

Yukon River Inseason Salmon Harvest Interviews, 2007

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Abstract

Subsistence salmon harvest information collected during the fishing season is an important management tool for Yukon River fishery managers. Information gauging progress towards subsistence salmon harvest goals, fishing conditions, and quality of subsistence catch was collected in 2007. Interviews were conducted between May 27 and July 29, 2007 in the Yukon River villages of Emmonak, Marshall, Holy Cross, Kaltag, Huslia, Galena, Beaver, and Eagle, a subsample of households were contacted each week to evaluate their progress towards meeting subsistence harvest goals. A total of 128 households were interviewed and 429 interviews were conducted during the Chinook salmon *Oncorhynchus tshawytscha* and summer chum salmon *O. keta* fishing season. Information from these interviews was reported during 14 weekly public Yukon River Drainage Fisheries Association teleconferences, distributed in eight weekly written summaries, and used in three federal inseason memorandums of concurrence management reports. Compared with information from previous seasons, subsistence harvest goal progression was average to below average in all villages with the exception of Holy Cross which reported an above average subsistence fishing season. Inseason interview information indicated that the largest change in subsistence harvest goal progression occurred when the first pulse of Chinook salmon was present in the villages of Emmonak and Holy Cross. The remaining communities reported the largest change occurred when the second pulse of Chinook salmon was present. In general, subsistence harvest goals for Chinook salmon, excluding the village of Huslia, were finished at or greater than the 80th percentile, while summer chum salmon harvest goals varied between 35% and 90% for the 2007 fishing season.

Introduction

Chinook *Oncorhynchus tshawytscha* and chum *O. keta* salmon spawn in the Yukon River and its tributaries which are located in the Yukon Delta, Koyukuk, Nowitna, Innoko, Kanuti, Arctic, and Yukon Flats National Wildlife Refuges (Figure 1). The Yukon River is approximately 2,000 miles in length, the majority of which 1,200 miles is located in Alaska and the remainder is in Canada (Kammerer 1990).

Chinook and summer chum salmon are important species for subsistence, commercial, sport, and personal use fisheries. Yukon River salmon return to their natal breeding grounds to spawn beginning in early summer and ending in late fall. Chinook salmon begin upstream migration in the Yukon River during late May (Bales 2008). Chinook salmon spawn throughout the Yukon River drainage with some spawning grounds located over 1,900 miles from the Bering Sea (Healey 1991). Summer chum salmon enter the Yukon River in early June and spawn primarily in tributaries located between the mouth of the Yukon River to the Tanana River drainage (ADF&G 2002). Returning adult salmon are harvested in subsistence, personal use,

commercial and sport fisheries in Alaska and in aboriginal and domestic fisheries in Canada (JTC 2007).

Decreases in the Alaskan combined commercial and subsistence harvests of Chinook salmon have occurred since an extremely poor run in 2001. The recent five year (2002-2006) average of approximately 94,000 fish is well below the ten year (1989-1998) average of approximately 156,000 fish (Hayes et. al. 2006). In response to this decrease, the State of Alaska Yukon River management determination lists Chinook salmon as a stock of “yield concern” (Hayes et. al. 2006), which is defined as “a concern 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. A yield concern is less severe than a management concern, which is less severe than a conservation concern” (5 AAC 39.222(f)(42)) (ADF&G 2004). Summer chum salmon have not been designated a level of concern due to their recent history of adequate run sizes (Clark et. al. 2006).

Postseason surveys have been conducted annually on the Yukon River by the ADF&G since 1961. These surveys help to estimate subsistence salmon harvest levels, evaluate management actions postseason, and detect and quantify shifts in harvest patterns and amounts (Borba and Hamner 2001). This information is only collected postseason and therefore unavailable for inseason management. The ten year (1997-2006) average subsistence harvest was estimated at 52,000 Chinook and 86,000 summer chum salmon (JTC 2007).

Managing mixed stocks and overlapping species with compressed or similar Yukon River entry timing and harvested using different gear types (set gillnets, drift gillnets, and fishwheels) with variable catch efficiencies is a complex task. Numerous projects are used to evaluate inseason salmon run-timing and strength, including test-net and fishwheel index fisheries, sonar, aerial counts, weir and tower counts, and salmon age assessment based on scales. However, these projects target quantitative data collection specific to escapement and run assessment and do not assess progress towards meeting subsistence harvest goals. As a result, inseason interviews were implemented to assist in meeting the mandate set forth in the Alaska Native Interest Lands Conservation Act (ANILCA) and the State of Alaska Statute 16.05.258 *Subsistence use and allocation of fish and game*, both of which requires a priority for subsistence over other consumptive uses.

The goal of the inseason interview project is to collect and summarize inseason subsistence salmon harvest information so that it can be used to inform inseason management decisions. The information collected provides fisheries managers with comparative harvest indices and an additional salmon run evaluation tool. In addition, it promotes feedback from and fosters involvement in management by subsistence fishermen. The communities were selected to participate in the study were chosen because of their proximity to federal conservation system as well as the presence of a dedicated interviewer. Interview collection and summary techniques were based on a methodology developed in 2003 (Gerken and Holder 2005). The project was funded by the United States Fish and Wildlife Service (USFWS), Office of Subsistence Management, Fisheries Resource Monitoring Program.

The 2007 project objectives included:

1. Facilitate inseason subsistence salmon interviews by local residents from early June to mid August in eight Yukon River communities (Emmonak, Marshall, Holy Cross, Kaltag, Galena, Huslia, Beaver, and Eagle).

2. Document subsistence harvest information in a standardized format weekly from at least five active fishing households per village. Provide a summary of subsistence fishing to fisheries managers by Monday noon of each week for inclusion in inseason fisheries management decision-making.
3. Promote/support local governments and or tribal organizations in developing their natural resource capabilities and programs.
4. Identify new local interviewers and encourage their participation in the preseason training program.

Methods

Data Collection

Individuals were selected as interviewers based on their in-depth knowledge about their community and local fishing activities. Interviewers were employed either by the USFWS National Wildlife Refuge system as a refuge information technician (RIT) or by the Yukon River Drainage Fisheries Association (YRDFA). Interviews with subsistence fishermen in Emmonak, Marshall, Kaltag, Huslia, Galena, and Eagle were conducted by YRDFA local hires. USFWS employees conducted interviews in Holy Cross and Beaver. USFWS personnel trained new interviewers in their village on an individual basis and consulted with experienced interviewers via telephone and during other Yukon River meetings.

Before the fishing season, interviewers contacted households either in person or by telephone to explain the project, determine if members of the household were willing to participate in the project, and gain their consent to be interviewed. Household lists from the ADF&G postseason subsistence surveys were used to identify potential interview contacts. Information from the ADF&G postseason surveys categorized households into unique strata dependent upon their degree of harvest during the prior five fishing seasons. These harvest strata were: Unknown, Do Not Fish, Light (1-100 salmon), Medium (101-500 salmon), or Heavy (> 500 salmon) harvester (Busher and Hamazaki 2007). Households identified for this project were categorized in the medium and heavy harvest strata. The assumption guiding this selection was that households in the medium and heavy harvest strata fished longer and more frequently and would provide greater consistency in weekly subsistence fishing input.

Interviews¹ were conducted weekly from June through August with a minimum sample of five subsistence fishing households per village. Timing of interviews depended on when salmon were present. Interviews were conducted near the end of the week, typically on weekends. Interviewers collected information on: 1) fishing gear used; 2) relative comparison to the 2006 season catch rate (“better”, “same”, “poor”) and amount of time fished (“more”, “equal”, “less”); 3) the harvest goal progress (expressed as a percentage in 25% increments) that households were making toward completing their subsistence harvest; 4) and general comments from fishermen related to the salmon run.

Interviewers summarized the results and provided the information to the USFWS project leader, who compiled the weekly subsistence information from all villages and distributed written weekly summaries to managers and the public. Verbal summaries describing fishing conditions and subsistence harvest progress for each village were presented at weekly YRDFA

¹ For the purposes of this study, an interview is defined as a meeting between an interviewer and a representative of a subsistence fishing household where information was obtained and documented by the interviewer.

teleconferences. Household specific interview information was confidential and no information that could identify an individual household was released to the general public.

Data Analysis

Data were analyzed in three ways. First, to evaluate inseason harvest progression a weekly average percentage was reported. This percentage represents the qualitative estimate of a village's subsistence harvest goal progression throughout the fishing season. Second, to estimate harvest goal completion, a final harvest percentage was reported. This percentage represented the qualitative estimate of a village's harvest goal success. Third, the 2007 harvest trend was compared to the historical Chinook salmon harvest trend, historical Chinook salmon run-timing quartiles, and incoming Chinook salmon pulse-timing. These comparisons were important for monitoring subsistence fishing practices and evaluating and predicting subsistence salmon harvest goal progress and success during a fishing season.

The weekly average percentage was calculated using household responses to the question "where are you at in your harvest (%)" during an interview week. In order to maintain consistency between villages, the weekly average percentage was constrained by two criteria. First, once a household reported it began fishing, indicated by a reported harvest percentage > 0%, the household was included in all remaining weekly average percentages regardless of an interview occurring. It was assumed that a household continued to fish and that the reported percentage would not decrease. For example, if a household reported 50% on week one and was not interviewed again until week four, the weekly harvest percentages for week two and week three was considered 50%. Second, once a household reported a 100% completion, it was considered to have met its harvest goal and was no longer interviewed. A household reporting 100% completion was included in following weekly averages as 100%. The weekly average percentage tracked harvest progression by village during the fishing season, interviews ended when the majority of fishing households reported 100% and those households not reporting 100% reported no longer fishing for Chinook salmon. The weekly average percentage was reported inseason in a weekly harvest summary datasheet (Appendix A).

Estimating the level of subsistence harvest goal success a village, as a whole, attained after the fishing season was expressed as a final percentage in the village summaries. The final percentage was the weighted average from all interviewed households during the 2007 fishing season. A household was included in the weighted average if it reported a harvest percentage greater than 0%. This percentage was weighted by the number of interviews per household. For example, a household interviewed twice had a lower weight in the final percentage than a household with ten interviews. Maintaining a consistent weekly household interview list was not always possible and some households were interviewed at a higher frequency than others. A household which was consistently interviewed throughout the fishing season was thought to represent subsistence harvest progression more accurately than a household that was interviewed infrequently.

Linear trend comparison was used to assess how a village's 2007 harvest progression compared to previous years. The values for the weekly average percentage from past interview years (2002 – 2006) were averaged, resulting in a historical mean average. Historical mean averages were used to generate a scatterplot for each project village. A linear trend was fitted to the data using Microsoft Excel. This trend represented the historical harvest progression. This analysis was specific to Chinook salmon data because summer chum salmon historical data was insufficient to

develop historical trend lines. The same process was used to produce a linear trend from the 2007 weekly average percentages.

The timing of the quarter-point, midpoint, and three-quarter point of a particular salmon run are generally unknown until the run is completed, therefore comparisons of run-timing inseason typically involve historical averages. The historical run-timing (1989-2006) of these quartile points in the lower river for Chinook salmon, indicated by the ADF&G lower Yukon River test fishery were June 15, June 20, and June 26. Historical summer chum salmon quartile points (1986-1991, 1993-1995, and 1997-2006) in the lower river were based on the ADF&G Pilot Station sonar project and occur on June 22, June 27, and July 3. In the following discussions of individual village subsistence harvest progression, the historical run-timing was compared to the weekly average percentages. If subsistence harvest progression tracked exactly with historical run-timing, then managers would expect a village to have harvested 25% of their subsistence goals by the quarter point, 50% by the midpoint, and 75% by three-quarter point.

The contribution to village harvest goal progression made by a specific salmon pulse was expressed as a harvest progression increase. This increase was calculated by subtracting the weekly average percentage between interview weeks when a salmon pulse was present. Pulse-timing occurring in a village was based on salmon run-timing. Salmon run-timing occurring for a village was estimated using the length of the run in relation to the ADF&G lower Yukon River test fishery for Chinook salmon. Dates for each village were estimated using a daily swimming rate of 37 miles/day for Chinook salmon. Radio-telemetry used to identify Chinook salmon movement patterns on the Yukon River indicated that radio-tagged fish traveled an average of 31 miles/day in 2003 (Eiler et. al. 2006), while Chinook salmon captured in the Ramparts Rapids fishwheel project traveled at 41 miles/day in 2005 (Zuray 2005). Inseason analysis indicated that Chinook salmon were traveling 37 miles/day in 2007. Specific to the 2007 Chinook salmon run, pulses were observed in the ADF&G lower Yukon River test fishery on June 14, June 20, and June 27, 2007. This information was used to estimate the migration run-timing and pulse-timing dates for villages participating in this project and was specific to the project's target species, Chinook salmon.

Results

A combined total of 429 interviews were conducted in the villages of Emmonak, Marshall, Holy Cross, Kaltag, Huslia, Galena, Beaver, and Eagle during the 2007 Chinook and summer chum salmon fishing season. Subsistence harvest information for summer chum salmon was collected in Emmonak, Marshall, Kaltag, Galena, and Huslia. Interviews for both species were conducted between May 27 and July 29, 2007. Data were summarized and presented in both written and verbal formats. Interview information was distributed in eight written weekly updates provided to fishery managers and interviewers, USFWS (Emmonak/Fairbanks), Emmonak Tribal Council, ADF&G Commercial and Subsistence Divisions, YR DFA, Loudon Tribal Council, Ohogamiut Tribal Council, Yukon Flats, Innoko, Yukon Delta, Koyukuk/Nowitna National Wildlife Refuges, local regional advisory council and coordinating fisheries committee members, and USFWS/Office of Subsistence Management (Anchorage). Weekly information was presented verbally on all 14 YR DFA teleconferences that occurred in 2007 (Table 1).

2007 Catch Rates and Fishing Time

Information regarding catch rates and fishing time for Chinook salmon in 2007 as compared to the 2006 fishing season was collected between June 3 and July 8, 2007 in lower river villages of

Emmonak, Marshall, and Holy Cross. A total of 95 responses comparing the amount of time fished in 2007 to 2006 during the Chinook salmon fishing season were provided. The majority of these households indicated that they spent less time fishing and that catch rates were better in 2007 than in 2006 (Table 2). A total of 91 responses comparing the amount of time fished in 2007 to 2006 during the Chinook salmon fishing season were provided by households in the upper Yukon River communities of Kaltag, Huslia, Galena, Beaver, and Eagle. Information was collected between June 24 and July 29, 2007. The majority of these households indicated that catch rates were poor and that they fished an equal amount of time as compared to the 2006 Chinook salmon fishing season (Table 3).

Interviews pertaining to summer chum salmon harvests were conducted with households in Emmonak, Marshall, Kaltag, Galena, and Huslia between June 10 and July 29, 2007. A total of 104 responses were provided by households during the summer chum salmon fishing season regarding catch rates, and 102 responses were provided regarding the amount of time fished as compared to the 2006 fishing season. Differences in the total number of responses were a result of fishermen declining to comment or an incomplete interview. The majority of households indicated that catch rates were better in 2007 and that the amount of time fished was less or equal as compared to the 2006 fishing season (Table 4).

Village Results

The weekly average percentage estimates (estimate of village harvest progression) for Chinook salmon were likely lower than corresponding actual percentages because many households could not be interviewed weekly (Table 5 and 6). In these instances, the percentage from the prior interview was used to estimate the weekly average percentage. A household that was not contacted likely had a larger harvest percentage than the week before, if they fished, and therefore the weekly average percentage represents the minimum for any interview week. This analysis was used because the number of interviews per week in a village differed and the households interviewed weekly differed in subsequent weeks. The final percentage (estimate of village harvest completion) was based on information collected in an interview and does not assume a harvest percentage in weeks where an interview for a household was not conducted (Table 5 and 6). Using a weighted average to depict the final percentage minimizes the influence of households that were interviewed infrequently.

All villages had an estimated final percentage at or greater than 80% for Chinook salmon, excluding the village of Huslia, which had a final percentage of 13%. Additionally, comparisons of the 2007 Chinook salmon harvest progression trend to the historical harvest progression trend indicated that Chinook salmon harvests were average in Emmonak, Kaltag, and Beaver, above average in Holy Cross, and below average in Galena and Huslia during the 2007 fishing season. The 2007 harvest progression trend in the village of Marshall indicates that the 2007 harvest was better compared to the 2006 harvest progression trend. No historical harvest progression information exists for the village of Eagle. Comparisons of pulse-timing in villages to the weekly average percentage in each village indicated that pulse 1 provided the largest Chinook salmon subsistence harvest increase in the villages of Emmonak and Holy Cross while pulse 2 provided the largest subsistence harvest increase in the remaining villages (Table 5 and 6). The final percentage for summer chum salmon ranged from 35% to 90% (Table 7).

Emmonak

Interviews occurred between June 3 and July 15, 2007. Four to 22 households were interviewed weekly. The historical quartiles for Chinook salmon run-timing in Emmonak were June 15, June 20, and June 26. During the week these dates occurred, the weekly average percentages for Chinook salmon were 47%, 53%, and 58%, respectively. Subsistence fishing around the three-quarter point was lower than the historical value because commercial fishing activity displaced subsistence fishing between June 10 and July 1, 2007. The 2007 harvest progression trend as compared to the five year historical harvest progression trend (2002 – 2006) began approximately a week later, but was near average as the Chinook salmon run continued (Figure 2). The final percentage for Chinook salmon harvest from all interviewed households was 92% occurring on July 15, 2007.

Chinook salmon pulses were present in the Emmonak area on June 14, June 20, and June 27, 2007. Harvest progression increases attributed to these pulses were 47%, 6%, and 5%. An increase of 28% occurred after all Chinook salmon pulses passed the Emmonak area and after commercial fishing ceased.

The historical quartiles for summer chum salmon run-timing in Emmonak were June 16, June 21, and June 27, 2007. The weekly average percentages for summer chum salmon on these dates were 44%, 44%, and 57%, respectively. The final percentage for summer chum salmon from all interviewed households was 84% occurring on July 15, 2007.

Marshall

Interviews occurred between June 10 and July 22, 2007. Four to 14 households were interviewed weekly. The historical quartiles for Chinook salmon run-timing in Marshall were June 18, June 23, and June 29. The weekly average percentages for Chinook salmon on these dates were 0%, 31%, and 58%, respectively, indicating that subsistence fishermen were behind in their subsistence harvests compared to historical quartiles. The 2007 harvest progression trend indicated that fishing was better as compared to the 2006 harvest progression trend. However, the 2006 trend was based on a low number of interviews, which resulted in a poor fitting regression (Figure 3). The final percentage for Chinook salmon harvest from all interviewed households was 87% occurring on July 22, 2007.

Chinook salmon pulses were present in the Marshall area on June 17, June 23, and June 30, 2007. Harvest progression increases attributed to these pulses were 31%, 27%, and 17%. An increase of 8% occurred after all Chinook salmon pulses passed the Marshall area.

The historical quartiles for summer chum salmon run-timing in Marshall were June 24, June 29, and July 5, 2007. The weekly average percentage for summer chum salmon on these dates was 12%, 49%, and 49%, respectively. The final percentage for summer chum salmon from all interviewed households was 84% occurring on July 22, 2007.

Holy Cross

Interviews occurred between May 27 and July 8, 2007. Five to 13 households were interviewed weekly. The historical quartiles for Chinook salmon run-timing were June 22, June 27, and July 3. The weekly average percentages for Chinook salmon on these dates were 67%, 75%, and 80% indicating that subsistence fishermen were completing their harvest goals ahead of quartile points. The 2007 harvest progression trend as compared to the 2003 – 2006 Chinook salmon

historical harvest progression trend indicated that subsistence harvests were completed ahead of average (Figure 4). The final percentage for Chinook salmon harvest from all interviewed households was 84% occurring on July 8, 2007.

Chinook salmon pulses were present in the Holy Cross area on June 21, June 27, and July 4, 2007. Harvest progression increases attributed to these pulses were 67%, 8%, and 5%.

Kaltag

Interviews occurred between June 24 and July 29, 2007. Eight to nine households were interviewed weekly. The historical quartiles for Chinook salmon run-timing were June 27, July 2, and July 8. The weekly average percentages for these dates were 23%, 58%, and 72%, respectively, indicating that subsistence fishermen were completing their harvest goals. The 2007 harvest progression trend as compared to the 2005 – 2006 historical harvest progression trend appeared near average (Figure 5). The final percentage for Chinook salmon harvest from all interviewed households was 80% occurring on July 29, 2007.

Chinook salmon pulses were present in the Kaltag area on June 26, July 2, and July 9, 2007. Harvest progression increases attributed to these pulses were 23%, 35%, and 14%. An increase of 8% occurred after all Chinook salmon pulses passed the Kaltag area.

The historical quartiles for summer chum salmon run-timing in Kaltag were July 10, July 15, and July 21, 2007. The weekly average percentages for summer chum salmon on these dates were 18%, 55%, and 57%, respectively. The final percentage for summer chum salmon from all interviewed households was 90% occurring on July 22, 2007.

Galena

Interviews occurred between June 10 and July 29, 2007. Seven to 10 households were interviewed weekly. The historical quartiles for Chinook salmon run-timing were June 29, July 4, and July 10. The weekly average percentages for these dates were 10%, 38%, and 50%, respectively, indicating subsistence fishermen were behind in completing their harvest goals. The 2007 harvest progression trend as compared to the 2002 – 2006 historical harvest progression trend appeared below average (Figure 6). The final percentage for Chinook salmon harvest from all interviewed households was 88% occurring on July 29, 2007.

Chinook salmon pulses were present in the Galena area on June 28, July 4, and July 11. Harvest progression increases attributed to these pulses were 3%, 28%, and 12%. An increase of 31% occurred after Chinook salmon pulses passed through the Galena area.

The historical quartiles for summer chum salmon run-timing in Galena were July 15, July 20, and July 26, 2007. The weekly average percentages for summer chum salmon on these dates were 10%, 43%, and 43%, respectively. The final percentage for summer chum salmon from all interviewed households was 59% occurring on July 22, 2007.

Huslia

Interviews occurred between June 24 and July 29, 2007. Four to eight households were interviewed weekly. The historical quartiles for Chinook salmon run-timing were July 4, July 9, and July 15. The weekly average percentages for these dates were 2%, 10%, and 10%, respectively, and were well below historical quartiles. The 2007 harvest progression trend as compared to the 2004 – 2006 historical harvest progression trend appeared below average

(Figure 7). The final percentage for Chinook salmon harvest from all interviewed households was 13% occurring on July 29, 2007.

Chinook salmon pulses were present in the Huslia area on July 3, July 9, and July 16. Harvest progression increases attributed to these pulses were 3%, 8%, and 0%. An increase of 2% occurred after Chinook salmon pulses passed the Huslia area.

The historical quartiles for summer chum salmon run-timing in Huslia were July 25, July 30, and August 5, 2007. Interviews ended on July 29, 2007 and do not include information specific to summer chum salmon after the midpoint. The weekly average percentages for summer chum salmon on the quarter-point and midpoint were 13% and 27%, respectively. The final percentage for summer chum salmon from all interviewed households was 35% occurring on July 29, 2007.

Beaver

Interviews occurred between June 24 and July 29, 2007. Five to eight households were interviewed weekly. The historical quartiles for Chinook salmon run-timing were July 10, July 15, and July 21. The weekly average percentages for these dates were 5%, 5%, and 65%, respectively. Minimal interviews occurred prior to July 22, 2007 and were likely not representative of the actual harvest progression. Nonetheless, the weekly average percentage on July 22, 2007 of 65% was still below the historical three quarter-point. The 2007 harvest progression trend as compared to the 2004 – 2006 historical harvest progression trend appeared average. There is high variability associated with the 2007 harvest progression trend due to minimal interviews prior to July 22, 2007 (Figure 8). The final percentage for Chinook salmon harvest from all interviewed households was 86% occurring on July 29, 2007.

Chinook salmon pulses were present in the Beaver area on July 9, July 15, and July 22. Harvest progression increases attributed to these pulses were 0%, 60%, and 14%. The increase for the first pulse was likely inaccurate due to the lack of interviews during that time period.

Eagle

Interviews occurred between July 1 and July 29, 2007. Five to 14 households were interviewed weekly. The historical quartiles for Chinook salmon run-timing were July 11, July 16, and July 22. The weekly average percentages for these dates were 2%, 62%, and 96% indicating subsistence fishermen were completing their harvest goals ahead of historical quartiles around the midpoint and the three-quarter point. No historical harvest comparison was available for the village of Eagle (Figure 9). The final percentage for Chinook salmon harvest from all interviewed households was 97% occurring on July 29, 2007.

Chinook salmon pulses were present in the Eagle area on July 10, July 16, and July 23. Harvest progression increases attributed to these pulses were 2%, 60%, and 34%.

Gear Type

Fishery managers have the ability to regulate fishing gear if there is a concern for species conservation. Regulations regarding the allowable fishing gear differ between lower river and upper river fishing districts. The primary difference is the use of drift gillnets in the lower river. Subdistrict 4A has a limited drift gillnet fishery availability regulated by date, see 5AAC 01.220(e) (2) (ADF&G 2004). Sixty-two fishermen were interviewed for gear type in lower Yukon River Districts 1, 2, and 3 and the middle river Subdistrict 4A. In these areas the use of a drift gillnet was predominant ($n = 32$). In the Koyukuk River District, middle Yukon River

Subdistricts 4B and 4C and in the upper Yukon River Subdistrict 5D, 30 fishermen were interviewed for gear type. Half ($n = 15$) reported fishing with set gillnets.

Discussion

Inseason Chinook salmon run assessment information is limited, particularly early in the fishing season. This project was designed to provide additional inseason subsistence fishing information to fishery managers throughout the Chinook salmon fishing season. Project objectives were to collect and document information on subsistence salmon harvests inseason. Data collected assisted fisheries managers in making more informed management decisions, especially with regard to changes to subsistence fishing time and implementation of commercial fishing opportunities. The information gathered through this project helps managers to: evaluate inseason subsistence salmon harvest progression during the fishing season; provide comparisons to other inseason management information such as historical run-timing quartiles, historical harvest goal progression, and Chinook salmon pulse timing; and provide an evaluation of village subsistence harvest goal completion.

Managers attain subsistence fishing reports on YRDFA teleconferences and in ad hoc telephone calls. However, because this information is limited in application for predicting subsistence harvest goal progression or subsistence harvest goal completion inseason, development of a comparative indicator between inseason harvest goal progression and historical run-timing quartiles and historical harvest goal progression was an important evaluative tool. A weekly average percentage, which estimated harvest goal progression during the fishing season, that exceeded 25% on the date of the historical quarter-point, 50% on the date of the historical midpoint, and 75% on the date of the historical three-quarter point was considered favorable for harvest goal completion in a village. Conversely, a weekly average percentage below historical quartiles raised concerns for harvest goal completion. Excluding the villages of Emmonak, Holy Cross and Kaltag, all villages reported weekly average percentages in 2007 that were below the historical quarter-point. Weekly average percentages reported around the historical midpoint were lower in the villages of Marshall, Galena, Huslia, and Beaver. Weekly average percentages reported around the historical three-quarter point were lower in Emmonak, Marshall, Galena, Huslia, and Beaver. Of the eight villages participating in this project, it appeared that the majority were below the historical quartiles for their village during the entire 2007 fishing season.

Fishery managers can forecast quartiles inseason using historical information. Being able to predict these quartiles is an important assessment tool because it provides a timeline for how many fish have entered the river. With regard to subsistence harvest progression, a village could be above or below an average quartile at any time during the fishing season. When this happens, it might be a result of the incoming salmon run-timing being earlier or later than average. As a result, interpretation of subsistence fishing success can be difficult. For example, if the actual run-timing is later than average, then the comparison of the weekly average percentages to historical quartiles would appear below average and subsistence harvest progression would be viewed as underachieving. If the actual run-timing was earlier than the comparison would appear above average and management would view subsistence harvest progression optimistically. In 2007, the run-timing was near average, approximately two days later than average as measured in the ADF&G lower Yukon River test fishery, making this comparison a useful gauge of harvest goal progression. Of course there are other variables that affect

subsistence fishermen success, such as fishing conditions or high gas prices, but measuring the impact of these factors on fishing success is complicated.

Ideally, a project interviewer would be able to contact the same village households at the same time every week. In reality, this rarely occurs. When an interviewer was unable to be contact a household, the percentage from the prior interview week was used in the weekly average percentage as long as the percentage was greater than 0%. It was assumed that the harvest percentage a household reported did not decrease, but without the interview information an increase in that harvest percentage from a prior interview could not be confirmed. This assumption resulted in the values calculated for weekly average percentages to be biased low. As a result, there is some ambiguity in the comparison of the 2007 weekly average percentages and trends to the historical quartiles and harvest progression trends. Regardless, both comparisons consistently yielded similar evaluations, regarding subsistence harvest progression in a village. The villages that were above average, such as Holy Cross, always had weekly average percentages greater than historical quartiles. Villages such as Emmonak, Kaltag, and Beaver, which had weekly average percentages greater than historical quartiles, part of the time, were average compared to historical harvest progression. While villages that always had weekly average percentages below historical quartiles, such as Huslia and Galena, were below average compared to historical harvest progression.

Since the onset of this project in 2002, subsistence Chinook salmon harvest goal completion in the village of Huslia has generally finished near the 50th percentile. Hayes et. al. (2008) indicated that summer chum salmon were the dominant salmon species harvested for subsistence in this area. The total Chinook salmon harvest in Huslia was near 200 fish and the summer chum harvest was approximately 1,300 fish in 2005 (Busher 2007). Likely the majority of Chinook salmon were caught in gear targeting summer chum salmon as bycatch. However, the small harvest of Chinook salmon in Huslia should not negate the importance of this project for management. When the final percentage for Chinook salmon in Huslia was below or well below the 50th percentile, such as in 2007, the Chinook salmon run was categorized as below average by management. Alternately, when the final percentage was near or above the 50th percentile, such as in 2003, the Chinook salmon fishing season was indicative of an average Chinook salmon run.

Based on the information collected during the 2007 Chinook salmon fishing season, all villages, excluding Huslia, finished at or greater than the 80th percentile for Chinook salmon harvest goal completion. This was surprising because inseason comparisons of the 2007 harvest progression to historical quartiles and historical harvest trends varied between villages. The variation can be explained by reviewing the catch rate and time fished information as compared to the 2006 fishing season. This information indicated that those villages that appeared above average (Holy Cross) consistently reported having better catch rates, but having to fish more. While the villages that appeared average (Kaltag and Beaver) and below average (Marshall, Galena, and Huslia) reported poorer catch rates, fishing longer, or both. Conversely, comparisons to historical information in Emmonak indicated an average year for subsistence harvest progression even though they fished less and had better catch rates.

Subsistence fishermen throughout the Yukon River commented that their fishing practices changed in 2007 as compared to previous years, due to warmer water temperature, which resulted in three changes in subsistence fishing practices. First, subsistence fishermen reported having to check their fishing gear more frequently because captured fish were spoiling quicker.

Second, they reported having to find different fishing locations that were more productive, such as moving farther out into the thalweg to fish deeper portions of the river where Chinook salmon were present. Finally, they had to fish longer as compared to the 2006 run. Subsistence fishermen in the villages of Emmonak and Holy Cross started fishing during the second week of June in both the 2006 and the 2007 fishing season. In 2006, they finished subsistence fishing for Chinook salmon around July 4, 2006, whereas in 2007 they fished until July 15, 2007. The villages of Galena and Kaltag began fishing in 2006 and 2007 on the third week of June and finished the last week of July, although the 2006 run was approximately 4 – 5 days later than the 2007 Chinook salmon run.

Fishing practices in combination with fish entry timing and abundance made Chinook salmon subsistence goals difficult to meet in 2007. Many subsistence fishermen reported having to fish longer and harder in the latter portion of the run. Usually, a lower river household can complete the majority of its harvest goals during the presence of one Chinook salmon pulse, while an upper river household completes the majority of harvest in two pulses. Therefore incoming Chinook salmon pulses have a greater importance dependent upon a household's location on the river. Pulse 1 typically triggers subsistence salmon fishing in most communities. In the villages of Emmonak and Holy Cross, this pulse contributed the largest increase in harvest progression for Chinook salmon. Pulse 2 contributed a larger increase in harvest progression in the remaining villages while contributing the second largest increase in the villages of Emmonak and Holy Cross. Pulse 3 contributed the second largest increase in harvest progression in Marshall, Galena, Beaver, and Eagle. Another indication that meeting subsistence harvest goals was difficult in 2007 was the occurrence of large increases in harvest progression after the third pulse. In the villages of Emmonak, Marshall, and Galena these increases were greater than when some Chinook salmon pulses were present.

The delay in fishing effort was likely caused by environmental, economic, and regulatory factors. Higher water temperatures and changes in water flow can compact incoming salmon runs, shift run-timing, and alter migratory routes resulting in decreased harvest efficiency. The price of gas in Emmonak increased approximately \$0.60 between the 2006 (\$5.12) and 2007 (\$5.73) fishing seasons causing fishermen to wait for increased fish abundance to decrease fuel costs. Additionally, the State of Alaska Board of Fisheries implemented the “windowed” subsistence fishing schedule in 2001, intended to reduce harvest impacts on any component of salmon run during years of low abundance and to spread subsistence harvest opportunity among years. The “windowed” schedule appears to accomplish this purpose. However, it should be recognized that fishing effort is an important component of management, salmon run evaluation, and the socioeconomic environment on the Yukon River and when it changes it raises questions regarding how inseason management and regulatory changes may impact subsistence users.

Evaluating inseason Chinook salmon subsistence harvest goal progression and completion was possible. This project collected a variety of data in order to monitor, evaluate, and predict subsistence harvest goal progression and completion. Comparisons of the 2007 subsistence harvest information to historical information and inseason information was valuable for evaluating harvest progression and if harvest completion would occur. Evaluating how and what fishing practices were occurring was accomplished through subsistence fishermen feedback and comparisons to the 2006 fishing season. Each type of collected data had weaknesses, but when all of the information is considered together, it provided fishery managers with important insight into Chinook salmon subsistence harvest goal progression and completion and fishing practices.

This information can be applied to other projects such as the ADF&G postseason salmon survey to augment inseason harvest analysis used to monitor long-term changes in subsistence fishing time and rates of subsistence harvest. Additionally, this project provides an additional opportunity for fishermen in fish camps to contribute and receive information related to the incoming salmon runs.

This project primarily targeted Chinook salmon subsistence harvest information. Summer chum salmon information collected throughout the 2007 fishing season was included in the results section of this report. In summary, the 2007 summer chum salmon information indicates that most households in the lower river villages fished less time and had better catch rates as compared to the 2006 fishing season, while households in upper river villages fished an equal amount of time and reported poor catch rates as compared to the 2006 fishing season. The final percentage in lower river villages was in the 80th percentile and in upper river villages ranged from 35% to 90%.

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Table 1. YR DFA teleconferences attendance by local hire and Refuge Information Technicians during the 2007 salmon fishing season.

Week Ending	Emmonak	Marshall	Holy Cross	Kaltag	Galena	Huslia	Beaver	Eagle
29-May	X	X	X		X	X		X
5-Jun	X		X					X
12-Jun	X	X	X		X	X		
19-Jun	X	X	X	X	X	X	X	
26-Jun	X	X	X	X	X	X	X	X
3-Jul	X		X		X	X	X	X
10-Jul	X	X	X		X	X	X	X
17-Jul	X	X		X	X	X		
24-Jul	X			X	X			X
31-Jul	X			X	X	X	X	X
7-Aug	X	X						X
14-Aug	X				X			X
21-Aug	X					X		X
28-Aug								X
4-Sep	X							
Total	13	7	7	5	10	9	5	11

Table 2. Results of household responses to the 2007 inseason subsistence interview questions for Chinook salmon in lower Yukon River villages, fishing districts 1, 2, and 3.

Date	Compared with this time "LAST" year, how were your catch rates for salmon this week?			Compared with this time "LAST" year, is the amount of time you have fished?		
	Poor	Same	Better	Less	Equal	More
	Emmonak					
3-Jun		1			1	
10-Jun	10		1	7	1	3
17-Jun	1	3	12	12	2	2
24-Jun			6	6		
1-Jul	1		4	4		1
8-Jul			7	7		
	Marshall					
10-Jun	3		1	4		
17-Jun	3			1		2
24-Jun	5	1	2	6		2
1-Jul	1		5	2	2	2
8-Jul			1			1
	Holy Cross					
10-Jun	4			4		
17-Jun						
24-Jun	1	1	10	2		10
1-Jul	1		5	1		5
8-Jul			5			5
Total	30	6	59	56	6	33

Table 3. Results of household responses to the 2007 inseason subsistence interview questions for Chinook salmon in middle and upper Yukon River villages, Koyukuk fishing district and sub-districts 4A, 4B, 4C, and 5D.

Date	Compared with this time "LAST" year, how were your catch rates for salmon this week?			Compared with this time "LAST" year, is the amount of time you have fished?		
	Poor	Same	Better	Less	Equal	More
	Kaltag					
24-Jun	3			1	2	
1-Jul	6	3			3	6
8-Jul	4	1	2	4	2	1
15-Jul	3		1		2	2
22-Jul		1			1	
	Galena					
10-Jun	1				1	
17-Jun	4			1	3	
24-Jun	3	3			6	
1-Jul	8			1	6	1
8-Jul	4		1	4	1	
15-Jul	5		1	4	1	1
22-Jul		1	3		4	
	Huslia					
24-Jun	1			1		
1-Jul	5			1	4	
8-Jul	5			5		
15-Jul	4			4		
22-Jul	1			1		
29-Jul	5			5		
	Beaver					
1-Jul	1	2		1	2	
15-Jul	4	2			2	4
	Eagle					
15-Jul		1			1	
22-Jul	1		1	1	1	
Total	68	14	9	34	42	15

Table 4. Results of household responses to the 2007 inseason subsistence interview questions for summer chum salmon in the Yukon River villages of Emmonak, Marshall, Kaltag, Huslia, and Galena.

Date	Compared with this time "LAST" year, how were your catch rates for salmon this week?			Compared with this time "LAST" year, is the amount of time you have fished?		
	Poor	Same	Better	Less	Equal	More
Emmonak						
10-Jun	6					6
17-Jun	1	3	9	9	2	2
24-Jun			8	8		
1-Jul	1		4	4		1
8-Jul			9	8		1
Marshall						
17-Jun	1					1
24-Jun	4	2	1	5		2
1-Jul	1	1	4	2	2	2
8-Jul			1			1
Kaltag						
24-Jun		1			1	
Galena						
10-Jun	1				1	
1-Jul	2	4	2		6	2
8-Jul	1	3			2	
15-Jul	1	5			5	1
22-Jul			4		4	
Huslia						
24-Jun	3			3		
1-Jul	2	4		1	5	
8-Jul		4	1	1	4	
15-Jul		3	1		3	1
22-Jul		1			1	
29-Jul		5			5	
Total	24	36	44	41	41	20

Table 5. The 2007 weekly average percentages for Chinook salmon subsistence harvest from interviewed households in the lower Yukon River villages.

Week Ending	Emmonak		Marshall		Holy Cross	
	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average
27-May					8	0%
3-Jun	4	0%			5	0%
10-Jun	7	1%	14	0%	11	4%
17-Jun	15	47% ¹	9	0% ¹		10%
24-Jun	20	53% ²	8	31% ²	13	67% ¹
1-Jul	18	58% ³	8	58% ³	7	75% ²
8-Jul	22	79%	10	75%	7	80% ³
15-Jul	7	85%	10	82%		
22-Jul			4	83%		
Total # of interviews	93		63		51	
Total # interview weeks	7		7		6	
Final percentage ^b	35	92%	12	87%	12	84%

¹ Pulse 1

² Pulse 2

³ Pulse 3

^a Number of households calculated in the average.

^b Estimate of subsistence Chinook salmon harvest completion.

Table 6. The 2007 weekly average percentages for Chinook salmon subsistence harvest from interviewed households in the middle and upper Yukon River villages.

Week Ending	Kaltag		Galena		Huslia		Beaver		Eagle	
	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average
10-Jun			8	0%						
17-Jun			8	0%						
24-Jun	8	0%	9	7%	5	0%	8	0%		
1-Jul	9	23% ¹	8	10% ¹	8	1%	5	3%	14	0%
8-Jul	9	58% ²	7	38% ²	5	2% ¹		5%	14	0%
15-Jul	9	72% ³	9	50% ³	5	10% ²		5% ¹	5	2% ¹
22-Jul	9	75%	8	74%	4	10% ³	6	65% ²	5	62% ²
29-Jul	9	80%	10	81%	5	12%	6	79% ³	7	96% ³
Total # of interviews	53		67		32		25		45	
Total # interview weeks	6		8		6		4		5	
Final percentage ^b	9	80%	10	88%	3	13%	7	86%	7	97%

¹ Pulse 1

² Pulse 2

³ Pulse 3

^a Number of households calculated in the average.

^b Estimate of subsistence Chinook salmon harvest completion.

Table 7. The 2007 weekly average percentages for summer chum salmon subsistence harvest from interviewed households in Yukon River villages of Emmonak, Marshall, Kaltag, Huslia, and Galena.

Week Ending	Emmonak		Marshall		Kaltag		Galena		Huslia	
	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average	<i>n</i> ^a	Weekly average
27-May										
3-Jun	4	0%								
10-Jun	7	0%	14	0%			8	0%		
17-Jun	15	44%	9	0%			8	0%		
24-Jun	20	44%	8	12%	8	0%	9	0%	5	0%
1-Jul	18	57%	8	49%	9	3%	8	10%	8	3%
8-Jul	22	78%	10	49%	9	18%	7	10%	5	4%
15-Jul	7	78%	10	54%	9	18%	9	10%	5	13%
22-Jul			4	71%	9	55%	8	43%	4	13%
29-Jul					9	88%	10	43%	5	27%
Total # of interviews	93		63		53		67		32	
Total # interview weeks	7		7		6		8		6	
Final percentage ^b	33	84%	11	84%	2	90%	8	59%	4	35%

^a Number of households calculated in the average.

^b Estimate of subsistence summer chum salmon harvest completion.

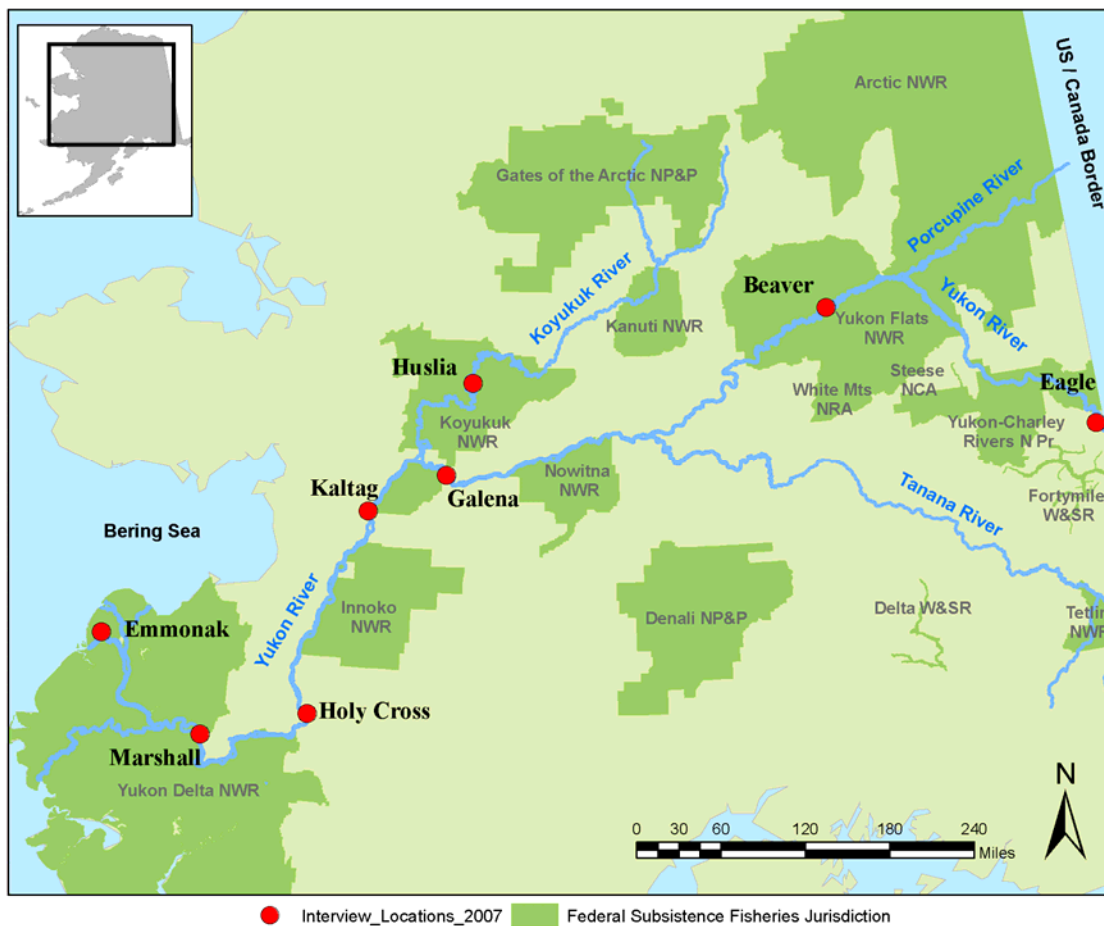


Figure 1. Map of the Yukon River drainage highlighting the villages of Emmonak, Marshall, Holy Cross, Kaltag, Huslia, Galena, Beaver, and Eagle.

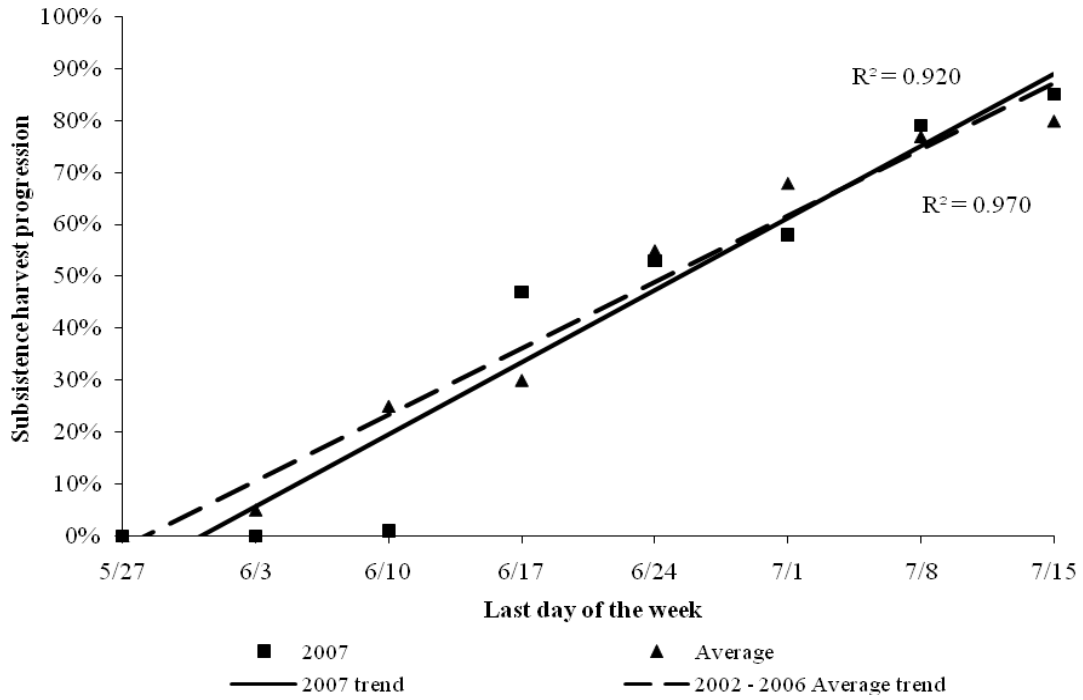


Figure 2. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2002 – 2006 average harvest progression trend in Emmonak.

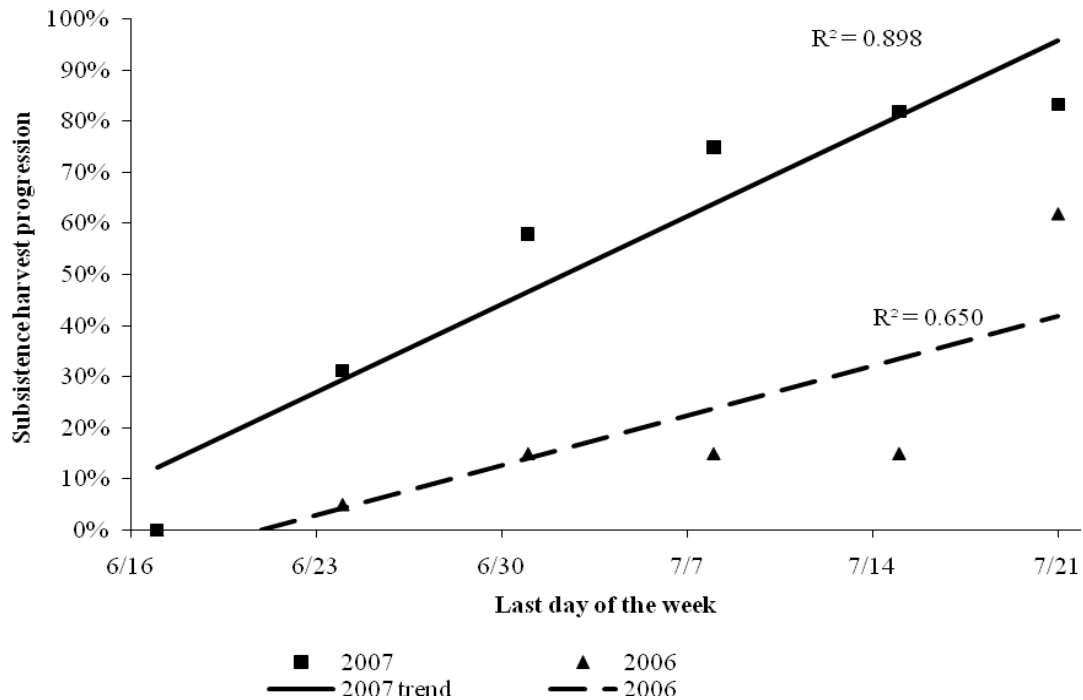


Figure 3. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2006 average harvest progression trend in Marshall.

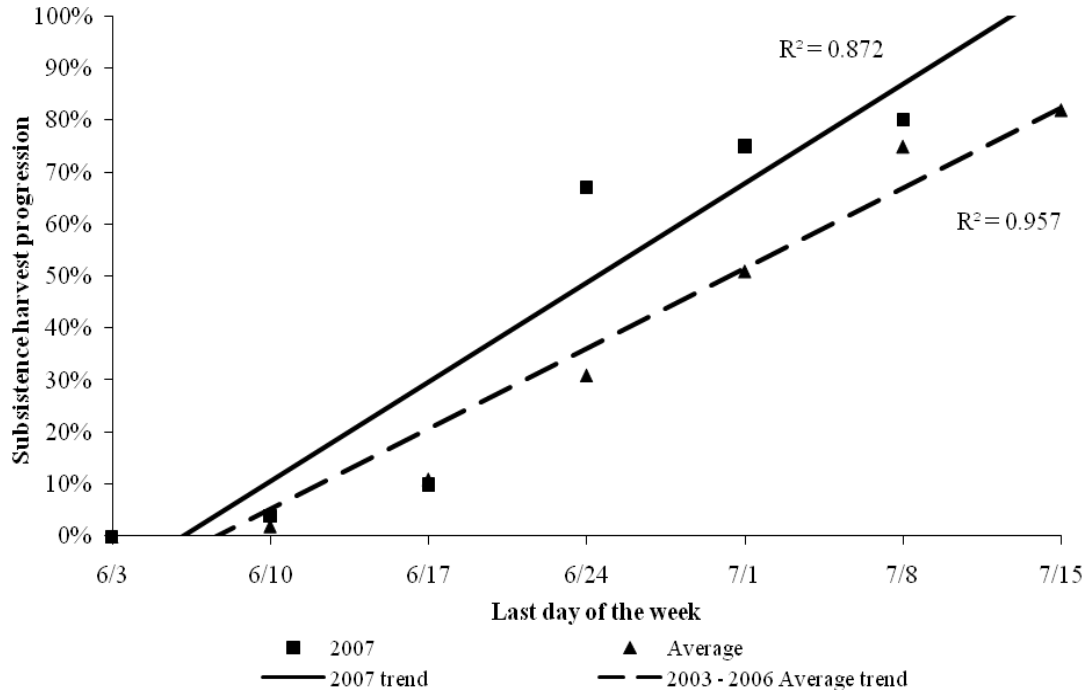


Figure 4. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2003 – 2006 average harvest progression trend in Holy Cross.

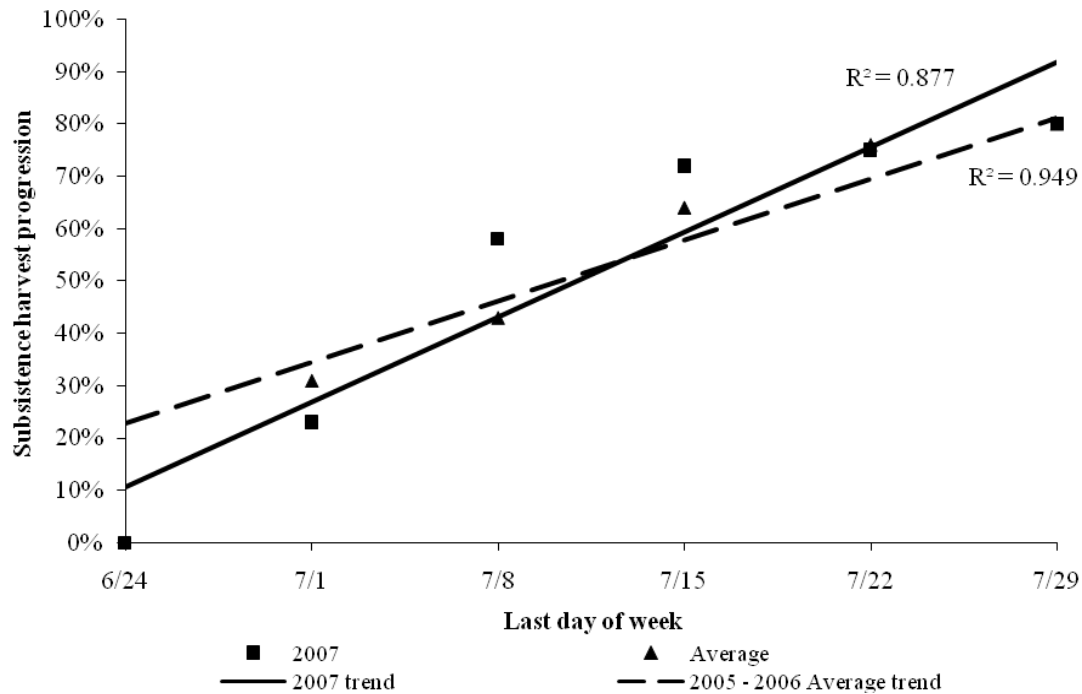


Figure 5. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2005 – 2006 average harvest progression trend in Kaltag.

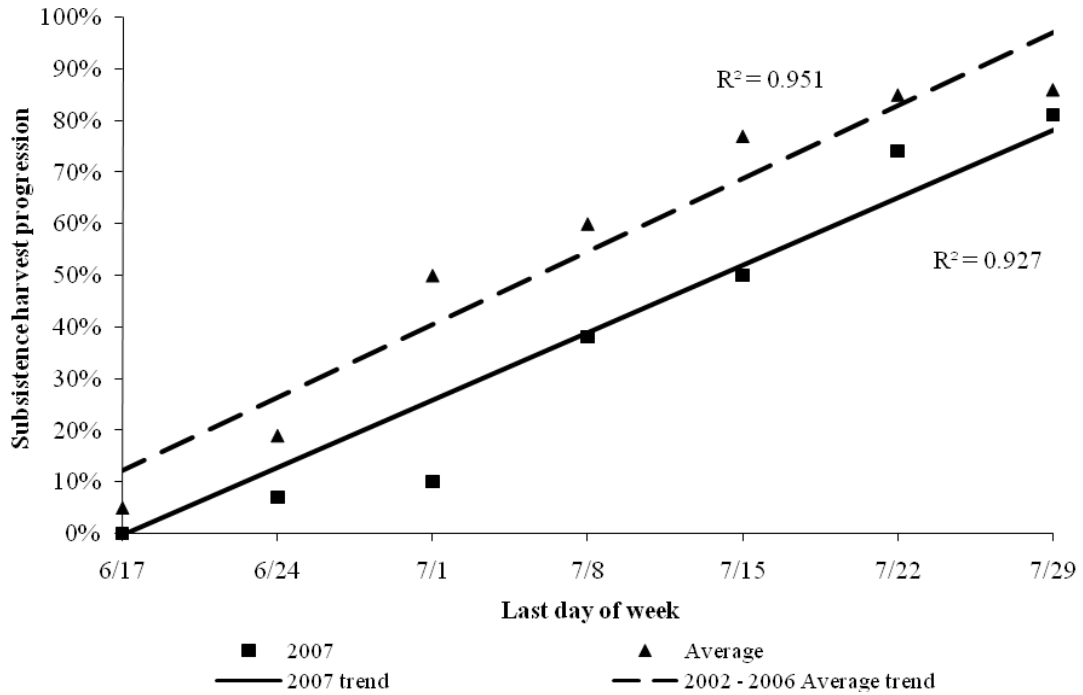


Figure 6. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2002 – 2006 average harvest progression trend in Galena.

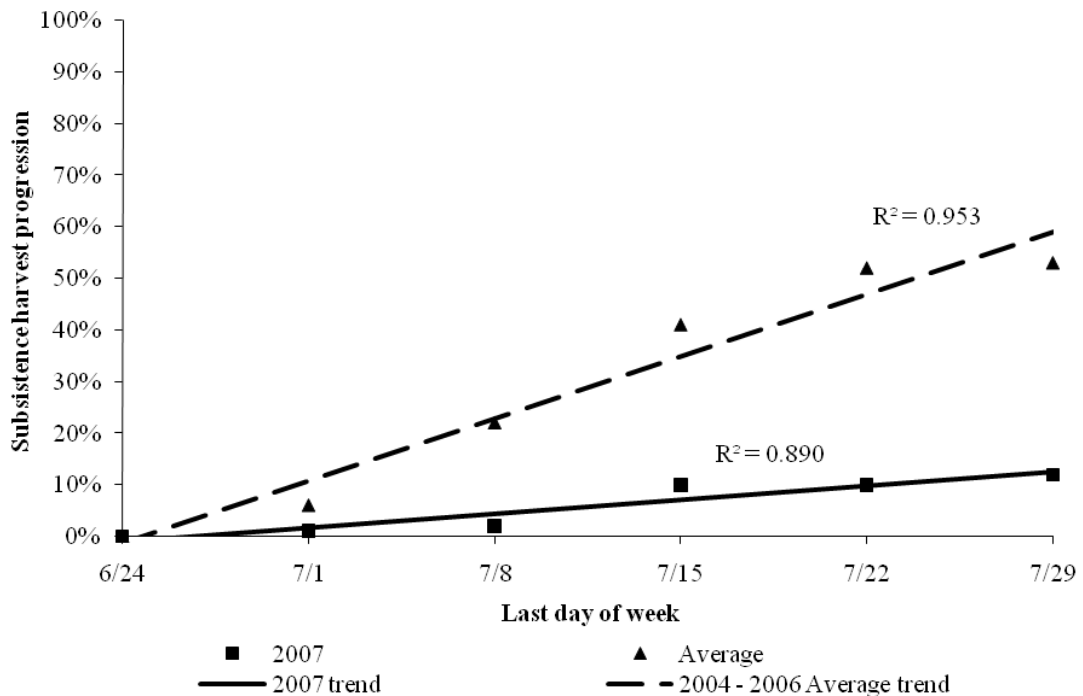


Figure 7. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2004 – 2006 average harvest progression trend in Huslia.

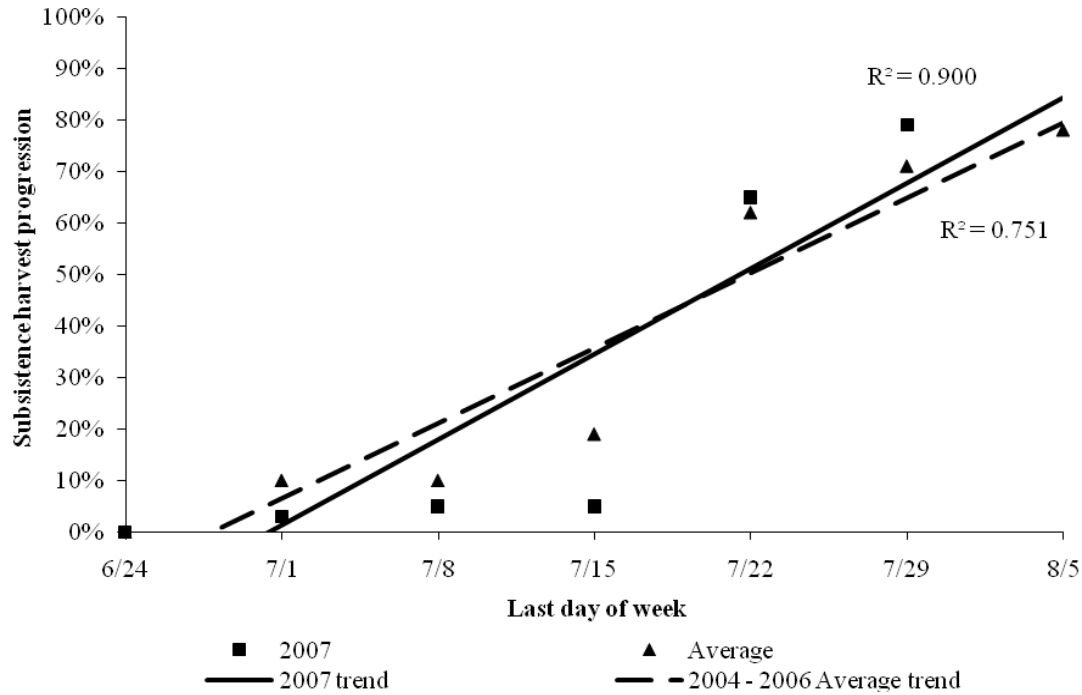


Figure 8. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households compared to the 2004 – 2006 average harvest progression trend in Beaver.

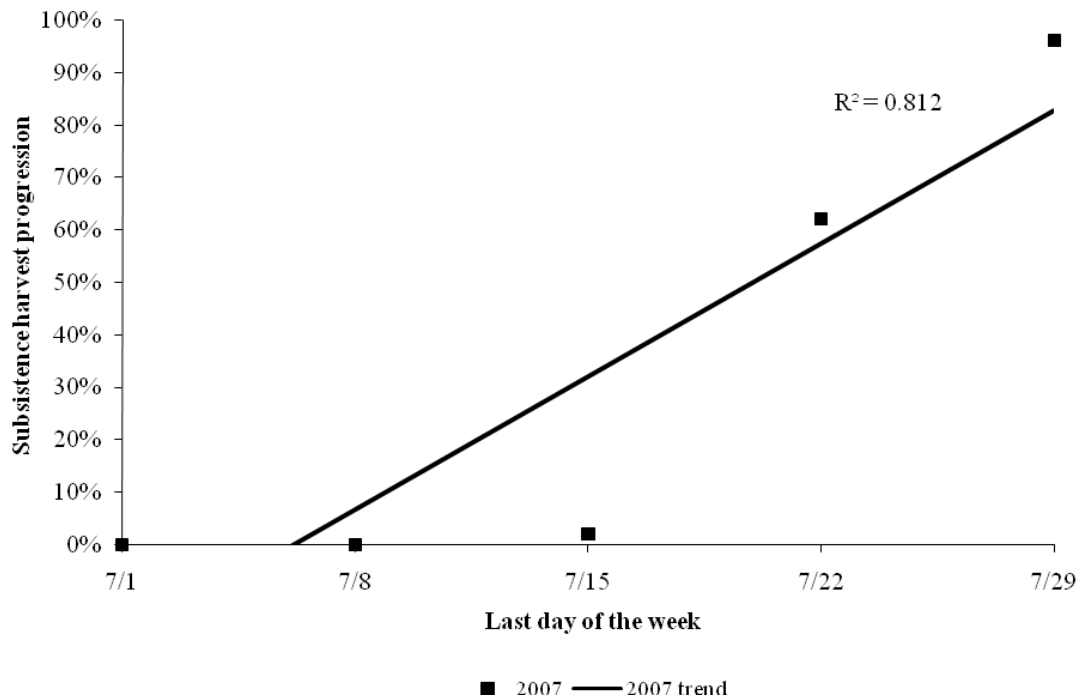


Figure 9. The 2007 weekly Chinook salmon subsistence harvest progression trend from interviewed households in Eagle.

Appendix A. The 2007 inseason salmon interview project inseason salmon weekly harvest summary sheet.

Preliminary Data

Inseason Salmon Harvest Interview Summary

Interview Week	Weekly Date:						
Village	Interview Date(s)	# of Interviews	Gear Type	Harvest % ^a	Catch Rate ^b	Time Fished ^c	Fishing Days ^d
Emmonak			Drift gillnet Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Holy Cross			Drift gillnet Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Kaltag			Drift gillnet Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Nulato			Drift gillnet Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Huslia			Drift gillnet Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Galena			Fishwheel Set gillnet Drift gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Beaver			Fishwheel Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	
Eagle			Fishwheel Set gillnet Combination Other	0 - 25	BETTER	MORE	
				26 - 75	SAME	EQUAL	
				76 - 100	POOR	LESS	

^a Where are you at in your harvest?

^b Compared to "LAST" year how were you catch rates?

^c Compared to "LAST" year is the amount of time fished?

^d Average number of fishing days of all interview participants?