



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

Department of Fish and Game

DIVISIONS OF COMMERCIAL FISHERIES and SPORT FISH
Headquarters Office

1255 West 8th Street
P.O. Box 115526
Juneau, Alaska 99811-5526
Main: 907.465.4210
Fax: 907.465.2604

MEMORANDUM

<p>TO: Members, Alaska Board of Fisheries</p> <p>FROM: Jeff Regnart, Director Division of Commercial Fisheries</p> <p>Tom Brookover, Director Division of Sport Fish</p>	<p>DATE: September 30, 2015</p> <p>SUBJECT: Arctic-Yukon- Kuskokwim Stock of Concern Recommendations</p>
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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 2016 board regulatory cycle.

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 the 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. Since the 2010 and 2013 board cycles, two chum salmon stocks (Norton Sound Subdistrict 1, and Subdistricts 2 and 3) and two king salmon stocks (Yukon River, and Norton Sound Subdistricts 5 and 6) continue to be designated as stocks of yield concern.

This current evaluation included a review of all 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 our evaluation, **it is recommended that Norton Sound Subdistrict 1 (Nome) chum salmon be discontinued as a stock of concern and the Norton Sound Subdistricts 2 and 3 chum salmon remain a stock of yield concern.**

Particular attention was paid to all AYK king salmon stocks as low productivity has been observed for this species in systems across Alaska. However, recent evidence suggests that improvements in productivity are anticipated over the next several years. In 2015, king salmon run abundance and resulting yield, while still below average, was better than expected throughout the AYK region. Other evidence, including abundance of juvenile king salmon in northern Bering Sea surveys, higher catches of immature king salmon in the Bering Sea, and higher than average age-4 returns in some systems in 2015 indicate a higher abundance of king salmon in the marine environment that will be returning over the next 2–3 years. Based on these expectations, **it is recommended that AYK king salmon stock designations remain status quo until returns from these indicators of improved productivity are substantiated.** Discussions related to Norton Sound Subdistricts 1, 2, &3 chum salmon, Subdistrict 5 and 6 king salmon and, Yukon and Kuskokwim River king salmon stock status are provided in 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.

Area/Stock	Salmon Species	Level of Concern					
		September 2000	January 2004	February 2007	January 2010	January 2013 (Current Status)	October 2015 Recommendation
<i>Norton Sound Area</i>							
Subdistrict 1	Chum	Management	Management	Changed to Yield	Yield	Yield	Discontinue
Subdistricts 2 and 3	Chum	Yield	Yield	Yield	Yield	Yield	Continue
Subdistricts 5 and 6	King	NA	Yield	Yield	Yield	Yield	Continue
<i>Yukon Area</i>							
Yukon River	King	Yield	Yield	Yield	Yield	Yield	Continue

All available 2015 data are preliminary; some 2015 data are unavailable because fisheries and stock assessment projects are still ongoing. All current stocks of concern were addressed through action plans at the January 2013 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 2016. 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.

EVALUATION OF PRESENT STOCKS OF CONCERN

Norton Sound

Norton Sound District is comprised of six commercial fishing subdistricts (Figure 1). Most subdistricts have several rivers, in addition to marine waters, where fishing occurs. Because these are not terminal fisheries, management plans are developed to include salmon from multiple rivers within a subdistrict, and sometimes representing multiple subdistricts. Two chum salmon stocks (Subdistrict 1, and Subdistricts 2 and 3), and 1 king salmon stock (Subdistricts 5 and 6) are currently designated as stocks of concern.

Norton Sound Subdistrict 1 (Nome) Chum Salmon

STOCK ASSESSMENT

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, was the most restrictive in Alaska. Since 2004, subsistence chum salmon fishing has been more liberal because overall chum salmon surpluses have generally been well above amounts needed for escapement.

In 2001, the department established a BEG range of 23,000 to 35,000 fish 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 for Nome, Snake, and Eldorado rivers, which are the same as the SEG ranges for these rivers. Individual river escapement goals 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. During the past five years (2011–2015), the upper end of the BEG range has been greatly exceeded (Figure 3). Similarly, OEG ranges were exceeded four out of five years in the Nome and Snake rivers, and every year in the Eldorado River.

Subsistence fishing was liberalized from Tier II to Tier I regulations in 2006; since then, the Subdistrict 1 BEG was achieved each year except 2009. During the most recent 5-year period (2011–2015), the average chum salmon subsistence harvest continued to be below the amount necessary for subsistence (ANS) of 3,430–5,716 chum salmon and below the historical total harvest (combined subsistence and commercial harvests) of the 1980s and early 1990s (Figure 2). However, based upon the available surplus, subsistence fishing time has been increased and commercial and sport fishing for chum salmon has been allowed again in Subdistrict 1 after the board rescinded previous restrictions beginning in 2013. Commercial fishing effort has been low even though chum salmon run sizes have been two and three times above the upper end of the escapement goal range.

STOCK OF CONCERN RECOMMENDATION

Given that chum salmon escapement goals for individual rivers have been achieved four of the past five years and the Eldorado River OEG and Subdistrict 1 BEG were achieved each of the past five years, there is not a chronic inability to meet escapement goals. The available yield the past five years has increased to near historical levels and has provided for ANS and other uses. Therefore, it is recommended that the designation of Subdistrict 1 chum salmon as a stock of

yield concern be discontinued. The stock of concern status was discussed with stakeholders as part of the escapement goal review process and there was a consensus among meeting participants that Subdistrict 1 chum salmon was no longer a stock of concern.

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 5-year period (1995–1999) compared to historical harvests in the 1980s (Table 1; Figures 4 and 5). The yield concern classification has continued through the last board cycle in 2013 because of the low available yield compared to harvest in the 1980s.

Commercial fishing was allowed to target chum salmon in 2010 and 2011 which resulted in the highest harvests in Subdistricts 2 and 3 since 1988 (Figures 4 and 5). However, chum salmon abundance was much lower in 2012 and only one chum salmon-directed fishing period was established in Subdistrict 2. Similarly, in 2013 continued low chum salmon abundance resulted in only two chum salmon-directed fishing periods in Subdistricts 2 and 3. However, in 2014 and 2015 chum salmon abundance increased and commercial fishing time was only restricted by buyer capacity. The combined commercial harvest in Subdistricts 2 and 3 was the highest since 1988. During the most recent 5-year period, subsistence fishing time has not been restricted. Estimated exploitation rates by the subsistence fishery on chum salmon continue to be very low and restrictions on subsistence fishing 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. The escapement goal was met in 2010 and 2011, but was not achieved in 2012. The Niukluk River tower project was discontinued in 2013. In 2014, a cooperative counting tower project farther downstream on the mainstem Fish River was initiated by Norton Sound Economic Development Corporation (NSEDC) and the department. Previous department tagging studies showed that approximately one-third of the chum salmon tagged in the lower Fish River spawn in the Niukluk River. High water in 2014 prevented an accurate assessment of escapement by the tower project and aerial surveys were used to obtain an index of spawning escapement. In 2015, an escapement count of 145,000 chum salmon at Fish River showed that the previous Niukluk River tower-based SEG would have likely been achieved.

In 2001, the department established a tower-based BEG range of 10,000–20,000 chum salmon for the Kwiniuk River and an aerial survey BEG range of 8,000–16,000 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 ranges to account for subsistence harvests that may occur above the tower site. Tower count estimates from the Kwiniuk River project during the 2012–2013 seasons fell short of the OEG range of 11,500–23,000 chum salmon (Figure 6). However, escapement counts greatly exceeded the upper bound of the Kwiniuk River OEG range in 2011, and again in 2014 and 2015. Since being designated as a stock of yield concern in 2001, Subdistrict 3 chum salmon have shown a propensity for dramatic swings in run abundance; the 2010 escapement was the highest on record while the 2012 and 2013 escapements were the lowest on record. The aerial survey OEG for the Tubutulik River was achieved in 2011 and 2015 but fell well short of the OEG range in 2013. Surveys were not conducted in 2012 and 2014 due to inclement weather and high water levels.

STOCK OF CONCERN RECOMMENDATION

Given the variable yield of chum salmon in Subdistricts 2 and 3 during the last 5 years despite the 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. However, the department notes that in 4 of the last 6 years, the yield in Subdistrict 3 was near the historical average in the 1980s.

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. The designation was based on low harvests during 1999–2003 compared to the historical average yield (Table 2; Figure 7). The board continued this designation at the 2007, 2010, and 2013 board meetings due to decreasing yield, despite no directed commercial fishery and subsistence and sport fishing restrictions and closures implemented in order to achieve escapement goals.

Beginning in 2013, preseason closures to subsistence and sport fisheries were established in early or mid-June contingent upon forecasted run timing. Following these temporary early season closures, subsistence fishing time has been incrementally increased throughout the month of June in the marine waters, but generally with mesh size restricted to six-inches or less to minimize harvests of king salmon. Since 2013, the Shaktoolik and Unalakleet rivers have largely been restricted to gillnets with a mesh size of four and one-half-inches or less until early July to allow king salmon relatively unimpeded access to spawning areas. Beach seining subsistence opportunities for other species of salmon have been allowed beginning in early July, and the commercial sale of king salmon has been prohibited by regulation because the management plan precludes the sale of king salmon in years with subsistence restrictions. This combination of measures was not sufficient to achieve escapement goals in 2013, but was effective at achieving goals in 2014 and 2015.

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 stocks originating from the Shaktoolik and Unalakleet rivers comprise harvests in each subdistrict. In Subdistrict 6, a salmon escapement counting tower has been in operation on North River, a major tributary of Unalakleet River, since 1996.

The North River tower-based SEG range of 1,200–2,600 king salmon was achieved in two of the previous five years (Figure 8). King salmon passage in 2011 was considered a minimum count due to high water affecting counting conditions, but escapement clearly fell well short of the goal in 2012 and 2013. However, king salmon escapements were within the escapement goal range in 2014 and 2015 as a result of commercial salmon fishing closures, preseason sport and subsistence fishing closures, and restrictions on gillnet mesh size. The department and stakeholders were pleased with escapement outcomes the past two seasons and there is some preliminary evidence that the 2011 brood year experienced good survival conditions based on a high percentage of age-4 king salmon observed in 2015 escapement samples.

Commercial king salmon harvests for the two subdistricts combined (Table 2) averaged 7,100 fish annually for the years 1989–1998. The recent five year (2010–2014) average declined to

just 140 fish, with all incidental commercial harvest being retained for subsistence use (Figure 7). The average subsistence harvest of 900 king salmon during the most recent five-year period (2010–2014) represents a decline of approximately 80% from the average subsistence harvest of 4,600 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 definitive historic comparison. Sport king salmon harvests for the Unalakleet River averaged 350 fish from 1989–1998 and has declined to 57 king salmon during the recent 5-year average (2010–2014).

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 decreased by 98% from historical harvests, subsistence harvests have decreased by 80%, and sport harvests have decreased by 84% since the mid to late 1990s. Norton Sound Subdistricts 5 and 6 king salmon have maintained a stock of yield concern classification since 2004 and harvest in the most recent five years remains well below the historical yield despite the use of specific management measures. Although yield has been higher than expected in recent years and there are multiple indicators yield may continue to increase over the next several years, it is recommended that the designation of Norton Sound Subdistricts 5 and 6 king salmon as a stock of yield concern be continued until increased yield from anticipated improved returns can be substantiated.

Yukon River King Salmon

STOCK ASSESSMENT

Yukon River king salmon run size has shown a general decline since 1998 due to lower productivity. 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, 2010, and 2013. 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) and all goals were met in 2015 for the first time since 2007. The ability to meet escapement goals despite below-average king salmon run sizes has been a result of significant restrictions on all Yukon River summer season fisheries (king and summer chum salmon). The Salcha River BEG has been met all three years that it has been assessed since 2011; water conditions in 2011 and 2014 hindered project operations and accurate counts were not possible. However, an aerial survey in 2011 of the Salcha River confirmed adequate escapement for achieving the goal. The neighboring Chena River failed to meet the BEG in 2012 and 2013 and water conditions prevented accurate counts in 2011. The East Fork Andreafsky River weir goal has been met four of the last five years and the goal was barely missed in 2013. The West Fork Andreafsky River aerial survey goal has been met in all four years it was assessed since 2011; poor conditions in 2012 prevented assessment of the goal. The Anvik River aerial survey SEG has been met the past two years, 2014 and 2015, but was not met from 2011 to 2013. The Nulato River aerial survey SEG has been met in all four years that it has been assessed since 2011, with conditions in 2014 preventing aerial assessment.

For the Canadian Yukon River mainstem stocks, which represent approximately half of the Yukon king salmon run, an interim management escapement goal (IMEG) of 42,500–55,000 king salmon was established by the Yukon River Panel for 2010–2015 (Figure 9). During the past five years, this goal has been met three times. Despite the most conservative management actions ever taken in the Alaska portion of the drainage, the IMEG was not achieved in 2012 and 2013. The total Canadian-origin king salmon run size in 2013 was less than the lower end of the IMEG, so even if there had been no harvest in the Alaska portion of the drainage, the IMEG would not have been achieved.

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 in 2000. The most recent five-year (2010–2014) average king salmon harvest of 28,700 fish is approximately 72% below the historical 10-year (1989–1998) average of 156,200 fish (Table 4, Figure 10). 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. The most dramatic decline in subsistence harvest has occurred since 2013, with the lowest reported subsistence harvest on record occurring in 2014 with just 3,300 king salmon harvested. 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 (2010–2014) of only 2,000 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 2011. The average available harvest for the years 2010 through 2014 was substantially less than the average yield from 1989 through 1998. No directed commercial fishery occurred in 2011–2015; additionally, the commercial sale of incidentally-caught king salmon has been prohibited since 2011. 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 2011–2015. Subsistence harvest data are not yet available for 2015; however, due to the conservative management actions taken, it is expected that the 2015 subsistence harvest was similar to that observed in 2013 and 2014 when the ANS was not achieved.

STOCK OF CONCERN RECOMMENDATION

Many Yukon River king salmon escapements have been met since 2011. However, Yukon River king salmon have maintained a stock of yield concern classification since 2001 and harvest in the most recent five years remains well below the expected historical yield despite the use of specific management measures. Yield has been higher than expected the last two years and there are multiple indicators from the marine environment and age class composition that suggest yield is expected to increase over the next several years; however, it is recommended that the designation of Yukon River king salmon as a stock of yield concern be continued until increased yield from anticipated improved returns can be substantiated.

KUSKOKWIM AREA KING SALMON DISCUSSION

KUSKOKWIM RIVER

Analysis of the Kuskokwim River king salmon stock shows an inverse relationship between escapement and recruitment. Years of high escapement resulted in low or below replacement

recruitment and below average yield. In contrast, years of low escapement resulted in high recruitment and above average yield. Kuskokwim River king salmon exhibit a cyclic pattern including periods of high and low abundance spanning 10–15 years. Data indicate that king salmon run abundance and available yield has been increasing since 2013, noting that this trend has been realized based on relatively low brood year escapements (Table 5, Figure 11).

Kuskokwim River king salmon SEGs include individual tributary goals from weirs and aerial surveys and a drainagewide escapement goal. The drainagewide escapement goal of 65,000-120,000 king salmon was established in 2013 based on a spawner-recruit analysis and resulting yield predictions across a range of spawning escapements. Weir-based escapement goals on the Kwethluk, George, and Kogrukluks rivers were adjusted in 2013 based on their average contribution to the drainagewide escapement. Escapements within the SEG ranges are expected to produce an average yield greater than 100,000 king salmon

King salmon escapement goals were achieved or exceeded in recent years due to substantial reductions in subsistence harvest and delays in the onset of chum and sockeye salmon commercial fishing. King salmon ANS (67,200–109,800) was last achieved in 2010. Subsistence harvest data in 2015 are not yet available; however, inseason accounting indicates total harvest was well below average and likely between 15,000–25,000 king salmon.

Postseason run abundance estimates from 2014 indicate that available yield was large enough to provide for additional harvest opportunities. Although it is unlikely ANS was achieved in 2015, the preliminary run abundance estimate indicates available yield was large enough to provide for a harvest within ANS. Achievement of drainagewide and tributary escapement goals in recent years indicate run abundance and available yield are expected to increase through 2016 and beyond. Although anecdotal to Kuskokwim River king salmon, this expectation is reinforced by similar trends in western Alaska king salmon populations and indicators from a marine juvenile king salmon assessment program focused on Yukon River stocks. Therefore, Kuskokwim River king salmon is not recommended for a stock of yield concern at this time and should continue to be monitored for anticipated improvement to stock status and yield in coming years.

KUSKOKWIM BAY

King salmon run abundance has also declined in Kuskokwim Bay Districts 4 and 5, which includes the Kanektok (District 4) and Goodnews (District 5) river systems. King salmon runs have exhibited persistent below average to poor run abundance since 2010 on the Kanektok River and since 2012 on the Goodnews River, as indicated by escapement and harvest data. However in 2015 the Kanektok River system exhibited much improvement with a near average run abundance. The Kanektok River aerial survey escapement goal was met and a near average yield was estimated to have been available. The Middle Fork weir-based escapement goal on the Goodnews River has not been met the past four years (2012–2015) and was one of the few king salmon escapement goals in the AYK Region that was not achieved in 2015. However, the aerial survey based escapement goal on the North Fork of the Goodnews River was achieved in 2015 and Middle Fork escapement exhibited improvement compared to recent years of poor run abundance being just 100 fish below its goal.

Harvest of king salmon has also been below average in Districts 4 and 5 during the past three years (2013–2015). This is attributable to delaying onset of commercial sockeye and chum salmon fishing until late June and early July in both districts. Starting in 2014, a single day subsistence fishing closure was implemented in District 4 (Quinhagak), gillnets were restricted to

6-inches or less in District 5 (Goodnews Bay), and sport fishing for king salmon was closed preseason in both districts. In 2015, Districts 4 and 5 were placed on a more restrictive subsistence fishing schedule, gillnets were restricted to 6-inches or less, the Kanektok and Goodnews river drainages were closed to gillnet subsistence fishing, and sport fishing for king salmon was closed preseason in both districts. Although Kuskokwim Bay king salmon harvest in the most recent four years has been at the lower end of the historical range, preliminary 2015 information indicates run abundance and yield increased to near average levels and was higher than expected in District 4. Although District 5 run abundance and yield did not increase as much by comparison, run abundance was improved compared to recent poor years. This was reflected, in part, through an increase king salmon harvest in 2015 under the most restrictive management actions implemented in these districts. Additionally, similar to trends observed and expectations elsewhere for western Alaska king salmon stocks, there are multiple indicators king salmon run abundance and yield is expected to increase in Kuskokwim Bay over the next several years. Therefore, Districts 4 and 5 king salmon are not recommended for a stock of yield concern at this time and should continue to be monitored for anticipated improvement to stock status and yield in coming years.

Table 1.—Commercial and subsistence chum salmon harvests for Norton Sound subdistricts 1–3, by year, 1961–2015.

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

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Year	Subdistrict 1		Subdistrict 2		Subdistrict 3	
	Commercial	Subsistence ^a	Commercial	Subsistence ^b	Commercial	Subsistence ^b
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
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	2,521 ^f	3,791	1,056	2,262	1,494
2013	^g	3,065 ^f	3,113	3,256	1,434	1,218
2014	1,456	3,844 ^f	13,560	1,719	17,525	2,081
2015	4,851	^{f,h}	17,800	^h	39,500	^h
5-Year Average (2010-2014)	–	2,796	11,550	1,857	13,641	2,478
10-Year Average (2005-2014)	–	1,980	5,846	1,812	7,367	1,847

Note: – = no 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, and 1983–1984 and 1986–1994.

^d Subsistence harvests were estimated from Subsistence Division surveys.

^e Tier II chum salmon fishing restrictions limited number of permit holders that could fish.

^f Tier II chum salmon fishing restrictions suspended.

^g Confidential.

^h Subsistence data not yet available.

Table 2.—Commercial, subsistence, and sport king salmon harvests for Norton Sound Subdistricts 5 and 6, by year, 1961–2015.

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

-continued-

Table 2.–Page 2 of 2.

Year	Shaktoolik (5)		Unalakleet (6)			Combined Totals	
	Commercial	Subsistence ^a	Commercial	Subsistence ^b	Sport	Commercial	Subsistence ^{a,b}
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
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	25	214 ^e	157	808 ^e	0	182	1,022
2013	6	136	131	468 ^e	0	137	604
2014	16	189	70	345 ^e	0	86	534
2015 ^f	34	^g	175	^g	^g	209	^g
5-Year Average (2010-2014)	19	220	121	697	14	140	917
10-Year Average (2005-2014)	16	364	88	1,317	165	104	1,682

Note: – = no 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 are 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 Subsistence Division surveys.

^e Subsistence harvests were estimated from Commercial Fisheries Division surveys.

^f Data are preliminary and subject to change.

^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	917	1,713	1,584
2003	11,100	b, d	15,500	b, d	4,336	—
2004	9,645	b	5,988	2,239	1,492	2,421
2005	—	—	5,988	2,239	1,492	2,421
2006	2,936	10,679	6,463	824	1,886	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	—	b, e	5,213	1,173
2012	2,220	7,165	2,517	—	722	1,374
2013	1,653	4,941	1,998	1,090	940	1,118
2014	4,358	—	b	5,949	1,695	1,584
2015 ^c	4,067	4,558	5,474	1,356	2,809	1,505
5-Year Average (2010-2014)						
Escapement	2,653	6,080	3,618	1,204	972	1,151
Goals (BEG)	2,800-5,700	3,300-6,500	2,100-4,900	640-1,600	1,100-1,700	940-1,900
Goals (SEG)	(BEG)	(BEG)	(SEG)	(SEG)	(SEG)	(SEG)

Note: — = no data.

^a Only surveys that were complete and had a higher rating than fair are included.

^b Incomplete count, project was not operated or was inoperable for a large portion of the season due to water conditions.

^c Data are preliminary and subject to change.

^d Estimate includes an expansion for missed counting days based on average run timing.

^e Aerial survey indicated escapement of at least 3,500 king salmon.

Table 4.—Alaskan catch of Yukon River king salmon, 1961–2015.

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

-continued-

Table 4.–Page 2 of 2.

Year	Commercial	Commercial Related ^a	Total Commercial	Subsistence ^b	Personal Use ^c	Test Fish Sales ^d	Sport Fish ^e	Total
2000	8,518	0	8,518	36,404	75	597	276	45,870
2001	0 ^g	0	0 ^g	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
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 ^{g,h}	0	4,641 ^{g,h}	45,186	126	0	409	50,362
2009	316 ^{g,h}	0	316 ^{g,h}	33,805	127	0	863	35,111
2010	9,897 ^{g,h}	0	9,897 ^{g,h}	44,559	162	0	474	55,092
2011	82 ^{g,h}	0	82 ^{g,h}	40,980	88	0	474	41,762
2012	0 ^g	0	0 ^g	30,415	71	0	345	30,831
2013	0 ^g	0	0 ^g	12,533	42	0	166	12,741
2014	0 ^g	0	0 ^g	3,281	1	0	ⁱ	3,282
2015	0 ^g	0	0 ^g	ⁱ	ⁱ	0	ⁱ	
Average								
Historical (1989-1998)	100,011	760	100,695	51,625	989	1,578	1,601	156,191
5 Year Average (2010-2014)	1,996	0	1,996	26,354	73	0	365	28,742

Note: – = 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.
- ^f Includes 653 and 2,136 king salmon illegally sold in districts 5 (Yukon River) and 6 (Tanana River), respectively.
- ^g No directed king salmon commercial fishery was conducted.
- ^h King salmon sold commercially were incidentally caught in chum directed commercial fishery.
- ⁱ Subsistence, personal use, and sport fish data are not yet available.

Table 5.–Escapement of Kuskokwim River king salmon, 1976–2015.

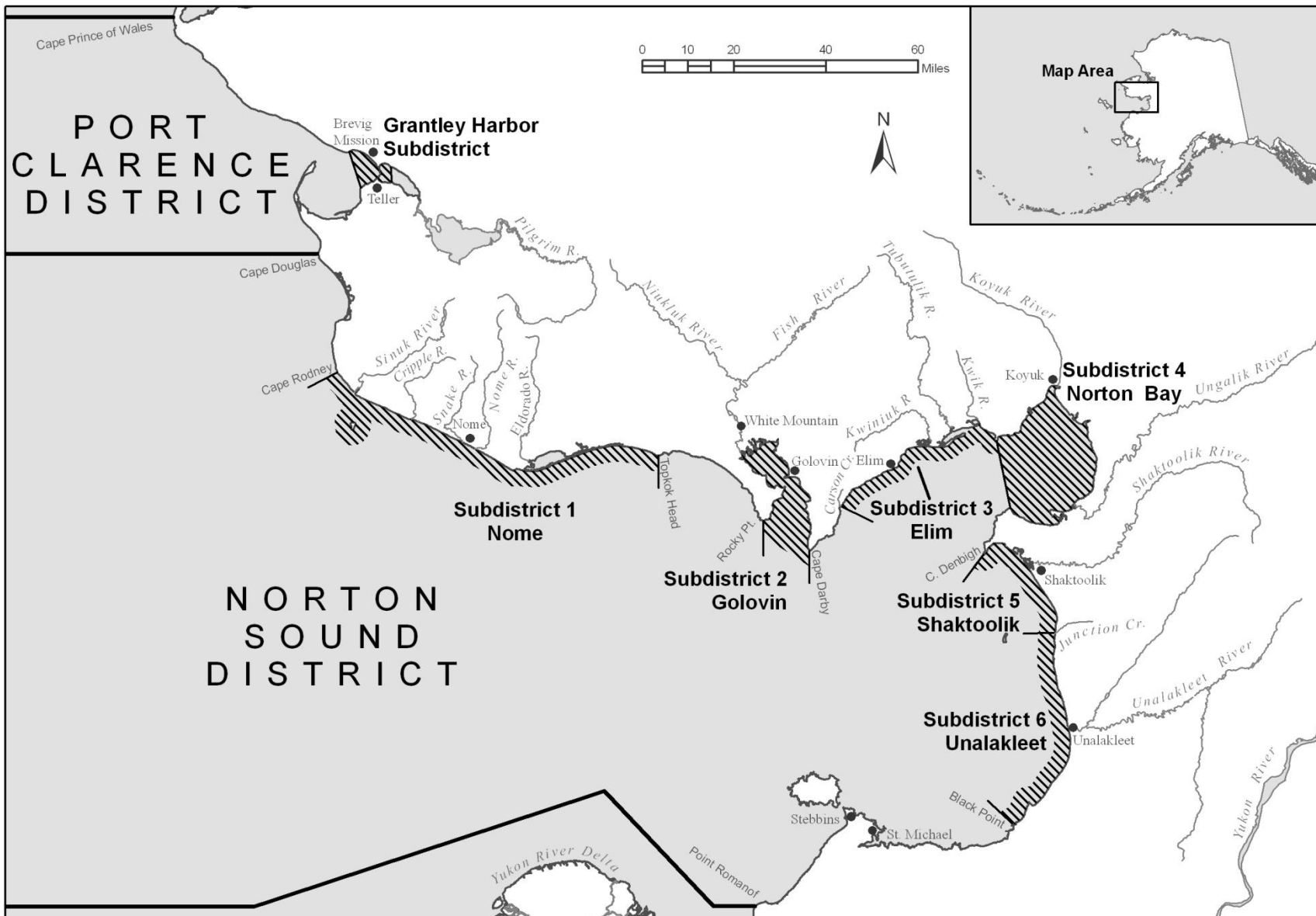
Year	Tributary Escapement (Weirs)			Tributary Escapement (Aerial Surveys)							Drainagewide Escapement
	Kwethluk R.	George R.	Kogrukluk R.	Kisaralik R.	Aniak R.	Salmon R. (Aniak R.)	Holitna R.	Cheeneetnuk R.	Gagaryah R.	Salmon R. (Pitka Fork)	
1976	–	–	5,638	–	–	–	2,571	–	–	–	143,420
1977	–	–	–	–	–	–	–	2,407	897	1,930	201,852
1978	–	–	14,533	2,417	–	289	2,766	268	504	1,100	180,853
1979	–	–	11,393	–	–	–	–	–	–	682	157,668
1980	–	–	–	–	–	1,186	–	–	–	–	203,605
1981	–	–	16,089	–	9,074	–	–	–	–	–	279,392
1982	–	–	13,126	81	–	126	521	–	–	413	80,353
1983	–	–	3,025	–	1,909	231	1,069	173	–	572	84,188
1984	–	–	4,922	–	–	–	–	1,177	–	545	99,062
1985	–	–	4,442	63	–	–	–	1,002	–	620	94,365
1986	–	–	5,038	–	424	336	650	–	–	–	58,556
1987	–	–	–	–	–	516	–	317	–	–	89,222
1988	–	–	8,028	869	954	244	–	–	–	474	80,055
1989	–	–	11,940	152	2,109	631	–	–	–	452	115,704
1990	–	–	10,093	631	1,255	596	–	–	–	–	100,614
1991	–	–	6,835	217	1,564	583	–	–	–	–	105,589
1992	9,675	–	6,563	–	2,284	335	2,022	1,050	328	2,536	153,573
1993	–	–	12,377	–	2,687	1,082	1,573	678	419	1,010	169,816
1994	–	–	15,227	1,243	–	1,218	–	1,206	807	1,010	242,616
1995	–	–	20,662	1,243	3,171	1,446	1,887	1,565	1,193	1,911	225,595
1996	7,415	7,770	13,771	–	–	985	–	–	–	–	197,092
1997	10,395	7,810	13,190	439	2,187	980	2,093	345	364	–	211,247
1998	–	–	12,107	457	1,930	425	–	–	–	–	113,627
1999	–	3,548	5,543	–	–	–	741	–	–	–	112,082
2000	3,547	2,959	3,242	–	714	238	301	–	–	362	65,180

-continued-

Table 5.–Page 2 of 2.

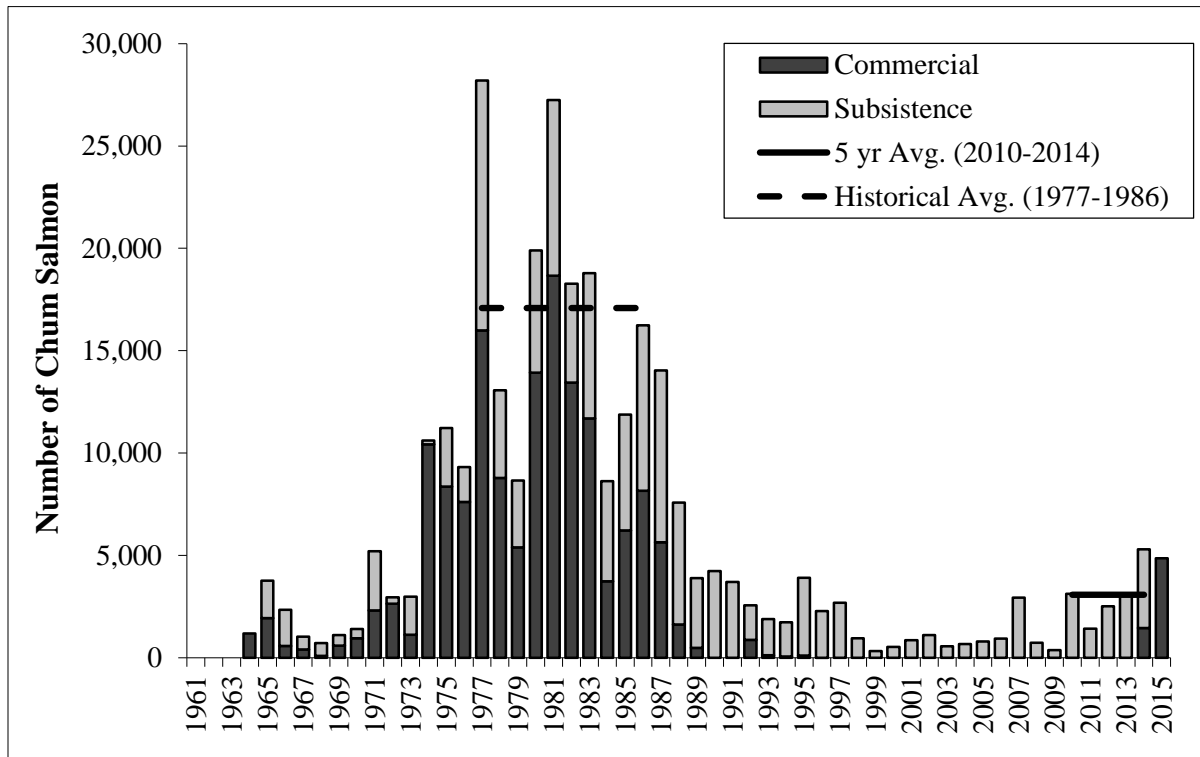
Year	Tributary Escapement (Weirs)			Tributary Escapement (Aerial Surveys)							Drainagewide Escapement
	Kwethluk R.	George R.	Kogruklu R.	Kisaralik R.	Aniak R.	Salmon R. (Aniak R.)	Holitna R.	Cheeneetnu R.	Gagaryah R.	Salmon R. (Pitka Fork)	
2002	8,502	2,443	10,025	1,727	–	1,236	733	730	–	–	164,635
2003	14,474	4,693	12,008	654	3,514	1,242	–	810	1,093	–	180,687
2004	28,605	5,488	19,819	5,157	5,362	2,177	4,051	918	670	1,138	287,178
2005	–	3,845	21,819	2,206	–	4,097	1,760	–	–	1,801	275,598
2006	17,619	4,355	20,205	4,734	5,639	–	1,866	1,015	531	862	214,004
2007	12,927	4,011	13,029	692	3,984	1,458	–	–	1,035	943	174,943
2008	5,276	2,563	9,750	1,074	3,222	589	–	290	177	1,033	128,978
2009	5,744	3,663	9,528	–	–	–	–	323	303	632	118,478
2010	1,668	1,498	5,812	235	–	–	–	–	62	135	49,073
2011	4,079	1,547	6,731	–	–	79	–	249	96	767	72,097
2012	–	2,201	–	588	–	49	–	229	178	670	76,074
2013	–	1,292	1,819	599	754	154	532	138	74	469	47,315
2014	3,187	2,993	3,732	622	3,201	497	–	340	359	1,865	123,987
2015	8,163	2,281	7,637	709	–	810	662	–	19	2,016	137,585
Escapement											
Goal (SEG)	4,100-7,500	1,800-3,300	4,800-8,800	400-1,200	1,200-2,300	330-1,200	970-2,100	340-1,300	300-830	470-1,600	65,000-120,000

Notes: – = no data. 2015 data are preliminary and subject to change.



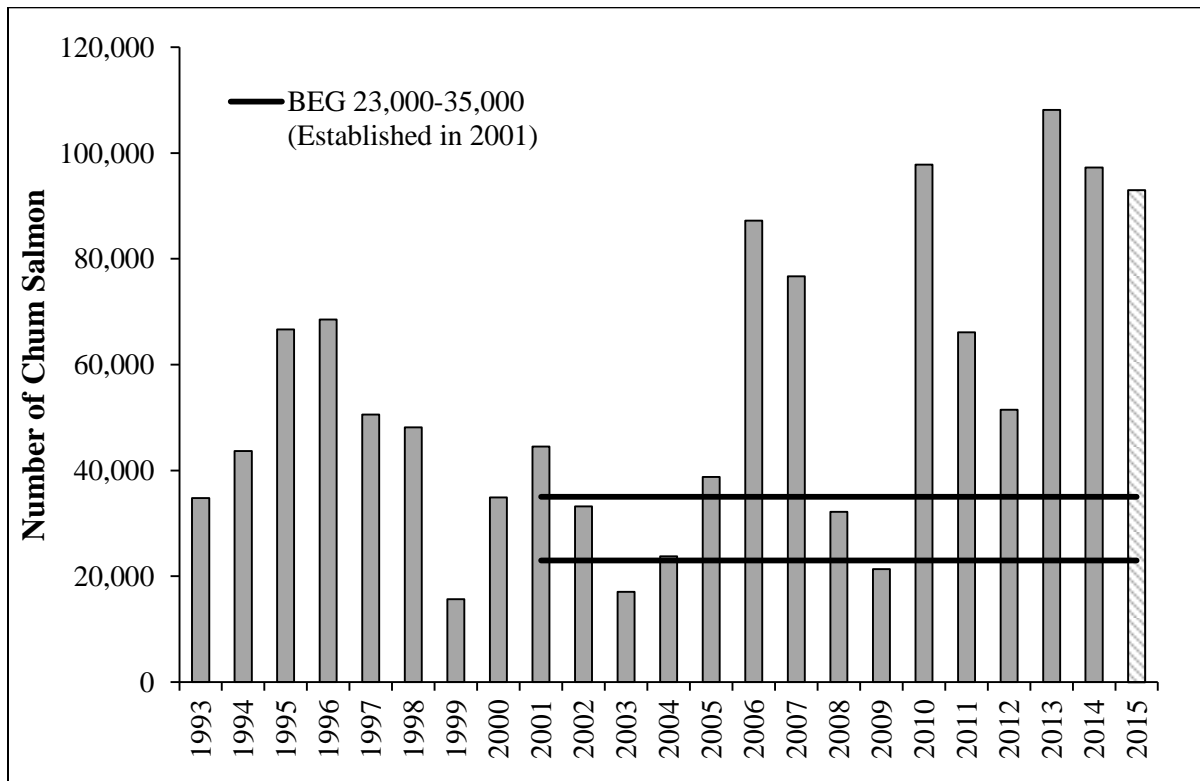
19

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



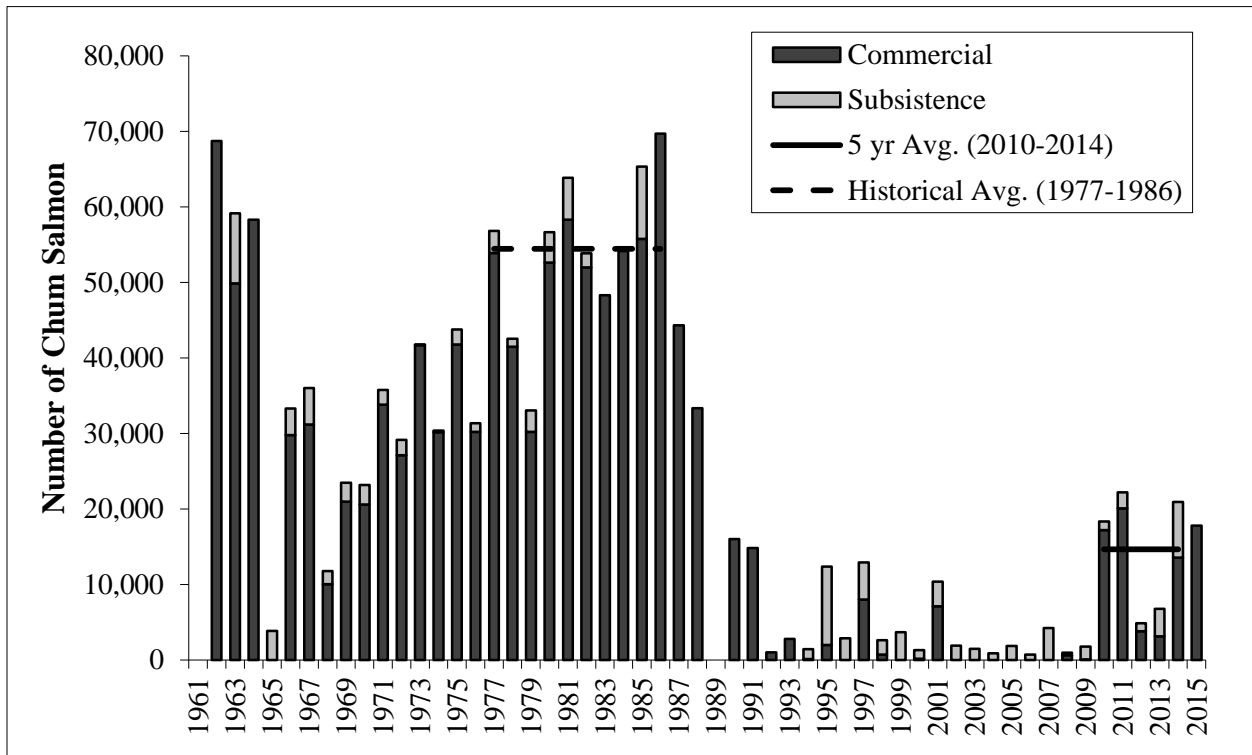
Note: Subsistence harvest data incomplete prior to 1979.

Figure 2.—Subdistrict 1 chum salmon harvest (1961–2015).



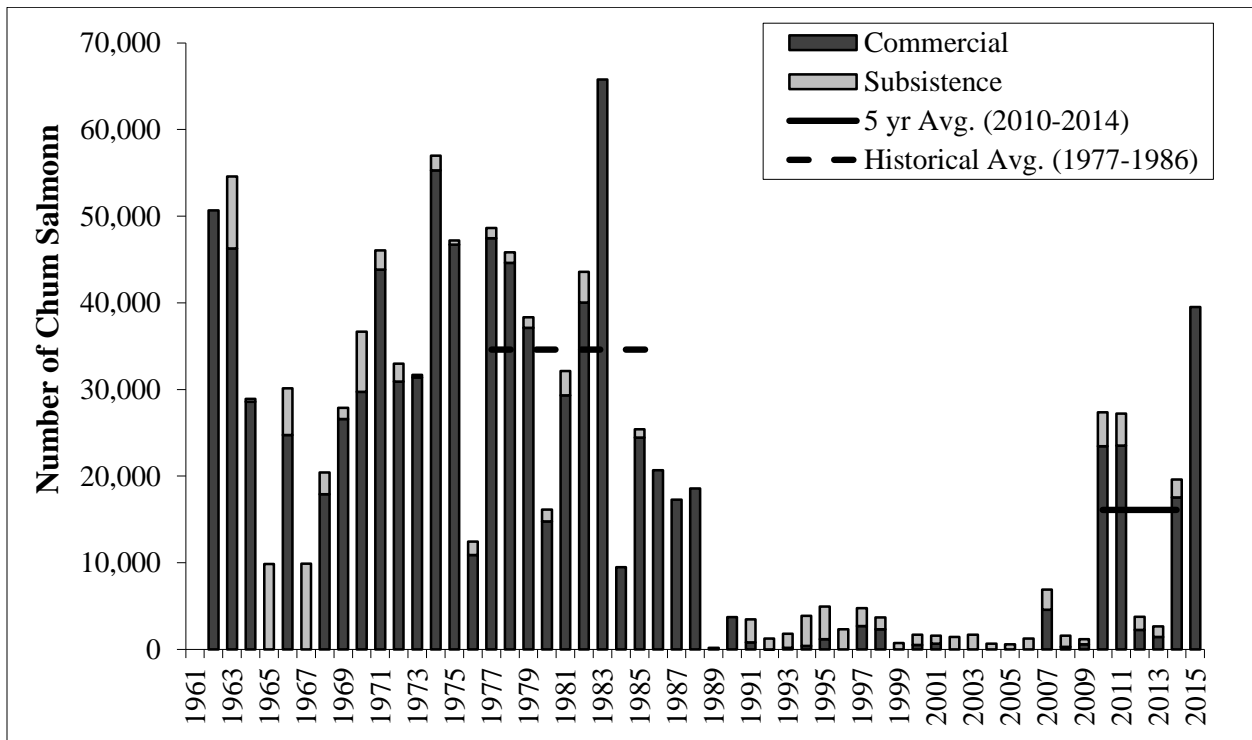
Note: 2015 data is preliminary and subject to change.

Figure 3.—Nome Subdistrict chum salmon escapement estimate compared to the escapement objective set by the board in 2001.



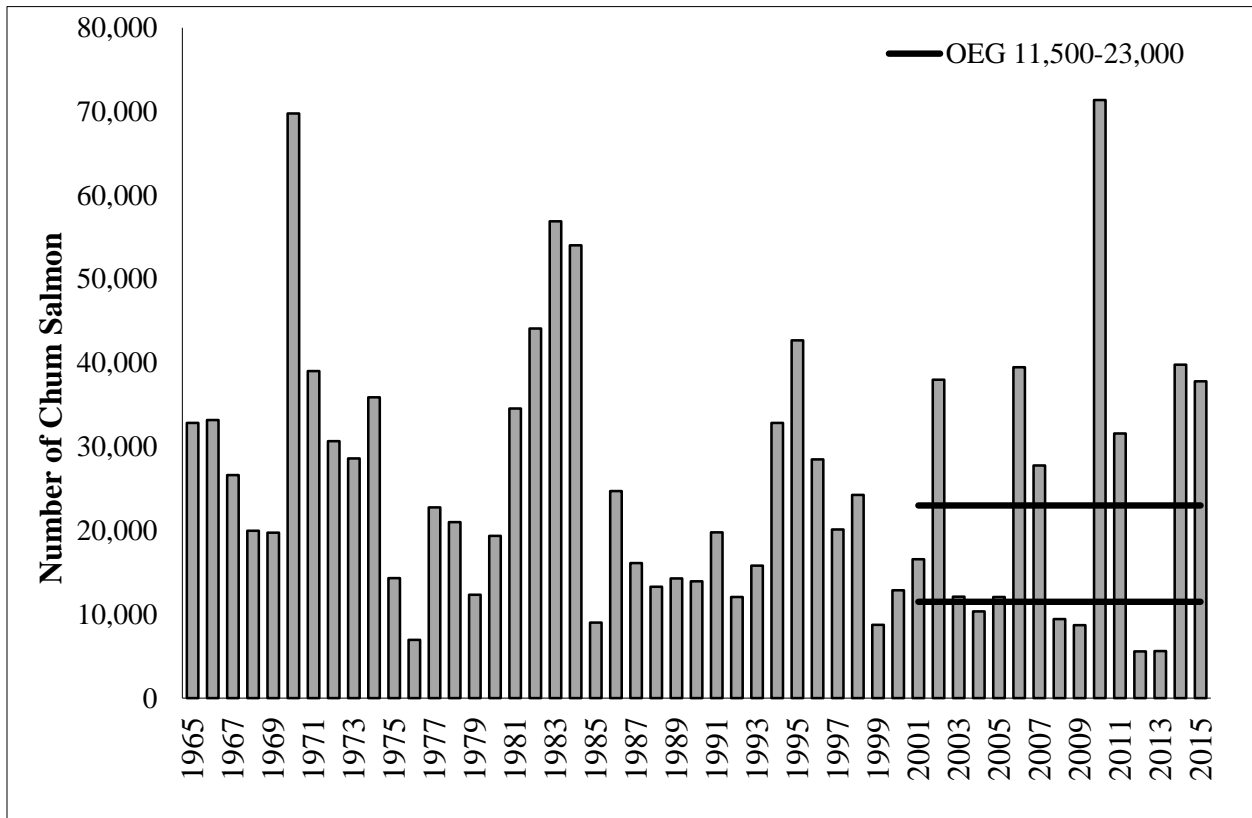
Note: Subsistence harvest not available for all years.

Figure 4.—Subdistrict 2 chum salmon harvest, 1961–2015.



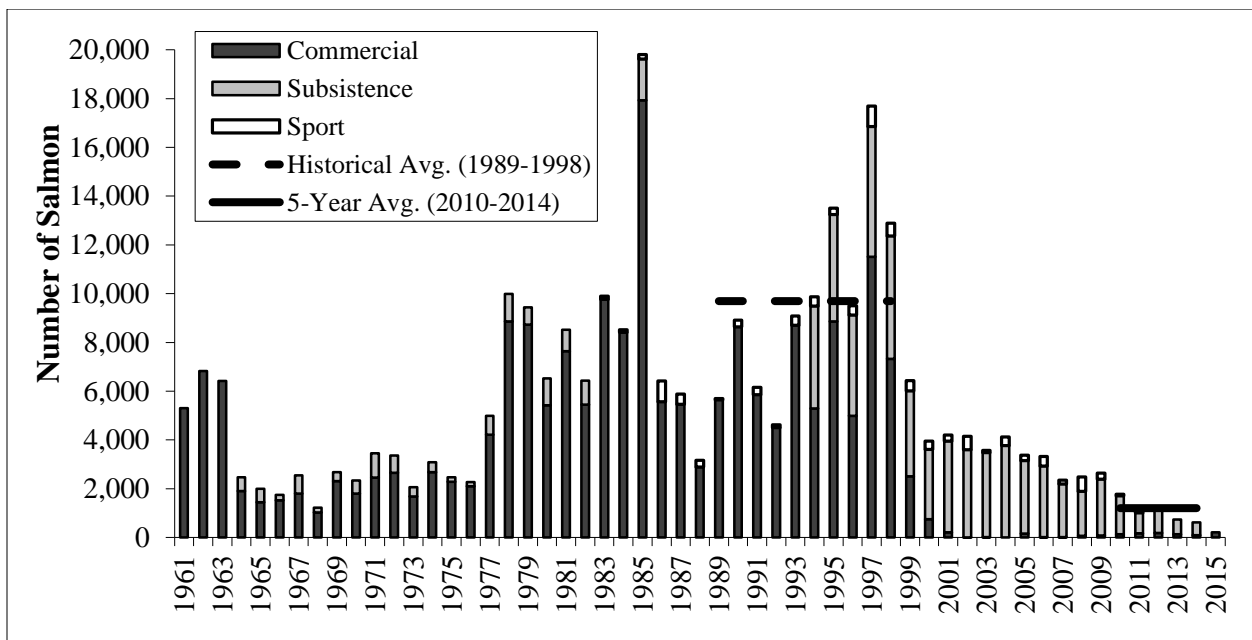
Note: Subsistence harvest not available for all years.

Figure 5.—Subdistrict 3 chum salmon harvest, 1961–2015.



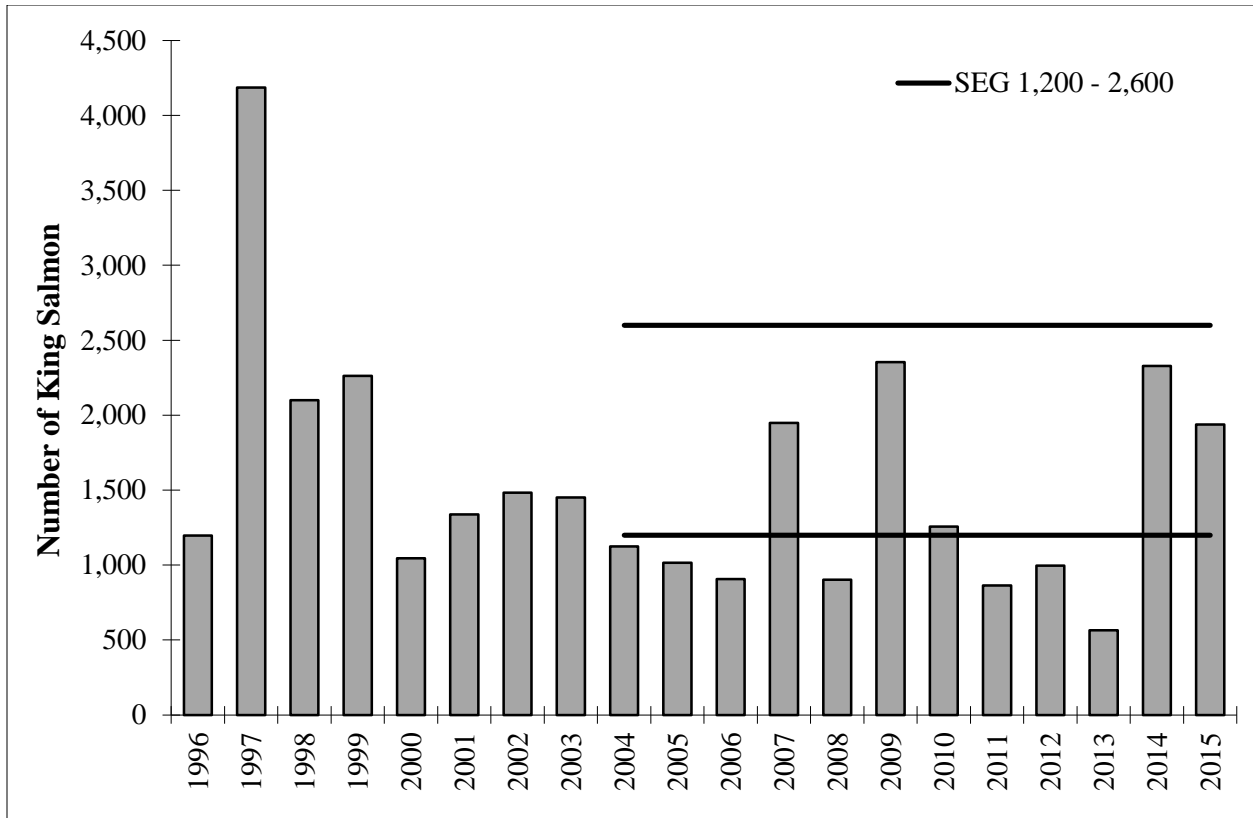
Note: 2015 data is preliminary and subject to change.

Figure 6.—Kwiniuk River chum salmon escapement estimate compared to the optimum escapement goal set by the board in 2001.



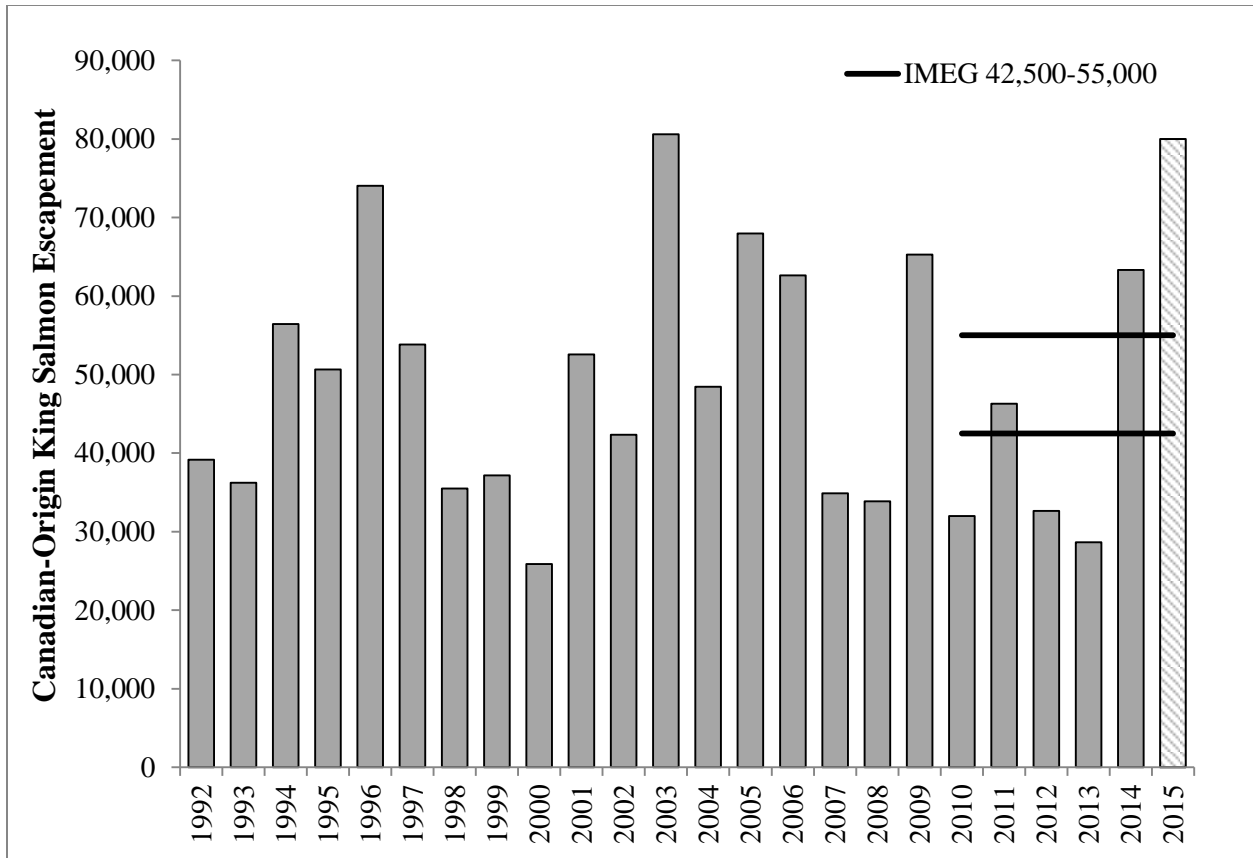
Note: Subsistence and sport fish harvest not available for all years. 2015 harvest is preliminary and does not include subsistence harvest.

Figure 7.—Subdistricts 5 and 6 combined king salmon harvest, 1961–2015.



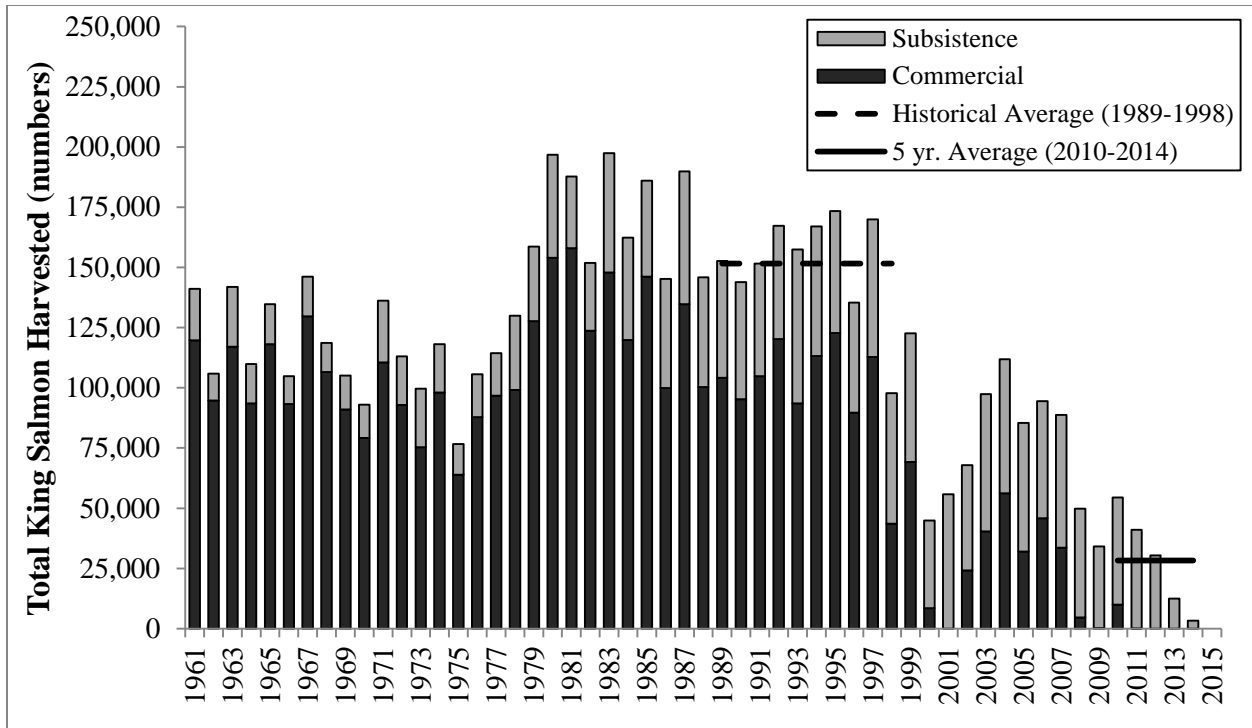
Note: 2015 data is preliminary and subject to change.

Figure 8.—North River king salmon escapement estimate compared to the sustainable escapement goal established in 2004.



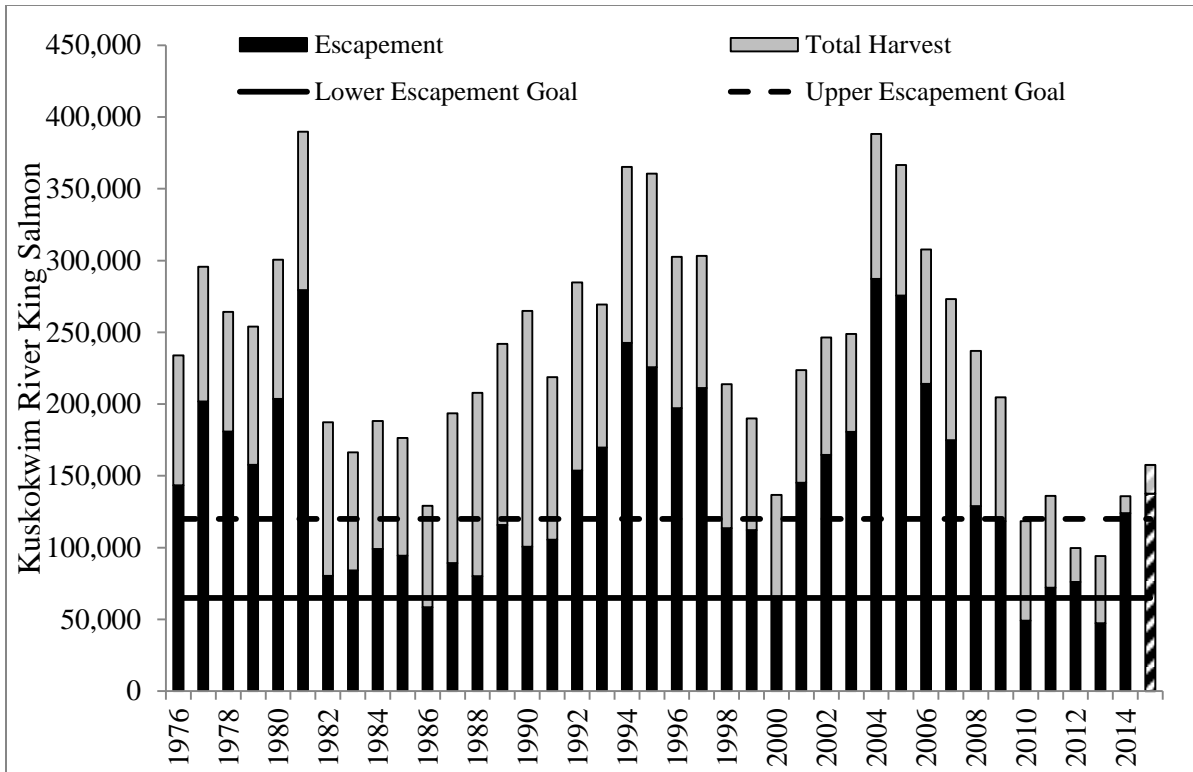
Note: 2015 data is preliminary and subject to change.

Figure 9.—Canadian-Origin Yukon River king salmon escapement estimate compared to the interim management escapement goal (IMEG) set by the US-Canada Yukon River Panel in 2010.



Note: 2015 harvest estimates are not yet available.

Figure 10.—Yukon River king salmon subsistence and commercial harvests. The historical baseline 1989–1998 average (151,600) and the recent 2010–2014 average (28,300) are shown.



Note: 2015 data is preliminary and subject to change.

Figure 11.—Kuskokwim River king salmon total run reconstruction, 1976–2015.