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

Lower Yukon River Subsistence Chinook Salmon Harvest: Age, Sex, Length, & Stock Composition Sampling Program

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ABSTRACT

Approximately 50,000 Yukon River Chinook salmon (*Oncorhynchus tshawytscha*) are harvested for subsistence use each year, which can account for a third or more of the total annual inriver run. About 30% of that harvest is from Districts 1 and 2 and most is taken early in the run when Canadian origin fish are in greatest abundance. Traditionally, much of this harvest also occurs with larger mesh gillnets that are selective for females and older aged fish. Low Chinook salmon run abundance in recent years has led to management action aimed at influencing the age, sex, and length (ASL) composition, and genetic stock composition of the subsistence harvest. A pilot project was begun in 2011 in cooperation between the Association of Village Council Presidents (AVCP) and the Alaska Department of Fish and Game (ADF&G) to develop a sampling program that would provide the information needed to estimate the ASL and genetic stock composition of the subsistence Chinook salmon harvest in Districts 1 and 2. The design centers on recruiting local residents who are trained and equipped to sample their own harvest following standard ADF&G protocols. Twenty individuals were recruited to participate from the communities of Alakanuk, Emmonak, and St. Mary's with the goal of sampling 200 fish from each community. Participant sampling was limited to their "subsistence-directed harvest." Chinook salmon caught as "commercial-incidental harvest" but retained for subsistence use were sampled by staff from AVCP and ADF&G. Ultimately, 16 participants were successful and sampled 329 fish, with Alakanuk and Emmonak well short of the sample goal. Collectively, 76% of the sampled fish were harvested with 7.5 inch mesh. Six inch mesh was the second most common gear type accounting for 15% of the sample. The timing of the pooled Alakanuk-Emmonak collection was very similar to the preliminary overall harvest timing for District Y1 as recorded on subsistence harvest calendars, plus the stock composition was dominated by the Canadian reporting group as expected. The timing of the St. Mary's collection, however, differed significantly from the preliminary District Y2 calendar data, plus the stock composition had a high proportion from the Lower Yukon reporting group, which was contrary to the expected pattern. In retrospect, the collections from St. Mary's are suspected to have been influenced by the occurrence of fish bound for the Andreafsky River that enters the Yukon River within a few miles upstream of where most of the sampled fish were caught. Consequently, future sampling design should be modified to include more communities, particularly in District Y2, and possibly include some weighting scheme. In addition, more participants should be recruited to better insure that the sample is self-weighting relative to variable harvest methods among subsistence fishermen, such as mesh size preference. Preliminary ASL and genetic stock composition findings are reported for the purpose of assessing the effectiveness of the sampling design, however final results from this data analysis will be reported independently by ADF&G.

KEY WORDS

Age composition, ASL composition, Chinook salmon, community involvement, gillnet, length composition, *Oncorhynchus tshawytscha*, subsistence harvest, stock composition, Yukon River, selective harvest, sex composition.

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I. INTRODUCTION

About 50,000 Yukon River Chinook salmon (*O. tshawytscha*) are harvested for subsistence use in Alaska and Canada each year (Jallen and Hamazaki 2011; JTC 2011). In years of low abundance, this harvest alone can account for a third or more of the total inriver run. Consequently, there is utility in estimating the age, sex, and length (ASL) composition and genetic stock composition of the annual subsistence harvest. Uses include contributing fundamental input data for pre-season forecasts of run abundance, development of brood tables used to determine productivity and escapement goals, determining stock-specific exploitation rate, assessing effectiveness of management action, and assessing long-term population trends such as changes in average length by age-sex group.

The task of estimating the ASL and genetic stock composition of the Yukon River Chinook salmon subsistence harvest is made particularly daunting by the immense size and diversity of the drainage and its fisheries. This report is focused on a pilot project targeting only subsistence harvest occurring in Districts 1 and 2 of the Lower Yukon River (Figure 1). These districts are located downstream of nearly all major spawning tributaries, which likely results in a harvest compositions different from those occurring further upstream. Districts 1 and 2 account for about 30% of the estimated annual subsistence Chinook salmon harvest for the entire Yukon River. Most of that harvest is taken early in the run when drying conditions are optimal, but when the proportion of Canadian origin fish tends to be high (DeCovich et al. 2010). A sister project operated by Tanana Chiefs Conference (TCC) addresses a similar information need in Alaskan waters upstream of District Y2 (e.g., Drobny and Stark 2011).

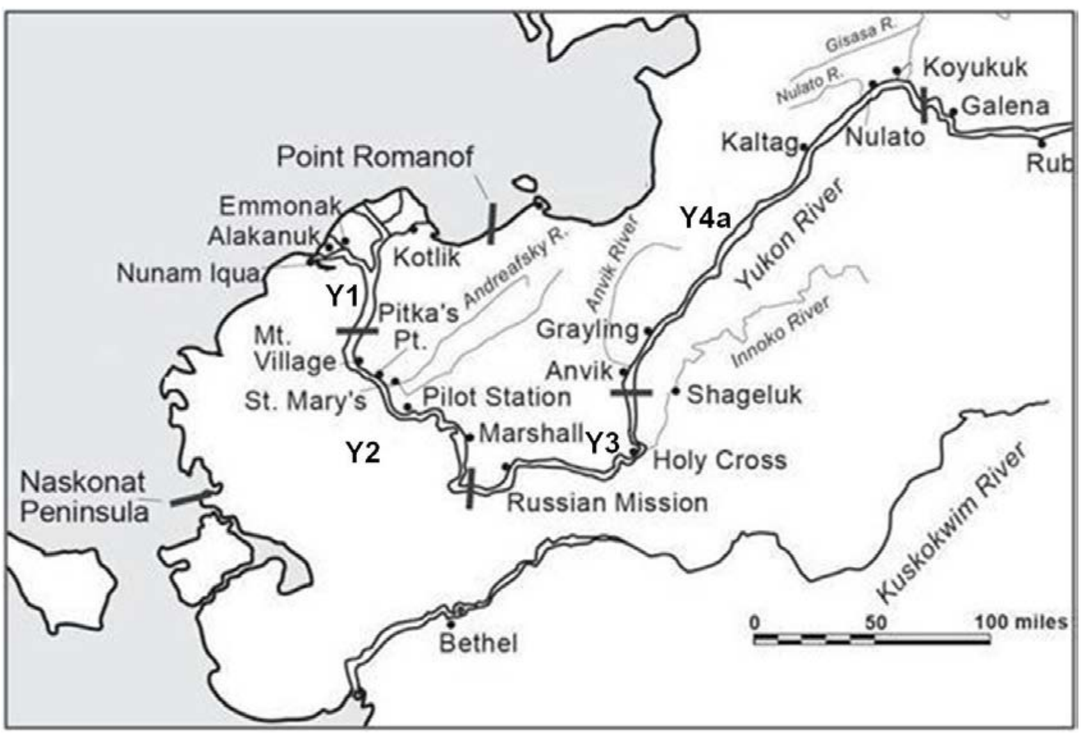


Figure 1. The Lower Yukon River with location of communities and fishing districts.

This and many other projects have been implemented in reaction to a long-term trend of low Chinook salmon abundance in the Yukon River. Chronic low run abundance first prompted the Alaska Board of Fisheries (BOF) to classify Yukon River Chinook salmon as a "yield concern" during their work session in September 2000 (Vania 2000). The measure was in accordance with guidelines established in the *Policy for the Management of Sustainable Salmon Fisheries,* which defines a yield concern as "*arising from a chronic inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs…*" (5 AAC 39.222(f) (42)). An action plan was subsequently developed by the Alaska Department of Fish and Game (ADF&G) with the goal of reducing fishing mortality to meet escapement goals, to provide opportunity for subsistence harvest within the range of Amounts Necessary for Subsistence, and to reestablish the historic range of harvest levels by other users. (Hayes et al. 2006). However, continued low abundance resulted in the BOF maintaining the yield concern classification at their January meetings in 2004 (Lingnau and Bergstrom 2004), 2007 (Hayes, et al 2006), and again in 2010 (Howard et al. 2009). Run abundance in 2011 continued to be among the lowest on record (http://yukonriverpanel.com/salmon/wp-content/uploads/2009/03/hayes-howard-2011-us-chinook-summer-chum-season-summary.pdf), and low abundance is again forecasted for 2012.

Several management actions implemented for Chinook salmon conservation in the 2011fishing season were aimed at influencing the ASL and genetic stock composition of the commercial and subsistence harvest. These included:

- continued implementation of scheduled weekly subsistence fishing closures (Hayes and Wiese 2011),
- additional reductions in subsistence fishing opportunity during the first and second Chinook salmon pulses in order to conserve the greatest number of Canadian-origin Chinook salmon,
- a restriction new to 2011 limiting subsistence gillnet to mesh sizes to ≤ 7.5 inches to reduce exploitation on older age classes and female Chinook salmon,
- the additional late-season restriction of subsistence gillnets to 6 inches and smaller mesh sizes beginning June 27 in District Y1 and June 29 in District Y2,
- continued closure of the commercial fishery targeting Chinook salmon,
- delay of the commercial fishery targeting chum salmon
- occasional implementation of concurrent subsistence and commercial fishing periods in Districts 1 and 2 to reduce the overall exposure of Chinook salmon to harvest activity,
- area closures within District Y1 commercial fishery to avoid channels with concentrations of Chinook salmon,
- and prohibition on the sale of Chinook salmon harvested incidental to chum salmon during chum-directed commercial fishing periods.

A summary of the 2011 season and more details about the above actions are described in an ADF&G news release dated 9/30/2011 (http://www.adfg.alaska.gov/static/fishing/PDFs/commercial/2011_yukonriver_summersalmon_summary.pdf).

II. OBJECTIVE:

To representatively sample the subsistence Chinook salmon harvest in three communities on the Lower Yukon River for biological information, scale samples, and tissue for genetic analysis.

III. METHODS:

This was a pilot project to determine the feasibility of developing a sampling program to estimate the ASL and genetic stock compositions of the subsistence-directed Chinook salmon harvest in Districts 1 and 2 of the Lower Yukon River. Based on a similar program conducted since 2005 in the Lower Kuskokwim River (Molyneaux et al. 2010), the design centers on recruiting non-agency members of subsistence fishing households who were trained and equipped to sample their own subsistence Chinook salmon harvest following standard ADF&G protocols. The information collected from each fish included: date and location of harvest, gear type, three scales for age determination, sex, length, and an axillary process for use in genetic stock identification (GSI). Our project was developed and implemented in close collaboration between AVCP and ADF&G, and was complimentary to a similar initiative conducted by TCC in the Middle Yukon River (Drobny and Stark 2011).

The scope of this project was limited to sample collection. All samples and their associated information were submitted to ADF&G staff for processing, analysis, and archiving, all of which was done independent of this project. Reporting of findings from the data analysis is also the responsibility of ADF&G independent of this project, but some preliminary findings are provided here for the context needed to assess the effectiveness of the sampling program and to provide insight for sampling design modifications.

Recruitment of Participants

Staff from AVCP began recruiting participants in early June. At the recommendation of ADF&G, participant selection was limited to the communities of Alakanuk, Emmonak, and St. Mary's (Figure 1), with a goal of collecting samples from 200 fish in each community. Participation was open to all subsistence fishing households in the selected communities regardless of their fishing preference (i.e., gear type, harvest timing, harvest area, and number of fish to be harvested). The primary criteria to identify suitable participants was their willingness to sample all Chinook salmon caught during each harvest event through the entire season. Potential participants were recruited from referrals by representatives from community organizations (e.g., tribal organizations), community leaders, ADF&G staff, and other contacts. To encourage participation, financial compensation was made to participants for every fish sampled provided quality control measures were met. Two Community Coordinators were contracted to assist in project implementation; one overseeing sampling in Alakanuk and Emmonak, and the other in St. Mary's.

All participants and Community Coordinators received formal training in sampling techniques by AVCP staff. Training was based on ADF&G's salmon ASL sampling procedures outlined by Molyneaux et al. (2010) and augmented with instructions from the ADF&G Gene Conservation Laboratory. Trainings were conducted in small groups of 1 to 4 participants. All sampling methods were described during the trainings, and repeated through a variety of verbal, visual, and hands-on activities (Appendix A). Each participant was instructed to sample every Chinook salmon they harvested for subsistence use throughout the 2011 season, with the exception of fish obtained from test fisheries as those fish were sampled independently by ADF&G. The importance for meticulous record keeping was emphasized so that each fish could be matched to its unique set of associated information. On completion of the training, each participant was given a sampling kit that included: a cloth measuring tape, scale cards, wax paper inserts, forceps, data forms, pencils, clipboard with instructions, uniquely numbered tissue sample vials with preservative, and dog nail clippers used for tissue collection. AVCP staff and Community Coordinators conducted follow-up visits with participants throughout the Chinook salmon fishing season to collect completed samples, to provide additional training and materials as need, and to monitor progress and data quality. Field operations were expected to end by 15 July, which is when nearly all Chinook salmon subsistence fishing is typically completed in these communities.

As part of the training, each prospective participant was asked to estimate their harvest goals for the season. The intent was to discontinue participant recruitment when sampling potential in each community summed to between 250 and 300 fish. The extra 50 to 100 fish was a contingency to account for participants that might fall short of their goals.

Sampling Procedures

Sampling conducted under this project included two categories:

- "Subsistence-directed harvest", which includes only fish harvested for noncommercial, customary and traditional use for direct personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption. These include fish used for human consumption or other purposes such as dog food. Readers should be aware that in some other literature (e.g., Jallen and Hamazaki 2011), the term "subsistence harvest" includes fish obtained for subsistence use from various test fisheries, but we exclude these fish because they were sampled for ASL and stock composition information independent of this project.
- "Commercial-incidental harvest", which includes fish caught while commercial fishing but retained for subsistence use. Readers may find the term "commercial related" in some other reports (e.g., Jallen and Hamazaki 2011). These terms are essentially identical, however, "commercial related" historically includes salmon retained from commercial harvests and used for subsistence purposes, or salmon carcasses retuned to fishermen from roe directed fisheries, which was not an issue in 2011.

Sampling of the commercial-incidental harvest was not part of the initial project proposal, but incorporated *post hoc* consequent to institution of a formal ban on the sale of Chinook salmon caught during commercial fishing periods. The ban was a conservation measure taken in reaction to exceptionally low Chinook salmon abundance. Commercial-incidental sampling was limited to District Y1 and done at the delivery site in Emmonak through a joint effort including staff from ADF&G and AVCP. Fishermen were greeted at the dock after they had offloaded their commercial catch and asked to allow staff to sample the Chinook salmon they were retaining for subsistence use. If agreed, 2-3 staff boarded the boat and quickly sampled the fish while the permit holder was in the buying station office to complete tasks associated with the sale of their fish (Appendix A). These commercial fishermen were not compensated for samples they allowed

AVCP and ADF&G staff to collect. The procedures described below focus on sampling of the subsistence-directed harvest.

At the start of each sampling event participants prepared one or more data form and scale card, as needed for the number of fish to be sampled (Appendix B). Data forms were printed on water proof paper and double-sided with one side depicting a generalized map of District Y1 or 2, and the other containing places for recording various details about the harvest event (e.g., collectors name, scale card number, locality of harvest, gear type, mesh size, and a reply to the question "did you cut every fish to look for eggs?), and rows for information specific to each fish (date caught, genetic vial number, sex, length, and the question "Adipose Fin Present?"). Data forms could accommodate up to 10 fish each. Scale cards were also double sided: one side again contained details about the harvest event, and the other side, coated in water soluble glue, had numbered squares within which individual scales were to be mounted. Each data form was paired with a matching scale card via a unique "Card Number" that the participant wrote on each. Scale cards were provided by ADF&G and included a place for identifying "Stat. Code", but these were left blank for this project.

Sampling began as soon as possible after fish were caught to ensure tissue freshness required for genetic analysis. In accordance with ADF&G protocols, sampling included collecting and recording the following from each fish:

- date the fish was caught;
- sex as determined by cutting the fish to inspect the abdominal cavity for egg skeins or milt sacs, as sex identification from external examination alone has often been unreliable (Molyneaux et al. 2010);
- length measured from mid-eye to the fork of the tail to the nearest millimeters using a cloth tape held straight so as not to include body curvature;
- one axillary process removed with dog nail clippers and placed in a genetics vial containing genetic grade ethanol and pre-labeled with a unique genetic vial number that the participant recorded on the data sheet;
- Three scales collected from the preferred area, which is on the left side of the fish and 2-3 rows above the lateral line along a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, were mounted on pre-printed scale card (INPFC 1963; Appendix C);
- Finally, each fish was inspected to determine the presence or absence of the adipose fin; if not present, it indicated the fish may contain a tag imbedded in its snout, and the participant was to remove the head, and freeze or dry the head until collected by AVCP staff.

Community Coordinators were instructed to refresh the ethanol in genetic samples within 48 hours of sampling. Contrary to the original proposal, on advice from ADF&G staff measurements of fish girth were not collected because of the high potential of inconsistency in sampling methods and the existence of adequate paired data already in the ADF&G database from previous years.

Biological data was numbered and recorded so that ASL and GSI samples could be matched to each fish sampled, and all samples collected during a unique harvest event were organized together. A harvest event was defined as fish caught by an individual/family, during one day, using one gear type, and in the same general location. A harvest event could include multiple drifts provided the time, gear, and location were consistent. Staff from AVCP periodically collected samples from each participant, inspected them for completeness and data quality, and then delivers them to ADF&G staff in Emmonak. The samples received from each participant were given a unique code specific to that participant and allowed AVCP and ADF&G staff to match samples to participants for the purpose of quality control; otherwise, the identity of participants were held confidential with no reference by name in the ADF&G database.

Data Analysis

Cumulative timing distributions of sample collection and actual reported subsistence harvest were tested for homogeneity within each fishing district using Kolmogorov-Smirnov (KS) two-sample test. The subsistence harvest timings were based on preliminary findings from the 2011 subsistence harvest calendars distributed as part of the annual post-season subsistence harvest survey project (Deena Jallen, post-season subsistence salmon harvest survey project leader, ADF&G, Fairbanks; personal communication). Recording harvest on calendars is voluntary and the return rate is typically only 15-20% of the calendars sent to fishing households, with some returned calendars being blank; consequently, the calendars only represent a fraction of the total harvest. Fortunately, fishermen are generally more diligent about recording their Chinook salmon harvest on the calendars than they are in recording harvest of other species.

Although outside the scope of this project, preliminary summaries of data analysis are provided for discussion related to sampling design. Details of the analysis methods are not provided, as those will be reported by ADF&G. The age information is reported using European notation, where the number of freshwater annuli is separated by a decimal from the number of marine annuli. Total age of a fish includes the time from when the egg is first extruded, but nearly a year passes before the first annuli forms; consequently, total age of a fish is the sum of freshwater and marine annuli, plus one additional year to account for time prior to the first annulus formation.

Summaries also include preliminary findings of genetic stock composition, and these are reported in three possible groupings depending on available sample size. The most detailed are the "fine-scale reporting groups", which divide the Yukon River drainage into 9 spatial groups and require a sample size of $\geq$ 200 fish (Figure 2). Next is the "broad-scale reporting groups", which divides the drainage into 3 groups: Lower Yukon, Middle Yukon (Tanana, Koyukuk, and Upper U.S.), and Canadian (Border, Pelly, Carmacks, Takhini, and Teslin), and can be estimated with 101-200. Finally is "country of origin", which partitions the river into 2 groupings: the United State (Lower and Middle Yukon), and Canada. This level can be estimated with 100 fish.

For various reasons, age sometimes cannot be determined from the scales collected from an individual fish, but the tissue sample can still be used for GSI analysis. As a consequence, the sample sizes reported in the ASL summaries may differ from those reported for the GSI findings.

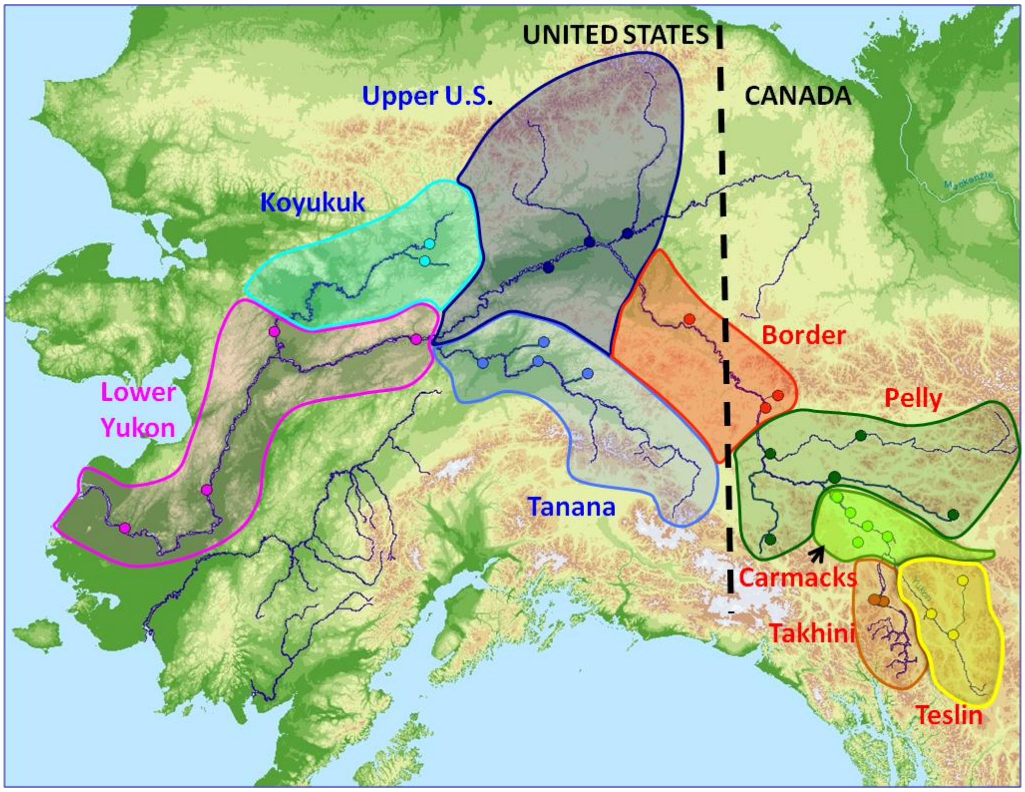


Figure 2. Location of 9 fine-scale GSI reporting groups for Yukon River Chinook salmon. The three broad-scale reporting groups include Lower Yukon, Middle Yukon (Tanana, Koyukuk, and Upper U.S.), and Canadian (Boarder, Pelly, Carmacks, Takhini, and Teslin). Circles note location of baseline collections from which reporting groups were determined.

IV. RESULTS:

This project serves as a platform for collecting samples. Data processing and analyzing, and reporting of findings are conducted by ADF&G independent of this project. Some preliminary results of the data analysis will be provided here for the context necessary to assess the effectiveness of the sampling program and for generating recommendations about design modifications. For final data results and analysis, readers are directed to annual ADF&G reports, including:

- The Joint Technical Committee report that will provide final summaries of both the ASL and stock composition findings (e.g., JTC 2011),
- The report on salmon ASL composition for the Yukon River Area that will provide detailed findings (e.g., Schuman and DuBois 2011),
- and the report focused on genetic stock identification of Chinook harvest on the Yukon River (e.g., DeCovich and Howard 2011).

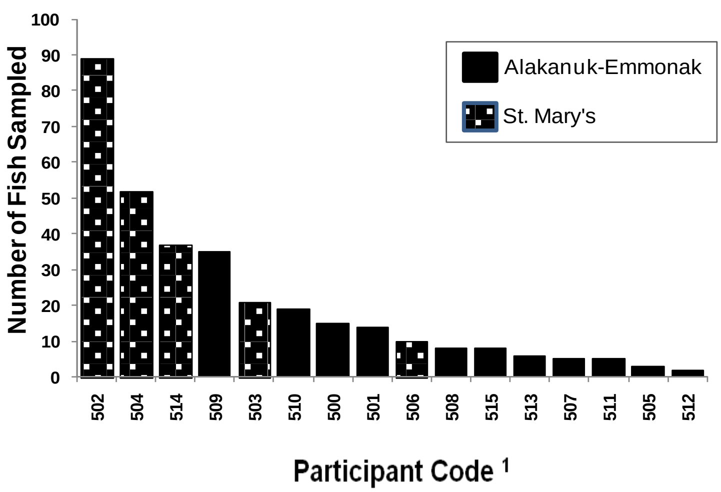
These reports include findings from many other project and thereby provide a broader context helpful for interpretation and application. As of this writing, most of these ADF&G report for 2011 were still in development.

Participation and Sample Sizes

Twenty participants were recruited for sampling their subsistence-directed harvest (Table 1). Pre-season harvest goals of participants collectively totaled 735 to 825 fish, with each community above the 200 fish minimum sample goal. Each participant understood that they were to sample every Chinook salmon they harvested for subsistence, although at least 5 participants had already harvested some fish prior to being recruited. Ultimately, 16 participants were successful, but only 329 fish were sampled. Sample sizes from Alakanuk and Emmonak fell well short of the 200 fish sample goal even when pooled. Reasons cited for the shortfall included disruption caused by the subsistence closures, low Chinook salmon abundance, higher than expected use of chum salmon, and a higher than expected use of fish from test fisheries. The number of fish sampled per participants ranged from 2 to 89 (Figure 3), and the average was 21 fish (11 for Alakanuk and Emmonak, and 42 for St. Mary's). All fish were caught using gillnets, and mesh sizes included 7.5-, 7.0-, 6.0-, and 5.0-inch (Figure 4). The timing of *Incidental* sample collection was June 5-29 in Alakanuk-Emmonak, and June 12-20 in St. Mary's. There was no significant difference between the timings of the Alakanuk-Emmonak sample collection and the District Y1 subsistence harvest (D=0.141, P= 0.317; Figure 5), but there was a highly significant difference between the timings of the St. Mary's sample collection and the District Y2 subsistence harvest (D=0.371, P= <0.001; Figure 6) when compared to harvest by day reported on harvest calendars.

Table 1. Level of participation in the 2011 lower Yukon River subsistence Chinook harvest sampling program.

District	Community	Number of People Trained	Pre-season Harvest Estimate of Those Trained (min. goal - 200 fish/community)	Number of People Actually Sampling	Number of Samples Collected
Y1	Alakanuk	6	275 - 320	6	64
Y1	Emmonak	9	210 - 245	5	56
Y2	St. Mary's	5	250 - 260	5	209
		20	735 - 825	16	329



[1] Each participant code represents one unique individual that collected samples.

Figure 3. Number of Chinook salmon sampled by participant in the lower Yukon River.

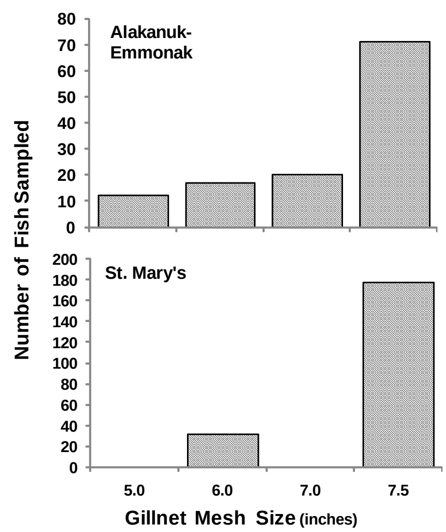


Figure 4. Number of Chinook salmon sampled by gillnet mesh size in the lower Yukon River.

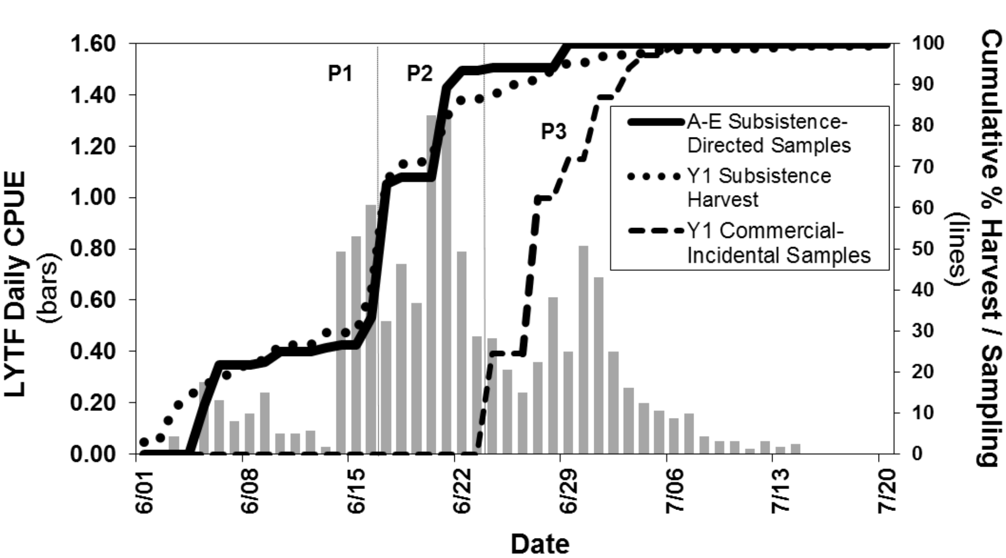


Figure 5. Timing of the Alakanuk-Emmonak (A-E) subsistence harvest sampling and Y1 commercial-incidental harvest sampling, in comparision with the timing of District Y1 subsistence harvest and the timing of Chinook salmon pulses (P1-P3) in the Lower Yukon River Test Fishery in 2011.

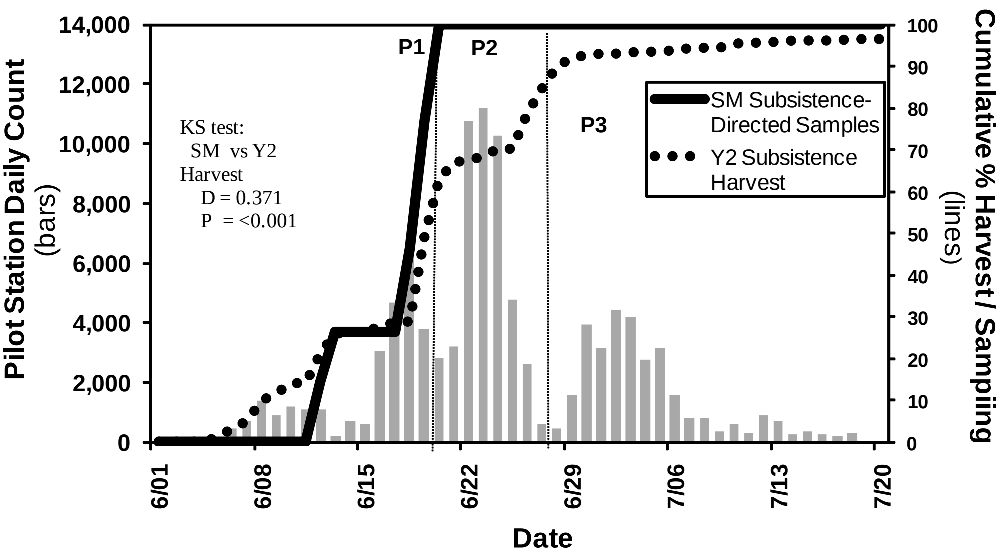


Figure 6. Timing of the St. Mary's (SM) subsistence sampling in comparision with the timing of District Y2 subsistence harvest and Chinook salmon pulses (P1-P3) atPilot Station Sonar in 2011.

An additional 477 Chinook salmon were sampled from fish retained for subsistence use from incidental harvest during the District Y1 commercial chum salmon fishery. Gillnets during these fishing periods were restricted to 6-inch and smaller mesh sizes. Samples were collected from 8 fishing periods beginning with the first period on 24 June and ending on 14 July, which is when 92.1% of the reported harvest had occurred. A tally was not kept of the number of fishermen sampled; however, the vast majority of Chinook salmon brought to the dock in Emmonak were sampled, with only a small number of fishermen declining to participate. Individual fishermen tended to have 0 to 5 Chinook salmon in their catch, more often zeroduring the final three periods. Overall, the sample accounted for 22.8% of the total reported District1 incidental harvest of Chinook salmon during commercial periods (Hayes et al 2011).

Preliminary Data Analysis

Age could be determined for 53 of the Alakanuk samples (82%), 53 of the Emmonak samples (95%), and 177 of the St. Mary's samples (85%), as well as for 427 of the District Y1 commercial-incidental samples (89.5%). Preliminary summaries of the ASL compositions are provided by community (Appendix D) and by mesh size (Appendices E) for the subsistence-directed samples, and by fishing period for the commercial-incidental samples (Appendix F). Overall, females composed 20.5% of the subsistence-directed samples, similar to the 19.2% in the commercial-incidental samples. Age-1.3 fish dominated subsistence-directed samples (63.6%), followed by age-1.4 (25.4%), and age-1.2 (9.2%) fish. For commercial-incidental samples, the composition was more evenly spread between age-1.2 (37.5%), age-1.3 (39.2%), and age-1.4 (21.4%) fish.

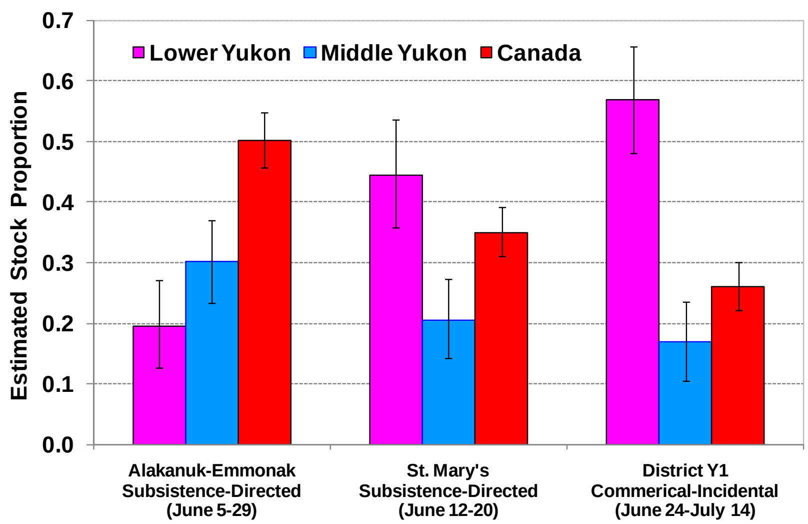


Figure 7. Preliminary broad-scale genetic stock composition of Chinook salmon subsistence harvest samples collected in the lower Yukon River in 2011.

Fish available for GSI analysis included 119 samples from the combined Alakanuk-Emmonak collections, 198 from St. Mary's, and 485 from the District Y1 incidental commercial harvest. Samples sizes for subsistence-directed collections were only adequate for estimating composition by country of origin and the 3 broad-scale reporting groups (Figure 7). The larger numbers of fish available from the commercial-incidental harvest allowed for estimating among the 9 fine-scale reporting groups (Figure 8). The Alakanuk-Emmonak samples were dominated by Canadian-origin fish (50.2%), while Lower Yukon origin fish were more prominent in samples from St. Mary's (44.5%) and the District Y1 commercial-incidental (56.9%) harvests.

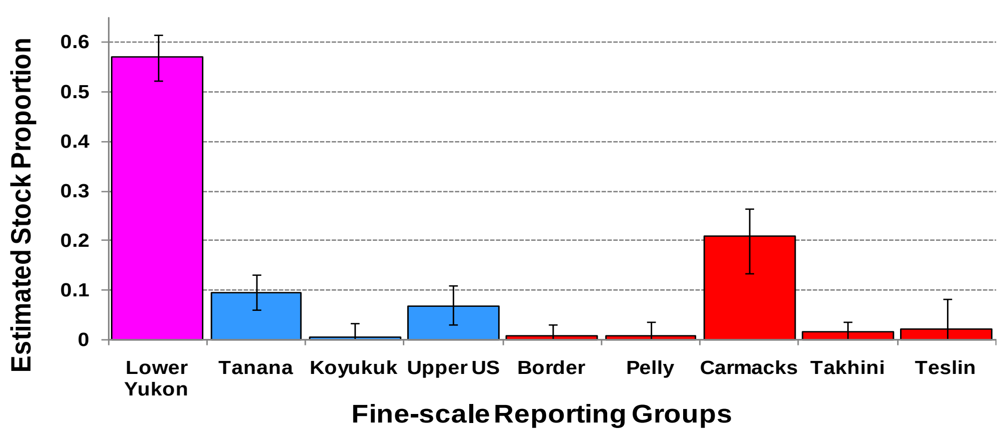


Figure 8. Preliminary fine-scale genetic stock composition of the District Y1 commercial-incidental Chinook salmon harvest in 2011.

V. DISCUSSION:

The issue of concern to this project is assessing whether the Alakanuk-Emmonak and St. Mary's samples are representative of the overall subsistence harvest in Districts 1 and 2. For Alakanuk-Emmonak samples the findings are promising: although the number of fish sampled is relatively small (n for ASL = 106 and n for GSI = 119), there was no significant difference between the timings of the sample collection and the District Y1 subsistence harvest (D=0.141, P= 0.317; Figure 5). Also encouraging is that the genetic stock composition of the Alakanuk-Emmonak samples is similar to the Lower Yukon Test Fishery (LYTF) stock composition (Figure 9), with the Alakanuk-Emmonak percentages occurring mid-way between the first and second Chinook salmon pulse composition taken from the LYTF (http://www.adfg.alaska.gov/static/fishing/PDFs /research/geneconservation/yukon_chinook_inseason_msa_2011.pdf). These two diagnostic perspectives give no reason to be suspect of the Alakanuk-Emmonak samples as being not representative of the overall District Y1 subsistence harvest.

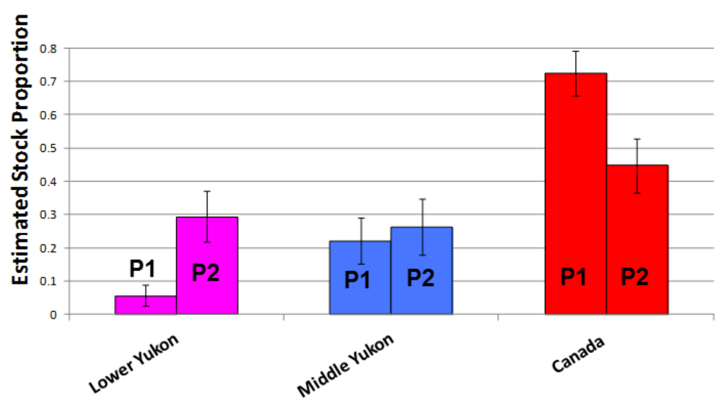


Figure 9. Preliminary broad-scale genetic stock composition of Chinook salmon caught in the Lower Yukon River Test Fishery (LYTF) during the first (P1)and second (P2) pulse in 2011.

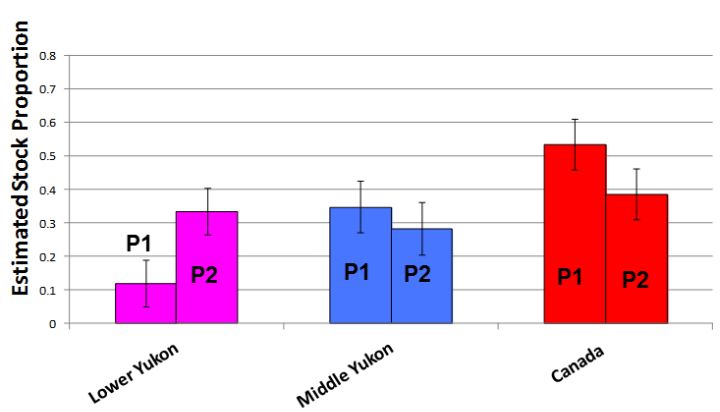


Figure 10. Preliminary broad-scale genetic stock composition of Chinook salmon caught at the Pilot Station sonar project during the first (P1) and second (P2) pulse in 2011.

Findings are less encouraging for the St. Mary's samples. The number of fish sampled is larger (n for ASL = 177 and for GSI = 198), but there is a highly significant difference between the timing of the sample collection and the District Y2 subsistence harvest as reported on subsistence harvest calendars (D=0.371, P= <0.001; Figure 6). Of particular concern is that the timing of the St. Mary's sample collection is entirely within the first Chinook salmon pulse, whereas a third of the District Y2 harvest occurred during the second and third pulses when ASL when the genetic sock compositions would likely be much different. This timing inconsistency does give reason to suspect whether the St. Mary's samples are representative of the overall District Y2 Chinook salmon subsistence harvest.

Another concern with the St. Mary's samples is that the stock composition is highest for the Lower Yukon reporting group (Figure 7), but the Lower Yukon reporting group should have been the least abundant considering the timing of samples was entirely within the first Chinook salmon pulse. The 2011 GSI samples from the Pilot Station sonar project show the more typical pattern with the first pulse dominated by the Canadian reporting group (Figure 10; http://www.adfg.alaska.gov/static/fishing/PDFs/research/ geneconservation/yukon_chinook_inseason_msa_2011.pdf).). A likely cause for this disparity is that the St. Mary's samples all came from the right (north) bank of the mainstem Yukon River, within a few miles downstream of the Andreafsky River confluence. The Andreafsky River also enters on the right bank (Figure 1), and it supports a relatively abundant Chinook salmon population. This portion of the Yukon River appears to have been a favored fishing area among St. Mary's residents, so the samples may be representative of the St. Mary's harvest, but not the entire District Y2 harvest. The community of Marshall, which historically accounts for about 26% of the annual Chinook salmon subsistence harvest in District Y2, is located 57 miles upstream of the Andreafsky River confluence. Also, Mountain Village, which accounts for about 22% of the District Y2 harvest, is located 17 miles downstream of the Andreafsky River. Both of these communities may have a broader mix of stocks in the Chinook salmon subsistence harvest. Consequently, the limited area from which the St. Mary's samples were taken gives a second reason to question their appropriateness in representing the overall subsistence Chinook salmon harvest in District Y2.

Another element influencing how well the subsistence samples represent the harvest is how well the participant harvest by gear types compares to the that of the subsistence fleet at large, but information about the later is lacking. One of the assumptions of this project was that if a sufficiently large number of fishermen participate in sample collection, then variation in gear selection would be self-weighting. But successful participation in Alakanuk-Emmonak was only 11 individuals and in St. Mary's only 5, which seems low. Still, for 2011 the likelihood that the gear compositions are comparable is enhanced because of the enactment of the 7.5 inch mesh size restriction that put an upper limit on the potential mesh sizes fishermen had to choose from. In addition, a local fish processor, Kwik'pak Fisheries, provided fishermen with 7.5-inch gillnet mesh at no cost when they turned in the banned larger mesh nets, which would also result in more consistency in the gear types used among fishermen. Although there is no definitive resolution of the issue, circumstances favored consistency in fishing gear between participants collecting samples and the subsistence fleet at large.

As a pilot project, results from 2011 were encouraging. If the project is to be continued then the sampling design should be modified to better address the time, area, and gear issues that influence the ASL and genetic stock compositions. Recruiting more participants would address the issues of timing and gear consistency. Plus, the subsistence calendar information provides a useful diagnostic tool for assessing consistency of timing. No parallel information is available for assessing consistency of gear, but investigations are underway by ADF&G staff in the Kuskokwim Area to develop quantitative guidelines for determining the number of participants needed to characterize the subsistence Chinook salmon harvest under circumstance similar to those on the Lower Yukon (Zach Liller, ADF&G Assistant Kuskokwim Area Research Biologist; personal communication). Findings from the Kuskokwim Area may provide insight for modifications to the Lower Yukon project design. Finally, more communities should be included in the sampling effort in order to more proportionally represent areas that may have different ASL or genetic stock compositions. This could be accomplished by trying to get a distribution of samples that is comparable to the proportion of harvest in the various communities, or a comparable weighting scheme. There are some logistical issues with including more communities, but these could be minimized though a limited strategic expansion to include at least Marshall and Mountain Village.

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VII. DELIVERABLES:

Listed below are deliverables resulting from this project including semi-annual project reports, final report, archival information, and outreach activities. As applicable, project deliverables were provided to AYK SSI in electronic format.

Semi-Annual Progress Report

Molyneaux, D.B., and C. Stockdale. 2011. Lower Yukon River subsistence Chinook salmon ASL& genetic composition. Project Number 1003. AYK Sustainable Salmon Initiative Semiannual Progress Report. (submitted July 31, 2011).

Final Report

Molyneaux, D.B., C. Stockdale, N. DeCovich, L. DuBois, and K. Schumann. 2012. Lower Yukon River subsistence Chinook Salmon age, sex, length, & stock composition. Report prepared for the Arctic Yukon Kuskokwim Sustainable Salmon Initiative. Project Final Product, Project Number 1005. 40 p

Archived Datasets / Database Systems

ADF&G, Commercial Fisheries Division, Yukon Area Stock Biology archive the original data forms, scale cards, and acetate impressions of the scale cards in the agency ASL archive in Anchorage.

ADF&G, Commercial Fisheries Division, Yukon Area Stock Biology archives the electronic ASL data in the *AYK Database Management System* in Anchorage.

ADF&G, Commercial Fisheries Division, Gene Conservation Laboratory archives all tissues remaining from the GSI sampling at the laboratory facility in Anchorage.

ADF&G, Commercial Fisheries Division, Gene Conservation Laboratory archive electronic GSI data in the Alaska Salmon GSI database (LOKI), Anchorage.

Outreach (Articles and Oral Presentations)

Molyneaux, D.B., C. Stockdale, T. Andrew. 2011. Plans for the Lower Yukon River Subsistence Chinook Salmon ASL& Genetic Composition. Presented at the March 2011 Yukon River Drainage Fisheries Association pre-season meeting. April 13, 2011. Anchorage.

Molyneaux, D.B., C. Stockdale, T. Andrew. 2011. Plans for the Lower Yukon River Subsistence Chinook Salmon ASL& Genetic Composition. Presented at the Yukon River Spring Interagency meeting, April 21-22, 2011. Fairbanks.

Molyneaux, D.B., C. Stockdale, T. Andrew. 2011. Plans for the Lower Yukon River Subsistence Chinook Salmon ASL& Genetic Composition. Presented at the Alakanuk Tribal Council special meeting. May 2, 2011. Alakanuk, via teleconference.

Molyneaux, D.B. and C. Stockdale. 2011 Plans for the Lower Yukon River Subsistence Chinook Salmon ASL& Genetic Composition. Networking presentation at the Yukon River Drainage Fisheries Association pre-season meeting. May 18, 2011. St. Mary's.

Molyneaux, D.B. 2011. Plans for the Lower Yukon River Subsistence Chinook Salmon ASL & Genetic Composition. Presented at the Emmonak Tribal Council special meeting. June 3, 2011. Emmonak.

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Molyneaux, D.B. 2011. Update on the Lower Yukon River Subsistence Chinook Salmon ASL& Genetic Composition. Presented at the Yukon River Fall Interagency meeting, October 7, 2011. Fairbanks.

Molyneaux, D.B., and C. Stockdale. 2011. Lower Yukon River Subsistence Chinook Salmon ASL& Genetic Composition. Presented at the AVCP Convention. Association of Village Council Presidents. October 11-13, 2011. Bethel.

Molyneaux, D.B. 2012. Project related photographs provided to AYK SSI on a thumb drive.

Future Reports

Project results are also expected to be presented in a number of independent reports initiated by ADF&G staff including the following:

Yukon River Panel, Joint Technical Committee report that will provide final summaries of both the ASL and stock composition findings (e.g., JTC 2011),

ADF&G series report on salmon ASL composition for the Yukon Area that will provide detailed

ASL findings (e.g., Schuman and DuBois 2011),

ADF&G series report on Yukon River genetic stock identification of Chinook salmon harvest (e.g., DeCovich and Howard 2011).

VIII. PROJECT DATA:

This section summaries data collected during the project in order to preserve the opportunity for other researchers and the public to access these data in the future.

(1) Description of the Data: Data consist of Chinook salmon age, sex, length and genetic stock composition from a portion of the 2011 subsistence harvest as collected by residents from the communities of Alakanuk, Emmonak, and St. Mary's, which are located along the Lower Yukon River, Alaska. Participants completed a thorough training prior to sampling and followed standard ADF&G protocols. All fish were harvested with gillnets fished in the mainstem of the Yukon River. Data quality is comparable to that collected by state and federal agency staff, plus the sex of each fish was confirmed through internal examination of the abdominal cavity for presence of ovaries or testis. Associated with these samples is information about the date and location of harvest, and the gear type (gillnet mesh size) used to harvest the fish. Participant names are confidential, but data sets by participant are available by a unique participant-specific numeric identifier.

(2) Format of Data: Electronic versions of the data are in Microsoft Access databases maintained by ADF&G, Division of Commercial Fisheries in Anchorage. Acetate impressions of the scales are available along with their associated data through ADF&G. Remaining tissue collected for GSI purposes may also be available through ADF&G Gene Conservation Laboratory in Anchorage.

(3) Custodian/Archive of the Data: ADF&G Commercial Fisheries Division is the custodian of all data collected from this project, including archiving of original scales, data forms, tissues, and electronic data and summaries.

(4) Access Limitations on the Data: data are available through contact with ADF&G Division of Commercial Fisheries in Anchorage. Specifically, for information related to ASL data, contact Yukon Area Stock Biology project leader, and for GSI data contact the Gene Conservation Laboratory, Anchorage.

IX. ACKNOWLEDGEMENTS:

This project was made possible through a collaboration of numerous staff from AVCP, ADF&G, AYK SSI, and a variety of public participants. We specifically thank the ADF&G summer season crew in Emmonak for their field support and hospitality in hosting AVCP staff, the ADF&G Gene Conservation Laboratory crew for providing sampling supplies and processing of sample, Deena Jallen of ADF&G (Fairbanks) for providing post-season subsistence harvest calendar data used in this report, and to Tim Andrew of AVCP for arranging and facilitating meetings with various Tribal Councils and his general support. Special thanks too to Community Coordinators Alexandra Waska and Sven Paukan for their diligence throughout the field season. We also want to acknowledge our appreciation to AVCP Administrative staff, AYK SSI

Program Director Karen Gillis and staff member Katie Williams for their assistance with project administration and other guidance, and to AYK SSI Research Coordinator Joe Spaeder who provided the initial vision. Finally, we thank the public participants for their trust, diligence, and to their attention to detail that resulted in excellent data quality.

This project was funded by award #NA04NMF4380162 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, administered by the Alaska Department of Fish and Game for the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (http://www.aykssi.org/). The statements, findings, conclusions, and recommendations are those of the author and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration, the U.S. Department of Commerce, or the Alaska Department of Fish and Game. This report is a final product for AYK SSI Project No. 1005, *Lower Yukon River Subsistence Chinook Salmon ASL & Genetic Composition*.

X. PRESS RELEASE:

Biologists with the Association of Village Council Presidents (AVCP) worked with 16 Lower Yukon River subsistence fishermen in Alakanuk, Emmonak, and St. Mary's to collect samples from their Chinook salmon catches in 2011. The goal of this pilot project was to develop a sampling program that would allow for estimating the age, sex, length (ASL), and stock composition of the Lower Yukon River subsistence Chinook harvest. From each Chinook salmon harvested fishermen measured length, identified sex, collected 3 fish scales for use in age determination, and collected a fin clip for use in genetic stock identification (GSI). They also recorded the date and general location where the fish was caught, plus the gear type and gillnet mesh size used. For their effort, fishermen were compensated for each fish sampled.

The primary value of this project is not so much in the utility of this one set of subsistence harvest information, but in its contribution to the collective set of information needed to understand the overall Yukon River Chinook salmon run and harvest dynamics. From throughout the Yukon River, ASL and GSI samples are collected from commercial and subsistence catches, from test fish projects, and from spawning grounds. Information is also collected about Chinook salmon abundance using sonars, weirs, counting towers, aerial surveys, and from the harvests. These are each like pieces to a puzzle, which when put together can be used to reveal some of the mysteries about the Yukon River Chinook salmon population that can be of great utility in improving fishery management by resolving a variety of short-term and long-term issues. The value of the Lower Yukon River subsistence information and similar data sets increase with each additional year information is collected provided standardized protocols are followed that allow for comparison between projects and between years.

The 2011 pilot project was funded by Arctic Yukon Kuskokwim Sustainable Salmon Initiative and was closely coordinated with the Alaska Department of Fish and Game (ADF&G) and a similar project conducted in the Middle Yukon River by Tanana Chiefs Conference. Results from the pilot project have been encouraging and provided direction on some modifications needed in future years to allow the project to deliver on its full potential. The two primary modifications are the need to recruit more fishermen to participate in the sampling and the need to include additional communities in the sampling effort, particularly in District Y2. The intent is that the sample collection be distributed from within a large enough group of participating fishermen that the results truly represent the diversity of harvest methods and harvest timing needed to characterize the overall Lower Yukon River Chinook salmon subsistence harvest composition.

XI. APPENDICES:

Appendix A

Project photographs

Participant training included the use of a life size Chinook salmon illustration, and oversized scales and scale card models to help demonstrate the process of pulling scales, inspecting them for indications of regeneration, handling of the scale to avoid inversion, and mounting and orienting scales on the scale card.

Alakanuk-Emmonak Community Coordinator Alexandra Waska with sampling packets.

Sampling packet distributed to participants.

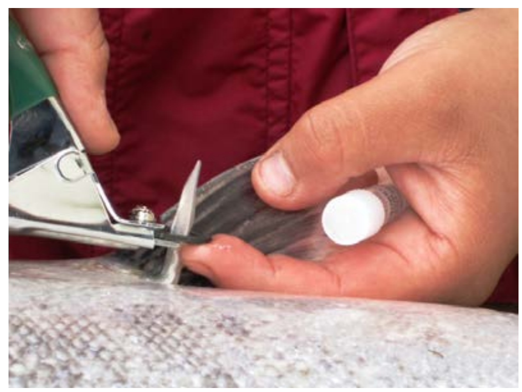
St. Mary's Community Coordinator Sven Paukan reviewing materials provided to coordinators for record keeping and re-supplying participants.

Collecting scales for age determination.

Inspecting scale for age regeneration.

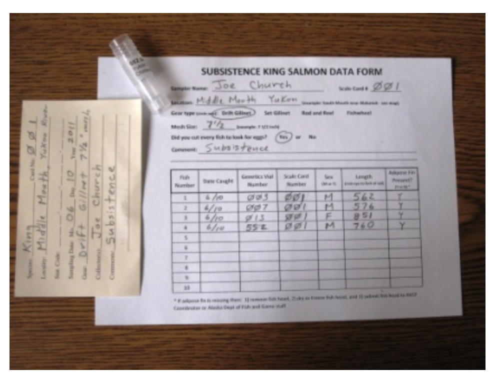
Mounting scale on scale card.

Internal inspection of abdominal cavity to confirm sex.



Removal of axillary fin for GSI analysis.

Straight-edge length measurement to avoid inclusion of body curvature.



Mock set of completed scale card, data form and one of associated genetic vials.

Requesting permission to sample a commercial fisherman's incidental Chinook catch.


Priority was given to collecting tissue samples.


Typically 3 staff from AVCP and ADF&G boarded the boat to quickly sample fish while the fishermen were in the office of the fish processor completing their fish ticket. A fourth staff person typically was on the dock to record. Speed was critical in getting the samples as fishermen typically were not inclined to be delayed at the end of the fishing

Appendix B

Data forms and scale cards

Data form with two alternate map images reverse (not to scale).

SUBSISTENCE KING SALMON DATA FORM

Sampler Name: ______________________________ **Scale Card #** __________

Location: ______________________________ **(example: South Mouth near Alakanuk - see map)**

Gear type (circle one): **Drift Gillnet** **Set Gillnet** **Rod and Reel** **Fishwheel**

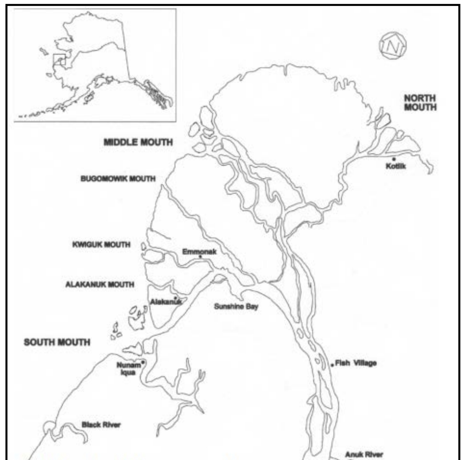
Mesh Size: __________ **(example: 7 1/2 inch)**

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

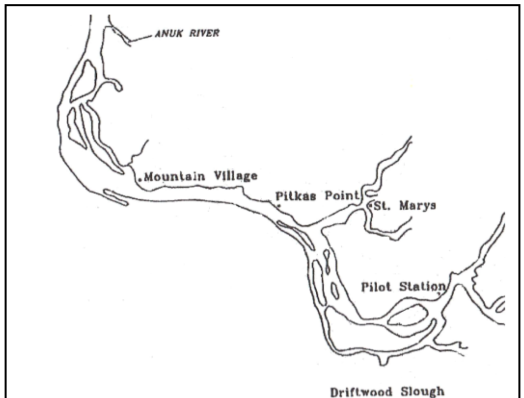
Comment: ______________________________

Fish Number	Date Caught	Genetics Vial Number	Scale Card Number	Sex (M or F)	Length (mid-eye to fork of tail)	Adipose Fin Present? (Y or N) *
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

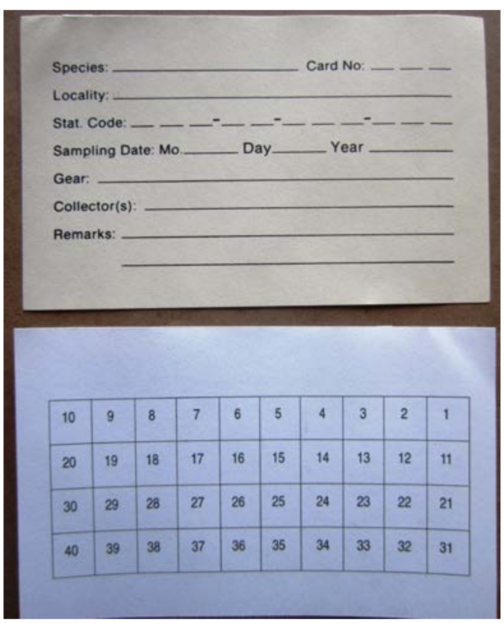
* If adipose fin is missing then: 1) remove fish head, 2) dry or freeze fish head, and 3) submit fish head to AVCP Coordinator or Alaska Dept of Fish and Game staff.



Circle location fish were caught



Circle location fish were caught



Species: ______________ Card No: __ __ __

Locality: ______________

Stat. Code: __ __ __-__ __-__ __ __-__ __ __

Sampling Date: Mo.____ Day____ Year ______

Gear: ______________

Collector(s): ______________

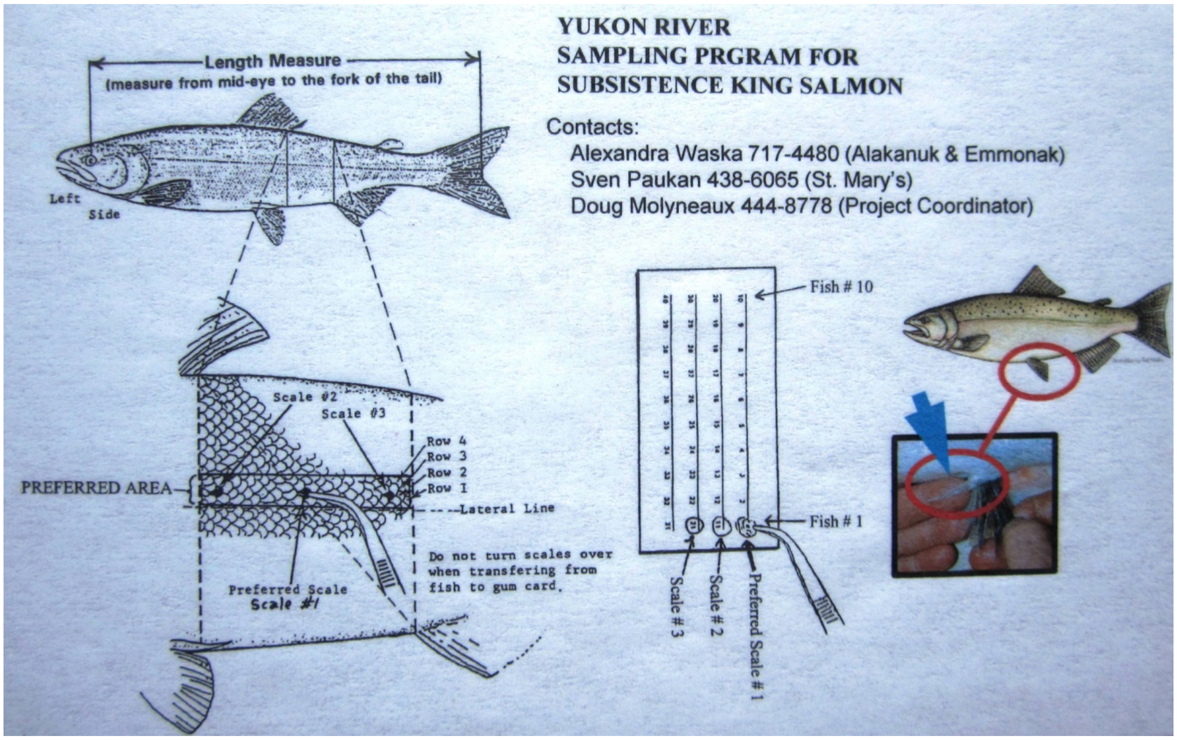
Remarks: ______________

10	9	8	7	6	5	4	3	2	1
20	19	18	17	16	15	14	13	12	11
30	29	28	27	26	25	24	23	22	21
40	39	38	37	36	35	34	33	32	31

Scale card images, front and back (not to scale).

Appendix C

Preferred scale location



Appendix D

Preliminary Lower Yukon River Chinook salmon subsistence samples by community, 2011

Appendix D. Preliminary age, sex, and length (mm) composition of lower Yukon River Chinook salmon 2011 subsistence samples by community.

			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Location	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Alakanuk	53	Male	0	0.0	2	3.8	0	0.0	34	64.2	0	0.0	8	15.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	44	83.0
(6/5, 6, 10, 17, 21-22)		Female	0	0.0	0	0.0	0	0.0	4	7.5	0	0.0	5	9.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	17.0
		Subtotal	0	0.0	2	3.8	0	0.0	38	71.7	0	0.0	13	24.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	53	100.0
		Male Mean Length	-		576		-		727		-		811		-		-		-		-		-			
		SE	-		16		-		8		-		21		-		-		-		-		-			
		Range	-		560-592		-		640-870		-		720-930		-		-		-		-		-			
		n	-		2		-		34		-		8		-		-		-		-		-			
		Female Mean Length	-		-		-		833		-		856		-		-		-		-		-			
		SE	-		-		-		25		-		24		-		-		-		-		-			
		Range	-		-		-		760-871		-		800-930		-		-		-		-		-			
		n	-		-		-		4		-		5		-		-		-		-		-			
Emmonak	53	Male	0	0.0	6	11.3	0	0.0	36	67.9	0	0.0	2	3.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	44	83.0
(6/9, 13-14, 16, 17,		Female	0	0.0	0	0.0	0	0.0	2	3.8	0	0.0	7	13.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	17.0
18, 21, 24, 29)		Subtotal	0	0.0	6	11.3	0	0.0	38	71.7	0	0.0	9	17.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	53	100.0
		Male Mean Length	-		594		-		704		-		806		-		-		-		-		-			
		SE	-		23		-		6		-		26		-		-		-		-		-			
		Range	-		530-691		-		616-788		-		780-832		-		-		-		-		-			
		n	-		6		-		36		-		2		-		-		-		-		-			
		Female Mean Length	-		-		-		810		-		846		-		-		-		-		-			
		SE	-		-		-		10		-		16		-		-		-		-		-			
		Range	-		-		-		800-820		-		780-916		-		-		-		-		-			
		n	-		-		-		2		-		7		-		-		-		-		-			
Y1 Subtotal	106	Male	0	0.0	8	7.5	0	0.0	70	66.0	0	0.0	10	9.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	88	83.0
(6/5, 6, 9, 10, 13-		Female	0	0.0	0	0.0	0	0.0	6	5.7	0	0.0	12	11.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	18	17.0
14, 16, 17, 18, 21-		Subtotal	0	0.0	8	7.5	0	0.0	76	71.7	0	0.0	22	20.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	106	100.0
22, 24, 29)																										
		Male Mean Length	-		589		-		715		-		810		-		-		-		-		-			
		SE	-		17		-		5		-		17		-		-		-		-		-			
		Range	-		530-691		-		616-870		-		720-930		-		-		-		-		-			
		n	-		8		-		70		-		10		-		-		-		-		-			
		Female Mean Length	-		-		-		825		-		850		-		-		-		-		-			
		SE	-		-		-		17		-		13		-		-		-		-		-			
		Range	-		-		-		760-871		-		780-930		-		-		-		-		-			
		n	-		-		-		6		-		12		-		-		-		-		-			

--- continued ---

Appendix D. Continued (page 2 of 2).

			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Location	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
St. Mary's	177	Male	0	0.0	18	10.2	0	0.0	97	54.8	1	0.6	19	10.7	1	0.6	0	0.0	1	0.6	0	0.0	0	0.0	137	77.4
Y2 Subtotal		Female	0	0.0	0	0.0	0	0.0	7	4.0	0	0.0	31	17.5	0	0.0	1	0.6	1	0.6	0	0.0	0	0.0	40	22.6
(6/12, 13, 18, 19-20)		Subtotal	0	0.0	18	10.2	0	0.0	104	58.8	1	0.6	50	28.2	1	0.6	1	0.6	2	1.1	0	0.0	0	0.0	177	100.0
		Male Mean Length	-		569		-		708		675		824		756		-		833		-		-			
		SE	-		8		-		5		-		13		-		-		-		-		-			
		Range	-		503-643		-		540-830		-		720-925		-		-		-		-		-			
		n	-		18		-		97		1		19		1		-		1		-		-			
		Female Mean Length	-		-		-		768		-		847		-		874		869		-		-			
		SE	-		-		-		17		-		10		-		-		-		-		-			
		Range	-		-		-		725-852		-		746-970		-		-		-		-		-			
		n	-		-		-		7		-		31		-		1		1		-		-			
Total Lower	283	Male	0	0.0	26	9.2	0	0.0	167	59.0	1	0.4	29	10.2	1	0.4	0	0.0	1	0.4	0	0.0	0	0.0	225	79.5
Yukon		Female	0	0.0	0	0.0	0	0.0	13	4.6	0	0.0	43	15.2	0	0.0	1	0.4	1	0.4	0	0.0	0	0.0	58	20.5
		Subtotal	0	0.0	26	9.2	0	0.0	180	63.6	1	0.4	72	25.4	1	0.4	1	0.4	2	0.7	0	0.0	0	0.0	283	100.0
		Male Mean Length	-		575		-		711		675		819		756		-		833		-		-			
		SE	-		8		-		4		-		10		-		-		-		-		-			
		Range	-		503-691		-		540-870		-		720-930		-		-		-		-		-			
		n	-		26		-		167		1		29		1		-		1		-		-			
		Female Mean Length	-		-		-		794		-		848		-		874		869		-		-			
		SE	-		-		-		14		-		8		-		-		-		-		-			
		Range	-		-		-		725-871		-		746-970		-		-		-		-		-			
		n	-		-		-		13		-		43		-		1		1		-		-			

Appendix E

Preliminary Lower Yukon River Chinook salmon subsistence samples by gear type, 2011

Appendix E. Preliminary age, sex, and length (mm) composition of lower Yukon River Chinook salmon 2011 subsistence samples by gear type .

ALAKANUK			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Gear Type	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6" Mesh	8	Male	0	0.0	1	12.5	0	0.0	5	62.5	0	0.0	1	12.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	7	87.5
Drift Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	12.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	12.5
(6/10, 17)		Subtotal	0	0.0	1	12.5	0	0.0	5	62.5	0	0.0	2	25.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	8	100.0
		Male Mean Length	-		592		-		712		-		802		-		-		-		-		-			
		SE	-		-		-		21		-		-		-		-		-		-		-			
		Range	-		-		-		640-760		-		-		-		-		-		-		-			
		n	-		1		-		5		-		1		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		890		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		1		-		-		-		-		-			
6" Mesh	3	Male	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
Set Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
(6/5-6)		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	-		-		-		-		-		862		-		-		-		-		-			
		SE	-		-		-		-		-		34		-		-		-		-		-			
		Range	-		-		-		-		-		825-930		-		-		-		-		-			
		n	-		-		-		-		-		3		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		-		-		-		-		-		-			
Total	11	Male	0	0.0	1	9.1	0	0.0	5	45.5	0	0.0	4	36.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	10	90.9
6" Mesh		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	9.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	9.1
		Subtotal	0	0.0	1	9.1	0	0.0	5	45.5	0	0.0	5	45.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11	100.0
		Male Mean Length	-		592		-		712		-		847		-		-		-		-		-			
		SE	-		-		-		21		-		28		-		-		-		-		-			
		Range	-		-		-		640-760		-		802-930		-		-		-		-		-			
		n	-		1		-		5		-		4		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		890		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		1		-		-		-		-		-			

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Appendix E. Continued (page 2 of 6).

ALAKANUK			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Gear Type	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
7" Mesh	9	Male	0	0.0	0	0.0	0	0.0	8	88.9	0	0.0	1	11.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	100.0
Set Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
(6/5)		Subtotal	0	0.0	0	0.0	0	0.0	8	88.9	0	0.0	1	11.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	100.0
		Male Mean Length	-		-		-		710		-		785		-		-		-		-		-			
		SE	-		-		-		11		-		-		-		-		-		-		-			
		Range	-		-		-		666-747		-		-		-		-		-		-		-			
		n	-		-		-		8		-		1		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		-		-		-		-		-		-			
7.5" Mesh	33	Male	0	0.0	1	3.0	0	0.0	21	63.6	0	0.0	3	9.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	75.8
Set Gillnet		Female	0	0.0	0	0.0	0	0.0	4	12.1	0	0.0	4	12.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	8	24.2
(6/6, 17, 21-22)		Subtotal	0	0.0	1	3.0	0	0.0	25	75.8	0	0.0	7	21.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	100.0
		Male Mean Length	-		560		-		738		-		770		-		-		-		-		-			
		SE	-		-		-		12		-		26		-		-		-		-		-			
		Range	-		-		-		650-870		-		720-810		-		-		-		-		-			
		n	-		1		-		21		-		3		-		-		-		-		-			
		Female Mean Length	-		-		-		833		-		848		-		-		-		-		-			
		SE	-		-		-		25		-		28		-		-		-		-		-			
		Range	-		-		-		760-871		-		800-930		-		-		-		-		-			
		n	-		-		-		4		-		4		-		-		-		-		-			
All Gear	53	Male	0	0.0	2	3.8	0	0.0	34	64.2	0	0.0	8	15.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	44	83.0
		Female	0	0.0	0	0.0	0	0.0	4	7.5	0	0.0	5	9.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	17.0
		Subtotal	0	0.0	2	3.8	0	0.0	38	71.7	0	0.0	13	24.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	53	100.0
		Male Mean Length	-		576		-		727		-		811		-		-		-		-		-			
		SE	-		16		-		8		-		21		-		-		-		-		-			
		Range	-		560-592		-		640-870		-		720-930		-		-		-		-		-			
		n	-		2		-		34		-		8		-		-		-		-		-			
		Female Mean Length	-		-		-		833		-		856		-		-		-		-		-			
		SE	-		-		-		25		-		24		-		-		-		-		-			
		Range	-		-		-		760-871		-		800-930		-		-		-		-		-			
		n	-		-		-		4		-		5		-		-		-		-		-			

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Appendix E. Continued (page 3 of 6).

EMMONAK			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Gear Type	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
5" Mesh	11	Male	0	0.0	2	18.2	0	0.0	7	63.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	81.8
Set Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	18.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	18.2
(6/17)		Subtotal	0	0.0	2	18.2	0	0.0	7	63.6	0	0.0	2	18.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11	100.0
		Male Mean Length	-		586		-		692		-		-		-		-		-		-		-			
		SE	-		13		-		24		-		-		-		-		-		-		-			
		Range	-		573-598		-		616-788		-		-		-		-		-		-		-			
		n	-		2		-		7		-		-		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		839		-		-		-		-		-			
		SE	-		-		-		-		-		9		-		-		-		-		-			
		Range	-		-		-		-		-		830-848		-		-		-		-		-			
		n	-		-		-		-		-		2		-		-		-		-		-			
6" Mesh Drift	3	Male	0	0.0	1	33.3	0	0.0	1	33.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	66.7
Gillnet		Female	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	0	0.0	0	0.0	1	33.3
(6/18, 24)		Subtotal	0	0.0	1	33.3	0	0.0	2	66.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0
		Male Mean Length	-		610		-		731		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		1		-		1		-		-		-		-		-		-		-			
		Female Mean Length	-		-		-		800		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		1		-		-		-		-		-		-		-			
6" Mesh Set	2	Male	0	0.0	1	50.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100.0
Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
(6/9, 13-14)		Subtotal	0	0.0	1	50.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100.0
		Male Mean Length	-		560		-		680		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		1		-		1		-		-		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		-		-		-		-		-		-			

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Appendix E. Continued (page 4 of 6).

EMMONAK

Gear Type (Sample Dates)	Sample Size		Brood Year (Age Class) 2008 (1.1) N	%	2007 (1.2) N	%	2007 (2.1) N	%	2006 (1.3) N	%	2006 (2.2) N	%	2005 (1.4) N	%	2005 (2.3) N	%	2004 (1.5) N	%	2004 (2.4) N	%	2003 (1.6) N	%	2003 (2.5) N	%	Total N	%
Total 6"	5	Male	0	0.0	2	40.0	0	0.0	2	40.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	80.0
Mesh		Female	0	0.0	0	0.0	0	0.0	1	20.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	20.0
		Subtotal	0	0.0	2	40.0	0	0.0	3	60.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	100.0
		Male Mean Length	-		585		-		706		-		-		-		-		-		-		-			
		SE	-		25		-		26		-		-		-		-		-		-		-			
		Range	-		560-610		-		680-731		-		-		-		-		-		-		-			
		n	-		2		-		2		-		-		-		-		-		-		-			
		Female Mean Length	-		-		-		800		-		-		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		1		-		-		-		-		-		-		-			
7" Mesh Drift	6	Male	0	0.0	1	16.7	0	0.0	3	50.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	66.7
Gillnet		Female	0	0.0	0	0.0	0	0.0	1	16.7	0	0.0	1	16.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	33.3
(6/29)		Subtotal	0	0.0	1	16.7	0	0.0	4	66.7	0	0.0	1	16.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	100.0
		Male Mean Length	-		530		-		692		-		-		-		-		-		-		-			
		SE	-		-		-		14		-		-		-		-		-		-		-			
		Range	-		-		-		665-710		-		-		-		-		-		-		-			
		n	-		1		-		3		-		-		-		-		-		-		-			
		Female Mean Length	-		-		-		820		-		780		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		1		-		1		-		-		-		-		-			
7.5" Mesh	15	Male	0	0.0	1	6.7	0	0.0	10	66.7	0	0.0	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	12	80.0
Drift Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	20.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	20.0
(6/16, 21)		Subtotal	0	0.0	1	6.7	0	0.0	10	66.7	0	0.0	4	26.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	100.0
		Male Mean Length	-		691		-		723		-		832		-		-		-		-		-			
		SE	-		-		-		9		-		-		-		-		-		-		-			
		Range	-		-		-		665-760		-		-		-		-		-		-		-			
		n	-		1		-		10		-		1		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		866		-		-		-		-		-			
		SE	-		-		-		-		-		28		-		-		-		-		-			
		Range	-		-		-		-		-		821-916		-		-		-		-		-			
		n	-		-		-		-		-		3		-		-		-		-		-			

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Appendix E. Continued (page 5 of 6).

EMMONAK			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Gear Type	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
7.5" Mesh Set	16	Male	0	0.0	0	0.0	0	0.0	14	87.5	0	0.0	1	6.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	93.8
Gillnet		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	6.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	6.3
(6/17)		Subtotal	0	0.0	0	0.0	0	0.0	14	87.5	0	0.0	2	12.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	16	100.0
		Male Mean Length	-		-		-		698		-		780		-		-		-		-		-			
		SE	-		-		-		7		-		-		-		-		-		-		-			
		Range	-		-		-		625-738		-		-		-		-		-		-		-			
		n	-		-		-		14		-		1		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		865		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		1		-		-		-		-		-			
Total 7.5" Mesh	31	Male	0	0.0	1	3.2	0	0.0	24	77.4	0	0.0	2	6.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	27	87.1
		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	12.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	12.9
		Subtotal	0	0.0	1	3.2	0	0.0	24	77.4	0	0.0	6	19.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	31	100.0
		Male Mean Length	-		691		-		709		-		806		-		-		-		-		-			
		SE	-		-		-		6		-		26		-		-		-		-		-			
		Range	-		-		-		625-760		-		780-832		-		-		-		-		-			
		n	-		1		-		24		-		2		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		866		-		-		-		-		-			
		SE	-		-		-		-		-		19		-		-		-		-		-			
		Range	-		-		-		-		-		821-916		-		-		-		-		-			
		n	-		-		-		-		-		4		-		-		-		-		-			
All Mesh	53	Male	0	0.0	6	11.3	0	0.0	36	67.9	0	0.0	2	3.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	44	83.0
		Female	0	0.0	0	0.0	0	0.0	2	3.8	0	0.0	7	13.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9	17.0
		Total	0	0.0	6	11.3	0	0.0	38	71.7	0	0.0	9	17.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	53	100.0
		Male Mean Length	-		594		-		704		-		806		-		-		-		-		-			
		SE	-		23		-		6		-		26		-		-		-		-		-			
		Range	-		530-691		-		616-788		-		780-832		-		-		-		-		-			
		n	-		6		-		36		-		2		-		-		-		-		-			
		Female Mean Length	-		-		-		810		-		846		-		-		-		-		-			
		SE	-		-		-		10		-		16		-		-		-		-		-			
		Range	-		-		-		800-820		-		780-916		-		-		-		-		-			
		n	-		-		-		2		-		7		-		-		-		-		-			

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Appendix E. Continued (page 6 of 6).

ST. MARY'S			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
			(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
Gear Type (Sample Dates)	Sample Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6" Mesh Drift Gillnet (6/12, 13, 19-20)	28	Male	0	0.0	11	39.3	0	0.0	14	50.0	0	0.0	2	7.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	27	96.4
		Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	3.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	3.6
		Subtotal	0	0.0	11	39.3	0	0.0	14	50.0	0	0.0	3	10.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	28	100.0
		Male Mean Length	-		573		-		696		-		816		-		-		-		-		-			
		SE	-		11		-		13		-		1		-		-		-		-		-			
		Range	-		503-643		-		600-769		-		815-817		-		-		-		-		-			
		n	-		11		-		14		-		2		-		-		-		-		-			
		Female Mean Length	-		-		-		-		-		833		-		-		-		-		-			
		SE	-		-		-		-		-		-		-		-		-		-		-			
		Range	-		-		-		-		-		-		-		-		-		-		-			
		n	-		-		-		-		-		1		-		-		-		-		-			
7.5" Mesh Drift Gillnet (6/12-13, 18-20)	149	Male	0	0.0	7	4.7	0	0.0	83	55.7	1	0.7	17	11.4	1	0.7	0	0.0	1	0.7	0	0.0	0	0.0	110	73.8
		Female	0	0.0	0	0.0	0	0.0	7	4.7	0	0.0	30	20.1	0	0.0	1	0.7	1	0.7	0	0.0	0	0.0	39	26.2
		Subtotal	0	0.0	7	4.7	0	0.0	90	60.4	1	0.7	47	31.5	1	0.7	1	0.7	2	1.3	0	0.0	0	0.0	149	100.0
		Male Mean Length	-		563		-		710		675		825		756		-		833		-		-			
		SE	-		12		-		5		-		14		-		-		-		-		-			
		Range	-		510-610		-		540-830		-		720-925		-		-		-		-		-			
		n	-		7		-		83		1		17		1		-		1		-		-			
		Female Mean Length	-		-		-		768		-		848		-		874		869		-		-			
		SE	-		-		-		17		-		10		-		-		-		-		-			
		Range	-		-		-		725-852		-		746-970		-		-		-		-		-			
		n	-		-		-		7		-		30		-		1		1		-		-			
All Mesh	177	Male	0	0.0	18	10.2	0	0.0	97	54.8	1	0.6	19	10.7	1	0.6	0	0.0	1	0.6	0	0.0	0	0.0	137	77.4
		Female	0	0.0	0	0.0	0	0.0	7	4.0	0	0.0	31	17.5	0	0.0	1	0.6	1	0.6	0	0.0	0	0.0	40	22.6
		Total	0	0.0	18	10.2	0	0.0	104	58.8	1	0.6	50	28.2	1	0.6	1	0.6	2	1.1	0	0.0	0	0.0	177	100.0
		Male Mean Length	-		569		-		708		675		824		756		-		833		-		-			
		SE	-		8		-		5		-		13		-		-		-		-		-			
		Range	-		503-643		-		540-830		-		720-925		-		-		-		-		-			
		n	-		18		-		97		1		19		1		-		1		-		-			
		Female Mean Length	-		-		-		768		-		847		-		874		869		-		-			
		SE	-		-		-		17		-		10		-		-		-		-		-			
		Range	-		-		-		725-852		-		746-970		-		-		-		-		-			
		n	-		-		-		7		-		31		-		1		1		-		-			

Appendix F

Chinook salmon ASL composition by fishing period for commercial-incidental harvests, 2011

Appendix F. Preliminary age, sex, and length (mm) composition of District Y1 Chinook salmon 2011 commerciaharvest.

			Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
Fishing Period	Sample		(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
(Sample Dates)	Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Period 1	108	Male	0	0.0	160	30.6	0	0.0	198	38.0	5	0.9	58	11.1	0	0.0	5	0.9	0	0.0	0	0.0	0	0.0	425	81.5
(6/24)		Female	0	0.0	0	0.0	0	0.0	29	5.6	0	0.0	63	12.0	0	0.0	0	0.0	5	0.9	0	0.0	0	0.0	97	18.5
		Subtotal	0	0.0	160	30.6	0	0.0	227	43.5	5	0.9	121	23.1	0	0.0	5	0.9	5	0.9	0	0.0	0	0.0	522	100.0
		Male Mean Length	-		575		-		664		630		856		-		970		-		-		-			
		SE	-		8		-		10		-		18		-		-		-		-		-			
		Range	-		480-700		-		520-830		-		725-920		-		-		-		-		-			
		n	-		33		-		41		1		12		-		1		-		-		-			
		Female Mean Length	-		-		-		773		-		843		-		-		775		-		-			
		SE	-		-		-		32		-		21		-		-		-		-		-			
		Range	-		-		-		715-920		-		710-985		-		-		-		-		-			
		n	-		-		-		6		-		13		-		-		1		-		-			
Period 2	150	Male	0	0.0	177	27.3	0	0.0	281	43.3	0	0.0	39	6.0	4	0.7	0	0.0	0	0.0	0	0.0	0	0.0	502	77.3
(6/27)		Female	0	0.0	0	0.0	0	0.0	61	9.3	0	0.0	82	12.7	0	0.0	0	0.0	4	0.7	0	0.0	0	0.0	147	22.7
		Subtotal	0	0.0	177	27.3	0	0.0	342	52.7	0	0.0	121	18.7	4	0.7	0	0.0	4	0.7	0	0.0	0	0.0	649	100.0
		Male Mean Length	-		571		-		665		-		804		640		-		-		-		-			
		SE	-		6		-		8		-		28		-		-		-		-		-			
		Range	-		520-750		-		510-795		-		650-915		-		-		-		-		-			
		n	-		41		-		65		-		9		1		-		-		-		-			
		Female Mean Length	-		-		-		744		-		850		-		-		770		-		-			
		SE	-		-		-		12		-		10		-		-		-		-		-			
		Range	-		-		-		660-845		-		780-940		-		-		-		-		-			
		n	-		-		-		14		-		19		-		-		1		-		-			
Periods 3 & 4	110	Male	0	0.0	194	52.7	0	0.0	103	28.2	0	0.0	27	7.3	3	0.9	0	0.0	3	0.9	0	0.0	0	0.0	330	90.0
(6/29, 7/1)		Female	0	0.0	0	0.0	0	0.0	17	4.5	0	0.0	20	5.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	37	10.0
		Subtotal	0	0.0	194	52.7	0	0.0	120	32.7	0	0.0	47	12.7	3	0.9	0	0.0	3	0.9	0	0.0	0	0.0	367	100.0
		Male Mean Length	-		576		-		708		-		814		680		-		700		-		-			
		SE	-		5		-		13		-		19		-		-		-		-		-			
		Range	-		510-665		-		570-855		-		740-915		-		-		-		-		-			
		n	-		58		-		31		-		8		1		-		1		-		-			
		Female Mean Length	-		-		-		800		-		802		-		-		-		-		-			
		SE	-		-		-		28		-		23		-		-		-		-		-			
		Range	-		-		-		715-855		-		710-878		-		-		-		-		-			
		n	-		-		-		5		-		6		-		-		-		-		-			

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Appendix F. Continued (page 2 of 2).

Fishing Period (Sample Dates)	Sample Size		Brood Year (Age Class)																						Total	
			2008		2007				2006				2005				2004				2003					
			(1.1)		(1.2)		(2.1)		(1.3)		(2.2)		(1.4)		(2.3)		(1.5)		(2.4)		(1.6)		(2.5)			
			N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Periods 5-11	59	Male	0	0.0	253	45.8	0	0.0	103	18.6	0	0.0	65	11.9	0	0.0	9	1.7	0	0.0	0	0.0	0	0.0	430	78.0
(7/3, 4, 6, 14)		Female	0	0.0	0	0.0	0	0.0	28	5.1	0	0.0	94	16.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	122	22.0
		Subtotal	0	0.0	253	45.8	0	0.0	131	23.7	0	0.0	159	28.8	0	0.0	9	1.7	0	0.0	0	0.0	0	0.0	552	100.0
		Male Mean Length	-		585		-		718		-		781		-		970		-		-		-			
		SE	-		10		-		14		-		23		-		-		-		-		-			
		Range	-		475-670		-		635-780		-		685-860		-		-		-		-		-			
		n	-		27		-		11		-		7		-		1		-		-		-			
		Female Mean Length	-		-		-		802		-		847		-		-		-		-		-			
		SE	-		-		-		18		-		35		-		-		-		-		-			
		Range	-		-		-		765-820		-		795-905		-		-		-		-		-			
		n	-		-		-		3		-		10		-		-		-		-		-			
Season	427	Male	0	0.0	783	37.5	0	0.0	686	32.8	5	0.2	189	9.0	8	0.4	14	0.7	3	0.2	0	0.0	0	0.0	1,688	80.8
		Female	0	0.0	0	0.0	0	0.0	134	6.4	0	0.0	259	12.4	0	0.0	0	0.0	9	0.4	0	0.0	0	0.0	402	19.2
		Total	0	0.0	783	37.5	0	0.0	820	39.2	5	0.2	448	21.4	8	0.4	14	0.7	12	0.6	0	0.0	0	0.0	2,090	100.0
		Male Mean Length	-		577		-		686		630		813		654		970		700		-		-			
		SE	-		4		-		5		-		12		-		-		-		-		-			
		Range	-		475-750		-		520-855		-		650-920		640-680		-		-		-		-			
		n	-		159		-		148		1		36		2		2		1		-		-			
		Female Mean Length	-		-		-		776		-		839		-		-		772		-		-			
		SE	-		-		-		11		-		12		-		-		-		-		-			
		Range	-		-		-		660-920		-		710-970		-		-		770-775		-		-			
		n	-		-		-		28		-		48		-		-		2		-		-			