fairly stable and mirrored the estimated the returns to the Yukon (at Pilot Station sonar) as well as the only other coho escapement monitoring site in the Yukon, the Delta Clearwater (Table 5).

Chatanika River salmon survey was undertaken every year since 1999. These surveys have positively confirmed the presence juvenile rearing salmon upstream of the Davidson ditch dam site. No salmon juveniles or adults had been noted prior to dam removal and no adults have been noted above the dam either. Juvenile Chinook salmon were located a maximum of 10km upstream of the former Davidson ditch dam site, in the mainstem. Numerous juveniles have also been caught in several sites above and below the dam site. Juveniles have been found above the dam site in all years since the dam was removed, except in 2009, when no juveniles were found upstream of the dam, despite extensive surveys and trapping efforts

Objective 3

In 2009, 25 subsistence fishers from four communities on the Yukon River were hired to sample their entire catch of Chinook salmon for ASL, girth and genetic information and 1,283 samples were obtained and analyzed. In 2010, 2,754 Chinook salmon samples were collected by 26 subsistence fishers in eight communities along the Yukon River (Table 6). The villages that sampled Chinook salmon in 2009 were Nulato, Galena, mainstem Yukon River above Hess Creek and Fort Yukon and in 2010, Holy Cross, Anvik, Bishop Mountain and Tanana were added to the 2009 communities that were sampled. Several different gear types were used in each community (Table 7).

Average length and girth measurements for all females and males sampled showed a decrease as distance increased from the mouth of the Yukon River (Length: Figure 3, Table 8; Girth: Figure 4, Table 9). On average, females were larger than males in both length and girth for both years sampled. The 2009 fish sampled were larger than the 2010 fish sampled in each community. Percentage of females that were caught also decreased as the distance from the mouth of the Yukon River increased (Figure 5). There was a larger percentage of females captured in 2009 than in 2010 (Figure 5). In 2009, all female Chinook salmon and the male Chinook salmon sampled closer to the mouth of the Yukon River were primarily age 1.4. But as distance increased from the mouth of the river, ages decreased in males with Fort Yukon male Chinook salmon being approximately 30% age 1.2, and 1.3 and about 20% age 1.4 (Figure 6). In 2010, female ages were still primarily age 1.4 but there was a larger percentage of age 1.3 females then

in 2009 (Figure 7). The 2010 males were primarily age 1.3 with a larger percentage of age 1.2 males as distance increased from the mouth of the Yukon River. Overall, the fish caught in 2009 were older than those captured in 2010.

All of the 2009 genetic samples collected were analyzed. Nulato and Galena had a large percentage of Middle Yukon fish and the majority of the mainstem Yukon above Hess Creek and Fort Yukon were Canadian bound Chinook salmon. Only a fraction of the 2010 samples were analyzed due to a decrease in funds for sampling by the ADF&G Gene Conservation Lab. Canadian bound Chinook salmon made up approximately 50% of the samples from Holy Cross, Nulato, Bishop Mountain and Galena. Fort Yukon genetic samples were 90% Canadian bound. More US origin fish were caught in 2009 than in 2010 (Figure 8).

Discussion

Objective 1

The Toklat River chum salmon escapement has been monitored since 1974. They have seen escapement numbers as high as 158,000 with an average of 31,243 (JTC, 2011). The escapement of Toklat River chum salmon has seen a drastic reduction in recent years (this survey). This reduction coincided with a large earthquake in the interior of Alaska in 2002. The earthquake could have changed the location or the quantity of the freshwater springs supplied to this area making it a less productive area for chum salmon. There is some evidence that there are chum salmon spawning lower in the Toklat River system but this has not been well documented or further researched. The escapement goal for the Toklat River system was 15,000- 33,000. However, this goal was removed in 2010 due to the inability to get a full assessment of the population. More research needs to be done on the Toklat River as a whole to determine the amount of available spawning habitat, to locate new spawning areas and to continue monitoring the traditional survey area for escapement of chum salmon.

Objective 2

Nenana River coho salmon escapement estimates have been made every year since 1974. Estimates of coho salmon escapement into Lost Slough, locally called Otter Creek, have been made in all but two years since 1974. Lost Slough is home to the most numerous (wild) spawning group, averaging approximately 3,000 per year. Abundance estimates were done from boat, on foot, or from a fixed wing aircraft or helicopter by Stark. Age, sex and length collections have been taken every year since 2000 as part of this continuing effort. The scales have been read and the data is archived at ADF&G. Complete surveys and run composition estimates were successfully completed in each of those years fulfilling the objective of this project. Spawning ground locations were recorded using GPS locations and were subsequently recorded and reported to ADF&G. No change in spawning locations was noted.

The project's goal has been to gather enough information on Nenana River coho and fall chum salmon escapement such that a biological escapement goal (BEG) can be established for coho salmon. The chum counts are generally small and sporadic thus not likely goal candidates. Though an escapement goal has not been formulated for the Nenana coho salmon to date, it was agreed during the most recent escapement goal review by ADF&G that during the next escapement goal review process (starting in 2012) that a Nenana River coho salmon escapement goal would be given formal review by ADF&G staff.

Removal of the Davidson ditch diversion dam, which previously blocked salmon passage, has allowed salmon access to approximately 40 km of stream habitat in the upper Chatanika River basin as confirmed by these projects findings. It was anticipated that adult chum and Chinook salmon would spawn above the dam site but have not been documented to date. Connecting this salmon habitat to the rest of the Chatanika river salmon habitat will help in maintaining a viable salmon ecosystem in the Chatanika River Basin.

Objective 3

This project successfully collected subsistence harvested Chinook salmon samples by teaching the community harvesters how to sample for age, sex, length, girth and genetic material. The capacity building portion of this project went beyond expectation as the samples collected in 2009 were exceptional. In 2010, because of the success in the previous year, the project was expanded to include more communities. All of the communities welcomed this sampling program and there was great community participation and response to the presentation of results from the previous year.

There are many different types of gear used on the Yukon River for catching Chinook salmon. The type of gear and mesh size used varies widely from the mouth of the river to the Canadian border. The lower Yukon River subsistence fishers generally use large mesh, 8" or greater, set gill nets or drift gill nets. In the upper Yukon River subsistence fishers use more fishwheels and set gill nets of any mesh size, 6" or greater. Gear selectively harvests a certain size range of fishes, with the larger mesh sizes catches larger, girthier fish, while and small mesh set gill nets and fishwheels may catch smaller fish (Howard and Evenson, 2010). The data from this study suggests that there is an overall decrease in size, in both length and girth, a decrease in the number of females harvested and a decrease in the age of Chinook salmon as the distance increases from the mouth of the Yukon River. This could be a byproduct of the different types of gear used or it could be an accurate reflection of the run and how it changes as the distance increase away from the mouth. More in depth statistical analysis needs to be done to determine the true relationships but this was beyond the scope of this project.

When comparing the same communities between years, differences in the runs can be seen. The 2009 run saw larger, older fish, more abundant females and more U.S. bound fish than 2010. The larger size may be explained by the more abundant age six fish dominating this run. The larger

harvest of U.S. fish in 2009 may be due to the management actions that were taken in 2009. The run was projected to be poor and meeting the escapement goal into Canada was the top priority. Two subsistence windowed periods were pulled in each fishing district in order to reduce the amount of fish taken in the U.S. subsistence fishery. This was done on the first pulse of fish in the river which are largely Canadian bound fish. So the subsistence fishery was executed on the second and third pulses which typically have less Canadian fish.

The Chinook salmon runs on the Yukon River have been decreasing for a number of years. Without any commercial harvest on which to sample to characterize the run, the subsistence harvest is vitally important to the monitoring of this valuable resource. With recent changes to maximum mesh size for gillnets in the Yukon River, this studies data set will be the only data set with which to compare to determine changes to the subsistence catch due to the restrictions. Continuation of this monitoring project is essential for future management decisions and to continue to observe the changes in the structure of the runs.

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Deliverables

- Semiannual progress reports
- Final report
- All samples and data sent to ADF&G for archiving and storage
- Presentation of previous years' results at the beginning of the fishing season to all villages that participated in this study
- Successfully trained 32 subsistence fishers on proper protocols for sampling salmon
- Presentation of project results at American Fisheries Society, Alaska Chapter November 2010 Juneau, AK
- Informal presentations at state and Federal meetings

Acknowledgements

This project was funded by the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative. I would like to thank the subsistence fishers on the Yukon River who participated in this study. Their dedication to the project and attention to detail made this project successful. I would also like to thank Lisa Kangas (TCC), Brandy Baker (TCC) and Mike Parker (ADF&G) who lent a helping hand at various times throughout the project.

Press Release

The Toklat River has seen chum salmon escapement numbers as high as 158,000 until recent years. This project was a continuation of this long term monitoring project recently vacated by Alaska Department of Fish and Game (ADF&G). Total chum salmon, *Oncorhynchus keta*, counts were 1652 in 2008, 2350 in 2009 and 3554 in 2010. Age, sex and length (ASL) samples were collected in 2009 only. Monitoring on this spawning site needs to continue as well as expand to areas closer to the mouth where some salmon have been spotted to determine if spawning grounds have changed in recent years.

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For the past decade, the Chinook salmon (*Oncorhynchus tshawytsch)* run on the Yukon River has been a stock of yield concern (Howard et al., 2009). Data, which has been historically collected in the commercial harvest, is now diminished or absent. Because of this, data describing the subsistence harvest are needed to appropriately characterize the harvest (historically subsistence harvest data was not a priority due to the ease and volume of commercial harvest data collections). For this project, subsistence fishers were hired and instructed on how to collect biological samples from the Chinook salmon that they caught. The villages that sampled Chinook salmon in 2009 were Nulato, Galena, mainstem Yukon River above Hess Creek and Fort Yukon and in 2010, Holy Cross, Anvik, Bishop Mountain and Tanana were added to the 2009 communities that were sampled. In 2009, 25 subsistence fishers from four communities on the Yukon River were hired to sample their entire catch of Chinook salmon for ASL, girth and genetic information and 1283 samples were obtained and analyzed. In 2010, 2754 Chinook salmon samples were collected by 26 subsistence fishers in eight communities along the Yukon River. It is crucial that sampling continues in order to monitor changes in the structure of the run amidst changing regulations.

Table 1: 2008 Toklat River foot survey data.

Latitude (North)	Longitude (West)	Month - Day - Year	Stream/River Name	Drainage
64° 27 15	150° 18 45	10/22/2008	Toklat River	Kantishna, Tanana, Yukon

Index Areas	Live Kings	King Carcass	King Redds	Live Chum	Chum Carcass	Live Pink	Pink Carcass	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
Total				1589	63					201	0
101				193	25						
102				445	11					2	0
103				494	11					4	0
104				457	16					195	0
105				0	0					0	0
106				0	0					0	0

Observer (Initials)	Survey Method	Wind	Weather	Water	Visibility	Bottom	Time	Distance Surveyed	Spawn Stage	Rating	Observing Agency
PD, BB	9	1	4	2	2	1	2		2	2	TCC

101 = Main channel and braids

102 = Sushana River

103 = Eastern Flood plain slough (Slough on east side of Wolf Island)

104 = Geiger Creek ~1/4 mile upstream and mouth vicinity

105 = Wolf Slough

106 = Western flood plain slough

A - Y - K SALMON ESCAPEMENT OBSERVATIONS

Description of Survey Codes

Method	
F - Float Equipped	10- Counting Tower

Wind
1 - No affect on counting

1 - PA-18 Super Cub	11- Weir
2 - C-185	12- Sonar
3 - C-180	13- Population Estimate
4 - Helio Courier	14- Personal Interview
5 - Maule	15- Literature Review
6 - Other fixed wing	16- Test Fishing
7 - Helicopter	17-Swimming or Snorkeling
8 - Boat	
9 - Foot	

2 - Slight adverse affects on counting from riffles or turbulence
3 - Moderate adverse affects on counting from riffles or turbulence
4 - Extreme adverse affects on counting from riffles or turbulence

Weather
1 - Clear
2 - Scattered (60% Cloud Cover)
3 - Broken (60% to 90% Cloud Cover)
4 - Overcast (100% Overcast)

Water
1 - Clear, no turbidity or stain affecting counts
2 - Slightly turbid or stained, bottom visible in most areas, deeper pools obscured
3 - Moderately turbid or stained; bottom visible only in gravel bars and shallow areas
4 - Extremely turbid or stained with fish counts not acceptable

Time
1 - No adverse affect on survey
2 - Slight affect on survey
3 - Moderate affect on survey
4 - Extreme affect on survey

Visibility
1 - Good
2 - Fair, fish slightly obscured by glare, shadows, timber, etc.
3 - Poor, fish moderately obscured by glare, shadows, timber, etc.
4 - Unacceptable, fish extremely obscured by elements

Spawning Stage
1 - Before peak spawning
2 - At peak spawning
3 - After peak spawning

Bottom
1 - No adverse affect on survey
2 - Slight adverse affect on survey
3 - Moderate adverse affect on survey
4 - Extreme adverse affect on survey

Rating
1 - Good
2 - Fair
3 - Poor
4 - Incomplete
5 - Survey too early
6 - Survey too late

Table 2: 2009 Toklat River foot survey data.

A -Y - K SALMON ESCAPEMENT OBSERVATIONS

Latitude (North)	Longitude (West)	Month - Day - Year	Stream/River Name	Drainage
64.45445	-150.31139	11/6-8/09	Toklat River	Kantishna, Tanana, Yukon

Index Areas	Live Kings	King Carcass	King Redds	Live Chum	Chum Carcass	Live Pink	Pink Carcass	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
Total				1556	794					137	0
101				764	240					0	0
102				41	15					0	0
103				282	276					18	0
104				202	50					77	0
105				51	14					1	0
106				0	0					0	0
107				38	28					41	0
108				162	168					0	0
109				16	3					0	0

Observer (Initials)	Survey Method	Wind	Weather	Water	Visibility	Bottom	Time	Distance Surveyed	Spawn Stage	Rating	Observing Agency
PD,BB,LK	9	1	3	2	2	1	1		3	2	TCC

101 =	Main channel and braids	Observers:	Paige Drobny
102 =	Sushana River		Brandy Baker
103 =	Eastern Flood plain slough (Slough on east side of Wolf Island)		Lisa Kangas
104 =	Geiger Creek ~1/4 mile upstream and mouth vicinity		
105 =	Wolf Slough		
106 =	Western flood plain slough		
107 =	Mallard Slough		
108 =	Lollipop slough		

109 = Roadhouse Slough

A - Y - K SALMON ESCAPEMENT OBSERVATIONS

Description of Survey Codes

Method	
F - Float Equipped	10- Counting Tower
1 - PA-18 Super Cub	11- Weir
2 - C-185	12- Sonar
3 - C-180	13- Population Estimate
4 - Helio Courier	14- Personal Interview
5 - Maule	15- Literature Review
6 - Other fixed wing	16- Test Fishing
7 - Helicopter	17-Swimming or Snorkeling
8 - Boat	
9 - Foot	

Wind
1 - No affect on counting
2 - Slight adverse affects on counting from riffles or turbulence
3 - Moderate adverse affects on counting from riffles or turbulence
4 - Extreme adverse affects on counting from riffles or turbulence

Weather
1 - Clear
2 - Scattered (60% Cloud Cover)
3 - Broken (60% to 90% Cloud Cover)
4 - Overcast (100% Overcast)

Water
1 - Clear, no turbidity or stain affecting counts
2 - Slightly turbid or stained, bottom visible in most areas, deeper pools obscured
3 - Moderately turbid or stained; bottom visible only in gravel bars and shallow areas
4 - Extremely turbid or stained with fish counts not acceptable

Time
1 - No adverse affect on survey
2 - Slight affect on survey
3 - Moderate affect on survey
4 - Extreme affect on survey

Visibility
1 - Good
2 - Fair, fish slightly obscured by glare, shadows, timber, etc.
3 - Poor, fish moderately obscured by glare, shadows, timber, etc.
4 - Unacceptable, fish extremely obscured by elements

Spawning Stage
1 - Before peak spawning
2 - At peak spawning
3 - After peak spawning

Rating
1 - Good

Bottom

1 - No adverse affect on survey
2 - Slight adverse affect on survey
3 - Moderate adverse affect on survey
4 - Extreme adverse affect on survey

2 - Fair
3 - Poor
4 - Incomplete
5 - Survey too early
6 - Survey too late

Notes
Mark 0 for a particular count ONLY if that species was actively looked for. Otherwise, leave blank. In most cases, you will record the predetermined lat/long for that stream on the survey form. In the event of an new stream or tributary, record the lat/long in *degrees/minutes* format i.e. 65º 14.42

Table 3: 2010 Toklat River aerial survey data.

A -Y - K SALMON ESCAPEMENT OBSERVATIONS

Latitude (North)	Longitude (West)	Month - Day - Year	Stream/River Name	Drainage
64.45445	-150.31139	10/31/2010	Toklat River	Kantishna, Tanana, Yukon

Index Areas	Live Kings	King Carcass	King Redds	Live Chum	Chum Carcass	Live Pink	Pink Carcass	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
Total				2968	586					84	7
101				343	36					3	0
102				766	23					0	0
103				0	0					0	0
104				966	181					0	0
105				300	212					78	7
106				228	10					3	0
107				365	124					0	0

Observer (Initials)	Survey Method	Wind	Weather	Water	Visibility	Bottom	Time	Distance Surveyed	Spawn Stage	Rating	Observing Agency
MJP	7	1	1	2	2	1	1		1	1	ADF&G

101 =	Main channel and braids downstream of traditional survey area (below Lollipop Slough)	Observers: Mike Parker
102 =	Mainstem downstream of Sushana River (East and West Floodplains)	Rick Swisher (pilot R-44)
103 =	Mainstem upstream of Sushana River	
104 =	Mouth of Geiger Creek and vicinity (includes Lollipop and Mallard Sloughs)	
105 =	Geiger Creek	
106 =	Wolf Slough	
107 =	Sushana River	

Survey counts started downstream of traditional survey area at 64° 16.02 N ,150° 08.384 W due to low fog on spring area.

Began looking for signs of salmon at the 'old' recovery camp in order to find areas reported to have active spawning in recent years.

A - Y - K SALMON ESCAPEMENT OBSERVATIONS

Description of Survey Codes

Method	
F - Float Equipped	10- Counting Tower
1 - PA-18 Super Cub	11- Weir
2 - C-185	12- Sonar
3 - C-180	13- Population Estimate
4 - Helio Courier	14- Personal Interview
5 - Maule	15- Literature Review
6 - Other fixed wing	16- Test Fishing
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9 - Foot	

Wind
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3 - Moderate adverse affects on counting from riffles or turbulence
4 - Extreme adverse affects on counting from riffles or turbulence

Weather
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3 - After peak spawning

Bottom
1 - No adverse affect on survey
2 - Slight adverse affect on survey
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Rating
1 - Good
2 - Fair
3 - Poor
4 - Incomplete

4 - Extreme adverse affect on survey

5 - Survey too early

6 - Survey too late

Notes
Mark 0 for a particular count ONLY if that species was actively looked for. Otherwise, leave blank.
In most cases, you will record the predetermined lat/long for that stream on the survey form.
In the event of an new stream or tributary, record the lat/long in *degrees/minutes* format i.e. 65º 14.42

Table 4: 2009 age, sex and length data from Toklat River chum salmon. Sex ID: Males 1; Females 2 (courtesy of ADF&G).

Sample Date	fishNum	sexID	length	ageFresh	ageSalt	Total Age
11/07/09	1	2	520	0	3	4
11/07/09	2	1	580	0	3	4
11/07/09	3	1	515	0	2	3
11/07/09	4	1	655	0	4	5
11/07/09	5	1	545	0	3	4
11/07/09	6	2	570	0	3	4
11/07/09	7	2	555	0	3	4
11/07/09	8	2	555	0	3	4
11/07/09	9	1	590	0	2	3
11/07/09	10	2	530	0	3	4
11/07/09	11	2	525	0	2	3
11/07/09	12	1	600	0	3	4
11/07/09	13	2	565	0	3	4
11/07/09	14	2	540	0	3	4
11/07/09	15	1	520	0	2	3
11/07/09	16	2	570	0	3	4
11/07/09	17	2	580	0	3	4
11/07/09	18	2	545	0	4	5
11/07/09	19	1	580	0	3	4
11/07/09	20	2	585	0	4	5
11/07/09	21	2	575	0	3	4
11/07/09	22	2	570	0	3	4
11/07/09	23	2	565	0	5	6
11/07/09	24	2	545	0	4	5
11/07/09	25	2	540	0	2	3
11/07/09	26	2	560	0	3	4
11/07/09	27	2	525	0	2	3
11/07/09	28	2	590	0	4	5
11/07/09	29	2	585	0	4	5
11/07/09	30	2	575	0	3	4
11/07/09	31	1	610	0	3	4
11/07/09	32	2	535	0	5	6
11/07/09	33	2	600	0	3	4
11/07/09	34	1	640	0	3	4
11/07/09	35	2	525	0	3	4
11/07/09	36	1	520	0	2	3
11/07/09	37	2	555	0	4	5
11/07/09	38	2	575	0	3	4
11/07/09	39	2	565	0	3	4
11/07/09	40	1	585	0	3	4
11/07/09	41	2	560	0	3	4
11/07/09	42	2	530	0	3	4
11/07/09	43	2	570	0	3	4
11/07/09	44	1	580	0	4	5
11/07/09	45	2	530	0	3	4

11/07/09	46	2	605	0	3	4
11/07/09	47	1	595	0	3	4
11/07/09	48	1	600	0	3	4
11/07/09	49	2	580	0	3	4
11/07/09	50	2	555	0	3	4
11/07/09	51	1	565	0	3	4
11/07/09	52	2	590	0	4	5
11/07/09	53	2	510	0	3	4
11/07/09	54	1	575	0	3	4
11/07/09	55	2	525	0	3	4
11/07/09	56	2	540	0	3	4
11/07/09	57	2	610	0	3	4
11/07/09	58	1	555	0	3	4
11/07/09	59	2	550	0	3	4
11/07/09	60	1	580	0	5	6
11/07/09	61	1	570	0	4	5
11/07/09	62	2	580	0	4	5
11/07/09	63	1	590	0	3	4
11/07/09	64	1	520	0	5	6
11/07/09	65	1	560	0	3	4
11/07/09	66	2	520	0	3	4
11/07/09	67	1	605	0	4	5
11/07/09	68	2	530	0	2	3
11/07/09	69	2	560	0	6	7
11/07/09	70	2	540	0	3	4
11/07/09	71	1	540	0	3	4
11/07/09	72	2	540	0	3	4
11/07/09	73	2	520	0	3	4
11/07/09	74	1	560	0	4	5
11/07/09	75	1	570	0	3	4
11/07/09	76	1	560	0	2	3
11/07/09	77	2	510	0	2	3
11/07/09	78	2	540	0	3	4
11/07/09	79	1	580	0	4	5
11/07/09	80	2	530	0	3	4
11/07/09	81	2	480	0	3	4
11/07/09	82	1	630	0	4	5
11/07/09	83	2	570	0	3	4
11/07/09	84	2	525	0	5	6
11/07/09	85	2	540	0	3	4
11/07/09	86	1	490	0	3	4
11/07/09	87	2	490	0	2	3
11/07/09	88	1	560	0	3	4
11/07/09	89	2	590	0	3	4
11/07/09	90	2	550	0	5	6
11/07/09	91	1	565	0	5	6
11/07/09	92	1	535	0	2	3
11/07/09	93	2	515	0	3	4
11/07/09	94	2	560	0	3	4
11/07/09	95	1	580	0	3	4

11/07/09	96	1	600	0	3	4
11/07/09	97	1	605	0	5	6
11/07/09	98	1	595	0	3	4
11/07/09	99	1	545	0	3	4
11/07/09	100	1	580	0	3	4
11/07/09	101	1	520	0	2	3
11/07/09	102	1	540	0	3	4
11/07/09	103	2	525	0	3	4
11/07/09	104	1	565	0	3	4
11/07/09	105	2	565	0	4	5
11/07/09	106	1	560	0	3	4
11/07/09	107	2	595	0	3	4
11/07/09	108	2	530	0	3	4
11/07/09	109	2	570	0	4	5
11/07/09	110	1	555	0	2	3
11/07/09	111	2	595	0	3	4
11/07/09	112	2	535	0	3	4
11/07/09	113	2	560	0	3	4
11/07/09	114	1	570	0	3	4
11/07/09	115	1	640	0	4	5
11/07/09	116	2	540	0	3	4
11/07/09	117	1	590	0	5	6
11/07/09	118	1	570	0	3	4
11/07/09	119	1	560	0	3	4
11/07/09	120	2	585	0	3	4
11/08/09	121	2	565	0	2	3
11/08/09	122	1	545	0	3	4
11/08/09	123	2	570	0	2	3
11/08/09	124	2	550	0	2	3
11/08/09	125	2	505	0	3	4
11/08/09	126	2	560	0	3	4
11/08/09	127	1	580	0	4	5
11/08/09	128	2	540	0	3	4
11/08/09	129	2	520	0	3	4
11/08/09	130	2	530	0	3	4
11/08/09	131	1	590	0	3	4
11/08/09	132	2	515	0	2	3
11/08/09	133	2	540	0	2	3
11/08/09	134	1	600	0	4	5
11/08/09	135	1	595	0	4	5
11/08/09	136	2	580	0	3	4
11/08/09	137	1	645	0	4	5
11/08/09	138	2	560	0	3	4
11/08/09	139	2	650	0	3	4
11/08/09	140	1	530	0	2	3
11/08/09	141	1	555	0	3	4
11/08/09	142	2	560	0	3	4
11/08/09	143	2	580	0	3	4
11/08/09	144	2	540	0	3	4
11/08/09	145	2	560	0	3	4

11/08/09	146	1	580	0	3	4
11/08/09	147	2	570	0	4	5
11/08/09	148	2	540	0	2	3
11/08/09	149	1	570	0	6	7
11/08/09	150	2	520	0	4	5

Table 5. 2008-2010 Nenana River Coho salmon surveys.

Surveyed Stream	2008	2009	2010
Lost Slough	1342	410	1110
Teklanika River	1539	No survey	280
Otter Creek	1652	680	720
Julius Creek	0	2	0
*Wood Creek	578	470	340
*Clear Creek	292	0 b	130
*Glacier Creek	0 b	0 b	0 b
Lignite Creek	343	113	234
June Creek	42 d	18	No survey
Total	5788	1693	2814

Table 6: Number of Chinook salmon samples collected in 2009 and 2010 by village.

Village	2009 Samples	2010 Samples
Holy Cross	0	369
Anvik	0	396
Nulato	387	290
Bishop Rock	0	119
Galena	353	467
Tanana	0	660
Mainstem above Hess Creek	190	250
Fort Yukon	152	203
Total	1283	2754

Table 7: 2009 and 2010 fishing gear used in each village.

2009	Fishwheel	6" Drift net	7.5" Drift net	8" Drift net	8.25" Drift net	8.5" Drift net	6" Set net	7.5" Set net	8" Set net	8.25" Set net	8.5" Set net
Nulato			**x**	**x**	**x**			**x**			
Galena	**x**	**x**		**x**		**x**	**x**				**x**
Mainstem Above Hess Creek									**x**		
Fort Yukon	**x**						**x**		**x**		

2010	Fishwheel	8" Drift net	8.5" Drift net	6" Set net	7.5" Set net	8" Set net	8.25" Set net	8.5" Set net
Holy Cross			**x**				**x**	**x**
Anvik		**x**	**x**			**x**		**x**
Nulato		**x**				**x**		
Bishop Mountain							**x**	
Galena	**x**	**x**	**x**		**x**	**x**	**x**	**x**
Tanana	**x**							
Mainstem above Hess Creek						**x**		
Fort Yukon	**x**			**x**				

Table 8: Length information from all communities and both years sampled.
Sample code = Year sampled + **F**emale or **M**ale Length + Village.

Sample Code	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
09FL Nulato	173	0	840.260	76.223	5.795	11.439
09 FL Galena	147	0	838.197	81.726	6.741	13.322
09 FL Mainstem above Hess	64	0	870.859	55.517	6.940	13.868
09FL Fort Yukon	40	0	793.000	106.782	16.884	34.150
09ML Nulato	203	0	789.729	109.044	7.653	15.091
09ML Galena	113	0	721.903	129.887	12.219	24.210
09ML Mainstem above Hess	104	0	786.154	112.695	11.051	21.916
09ML Fort Yukon	88	0	703.807	121.362	12.937	25.714
10 FL Holy Cross	167	0	822.844	56.142	4.344	8.577
10FL Anvik	152	0	832.730	61.976	5.027	9.932
10FL Nulato	100	0	824.990	68.133	6.813	13.519
10FL Bishop Mountain	44	0	856.136	41.468	6.252	12.607
10FL Galena	136	0	811.279	69.648	5.972	11.811
10FL Tanana	224	0	744.241	111.502	7.450	14.681
10FL Mainstem Hess	77	0	847.273	42.547	4.849	9.657
10FL Fort Yukon	43	0	781.512	79.803	12.170	24.560
10ML Holy Cross	201	0	767.637	83.579	5.895	11.625
10ML Anvik length male 2010	243	0	745.062	81.722	5.242	10.327
10ML Nulato	189	0	742.757	88.279	6.421	12.667
10ML Bishop Mountain	72	0	789.722	85.990	10.134	20.207
10ML Galena	272	0	713.202	101.673	6.165	12.137
10ML Tanana	435	0	694.782	108.299	5.193	10.206
10ML Mainstem Hess	173	0	752.341	98.063	7.456	14.7
10ML Fort Yukon	158	0	687.184	97.441	7.752	15.312

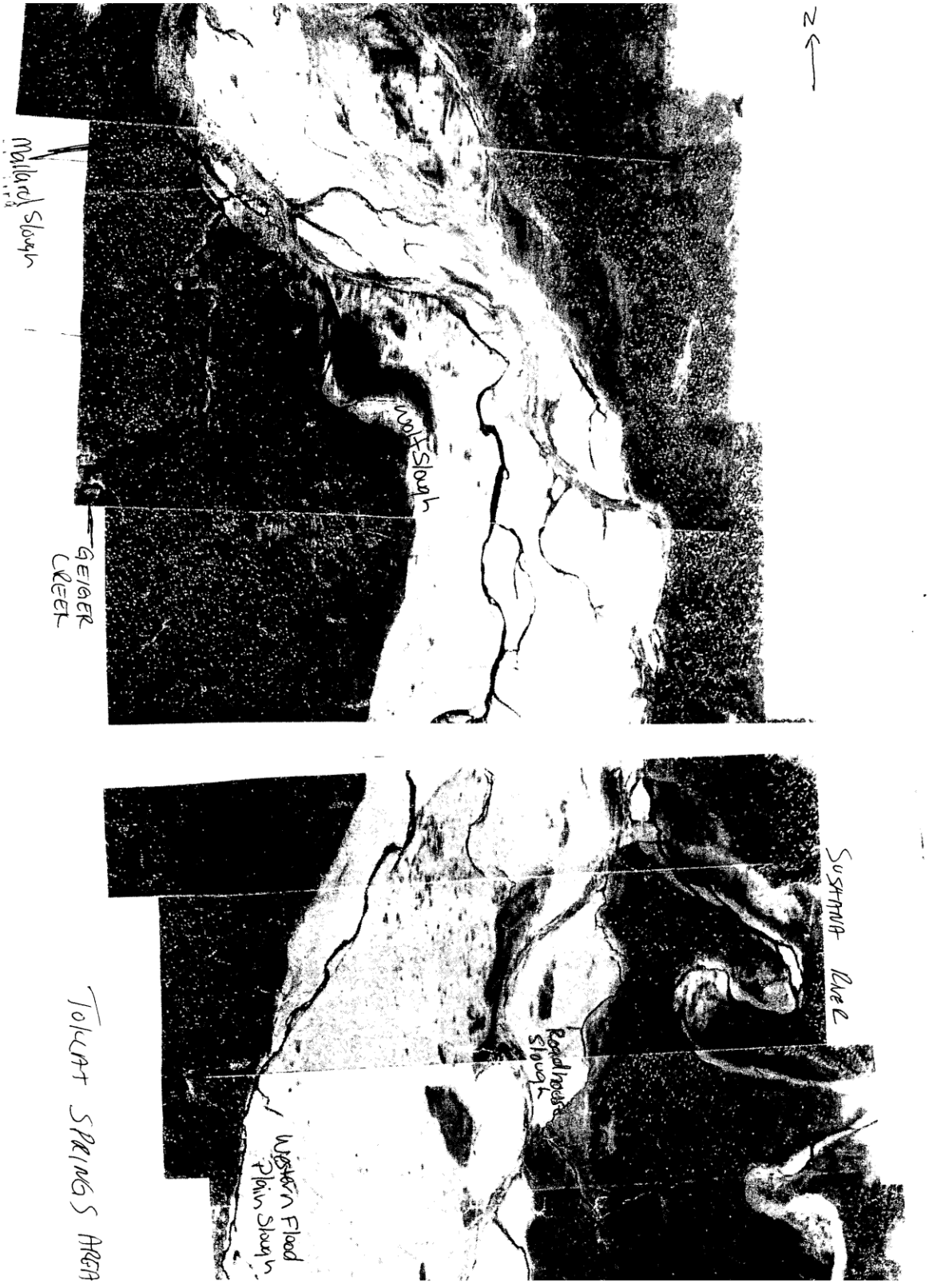
Column	Range	Max	Min	Median	25%	75%
09FL Nulato	445.000	990.000	545.000	855.000	820.000	885.000
09 FL Galena	500.000	1000.000	500.000	850.000	811.250	888.750
09 FL Mainstem above Hess	360.000	1130.000	770.000	865.000	835.000	905.000
09FL Fort Yukon	490.000	960.000	470.000	825.000	725.000	867.500
09ML Nulato	490.000	980.000	490.000	820.000	715.000	870.000
09ML Galena	460.000	970.000	510.000	740.000	607.500	822.500
09ML Mainstem above Hess	470.000	1000.000	530.000	810.000	692.500	865.000
09ML Fort Yukon	600.000	1060.000	460.000	680.000	610.000	787.500
10 FL Holy Cross	365.000	990.000	625.000	830.000	790.000	858.750
10FL Anvik	360.000	1020.000	660.000	832.500	800.000	860.000
10FL Nulato	375.000	960.000	585.000	835.000	790.000	870.000
10FL Bishop Mountain	220.000	940.000	720.000	860.000	830.000	885.000
10FL Galena	480.000	1010.000	530.000	820.000	762.500	850.000
10FL Tanana	520.000	970.000	450.000	765.000	675.000	820.000
10FL Mainstem Hess	195.000	940.000	745.000	845.000	820.000	880.000
10FL Fort Yukon	410.000	950.000	540.000	810.000	740.000	838.750
10ML Holy Cross	535.000	1050.000	515.000	770.000	725.000	825.000
10ML Anvik length male 2010	500.000	1000.000	500.000	750.000	710.000	795.000
10ML Nulato	470.000	990.000	520.000	750.000	700.000	796.250
10ML Bishop Mountain	420.000	950.000	530.000	800.000	745.000	840.000
10ML Galena	560.000	1010.000	450.000	730.000	657.500	780.000
10ML Tanana	580.000	1030.000	450.000	700.000	600.000	750.000
10ML Mainstem Hess	525.000	1035.000	510.000	750.000	703.750	805.000
10ML Fort Yukon	655.000	1040.000	385.000	695.000	610.000	735.000

Table 9: Girth information from all communities and both years sampled.
Sample code = Year sampled + **F**emale or **M**ale Girth + Village.

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
09FG Nulato	60	0	501.083	50.170	6.477	12.960
09 FG Galena	142	0	485.739	60.171	5.049	9.982
09 FG Mainstem above Hess	63	0	490.794	42.609	5.368	10.731
09FG Fort Yukon	27	0	453.333	56.552	10.883	22.371
09MG Nulato	44	0	495.114	61.620	9.290	18.734
09MG Galena	109	0	416.422	80.955	7.754	15.370
09MG Mainstem above Hess	104	0	437.587	72.826	7.141	14.163
09MG Fort Yukon	56	0	374.464	67.841	9.066	18.168
10FG Holy Cross	167	0	475.659	94.699	7.328	14.468
10FG Anvik	152	0	519.704	42.715	3.465	6.845
10FG Nulato	71	0	484.789	45.981	5.457	10.884
10FG Bishop Mountain	44	0	496.591	37.038	5.584	11.261
10FG Galena	136	0	486.515	41.504	3.559	7.039
10FG Tanana	224	0	428.125	70.112	4.685	9.232
10FG Mainstem Hess	77	0	487.532	35.343	4.028	8.022
10FG Fort Yukon	33	0	429.242	44.689	7.779	15.846
10MG Holy Cross	201	0	443.234	96.942	6.838	13.483
10MG Anvik	243	0	465.835	56.615	3.639	7.169
10MG Nulato	129	0	445.884	58.176	5.122	10.135
10MG Bishop Mountain	71	0	468.028	56.426	6.697	13.356
10MG Galena	269	0	429.152	63.225	3.855	7.590
10MG Tanana	435	0	399.908	68.677	3.293	6.472
10MG Mainstem Hess	173	0	431.243	62.676	4.765	9.406
10MG Fort Yukon	150	0	371.733	53.095	4.335	8.566

Column	Range	Max	Min	Median	25%	75%
09FG Nulato	300.000	650.000	350.000	510.000	475.000	527.500
09 FG Galena	370.000	625.000	255.000	500.000	460.000	520.000
09 FG Mainstem above Hess	250.000	660.000	410.000	490.000	461.250	515.000
09FG Fort Yukon	220.000	555.000	335.000	455.000	410.000	498.750
09MG Nulato	345.000	625.000	280.000	505.000	467.500	535.000
09MG Galena	350.000	630.000	280.000	410.000	347.500	472.500
09MG Mainstem above Hess	285.000	585.000	300.000	442.500	375.000	485.000
09MG Fort Yukon	275.000	545.000	270.000	362.500	322.500	400.000
10FG Holy Cross	445.000	620.000	175.000	500.000	470.000	525.000
10FG Anvik	265.000	665.000	400.000	520.000	495.000	540.000
10FG Nulato	235.000	590.000	355.000	484.000	461.250	510.000
10FG Bishop Mountain	190.000	590.000	400.000	500.000	480.000	520.000
10FG Galena	290.000	620.000	330.000	485.000	460.000	515.000
10FG Tanana	330.000	580.000	250.000	440.000	390.000	480.000
10FG Mainstem Hess	170.000	560.000	390.000	485.000	465.000	511.250
10FG Fort Yukon	195.000	500.000	305.000	430.000	407.500	461.250
10MG Holy Cross	495.000	645.000	150.000	470.000	435.000	496.250
10MG Anvik	453.000	675.000	222.000	470.000	435.000	495.000
10MG Nulato	285.000	580.000	295.000	450.000	413.750	480.000
10MG Bishop Mountain	300.000	590.000	290.000	470.000	442.500	500.000
10MG Galena	360.000	630.000	270.000	440.000	388.750	470.000
10MG Tanana	410.000	630.000	220.000	400.000	350.000	450.000
10MG Mainstem Hess	375.000	655.000	280.000	430.000	390.000	470.000
10MG Fort Yukon	315.000	580.000	265.000	370.000	330.000	400.000

Figure 1: Map of the Toklat River survey area.



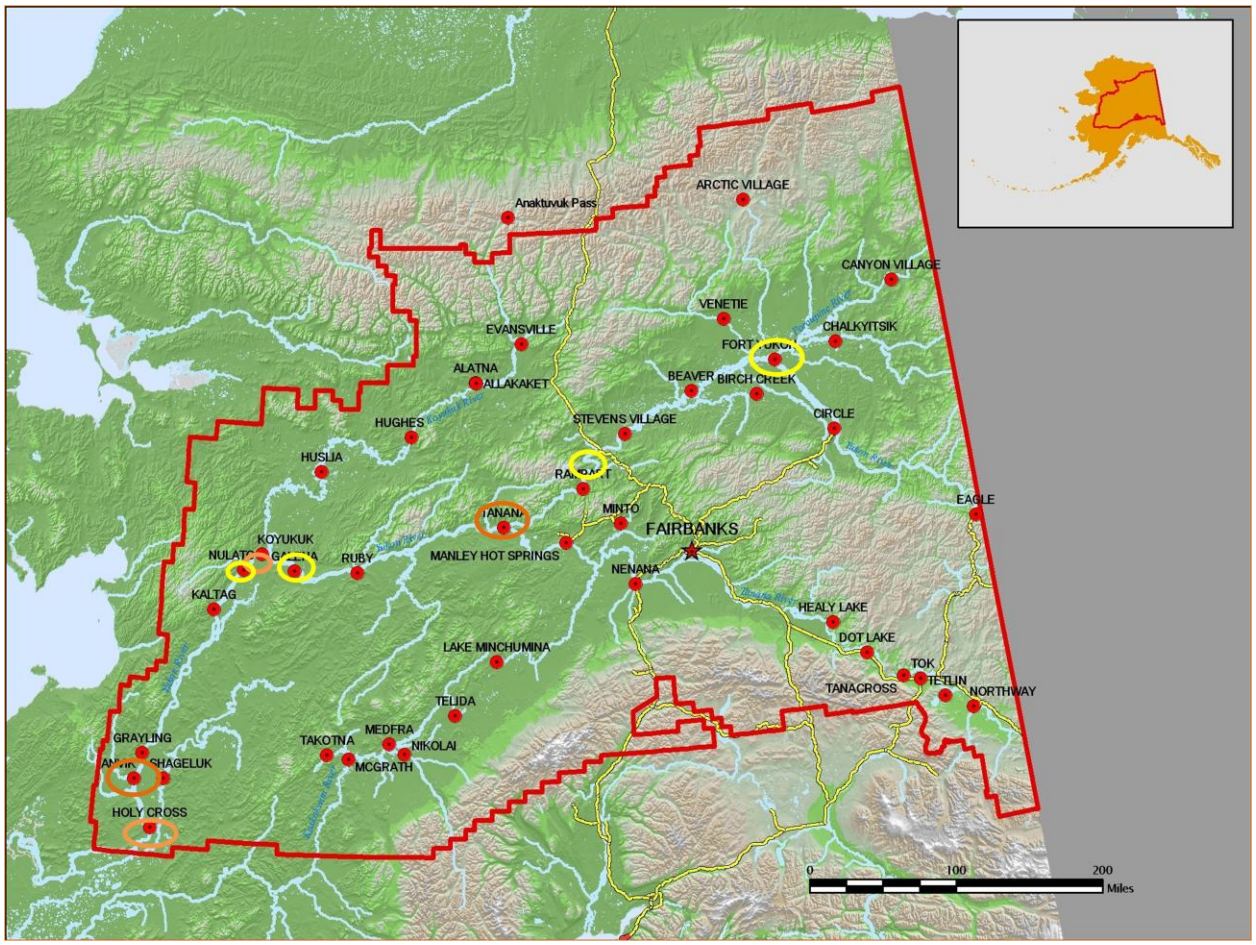
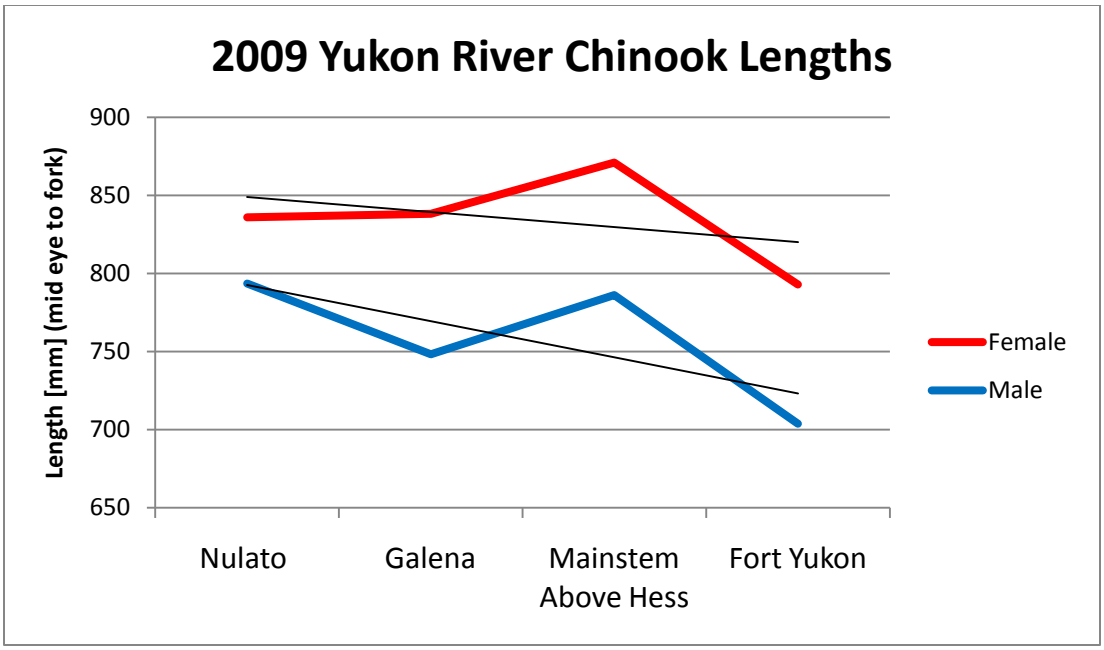


Figure 2: Map of Yukon River Chinook sampling area. The red outline is the area that Tanana Chiefs Conference serves. The communities circled in yellow were sampled in 2009 and the communities circled in orange were added to the 2009 communities and sampled in 2010.



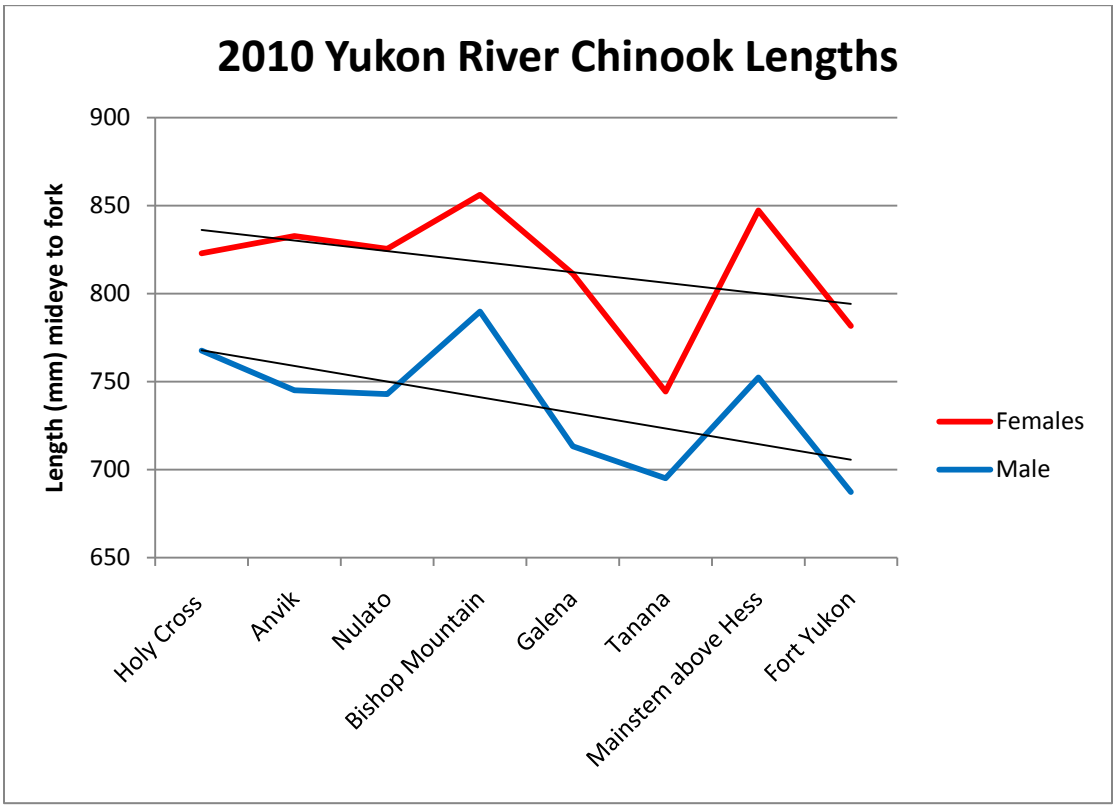
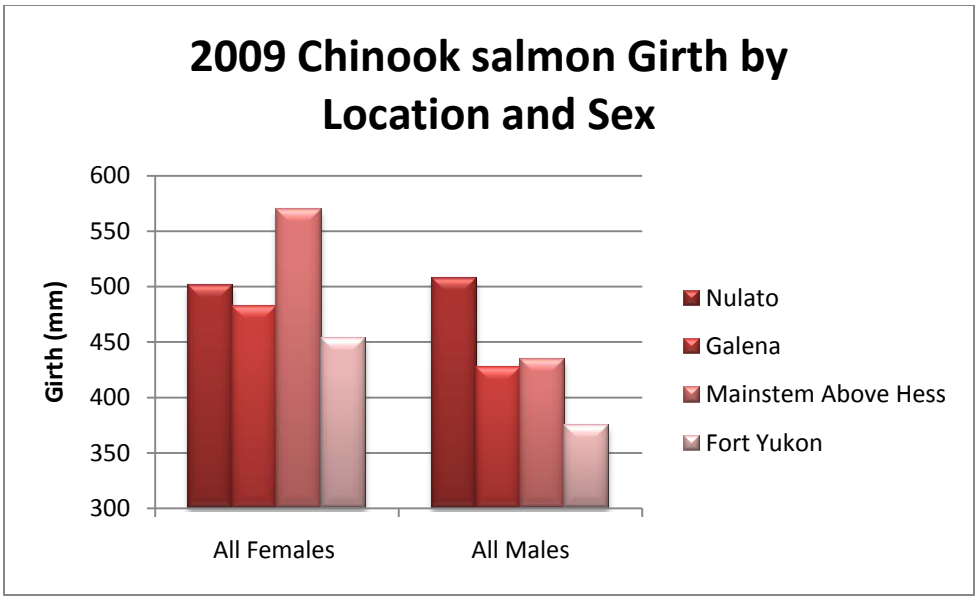


Figure 3: 2009 and 2010 Chinook salmon lengths by capture location. Sample locations are listed in chronological order moving upstream.



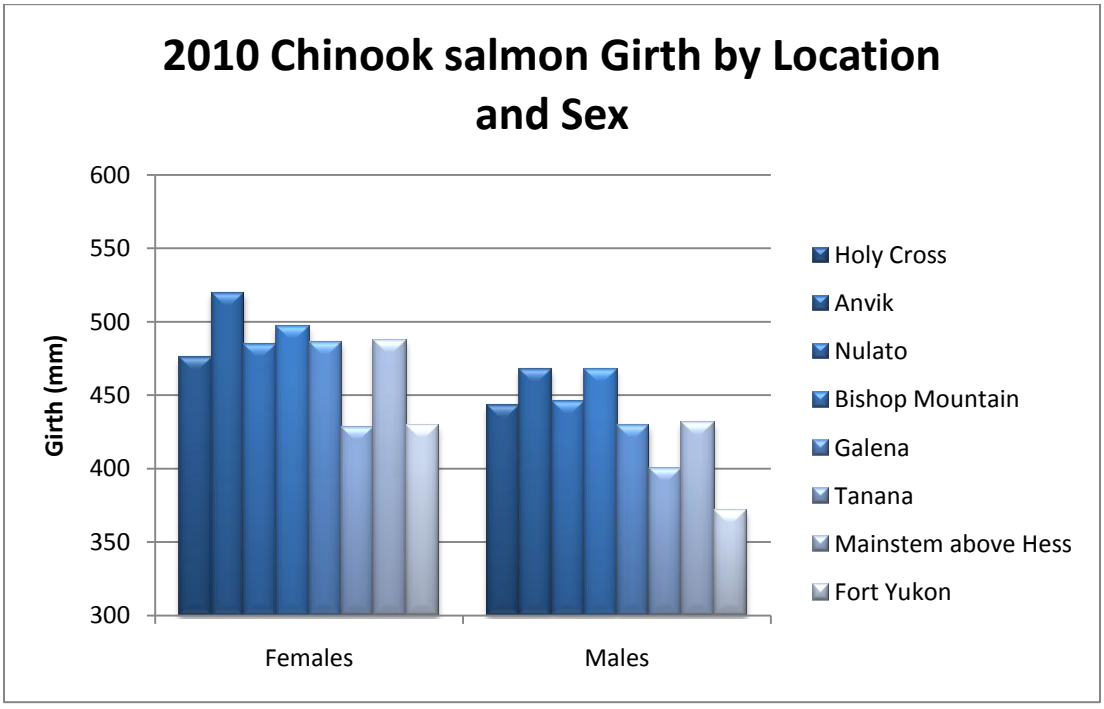


Figure 4: 2009 and 2010 average girth for Chinook salmon. Sample locations are listed in chronological order moving upstream.

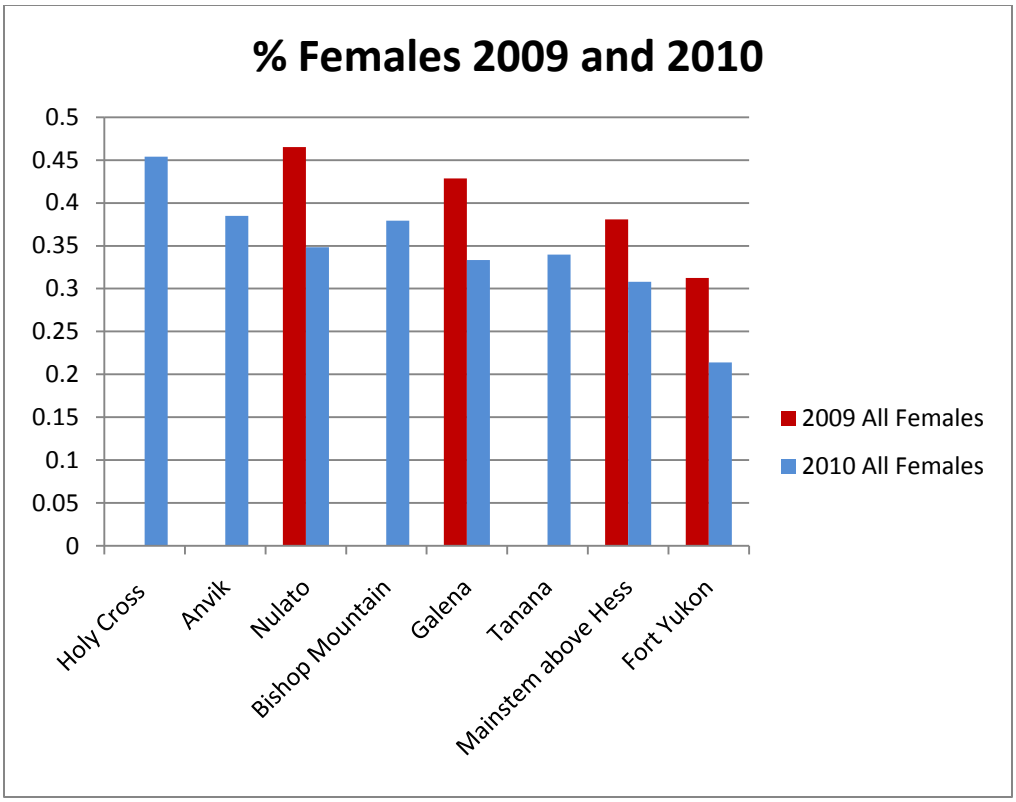


Figure 5: Percentage of females sampled from the subsistence catch in each community. Sample locations are listed in chronological order moving upstream.

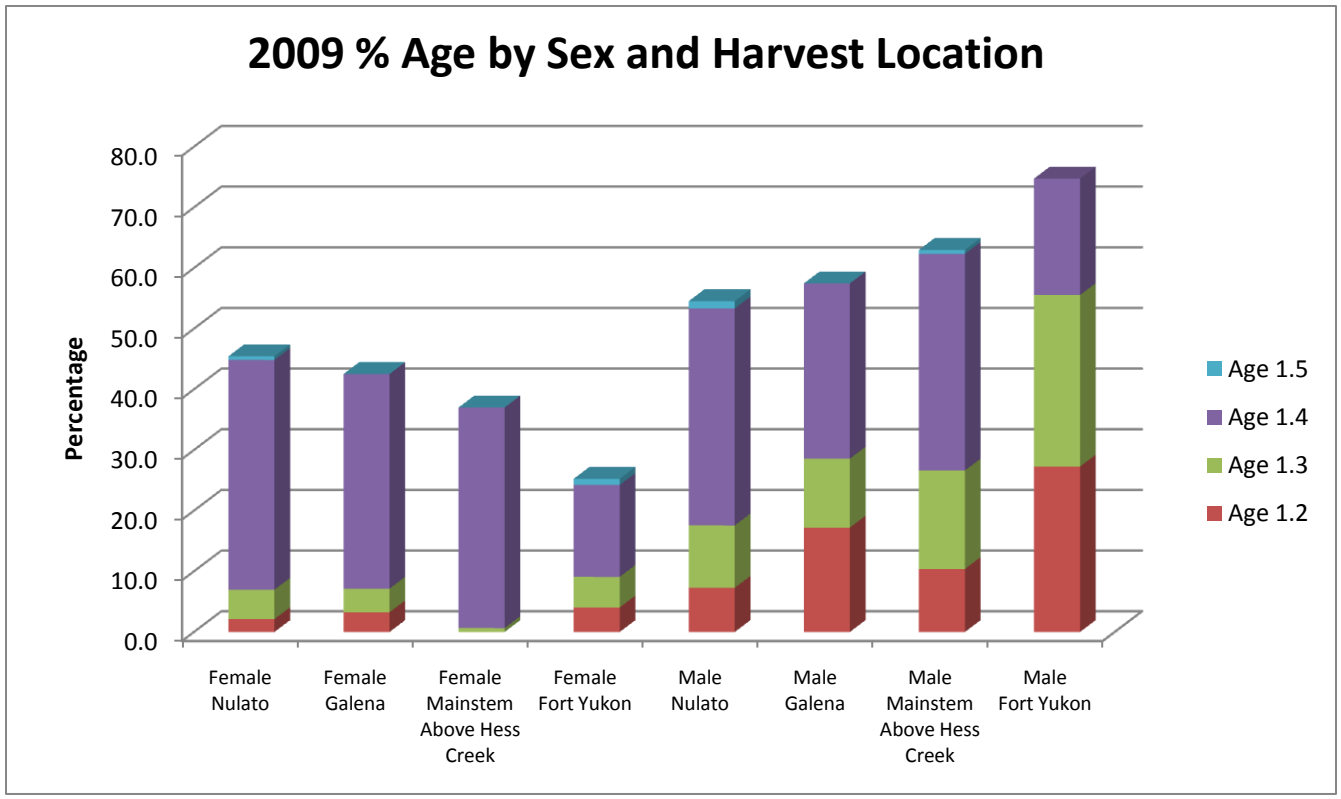


Figure 6: 2009 proportional ages for Chinook salmon separated by sex and harvest location. Sample locations are listed in chronological order moving upstream (Courtesy of ADF&G).

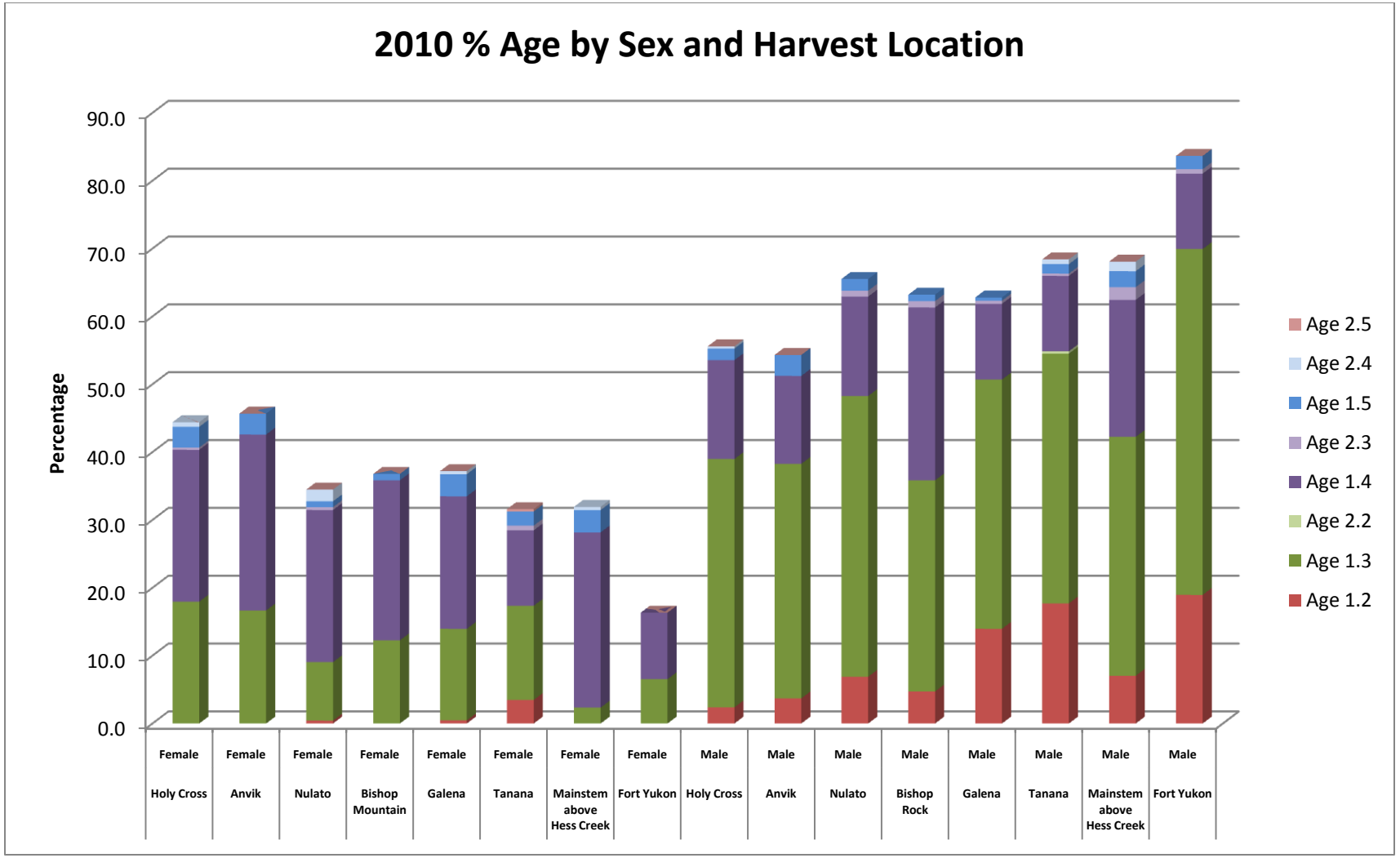
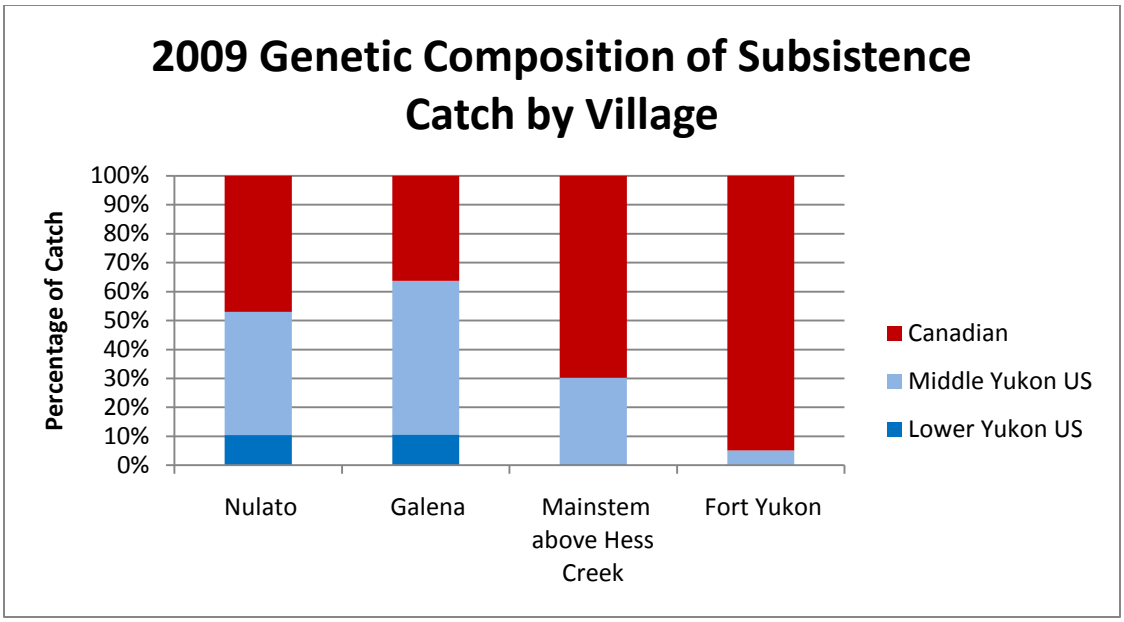


Figure 7: 2010 proportional ages for Chinook salmon separated by sex and harvest location. Sample locations are listed in chronological order moving upstream (Courtesy of ADF&G).



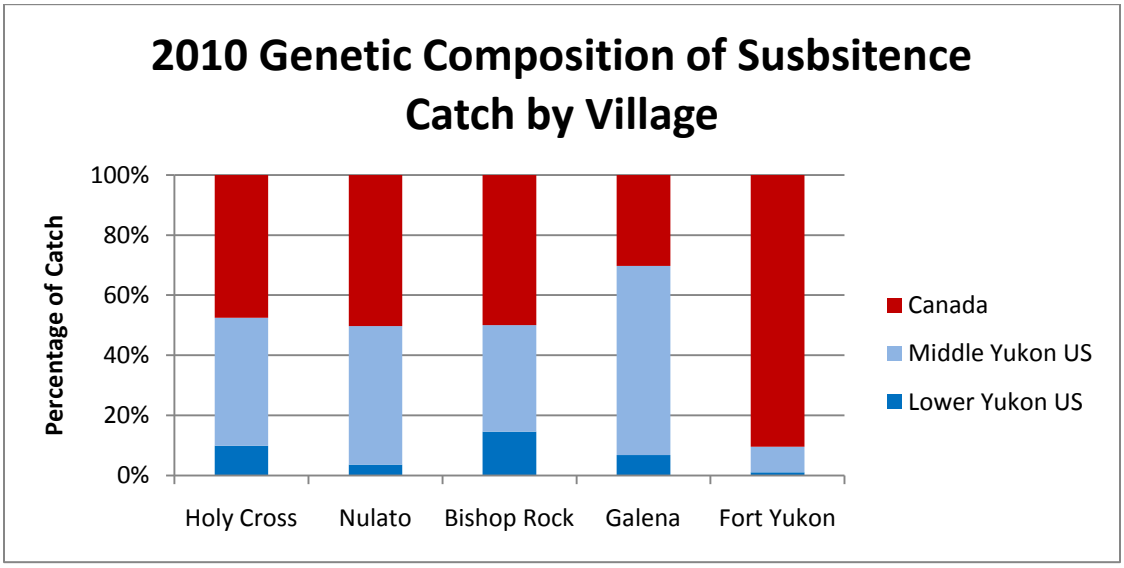


Figure 8: 2009 and 2010 proportional genetic composition of the subsistence catch sampled. Sample locations are listed in chronological order moving upstream.

Appendix 1: Data forms for sampling Chinook salmon from the subsistence harvest.

Subsistence Salmon Data Form

Name: **Scale Card #**

Sample Date: **(month/day/year)** **Species: Chinook Chum**

Location: **(e.g. North bank Yukon R. near Galena)**

Gear Type: **Drift Gillnet** **Set Gillnet** **Rod & Reel** **Fishwheel**

Mesh Size: **Did you cut every fish to look for eggs?** **Yes or No**

Comments:

Fish #	Genetic Vial #	Scale Card #	Length (mm) mid-eye to fork	Length (mm) snout to fork	Girth (mm)	Weight (lbs)	Sex	Bank
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								