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**Norton Sound Subdistrict 5 (Shaktoolik) and
Subdistrict 6 (Unalakleet) Chinook Salmon Stock
Status and Action Plan, 2010; a Report to the Alaska
Board of Fisheries**

by

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and

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December 2009

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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| | | | | | |
|---|--------------------|--|---|---|-------------------------|
| Weights and measures (metric) | | General | | Measures (fisheries) | |
| centimeter | cm | Alaska Administrative Code | AAC | fork length | FL |
| deciliter | dL | all commonly accepted abbreviations | e.g., Mr., Mrs., AM, PM, etc. | mid-eye-to-fork | MEF |
| gram | g | all commonly accepted professional titles | e.g., Dr., Ph.D., R.N., etc. | mid-eye-to-tail-fork | METF |
| hectare | ha | at | @ | standard length | SL |
| kilogram | kg | compass directions: | | total length | TL |
| kilometer | km | east | E | | |
| liter | L | north | N | Mathematics, statistics | |
| meter | m | south | S | <i>all standard mathematical signs, symbols and abbreviations</i> | |
| milliliter | mL | west | W | alternate hypothesis | H _A |
| millimeter | mm | copyright | © | base of natural logarithm | <i>e</i> |
| | | corporate suffixes: | | catch per unit effort | CPUE |
| Weights and measures (English) | | Company | Co. | coefficient of variation | CV |
| cubic feet per second | ft ³ /s | Corporation | Corp. | common test statistics | (F, t, χ^2 , etc.) |
| foot | ft | Incorporated | Inc. | confidence interval | CI |
| gallon | gal | Limited | Ltd. | correlation coefficient (multiple) | R |
| inch | in | District of Columbia | D.C. | correlation coefficient (simple) | r |
| mile | mi | et alii (and others) | et al. | covariance | cov |
| nautical mile | nmi | et cetera (and so forth) | etc. | degree (angular) | ° |
| ounce | oz | exempli gratia | | degrees of freedom | df |
| pound | lb | (for example) | e.g. | expected value | <i>E</i> |
| quart | qt | Federal Information Code | FIC | greater than | > |
| yard | yd | id est (that is) | i.e. | greater than or equal to | ≥ |
| | | latitude or longitude | lat. or long. | harvest per unit effort | HPUE |
| Time and temperature | | monetary symbols | | less than | < |
| day | d | (U.S.) | \$, ¢ | less than or equal to | ≤ |
| degrees Celsius | °C | months (tables and figures): first three letters | Jan, ..., Dec | logarithm (natural) | ln |
| degrees Fahrenheit | °F | registered trademark | ® | logarithm (base 10) | log |
| degrees kelvin | K | trademark | ™ | logarithm (specify base) | log ₂ , etc. |
| hour | h | United States (adjective) | U.S. | minute (angular) | ' |
| minute | min | United States of America (noun) | USA | not significant | NS |
| second | s | U.S.C. | United States Code | null hypothesis | H ₀ |
| | | U.S. state | use two-letter abbreviations (e.g., AK, WA) | percent | % |
| Physics and chemistry | | | | probability | P |
| all atomic symbols | | | | probability of a type I error (rejection of the null hypothesis when true) | α |
| alternating current | AC | | | probability of a type II error (acceptance of the null hypothesis when false) | β |
| ampere | A | | | second (angular) | " |
| calorie | cal | | | standard deviation | SD |
| direct current | DC | | | standard error | SE |
| hertz | Hz | | | variance | |
| horsepower | hp | | | population | Var |
| hydrogen ion activity (negative log of) | pH | | | sample | var |
| parts per million | ppm | | | | |
| parts per thousand | ppt, ‰ | | | | |
| volts | V | | | | |
| watts | W | | | | |

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**NORTON SOUND SUBDISTRICT 5 (SHAKTOOLIK) AND
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CHINOOK SALMON STOCK STATUS AND ACTION PLAN, 2010;
A REPORT TO THE ALASKA BOARD OF FISHERIES**

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ABSTRACT

In response to the guidelines established in the *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222), the Alaska Board of Fisheries (BOF) classified the Norton Sound Subdistrict 5 (Shaktoolik) and Subdistrict 6 (Unalakleet) Chinook salmon *Oncorhynchus tshawytscha* stock as a stock of concern, specifically a yield concern, at its January 2004 meeting. An action plan was developed by the Alaska Department of Fish and Game (ADF&G) and acted upon by the BOF in January 2004. The SSFP directs ADF&G to assess salmon stocks in areas addressed during the BOF regulatory cycle to identify stocks of concern and in the case of Norton Sound Subdistricts 5 and 6 Chinook salmon, to reassess the stock of concern status. In 2007, the BOF continued the Subdistrict 5 and Subdistrict 6 Chinook salmon classification as a stock of yield concern and adopted a Chinook salmon management plan (5 AAC 04.395) in order to increase escapements and restore the stock to historical levels of abundance. Escapement goals were achieved in 2007 and 2009, but only as a result of the subsistence fishing schedule stipulated in the management plan, inriver gillnet mesh size restrictions, and early closures to subsistence and sport fisheries. Given the continued inability to maintain near average yields despite the use of specific management measures, the Subdistricts 5 and 6 Chinook salmon stock continues to meet the definition for a stock of yield concern as defined in the SSFP. Therefore, ADF&G recommends continuing the stock of yield concern classification. ADF&G is recommending changes to the management plan in order to ensure commercial fisheries directed on chum *O. keta* and pink salmon *O. gorbuscha* are prosecuted in a manner that does not negatively affect the Subdistricts 5 and 6 Chinook salmon subsistence fishery and escapement.

Key words: Norton Sound, Chinook salmon, *Oncorhynchus tshawytscha*, stock of concern, yield concern, commercial, fishing, ADF&G, sustainable salmon fisheries policy, Alaska Board of Fisheries.

INTRODUCTION

The *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222, effective 2000, amended 2001) directs the Alaska Department of Fish and Game (ADF&G) to provide the Alaska Board of Fisheries (BOF) with reports on the status of salmon stocks and identify any salmon stocks that present a concern related to yield, management, or conservation during regular BOF meetings. This report provides ADF&G's reassessment of the Norton Sound Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) Chinook salmon (*Oncorhynchus tshawytscha*) stock of concern, which has been classified as a yield concern.

A stock of yield concern 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” (5 AAC 39.222(f)(42)). The SSFP further goes on to define chronic inability as “the continuing or anticipated inability to meet expected yields over a 4 to 5 year period”. Therefore, in the supporting analysis, only the most recent 5-year escapement performance history along with a comparison of the most recent 5-year yields or harvestable surpluses and a select 10-year historical level of yield or harvestable surpluses are considered.

In response to the guidelines established in the SSFP, the BOF classified the Norton Sound Subdistricts 5 and 6 Chinook salmon stock as a yield concern at the January 2004 BOF meeting. An action plan was subsequently developed by ADF&G (Jones 2003) and acted upon by the BOF in January 2004. Following 3 consecutive years (2004–2006) of failing to meet escapement goals despite reductions in harvests, ADF&G recommended continuing the stock of yield concern classification (Kent and Bergstrom 2006). The BOF agreed with this determination at the February 2007 meeting, and in an effort to further conserve Chinook salmon and restore the stock to historical yield levels, adopted the Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan (5 AAC 04.395). This

new plan incorporates a restrictive subsistence fishing schedule and a 50% reduction in the daily and annual sport fish bag limits. Prior to 2007, subsistence fishing was open continuously in the marine waters and inriver subsistence fishing was closed for 36 hours a week. Additionally, for fish 20 inches or greater in length caught in the sport fishery prior to 2007, the daily bag limit was 2 and the annual possession limit was 4. Under 5 AAC 04.395, subsistence fishing from June 15 to July 15 in Subdistrict 6 is limited to two 48-hour periods per week in the marine waters, and two 36-hour periods per week in Unalakleet River. Similarly, the Unalakleet River sport fish bag limit for Chinook salmon 20 inches or greater was reduced to one fish per day with an annual harvest limit of 2 fish. Subsistence fishing time and sport fish bag limits can only be increased if Chinook salmon escapement goals are projected to be reached. The intent of 5 AAC 04.395 was to enhance Chinook salmon escapements by providing escapement windows between subsistence fishing periods and reducing sport fish harvests.

In accordance with the SSFP 5 AAC 39.222, ADF&G recommended continuing the designation of Norton Sound Subdistricts 5 and 6, Chinook salmon stock as a stock of yield concern at the October 2009 BOF work session. This recommendation as a yield concern was based on low harvests during the most recent 5-year period (2005–2009) compared to the historical average yield, as indicated by the historic 10-year (1989–1998) average for commercial harvests. Subsistence harvest data were not collected in some years and, prior to 1994, varying data collection methods were used and data were not expanded to account for households that were not surveyed. Therefore, the historic baseline for comparison, the 10-year period from 1989–1998, cannot be used in this analysis. Alternatively, the 5-year period from 1994 through 1998 was used for the yield analysis for subsistence harvests because data collection methodology and analysis was similar during this period. Unalakleet River Chinook salmon test fishery catches, which are distributed to subsistence users, were added to subsistence survey harvest estimates for all years to fully capture subsistence harvests.

Although sport fishing harvest and effort information has been collected from anglers on the Unalakleet River by ADF&G starting in 1983, catch information is only available starting in 1990. Additionally, sport fish harvest and catch information is not yet available for 2009. Therefore, the most recent 5-year (2004–2008) average harvest and catch statistics were substituted for 2009 in order to make comparisons with the historic 10-year period from 1990-1999.

STOCK ASSESSMENT BACKGROUND

The Norton Sound District is composed of 6 commercial fishing subdistricts (Figure 1). Most subdistricts have several rivers where subsistence fishing occurs, and except for Subdistrict 1 (Nome), there are few restrictions (Soong et al. 2008). In Subdistrict 5, most freshwater subsistence fishing occurs in Shaktoolik River and, in Subdistrict 6, in Unalakleet River (Figure 1). Subdistricts 5 and 6 salmon fisheries are managed as one unit because previously conducted tagging studies have shown salmon bound for these subdistricts intermingle in marine waters; thus marine harvests likely contain fish bound for both rivers (Gaudet and Schaeffer 1982).

Chinook salmon abundance in Subdistricts 5 and 6 is evaluated using inseason subsistence fishery surveys and passage estimates obtained at a counting tower project located on the North River, an important spawning tributary of Unalakleet River. Lower Unalakleet River test fishery catches of Chinook salmon provide fishery managers with run timing information. Aerial

surveys are also flown of the Shaktoolik and Unalakleet river drainages in order to ground truth North River tower counts, calibrate survey estimates, and correlate current aerial survey data with historical data. However, aerial surveys are subject to inclement weather, water clarity, and pilot availability. Acceptable aerial surveys, those flown under good viewing conditions during peak spawning periods, of upper Unalakleet River and Old Woman River have been accomplished in 14 of previous 30 years, and only twice (2007 and 2009) in the last 5 years. Therefore, aerial survey data are only peripherally used in analyses.

Test Fishing

ADF&G has operated a set gillnet test fishery several miles upstream from the mouth of Unalakleet River since 1985. The 5 7/8-inch stretched mesh gillnet used in the test fishery is primarily for chum and coho salmon stock assessment. This small mesh is relatively inefficient at capturing age-5 and older Chinook salmon that comprise the majority of the run. Consequently, the test fishery is not considered to provide a reliable index of Chinook salmon abundance in Subdistricts 5 and 6, although it does provide fishery managers with useful information concerning run timing.

Test fishery catches of Chinook salmon from 2007–2009 were above the long-term (1985–2006) average catch of 73 Chinook salmon (Figure 2). However, test fishery catches from 2007–2009 are thought to be somewhat inflated due to reduced subsistence fishing time and Unalakleet River mesh-size restrictions. Mesh-size restrictions effectively closed down the inriver subsistence fishery in late June during the 2008 and 2009 seasons because subsistence fishermen were not interested in deploying chum salmon gear. Chinook salmon runs exhibited later than average timing with cumulative catch quarter point dates of 27 June, 2 July, and 23 June for the 2007–2009 seasons, respectively; the long-term (1985–2006) average quarter point at the test fishery is 20 June (Table 1).

Subsistence Catch Monitoring

Since 2007, the Unalakleet River test fishery crew has conducted daily interviews inseason with all active fishermen in order to provide managers with a reliable early index of Chinook salmon run strength and timing in Subdistricts 5 and 6. Chinook salmon will often mill in the lower Unalakleet River for 7–10 days before actively migrating upstream to spawning areas. Prolonged milling behavior coupled with late run timing has elevated the importance of inseason surveys in recent years. If additional restrictions and/or closures are necessary to meet escapement needs, such management actions must be implemented by early July, which is 7–10 days before the first pulse of Chinook salmon is typically observed at the North River counting tower.

Chinook salmon catches peaked in the marine waters on 21 June, 27 June, and 25 June during the 2007–2009 seasons, respectively, whereas Unalakleet River subsistence catches peaked between 25–29 June in 2007 and on 26 June in 2009 (Table 2; Figure 3). Very few Chinook were harvested for subsistence in the Unalakleet River in 2008 due to a combination of very late run timing and mesh-size restrictions that were implemented on June 30.

Escapement

Subdistricts 5 and 6 Chinook salmon management plan is based primarily on the North River tower-based sustainable escapement goal (SEG) range of 1,200–2,600 fish. The North River counting tower has been operated continually since 1996 by Kawerak Inc. (1996–2001) and later

by Native Village of Unalakleet (2002–2008) (Kent *In prep*). Currently, Norton Sound Economic Development Corporation (NSEDC) operates the tower with support and assistance from ADF&G. Radiotelemetry data show that the North River tower count is a reliable indicator of Chinook salmon abundance to the entire Unalakleet River drainage with the North River accounting for an average of 40% of drainagewide Chinook salmon escapement (Wuttig 1999; Phil Joy, Fisheries Biologist, Division of Sport Fish; personal communication).

In 1999, an escapement goal range of 1,200–2,400 was established for the North River (Fair et al. 1999), and later revised to an SEG with a new upper range of 2,600 salmon (ADF&G 2004). Chinook salmon escapements to North River were within the SEG of 1,200–2,600 from 2001–2003 and in 2007 and 2009 (Table 3; Figure 4). Specifically in 2007 and 2009, North River Chinook salmon escapements were 1,948 and 2,352 respectively (Table 3; Figure 3). The 2009 escapement was the second highest tower count on record and the fourth time that the midpoint of the escapement goal was reached. It should also be noted that escapement goals may not have been achieved in 2007 and 2009 had it not been for inriver set gillnet mesh size restrictions and early closures imposed on subsistence and sport fisheries. The SEG was not achieved from 2004–2006, and in 2008, when a record-low Chinook salmon passage estimate of 903 was observed at North River tower (Table 3; Figure 4).

Aerial survey SEG ranges were established in 1999 for Shaktoolik River (400–800 salmon) and the upper Unalakleet River index area (550–1,100 salmon) that encompasses the main stem of Unalakleet River above John Auliye’s cabin and Old Woman River (Fair et al. 1999; ADF&G 2004). Since 2005, there has only been one complete survey of Shaktoolik River conducted under good viewing conditions. This occurred in 2007 when a total of 412 Chinook salmon were enumerated. Thus, aerial survey data of Shaktoolik River were not used in this analysis. However, Unalakleet River aerial survey data are presented as there was a partially acceptable survey conducted in 2005 and complete surveys conducted under excellent viewing conditions in 2007 and 2009. Upper Unalakleet River index area aerial survey indices from these years were consistent with North River tower counts. Aerial surveys fell short of the lower end of the SEG range in 2005, above the midpoint of the SEG in 2007 and above the upper end of the SEG in 2009 (Figure 5). A total of 1,368 Chinook salmon were enumerated in 2009, which was the highest aerial survey recorded since 1991 (Figure 5).

YIELD

Combined commercial Chinook salmon harvests for Subdistricts 5 and 6 averaged 7,131 per year for the historical period 1989–1998 (Table 4 and Figure 6). This average plummeted to 67 Chinook salmon harvested per year for the recent 5-year period (2005–2009), which represents a 99% decrease in commercial harvest. During this time period, the commercial harvest of Chinook salmon was incidental to directed chum, pink, and coho salmon fisheries, except for a small directed commercial harvest of Chinook salmon in 2005. Additionally, the average combined Subdistricts 5 and 6 subsistence harvest of 2,447 Chinook salmon from 2005–2009 represents a 47% decline from the 1994–1998 average subsistence harvest of 4,624 Chinook salmon (Table 4; Figure 7). Decreases in commercial and subsistence harvest patterns were apparent in both subdistricts (Figure 8) and within each subdistrict individually (Figures 9 and 10).

The large decline in yields from this stock is evidenced by the extreme decline in harvest (Figure 11). Assuming that 100% of the marine subsistence and commercial harvest in

Subdistrict 6 (Unalakleet) originates in Unalakleet River, total run size estimates during the period 1984–1986 and 1996–2009 ranged from 4,386 salmon in 2008 to 24,942 in 1997 (Table 3; Figure 11). It should be noted that the 1,891 Chinook salmon harvested in Subdistrict 6 in 2009 represented a 26% increase from the previous year.

Sport fisheries have been active on Unalakleet River for many years. The U.S. Air Force operated a recreational fishing camp on the river in the early 1960s, and a commercial sport fishing lodge was constructed on the river in the late 1960s. The Unalakleet Native Corporation owned the lodge for several years and contracted operations; it is currently in private ownership and has been expanded. Since the inception of the Sport Fish Guide Logbook Program in 2005, guided anglers have harvested between 38 and 68 Chinook salmon per year. Total Chinook salmon sport harvests (guided and unguided) have ranged from 97 fish in 2003 to 842 fish in 1997, with about 50% of the harvests coming from Alaska residents. The recent 5-year (2005–2009) average harvest of 335 Chinook salmon represents a 13% decline from the (1990–1999) average harvest of 386 Chinook salmon (Table 5). However, sport harvests are thought to actually be lower during the recent 5-year period. In 2008, the estimated harvest of Chinook salmon was 580 fish, of which 519 were “jacks” (< 20 inches). This estimated harvest of “jacks” is likely erroneously high due to the expansions of one angler’s reported harvest of 32 Chinook salmon under 20 inches in length, all before the closure on July 5. Based upon the record low escapement into North River in 2008 (903 Chinook salmon) and the generally low proportions that these smaller Chinook salmon are found in the population, it is likely that this estimate of smaller Chinook salmon is inaccurate; likely, these 32 harvested fish were either bright pink salmon or Dolly Varden. Further, this was the first year in which the sport fish harvest did not trend with subsistence harvests and escapements. The recent 5-year (2005–2009) average Chinook salmon catch of 1,159 Chinook salmon, which includes fish that were released in addition to fish that were harvested, was 18% below the 10-year (1990–1999) average catch of 1,407 Chinook salmon. Sport fishing effort in Shaktoolik River is very light to non-existent, and the small amount of sport fishing that does occur is generally targeted at coho salmon.

There have been no commercial fishing periods targeting Chinook salmon since 2001, except for two periods in 2005, which yielded a very small harvest (Table 4). Additionally, subsistence fishing and sport fishing closures were implemented in 2003, 2004, and from 2006–2009 (Table 6) because of below average early July North River tower escapement counts (Figure 4).

EXPLOITATION RATE

An analysis of exploitation is not possible for Subdistrict 5 because reliable estimates of Chinook salmon escapements to Shaktoolik River are unavailable. However, during the period where we can estimate total Unalakleet River Chinook salmon run size (1984–1986 and 1996–2009), yields have declined precipitously (Figure 11). As subsistence use is the mandated priority consumptive use, commercial harvests have taken the brunt of this decrease. Total exploitation rates of Unalakleet River Chinook salmon ranged from 26.6% in 2007 to 81.3% in 1985 (Table 7). Total exploitation rates have decreased approximately 13% from an average of 54.1% for the period 1996–2004 to 40.8% during the most recent 5-year average (2005–2009) period (Table 7).

Exploitation rate of Chinook salmon by commercial fishing has ranged from 0 in 2004 to 64% in 1985 (Table 7; Figure 12). More recently, the commercial exploitation rate has decreased from an average of 16% for the period 1996–2004 to 1%, for the recent 5-year average (2005–2009)

(Table 7). This dramatic decrease in the commercial harvest is directly attributable to the low run size of Chinook salmon returning to this drainage (Figure 11). Lack of escapement data for the years prior to 1984 and from 1987–1995 precludes calculation of total run and exploitation rates for those years.

Although subsistence harvests have decreased in Subdistricts 5 and 6 over the last 16 years, the decrease was not as dramatic as that of the commercial harvest. Exploitation rates for subsistence harvests have varied from 16.4% in 1985 to 48.9% in 2006 (Table 7; Figure 12). However, recent drastic reductions in the commercial harvests following the 1999 season led to marked increases in exploitation by the subsistence fishery (Figure 12), even with a substantial decrease in subsistence harvests. The recent 5-year average (2005–2009) exploitation rate by the subsistence fishery of 34.1% represents a 33% increase from the historic 1984–1986 and 1996–1999 average of 22.8% (Table 7). Subsistence fishery exploitation has only increased slightly from the previous 9-year (1996–2004) average exploitation rate of 33.8% (Table 7). The estimated exploitation of Chinook salmon in the Unalakleet River by sport fisheries ranged from 0.2% in 1984 to about 13.2% in 2008 (Table 5; Figure 12). Exploitation by sport fishers has increased slightly from an average of 4.0% for the period 1996–2004 to 5.8% for the most recent 5-year average (2005–2009), although the recent 5-year period includes the inflated sport fish harvest estimate of 580 Chinook salmon in 2008 (Table 7).

STOCK OF CONCERN RECOMMENDATION

Management direction provided in the Subdistricts 5 and 6 Chinook salmon management plan has enabled ADF&G to implement actions and successfully control harvests for the purpose of reaching escapement goals in 2 of the previous 3 years. However, given the continued inability to maintain near average yields despite these measures, the Norton Sound Subdistricts 5 and 6 Chinook salmon stock continues to meet the criteria of a stock of yield concern. Therefore, based on the definitions provided in the *Policy for the Management of Sustainable Salmon Fisheries* in 5 AAC 39.222(f)(42), ADF&G recommends continuation of the yield concern classification for the Norton Sound Subdistricts 5 and 6 Chinook salmon stock.

OUTLOOK

The 2010 Chinook salmon run in Norton Sound Subdistricts 5 and 6 is expected to be similar to runs in recent years when no commercial fishing was allowed. Compared to 2008, the age structure of the 2009 spawning escapement showed a similar percentage of age-4 Chinook salmon, but a three fold reduction in the percentage of age-5 fish, and three-fold increase in age-6 fish (Figure 13). A weak run was forecasted for the 2009 season based on the recent trend of poor run performance (i.e., record-low run in 2008) even with a projected high age-6 component based on sibling relationship analyses and good escapements observed in 2003. Unexpectedly, the magnitude of the contribution of age-6 to the 2009 run was much higher than anticipated, which resulted in the best run observed since 1999 (Table 3; Figure 11). In 2010, however, the age-6 component is expected to be weak. Additionally, it should be noted that prior to 2007, 2003 was the last year the North River tower SEG was reached and the 2003 brood year comprised the majority of the escapement from 2007–2009 (Figure 4). In contrast, North River escapements from 2004–2005, the predominant parent years for the 2010 run, were the fifth and third lowest, respectively.

ALASKA BOARD OF FISHERIES ACTION

In response to the guidelines established in the *SSFP*, the Alaska Board of Fisheries, during the 26–31 January, 2010 regulatory meeting is anticipated to continue the classification of the Norton Sound Subdistricts 5 and 6 Chinook salmon stock as a yield concern.

ESCAPEMENT GOAL EVALUATION

ADF&G has undertaken a review of escapement goals for several Norton Sound salmon stocks where long-term escapement, catch, and age composition data exist that enable the development of biological escapement goals (BEG) or SEGs based on analysis of production consistent with the escapement goal policy. In 1999, ADF&G established Chinook salmon aerial survey escapement goals for the Shaktoolik, Unalakleet/Old Woman, and North rivers. Additionally, an escapement goal for the North River tower was also established in 1999 (Fair et al. 1999). It is difficult to obtain aerial survey counts for Chinook salmon from the Shaktoolik, Unalakleet/Old Woman, and North rivers because of weather and river conditions and, more recently, prodigious numbers of pink salmon spawning in both rivers during the optimal aerial survey window of opportunity mask other species in the river, including Chinook salmon. A tagging study completed by the Division of Sport Fish in 1999 indicated the North River tower Chinook salmon count represents about 40% of the Chinook salmon escapement to Unalakleet River Drainage (Wuttig 1999). More recently, Division of Sport Fish began another 2-year radiotelemetry investigation in 2009 and preliminary results from the first field season suggest that the proportion of Chinook salmon that spawned in the North River (44%) was similar to the proportions found in 1997 (38%) and 1998 (41%) (Phil Joy, Fisheries Biologist, Division of Sport Fish, personal communication). In 2004, utilizing additional data since the escapement goal for the North River was established resulted in ADF&G establishing a SEG range of 1,200 to 2,600 Chinook salmon (ADF&G 2004). Escapement goals were reviewed for the 2010 BOF cycle utilizing additional data since the escapement goals were established. This evaluation resulted in no recommended changes (Volk et al. 2009).

The following is a list of current and proposed goals for Subdistricts 5 and 6 Chinook salmon stocks:

| Stream (Project Type) | Current Goal | Proposed Goal |
|-------------------------------------|-----------------|---------------|
| Shaktoolik River (aerial) | 400–800 SEG | No Change |
| Unalakleet/Old Woman River (aerial) | 550–1,100 SEG | No Change |
| North River (tower) | 1,200–2,600 SEG | No Change |

MANAGEMENT ACTION PLAN OPTIONS FOR ADDRESSING STOCKS OF CONCERN AS OUTLINED IN THE SUSTAINABLE FISHERIES POLICY

NORTON SOUND SUBDISTRICTS 5 AND 6 CHINOOK SALMON MANAGEMENT PLAN REVIEW/DEVELOPMENT

Current Stock Status

In response to the guidelines established in the SSFP, ADF&G recommended continuing the designation of the Subdistricts 5 and 6 Chinook salmon stock as a yield concern at the October 2009 BOF work session. The BOF, after reviewing stock status information and public input during the January 26–31, 2010 regulatory meeting, is anticipated to continue the classification of Subdistricts 5 and 6 Chinook salmon stock as a yield concern. This determination is anticipated to be based on the inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs during the last 5 years (2005–2009).

Customary and Traditional Use Finding and Amount Necessary for Subsistence Uses

The BOF has made a positive finding for customary and traditional use for salmon in the Norton Sound-Port Clarence Area. The amount necessary for subsistence (ANS) uses has been determined to be 96,000–160,000 salmon for the Norton Sound-Port Clarence Area. Subsistence fishing restrictions targeting the Chinook salmon stocks have occurred four times (2006–2009) in the last 5 years in Subdistricts 5 and 6.

HABITAT FACTORS ADVERSELY AFFECTING THE STOCK

There has been fish habitat damage in the Unalakleet River drainage due to road construction. An access road has blocked complete estuarine exchange within the lower Unalakleet River estuary, although fish passage is maintained through other channels. Historically, this area has not been mined as in northern Norton Sound and in particular the Nome area. The upper Unalakleet River is designated as a Wild and Scenic River and the habitat remains pristine.

DO NEW OR EXPANDING FISHERIES ON THIS STOCK EXIST?

There are no new or expanding fisheries on this stock. However, Norton Sound bound Chinook salmon are likely taken as bycatch in the Bering Sea groundfish fishery as part of the western Alaska stock grouping. The Chinook salmon bycatch greatly increased from 2003 through 2006 and peaked in 2007, although it is unknown what portion of this bycatch are Norton Sound Chinook salmon stocks. Subsequently, Chinook salmon bycatch greatly decreased in 2008 and 2009.

EXISTING MANAGEMENT PLAN

5 AAC 04.395. Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River king salmon management plan.

ACTION PLAN DEVELOPMENT

NORTON SOUND SUBDISTRICTS 5 AND 6 CHINOOK SALMON ACTION PLAN GOAL

The goal of the Norton Sound Subdistricts 5 and 6 Chinook Salmon Action Plan is to reduce fishing mortality in order to meet spawning escapement goals, provide reasonable opportunity for subsistence fishing, and to re-establish historical range of harvest levels in the commercial and sport fisheries.

Regulation Changes Adopted in February 2004

In January 2004, after review of the management action plan options addressing this stock of concern (Jones 2003), the BOF adopted subsistence fishing regulations 5 AAC 01.170(j)(1) and sport fishing regulations 5 ACC 70.011(c)(9). Under regulation 5 AAC 01.170(j)(1), during times in which the commissioner determines it is necessary for the conservation of king salmon, the commissioner may, by emergency order, close the subsistence fishing season in Subdistricts 5 and 6 and immediately reopen the season in those subdistricts during which gillnets must have a mesh size not exceeding 6-inches. The sport fish daily bag and possession limit in regulation 5 ACC 70.011(c)(9) for Chinook salmon less than 20 inches was reduced from 10 to 1 fish, effectively reducing the overall daily limit from 11 to 2 fish. However, the daily bag limit can only be comprised of one fish exceeding 20 inches in length. In addition, this regulation placed an annual sport limit of 4 Chinook salmon 20 inches or greater in the Unalakleet River drainage, of which only two can be taken from the North River. Regulation 5 ACC 70.011(c)(9) also stipulated that anglers targeting Chinook salmon in the Unalakleet River drainage must possess and complete a current year's harvest record as described in 5 AAC 70.024.

Regulation Changes Adopted in February 2007

In February 2007, after review of the management action plan options addressing this stock of concern (Kent and Bergstrom 2006), the BOF adopted regulation 5 AAC 04.395. Subdistricts 5 and 6 of the Norton Sound District King Salmon Management Plan. Regulation 5 AAC 04.395 (b)(1) directs the commissioner to close the subsistence fishery and reopen it no earlier than 15 June to a subsistence fishing schedule of two 48-hour periods per week in the ocean and two 36 hour periods per week in Unalakleet River. 5 AAC 04.395(b)(2) directs the commissioner to reduce the daily possession and bag limit to two Chinook salmon, of which only one can be greater than 20 inches and the annual possession limit for fish 20 inches or greater in length is two. Additionally, 5 AAC 04.395(c) states that if the projected escapement is below the lower end of the escapement goal range, all fishing for Chinook salmon will be closed; and 5 AAC 04.395(d)(3) the commissioner may open a commercial Chinook salmon fishery of no more than two 24-hour periods per week only if the midpoint of the escapement goal is projected to be reached.

MANAGEMENT REVIEW

Commercial and Subsistence Fisheries

The previously used strategy by ADF&G to open the commercial Chinook salmon fishery in Subdistricts 5 and 6 was to wait until increasing test fishery and subsistence catches were observed for at least 7 days in the Unalakleet River. Typically, Chinook salmon commercial

fishing consisted of twice weekly 24 hour periods. This strategy was followed to prevent fishing on milling Chinook salmon and co-migrating Yukon River stocks, and to allow for adequate escapement. However, fishery managers have been more conservative since 2007 as the management plan clearly states that a commercial Chinook salmon fishery may only occur if the midpoint of the North River tower escapement goal range is projected to be reached. Commercial fisheries directed at Chinook salmon have not occurred during the recent 3-year period because managers projected that escapement goals would not be reached.

Since 2007, per the management plan, subsistence fishing schedules have been implemented for the Subdistricts 5 and 6 marine and Unalakleet River subsistence fisheries from June 15 to July 15. In marine waters, the subsistence fishing schedule consists of two 48-hour periods per week from 6:00 PM Monday to 6:00 PM Wednesday and from 6:00 PM Thursday to 6:00 PM Saturday. In Unalakleet River, subsistence fishing is restricted to two 36-hour periods per week from 8:00 AM Monday to 8:00 PM Tuesday, and from 8:00 AM Friday to 8:00 PM Saturday.

Subsistence fishing in Unalakleet River was also restricted to set gillnets with a stretched mesh size of 6 inches or less in late June during the 2008 and 2009 seasons. These mesh-size restrictions were planned in order to protect milling Chinook salmon, particularly large females in the lower Unalakleet River during their peak migration period. Allowing more of these larger and more fecund females to reach spawning areas was considered imperative in light of continued diminished productivity of Subdistricts 5 and 6 Chinook salmon and concerns with the quality of the spawning escapement.

Less than favorable ocean conditions in recent years may have contributed to the poor run performance observed in Subdistricts 5 and 6 Chinook salmon in recent years. However, the continued diminished productivity of Unalakleet River Chinook salmon observed since 2000 cannot be attributed entirely to ocean conditions. Another important factor limiting production may be major changes observed in the quality of the spawning escapement in the 2000s. An analysis of the historical test fishery data from 1986–2006 shows a trend toward fewer larger and potentially more fecund females belonging to the older age classes being caught. Between 1986–1999, test fishery samples averaged 71% age-5 and -6 combined Chinook salmon and were 43–50% female (Figure 14). From 2000–2006, test fishery samples have only averaged 57% age-5 and -6 combined and 20% female (Figure 14). Moreover, the overall length of Chinook salmon caught in the test fishery also declined from an average of 728 mm from 1986–1999 to an average of 684 mm from 2000–2006 (Figure 15).

There has been a resurgence of market interest in Norton Sound chum and pink salmon. There is also interest in commencing commercial salmon fishing for these species earlier in order to target these species at their peak migration to increase harvests. Fishery managers and subsistence users are concerned about the potential impacts of prosecuting fisheries on chum and pink salmon stocks which overlap in migration timing with Chinook salmon, particularly chum salmon. ADF&G is recommending changes to the Chinook salmon management plan that provide a framework for a clear management strategy that addresses concerns associated with the anticipated increased commercial harvest of other salmon.

Sport Fisheries

Sport fishery management actions are taken inseason when necessary in accordance with the guidelines in the Chinook salmon management plan. The sport fishery for Chinook salmon has been closed in early July by emergency order 6 out of the last 7 years due to low projected

escapements, and was not reopened in the 3 years in which the lower end of the escapement goal had been met later in the season (2003, 2007, and 2009). These emergency orders apply not only to the Unalakleet River drainage, but also apply to Shaktoolik River as well as marine waters in Subdistrict 5 and 6. In addition to estimating sport harvest and catch of Chinook salmon through a mail-out Statewide Harvest Survey sent to licensed anglers, beginning in 2005 all sport fishing guides must maintain ADF&G guide logbooks, and record all catch and harvest from clients. Since 2005, the harvest of Chinook salmon by guided anglers has ranged from 39 to 68 fish.

ACTION PLAN ALTERNATIVES

ACTION 1

Objective

The purpose of this action is to open commercial salmon fishing for chum and pink salmon earlier in order to target these species at their peak migration to increase harvests, if it is determined there is a harvestable surplus of chum or pink salmon, and that a directed chum or pink salmon commercial fishery will not have a significant impact on escapement or subsistence use of Chinook salmon.

Specific Action Recommended to Implement the Objective

If there are restrictions or closures to the subsistence Chinook salmon fishery, allow a directed commercial chum or pink salmon fishery to be opened no earlier than July 1 in Subdistricts 5 and 6.

Recommended regulatory language for the proposed changes to the existing management plan is indicated in bold font and underlined.

5 AAC 04.395. SUBDISTRICTS 5 and 6 OF THE NORTON SOUND DISTRICT AND THE UNALAKLEET RIVER KING SALMON MANAGEMENT PLAN. (c)-(h)

(c) If the projected **king salmon** escapement is below the lower end of the escapement goal range, all fishing for **king salmon** will be closed.

(d) Notwithstanding any provision any provision of 5 AAC 39.222 and 5 AAC 39.223, if the projected king salmon count at the North River counting tower exceeds the midpoint of the escapement goal,

(1) the commissioner may open, by emergency order, a subsistence king salmon fishery in the

(A) marine waters of Subdistricts 5 and 6 for two 48-hour fishing periods per week; and

(B) in river fishery for two 36-hour fishing periods per week;

(2) the commissioner may increase, by emergency order, the sport fish annual limit for king salmon, 20 inches or greater in length, to four fish;

(3) the commissioner may open, by emergency order, a commercial king salmon fishery with two 24-hour fishing periods per week.

(e) If subsistence fishing periods in the Unalakleet River drainage are restricted to less than two 36-hour openings, the sport fish harvest annual limit for king salmon will be reduced to one fish with no size limit.

(f) In Subdistricts 5 and 6, if the marine waters subsistence fishery is restricted to less than two 48-hour periods, the sport fishery will be reduced, by emergency order, to catch-and-release fishing only.

(g) In the Unalakleet River drainage or in the marine waters of Subdistricts 5 and 6, if the subsistence fishery is closed to the retention of king salmon, sport fishing for king salmon will be closed.

(h) In the commercial pink and chum salmon fishery in Subdistricts 5 and 6, the fishery may occur only if it is determined there is a harvestable surplus of pink or chum salmon and that a directed pink or chum salmon commercial fishery will not have a significant impact on escapement or subsistence use of king salmon; and no earlier than July 1 if either gillnet mesh-size or subsistence fishing time are restricted in the king salmon subsistence fishery.

Cost/Benefit Analysis

Adoption of this action would direct ADF&G to not allow commercial fishing for pink and chum salmon until July 1 if subsistence fisheries are being restricted in order to reach Chinook salmon escapement goals. Currently, commercial fishing periods can be established by emergency order in Subdistricts 5 and 6 from June 8 to September 7.

If adopted, this action would provide management direction consistent with the purpose of the Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan. A clear management strategy is necessary in order to ensure that the anticipated increased commercial harvest of other salmon does not negatively affect Chinook salmon subsistence or escapement needs. In situations in which it is projected that Unalakleet River Chinook salmon escapements will fall short of goals, or ADF&G has implemented restrictions (e.g., mesh-size or reductions in fishing time) to subsistence fisheries in order to reach escapement goals, it is preferred to delay commercial salmon fishing for other salmon until July 1. Additionally, ADF&G will make a determination that there is a harvestable surplus of chum or pink salmon, and that a directed chum or pink salmon commercial fishery will not have a significant impact on escapement or subsistence use of Chinook salmon.

Subsistence harvest data collected inseason since 2007 show that marine catches of Chinook salmon peak in late June and drop off sharply in early July (Figure 16). In general, the majority of Chinook salmon migrate into the lower Shaktoolik and Unalakleet rivers by early July. In times of low Chinook salmon abundance, delaying commercial fishing until July 1 will minimize the number of Chinook salmon incidentally harvested in Subdistricts 5 and 6 fisheries directed at other salmon species. Allowing commercial fishing for chum and pink salmon in early July is about a week earlier than fishing has occurred in the 2000s. However, restricting commercial mesh size to 6 inches or less has been effective at allowing commercial fishermen to target other salmon while keeping incidental harvests of Chinook salmon low in Subdistricts 5 and 6.

Adopting these changes to the current management plan would provide ADF&G with a clear directive for how to prosecute commercial salmon fisheries on pink and chum salmon which

have migration timing concurrent with Subdistricts 5 and 6 Chinook salmon. If commercial fishing on chum and pink salmon were to occur before July 1, it should be supported by Chinook salmon abundance indices (e.g., subsistence and test fishery catch indices, tower counts) that suggest that Chinook salmon subsistence needs and escapement goals will be satisfied. In years of low Chinook salmon abundance, the July 1 start date would ensure that the majority of Chinook salmon are in the river before commercial fishing begins. The ability to meet Chinook salmon escapement goals should not be affected because of a combination of the July 1 start date and restricted commercial gillnet mesh size (4.5-inch for pink and 6-inch for chum salmon). In most years, these changes will enhance ADF&G's ability to allow harvest of surpluses of other salmon species while protecting Chinook salmon subsistence harvests or escapements.

Allowing the potential opening of commercial chum and pink salmon fishery earlier in the run will provide benefits to this economically depressed area, if commercial markets are available. There will be a cost in some incidental harvest of Chinook salmon that may have been utilized for subsistence or contributed to spawning escapement.

Adoption of this action is not expected to result in additional direct costs for private individuals to participate in this fishery.

Subsistence Issues/Considerations

The proposed management strategy is not expected to change the current subsistence harvest patterns or be an additional expense for subsistence fishermen. Typically, a majority of the Chinook salmon runs in Subdistricts 5 and 6 would be available for subsistence harvest prior to allowing a commercial chum or pink salmon fishery.

Performance Measures

An important measure of performance would be evaluating the incidental Chinook salmon harvest compared to meeting established escapement goals, reaching the historical level of subsistence Chinook salmon harvest (approximately 4,000 Chinook salmon for Subdistricts 5 and 6 combined), and to the level of chum and pink salmon surplus harvested by the commercial fishery. Harvest levels would be determined through inseason verbal catch reports from buyers and fish tickets. Spawning escapement will be monitored through existing tower project and aerial surveys. Subsistence harvest will be monitoring inseason as well as through postseason household surveys.

2010 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING NORTON SOUND SUBDISTRICTS 5 AND 6 CHINOOK SALMON

SUBSISTENCE

Proposal 69—Any resident of Alaska would be able to use a hook and line attached to a rod or pole to fish for subsistence in the Norton Sound, except in the Unalakleet River drainage.

Proposal 72—In the subsistence fishery, allow managers to restrict gillnets to a mesh size of 7-inches or less. This will allow conservation of larger Chinook salmon while minimizing incidental catch of less desirable chum salmon.

COMMERCIAL

Proposal 76—Allow purse seines to harvest pink salmon commercially in Norton Sound.

Proposal 77—Allow purse seines and beach seines in Norton Sound-Port Clarence to harvest salmon commercially.

RESEARCH PLAN

RESEARCH AND STOCK ASSESSMENT PROJECTS

Division of Sport Fish began a 2-year radiotelemetry study in 2009 to re-evaluate the reliability of the North River Chinook salmon escapement as an index of total drainagewide escapement. The initial radiotelemetry study revealed that North River accounts for approximately 40% of the Chinook salmon that return annually to the Unalakleet River drainage to spawn (Wuttig 1999). While preliminary, data obtained from the first year of the 2009 radiotelemetry study suggests that the proportion of Chinook salmon that spawned in the North River (44%) was similar to the proportions found in 1997 (38%) and 1998 (41%; Phil Joy, Fisheries Biologist, Division of Sport Fish, personal communication).

Since 2007, Division of Commercial Fisheries personnel have documented the age, sex, and size composition of Chinook salmon escapement to Unalakleet River by capturing Chinook salmon upstream from subsistence fishing areas in beach seines. Similarly, the age, sex, and size composition of the subsistence harvest has been documented during this time. Additionally, 140 genetic tissue samples are being collected annually from both the marine harvests of Subdistricts 5 and 6 Chinook salmon. If the proper genetic markers become available, ADF&G intends to sequence these samples in effort to more accurately apportion marine harvests from this mixed-stock fishery. While this genetic sampling of harvest has occurred, ADF&G with assistance from NSEDC has made significant progress obtaining baseline collections from Norton Sound Chinook salmon stocks (e.g., Inglutalik River, Tubutulik River, Pilgrim River, and Golsovia River).

Stock-specific length-fecundity and age-fecundity relationships for Unalakleet River Chinook salmon are also being examined. The apparent change in Unalakleet River Chinook salmon age, sex, and size composition is of concern to fishery managers, especially in light of major declines in total run size estimates. Findings from previous investigations show that fecundity is positively correlated with length in Chinook salmon (Beacham and Murray 1993; Healey and Heard 1984; Quinn et al. 2004), and that more northerly populations of Chinook salmon may exhibit relatively high fecundity (Healy and Heard 1984). Additionally, preliminary fecundity data collected from Unalakleet River Chinook salmon show that egg mass is also positively correlated with body length (Figures 16 and 17). Given the relationship between fecundity and egg mass, and body size, and the potentially adaptive significance of high fecundity in northern regions, major changes in the age and size structure of the escapement (i.e., fewer larger female Chinook salmon) could adversely affect the productive capacity of Unalakleet Chinook salmon.

Norton Sound Economic Development Corporation (NSEDC) has purchased a Dual Frequency Identification sonar (DIDSON) unit for the Shaktoolik River and has been operating the sonar for three seasons. The 2010 season will mark the first season that NSEDC plans to apply species apportionment to the sonar operation.

Perhaps most importantly, ADF&G submitted a proposal to the U.S. Fish & Wildlife Service Office of Subsistence Management to construct, install and operate a floating, resistance-board style weir on the main stem of the Unalakleet River. A floating weir would provide reliable and timely escapement and age class information that would allow fishery managers to make informed management decisions and build a data set that can be used to develop scientifically defensible escapement goals for the Unalakleet River. The proposal was recently recommended to be funded by the Seward Peninsula Regional Advisory Council and will be before the Federal Subsistence Board in January of 2010. Weir operations are slated to begin in mid-June of 2010. The major purpose for the weir is to obtain reliable estimates of drainagewide Chinook salmon escapement and unbiased age class information to develop BEGs.

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TABLES AND FIGURES

Table 1.—Unalakleet River test fishery and North River tower Chinook salmon run timing cumulative percentage by date, Subdistrict 6 (Unalakleet), Norton Sound, 2007–2009.

| Date | 2007 | | 2008 | | 2009 | | Historical Average ^a | |
|--------|----------------------------|-------------------|----------------------------|-------------------|----------------------------|-------------------|---------------------------------|-------------------|
| | Unalakleet River Test Fish | North River Tower | Unalakleet River Test Fish | North River Tower | Unalakleet River Test Fish | North River Tower | Unalakleet River Test Fish | North River Tower |
| 5-Jun | 0.0 | | | | 0.0 | | 0.4 | |
| 6-Jun | 0.0 | | | | 0.0 | | 0.5 | |
| 7-Jun | 0.0 | | | | 0.0 | | 0.7 | |
| 8-Jun | 0.0 | | | | 0.0 | | 1.1 | |
| 9-Jun | 0.0 | | 0.0 | | 0.0 | | 1.8 | |
| 10-Jun | 0.0 | | 0.0 | | 0.0 | | 3.7 | |
| 11-Jun | 0.0 | | 0.0 | | 0.0 | | 4.7 | |
| 12-Jun | 0.0 | | 0.0 | | 0.0 | | 6.4 | |
| 13-Jun | 0.0 | | 0.0 | | 0.7 | | 7.4 | |
| 14-Jun | 0.0 | | 0.0 | | 1.5 | | 9.4 | |
| 15-Jun | 0.0 | | 0.0 | | 2.2 | | 11.0 | |
| 16-Jun | 0.0 | 0.0 | 0.0 | | 3.0 | | 12.7 | 0.1 |
| 17-Jun | 0.0 | 0.0 | 0.8 | | 5.2 | | 15.2 | 0.1 |
| 18-Jun | 2.1 | 0.0 | 0.8 | | 7.4 | | 18.2 | 0.2 |
| 19-Jun | 3.1 | 0.0 | 1.6 | 0.0 | 10.4 | 0.0 | 21.1 | 0.3 |
| 20-Jun | 3.1 | 0.0 | 3.3 | 0.0 | 11.1 | 0.0 | 26.5 | 0.6 |
| 21-Jun | 4.2 | 0.0 | 3.3 | 0.0 | 17.8 | 0.3 | 29.7 | 0.7 |
| 22-Jun | 6.3 | 0.0 | 6.5 | 2.0 | 24.4 | 0.3 | 33.5 | 0.8 |
| 23-Jun | 7.3 | 0.0 | 10.6 | 2.0 | 27.4 | 0.5 | 36.2 | 1.3 |
| 24-Jun | 7.3 | 0.0 | 12.2 | 2.0 | 31.9 | 0.5 | 39.2 | 1.7 |
| 25-Jun | 10.4 | 0.3 | 12.2 | 2.0 | 37.8 | 0.5 | 42.7 | 2.9 |
| 26-Jun | 12.5 | 0.6 | 12.2 | 2.0 | 42.2 | 1.0 | 45.9 | 4.0 |
| 27-Jun | 29.2 | 1.2 | 14.6 | 3.3 | 48.9 | 1.3 | 49.3 | 5.7 |
| 28-Jun | 39.6 | 2.2 | 15.4 | 3.3 | 51.1 | 1.3 | 51.9 | 8.7 |
| 29-Jun | 49.0 | 2.2 | 16.3 | 3.3 | 53.3 | 1.3 | 54.1 | 12.5 |
| 30-Jun | 58.3 | 2.2 | 17.9 | 4.0 | 56.3 | 2.3 | 56.3 | 16.5 |
| 1-Jul | 65.6 | 3.1 | 17.9 | 4.0 | 60.0 | 2.6 | 59.1 | 21.0 |
| 2-Jul | 71.9 | 4.6 | 25.2 | 4.0 | 61.5 | 3.8 | 62.5 | 24.9 |
| 3-Jul | 79.2 | 6.2 | 34.1 | 5.3 | 63.7 | 6.4 | 65.3 | 29.4 |
| 4-Jul | 83.3 | 8.3 | 39.0 | 7.3 | 67.4 | 7.1 | 67.7 | 33.6 |
| 5-Jul | 84.4 | 13.9 | 44.7 | 8.0 | 69.6 | 8.2 | 70.4 | 37.2 |

-continued-

Table 1.–Page 2 of 2.

| Date | 2007 | | 2008 | | 2009 | | Historical Average ^a | |
|--------|---------------------|----------------|---------------------|----------------|---------------------|----------------|---------------------------------|----------------|
| | Unalakleet River | North River | Unalakleet River | North River | Unalakleet River | North River | Unalakleet River | North River |
| | Test Fish | Tower | Test Fish | Tower | Test Fish | Tower | Test Fish | Tower |
| 6-Jul | 84.4 | 18.5 | 48.0 | 9.3 | 72.6 | 9.2 | 73.9 | 42.1 |
| 7-Jul | 88.5 | 23.4 | 53.7 | 10.0 | 73.3 | 16.8 | 77.6 | 46.6 |
| 8-Jul | 90.6 | 28.6 | 57.7 | 16.9 | 77.8 | 18.6 | 80.6 | 49.9 |
| 9-Jul | 91.7 | 31.4 | 72.4 | 21.3 | 85.2 | 19.4 | 82.4 | 55.0 |
| 10-Jul | 91.7 | 40.3 | 77.2 | 22.3 | 88.9 | 19.6 | 85.5 | 58.2 |
| 11-Jul | 92.7 | 44.0 | 79.7 | 22.6 | 91.1 | 23.5 | 87.3 | 64.2 |
| 12-Jul | 94.8 | 50.5 | 82.9 | 24.9 | 94.1 | 37.8 | 88.1 | 67.9 |
| 13-Jul | 95.8 | 58.8 | 86.2 | 39.5 | 95.6 | 51.0 | 90.3 | 71.4 |
| 14-Jul | 96.9 | 66.5 | 87.0 | 43.2 | 97.0 | 52.0 | 91.7 | 74.6 |
| 15-Jul | 97.9 | 70.5 | 88.6 | 51.2 | 97.8 | 53.6 | 93.1 | 78.5 |
| 16-Jul | 97.9 | 72.7 | 91.9 | 72.1 | 98.5 | 54.6 | 94.9 | 81.3 |
| 17-Jul | 99.0 | 72.7 | 94.3 | 73.8 | 99.3 | 67.6 | 96.0 | 83.8 |
| 18-Jul | 99.0 | 73.3 | 95.1 | 74.8 | 99.3 | 73.5 | 96.6 | 86.0 |
| 19-Jul | 100.0 | 74.2 | 97.6 | 78.7 | 99.3 | 75.3 | 97.3 | 88.2 |
| 20-Jul | 100.0 | 76.1 | 98.4 | 82.7 | 99.3 | 79.6 | 98.9 | 90.5 |
| 21-Jul | 100.0 | 78.9 | 98.4 | 88.0 | 99.3 | 82.7 | 99.2 | 92.6 |
| 22-Jul | 100.0 | 83.2 | 99.2 | 94.0 | 99.3 | 88.3 | 99.7 | 94.3 |
| 23-Jul | 100.0 | 84.1 | 99.2 | 94.7 | 100.0 | 89.0 | 99.9 | 95.5 |
| 24-Jul | 100.0 | 85.0 | 99.2 | 95.3 | 100.0 | 90.8 | 100.0 | 96.3 |
| 25-Jul | 100.0 | 91.2 | 100.0 | 93.4 | 100.0 | 91.6 | 100.0 | 97.1 |

^a The Unalakleet River test fishery historical average is from 1986–2006 and the North River tower average includes the years 1996–1998, 2000, 2002–2006.

Table 2.—Reported Chinook salmon harvest by period, marine and Unalakleet River subsistence fisheries (8-inch mesh gillnets), inseason subsistence survey, Subdistrict 6 (Unalakleet), Norton Sound, 2007–2009.

| 2007 | | | | | |
|-------------------|----------------|------------------------|-------------------|-----------------|-------------------------|
| Fishing Period | Marine Harvest | Marine Average Harvest | Fishing Period | Inriver Harvest | Inriver Average Harvest |
| Period 1 (Jun-18) | 153 | 9 | Period 1 (Jun-18) | 52 | 3 |
| Period 2 (Jun-21) | 493 | 20 | Period 2 (Jun-22) | 67 | 5 |
| Period 3 (Jun-25) | 251 | 10 | Period 3 (Jun-25) | 120 | 9 |
| Period 4 (Jun-28) | 252 | 10 | Period 4 (Jun-29) | 126 | 8 |
| Period 5 (Jul-2) | 96 | 7 | Period 5 (Jul-2) | 36 | 4 |
| Season Total | 1,245 | 26 | | 401 | 14 |
| 2008 | | | | | |
| Fishing Period | Marine Harvest | Marine Average Harvest | Fishing Period | Inriver Harvest | Inriver Average Harvest |
| Period 1 (Jun-16) | 14 | 3 | Period 1 (Jun-16) | 8 | 1 |
| Period 2 (Jun-19) | 96 | 7 | Period 2 (Jun-20) | 15 | 2 |
| Period 3 (Jun-23) | 161 | 7 | Period 3 (Jun-23) | 24 | 3 |
| Period 4 (Jun-26) | 460 | 15 | Period 4 (Jun-27) | 28 | 3 |
| Period 5 (Jun-30) | 145 | 5 | Period 5 (Jun-30) | 25 | 5 |
| Period 6 (Jul-3) | 94 | 7 | Period 6 (Jul-4) | No one Fished | No one Fished |
| Season Total | 970 | 27 | | 100 | |
| 2009 | | | | | |
| Fishing Period | Marine Harvest | Marine Average Harvest | Fishing Period | Inriver Harvest | Inriver Average Harvest |
| Period 1 (Jun-15) | 220 | 17 | Period 1 (Jun-15) | 11 | 2 |
| Period 2 (Jun-18) | 146 | 7 | Period 2 (Jun-19) | 24 | 3 |
| Period 3 (Jun-22) | 245 | 12 | Period 3 (Jun-22) | 33 | 4 |
| Period 4 (Jun-25) | 323 | 36 | Period 4 (Jun-26) | 180 | 14 |
| Period 5 (Jun-29) | 196 | 12 | Period 5 (Jun-29) | No one Fished | No one Fished |
| Period 6 (Jul-2) | 85 | 12 | Period 6 (Jul-3) | No one Fished | No one Fished |
| Season Total | 1,230 | 27 | | 265 | |

Table 3.—Estimated escapement, total harvest, and total run, Unalakleet River Chinook salmon, 1984–1986 and 1996–2009.

| Year | Escapement ^a | | Harvest ^{b, c} | Total | |
|--------------------------------|-------------------------|------------------|-------------------------|--------------------|-----------------------------|
| | North River | Unalakleet River | | Estimated Run Size | Exploitation Rate (Percent) |
| 1984 | 2,844 | 7,368 | 9,999 | 17,367 | 57.6 |
| 1985 | 1,426 | 3,694 | 16,034 | 19,728 | 81.3 |
| 1986 | 1,613 | 4,179 | 8,437 | 12,615 | 66.9 |
| ^d | | | | | |
| 1996 | 1,197 | 3,101 | 7,051 | 10,152 | 69.5 |
| 1997 | 4,185 | 10,842 | 14,100 | 24,942 | 56.5 |
| 1998 | 2,100 | 5,440 | 10,992 | 16,432 | 66.9 |
| 1999 | 1,639 | 4,246 | 5,033 | 9,279 | 54.2 |
| 2000 | 1,046 | 2,710 | 3,356 | 6,066 | 55.3 |
| 2001 ^e | 1,337 | 3,464 | 3,176 | 6,640 | 47.8 |
| 2002 | 1,484 | 3,845 | 2,915 | 6,760 | 43.1 |
| 2003 | 1,452 | 3,762 | 2,692 | 6,454 | 41.7 |
| 2004 | 1,125 | 2,915 | 3,185 | 6,100 | 52.2 |
| 2005 | 1,015 | 2,630 | 2,510 | 5,140 | 48.8 |
| 2006 | 906 | 2,347 | 2,842 | 5,189 | 54.8 |
| 2007 | 1,948 | 5,047 | 1,826 | 6,873 | 26.6 |
| 2008 | 903 | 2,339 | 2,047 | 4,386 | 46.7 |
| 2009 | 2,352 | 6,093 | 2,291 | 8,384 | 27.3 |
| Long-Term Average ^f | 1,669 | 4,324 | 6,594 | 10,919 | 56.9 |
| 2005–2009 Average | 1,425 | 3,691 | 2,303 | 5,994 | 40.8 |

^a Drainagewide escapement estimate calculated by expanding tower counts by 0.386, the average proportion of Chinook salmon migrating into the North River, 1997 and 1998 (Wuttig, 1999).

^b The 1994–2001 average subsistence harvest of 3,041 Chinook salmon was used for 1984–1986 harvest estimates.

^c Sport fish harvest unavailable for 2009. Recent 5-year (2004–2008) average harvest of 339 substituted for 2009.

^d North River tower not operational from 1987–1995.

^e Minimum estimate in 2001 because project started late.

^f Average is from 1984–1986, and 1996–2006.

Table 4.–Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) commercial and subsistence Chinook salmon harvest, Norton Sound District, 1961–2009.

| Year | Subdistrict 5 | | Subdistrict 6 | | Subdistricts 5 & 6 | |
|------|---------------|-------------|---------------|-------------|--------------------|-------------|
| | Commercial | Subsistence | Commercial | Subsistence | Commercial | Subsistence |
| 1961 | 140 | | 5,160 | | 5,300 | |
| 1962 | 1,738 | | 5,089 | | 6,827 | |
| 1963 | 480 | | 5,941 | | 6,421 | |
| 1964 | 631 | 77 | 1,273 | 488 | 1,904 | 565 |
| 1965 | 127 | 31 | 1,321 | 521 | 1,448 | 552 |
| 1966 | 310 | 142 | 1,208 | 90 | 1,518 | 232 |
| 1967 | 43 | 262 | 1,751 | 490 | 1,794 | 752 |
| 1968 | 61 | 10 | 960 | 186 | 1,021 | 196 |
| 1969 | 33 | 40 | 2,276 | 324 | 2,309 | 364 |
| 1970 | 197 | 43 | 1,604 | 495 | 1,801 | 538 |
| 1971 | 284 | 87 | 2,166 | 911 | 2,450 | 998 |
| 1972 | 419 | 64 | 2,235 | 643 | 2,654 | 707 |
| 1973 | 289 | 51 | 1,397 | 323 | 1,686 | 374 |
| 1974 | 583 | 93 | 2,100 | 313 | 2,683 | 406 |
| 1975 | 651 | 18 | 1,638 | 163 | 2,289 | 181 |
| 1976 | 892 | 24 | 1,211 | 142 | 2,103 | 166 |
| 1977 | 1,521 | 49 | 2,691 | 723 | 4,212 | 772 |
| 1978 | 1,339 | 81 | 7,525 | 1,044 | 8,864 | 1,125 |
| 1979 | 2,377 | 62 | 6,354 | 640 | 8,731 | 702 |
| 1980 | 1,086 | 57 | 4,339 | 1,046 | 5,425 | 1,103 |
| 1981 | 1,484 | 8 | 6,157 | 869 | 7,641 | 877 |
| 1982 | 1,677 | 68 | 3,768 | 913 | 5,445 | 981 |
| 1983 | 2,742 | No survey | 7,022 | 1,868 | 9,764 | 1,868 |
| 1984 | 1,613 | No survey | 6,804 | 1,650 | 8,417 | 1,650 |
| 1985 | 5,312 | 298 | 12,621 | 1,397 | 17,933 | 1,695 |
| 1986 | 1,075 | No survey | 4,494 | 1,339 | 5,569 | 1,339 |
| 1987 | 2,214 | No survey | 3,246 | No survey | 5,460 | No survey |
| 1988 | 671 | No survey | 2,218 | No survey | 2,889 | No survey |
| 1989 | 1,241 | No survey | 4,402 | No survey | 5,643 | No survey |
| 1990 | 2,644 | No survey | 5,998 | 2,476 | 8,642 | 2,476 |
| 1991 | 1,324 | No survey | 4,534 | No survey | 5,858 | No survey |

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Table 4.–Page 2 of 2.

| Year | Subdistrict 5 | | Subdistricts 6 | | Subdistrict 5 & 6 | |
|----------------|---------------|-------------|----------------|-------------|-------------------|-------------|
| | Commercial | Subsistence | Commercial | Subsistence | Commercial | Subsistence |
| 1992 | 1,098 | No survey | 3,409 | No survey | 4,507 | No survey |
| 1993 | 2,756 | No survey | 5,944 | No survey | 8,700 | No survey |
| 1994 | 885 | 1,175 | 4,400 | 3,035 | 5,285 | 4,210 |
| 1995 | 1,239 | 1,275 | 7,617 | 3,114 | 8,856 | 4,389 |
| 1996 | 1,340 | 1,114 | 3,644 | 3,023 | 4,984 | 4,137 |
| 1997 | 2,449 | 1,146 | 9,067 | 4,191 | 11,516 | 5,337 |
| 1998 | 910 | 982 | 6,413 | 4,066 | 7,323 | 5,048 |
| 1999 | 581 | 818 | 1,927 | 2,691 | 2,508 | 3,509 |
| 2000 | 160 | 440 | 582 | 2,429 | 742 | 2,869 |
| 2001 | 90 | 936 | 116 | 2,810 | 206 | 3,746 |
| 2002 | 1 | 1,230 | 4 | 2,367 | 5 | 3,597 |
| 2003 | 2 | 806 | 10 | 2,585 | 12 | 3,391 |
| 2004 | 0 | 943 | 0 | 2,829 | 0 | 3,772 |
| 2005 | 50 | 807 | 101 | 2,193 | 151 | 3,000 |
| 2006 | 0 | 382 | 12 | 2,537 | 12 | 2,919 |
| 2007 | 5 | 515 | 13 | 1,666 | 18 | 2,181 |
| 2008 | 6 | 422 | 65 | 1,402 | 71 | 1,824 |
| 2009 | 4 | 417 | 80 | 1,892 | 84 | 2,309 |
| 2005–2009 Avg. | 13 | 509 | 54 | 1,938 | 67 | 2,447 |
| 1994–1998 Avg. | 1,365 | 1,138 | 6,228 | 3,486 | 7,593 | 4,624 |
| 1989–1998 Avg. | 1,589 | | 5,543 | | 7,131 | |

Note: Subsistence harvests collected before 1994 are based on household surveys, but the number of households surveyed is unknown and varied annually and actual harvests were greater.

Table 5.—Unalakleet River Chinook salmon sport fish harvest, and catch estimates for 1983–2009.

| Year | Chinook Salmon Catch | Chinook Salmon Harvest |
|----------------|----------------------|------------------------|
| 1983 | ^a | 93 |
| 1984 | ^a | 39 |
| 1985 | ^a | 179 |
| 1986 | ^a | 850 |
| 1989 | ^a | 49 |
| 1990 | 361 | 276 |
| 1991 | 375 | 296 |
| 1992 | 476 | 117 |
| 1993 | 2,340 | 382 |
| 1994 | 517 | 379 |
| 1995 | 588 | 259 |
| 1996 | 2,059 | 384 |
| 1997 | 5,144 | 842 |
| 1998 | 1,539 | 513 |
| 1999 | 669 | 415 |
| 2000 | 1,045 | 345 |
| 2001 | 542 | 250 |
| 2002 | 835 | 544 |
| 2003 | 505 | 97 |
| 2004 | 1,930 | 356 |
| 2005 | 431 | 216 |
| 2006 | 2,511 | 394 |
| 2007 | 776 | 147 |
| 2008 | 790 ^b | 580 ^b |
| 2009 | 1,288 ^c | 339 ^c |
| 2005–2009 Avg. | 1,159 | 335 |
| 1990–1999 Avg. | 1,407 | 386 |

^a Sport fishery harvest unavailable prior to 1990 and harvest unavailable from 1987–1988.

^b Unalakleet River king salmon harvest and catch for 2008 is inflated by an unknown amount due to an individual angler report of a high number of small king salmon.

^c 2009 sport fishery harvest data unavailable. Recent 5-year (2004–2008) average harvest of 339 substituted.

Table 6.–Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) historical management actions.

| | |
|------|---|
| 1993 | -Commercial drift fishing allowed in June so fishers can avoid fouling their nets with the debris loads in the spring. Chum salmon fishing closed early because of weak run. |
| 1994 | -Chinook salmon periods limited to two 24-hour periods per week. Pink salmon fishing opened continuously. There was no fisher interest in chum salmon. A strong coho salmon run results in record harvest. |
| 1995 | -Strong Chinook salmon run. Buyer expresses interest in pink salmon and limited interest in chum salmon. Late season coho salmon closure (August 26) to bolster escapement. |
| 1996 | -Early run of Chinook salmon. Limited market for chum salmon. Pink salmon fishing opened continuously. Strong run of coho salmon. |
| 1997 | -The last year the majority of the Chinook salmon periods were two 48-hour periods per week. Best Chinook commercial harvest of the decade. Limited market for chum salmon. Coho salmon run is below average and season closes on August 23. |
| 1998 | -The majority of Chinook salmon periods are now 24 hours in length. Limited market for chum salmon. Pink salmon fishing opened continuously because of large surplus of pink salmon. Subdistrict 5 opened to continuous fishing the last 2 weeks of August to provide flexibility during persistent inclement weather. |
| 1999 | -Weak runs of Chinook, chum and coho salmon. Coho salmon commercial fishing restricted to two 24-hour periods per week instead of the normal two 48-hour periods per week. |
| 2000 | -Only two commercial Chinook salmon fishing periods. Lowest commercial Chinook and chum salmon harvest to date. Pink salmon fishing opened continuously to allow buyer to more effectively direct fleet. Pink salmon catches were below average which was attributed to low volumes of fish and lack of fishing interest. |
| 2001 | -Only two commercial Chinook salmon fishing periods. Lowest commercial Chinook and chum salmon harvest to date. |
| 2002 | -No commercial Chinook or chum salmon fishing because of weak runs. No market interest in pink salmon unless there is a 500,000 pink salmon harvest projection. -Coho salmon commercial fishing time reduced to two 24 hour periods per week. Commercial fishing closed on August 19 to protect coho salmon. Sport fish reduces bag limit to 1 per day from 5 per day. |

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- 2003 -No commercial Chinook or chum salmon fishing because of weak runs.
-Three week (July 3-25) subsistence salmon fishing closure to protect Chinook and chum salmon in Shaktoolik and Unalakleet River drainages. Subsistence beach seining for pink salmon is allowed.
-Unalakleet and Shaktoolik rivers sport fishing closed to the retention of Chinook salmon from July 3 through August 15 and the use of bait was prohibited during this period.
- 2004 -No commercial Chinook salmon fishing periods.
-Unalakleet River drainage closed to salmon gillnet fishing effective July 10. Beach seining is permitted to target large numbers of pink salmon but closed to the retention of Chinook salmon.
-Commercial coho salmon fishing opened on July 26 to the regular schedule of two 48-hour periods per week for the remainder of the season. The season closed on September 7 by regulation.
-Sport fishing was allowed in the Unalakleet River, but all Chinook salmon had to be immediately released effective July 1 through August 3 and the use of bait was prohibited during this period.
- 2005 -Two 24-hour Chinook salmon commercial fishing periods were allowed beginning June 27 and ending June 30. However, Chinook salmon commercial catches were poor and test fish catches and tower counts also dropped off abruptly in early July. As a result, commercial fishing was not permitted until coho salmon season.
-The coho salmon commercial fishing season was opened on July 24 as a result of record test fish catches during the third week of July. The regular schedule of two 48-hour periods per week was in effect for the remainder of the season. The season closed by regulation on September 7.
- 2006 -No commercial Chinook salmon fishing periods.
-Unalakleet River test fish catches and North River tower counts of Chinook salmon were well below average. As a result, the fresh and marine waters of Subdistricts 5 and 6 were closed to salmon gillnet fishing effective July 10. Beach seining was allowed, but Chinook salmon had to be immediately released.
-Coho salmon commercial fishing opened on July 21. Coho salmon catches were well above average to record setting throughout the season.
-Commercial coho salmon fishing extended after the regulatory closure date because of record commercial and test fish catches for the first week of September. The commercial salmon fishing season closed on September 14.
-Marine and fresh waters of Subdistricts 5 and 6 were closed to sport fishing for Chinook salmon from July 8 through August 15 and the use of bait was prohibited during this period.

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- 2007 -No commercial Chinook salmon fishing periods because of weak runs.
- On June 16, Subdistricts 5 and 6 marine waters placed on subsistence fishing schedule of two 48-hour periods per week and Unalakleet River placed on subsistence fishing schedule of two 36-hour periods per week.
 - Test fishery catches of Chinook salmon above recent 5, 10, and 20-year averages. However, below average Chinook salmon escapements and weak catch rates in the subsistence fishery for early July. Subsistence fishing closed to set gillnets in Subdistricts 5 and 6 effective July 4. Sport fishery closed July 5. Beach seining allowed for other salmon species during the regularly scheduled periods.
 - Beach seining for other salmon allowed 7 days a week effective July 16. Also effective July 16, gillnetting reopens 7 days a week in the marine waters and in the Unalakleet River below the confluence of the North River to set gillnets with a mesh size of 6 inches or less.
 - Two 24-hour commercial openings directed at chum salmon on July 18 and July 20.
 - Subdistricts 5 and 6 placed on commercial fishing schedule of two 48-hour openings per week effective July 22 due to record coho salmon catches during the third week of July.
 - Record catches for a single period occurred in Shaktoolik and Unalakleet causing the processor to be overwhelmed. In response, ADF&G suspended the commercial fishing schedule on August 3 and reduced fishing time to two 24-hour openings per week until August 9. One 48-hour opening was permitted on August 9.
 - Commercial fishing schedule of two 48-hour periods per week resumes in Subdistricts 5 and 6.
- 2008 -No commercial Chinook salmon fishing periods allowed because of poor runs.
- Lower river mesh-size restrictions (6 inches or less) imposed on the Unalakleet River effective June 30 due to anticipated difficulty in reaching escapement goals. Restrictions were timed to coincide with peak migration period of Chinook salmon entering the lower Unalakleet River.
 - Managers determine that the Chinook salmon run is weak and exhibiting much later than average timing indicated by a sharp decline in marine subsistence fishery catches in late June, below average test fishery catches, and below average Chinook salmon passage observed at the North River tower in early July. Subsistence fishery closed to set gillnets and sport fishery closed to retention of Chinook salmon on July 5.
 - Subsistence salmon fishing with set gillnets reopens in the marine waters of Subdistricts 5 and 6 on July 7.
 - From July 8–15, daily pink salmon commercial openings occur, each ranging from 6–8 hours.
 - Effective July 16, all marine and fresh waters of Subdistricts 5 and 6 reopens to subsistence salmon fishing with set gillnets 7 days a week but gillnets are restricted to a mesh size of 6 inches or less.
 - Commercial chum salmon fishing occurs from July 17–25 consisting of one 24-hour and two 48-hour periods. Commercial coho salmon fishing schedule of two 48-hour periods per week begins July 27.
 - Commercial coho salmon fishing season extended for one week beginning September 7 due to record early September test fishery catches.

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- 2009 -No commercial Chinook salmon fishing periods for 4th consecutive year due to weak runs.
- Subsistence fishing schedule goes into effect June 15 for Subdistricts 5 and 6.
 - Lower river mesh-size restrictions (6 inches or less) implemented for the Unalakleet River effective June 29 in order to protect Chinook salmon during their peak migration period in the lower Unalakleet River. Also, 6-year component was forecasted to dominate the age structure of the Subdistricts 5 and 6 Chinook salmon run. Mesh-size restrictions were hoped to mitigate some of the effects of a forecasted weak run by allowing larger, more productive individuals to reach spawning areas.
 - On July 4, Chinook salmon set gillnet subsistence and sport fisheries closed due to below average tower counts. Beach seining allowed 7 days a week for other salmon.
 - On July 8, one 24-hour commercial pink salmon opening is permitted in Subdistricts 5 and 6.
 - Subsistence salmon fishing with set gillnets reopens in the marine waters of Subdistricts 5 and 6. Mesh-size is restricted to 6-inches or less on July 10.
 - On July 10–16, commercial chum salmon openings occur consisting of four 24-hour periods in Subdistricts 5 and 6 with set gillnets restricted to 6 inches or less.
 - On July 16, subsistence Chinook salmon fishery reopens to 7 days a week in the marine waters and all freshwaters except for the Unalakleet River drainage above the confluence of the North River.
 - 48-hour commercial chum and coho salmon openings occur from July 17–31.
 - On August 1, Unalakleet River drainage-wide coho salmon escapement projected to be well above average. Subdistricts 5 and 6 placed on schedule of two 48-hour periods per week.
 - Commercial salmon fishing season extended for another full week beginning September 6 due to record-setting coho salmon escapements.
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Table 7.—Unalakleet River drainage Chinook salmon percent exploitation by fishery, 1984–1986 and 1996–2009.

| Year | | Exploitation Rate (%) | | | |
|----------------|--------------|-----------------------|-------------|------------|-------|
| | | Commercial | Subsistence | Sport Fish | Total |
| 1984 | ^a | 39.2 | 18.2 | 0.2 | 57.6 |
| 1985 | ^a | 64.0 | 16.4 | 0.9 | 81.3 |
| 1986 | ^a | 35.6 | 24.5 | 6.7 | 66.9 |
| 1996 | | 35.9 | 29.8 | 3.8 | 69.5 |
| 1997 | | 36.4 | 16.8 | 3.4 | 56.5 |
| 1998 | | 39.0 | 24.7 | 3.1 | 66.9 |
| 1999 | | 20.8 | 29.0 | 4.5 | 54.2 |
| 2000 | | 9.6 | 40.0 | 5.7 | 55.3 |
| 2001 | | 1.7 | 42.3 | 3.8 | 47.8 |
| 2002 | | 0.1 | 35.0 | 8.0 | 43.1 |
| 2003 | | 0.2 | 40.1 | 1.5 | 41.7 |
| 2004 | | 0.0 | 46.4 | 5.8 | 52.2 |
| 2005 | | 2.0 | 42.7 | 4.2 | 48.8 |
| 2006 | ^b | 0.2 | 48.9 | 5.6 | 54.8 |
| 2007 | | 0.2 | 24.2 | 2.1 | 26.6 |
| 2008 | | 1.5 | 32.0 | 13.2 | 46.7 |
| 2009 | | 1.0 | 22.3 | 4.0 | 27.3 |
| Avg. 1984–2004 | | 23.5 | 30.3 | 4.0 | 57.8 |
| Avg. 1984–1999 | | 38.7 | 22.8 | 3.2 | 64.7 |
| Avg. 1996–2004 | | 16.0 | 33.8 | 4.4 | 54.1 |
| Avg. 2005–2009 | | 1.0 | 34.0 | 5.8 | 40.8 |

^a The 1994–2001 average subsistence harvest of 3,041 Chinook salmon was used for 1984–1986 harvest estimates.

^b 2009 sport fishery harvest data unavailable. The average harvest of 339 Chinook salmon from 2004–2008 was substituted.

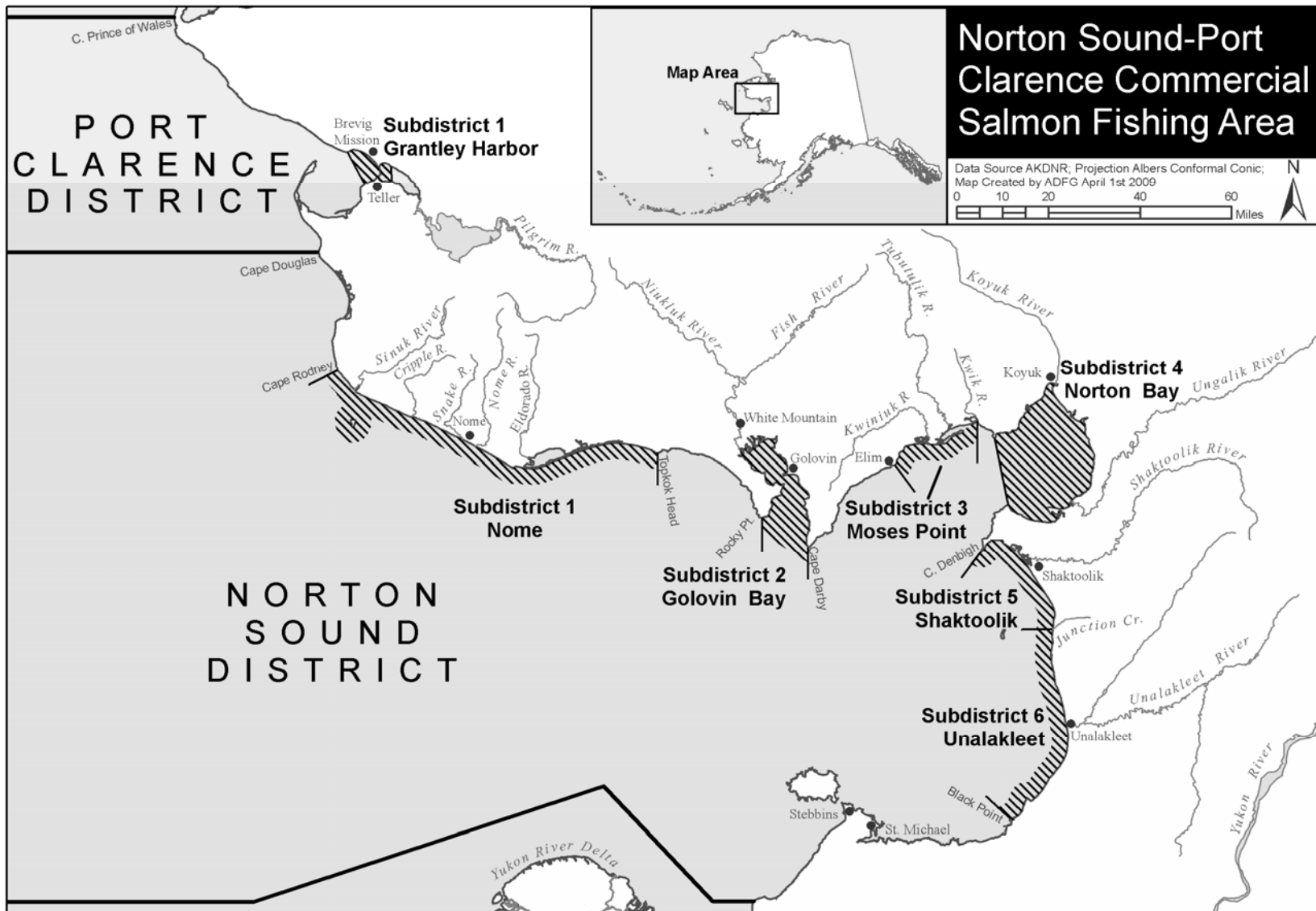


Figure 1.—Salmon commercial fishing subdistricts and rivers in Norton Sound.

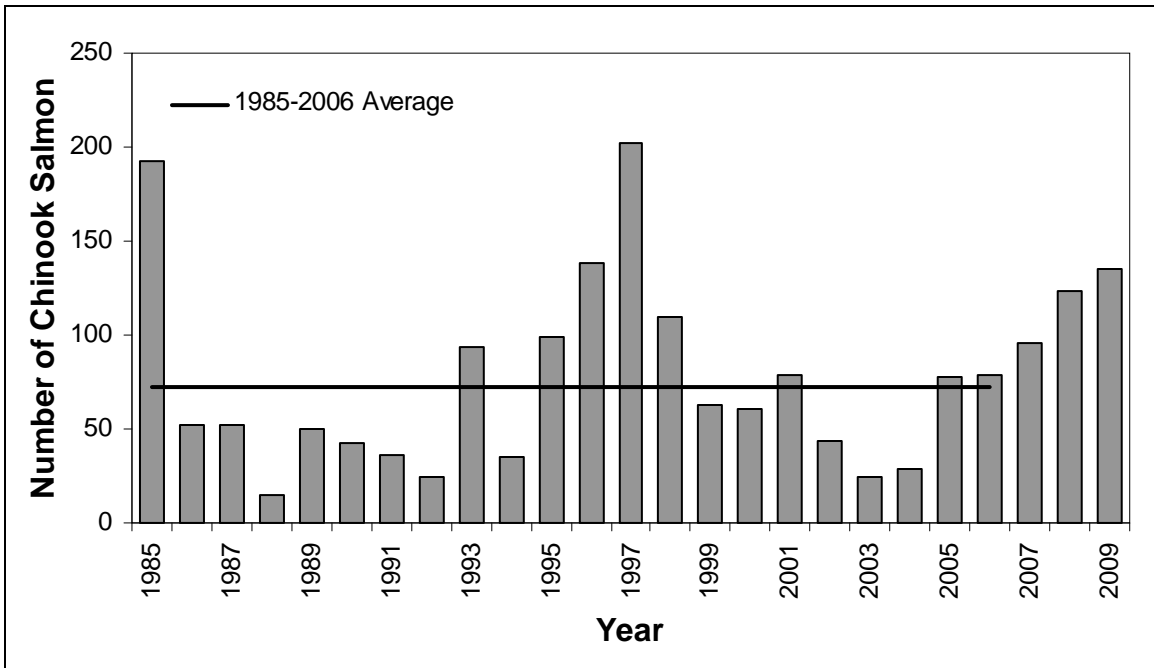


Figure 2.—Annual Chinook salmon catch compared to the long-term average (1985–2006) catch, Unalakleet River test fishery, Unalakleet River drainage, Norton Sound, 1985–2009.

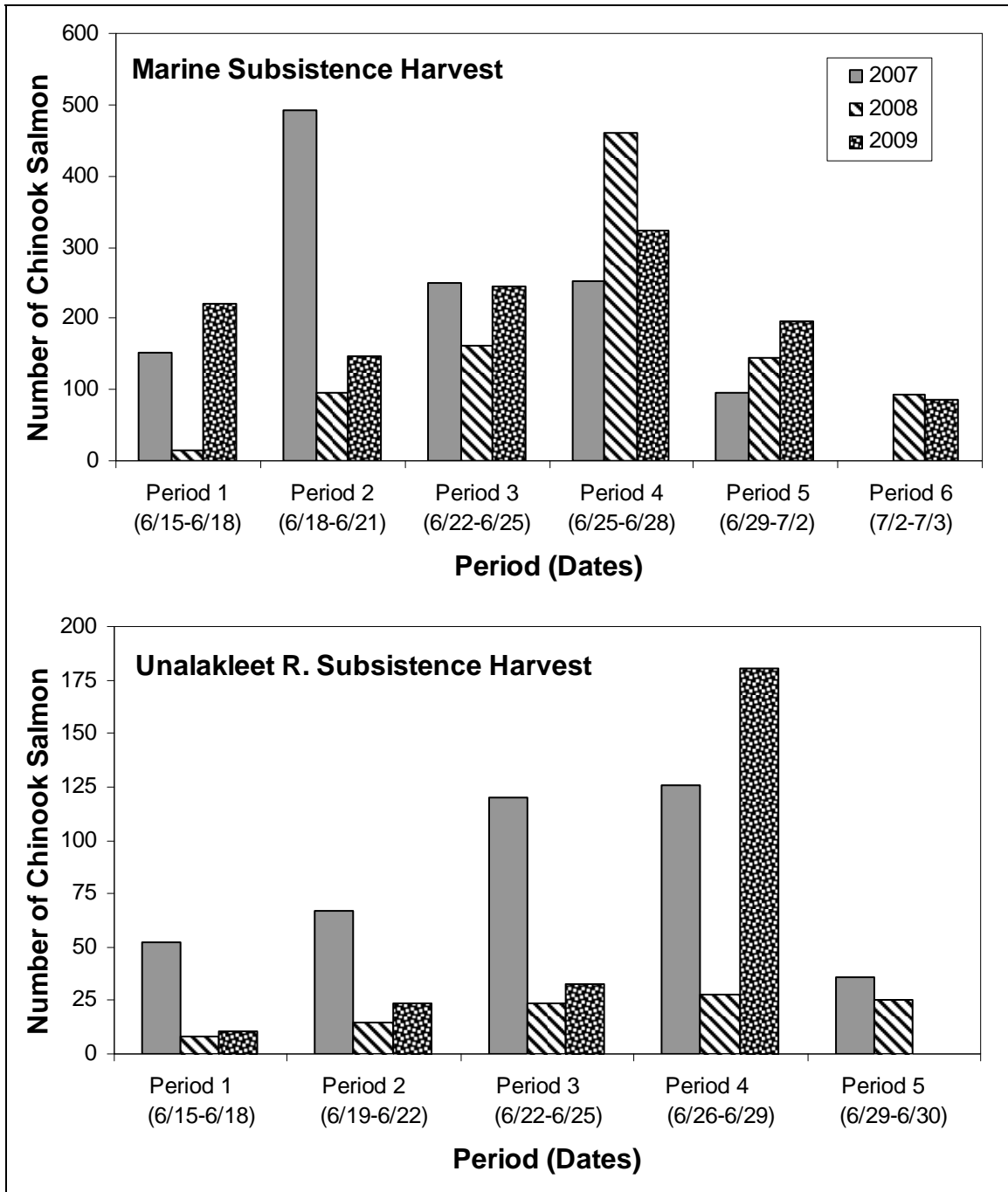


Figure 3.—Chinook salmon harvest by period, marine and Unalakleet River subsistence fisheries (8-inch mesh gillnets), inseason subsistence survey, Subdistrict 6 (Unalakleet), Norton Sound, 2007–2009.

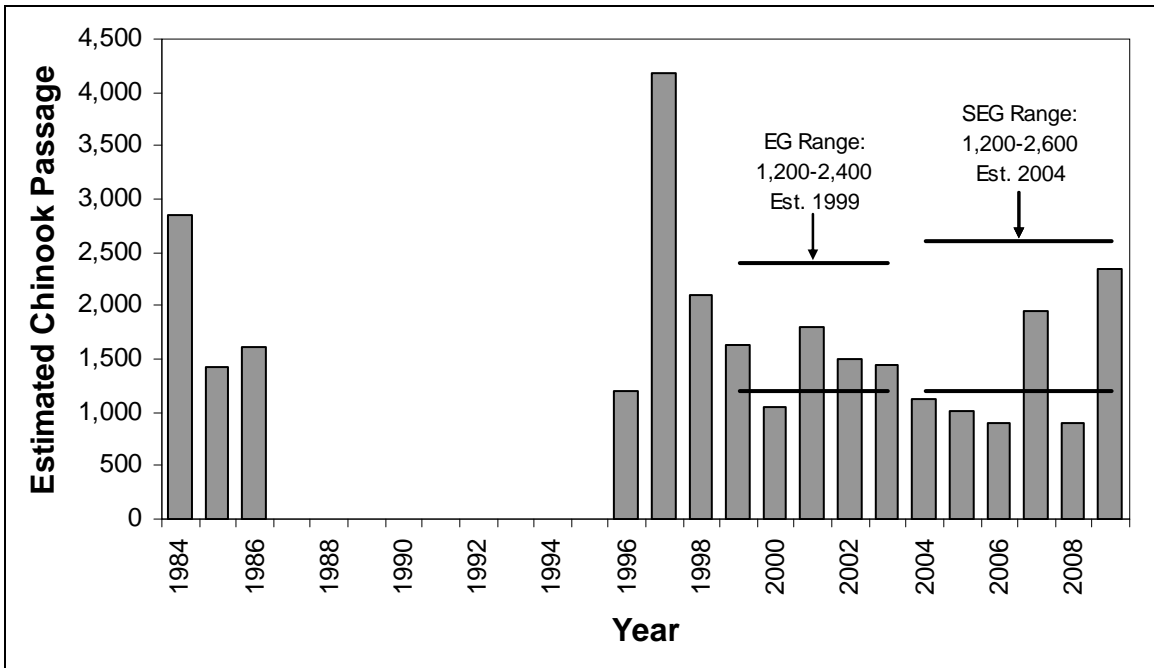
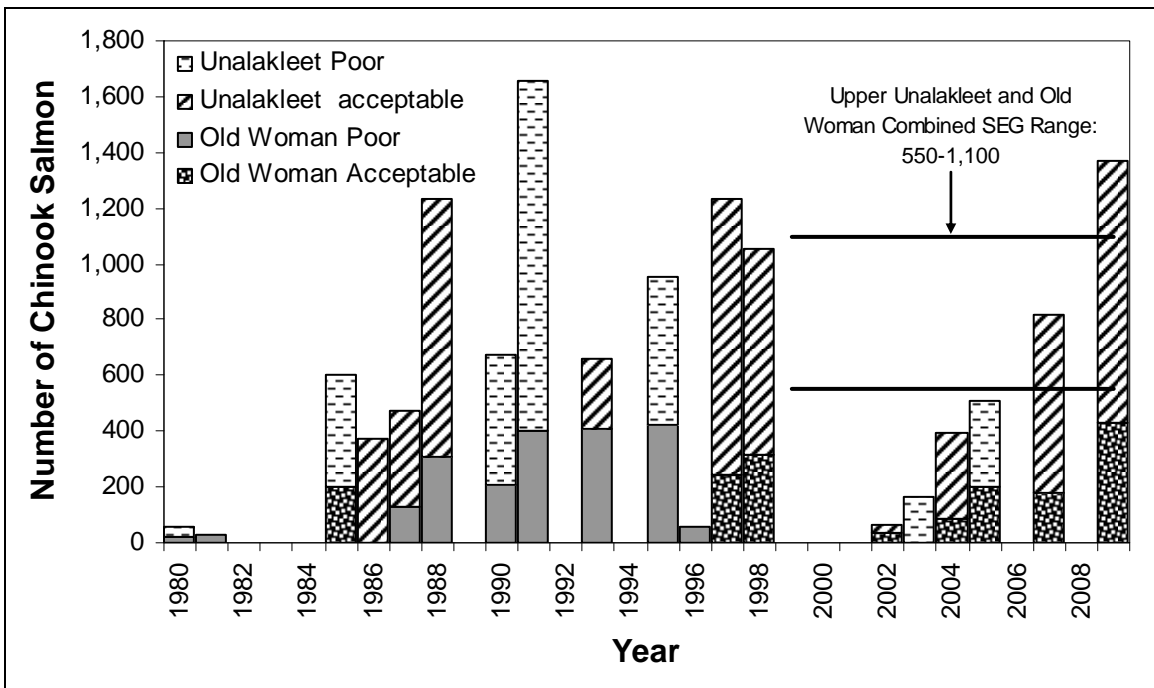
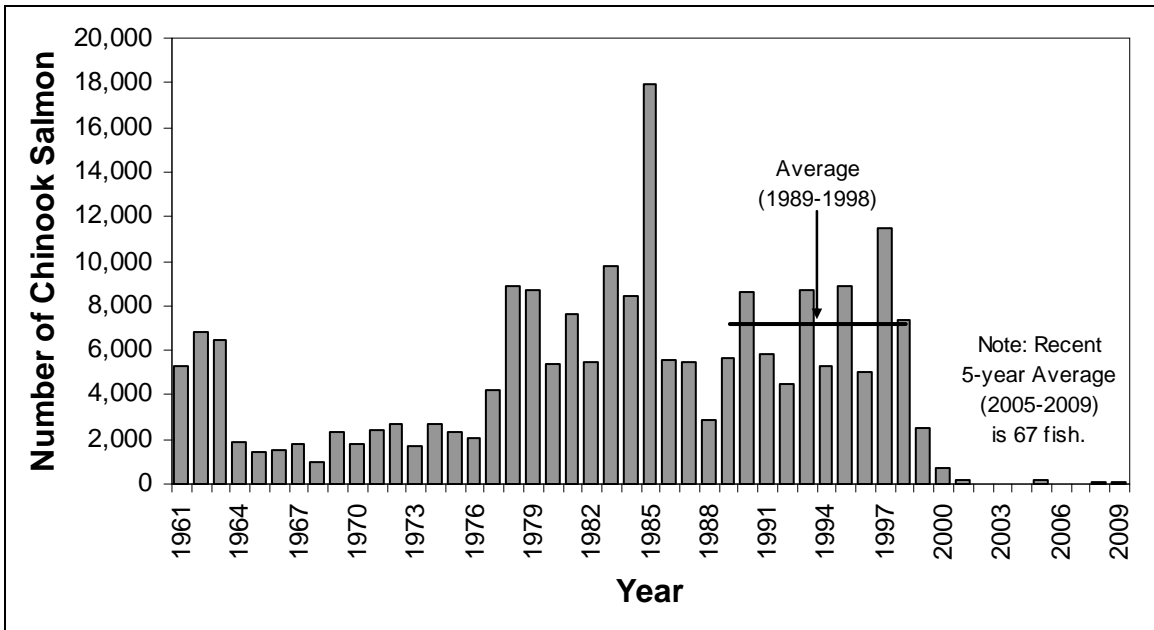


Figure 4.—North River Chinook salmon passage estimates compared to escapement goal ranges, 1984–1986 and 1996–2009.



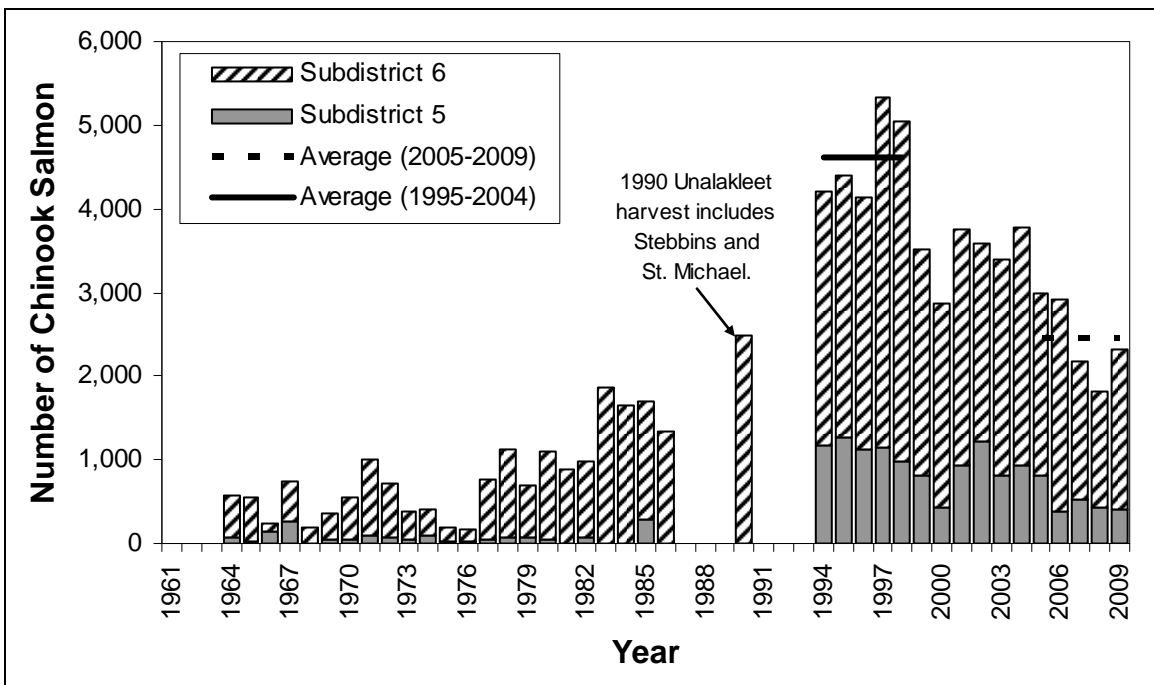
Note: Years with no data indicate the survey was not conducted. Acceptable and unacceptable survey ratings from Estensen and Evenson 2006.

Figure 5.—Chinook salmon aerial survey counts for the Old Woman and Unalakleet rivers compared to upper Unalakleet River and Old Woman River combined aerial survey SEG range (550–1,100), 1980–2009.



Note: harvests from 2002–2004 and 2006–2009 are incidental to directed pink, chum, and coho salmon fisheries.

Figure 6.—Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) commercial Chinook salmon harvest, compared to the recent 5-year (2005–2009) and historic (1989–1998) averages, 1961–2009.



Note: Subsistence harvests collected prior to 1994 are based on unexpanded household surveys; actual harvests were greater. Years with no data indicate that surveys were not conducted.

Figure 7.—Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) subsistence Chinook salmon harvest, compared to the recent 5-year (2005–2009) and historic (1994–1998) averages, 1964–2009.

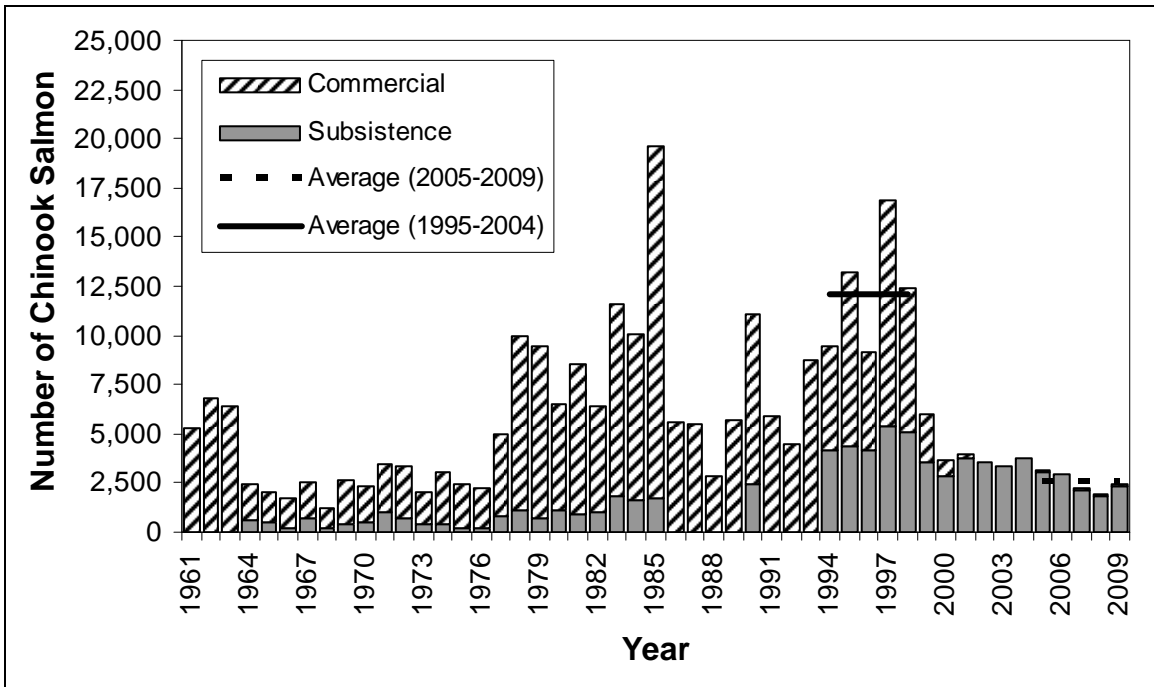


Figure 8.—Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) combined Chinook salmon harvest, compared to the recent 5-year (2005–2009) and historic (1994–1998) averages, 1961–2009.

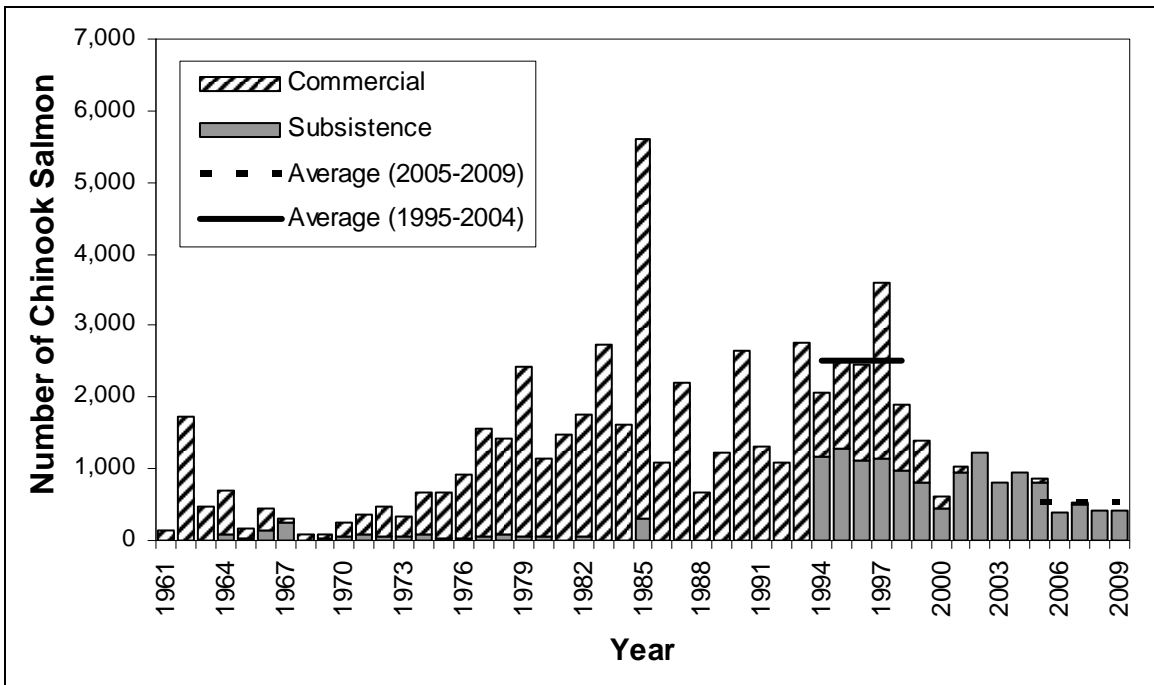


Figure 9.—Subdistrict 5 (Shaktoolik) combined (subsistence + commercial) Chinook salmon harvest, compared to the recent 5-year (2005–2009) and historic (1994–1998) averages, 1961–2009.

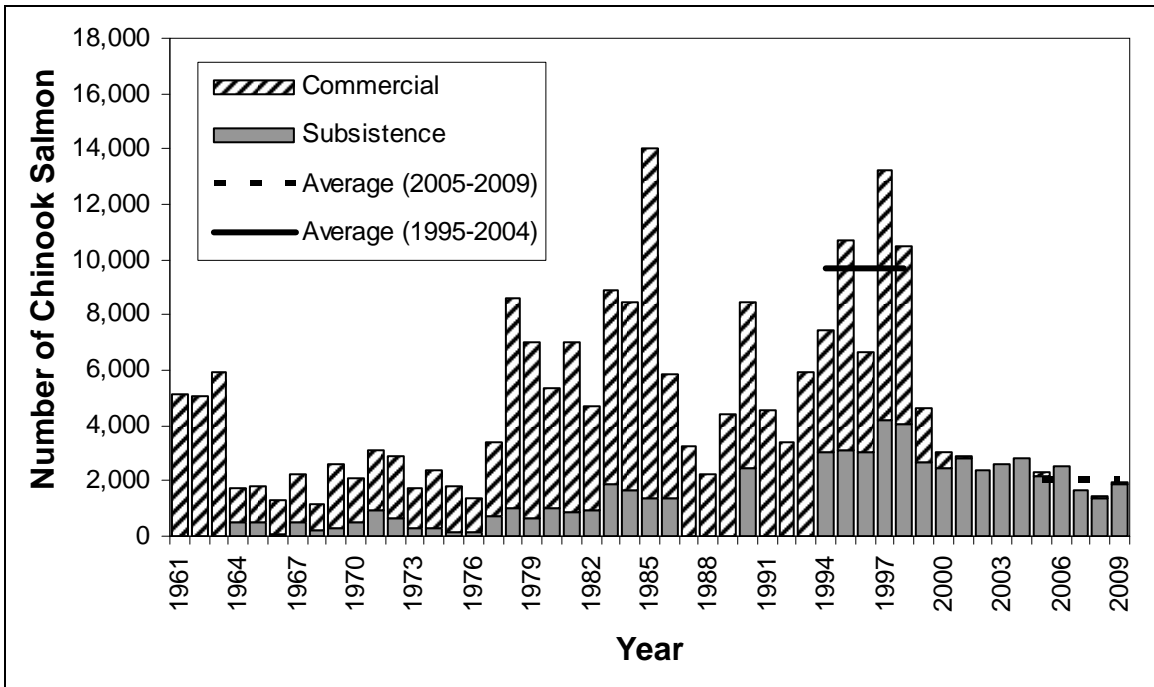


Figure 10.—Subdistrict 6 (Unalakleet) combined (subsistence + commercial) Chinook salmon harvest, compared to the recent 5-year (2005–2009) and previous 10-year (1995–2004) averages, 1961–2009.

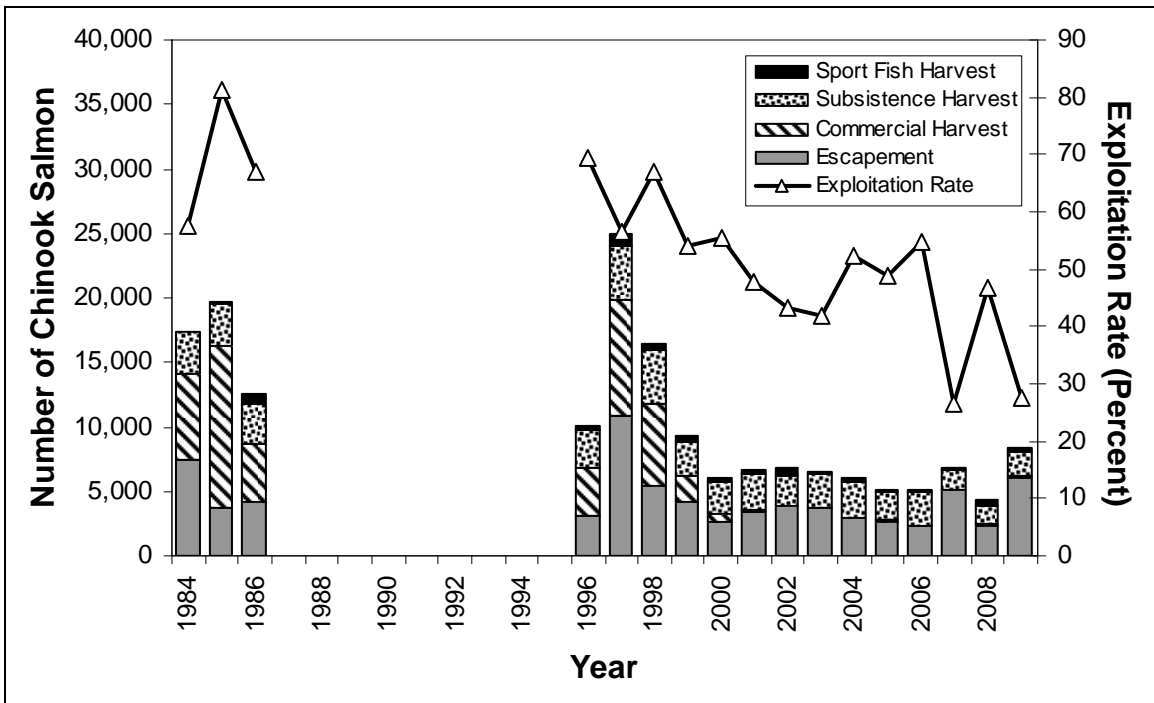


Figure 11.—Estimated total run of Unalakleet River drainage Chinook salmon by escapement and harvest compared to total exploitation rate (percent), 1984–1986 and 1996–2009.

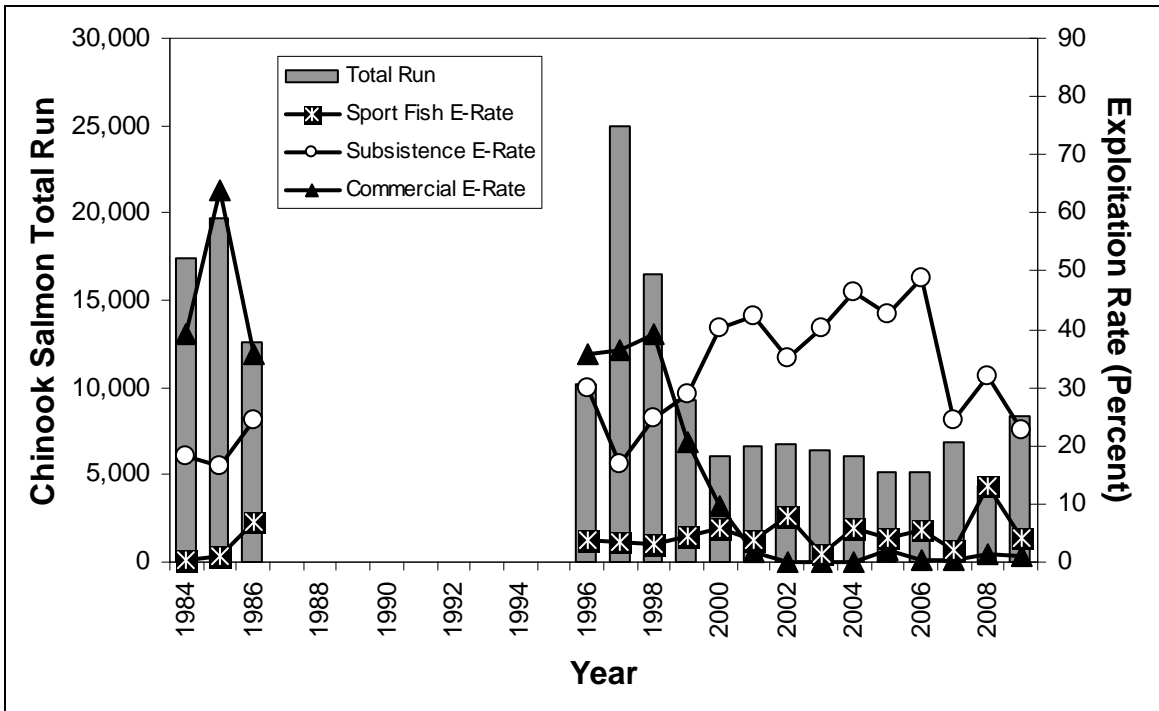


Figure 12.—Commercial, subsistence, and sport fish exploitation rates and total run for the Unalakleet River Chinook salmon stock, 1984–1986 and 1996–2009.

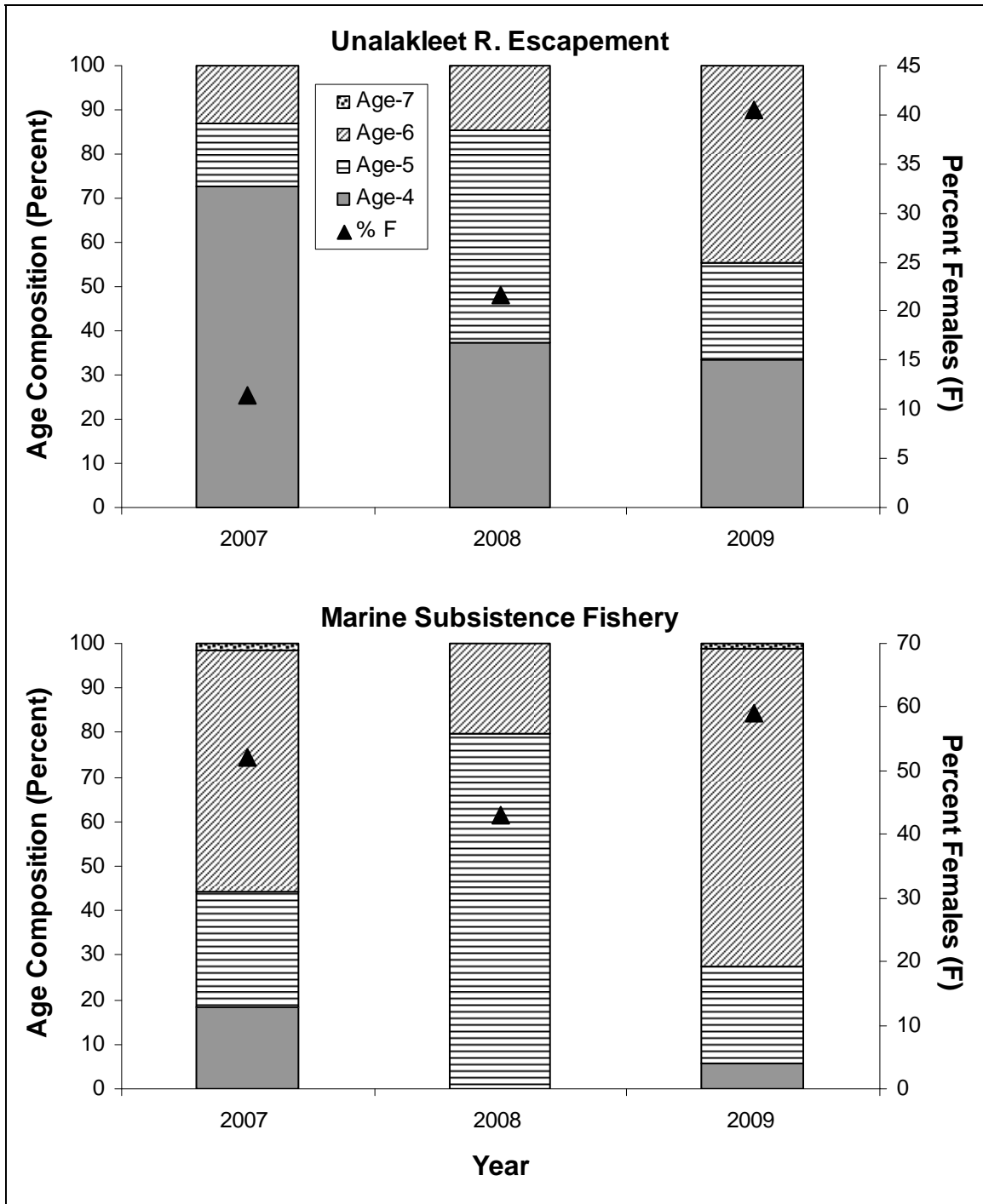


Figure 13.—Comparison of Chinook salmon age and sex structure from the marine subsistence fishery (8-inch mesh gillnets) and Unalakleet River spawning escapement (beach seined fish), Norton Sound, 2007–2009.

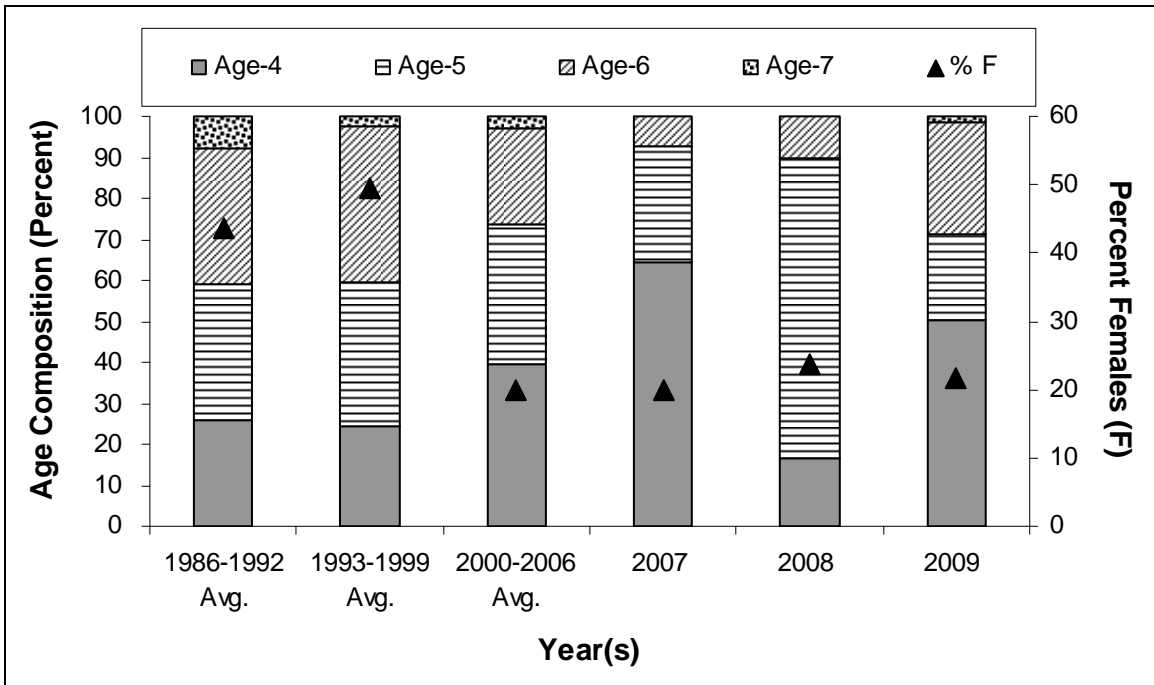


Figure 14.—Comparison of the 2007–2009 Chinook salmon age and sex structure with 1986–1992, 1993–1999, and 2000–2006 average age and sex compositions of Unalakleet River test fishery (5 7/8-inch mesh) samples.

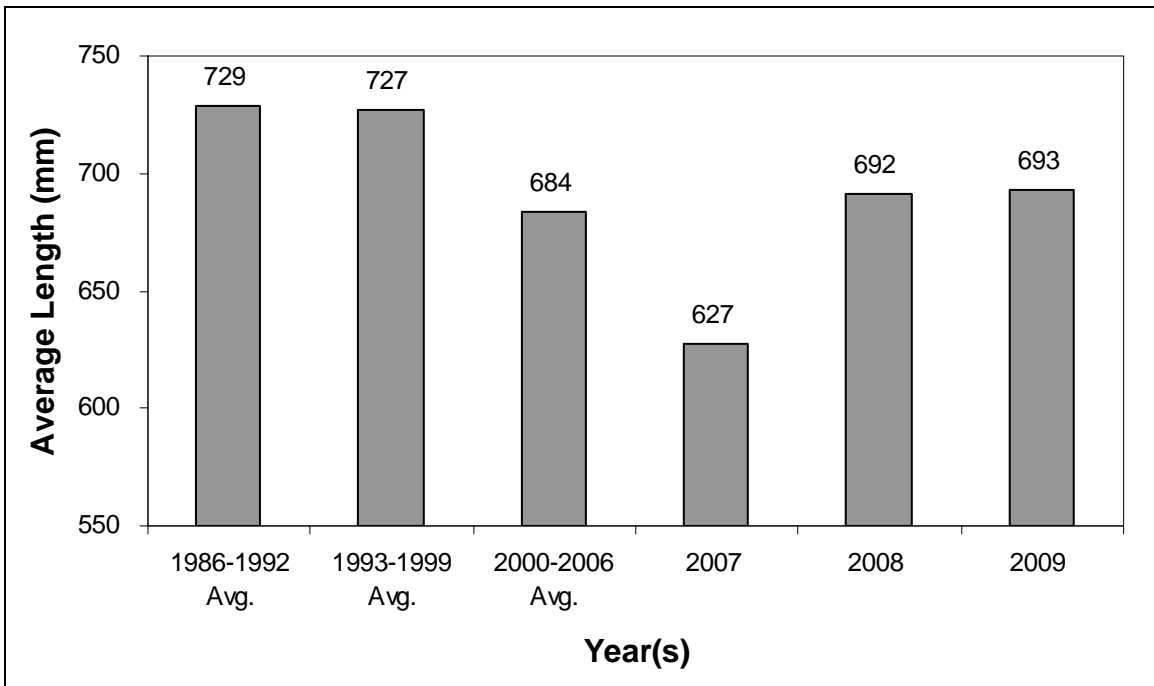


Figure 15.—Comparison of the 2007–2009 Chinook salmon average length with 1986–1992, 1993–1999, and 2000–2006 average length of Unalakleet River test fishery (5 7/8-inch mesh) samples.

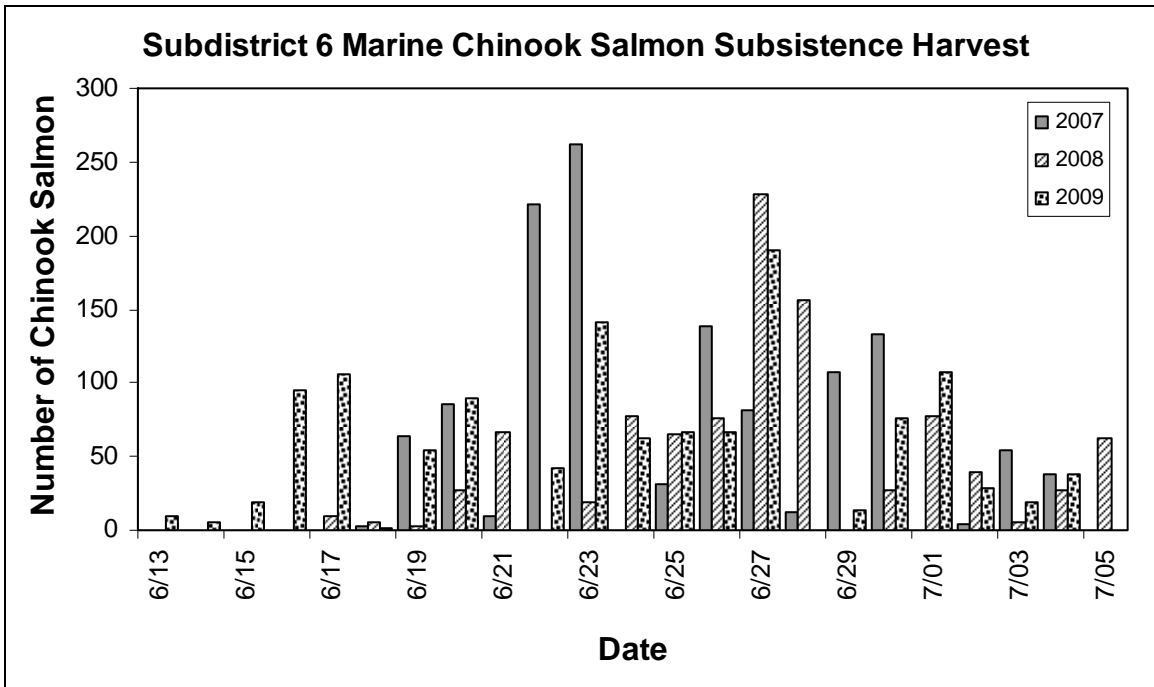


Figure 16.—Inseason subsistence survey Chinook salmon subsistence harvest by date, marine subsistence fishery, Subdistrict 6 (Unalakleet), Norton Sound, 2007–2009.

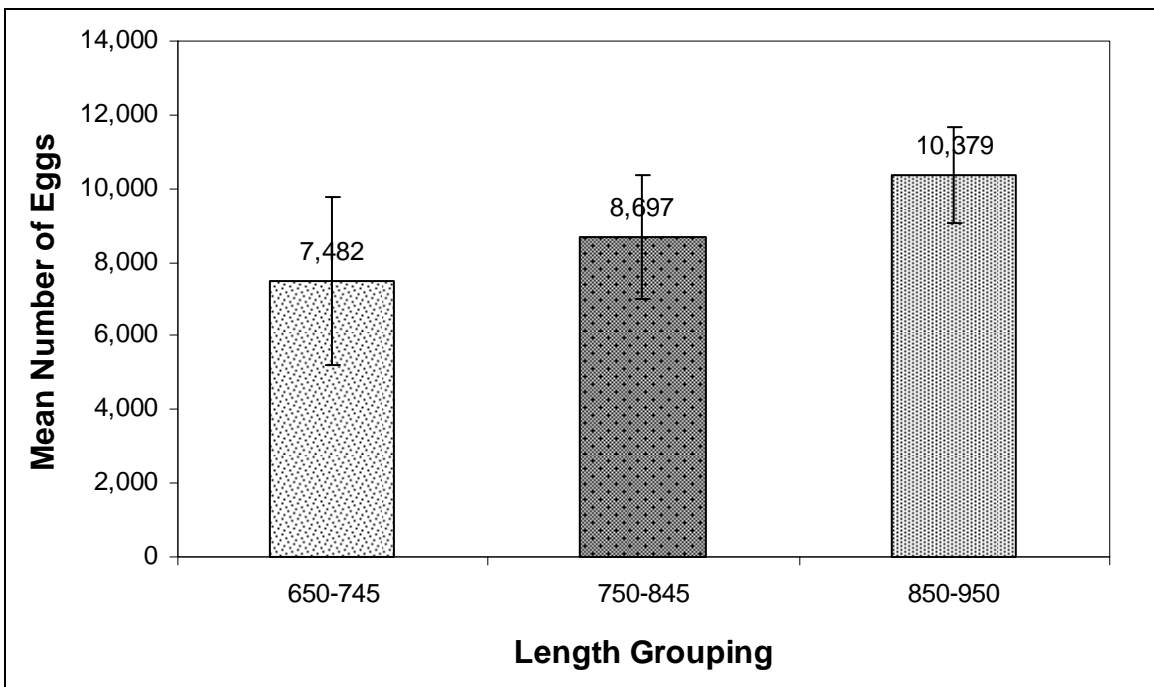


Figure 17.—Mean fecundity by length grouping, Unalakleet River drainage Chinook salmon, Norton Sound, 2008–2009.

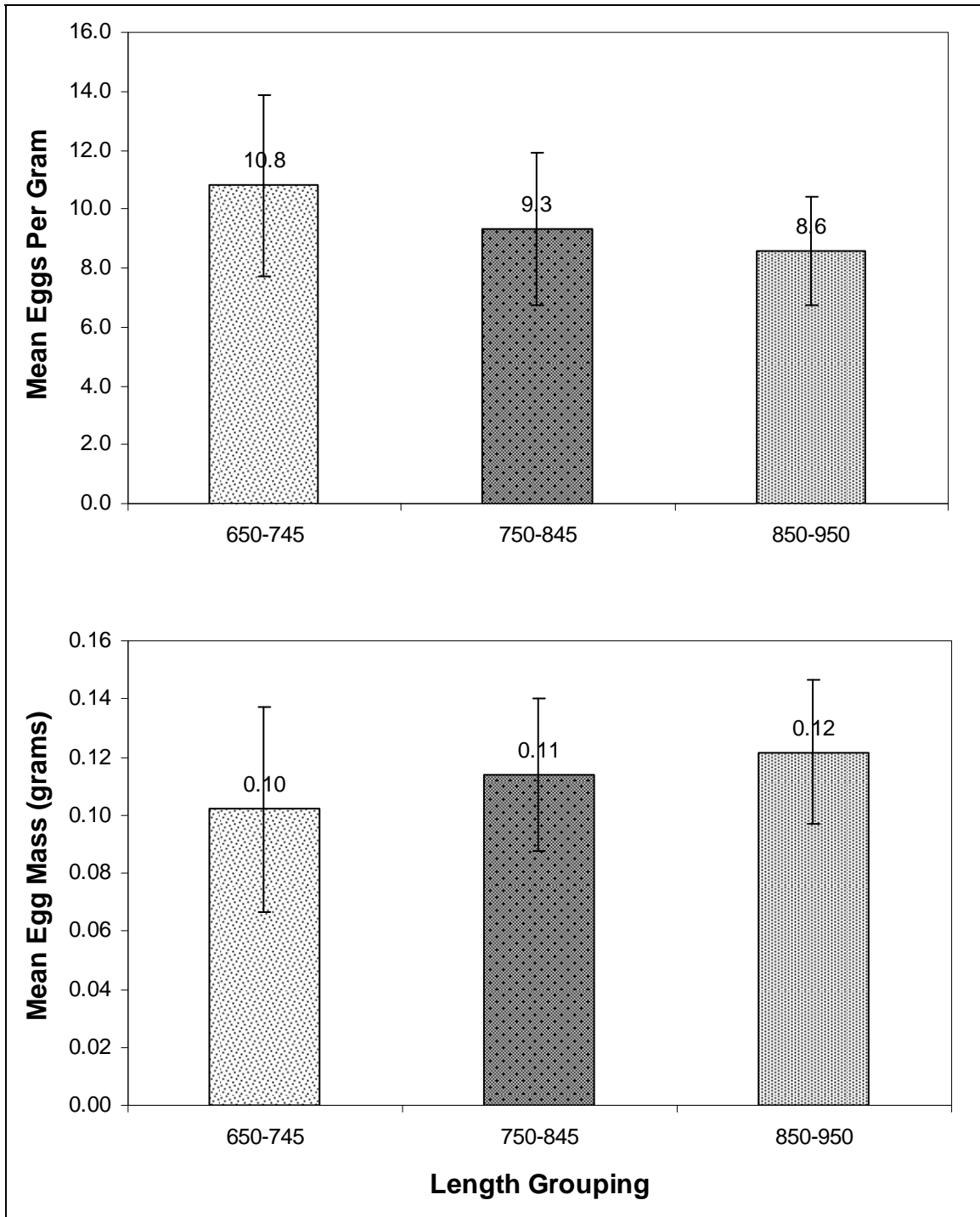


Figure 18.—Comparison of mean number of eggs per gram of skein and egg mass by length grouping, Unalakleet River drainage Chinook salmon, Norton Sound, 2008–2009.