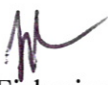





MEMORANDUM

TO: Members, Alaska Board of Fisheries DATE: September 24, 2012

FROM: Jeff Regnart, Director 
Division of Commercial Fisheries SUBJECT: Arctic-Yukon-
Kuskokwim
Stock of Concern
Recommendations

Charles O. Swanton, Director 
Division of Sport Fish

The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) directs the Alaska Department of Fish and Game (department) to report to the Alaska Board of Fisheries (board) on the status of salmon stocks and identify any stocks that present a concern related to yield, management, or conservation during regular board meetings. This memorandum summarizes the results of the stock of concern evaluation for Arctic-Yukon-Kuskokwim (AYK) Region salmon stocks for the 2013 board regulatory cycle. The evaluation includes input from regional and area staff from both fishery divisions.

In September 2000, the board designated nine AYK Region salmon stocks as stocks of concern, at either the management concern level or the yield concern level, based on definitions provided in the SSFP (5 AAC 39.222(f)(21) and (42)). "Yield concern" means 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)). "Management concern" means a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the sustainable escapement goal (SEG), biological escapement goal (BEG), optimal escapement goal (OEG), or other specified management objectives for the fishery (5 AAC 39.222(f)(21)). The policy further defines "chronic inability" as "the continuing or anticipated inability to meet escapement thresholds over a four to five year period" (5 AAC 39.222 (f)(5)).

In January 2004 and February 2007, the board made changes to stock of concern designations based on recommendations by the department. In 2004, two stocks were removed and one stock was added (a total of eight stocks designated). In 2007, four stocks were removed from designation. Currently, two chum salmon stocks and two king salmon stocks are listed as stocks of yield concern.

Based on our evaluation, **it is recommended that the four salmon stocks designated in 2010 as stocks of yield concern maintain their designations.** This evaluation also included a review of all other major salmon stocks in the region to determine if any meet the criteria to be listed as

stocks of concern during the coming regulatory cycle. Based on this review, **it is further recommended that no additional stocks be listed for designation as stocks of concern.** However, a discussion related to Kuskokwim River king salmon stock status is provided at the end of this memo.

The table below summarizes the current stocks of concern by area, stock, and species designated by the board; the level of concern for each stock; and recommendations to continue, change, or discontinue the stock of concern status for each stock. A more detailed description of the stock assessment and discussion of recommendations for each of the current stocks of concern are presented following the summary table. All available 2012 data are preliminary; some 2012 data are unavailable because fisheries and projects are still ongoing. All current stocks of concern were addressed through action plans at the January 2010 board meeting; therefore, action plans already exist for these stocks. Stock status, regulatory history, and management plans will be addressed at the AYK board meeting in January 2013. The escapement goal review for the AYK Region is complete. Existing escapement goals were used to assess the stocks in this document unless stated otherwise, and proposed changes in escapement goals will not affect the stock of concern recommendations.

| Level of Concern | | | | | | |
|--------------------------|----------------|----------------|--------------|------------------|-------------------------------|-----------------------------|
| Area/Stock | Salmon Species | September 2000 | January 2004 | February 2007 | January 2010 (Current Status) | October 2012 Recommendation |
| <i>Norton Sound Area</i> | | | | | | |
| Subdistrict 1 | Chum | Management | Management | Changed to Yield | Yield | Continue |
| Subdistricts 2 and 3 | Chum | Yield | Yield | Yield | Yield | Continue |
| Subdistricts 5 and 6 | King | NA | Yield | Yield | Yield | Continue |
| <i>Yukon Area</i> | | | | | | |
| Yukon River | King | Yield | Yield | Yield | Yield | Continue |

EVALUATION OF PRESENT STOCKS OF CONCERN

Norton Sound Subdistrict 1 (Nome) Chum Salmon

Stock Assessment

Norton Sound District is comprised of six commercial fishing subdistricts (Figure 1). Most subdistricts have several rivers, in addition to marine waters, where subsistence fishing occurs and, except for Subdistrict 1, there are few restrictions. Subdistrict 1 chum salmon were classified as a stock of management concern in September 2000 because of persistent low productivity since the 1980s. All harvests decreased substantially (Figure 2, Table 1) in an effort to meet aerial survey goals, and a Tier II chum salmon subsistence fishery was established in 1999. Management of subsistence salmon fisheries in Subdistrict 1, the only Tier II subsistence fishery in the state, has been the most restrictive in Alaska. Since 2004, subsistence chum salmon fishing has been more liberal because the overall chum salmon surpluses have generally been well above the amounts reasonably necessary for subsistence (ANS).

In 2001, the department established a BEG of 23,000 to 35,000 chum salmon for the Subdistrict 1 chum salmon composite stock escapement and SEGs for Nome, Snake, and Eldorado rivers. In January 2001, the board established OEG ranges for chum salmon in regulation for Nome,

Snake, and Eldorado rivers, which are the same as the SEGs for these rivers. The department also established SEG ranges based on aerial survey information on four other rivers (Bonanza, Flambeau, Sinuk, and Solomon rivers) in the subdistrict. All OEGs and SEGs were set in conjunction with the overall Subdistrict 1 BEG and used to assess the overall escapement to Subdistrict 1 in relation to the BEG. In 2010, the department discontinued the aerial survey SEGs because the quality of the ground-based projects was better and more useful for inseason management, as well as for postseason assessment. The Subdistrict 1 BEG was achieved in 2008 and from 2010–2012, but the combined escapement fell short of the lower end of the BEG in 2009 (Figure 3). During the past five years (2008–2012), OEGs were attained two times in the Nome and Snake rivers, and four times in the Eldorado River. More detailed escapement information will be provided in the stock status and action plan report.

Since 2006, subsistence fishing has been liberalized from Tier II to Tier I regulations and the subdistrict BEG was achieved, except for 2009. During the most recent five-year period (2008–2012), the average total chum salmon harvest, which is entirely subsistence harvest, continued to be well below the ANS of 3,430–5,716 chum salmon and the historical total harvest (combined subsistence and commercial harvests) of the 1980s and early 1990s (Figure 2). The 2012 chum salmon surplus was found east of Cape Nome in Eldorado River, Safety Sound (Figure 1). During the past five years, the largest surplus available in Subdistrict 1 has been in Safety Sound, based upon the Eldorado River escapement project.

Stock of Concern Recommendation

Given that chum salmon escapement goals for individual rivers have been achieved two of the past five years, and the Eldorado River OEG and Subdistrict 1 BEG were achieved four of the past five years, there is not a chronic inability to meet escapement goals. Although the recent available yield from 2010 to 2012, based upon the combined Subdistrict 1 escapement, appears to be near historical levels, the surplus is primarily in the eastern portion of the subdistrict as assessed by individual tributary projects. Thus overall, the Subdistrict 1 chum salmon stock is showing improvement. However, the available yield in 2008 and 2009 and in the western portion of the subdistrict, as assessed by Nome and Snake rivers, remains below historical levels despite use of specific management measures. Based on this assessment, it is recommended that the designation of Subdistrict 1 chum salmon as a stock of yield concern be continued.

Norton Sound Subdistricts 2 and 3 (Golovin and Elim) Chum Salmon

Stock Assessment

In 2000, the board classified chum salmon in Subdistrict 2 (Golovin) and Subdistrict 3 (Elim) as a stock of yield concern based on low harvest levels for the previous five-year period (1995–1999) compared to historical harvests in the 1980s (Table 1; figures 4 and 5). Surplus chum salmon were available for commercial harvest in 2002, 2006, and 2007 in Subdistrict 3 (figures 6 and 7), but there was little harvest taken because of market conditions. The chum salmon run was very poor in 2005 and no commercial fishing was allowed in either subdistrict. Beginning in 2007, salmon markets improved to accommodate more commercial fishing. The department limited commercial salmon fishing during the 2008 season to three 12-hour periods in Subdistrict 2 and two 12-hour periods in Subdistrict 3. Chum salmon escapements in 2009 were well below tower-based escapement goals at the Niukluk (Subdistrict 2; SEG >30,000; Figure 6) and Kwiniuk rivers (Subdistrict 3; OEG 11,500–23,000; Figure 7). As a consequence, pink and chum salmon-directed commercial fishing was not allowed in accordance with the management

plan for subdistricts 2 and 3. Commercial fishing was allowed to target chum salmon in 2010 and 2011, with resulting harvests in subdistricts 2 and 3 the highest since 1988. However, chum salmon abundance was much lower in 2012 and only a pink salmon-directed commercial fishery was allowed in subdistricts 2 and 3, and one chum salmon-directed fishing period in Subdistrict 2. During the most recent five-year period, subsistence fishing time has not been restricted. Estimated exploitation rates of the subsistence fishery on chum salmon are very low and restrictions on subsistence have shown to have little effect on achieving chum salmon escapement goals in subdistricts 2 and 3.

In Subdistrict 2, the department revised the Niukluk River tower-based SEG of >30,000 chum salmon to an SEG of >23,000 in 2010. During the most recent five-year period (2008–2012), the SEG for chum salmon was achieved in 2010 and 2011 (Figure 6).

In 2001 the department established chum salmon BEGs for the Kwiniuk River of 10,000 to 20,000 chum salmon, and 8,000 to 16,000 chum salmon for the Tubutulik River in Subdistrict 3. In January 2001, the board established OEG ranges for chum salmon in Kwiniuk River and Tubutulik River by adding 15% to the BEG range to account for subsistence harvests that may occur above the tower site. Based on escapement counts from the Kwiniuk River counting tower, the OEG of 11,500 to 23,000 chum salmon has been achieved in two out of the five recent years (Figure 7). Interestingly, there have been dramatic swings in run size and subsequent escapement in recent years. The 2010 escapement was the highest on record, while the 2009 and 2012 escapements were the lowest on record. The OEG for the Tubutulik River chum salmon stock is 9,200 to 18,400 chum salmon. However, Tubutulik River chum salmon escapement is assessed via aerial survey. It is difficult to determine if the OEG was achieved in most years because aerial surveys were not completed in three of the last five years due to poor weather conditions or lack of available aircraft.

Stock of Concern Recommendation

Given the continued low yield of chum salmon in three of the last five years, despite use of specific management measures, the Norton Sound subdistricts 2 and 3 chum salmon stock continues to meet the criteria of a stock of yield concern. Therefore, it is recommended that the designation of Norton Sound subdistricts 2 and 3 chum salmon as a stock of yield concern be continued.

Norton Sound Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) King Salmon

Stock Assessment

In 2004, the board classified king salmon in Subdistrict 5 (Shaktoolik) and Subdistrict 6 (Unalakleet) as a stock of yield concern based on low harvests during 1999–2003, compared to the historical average yield, as indicated by the 1989–1998 10-year average (Table 2; Figure 8). The average yield for this time period is conservative because of the lack of subsistence harvest estimates for 1989–1993. The board continued this designation in 2007 and 2010 based on continued low subsistence harvests and poor escapements. In an effort to further conserve king salmon and restore the stock to historical yield levels, the board adopted a new management plan (5 AAC 04.395) that became effective during the 2008 fishing season. This management plan includes a more restrictive subsistence fishing schedule, and a 50% reduction in sport fish bag and annual limits. Prior to 2007, subsistence fishing was open continuously in marine waters, and inriver subsistence fishing was only closed for 36 hours a week. For fish 20 inches or greater in length, the sport fishery bag limit was two and the annual limit was four. Under the

newly-adopted plan, subsistence fishing from June 15 to July 15 in subdistricts 5 and 6 is limited to two 48-hour periods per week in the marine waters, and two 36-hour periods per week in the Unalakleet River. Similarly, the Unalakleet River sport fish bag limit for king salmon, 20 inches or greater, was reduced to one king salmon per day, with an annual harvest limit of two. The intent of 5 AAC 04.395 is to enhance king salmon escapements by providing escapement windows between subsistence fishing periods, and reducing subsistence and sport harvests.

Subdistricts 5 and 6 have been managed as one fishery because past studies have shown salmon bound for these subdistricts intermingle in nearshore marine waters and that harvests in each subdistrict are most likely composed of fish bound for both rivers. In Subdistrict 6, a salmon escapement counting tower has been operated on North River, a major tributary to Unalakleet River, since 1996.

The North River tower-based SEG range of 1,200–2,600 king salmon has been reached in two of the previous five years; the goal was reached in 2009 and 2010, but only as a result of the restrictive subsistence fishing schedule, and early closures to king salmon subsistence and sport fisheries (Figure 9). Escapement during the past two years has been disappointing given the conservative subsistence fishing schedule, mesh-size restrictions, and early July closures of the subsistence and sport fisheries. There was a small directed king salmon harvest in 2005, but no directed commercial harvest in all other years since 2001.

Commercial king salmon harvests for the two subdistricts combined (Table 2) averaged 7,131 fish annually for the historical period, 1989–1998. This average declined to 94 fish for the recent five years (2007–2011) (Figure 8). In 2012, the buyer agreed to not purchase king salmon during chum and pink salmon-directed fishing periods. The average subsistence harvest of 1,748 king salmon during the most recent five-year period (2007–2011) represents a decline of approximately 62% from the average subsistence harvest of 4,624 king salmon taken during the 1994–1998 period (Table 2). Lack of subsistence harvest data, along with varying harvest collection methodologies during the period prior to 1994, prohibits a more historical comparison. Sport king salmon harvests for the Unalakleet River averaged 350 fish from 1989–1998 and declined to 209 king salmon during the recent five-year average (2007–2011), a reduction in harvest of 40%.

Stock of Concern Recommendation

Managers have taken direct action on all fisheries in order to achieve the king salmon SEG for North River, which serves as an index for escapement throughout the Unalakleet River drainage. Commercial harvests on this stock have been reduced by 99% from historical harvests, subsistence harvests have decreased 62%, and sport harvests have declined 40% since the mid to late 1990s. Production from this spawning stock remains very poor. Given the continued low yield of king salmon, despite use of specific management measures, Norton Sound subdistricts 5 and 6 king salmon stock continues to meet the criteria of a stock of yield concern. Therefore, it is recommended that the designation of Norton Sound subdistricts 5 and 6 king salmon as a stock of yield concern be continued.

Yukon River King Salmon

Stock Assessment

Yukon River king salmon run size has shown a declining trend since 1998. The board classified Yukon River king salmon as a yield concern in 2000 based on low harvest levels for the previous three-year period (1998–2000) and anticipated low harvest in 2001. The board continued the

classification as a yield concern in 2004, 2007, and 2010. While king salmon run size increased in 2005 and 2006, lower returns have occurred since that time.

King salmon escapement goals were generally met in the Alaska portion of the Yukon River drainage the past five years (Table 3), but were made possible by significant restrictions on all Yukon River summer season fisheries (king and summer chum salmon). The Salcha River BEG has been met each year since 2008, while the neighboring Chena River failed to meet its BEG in 2010 and 2012; neither river was adequately assessed in 2011 due to high water conditions, though an aerial survey of the Salcha River confirmed adequate escapement for achieving the escapement goal. East Fork Andreafsky River weir and West Fork Andreafsky River aerial survey goals have been met in all years since 2008, though West Fork Andreafsky could not be assessed in 2008 and 2012 due to poor survey conditions. The Anvik River aerial survey SEG was not assessed in 2008 due to poor survey conditions, and the goal has not been met since 2008. The Nulato River aerial survey SEG has been met in all but two years since 2008 (2008 and 2010).

Historical Canadian Yukon River mainstem escapement estimates are based on a three-area escapement index for years prior to 2002, radio telemetry estimates from 2002–2004, and Eagle sonar passage estimates from 2005–2012 (Figure 10). For 2008 and 2009, an interim management escapement goal (IMEG) of >45,000 king salmon for Canadian-origin Yukon River king salmon was established by the Yukon River Panel. For 2010–2012, an interim management escapement goal (IMEG) of 42,500–55,000 king salmon was established by the Yukon River Panel for Canadian-origin Yukon River king salmon. During the past three years, this goal was only met in 2011. Despite the most conservative management actions ever taken in the Alaska portion of the drainage, the IMEG was not achieved in 2012. The IMEG has been achieved two of the last five years.

The board used the 1989–1998 period as the historical baseline for comparison with recent years in making its initial determination that the Yukon River king salmon stock was a stock of yield concern. The most recent five-year (2007–2011) average king salmon harvest of approximately 54,600 fish is approximately 65% below the historical 10-year (1989–1998) average of 156,200 fish (Table 4, Figure 11). Subsistence harvests show a decline, since 2008, after remaining stable near 50,000 king salmon in prior years. Subsistence harvest has been below the lower bound of the ANS (45,500–66,704) since 2008. Commercial harvests have decreased over 97% during the same time frame, from an average of 101,000 annually (1989–1998) to the recent five-year average (2008–2012) of 3,000 fish sold during the summer chum salmon-directed fishery.

In summary, while many Alaskan Yukon River tributary king salmon escapement goals were met, efforts to meet Alaskan and Canadian escapement goals have necessitated severe restrictions to all summer season salmon fisheries since 2008. The average available harvest for the years 2008 through 2012 was substantially less than the average yield from 1989 through 1998. No directed commercial fishery occurred in 2008–2012; additionally, the commercial sale of incidentally-caught king salmon was prohibited in 2009, 2011, and 2012. Commercial summer chum salmon fishing opportunities were also limited due to concerns of incidental catch of king salmon. Significant subsistence fishing restrictions aimed at conserving king salmon were implemented in 2008–2012, except for 2010. Subsistence harvest data are not yet available for 2012; however, due to the conservative management regime employed, it is expected that the 2012 subsistence harvest was less than that observed in recent years when the ANS was not achieved.

Stock of Concern Recommendation

Many Yukon River king salmon escapements have been met since 2008. Given that the most recent five-year average harvest remains approximately 65% below the historical long-term average, despite use of specific management measures, the Yukon River king salmon stock continues to meet the criteria of a stock of yield concern. Therefore, it is recommended that the designation of Yukon River king salmon as a stock of yield concern be continued.

Kuskokwim River King Salmon Discussion

The Kuskokwim River king salmon stock has been perceived by many to be poor in recent years due to a failure to achieve tributary SEGs on the Kwethluk, Tuluksak, and George rivers in multiple years since 2007. However, SEGs for these three systems were established prior to refinement of data quality standards that are currently in place for percentile-based escapement goal development: greater than ten years of data, data are from consecutive years, and the contrast between high and low observations is greater than four. The Kwethluk River has an escapement goal of 6,000–11,000 fish that was based on only eight nonconsecutive years of weir escapement data at the time it was set in 2007. The contrast was eight. The Tuluksak River has an escapement goal of 1,000–2,100 fish that was based on 10 nonconsecutive years of weir escapement data at the time it was set in 2007. The contrast was four. The George River has an escapement goal of 3,100–7,900 fish that was based on 10 years of weir escapement data, with one missing year in the series, at the time it was set in 2007. The contrast was three.

In contrast, the Kogrukluk River weir, which has been in operation since 1976, has an SEG of 5,300–14,000 that was established in 2005 using the percentile method and that includes data from all years, 1976–2004. This escapement goal, established on more robust data, has been met every year since its establishment. There is considerable evidence that failure to meet Kwethluk, Tuluksak, and George rivers escapement goals is more likely to happen because those goals were prematurely established on less robust datasets and had lower-bound estimates that were artificially high, rather than inadequate king salmon abundance.

Fishery restrictions taken in the past three years on the Kuskokwim River have been focused on achieving the tributary escapement goals at the Kwethluk, Tuluksak, and George rivers. It is the department's determination that management actions of late were driven by obligations to achieve SEGs that appear to be higher than necessary. Recent results of a drainagewide run reconstruction and development of a spawner-recruit relationship suggest that drainagewide Kuskokwim River king salmon escapement has been low in 2010–2012, but not below sustainable levels.

Additional details of Kuskokwim River king salmon run reconstruction, spawner-recruit analysis, and the department's recommendations for establishing a drainagewide king salmon escapement goal and modifying tributary escapement goals will be described in a memo to the board, and in written and oral reports at the January 2013 board meeting. Evaluating current knowledge of Kuskokwim River king salmon escapement against stock of concern criteria indicates overall escapements observed over the past five years have been within sustainable levels. Therefore, the Kuskokwim River king salmon stock does not meet the criteria of a stock of concern at this time.

Table 1.—Commercial and subsistence chum salmon harvests for Norton Sound subdistricts 1–3, by year, 1961–2012.

| Year | Subdistrict 1 | | Subdistrict 2 | | Subdistrict 3 | |
|------|---------------|--------------------------|---------------|--------------------------|---------------|--------------------------|
| | Commercial | Subsistence ^a | Commercial | Subsistence ^b | Commercial | Subsistence ^b |
| 1961 | 0 | — ^c | 0 | — ^c | 0 | — ^c |
| 1962 | 0 | — ^c | 68,720 | — ^c | 50,683 | — ^c |
| 1963 | 0 | — ^c | 49,850 | 9,319 ^c | 46,274 | 8,316 ^c |
| 1964 | 1,194 | — ^c | 58,301 | — ^c | 28,568 | 348 ^c |
| 1965 | 1,941 | 1,825 ^c | 0 | 3,847 ^c | 0 | 9,857 ^c |
| 1966 | 581 | 1,762 ^c | 29,791 | 3,520 ^c | 24,741 | 5,409 ^c |
| 1967 | 406 | 627 ^c | 31,193 | 4,803 ^c | 0 | 9,913 ^c |
| 1968 | 102 | 621 ^c | 10,011 | 1,744 ^c | 17,908 | 2,527 ^c |
| 1969 | 601 | 508 ^c | 20,949 | 2,514 ^c | 26,594 | 1,303 ^c |
| 1970 | 960 | 458 ^c | 20,566 | 2,614 ^c | 29,726 | 6,960 ^c |
| 1971 | 2,315 | 2,900 ^c | 33,824 | 1,936 ^c | 43,831 | 2,227 ^c |
| 1972 | 2,643 | 315 ^c | 27,097 | 2,028 ^c | 30,919 | 2,070 ^c |
| 1973 | 1,132 | 1,863 ^c | 41,689 | 74 ^c | 31,389 | 298 ^c |
| 1974 | 10,431 | 183 ^c | 30,173 | 205 ^c | 55,276 | 1,723 ^c |
| 1975 | 8,364 | 2,858 ^c | 41,761 | 2,025 ^c | 46,699 | 508 ^c |
| 1976 | 7,620 | 1,705 ^c | 30,219 | 1,128 ^c | 10,890 | 1,548 ^c |
| 1977 | 15,998 | 12,192 ^c | 53,912 | 2,915 ^c | 47,455 | 1,170 ^c |
| 1978 | 8,782 | 4,295 ^c | 41,462 | 1,061 ^c | 44,595 | 1,229 ^c |
| 1979 | 5,391 | 3,273 | 30,201 | 2,840 | 37,123 | 1,195 |
| 1980 | 13,922 | 5,983 | 52,609 | 4,057 | 14,755 | 1,393 |
| 1981 | 18,666 | 8,579 | 58,323 | 5,543 | 29,325 | 2,819 |
| 1982 | 13,447 | 4,831 | 51,970 | 1,868 | 40,030 | 3,537 |
| 1983 | 11,691 | 7,091 ^c | 48,283 | — ^c | 65,776 | — ^c |
| 1984 | 3,744 | 4,883 ^c | 54,153 | — ^c | 9,477 | — ^c |
| 1985 | 6,219 | 5,667 | 55,781 | 9,577 | 24,466 | 947 |
| 1986 | 8,160 | 8,085 ^c | 69,725 | — ^c | 20,668 | — ^c |
| 1987 | 5,646 | 8,394 ^c | 44,334 | — ^c | 17,278 | — ^c |
| 1988 | 1,628 | 5,952 ^c | 33,348 | — ^c | 18,585 | — ^c |
| 1989 | 492 | 3,399 ^c | 0 | — ^c | 167 | — ^c |
| 1990 | 0 | 4,246 ^c | 15,993 | — ^c | 3,723 | — ^c |
| 1991 | 0 | 3,715 ^c | 14,839 | — ^c | 804 | 2,660 ^c |
| 1992 | 881 | 1,684 ^c | 1,002 | — ^c | 6 | 1,260 ^c |
| 1993 | 132 | 1,766 ^c | 2,803 | — ^c | 167 | 1,635 ^c |
| 1994 | 66 | 1,673 | 111 | 1,337 ^d | 414 | 3,476 |
| 1995 | 122 | 3,794 | 1,987 | 10,373 ^d | 1,171 | 3,774 |
| 1996 | 3 | 2,287 | 0 | 2,867 ^d | 0 | 2,319 |
| 1997 | 0 | 2,696 | 8,003 | 4,891 ^d | 2,683 | 2,064 |
| 1998 | 0 | 964 | 723 | 1,893 ^d | 2,311 | 1,376 |
| 1999 | 0 | 337 ^e | 0 | 3,656 ^d | 0 | 744 |
| 2000 | 0 | 535 ^e | 164 | 1,155 ^d | 535 | 1,173 |
| 2001 | 0 | 858 ^e | 7,094 | 3,291 ^d | 681 | 898 |
| 2002 | 0 | 1,114 ^e | 0 | 1,882 ^d | 0 | 1,451 |
| 2003 | 0 | 565 ^e | 0 | 1,477 ^d | 0 | 1,687 |
| 2004 | 0 | 685 ^e | 0 | 880 | 0 | 683 |
| 2005 | 0 | 803 ^e | 0 | 1,852 | 0 | 598 |
| 2006 | 0 | 940 ^f | 0 | 722 | 0 | 1,267 |

-continued-

Table 1.–Page 2 of 2.

| Year | Subdistrict 1 | | Subdistrict 2 | | Subdistrict 3 | |
|-------------------------------------|---------------|--------------------------|---------------|----------------|---------------|--------------------------|
| | Commercial | Subsistence ^a | Commercial | Year | Commercial | Subsistence ^a |
| 2007 | 0 | 2,938 ^f | 0 | 4,217 | 4,567 | 2,334 |
| 2008 | 0 | 739 ^f | 623 | 350 | 304 | 1,284 |
| 2009 | 0 | 397 ^f | 87 | 1,694 | 597 | 600 |
| 2010 | 0 | 3,124 ^f | 17,212 | 1,133 | 23,453 | 3,925 |
| 2011 | 0 | 1,428 ^f | 20,075 | 2,122 | 23,531 | 3,671 |
| 2012 | 0 | – ^{f,g} | 3,748 | – ^g | 2,158 | – ^g |
| 5-year average 2007- 2011 | 0 | 1,725 | 7,599 | 1,903 | 10,490 | 2,363 |
| 10-year average 2002- 2011 | 0 | 1,273 | 3,800 | 1,633 | 5,245 | 1,750 |

Note: Dashes (–) indicate that a value can't be computed due to limitations of the data.

- ^a Beginning in 1975, a subsistence permit was required for Subdistrict 1 and harvest numbers were taken from permits returned.
- ^b Beginning in 2004, a subsistence fishing permit was required for subdistricts 2 and 3. The permit obtains harvest information by Alaska residents living outside the subdistricts.
- ^c Subsistence harvest data are incomplete prior to 1979, 1983–1984, and 1986–1994.
- ^d Subsistence harvests were estimated from Division of Subsistence household surveys.
- ^e Tier II chum salmon fishing restrictions limited number of permit holders who could fish.
- ^f Tier II chum salmon fishing restrictions suspended.
- ^g Subsistence data not yet available.

Table 2.—Commercial and subsistence king salmon harvests for Norton Sound subdistricts 5 and 6, by year, 1961–2012.

| Year | Shaktoolik (5) | | Unalakleet (6) | | | Combined Totals | |
|------|----------------|--------------------------|----------------|--------------------------|----------------|-----------------|----------------------------|
| | Commercial | Subsistence ^a | Commercial | Subsistence ^b | Sport | Commercial | Subsistence ^{a,b} |
| 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 | — ^c | 8,864 | 1,125 |
| 1979 | 2,377 | 62 | 6,354 | 640 | — ^c | 8,731 | 702 |
| 1980 | 1,086 | 57 | 4,339 | 1,046 | — ^c | 5,425 | 1,103 |
| 1981 | 1,484 | 8 | 6,157 | 869 | — ^c | 7,641 | 877 |
| 1982 | 1,677 | 68 | 3,768 | 913 | — ^c | 5,445 | 981 |
| 1983 | 2,742 | — | 7,022 | 1,868 | 130 | 9,764 | — |
| 1984 | 1,613 | — | 6,804 | 1,650 | 104 | 8,417 | — |
| 1985 | 5,312 | 298 | 12,621 | 1,397 | 179 | 17,933 | 1,695 |
| 1986 | 1,075 | — | 4,494 | — | 850 | 5,569 | — |
| 1987 | 2,214 | — | 3,246 | — | 417 | 5,460 | — |
| 1988 | 671 | — | 2,218 | — | 272 | 2,889 | — |
| 1989 | 1,241 | — | 4,402 | — | 49 | 5,643 | — |
| 1990 | 2,644 | — | 5,998 | 2,476 | 276 | 8,642 | — |
| 1991 | 1,324 | — | 4,534 | — | 296 | 5,858 | — |
| 1992 | 1,098 | — | 3,409 | — | 117 | 4,507 | — |
| 1993 | 2,756 | — | 5,944 | — | 382 | 8,700 | — |
| 1994 | 885 | 1,175 ^d | 4,400 | 3,035 ^d | 379 | 5,285 | 4,210 |
| 1995 | 1,239 | 1,275 ^d | 7,617 | 3,114 ^d | 259 | 8,856 | 4,389 |
| 1996 | 1,340 | 1,114 ^d | 3,644 | 3,023 ^d | 384 | 4,984 | 4,137 |
| 1997 | 2,449 | 1,146 ^d | 9,067 | 4,191 ^d | 842 | 11,516 | 5,337 |
| 1998 | 910 | 982 ^d | 6,413 | 4,066 ^d | 513 | 7,323 | 5,048 |
| 1999 | 581 | 818 ^d | 1,927 | 2,691 ^d | 415 | 2,508 | 3,509 |
| 2000 | 160 | 440 ^d | 582 | 2,429 ^d | 345 | 742 | 2,869 |
| 2001 | 90 | 936 ^d | 116 | 2,810 ^d | 250 | 206 | 3,746 |
| 2002 | 1 | 1,230 ^d | 4 | 2,367 ^d | 544 | 5 | 3,597 |
| 2003 | 2 | 881 ^d | 10 | 2,585 ^d | 97 | 12 | 3,466 |
| 2004 | 0 | 943 ^e | 0 | 2,829 ^e | 356 | 0 | 3,772 |
| 2005 | 50 | 807 ^e | 101 | 2,193 ^e | 216 | 151 | 3,000 |

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Table 2.–Page 2 of 2.

| Year | Shaktoolik (5) | | Unalakleet (6) | | | Combined Totals | |
|-------------------------------------|----------------|--------------------------|----------------|--------------------------|----------------|-----------------|----------------------------|
| | Commercial | Subsistence ^a | Commercial | Subsistence ^b | Sport | Commercial | Subsistence ^{a,b} |
| 2006 | 0 | 382 ^e | 11 | 2,537 ^e | 394 | 11 | 2,919 |
| 2007 | 5 | 515 ^e | 13 | 1,665 ^e | 147 | 18 | 2,180 |
| 2008 | 6 | 422 ^e | 65 | 1,402 ^e | 580 | 71 | 1,824 |
| 2009 | 4 | 417 ^e | 80 | 1,892 ^e | 248 | 84 | 2,309 |
| 2010 | 4 | 327 ^e | 124 | 1,257 ^e | 61 | 128 | 1,584 |
| 2011 | 45 | 235 ^e | 124 | 607 ^e | 8 | 169 | 842 |
| 2012 ^f | 0 | 300 ^e | 0 | 1,609 ^e | – ^g | 0 | 1,909 |
| 5-year average 2007- 2011 | 13 | 383 | 81 | 1,365 | 209 | 94 | 1,748 |
| 10-year average 2002- 2011 | 12 | 616 | 53 | 1,933 | 265 | 65 | 2,549 |

Note: Dashes (–) indicate that a value can't be computed due to limitations of the data.

- ^a Subsistence harvest data are incomplete prior to 1982, and from 1983 to 1993, only one partial survey in 1985.
- ^b Subsistence harvest data incomplete prior to 1979 and from 1986 to 1993; only one survey in 1990.
- ^c Sport fish harvest estimates could not be generated.
- ^d Subsistence harvests were estimated from Division of Subsistence household surveys.
- ^e Subsistence harvests were estimated from Division of Commercial Fisheries surveys.
- ^f Data are preliminary.
- ^g Data not yet available.

Table 3.—Yukon River king salmon historical escapements from selected tributaries.

| Year | Ground Based Projects | | | Aerial Surveys ^a | | |
|-------------------------------|------------------------|------------------------|---------------------|-----------------------------|-------------|-----------|
| | Chena R. | Salcha R. | E. F. Andreafsky R. | W.F. Andreafsky R. | Anvik R. | Nulato R. |
| 1980 | | | | 1,500 | 1,330 | |
| 1981 | | | | | | |
| 1982 | | | | 851 | | |
| 1983 | | | | | | 1,006 |
| 1984 | | | | 1,993 | | |
| 1985 | | | | 2,248 | 1,051 | 2,780 |
| 1986 | 9,065 | | 1,530 | 3,158 | 1,118 | 2,974 |
| 1987 | 6,404 | 4,771 | 2,011 | 3,281 | 1,174 | 1,638 |
| 1988 | 3,346 | 4,562 | 1,339 | 1,448 | 1,805 | 1,775 |
| 1989 | 2,666 | 3,294 | | 1,089 | | |
| 1990 | 5,603 | 10,728 | | 1,545 | 2,347 | |
| 1991 | 3,025 | 5,608 | | 2,544 | | 2,020 |
| 1992 | 5,230 | 7,862 | | | 1,536 | 579 |
| 1993 | 12,241 | 10,007 | | 2,765 | 1,720 | 3,025 |
| 1994 | 11,877 | 18,399 | 7,801 | | | 1,795 |
| 1995 | 9,680 | 13,643 | 5,841 | 1,108 | 1,996 | 1,649 |
| 1996 | 7,153 | 7,570 | 2,955 | 624 | 839 | |
| 1997 | 13,390 | 18,514 | 3,186 | 1,510 | 3,979 | |
| 1998 | 4,745 | 5,027 | 4,034 | | | 1,053 |
| 1999 | 6,485 | 9,198 | 3,444 | | | |
| 2000 | 4,694 | 4,595 | 1,609 | 427 | 1,721 | |
| 2001 | 9,696 | 13,328 | | 565 | 1,420 | 1,884 |
| 2002 | 6,967 | 9,000 ^{b, d} | 4,123 | 917 | 1,713 | 1,584 |
| 2003 | 11,100 ^{b, d} | 15,500 ^{b, d} | 4,336 | | | |
| 2004 | 9,645 | 15,761 | 8,045 | 1,317 | 3,679 | 1,321 |
| 2005 | ^{b, c} | 5,988 | 2,239 | 1,492 | 2,421 | 553 |
| 2006 | 2,936 | 10,679 | 6,463 | 824 | 1,876 | 1,292 |
| 2007 | 3,806 | 6,425 | 4,504 | 976 | 1,529 | 2,583 |
| 2008 | 3,208 | 5,415 ^b | 4,242 | | | 922 |
| 2009 | 5,253 | 12,774 | 3,004 | 1,678 | 832 | 2,260 |
| 2010 | 2,382 | 6,135 | 2,413 | 858 | 974 | 711 |
| 2011 | ^{b, c} | ^{b, c, f} | 5,213 | 1,173 | 642 | 1,401 |
| 2012 ^e | 1,615 | 7,053 | 2,516 | | 722 | 1,374 |
| 5-Year Average (2008-2012) | 3,115 | 7,844 | 3,478 | 1,236 | 793 | 1,334 |
| Escapement Goals | 2,800-5,700 | 3,300-6,500 | 2,100-4,900 | 640-1,600 | 1,100-1,700 | 940-1,900 |

Note: blank cells indicate no data.

- ^a Only acceptable surveys are included.
- ^b Incomplete count, project was not operated or was inoperable for a large portion of the season due to water conditions.
- ^c Preliminary estimate and subject to change.
- ^d Estimate includes an expansion for missed counting days based on average run timing.
- ^e No estimate due to extreme high water conditions that prevented counting for much of the season.
- ^f Aerial survey indicated escapement of at least 3,500 king salmon.

Table 4.—Alaskan catch of Yukon River king salmon, 1961–2012.

| Year | Commercial | Commercial Related ^a | Total Commercial | Subsistence ^b | Personal Use ^c | Test Fish Sales ^d | Sport Fish ^e | Total |
|-------------------|------------|------------------------------------|----------------------|--------------------------|------------------------------|---------------------------------|----------------------------|---------|
| 1961 | 119,664 | | 119,664 | 21,488 | | | | 141,152 |
| 1962 | 94,734 | | 94,734 | 11,110 | | | | 105,844 |
| 1963 | 117,048 | | 117,048 | 24,862 | | | | 141,910 |
| 1964 | 93,587 | | 93,587 | 16,231 | | | | 109,818 |
| 1965 | 118,098 | | 118,098 | 16,608 | | | | 134,706 |
| 1966 | 93,315 | | 93,315 | 11,572 | | | | 104,887 |
| 1967 | 129,656 | | 129,656 | 16,448 | | | | 146,104 |
| 1968 | 106,526 | | 106,526 | 12,106 | | | | 118,632 |
| 1969 | 91,027 | | 91,027 | 14,000 | | | | 105,027 |
| 1970 | 79,145 | | 79,145 | 13,874 | | | | 93,019 |
| 1971 | 110,507 | | 110,507 | 25,684 | | | | 136,191 |
| 1972 | 92,840 | | 92,840 | 20,258 | | | | 113,098 |
| 1973 | 75,353 | | 75,353 | 24,317 | | | | 99,670 |
| 1974 | 98,089 | | 98,089 | 19,964 | | | | 118,053 |
| 1975 | 63,838 | | 63,838 | 12,867 | | | | 76,705 |
| 1976 | 87,776 | | 87,776 | 17,806 | | | | 105,582 |
| 1977 | 96,757 | | 96,757 | 17,581 | | | 156 | 114,494 |
| 1978 | 99,168 | | 99,168 | 30,785 | | | 523 | 130,476 |
| 1979 | 127,673 | | 127,673 | 31,005 | | | 554 | 159,232 |
| 1980 | 153,985 | | 153,985 | 42,724 | | | 956 | 197,665 |
| 1981 | 158,018 | | 158,018 | 29,690 | | | 769 | 188,477 |
| 1982 | 123,644 | | 123,644 | 28,158 | | | 1,006 | 152,808 |
| 1983 | 147,910 | | 147,910 | 49,478 | | | 1,048 | 198,436 |
| 1984 | 119,904 | | 119,904 | 42,428 | | | 351 | 162,683 |
| 1985 | 146,188 | | 146,188 | 39,771 | | | 1,368 | 187,327 |
| 1986 | 99,970 | | 99,970 | 45,238 | | | 796 | 146,004 |
| 1987 | 134,760 | | 134,760 ^f | 55,039 | 1,706 | | 502 | 192,007 |
| 1988 | 100,364 | | 100,364 | 45,495 | 2,125 | 1,081 | 944 | 150,009 |
| 1989 | 104,198 | | 104,198 | 48,462 | 2,616 | 1,293 | 1,063 | 157,632 |
| 1990 | 95,247 | 413 | 95,660 | 48,587 | 2,594 | 2,048 | 544 | 149,433 |
| 1991 | 104,878 | 1,538 | 106,416 | 46,773 | | 689 | 773 | 154,651 |
| 1992 | 120,245 | 927 | 121,172 | 47,077 | | 962 | 431 | 169,642 |
| 1993 | 93,550 | 560 | 94,110 | 63,915 | 426 | 1,572 | 1,695 | 161,718 |
| 1994 | 113,137 | 703 | 113,840 | 53,902 | | 1,631 | 2,281 | 171,654 |
| 1995 | 122,728 | 1,324 | 124,052 | 50,620 | 399 | 2,152 | 2,525 | 179,748 |
| 1996 | 89,671 | 521 | 90,192 | 45,671 | 215 | 1,698 | 3,873 | 141,649 |
| 1997 | 112,841 | 769 | 113,610 | 57,117 | 313 | 2,811 | 2,174 | 176,025 |
| 1998 | 43,618 | 81 | 43,699 | 54,124 | 357 | 926 | 654 | 99,760 |
| 1999 | 69,275 | 288 | 69,563 | 53,305 | 331 | 1,205 | 1,023 | 125,427 |
| 2000 | 8,518 | 0 | 8,518 | 36,404 | 75 | 597 | 276 | 45,870 |
| 2001 ^g | 0 | 0 | 0 | 55,819 | 122 | 0 | 679 | 56,620 |
| 2002 | 24,128 | 0 | 24,128 | 43,742 | 126 | 528 | 486 | 69,010 |
| 2003 | 40,438 | 0 | 40,438 | 56,959 | 204 | 680 | 2,252 | 100,533 |
| 2004 | 56,151 | 0 | 56,151 | 55,713 | 201 | 792 | 1,513 | 114,370 |
| 2005 | 32,029 | 0 | 32,029 | 53,409 | 138 | 310 | 483 | 86,369 |

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Table 4.–Page 2 of 2.

| Year | Commercial | | Total | Subsistence ^b | Personal | Test | Sport | Total |
|-------------------|------------|----------------------|------------|--------------------------|------------------|-------------------------|-------------------|---------|
| | Commercial | Related ^a | Commercial | | Use ^c | Fish Sales ^d | Fish ^e | |
| 2006 | 45,829 | 0 | 45,829 | 48,593 | 89 | 817 | 739 | 96,067 |
| 2007 | 33,634 | 0 | 33,634 | 55,174 | 136 | 849 | 960 | 90,753 |
| 2008 | 4,641 | 0 | 4,641 | 45,186 | 126 | 0 | 409 | 50,362 |
| 2009 | 316 | 0 | 316 | 33,805 | 127 | 0 | 863 | 35,111 |
| 2010 | 9,897 | 0 | 9,897 | 44,559 | 162 | 0 | 474 | 55,092 |
| 2011 | 82 | 0 | 82 | 40,903 | 88 | 0 | 689 | 41,762 |
| 2012 ^h | 0 | 0 | 0 | – | – | 0 | – | – |
| Average | | | | | | | | |
| 1989-1998 | 100,011 | 760 | 100,695 | 51,625 | 989 | 1,578 | 1,601 | 156,191 |
| 2007-2011 | 9,714 | 0 | 9,714 | 43,925 | 128 | 170 | 679 | 54,616 |

Note: blank cells indicate no data.

- ^a Refers to production of salmon roe, including carcasses from subsistence-caught fish. These data are only available since 1990.
- ^b Includes harvest from the Coastal District and test fishery harvest that were utilized for subsistence. In 2009, 2011, and 2012, subsistence includes fish commercially caught, but not sold.
- ^c Prior to 1987, and in 1990, 1991, and 1994, personal use was considered part of subsistence.
- ^d Includes only test fishery fish that were sold commercially.
- ^e Sport fish harvest for the Alaskan portion of the Yukon River drainage. Most of this harvest is believed to be taken within the Tanana River drainage (see Schultz et al. 1993; *Yukon Area Annual Management Report, 1992*).
- ^f Includes 653 and 2,136 king salmon illegally sold in districts 5 (Yukon River) and 6 (Tanana River), respectively.
- ^g No commercial fishery was conducted.
- ^h Data are preliminary. Subsistence, personal use, and sport fish data are not yet available.

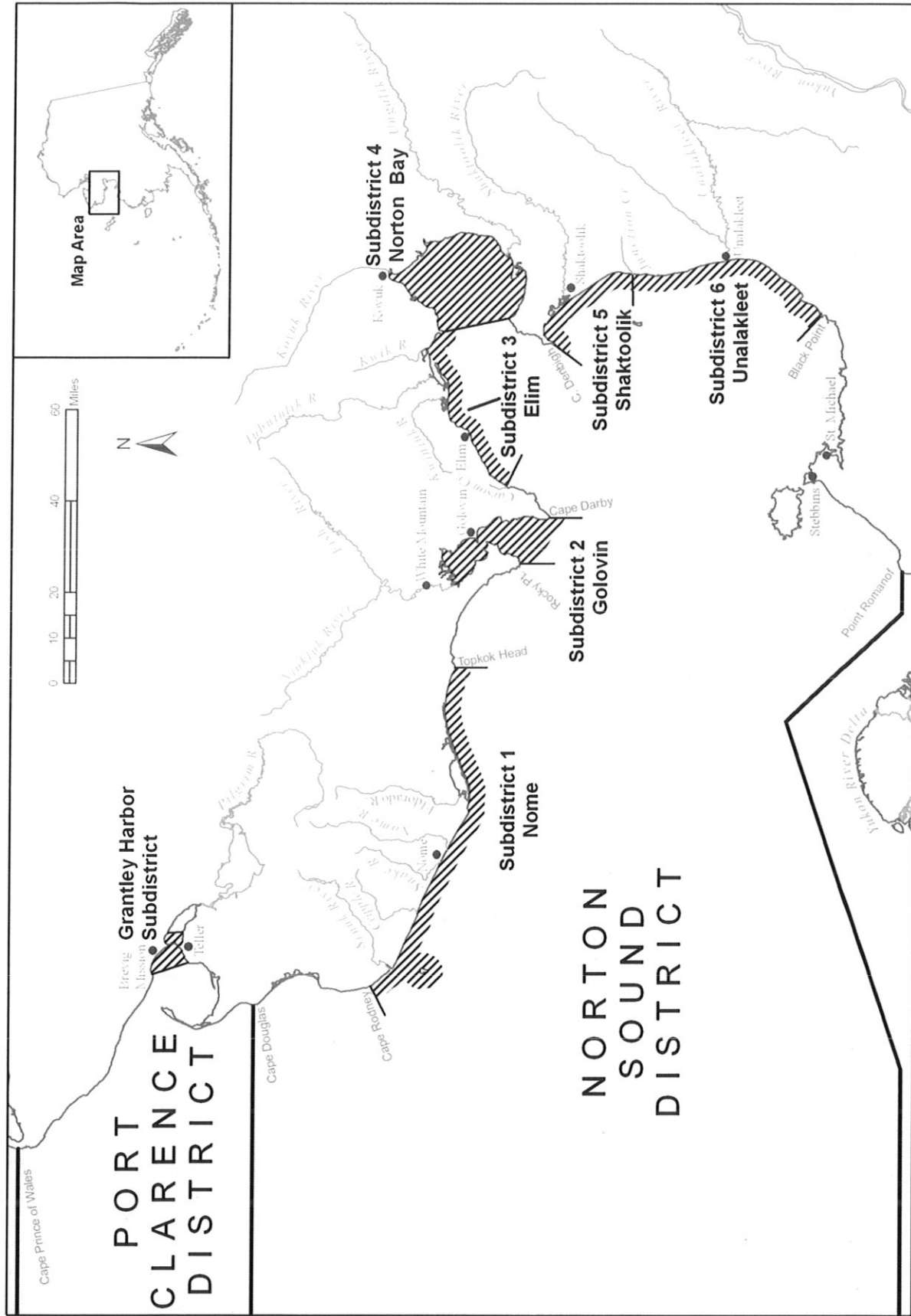


Figure 1.—Norton Sound District commercial salmon fishing subdistricts.

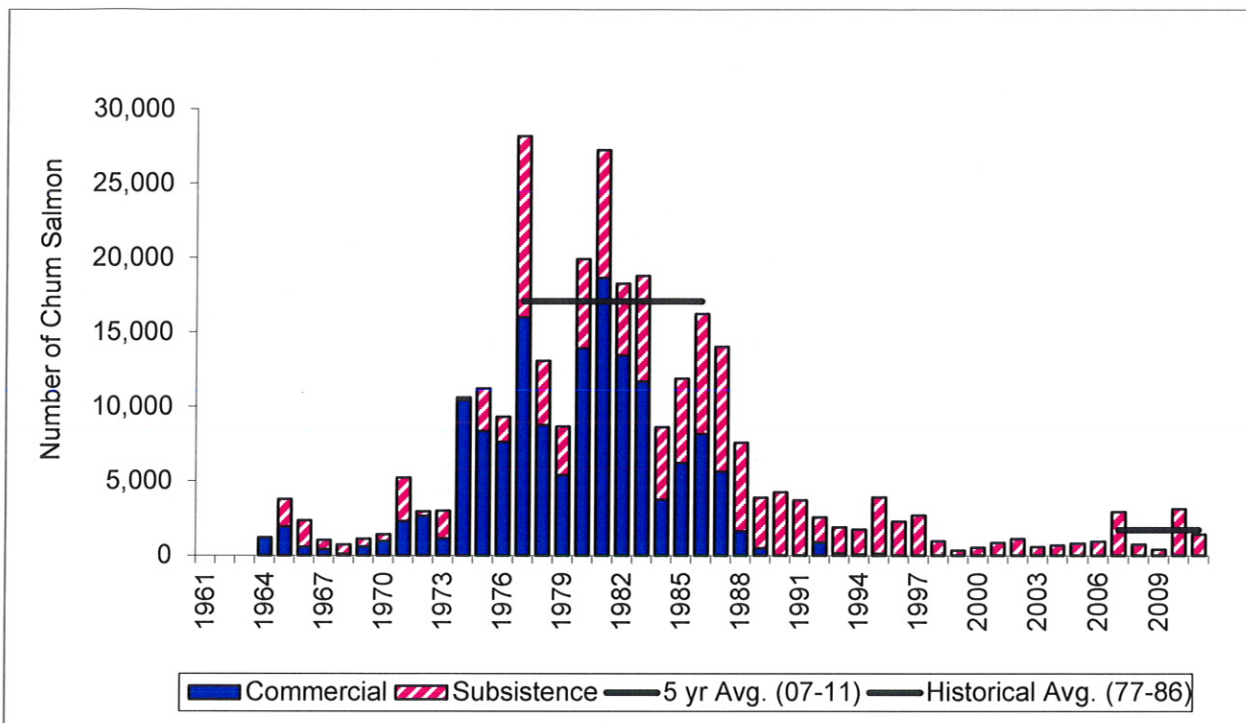


Figure 2.—Subdistrict 1 chum salmon harvest (1961–2011). Note: Subsistence harvest data incomplete prior to 1979.

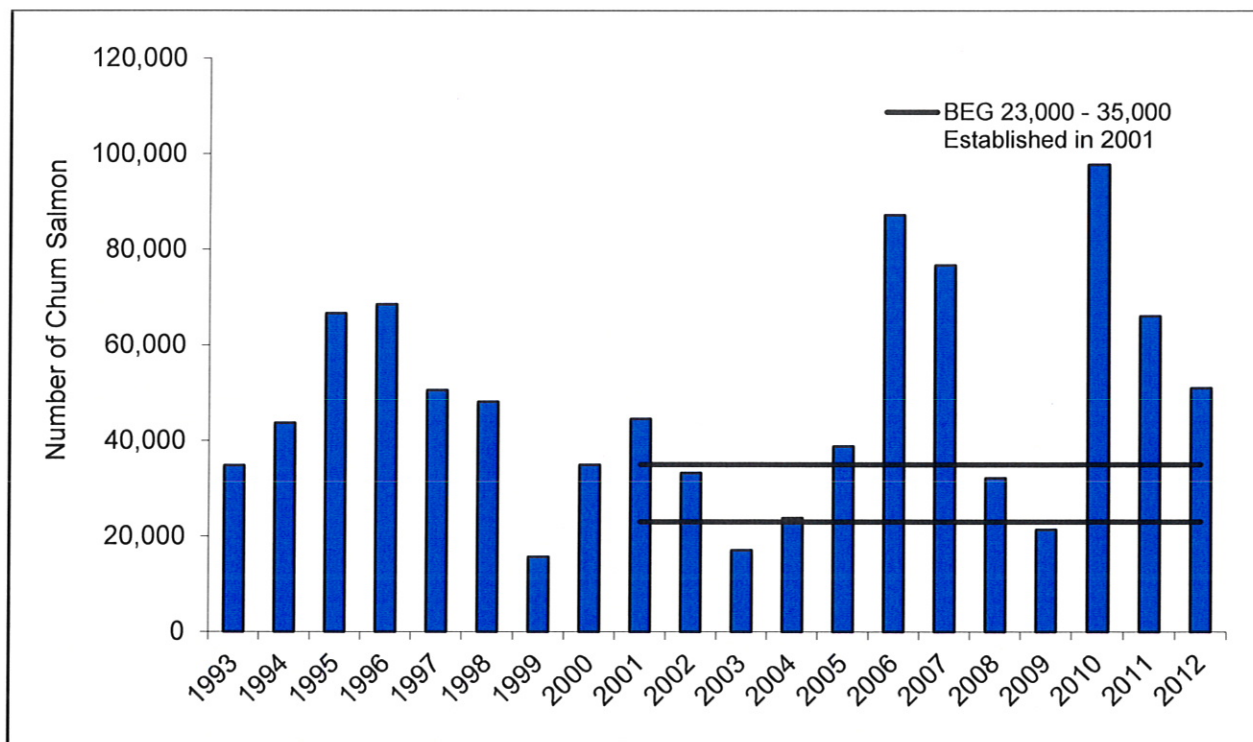


Figure 3.—Subdistrict 1 chum salmon escapement (1993–2012).

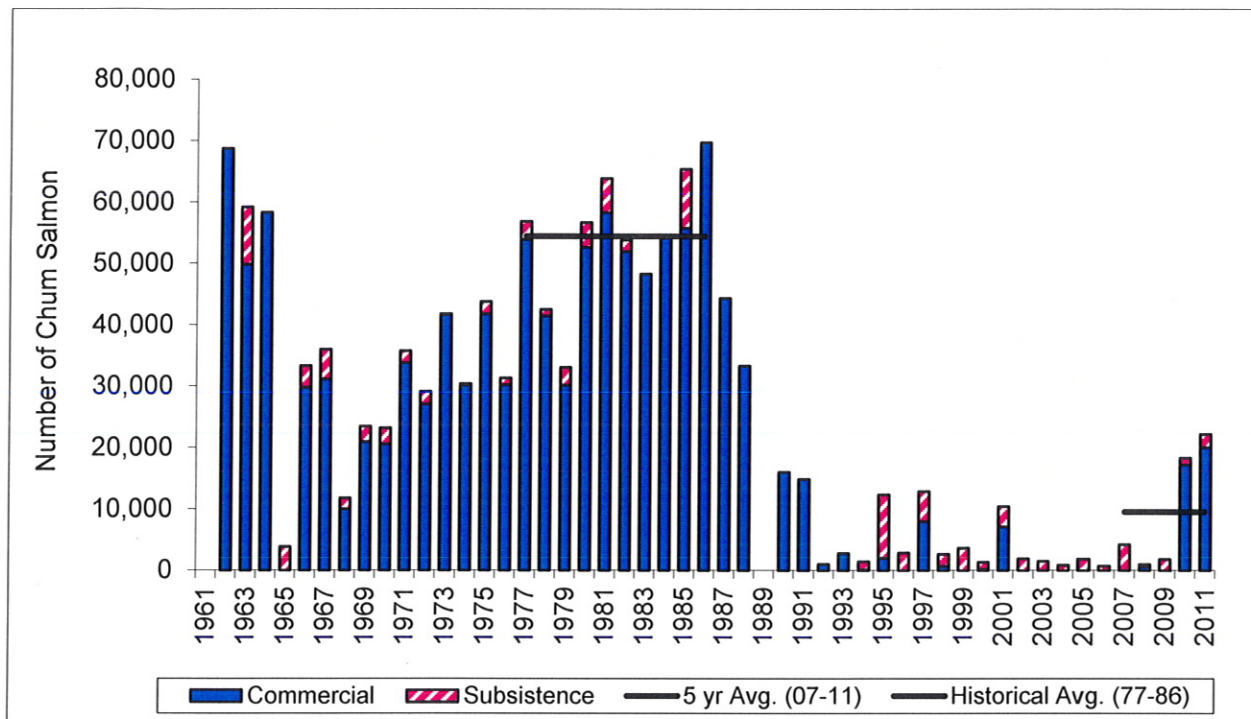


Figure 4.—Subdistrict 2 chum salmon harvest, 1961–2011. Note: Subsistence harvest not available for all years.

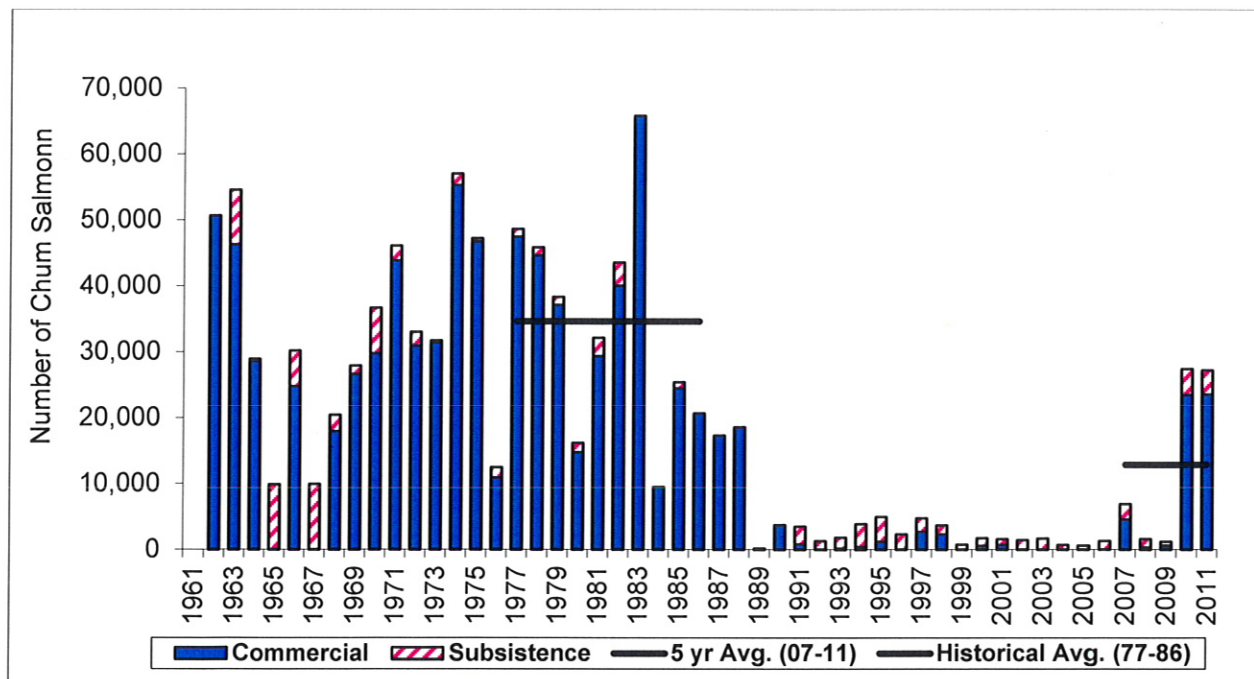


Figure 5.—Subdistrict 3 chum salmon harvest, 1961–2011. Note: Subsistence harvest not available for all years.

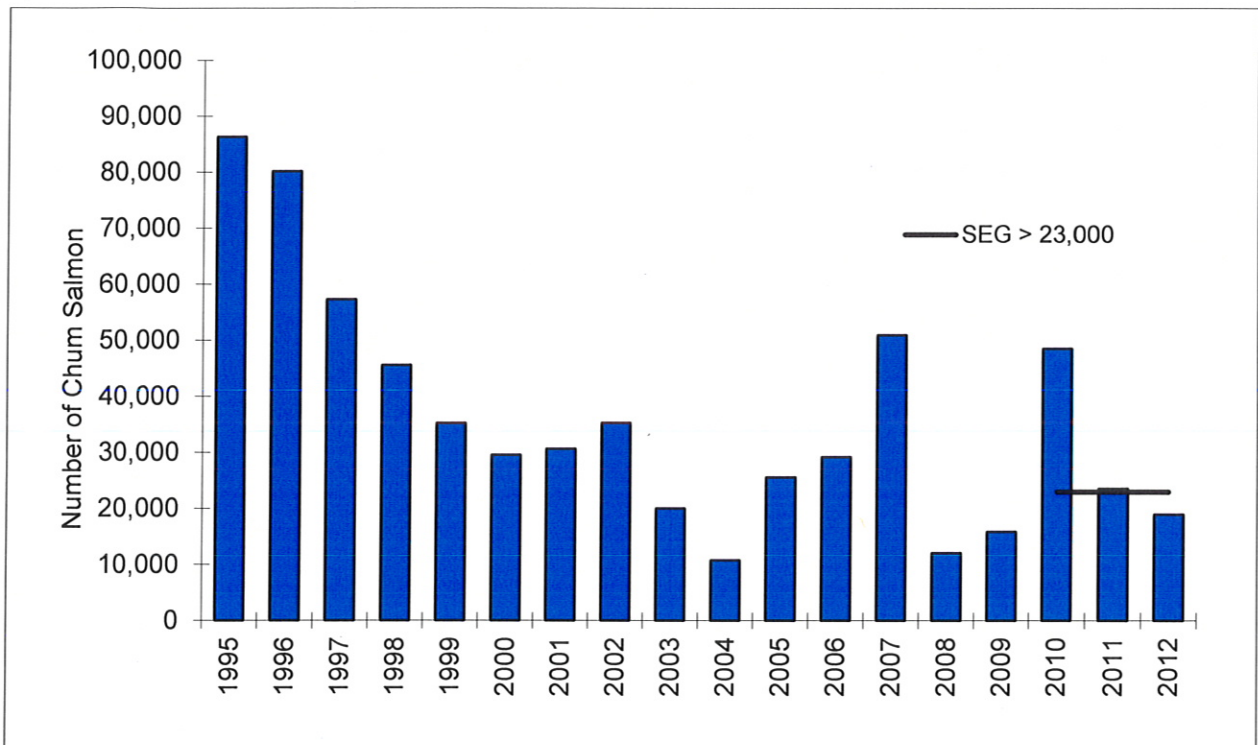


Figure 6.—Niukluk River chum salmon escapement estimate compared to the lower bound sustainable escapement goal established in 2010. Escapement estimate for 2012 is preliminary.

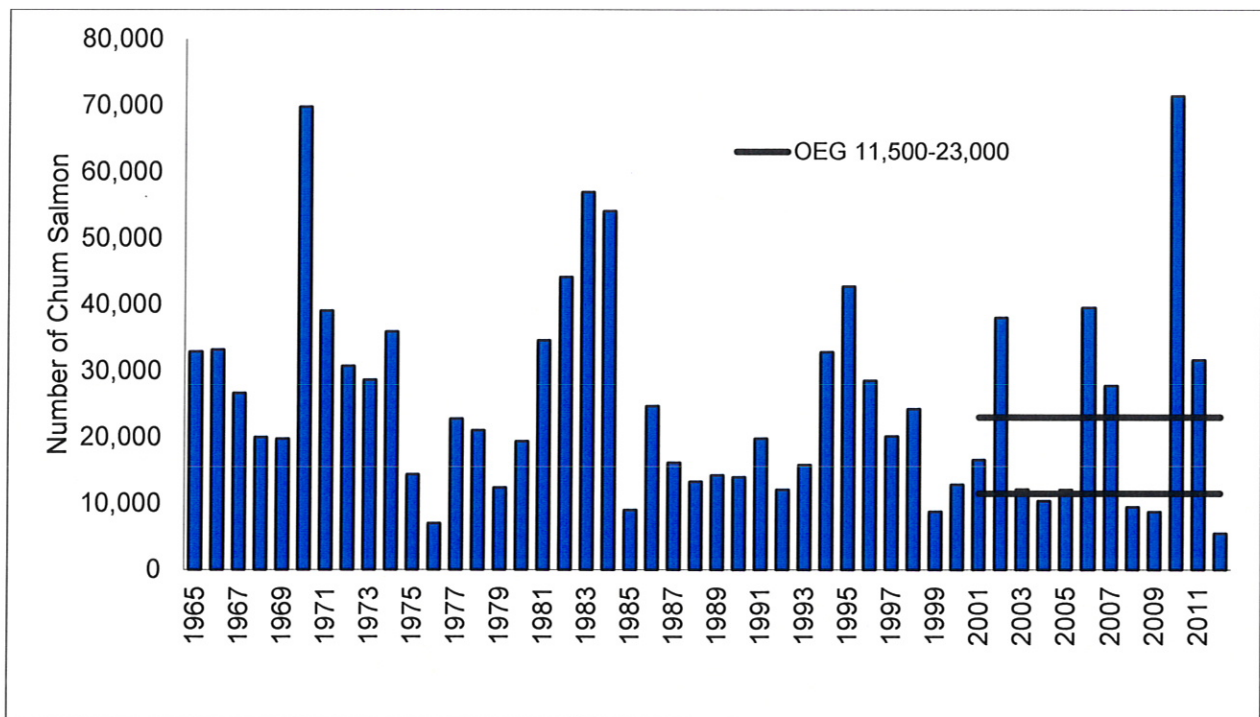


Figure 7.—Kwiniuk River chum salmon escapement estimate compared to the optimum escapement goal set by the board in 2001. Escapement estimate for 2012 is preliminary.

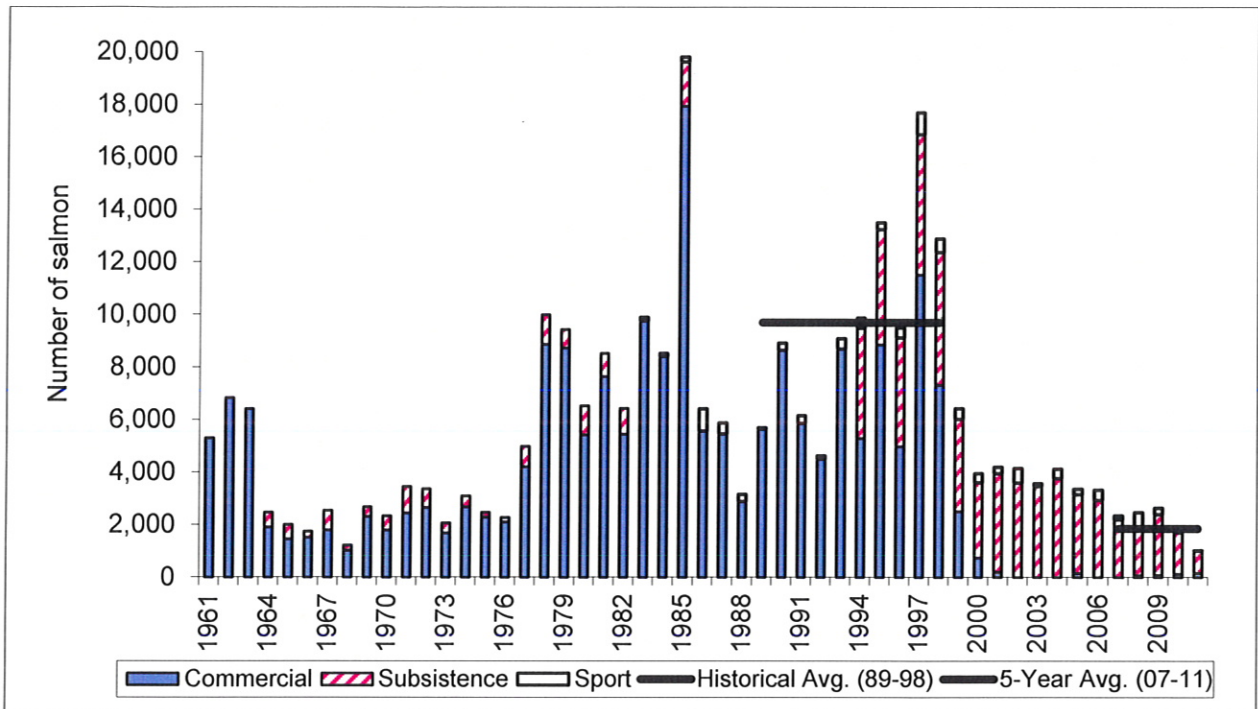


Figure 8.—Subdistricts 5 and 6 combined king salmon harvest, 1961–2011. Note: Subsistence and sport fish harvest not available for all years.

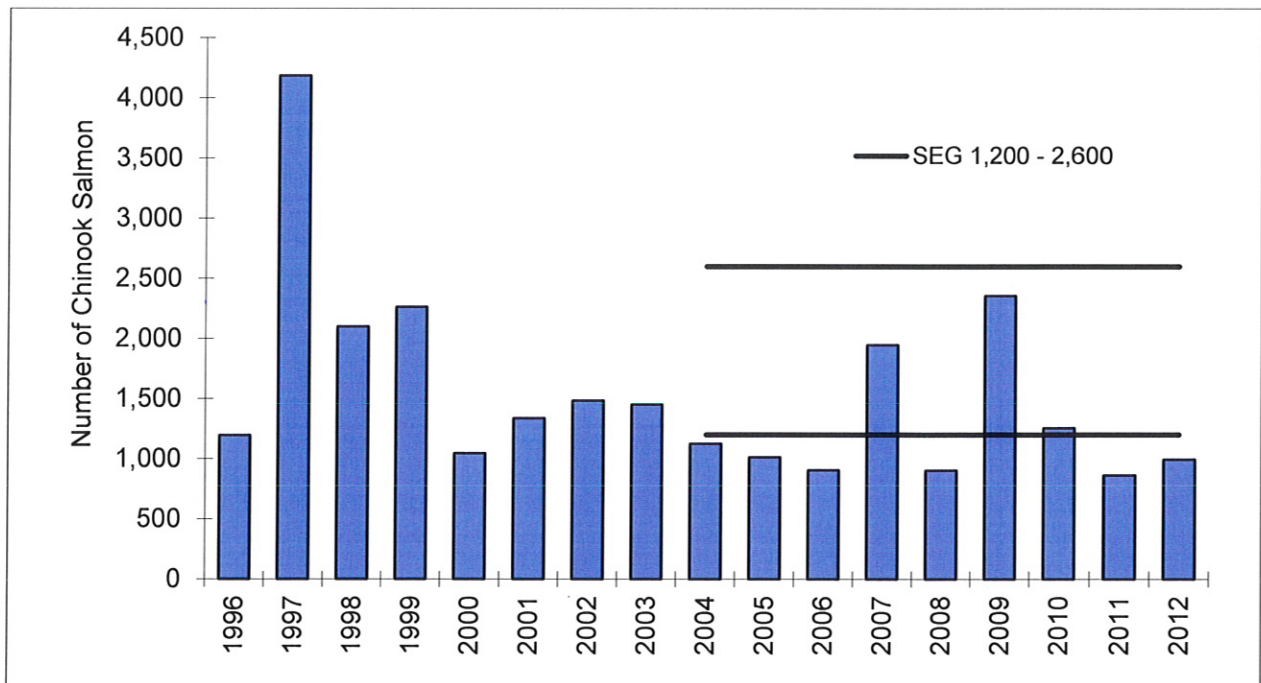


Figure 9.—North River king salmon escapement estimate compared to the sustainable escapement goal established in 2004. Escapement estimate for 2012 is preliminary.

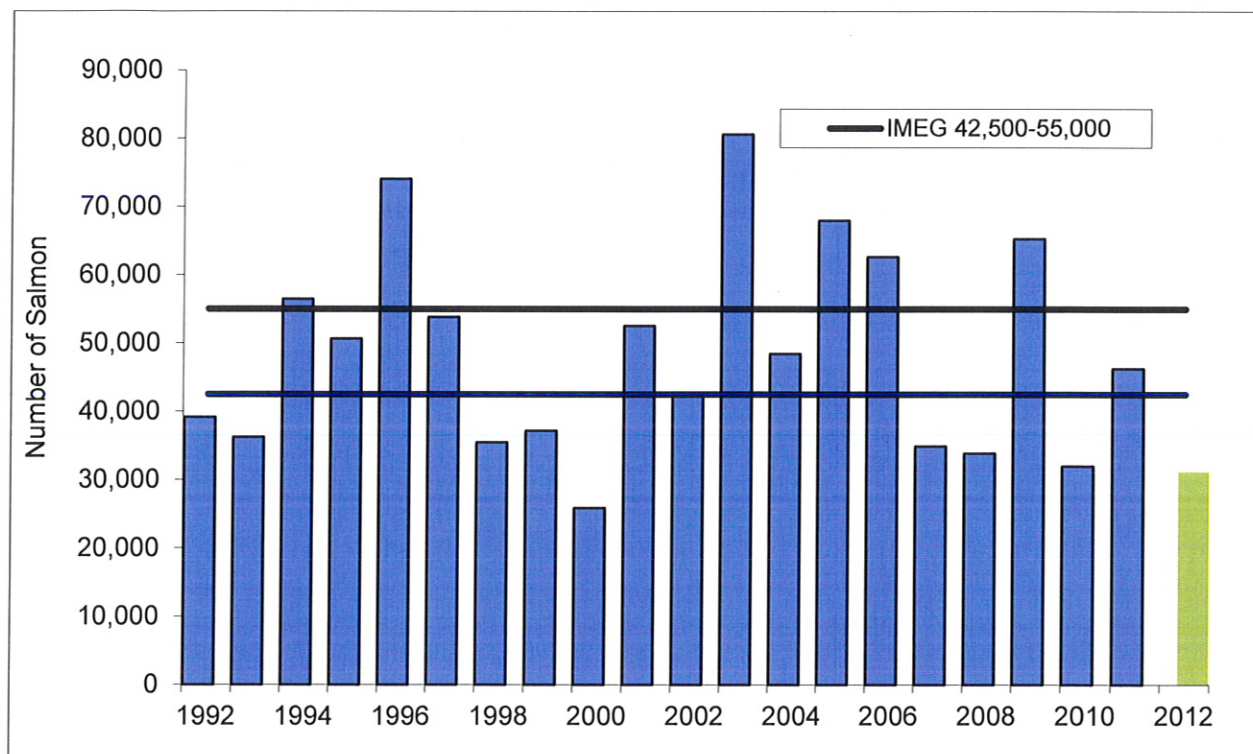


Figure 10.—Canadian-Origin Yukon River king salmon escapement estimate compared to the interim management escapement goal set by the US-Canada Yukon River Panel in 2010. Canadian escapement estimates are based on a three-area escapement index, Eagle sonar (2005–2012), and radio-telemetry (2002–2004).

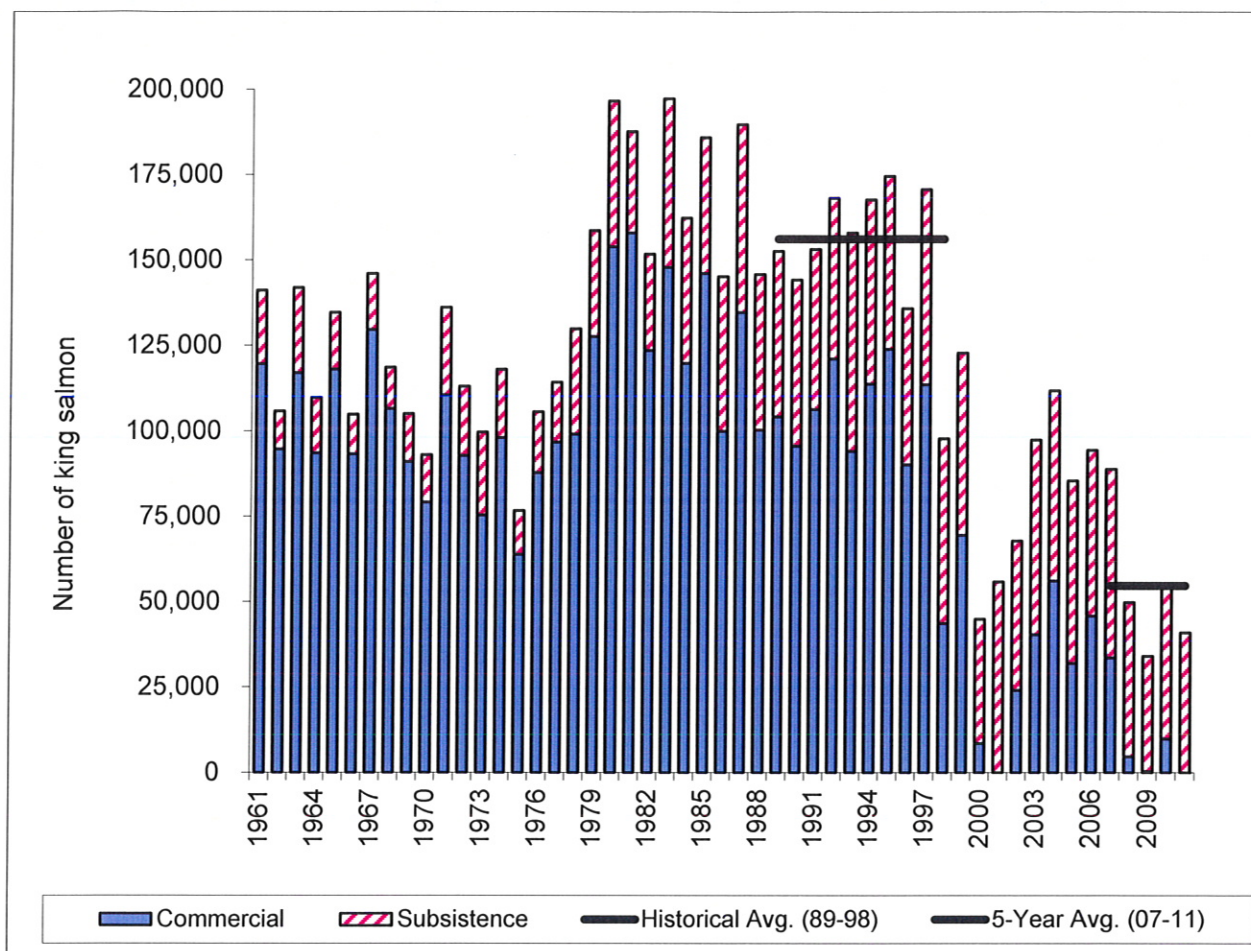


Figure 11.—Yukon River king salmon subsistence and commercial harvests compared to the historical baseline 1989–1998 average (156,200) and the recent 2007–2011 average (54,600).