

Division of Commercial Fisheries
Sam Rabung, Director
Fairbanks Office
1300 College Road
Fairbanks, AK 99701-1551



Alaska Department of Fish and Game
Doug Vincent-Lang, Commissioner
PO Box 115526
Juneau, AK 99811-5526
www.adfg.alaska.gov

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CONTACT:
Christy Gleason, Area Management Biologist
Bonnie Borba, Fall Season Research Biologist
Shane Ransbury, Assistant Area Management Biologist
(907) 459-7274

2021 Yukon Area Fall Season Summary

This announcement provides a preliminary summary of the 2021 Yukon Area (Figure 1) fall chum and coho salmon run size and escapements. All results are considered preliminary.

2021 Fall Season Outlook

The fall chum salmon run size forecast, using brood year analysis, was for 652,000 fish, with a range of 542,000 to 762,000 fish. A preseason run size projection was made in mid-July using the relationship between historical summer and fall chum salmon run size estimates. Using the estimate of 157,000 summer chum salmon, the preseason projection for a fall chum salmon was a run size of less than 184,000 fish.

The coho salmon outlook for 2021 was for a near average run size of 240,000 fish. The outlook assumed an average survival of fish from the 2017 parent year, however recent trends have been run sizes below average.

Preseason Management Strategy

Management of the Yukon Area fall season salmon fisheries are in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 AAC 01.249). The plan requires that when a projected run size is less than 300,000 fall chum salmon, all subsistence, personal use, sport, and commercial directed chum salmon fisheries shall close. The plan also requires a run size of at least 550,000 fall chum salmon to allow directed commercial fishing on surplus fish above that level.

Based on the preseason projection of less than 300,000 fall chum, preseason management strategies included the following:

- Concurrent with the fall chum salmon migration upriver, all Yukon Area districts and subdistricts would remain closed to subsistence fishing unless the run projection exceeded 300,000 fish.
- To improve fall chum salmon escapement to the spawning grounds, the Alaska Department of Fish and Game (department) anticipated implementing a complete closure of subsistence salmon fishing in the Alaska portion of the Porcupine River, including the tributaries, as the fall chum salmon migration reached that area.

- Commercial salmon fishing would not be allowed unless the inseason drainagewide fall chum salmon run projection exceeded 550,000 fish, and a commercial surplus was identified.

2021 Run Assessment

Assessment information collected from projects located in the lower river were used to inform management decisions. The projects included two lower river drift gillnet test fisheries that provided run timing and relative abundance information, and a mainstem Yukon River sonar, located near the community of Pilot Station, that provided fish abundance estimates. Stock composition information for chum salmon was provided by genetic samples collected at the mainstem Yukon River sonar. Upriver projects that monitored escapement consisted of a mainstem Yukon River sonar operated near the U.S./Canada border; Teedriinjik (Chandalar River) sonar, an upper Porcupine River sonar; a weir/sonar/video project operated in the Fishing Branch River, a Porcupine River headwater tributary; foot surveys conducted in the Delta River, a tributary of the Tanana River; boat surveys in the Delta Clearwater River, a tributary of the Tanana River; and aerial surveys in the Tanana River drainage. Age, sex, and length information was collected at the lower river test fisheries, the mainstem Yukon River sonar near the U.S./Canada border, and from the Fishing Branch and Delta rivers.

By regulation, the fall season began in District 1 on July 16, and chum salmon caught after that date in the Lower Yukon River Drift Gillnet Test Fishery (LYTF) are considered fall chum salmon. Mountain Village Drift Gillnet Test Fishery (MVTF) began operating on July 18, and the mainstem Yukon River sonar, operated near the community of Pilot Station, began counting fall chum salmon on July 19. The transition of upriver districts and subdistricts to the fall season management was based on the migration timing of fall chum salmon. The LYTF completed operations on September 10 (Yukon Delta Fisheries Development Association assisted throughout the season and conducted all drifts in late August through the end of the season) and resulted in a preliminary cumulative fall chum salmon catch per unit effort (CPUE) of 125.72, which was well below the historical median of 1,588.86. The MVTF project ceased operations September 12 with a preliminary cumulative fall chum salmon CPUE of 450.29, which was well below the historical median of 2,038.58. The mainstem Yukon River sonar near Pilot Station ceased operations on September 7.

After July 19, six groups of chum salmon were monitored entering the Yukon River (Figure 2). The first group that entered in July contained a mixture of summer and fall chum salmon. After that, predominantly fall chum salmon entered the river. The preliminary chum salmon passage estimate at the mainstem sonar project near Pilot Station was 146,172 fish, which was well below the historical median of 723,000 fish. Applying mixed stock genetic analysis to all the chum salmon that passed the mainstem sonar after July 18, the estimated number of fall chum salmon was near 102,000 fish.

Throughout the fall season, the run size tracked below the 300,000 fall chum salmon threshold necessary to allow subsistence fishing (Figure 2). Run timing for fall chum salmon in the lower river assessment projects was nearly four days later than average and upriver escapement projects were two days later than average. Water levels were generally average to below average during the fall salmon migration within the Alaska portion of the Yukon River drainage.

Coho salmon appeared to be weak and late through the entire run (Figure 3). The preliminary coho salmon passage at the mainstem sonar was estimated to be 37,000 fish, which was well below the

historical median of 147,000 fish (Figure 3), and the lowest ever observed at this project. The preliminary run size index was estimated to be 45,500 coho salmon, which includes estimates of passage after the sonar concludes for the season. Both the preliminary cumulative CPUE for coho salmon at the LYTF and MVTF were well below their respective historical medians and represent new record lows for the projects. Run timing for coho salmon was four days later than average across all the assessment projects.

Subsistence Fishery

This year's low fall chum and coho salmon runs, on top of poor summer season salmon returns, led to extreme hardships for subsistence fishermen relying on these critical resources along the Yukon River. The Alaska Department of Fish and Game and U.S. Fish and Wildlife Service staff want to extend our gratitude for the commitment of fishermen to conserve salmon runs for future generations during low abundance years. We recognize the extreme hardship these salmon fishing closures place on food security, especially during the pandemic. While we understand there is no replacement for salmon, we tried to provide other fishing opportunities during this difficult year while implementing necessary restrictions and closures to conserve salmon for future years. We also want to thank everyone for their participation in the preseason and inseason Yukon River Drainage Fisheries Association (YRDFA) teleconferences. The input and information managers receive during the teleconferences is invaluable.

The 2021 fall chum salmon preliminary estimated run size of 102,000 fish was the lowest on record for the second consecutive year. With last year's unexpected poor fall chum salmon run size of 194,000 fish, the 2021 run strength was uncertain. After observing the record low summer chum salmon run this year, it became apparent the fall chum salmon run was going to be worse than last year. This was based on the strong relationship between summer and fall chum salmon run abundance trends, a tool that allows refinement of the fall chum salmon projection just prior to the fishing season.

The fall season began with a revised fall chum salmon projection of less than 300,000 fish. In accordance with the *Yukon River Fall Chum Salmon Management Plan*, all fishing (subsistence, personal use, sport, and commercial) was closed from the beginning of the fall season. As the season progressed, the fall chum salmon run projection dropped to 102,000 fish compared to an average run size of 1 million fish. Coho salmon also returned at a record low abundance with only 37,000 fish passing the mainstem sonar.

Managers coordinated with fishermen and YRDFA inseason teleconference callers to find ways to provide some opportunity for other salmon species. Subsistence fishing opportunity was provided with selective gear types (dip nets and hook and line) for pink, sockeye, and coho salmon that are present in the Lower Yukon Area. While using selective gear, all chum salmon were required to be released alive. Fishing for important non-salmon species, such as northern pike, whitefishes, and burbot, remained open throughout the Yukon River drainage with various gears.

As the season progressed, it became apparent that the body size of fall chum and coho salmon was the smallest observed in the historical datasets and the percentage of female fall chum salmon was trailing about 10% below average in Lower Yukon assessment projects. Due to the higher probability of encountering smaller bodied salmon and females, 4-inch or smaller mesh gillnets that are used to target non-salmon species were placed on a reduced schedule to allow more salmon to reach their spawning grounds. To provide more fishing opportunity during this time, subsistence

fishing opened with fish wheels (manned) for non-salmon, while fall chum salmon were required to be released alive immediately, and coho salmon were strongly recommended to be released as well.

Once the tail end of the salmon runs had passed, subsistence fishing restrictions were relaxed. However, to protect spawning salmon, important spawning areas for fall chum and coho salmon in Yukon River drainage tributaries will remain closed to subsistence salmon fishing through the end of December.

The preliminary subsistence harvest of fall chum salmon was estimated to be 703 fish, which is well below the 2016–2020 average of 60,861 fish (Table 1). The preliminary subsistence harvest of coho salmon was estimated to be 293 fish, which is well below the 2016–2020 average of 6,078 fish (Table 2). These subsistence harvest levels are unprecedented, creating extreme hardships for fishermen relying on this resource.

Commercial Fishery

There was no commercial fishing in the Yukon Area during the fall season, in 2021. Historical harvest, value, and numbers of permits in the fall chum and coho salmon fishery can be found in Tables 3-6.

Salmon Escapement

Fall Chum Salmon Escapement

The total run size of fall chum salmon is estimated postseason, based on information from individually monitored spawning escapements and includes estimated U.S. and Canadian harvests. Escapements were monitored using sonars in the Teedriinjik (Chandalar) River, upper Porcupine River in Canada, and Canadian mainstem Yukon River (near Eagle; Table 7). In 2021, the preliminary estimate of the drainagewide total run size is near 100,000 fall chum salmon and even without the removal of the estimated small harvests this season the escapement is nowhere near the sustainable escapement goal (SEG) range of 300,000 to 600,000 fish. The final run reconstruction estimate will be determined using the Bayesian statistical methods once the subsistence harvest estimates are completed.

Fall chum salmon escapements in 2021 were approximately 10% to 30% of the lower end of escapement goals at all assessment projects. In the Teedriinjik River the estimated escapement of 21,162 fall chum salmon (including expansions to estimate the run after the sonar project ended) was below the sustainable escapement goal (SEG) range of 85,000 to 234,000 fish (Table 7) and a new record low for this project. An estimated run size of 13,000 fall chum salmon in the Sheenjek River was derived from using the relationship of Sheenjek River sonar counts and Fishing Branch River weir. An estimate of 3,486 fall chum salmon was counted past the Porcupine River border sonar downstream of Old Crow and border passage was estimated to be 3,465, after removal of Old Crow harvests. The Fishing Branch River weir estimate was approximately 2,413 fall chum salmon which was well below the lower end of the Interim Management Escapement Goal (IMEG) range of 22,000–49,000 fish (Table 7). The fall chum salmon passage estimate at the mainstem Yukon River sonar project near Eagle was 18,671 fish (90% CI: 19,268–20,068) for the dates September 1 through October 6. The fall chum salmon estimate was subsequently adjusted to 23,170 fish, which includes estimated passage after the project was concluded for the winter. The preliminary escapement for the mainstem Yukon River in Canada is derived by subtracting the upstream U.S. and Canadian harvests above the Eagle sonar project from the expanded sonar

estimate (in 2021 there was no U.S. or Canada harvests reported due to conservation measures). The preliminary mainstem Yukon River escapement estimate of 23,170 fall chum salmon is well below the IMEG range of 70,000 to 104,000 fish (Table 7), which is also a new record low.

The Tanana River preliminary escapement estimate was 43,000 fall chum salmon based on mixed stock analysis, ranking near the lowest escapement for this system. The estimated escapement in the Delta River of 1,613 fall chum salmon was a new record low and was well below the SEG range of 7,000 to 20,000 fish (Table 7). The escapement into the Delta River, particularly the mainstem, may have been partially affected by environmental factors resulting in the latest run timing of the fish moving into the system from the mainstem Tanana River.

Fall Chum Salmon Age, Sex, Length and Stock Composition

Stock composition estimates for chum salmon were provided by USFWS Conservation Genetics Laboratory using tissue samples (fin clips) collected from salmon captured in the mainstem Yukon River sonar test net fishery. Chum salmon genetic samples processed from three strata between July 19 and September 7 (fall season) indicated that stocks represented were approximately 31% summer, 28% Border U.S. (Teedriinjik/Sheenjek/Draanjik), 12% Canadian, and 29% Tanana.

In 2021, the proportion of age-3 (3%) fall chum salmon was average, age-4 fish (87%) was above average, age-5 fish (9%) was below average, and age-6 fish (<1%) was below average based on samples collected at the Lower Yukon Test Fishery using 6-inch mesh drift gillnets. The 2016 and 2017 brood year estimates of return per spawner of 1.16 and 0.47, respectively, are both below the 1974–2014 average of 1.76. Females contributed 54% of the samples which was slightly below the 1986 to 2020 average (58%). Fall chum salmon length samples in 2021 averaged 562 mm, well below the long term 1981–2020 average of 593 mm.

Coho Salmon Escapement

There are few coho salmon spawning escapement assessment projects in the Yukon River drainage because of funding limitations and late timing relative to onset of winter. The sonar in the mainstem Yukon River near Pilot Station was operated through September 7 and had an estimated passage of 37,257 coho salmon (SE 2,359) which is well below the historical average of 147,000 fish. The Delta Clearwater River (DCR) has the only established escapement goal for coho salmon, a SEG range of 5,200–17,000 fish. A series of boat surveys were conducted on the DCR, with the peak count occurring in early November with an estimated 913 coho salmon, which was well below the escapement goal (Table 8). Escapement estimates for coho salmon were conducted by aerial surveys in the Nenana River drainage; all four spawning areas counted were below their respective 2011–2020 averages (Table 8).

Coho Salmon Age, Sex and Length Composition

In 2021, very few coho salmon were captured in either LYTF and MVTF therefore samples sizes for age, sex, and length were extremely small. The few samples (n=49) that were collected represented mostly small male coho salmon. The greatest number of length samples of coho salmon (n=411) were collected from the test fishery associated with the mainstem sonar operated near Pilot Station. Coho salmon in 2021 in this project averaged 520 mm in length (based on all mesh sizes operated) and ranked second smallest compared to the 1995–2020 average of 558 mm.

Perspectives on Low Returns

In 2021, the fall chum and coho salmon returns to the Yukon River were the lowest on record for a second consecutive year. The primary parent years of the 2021 runs for fall chum salmon were 2016 and 2017, and 2017 for coho salmon. The parent years that produced these last two years of poor runs met or exceeded escapement goals for both salmon species, including meeting the fall chum salmon IMEG at the Fishing Branch River in both 2016 and 2017 (Tables 7 and 8). Of note, the parent years for this year's fall chum and coho salmon run were exceptional, ranking second largest since 1975 for fall chum salmon and third largest for coho salmon (Figure 4).

The reason for the critically low returns during 2020 and 2021 is currently unknown. Stocks of both species within the entire drainage and across dominant age classes (ages 4 and 5) are being impacted. The species experienced dramatic declines despite their different life histories, where chum salmon migrate to the ocean shortly after hatching to spend 2–5 years at sea, and coho salmon remain in freshwater for 1–3 years and then spend 1 year at sea before returning.

This year's poor chum salmon runs were not unique to the Yukon River. Chum salmon runs throughout Western Alaska, including the Kuskokwim River and rivers in Norton Sound, also came in well below preseason forecasts in 2020 and 2021. It is likely that the factors and conditions impacting Yukon River fall chum and coho runs this year also impacted other eastern Bering Sea salmon stocks. The department is committed to investigating the cause of the recent Pacific salmon declines, especially to the Yukon River Area. Research updates are shared on <https://www.facebook.com/ADFGUnderseaWorldOfSalmonAndSharks>.

If you have further questions on upcoming marine salmon research efforts, contact Dr. Katie Howard, kathrine.howard@alaska.gov and Sabrina Garcia, sabrina.garcia@alaska.gov.

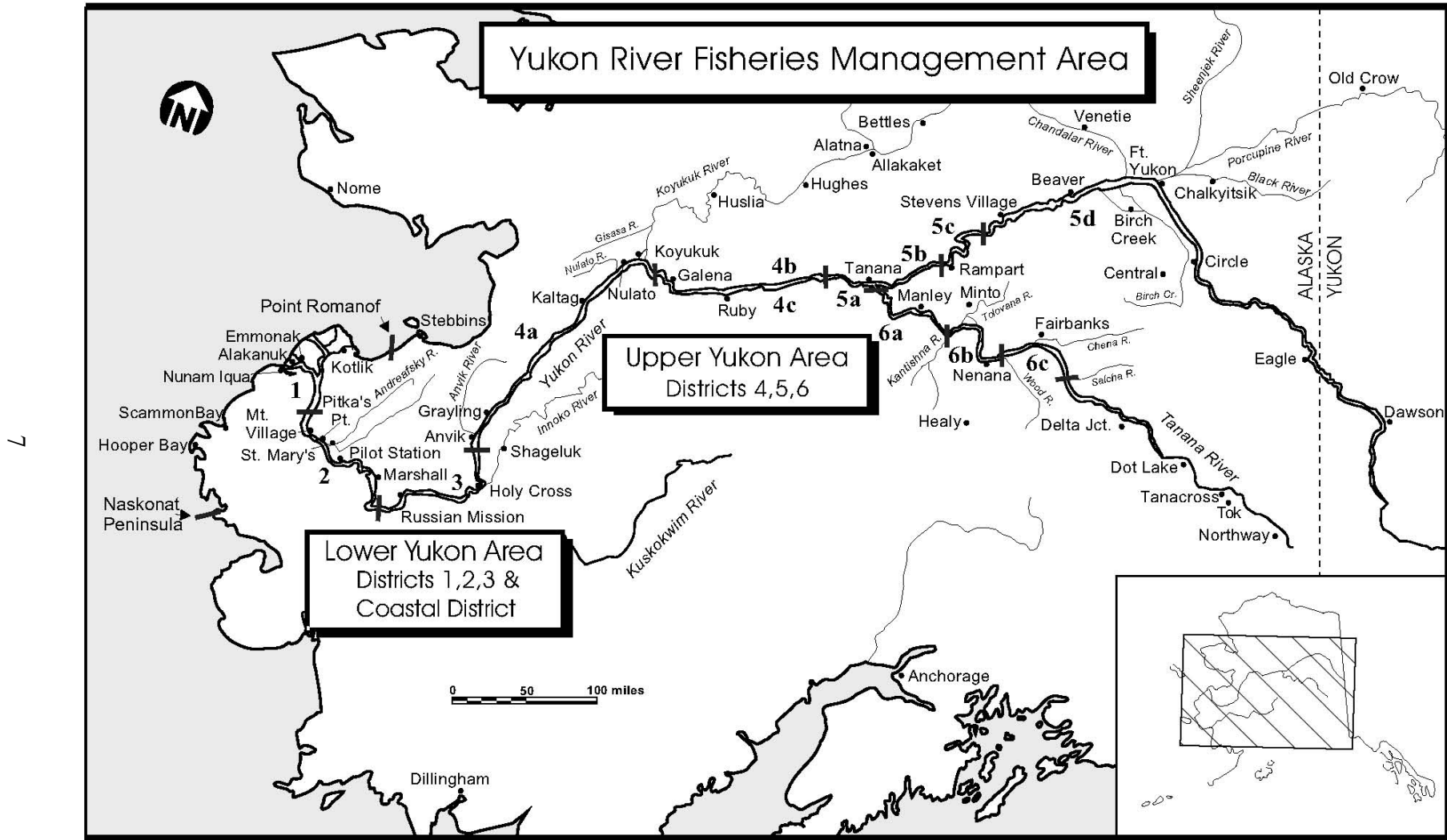


Figure 1.—Alaska portion of the Yukon River drainage showing communities and fishing districts.

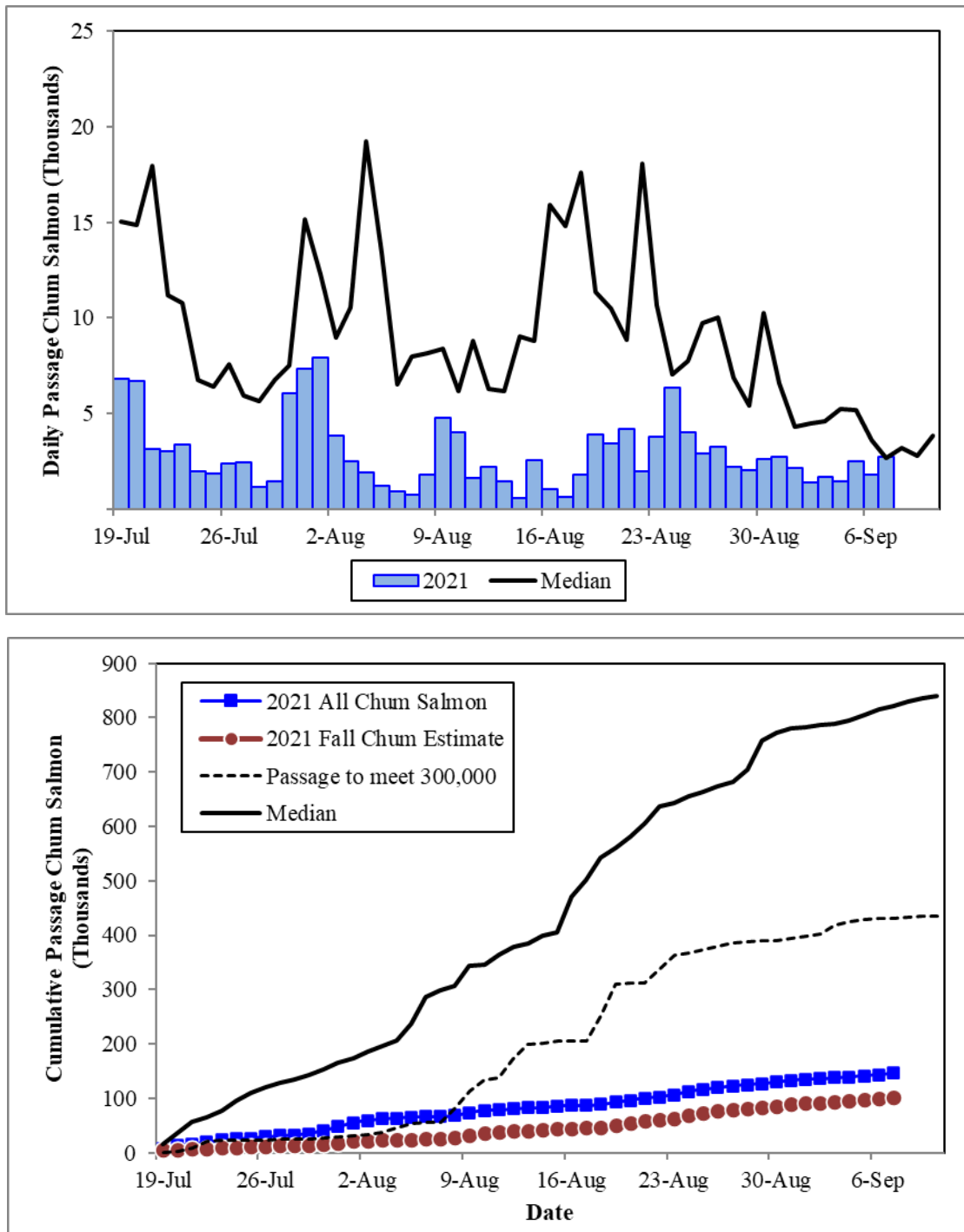


Figure 2.—Estimated daily passage of chum salmon (top) based on the Yukon River mainstem sonar (Pilot Station) and cumulative of all chum and adjusted fall chum salmon (using genetics) for 2021 (bottom), 2021 compared to historical (1995, 1997–2008, and 2010–2020) median run size.

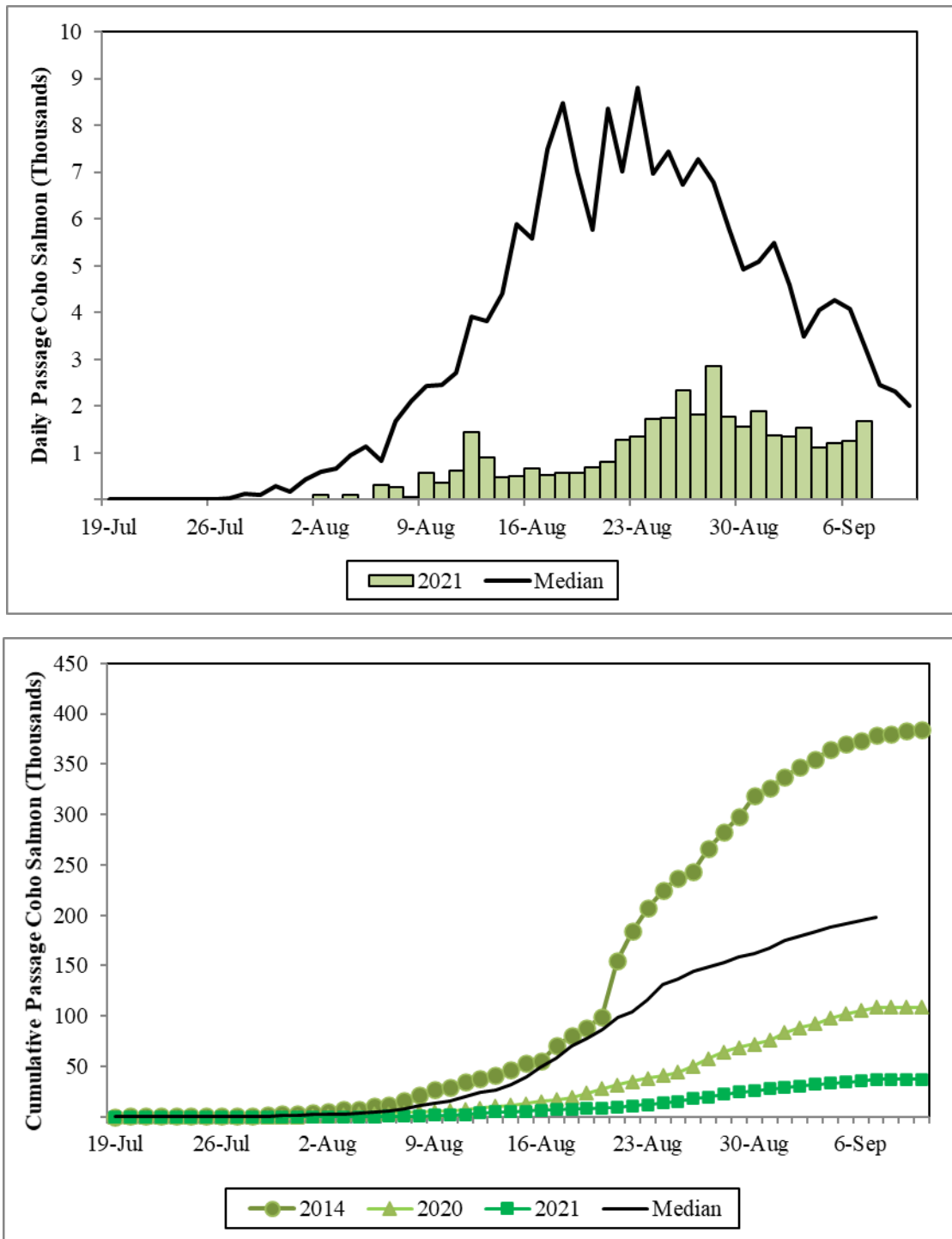


Figure 3.—Estimated daily passage attributed to coho salmon (top) based on the Yukon River mainstem sonar (Pilot Station) and cumulative (bottom), 2021 compared to historical (1995, 1997–2008, and 2010–2020) median run size index and minimum and maximum years.

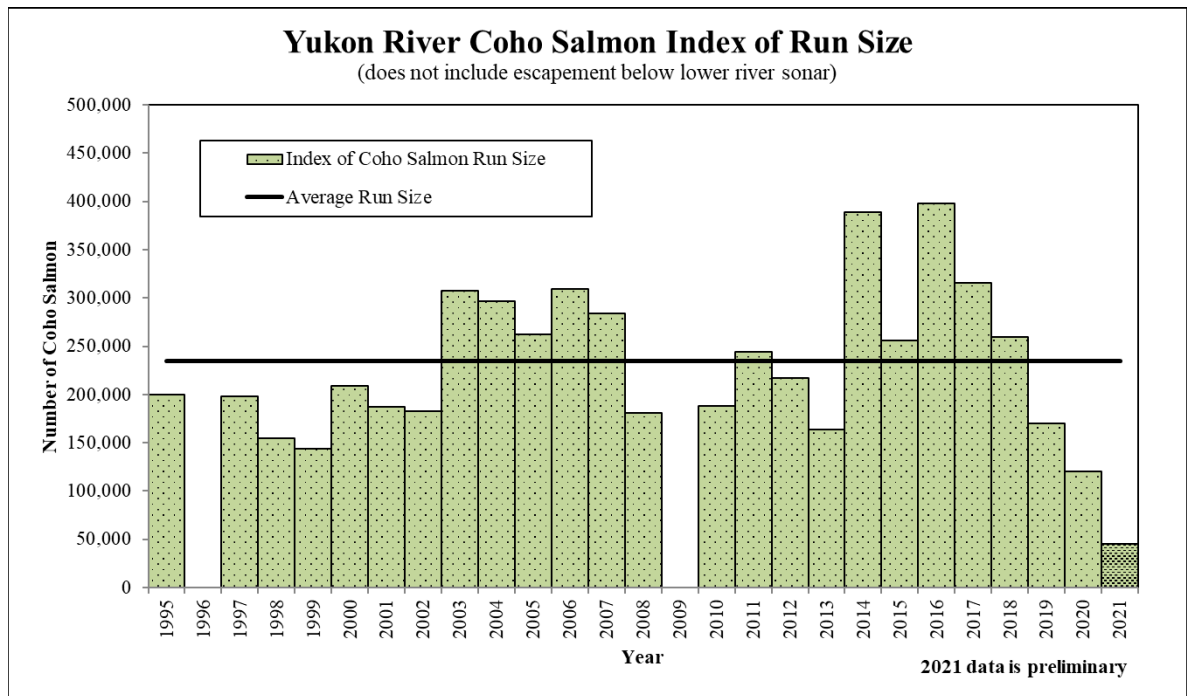
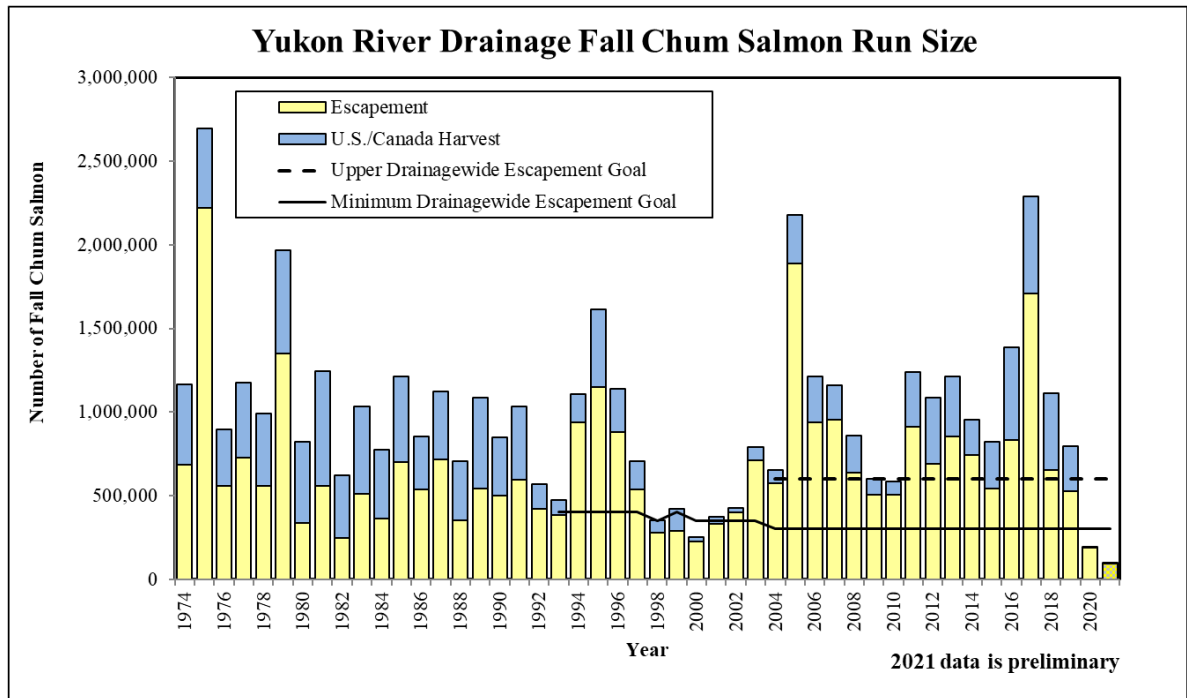


Figure 4.—Estimated drainagewide run size of fall chum salmon (top) and index of run size of coho salmon (bottom) in the Yukon Area.

Table 1.–Fall chum salmon subsistence harvest estimates by district, Yukon Area, 2001–2021.

Year	<i>Lower Yukon</i>					<i>Upper Yukon</i>				Yukon total
	Coastal	District 1	District 2	District 3	<i>Subtotal</i>	District 4	District 5	District 6	<i>Subtotal</i>	
2001	559	3,437	3,256	700	7,952	3,352	20,873	3,526	27,751	35,703
2002	284	1,881	1,618	164	3,947	1,549	10,976	3,202	15,727	19,674
2003	146	2,139	2,901	738	5,924	9,750	28,270	12,986	51,006	56,930
2004	320	2,067	2,421	298	5,106	7,797	40,670	8,953	57,420	62,526
2005	70	2,889	3,257	1,304	7,520	9,405	51,663	22,946	84,014	91,534
2006	187	3,902	4,015	480	8,584	6,335	52,158	16,925	75,418	84,002
2007	234	4,390	3,472	925	9,021	8,576	53,731	29,893	92,200	101,221
2008	386	2,823	3,522	1,821	8,552	7,412	57,258	16,135	80,805	89,357
2009	158	1,917	1,563	937	4,575	7,382	38,083	16,079	61,544	66,119
2010	186	3,202	1,419	1,325	6,132	6,788	44,334	11,391	62,513	68,645
2011	315	3,434	2,578	354	6,681	7,260	51,885	14,376	73,521	80,202
2012	11	7,622	3,332	637	11,602	18,055	54,350	15,302	87,707	99,309
2013	149	3,673	4,878	1,764	10,464	15,191	76,098	11,640	102,929	113,393
2014	252	4,072	5,817	2,457	12,598	15,936	51,197	12,798	79,931	92,529
2015	198	5,877	6,258	1,388	13,721	13,274	50,260	9,345	72,879	86,600
2016 ^a	762	4,602	4,533	997	10,894	10,034	58,840	4,882	73,756	84,650
2017 ^a	561	4,587	4,175	1,304	10,627	9,609	60,438	4,419	74,466	85,093
2018 ^a	525	3,680	3,004	706	7,915	5,779	44,891	5,909	56,579	64,494
2019 ^a	815	4,251	3,809	754	9,629	4,232	45,071	4,930	54,233	63,862
2020 ^a	1,053	1,938	1,171	41	4,203	509	1,294	201	2,004	6,207
2021 ^a	39	141	435	0	615	0	71	17	88	703
Average										
2011–2020	464	4,374	3,956	1,040	9,833	9,988	49,432	8,380	67,801	77,634
2016–2020	743	3,812	3,338	760	8,654	6,033	42,107	4,068	52,208	60,861

Source: Numbers of fish harvested are based on reports from OceanAK, applicable annual footnotes are within the database.

^a Values are preliminary until the project report is published.

Table 2.–Coho salmon subsistence harvest estimates by district, Yukon Area, 2001–2021.

Year	<i>Lower Yukon</i>					<i>Upper Yukon</i>				Yukon total
	Coastal	District 1	District 2	District 3	<i>Subtotal</i>	District 4	District 5	District 6	<i>Subtotal</i>	
2001	502	1,274	1,440	0	3,216	2,266	7,674	8,966	18,906	22,122
2002	248	1,295	1,233	115	2,891	1,023	2,076	9,499	12,598	15,489
2003	292	1,260	1,586	711	3,849	5,773	3,887	10,363	20,023	23,872
2004	63	1,175	1,500	284	3,022	4,766	1,423	11,584	17,773	20,795
2005	279	976	1,110	217	2,582	2,971	2,159	19,538	24,668	27,250
2006	335	1,177	2,459	83	4,054	1,302	3,779	10,571	15,652	19,706
2007	110	2,265	2,347	739	5,461	2,952	3,366	7,845	14,163	19,624
2008	116	1,211	1,997	410	3,734	1,490	3,203	8,428	13,121	16,855
2009	246	847	1,057	321	2,471	3,986	2,498	7,051	13,535	16,006
2010	124	1,122	557	353	2,156	1,730	3,604	5,555	10,889	13,045
2011	55	1,127	823	36	2,041	2,072	1,389	6,842	10,303	12,344
2012	93	3,350	1,346	556	5,345	3,556	3,092	9,540	16,188	21,533
2013	287	1,224	1,080	371	2,962	4,940	1,298	5,257	11,495	14,457
2014	204	1,782	1,769	340	4,095	3,062	2,030	7,911	13,003	17,098
2015	174	2,100	3,002	428	5,704	1,941	2,462	8,000	12,403	18,107
2016 ^a	355	1,236	1,133	140	2,864	826	861	4,271	5,958	8,822
2017 ^a	435	1,046	1,263	497	3,241	529	1,007	2,525	4,061	7,302
2018 ^a	871	966	595	154	2,586	1,545	1,343	53	2,941	5,527
2019 ^a	804	1,962	643	232	3,641	497	612	1,069	2,178	5,819
2020 ^a	556	747	637	37	1,977	195	159	591	945	2,922
2021 ^a	50	31	126	0	207	0	33	53	86	293
<i>Average</i>										
2011–2020	383	1,554	1,229	279	3,446	1,916	1,425	4,606	7,948	11,393
2016–2020	604	1,191	854	212	2,862	718	796	1,702	3,217	6,078

Source: Numbers of fish harvested are based on reports from OceanAK, applicable annual footnotes are within the database.

^a Values are preliminary until the project report is published.

Table 3.–Fall chum salmon commercial harvest by district, Yukon Area, 2001–2021.

Year ^a	<i>Lower Yukon</i>				<i>Upper Yukon</i> ^b				Yukon total
	District 1	District 2	District 3	<i>Subtotal</i>	District 4	District 5	District 6	<i>Subtotal</i>	
2001	–	–	–	–	–	–	–	–	–
2002	–	–	–	–	–	–	–	–	–
2003	5,586	–	–	5,586	1,315	–	4,095	5,410	10,996
2004	660	–	–	660	–	–	3,450	3,450	4,110
2005	130,525	–	–	130,525	–	–	49,637	49,637	180,162
2006	101,254	39,905	–	141,159	–	1,667	23,353	25,020	166,179
2007	38,852	35,826	–	74,678	–	427	15,572	15,999	90,677
2008	67,704	41,270	–	108,974	–	4,556	5,967	10,523	119,497
2009	11,911	12,072	–	23,983	–	–	1,893	1,893	25,876
2010	545	270	–	815	–	–	1,735	1,735	2,550
2011	127,735	100,731	–	228,466	–	1,246	10,917	12,163	240,629
2012	139,842	129,284	–	269,126	811	2,419	17,336	20,566	289,692
2013	106,588	106,274	–	212,862	–	1,041	24,148	25,189	238,051
2014	51,829	59,138	–	110,967	–	1,264	3,368	4,632	115,599
2015	100,562	74,214	–	174,776	–	1,048	15,646	16,694	191,470
2016	226,576	213,225	–	439,801	–	7,542	18,053	25,595	465,396
2017	328,410	134,668	–	463,078	1,402	1,952	23,270	26,624	489,702
2018	198,950	170,645	–	369,595	596	896	16,698	18,190	387,785
2019	145,692	106,141	–	251,833	–	900	15,627	16,527	268,360
2020	–	–	–	–	–	–	–	–	–
2021	–	–	–	–	–	–	–	–	–
Average									
2011–2020	158,465	121,591	–	280,056	936	2,034	16,118	18,464	298,520
2016–2020	224,907	156,170	–	381,077	999	2,823	18,412	21,734	402,811

Note: En dash indicates no commercial fishing occurred. Blank cells indicate insufficient information to generate average.

^a Numbers of fish harvested are based on reports from the State TIX, Zephyr, and OceanAK programs.

^b Estimated harvest is the number of fish sold in the round plus the estimated number of females to produce the roe sold.

Table 4.–Coho salmon commercial harvest by district, Yukon Area, 2001–2021.

Year ^a	<i>Lower Yukon</i>				<i>Upper Yukon</i> ^b			Yukon total
	District 1	District 2	District 3	<i>Subtotal</i>	District 4	District 5	District 6	
2001	–	–	–	–	–	–	–	–
2002	–	–	–	–	–	–	–	–
2003	9,757	–	–	9,757	–	–	15,119	24,876
2004	1,583	–	–	1,583	–	–	18,649	20,232
2005	36,533	–	–	36,533	–	–	21,778	58,311
2006	39,323	14,482	–	53,805	–	–	11,137	64,942
2007	21,720	21,487	–	43,207	–	–	1,368	44,575
2008	13,946	19,248	–	33,194	–	91	2,408	35,693
2009	5,992	1,577	–	7,569	–	–	742	8,311
2010	1,027	1,023	–	2,050	–	–	1,700	3,750
2011	45,335	24,184	–	69,519	–	–	7,502	77,021
2012	39,757	29,063	–	68,820	0	634	5,335	74,789
2013	27,304	31,456	–	58,760	–	0	7,439	66,199
2014	54,804	48,602	–	103,406	–	0	1,286	104,692
2015	66,029	54,860	–	120,889	–	0	8,811	129,700
2016	113,669	67,208	–	180,877	–	54	20,551	201,482
2017	95,982	33,277	–	129,259	0	0	9,656	138,915
2018	65,431	40,845	–	106,276	0	0	4,314	110,590
2019	40,621	15,622	–	56,243	–	0	2,348	58,591
2020	–	–	–	–	–	–	–	–
2021	–	–	–	–	–	–	–	–
Average								
2011–2020	60,992	38,346		99,339		86	7,471	106,887
2016–2020	78,926	39,238		118,164		14	9,217	127,395

Note: En dash indicates no commercial fishing occurred. Blank cells indicate insufficient information to generate average.

^a Numbers of fish harvested are based on reports from the State TIX, Zephyr, and OceanAK programs.

^b Estimated harvest is the number of fish sold in the round plus the estimated number of females to produce the roe sold.

Table 5.–Value of fall chum and coho salmon commercial salmon fishery, 2001–2021.

Year	Fall chum					Coho					Value by species		Value by area		
	Lower Yukon		Upper Yukon			Lower Yukon		Upper Yukon			Fall Chum	Coho	Lower	Upper	Total
	\$/lb	Value	\$/lb	\$/lb	Roe	Value	\$/lb	Value	\$/lb	\$/lb					
2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	0.15	5,993	0.10	-	3,398	0.25	18,168	0.05	-	5,095	9,391	23,263	24,161	8,493	32,654
2004	0.25	1,126	0.05	-	848	0.25	2,774	0.06	-	6,372	1,974	9,146	3,900	7,220	11,120
2005	0.32	316,698	0.14	-	48,159	0.32	83,793	0.12	-	19,182	364,857	102,975	400,491	67,341	467,832
2006	0.20	202,637	0.14	-	33,806	0.20	50,299	0.19	-	11,137	236,443	61,436	252,936	44,943	297,879
2007	0.27	144,256	0.20	-	16,907	0.39	127,869	0.20	-	1,368	161,163	129,237	272,125	18,275	290,400
2008	0.55	428,969	0.27	-	22,089	0.97	216,777	0.20	-	3,717	451,058	220,494	645,746	25,806	671,552
2009	0.70	108,778	0.19	-	1,286	1.00	52,176	0.15	-	457	110,064	52,633	160,954	1,743	162,697
2010	1.00	5,428	0.23	-	2,761	1.50	20,535	0.26	-	442	8,189	20,977	25,963	3,203	29,166
2011	1.00	1,627,575	0.22	-	16,114	1.00	472,168	0.15	-	6,792	1,643,689	478,960	2,099,743	22,906	2,122,649
2012	0.75	1,385,550	0.22	-	28,354	1.25	534,523	0.22	-	7,428	1,413,904	541,951	1,920,073	35,782	1,955,855
2013	0.75	1,154,203	0.16	-	25,744	1.10	453,998	0.17	-	7,115	1,179,947	461,113	1,608,201	32,859	1,641,060
2014	0.75	621,975	0.25	-	8,156	1.00	706,665	0.38	-	2,380	630,131	709,045	1,328,640	10,536	1,339,176
2015	0.60	762,142	0.14	-	15,683	0.70	616,617	0.12	-	6,877	777,825	623,494	1,378,759	22,560	1,401,319
2016	0.68	2,093,566	0.14	-	22,477	1.00	1,143,844	0.13	-	15,540	2,116,043	1,159,384	3,237,410	38,017	3,275,427
2017	0.60	2,038,232	0.15	1.75	29,176	1.00	814,580	0.15	2.00	8,778	2,067,408	823,358	2,852,812	37,954	2,890,766
2018	0.78	2,113,454	0.13	-	17,933	1.00	677,205	0.15	-	3,688	2,131,387	680,892	2,790,659	21,620	2,812,279
2019	0.60	1,054,751	0.17	-	18,395	1.00	336,578	0.21	-	2,371	1,073,146	338,949	1,391,329	20,766	1,412,095
2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average															
2011–2020	0.72	1,427,939	0.18	-	20,226	1.01	639,575	0.19	-	6,774	1,448,164	646,350	2,067,514	27,000	2,094,514
2016–2020	0.67	1,825,001	0.15	-	21,995	1.00	743,052	0.16	-	7,594	1,846,996	750,646	2,568,053	29,589	2,597,642

Note: En dash indicates no commercial fishing occurred.

Table 6.–Number of participating commercial salmon fishing gear permit holders by district and season, Yukon Area in Alaska, 2001–2021.

Year	Fall chum and coho salmon season ^a								Yukon Area total	
	Lower Yukon Area				Upper Yukon Area					
	District 1	District 2	District 3	Subtotal ^b	District 4	District 5	District 6	Subtotal ^c		
2001	0	0	0	0	0	0	0	0	0	
2002	0	0	0	0	0	0	0	0	0	
2003	75	0	0	75	2	0	5	7	82	
2004	26	0	0	26	0	0	6	6	32	
2005	177	0	0	177	0	0	7	7	184	
2006	219	71	0	286	0	4	11	15	301	
2007	181	122	0	300	0	2	8	10	310	
2008	251	177	0	428	0	3	8	11	439	
2009	165	130	0	292	0	0	2	2	294	
2010	72	18	0	90	0	0	4	4	94	
2011	234	169	0	395	0	2	5	8	403	
2012	266	201	0	457	4	3	5	13	462	
2013	251	197	0	436	0	1	6	7	443	
2014	256	199	0	441	0	2	2	4	445	
2015	266	184	0	440	0	1	5	6	446	
2016	275	197	0	459	0	4	4	8	467	
2017	318	144	0	438	5	4	4	13	451	
2018	284	172	0	448	4	3	3	10	458	
2019	276	136	0	404	0	3	4	7	411	
2020	0	0	0	0	0	0	0	0	0	
2021	0	0	0	0	0	0	0	0	0	
Average										
2011–2020	243	160	0	392	1	2	4	8	399	
2016–2020	231	130	0	350	2	3	3	8	357	

^a Number of permit holders which made at least one delivery.

^b The Lower Yukon Area subtotal is the unique number of permits fished in Districts 1, 2, and 3 as fishermen may transfer between districts during the season.

^c Sum of Districts 4, 5, and 6 averages may not equal Upper Yukon Area district subtotal due to rounding error.

Table 7.–Fall chum salmon passage or escapement estimates for selected spawning areas, Yukon River drainage, 2001–2021.

Year	Alaska						Canada			
	Yukon River mainstem (Pilot) sonar estimate ^b	Tanana River drainage		Upper Yukon River drainage		Yukon River mainstem (Eagle) passage estimate ^e	Mainstem escapement estimate ^f	Porcupine River sonar ^g	Fishing Branch River ^h	
		Delta River ^a	Tanana River estimate ^b	Teedriinjik (Chandalar) River ^c	Sheenjek River ^d					
2001	408,961	8,103	116,012	112,664	53,932	–	33,491	–	21,737	
2002	367,886	11,992	163,421	94,472	31,642	–	98,679	–	13,600	
2003	923,540	22,582	263,302	221,343	44,047 ⁱ	–	143,133	–	29,713	
2004	633,368	25,073	187,409	169,848	37,878	–	154,080	–	20,417	
2005	1,894,078	28,132	372,758	526,838	561,863 ^j	–	437,733	–	119,058	
2006	964,238	14,055	233,193	254,778	160,178 ^j	245,290	220,898	–	30,954	
2007	740,195	18,610	357,016	243,805	65,435 ^j	265,008	236,987	–	32,150	
2008	636,525	23,055	264,200 ^k	178,278	50,353 ^j	185,409	167,898 ^l	–	19,086	
2009	– ^m	13,492	159,828 ^k	150,000 ⁿ	54,126 ^j	101,734	93,626 ^l	–	25,828	
2010	458,103	17,993	212,660 ^k	167,532	22,053	132,930	117,789 ^l	–	15,773	
2011	873,877	23,639	270,846 ^k	298,223	97,976 ^j	224,355	205,566 ^l	–	13,085	
2012	778,158	9,377 ^o	102,096 ^k	205,791	104,701 ^j	153,248	137,662 ^l	–	22,399	
2013	865,295	31,955	275,089 ^p	252,710	130,000 ^q	216,791	200,262 ^l	35,615	–	
2014	706,630	32,480 ^o	215,393 ^p	226,489	51,000 ^q	172,887	156,796 ^l	17,698	–	
2015	669,483	33,401 ^o	149,265 ^p	164,486	64,000 ^q	125,095	109,505 ^l	21,396	9,000	
2016	994,760	21,913 ^o	199,102 ^p	295,023	180,000 ^q	161,027	145,267 ^l	54,395	29,397	
2017	1,829,931	48,783 ^o	525,293 ^p	509,115	250,000 ^q	419,099	401,489 ^l	67,818	48,422	
2018	928,664	39,641 ^o	302,013 ^r	170,356	81,000 ^q	168,798	153,988 ^l	–	10,151	
2019	842,041	51,748 ^o	189,882 ^r	116,323	91,000 ^q	113,266	98,738 ^l	27,805	18,171	
2020	262,439	9,854 ^o	81,761 ^r	–	–	23,512	23,512 ^l	–	4,785	
2021 ^s	146,172	1,613	42,818 ^r	21,162	13,000 ^q	23,170	23,170 ^l	3,486	2,413	
Average										
2011–2020	875,128 ^m	30,279	231,074	248,724	116,631	177,808	163,402	37,455	19,358	
2016–2020	971,567	34,388	259,610	272,704	150,500	177,140	164,846	50,006	22,206	
SEG Range	300,000 ^t	7,000 ^u		85,000 ^u			> 80,000 ^w		50,000	
	600,000	20,000		234,000					120,000 ^w	
Interim Management Escapement Goal							70,000–104,000 ^x		22,000–49,000 ^y	

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Table 7.–Page 2 of 2.

Note: En dash indicates no data were collected or calculated. Yukon River mainstem sonar historical estimates were revised in 2016, using updated selectivity parameters.

^a Population estimate generated from replicate foot surveys and stream life data using AUC (area-under-curve) method unless otherwise indicated.

^b Fall chum salmon passage estimate based on mark-recapture projects operated from 1995–2007 on the upper Tanana River and from 1999–2007 on the Kantishna River minus harvests, unless otherwise noted.

^c Split beam sonar estimate (1995–2006). DIDSON sonar (2007-present). Includes expansions to the beginning end of the run.

^d Single beam sonar estimate (2000–2002), split beam sonar estimate (2003–2004), DIDSON sonar (2005–2012).

^e Sonar estimates include an expansion for fish that may have passed after operations ceased through October 18, except 2018 was expanded through October 23 for an extremely late run.

^f Estimated mainstem Canadian escapement derived from mark-recapture project minus Canadian mainstem harvest and excluding Canadian Porcupine River drainage escapement, unless otherwise noted.

^g Porcupine River Sonar is located near Canadian border, downstream of community of Old Crow. Includes expansions to the end of the run.

^h Weir located within the Canadian portion of the Porcupine River drainage. Late season adjustments have been made for the period when weir was not operating for most years.

ⁱ Project ended on peak daily passage in 2003 due to late run timing, estimate was expanded based on run timing (87%) at Rapids.

^j BEG based on right bank only. Inseason right bank counts include 266,963, 106,397, 39,548, 35,912, 28,480, 49,080, and 72,746 in 2005 through 2009 and 2011 to 2012 respectively.

^k Tanana River estimate is based on regression of Delta River 1995–2006 with estimate for Tanana River (Kantishna 1999–2007 and Upper Tanana 1995–2007 based on mark-recapture).

^l Estimated mainstem Yukon River Canadian escapement is derived from Eagle sonar estimate (expanded through October 18; 2008 to present) minus harvest from Eagle community upstream including Canadian harvests.

^m Extreme low water levels were experienced in 2009, affecting species apportionment, therefore passage estimates are not used.

ⁿ Project ended early, estimate based on regression of Chandalar to Fishing Branch River plus Mainstem Border from 1995–2009.

^o Peak counts from foot surveys unless otherwise noted.

^p Preliminary estimate based on regression of Tanana with mainstem Yukon River Canada from 1995 to 2012 excluding 2005 from 2013–2017.

^q Preliminary estimate based on regression of Fishing Branch River weir counts (1985–2012) to Sheenjek estimates from two bank operations in 1985–1987, 2005 to 2009, and 2011 to 2012 and remaining years were expanded using average 36% for second bank operations.

^r Preliminary estimate based on mixed stock analysis minus harvest in the Tanana River.

^s Data are preliminary.

^t Yukon River drainagewide sustainable escapement goal is assessed inseason using Pilot Station sonar estimates minus upstream estimated harvests. Post season run reconstruction uses harvest and escapements to determine whether the goal was achieved.

^u Escapement goal revised to a sustainable escapement goal in 2019 based on percentile method.

^v Tanana escapement goal range of 61,000–136,000 was discontinued 2019, Sheenjek escapement goal 50,000–104,000 was discontinued in 2016.

^w Escapement goal as written in the Pacific Salmon Treaty.

^x Interim Management Escapement Goal (IMEG) range of 70,000 to 104,000 was established for 2010 to present is based on Canadian stock Ricker model.

^y IMEG established 2008 and is based on percentile method.

Table 8.–Coho salmon passage or escapement estimates for selected spawning areas, Yukon River drainage, 2001–2021.

Year	Yukon River	Upper Tanana River Drainage							
	Mainstem	Nenana River Drainage				Delta	Clearwater	Richardson	
	Sonar Estimate ^a	Lost Slough	Nenana Mainstem ^b	Wood Creek	Seventeen Mile Slough	Clearwater River ^c	Lake and Outlet	Clearwater River	
2001	160,272	242 (h)	859 (h)	699 (h)	3,753 (h)	27,500 (b)	4,425 (b)	1,531 (f)	
2002	137,077	0 (h)	328 (h)	935 (h)	1,910 (h)	38,625 (b)	5,900 (b)	874 (f)	
2003	280,552	85 (h)	658 (h)	3,055 (h)	4,535 (h)	102,800 (b)	8,800 (b)	6,232 (h)	
2004	207,844	220 (h)	450 (h)	840 (h)	3,370 (h)	37,550 (b)	2,925 (b)	8,626 (h)	
2005	194,622	430 (h)	325 (h)	1,030 (h)	3,890 (h)	34,293 (b)	2,100 (b)	2,024 (h)	
2006	163,889	194 (h)	160 (h)	634 (h)	1,916 (h)	16,748 (b)	4,375 (b)	271 (h)	
2007	192,406	63 (h)	520 (h)	605 (h)	1,733 (h)	14,650 (b)	2,075 (b)	553 (h)	
2008	145,378	1,342 (h)	1,539 (h)	578 (h)	1,652 (h)	7,500 (b)	1,275 (b)	265 (h)	
2009	– ^d	410 (h)	–	470 (h)	680 (h)	16,850 (b)	5,450 (b)	155 (h)	
2010	177,724	1,110 (h)	280 (h)	340 (h)	720 (h)	5,867 (b)	813 (b)	1,002 (h)	
2011	149,533	369 (h)	–	–	912 (h)	6,180 (b)	2,092 (b)	575 (h)	
2012	130,734	–	106 (h)	–	405 (h)	5,230 (b)	396 (h)	515 (h)	
2013	110,515	721 (h)	–	55 (h)	425 (h)	6,222 (b)	2,221 (h)	647 (h)	
2014	283,421	333 (h)	378 (h)	649 (h)	886 (h)	4,285 (b)	434 (h)	1,941 (h)	
2015	121,193	242 (h)	1,789 (h)	1,419 (h)	3,890 (h)	19,533 (b)	1,621 (h)	3,742 (h)	
2016	168,297	334 (h)	1,680 (h)	1,327 (h)	2,746 (h)	6,767 (b)	1,421 (h)	1,350 (h)	
2017	166,320	1,278 (h)	862 (h)	2,025 (h)	1,942 (h)	9,627 (b)	–	–	
2018	136,347	1,822 (h)	241 (h)	361 (h)	347 (h)	2,884 (b)	2,465 (h)	976 (h)	
2019	86,214	–	749 (h)	184 (h)	424 (h)	2,043 (b)	258 (h)	300 (h)	
2020	107,680	28 (h)	206 (h)	231 (h)	507 (h)	2,557 (b)	210 (h)	472 (h)	
2021 ^e	37,257	126 (h)	104 (h)	226 (h)	213 (h)	913 (b)	130 (h)	17 (h)	
SEG ^f						5,200–17,000			
Average									
2011–2020	146,044 ^d	641	751	781	1,248	6,533	1,235	1,169	
2016–2020	133,009	866	748	826	1,193	4,776	1,089	775	

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Table 8.–Page 2 of 2.

Note: Only peak counts presented. Survey rating is fair to good, unless otherwise noted. Denotations of survey methods include: (b)=boat, (f)=fixed wing, (g)=ground/foot, (h)=helicopter, and (u)=undocumented. En dash indicates no data available.

- ^a Passage estimates for coho salmon are incomplete. The sonar project is terminated prior to the end of the coho salmon run. Yukon River mainstem sonar historical estimates were revised in 2016, using updated selectivity parameters.
- ^b Index area includes mainstem Nenana River between confluences of Lost Slough and Teklanika River.
- ^c Index area is lower 17.5 miles of system.
- ^d Extreme low water levels were experienced in 2009, affecting species apportionment, therefore passage estimates are not used.
- ^e Data are preliminary.
- ^f Sustainable escapement goal (SEG) established January 2004, (replaces BEG of greater than 9,000 fish established March 1993) based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21 through 27.