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Advisory Announcement

For Immediate Release: December 23, 2019

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2019 Yukon Area Fall Season Summary

This news release provides a preliminary summary of the 2019 Yukon Area (Figure 1) fall chum and coho salmon harvests and escapements. All reported results are preliminary and subject to revision.

2019 Fall Season Outlook

The preseason forecasted fall chum salmon run size, using brood year analysis, was estimated at 1,045,000 fish with a range of 933,000 to 1,160,000 fish. An inseason run size projection was made in mid-July using the relationship between historical summer and fall chum salmon run size estimates. Based on the initial estimate of 1.7 M summer chum salmon on July 15, the resulting preseason fall chum salmon projection was 500,000-750,000 fish. To account for the large number of summer chum salmon present in the first pulse, the inseason run projection was revised on August 3 to a range of 700,000 to 800,000 fall chum salmon.

The 2019 coho salmon outlook was for an average run size, assuming average survival from the 2015 parent year, and based on recent trends. The average of the coho salmon run size index is approximately 242,000 fish established using data from 1995 to 2018 (excluding 1996 and 2009).

Preseason Management Strategy

The preseason run projection indicated that the 2019 fall chum salmon run would be sufficient to meet escapement needs and provide for an above average subsistence harvest. Management of the Yukon Area fall season commercial salmon fisheries is in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* (5 ACC 01.249). The fall chum salmon plan incorporates the amount of fall chum salmon needed to meet U.S./Canada treaty objectives for border passage and provides guidelines necessary for meeting escapement goals and providing for prioritized uses. The plan sets the threshold number of fall chum salmon needed to allow commercial fishing at 550,000 fish with commercial harvest allowed on the surplus above that level. Preseason management strategies formulated with fishermen and the Federal inseason manager input included the following:

- Concurrent with the fall chum salmon migration upriver, all Yukon Area districts and subdistricts would be placed on their full regulatory subsistence fishing schedule, and the use of gillnets with an unconstrained mesh size of 7.5 inches or less would be allowed.
- Porcupine River fall chum salmon stock abundances have been low in recent years compared to other stocks in the Yukon River drainage. Escapements into the Canadian Fishing Branch River, a tributary of the Porcupine River, have consistently fallen short of meeting the escapement objectives agreed upon by U.S. and Canadian representatives in recent years. To improve fall chum salmon escapement into the spawning grounds, the department anticipated implementing a complete closure of subsistence salmon fishing in the Alaska portion of the mainstem Porcupine River as the fall chum salmon migration reached that area.

- Because of the uncertainty in the preseason projection, a cautious approach would be taken in managing commercial salmon fishing in Districts 1 and 2 to begin the season. This strategy would allow a small number of periods, shorter in length, at the beginning of the season and assure passage of fish for upriver subsistence fishermen. The amount of commercial opportunity would be adjusted as inseason assessment information was available. If a commercial surplus was available, smaller scale commercial fishing would be allowed in Subdistricts 5-B and 5-C, and District 6.

2019 Assessment

The department monitored a group of assessment projects in the lower river that supplied inseason data that informed management decisions. Projects operated included two drift gillnet test fisheries that provided timing information and relative abundance, a mainstem Yukon River sonar located near Pilot Station that provided abundance estimates, and harvest information from both subsistence and commercial fisheries. Genetic samples collected from chum salmon at the mainstem sonar project provided stock composition information. Additionally, escapement projects were operated in the upper Yukon River tributaries and the upper mainstem of the Yukon River. Assessment projects operated in the upper river included a sonar in the mainstem Yukon River near U.S./Canada border as well as in two tributaries (Teedriinjik/Chandalar and Upper Porcupine rivers), and a weir/sonar on the Fishing Branch River (Porcupine River headwater). Data from these projects were analyzed collectively inseason, used to verify collaboration between projects, and used to predict whether escapement goals would be achieved. Age, sex, and length information were also collected at the lower river test fisheries, the District 1 commercial fishery, and the mainstem Yukon River sonar (Eagle), as well as from the escapement grounds in the Fishing Branch and Delta rivers.

By regulation, the fall season began in District 1 on July 16 where chum salmon caught in the Lower Yukon River Drift Gillnet Test Fishery (LYTF) after this date were considered fall chum salmon. Mountain Village Drift Gillnet Test Fishery (MVTF) began operating on July 18, and the mainstem Yukon River sonar operated near Pilot Station began counting fall chum salmon on July 19. The subsequent transition of upriver districts and subdistricts to the fall season was based on the migration timing of fall chum salmon. The LYTF completed operations on September 10 (Yukon Delta Fisheries Development Association conducted drifts in late August through the end of the season) and had a preliminary total cumulative catch per unit effort (CPUE) for fall chum salmon of 1,680 which was near the historical median of 1,606. The MVTF ceased operations after September 12 with a preliminary cumulative CPUE for fall chum salmon of 2,904 which was above the historical median of 2,068, however new fishing sites were used this season. The mainstem Yukon River sonar near Pilot Station ceased operations on August 31. The preliminary chum salmon passage estimate at the mainstem sonar project near Pilot Station was 842,835 fish, which was above the historical median of 718,000 fish.

After July 19, four distinct pulses of chum salmon entered the Yukon River in 2019 (Figure 2). The first pulse contained the highest proportion on record of summer chum salmon (88%). Fall chum abundance began building in early August when they dominated the three remaining pulses that were each estimated to be 203,000, 185,000 and 172,000 fish respectively.

Cumulative chum salmon passage past the mainstem sonar tracked above the historical median (1995, 1997–2008, 2010–2018) throughout the run largely due to the contribution of summer chum salmon in the first pulse (Figure 2). Inseason adjustments of run size were used to manage the run account for the high proportion of summer chum salmon in the first pulse. The adjusted run size tracked along the 550,000 fall chum salmon threshold necessary to allow fall chum salmon directed commercial fishing through August 16. The two remaining pulses continued to increase the run size passage rate up and on August 26 the median was achieved (Figure 2). Run timing for fall chum salmon was three days later than average across all the assessment projects.

Coho salmon appeared to be weak or late through the middle of August then ramped up with most of the run entering in the latter half of August (Figure 3). The cumulative run size for coho salmon based on the mainstem sonar near Pilot Station and commercial harvest downstream was tracking well below the historical median (1995, 1997–2008, 2010–2018) throughout the season. The preliminary coho salmon run size was estimated to be

133,000 fish, which was below the historical median of 186,000 fish (Figure 3). Both the preliminary total cumulative CPUE for coho salmon at the LYTF and MVTF were well below their respective historical medians. Run timing for coho salmon was four days later than average across all the assessment projects.

Subsistence Fisheries

In anticipation that the fall chum salmon run size in 2019 would meet escapement needs, all Yukon River mainstem districts and subdistricts were placed on their regulatory subsistence fishing schedules upon transitioning to fall season management. The transition date was based on the fall chum salmon migration timing upriver. Because of the favorable inseason run projections, the department liberalized subsistence fishing schedules on the Yukon River mainstem. Upon transitioning to fall season management, subsistence fishermen could use gillnets up to 7.5-inch mesh size.

Subsistence salmon fishing in the mainstem Porcupine River was closed on August 23 consistent with the timing of fall chum salmon reaching that section of river. Subsistence salmon fishing on Porcupine River tributaries, such as the Sheenjek and Black rivers, remained open seven days a week, 24 hours per day. The closure was an attempt to protect fall chum salmon through the Alaska portion of the Porcupine River to the Canadian Border. The fall chum salmon run into the upper Porcupine River continued to be poor. Both the Porcupine River sonar near Old Crow and the Fishing Branch river weir were projecting that the Fishing Branch River escapement objective would not be achieved. Therefore, subsistence salmon fishing remained closed for the entire fall season in the Alaska portion of the Porcupine River.

A comprehensive estimate of the 2019 subsistence salmon harvest based on household surveys and permit harvest information is not available at this time. It is anticipated to be available by early spring of 2019. The department anticipates the 2019 harvest to be below recent year averages likely of because of a continued decrease in the need to provide food for dogs.

Commercial Fishing Summary

There was a total of 40 commercial periods in 2019. Table 1 provides a summary of the 2019 Yukon Area fall season commercial salmon harvest by district. The majority of fall season commercial harvest occurred in the lower river districts. Commercial fishing periods were established in Subdistricts 5-B, and 5-C and in District 6, but limited markets resulted in low fishing effort and relatively small harvests. The total commercial harvest for the Yukon River in the Alaska portion of the drainage was 268,360 fall chum salmon and 58,591 coho salmon (Table 1). The fall chum salmon harvest in 2019 was below the most recent 5-year (2014-2018) average of 329,990 fish (Table 2). The coho salmon harvest in 2019 was also below the most recent 5-year (2014-2018) average of 137,076 fish (Table 3). The average weight of fall chum salmon caught commercially in Districts 1 and 2 was approximately 7.0 lbs. The average weight of coho salmon was approximately 6.0 lbs. All fall chum salmon and coho salmon were sold in the round. The exvessel value of the total salmon harvest was \$1.4 million; \$1.1 million for fall chum salmon and \$0.3 million for coho salmon (Table 4). The average price per pound paid for fall chum salmon in Districts 1 and 2 was \$0.60; the average price paid for coho salmon was \$1.00. A total of 411 individual permit holders participated in the fall chum and coho salmon fishery: 404 in Districts 1 and 2 combined and 7 in Districts 4 through 6 (Table 5). Participation was well below the recent the 5-year average (2014-2018) of 453 permits in the Yukon Area.

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 6). In 2019, the preliminary estimate of the drainagewide total run size is 800,000 fall chum salmon and the escapement after harvest is removed expected to be within 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.

In the Teedriinjik River the estimated escapement of 116,000 fall chum salmon (including expansions to estimate the run after the sonar project ended) was within the sustainable escapement goal (SEG) range of 85,000 to 234,000 fish (Table 6). An estimated run size of 91,000 fall chum salmon in the Sheenjek River was derived from using the relationship Sheenjek River sonar counts and Fishing Branch River weir. An estimate of 27,800 fall chum salmon was counted past the Porcupine River border sonar downstream of Old Crow and border passage would be determined after removal of harvests. The Fishing Branch River weir estimate was approximately 18,000 fall chum salmon which was slightly below the lower end of the interim management escapement goal (IMEG) of 22,000–49,000 fish (Table 6). The fall chum salmon passage estimate at the mainstem Yukon River sonar project near Eagle was 101,678 fish (90% CI: 100,778–102,578) for the dates August 15 through October 6. Because of continued high passage at the termination of the project, the fall chum salmon estimate was subsequently adjusted to 113,266 fish. The preliminary escapement for the mainstem Yukon River in Canada is derived by subtracting the upstream U.S. and Canadian harvests from the expanded sonar estimate. The preliminary mainstem Yukon River escapement estimate of 97,000 fall chum salmon is within the IMEG range of 70,000 to 104,000 fish (Table 6).

The Tanana River preliminary escapement estimate was 190,000 fall chum salmon. Assessment of Tanana River drainage stocks was based on mixed stock analysis, instead of its relationship to Canadian stocks, since there was some indication that the production on the Tanana River may have been higher relative to the upper Yukon. Some confirmation of the high production in the Tanana River drainage came from the Delta River escapement of fall chum salmon that broke the record set in 2017. The estimated escapement in the Delta River of 51,748 fall chum salmon was well above the sustainable escapement goal of 7,000 to 20,000 fish (Table 6). Additional environmental factors, from the relatively warm October and November, may have contributed to the way fish moved into the Delta River from the mainstem Tanana River.

Stock composition estimates were provided by USFWS Conservation Genetics Laboratory using tissue samples (fin clips) collected from chum salmon captured in the mainstem Yukon River sonar test net fishery. Chum salmon genetic samples processed from four strata between July 19 and August 31 (fall season) indicated that stocks represented approximately 35% summer, 20% Border U.S. (Teedriinjik/Sheenjek), 21% Canadian, and 24% Tanana.

In 2019, the proportion of age-3 (<1%) fall chum salmon was below average, age-4 fish (82%) was above average, age-5 fish (16%) 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 2014 and 2015 brood year estimates of return per spawner of 1.3 and 1.7 respectively are both below the 1974–2013 average of 1.76. Females contributed 55% of the samples which was below the 1986 to 2018 average (58%). Fall chum salmon length samples in 2019 averaged 574 mm, the smallest on record being well below the long term 1981–2018 average of 593 mm.

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 August 31 and had an estimated passage of 86,214 coho salmon (SE 5,863) which is well below the historical average of 155,000 fish. Table 7 shows historical escapements to selected spawning areas in the Yukon Area. The Delta Clearwater River (DCR) has the only established escapement goal for coho salmon, a SEG of 5,200–17,000 fish. A boat survey conducted on the DCR in early November counted an estimated 2,043 coho salmon which was below the escapement goal (Table 7). Escapement count estimates for coho salmon were conducted by aerial surveys in the Nenana River drainage, where three spawning areas are monitored with all escapements below their 1974–2018 averages (Table 7).

In 2019, coho salmon age, sex, and length samples were collected from the Lower Yukon Test Fishery using 6-inch mesh drift gillnets. The sex composition and length data are preliminary, and ages are not currently available for coho salmon. Females contributed 52% to the coho salmon samples which was above 1986–2018 average (47%). Coho salmon in 2019 averaged 556 mm in length ranking the fourth smallest compared to the 1981–2018 average of 577 mm.

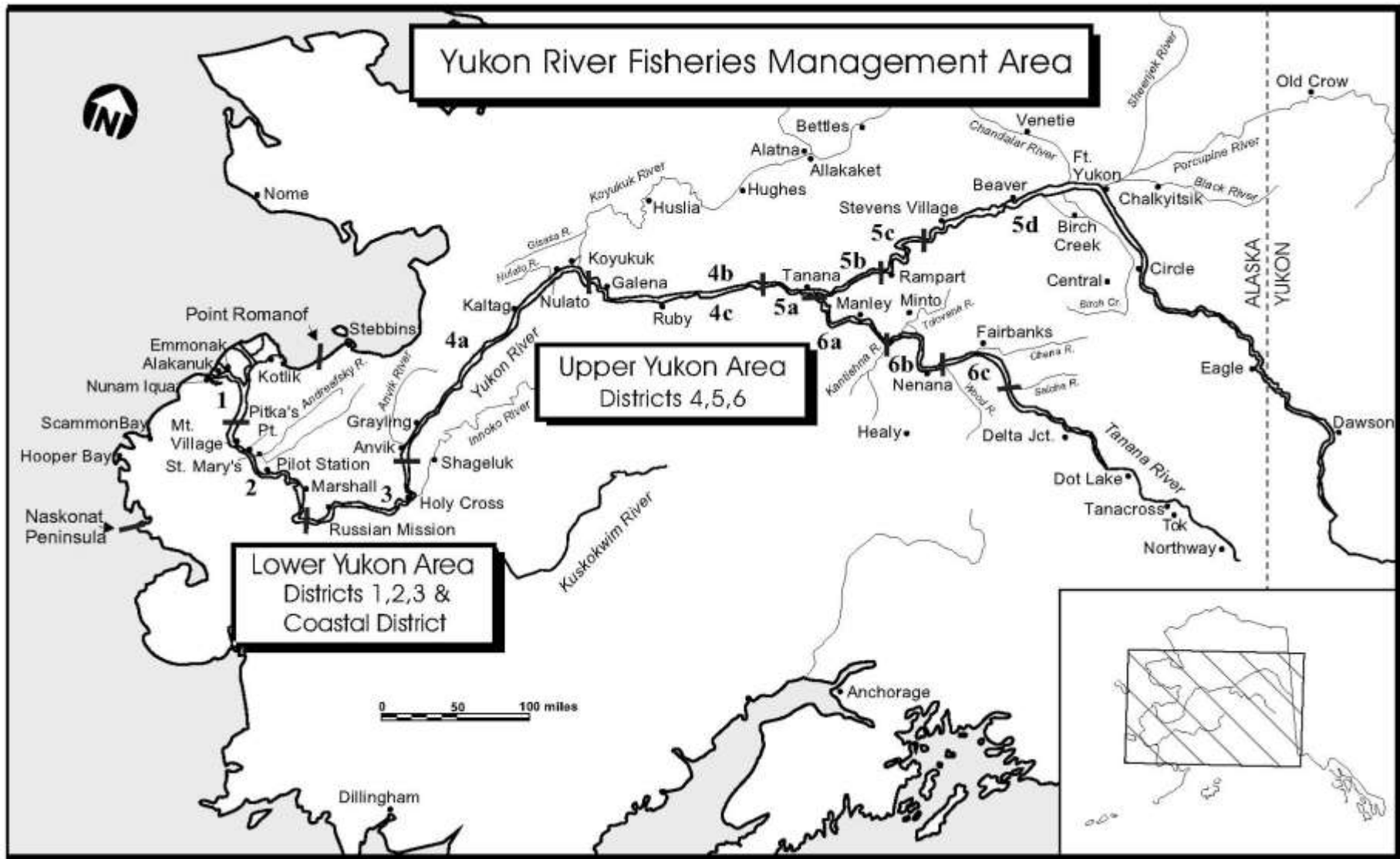


Figure 1. Alaskan portion of the Yukon River drainage showing communities and fishing districts.

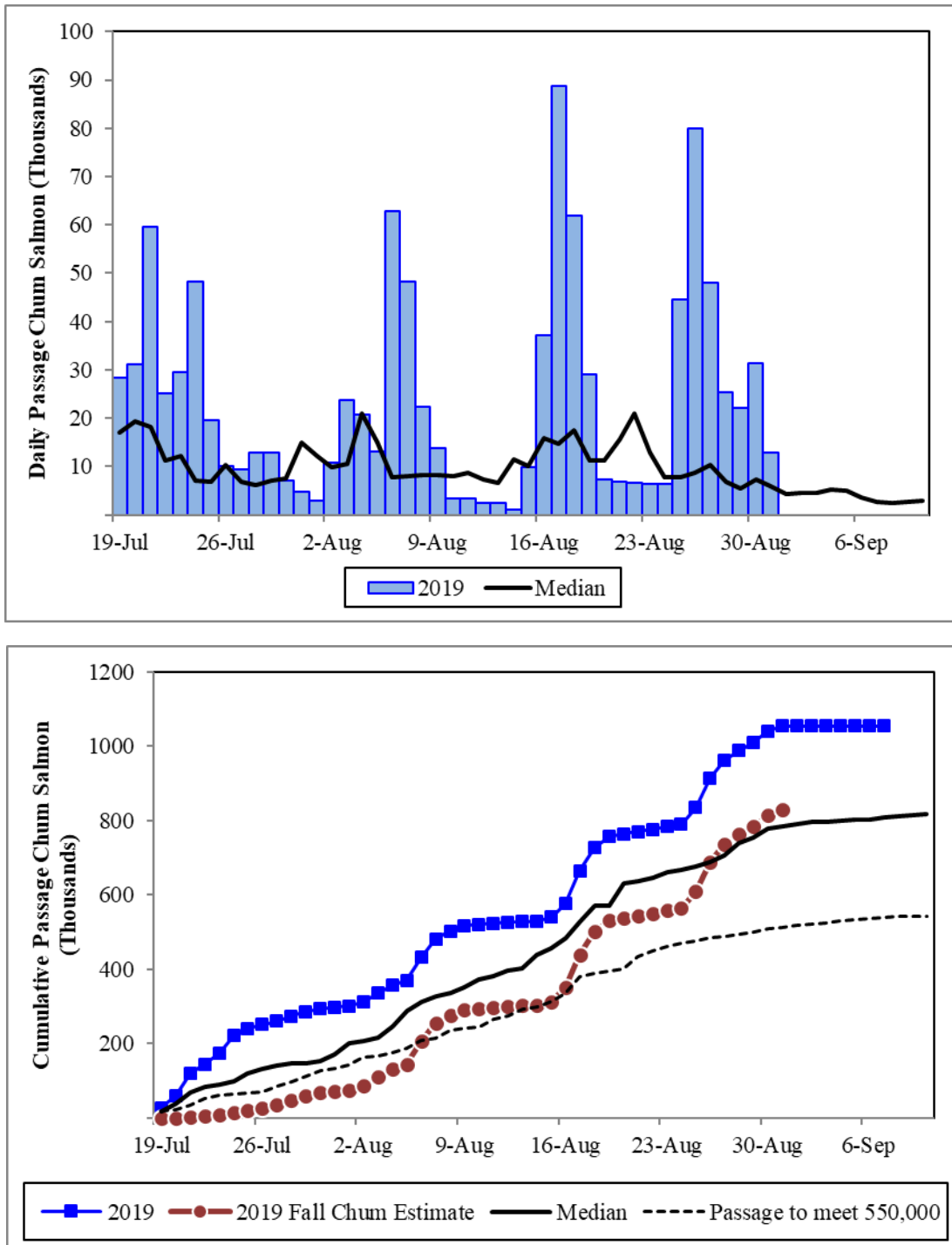


Figure 2.—Estimated daily passage attributed to fall chum salmon based on the Yukon River mainstem sonar (Pilot Station) plus downstream harvests (top) and cumulative of all chum and adjusted fall chum salmon for 2019 (bottom), 2019 compared to historical (1995, 1997–2008, 2010–2018) median run size.

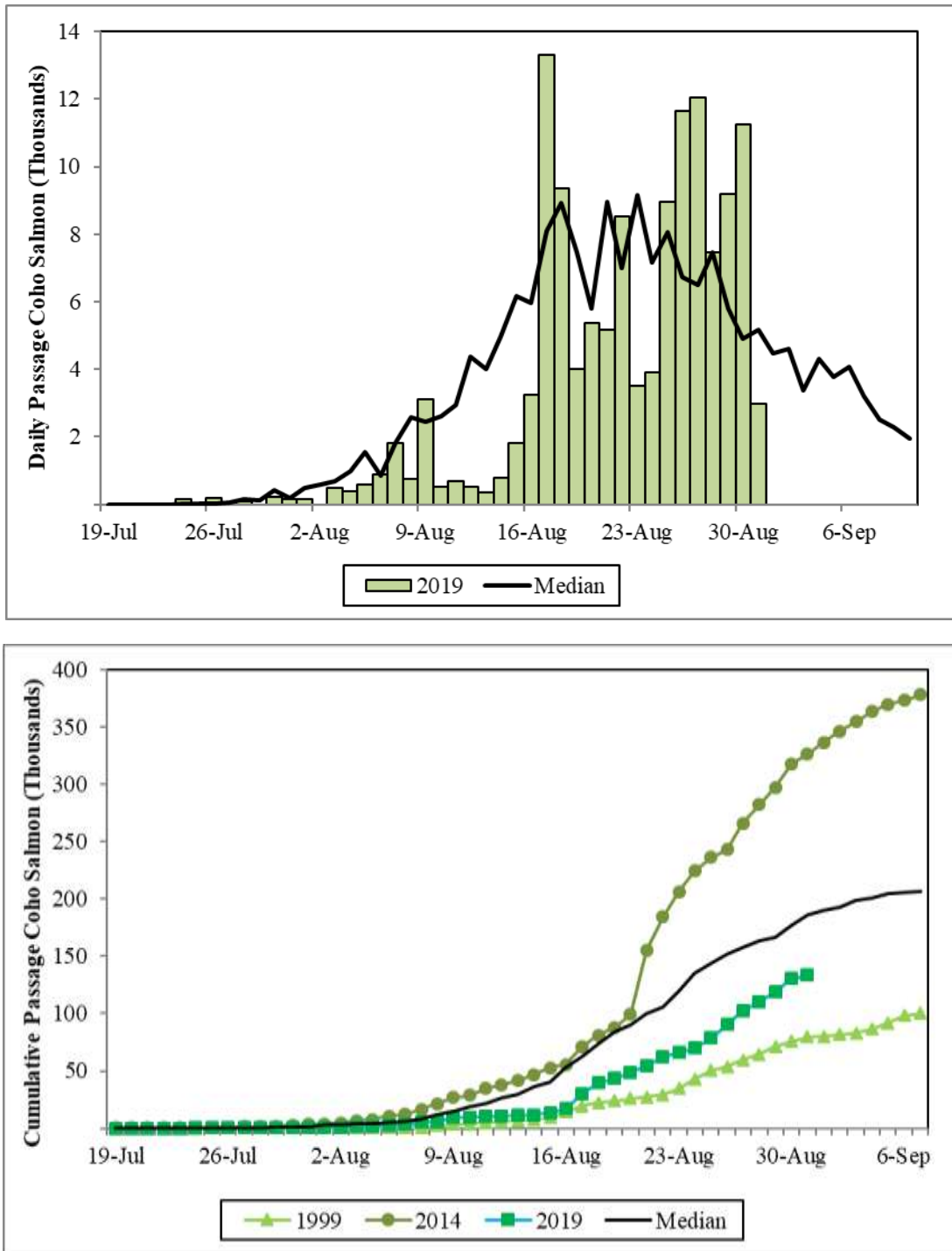


Figure 3.— Estimated daily passage attributed to coho salmon based on the Yukon River mainstem sonar (Pilot Station) plus downstream harvests (top) and cumulative (bottom), 2019 compared to historical (1995, 1997–2008, 2010–2018) median run size index and minimum and maximum years.

Table 1.–Summary of the fall season commercial salmon harvest, by district, Yukon Area, 2019.

District	Periods	Permits	Fall Chum Salmon			Coho Salmon		
			Number	Pounds	Average Weight ^a	Number	Pounds	Average Weight ^a
1	13	276	145,692	1,003,989	6.9	40,621	243,521	6.0
2	12	136	106,141	753,821	7.1	15,622	93,103	6.0
3			No commercial openings					
4			No commercial openings					
5 ^b	1	3	900	6,300	7.0	0	0	–
6	14	4	15,627	99,259	6.4	2,348	11,061	4.7
TOTAL	40	411	268,360	1,863,369	6.9	58,591	347,685	5.9

Note: En dash indicates no data available.

^a Average weight is weighted based on individual periods.

^b Commercial fishing occurred in Subdistricts 5-A, 5-B, and 5-C.

Table 2.—Fall chum salmon commercial harvest by district, Yukon Area, 1999–2019.

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>	
1999	9,987	9,703	–	19,690	681	–	–	681	20,371
2000	–	–	–	–	–	–	–	–	–
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
Average									
2014–2018	181,265	130,378		311,643	999	2,540	15,407	18,347	329,990
2009–2018	129,295	100,052		229,347	936	2,176	13,306	15,328	244,675

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 3.—Coho salmon commercial harvest by district, Yukon Area, 1999–2019.

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>	
1999	855	746	–	1,601	–	–	–	–	1,601
2000	–	–	–	–	–	–	–	–	–
2001	–	–	–	–	–	–	–	–	–
2002	–	–	–	–	–	–	–	–	–
2003	9,757	–	–	9,757	–	–	15,119	15,119	24,876
2004	1,583	–	–	1,583	–	–	18,649	18,649	20,232
2005	36,533	–	–	36,533	–	–	21,778	21,778	58,311
2006	39,323	14,482	–	53,805	–	–	11,137	11,137	64,942
2007	21,720	21,487	–	43,207	–	–	1,368	1,368	44,575
2008	13,946	19,248	–	33,194	–	91	2,408	2,499	35,693
2009	5,992	1,577	–	7,569	–	–	742	742	8,311
2010	1,027	1,023	–	2,050	–	–	1,700	1,700	3,750
2011	45,335	24,184	–	69,519	–	–	7,502	7,502	77,021
2012	39,757	29,063	–	68,820	0	634	5,335	5,969	74,789
2013	27,304	31,456	–	58,760	–	0	7,439	7,439	66,199
2014	54,804	48,602	–	103,406	–	0	1,286	1,286	104,692
2015	66,029	54,860	–	120,889	–	0	8,811	8,811	129,700
2016	113,669	67,208	–	180,877	–	54	20,551	20,605	201,482
2017	95,982	33,277	–	129,259	0	0	9,656	9,656	138,915
2018	65,431	40,845	–	106,276	0	0	4,314	4,314	110,590
2019	40,621	15,622	–	56,243	–	0	2,348	2,348	58,591
Average									
2014–2018	79,183	48,958		128,141		11	8,924	8,934	137,076
2009–2018	51,533	33,210		84,743		98	6,734	6,802	91,545

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.—Exvessel value of fall chum and coho salmon commercial salmon fishery, 1999–2019.

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	\$/lb Roe	Value	\$/lb	\$/lb Roe	Value					
1999	0.25	35,639	0.20		876	0.35		3,620	–		–	36,515	–	39,259	876	40,135
2000	–	–	–		–	–	–	–	–	–	–	–	–	–	–	–
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
Average																
2014–2018	0.68	1,525,874	0.16		18,685	0.94		791,782	0.19		7,453	1,544,559	799,235	2,317,656	26,137	2,343,793

Note: En dash indicates no commercial fishing occurred.

Table 5.—Number of participating commercial salmon fishing gear permit holders by district and season, Yukon Area in Alaska, 1999–2019.

Fall Chum and Coho Salmon Season ^a									
Year	Lower Yukon Area				Upper Yukon Area				Yukon Area
	District 1	District 2	District 3	Subtotal ^b	District 4	District 5	District 6	Subtotal ^c	Total
1999	146	110	0	254	4	0	0	4	258
2000	0	0	0	0	0	0	0	0	0
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
Average									
2014-2018	280	179	0	445	2	3	4	8	453
2009-2018	239	161	0	390	1	2	4	8	396

^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 6.–Fall chum salmon passage estimates or escapement estimates for selected spawning areas, Yukon River drainage, 1999–2019.

Year	Alaska						Canada			
	Yukon River Mainstem (Pilot) Sonar Estimate	Tanana River Drainage		Upper Yukon River Drainage		Yukon River Mainstem (Eagle) Passage Estimate	Mainstem Escapement Estimate	Porcupine River Sonar	Fishing Branch River	
		Delta River	Tanana River Estimate	Teedriinjik (Chandalar) River	Sheenjek River					
	^b	^a	^b	^c	^d	^e	^f	^g	^h	
1999	451,505	16,534	109,309	92,685	14,229	–	58,552	–	12,958	
2000	273,206	3,001	55,983	71,048	30,084	ⁱ –	53,732	–	5,057	
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	^j –	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	^k –	437,733	–	119,058	
2006	964,238	14,055	233,193	254,778	160,178	^k 245,290	220,898	–	30,954	
2007	740,195	18,610	357,016	243,805	65,435	^k 265,008	236,987	–	32,150	
2008	636,525	23,055	264,200	^l 178,278	50,353	^k 185,409	167,898	^m –	19,086	
2009	–	ⁿ 13,492	159,828	^l 150,000	^o 54,126	^k 101,734	93,626	^m –	25,828	
2010	458,103	17,993	212,660	^l 167,532	22,053	132,930	117,789	^m –	15,773	
2011	873,877	23,639	270,846	^l 298,223	97,976	^k 224,355	205,566	^m –	13,085	
2012	778,158	9,377	^p 102,096	^l 205,791	104,701	^k 153,248	137,662	^m –	22,399	
2013	865,295	31,955	275,089	^q 252,710	130,000	^r 216,791	200,262	^m 35,615	–	
2014	706,630	32,480	^p 215,393	^q 226,489	51,000	^r 172,887	156,796	^m 17,698	–	
2015	669,483	33,401	^p 149,265	^q 164,486	64,000	^r 125,095	109,505	^m 21,396	9,000	
2016	994,760	21,913	^p 199,102	^q 295,023	180,000	^r 161,027	145,267	^m 54,395	29,397	
2017	1,829,931	48,783	^p 525,293	^q 509,115	250,000	^r 419,099	401,489	^m 67,818	48,422	
2018	928,664	39,641	^p 302,013	^q 170,356	81,000	^r 168,798	153,988	^m –	10,151	
2019	^s 842,835	51,748	^p 189,994	^q 116,323	91,000	^r 113,266	97,000	^m 27,805	18,171	
Average										
1999–2018	810,442	ⁿ 22,191	226,709	220,274	104,225	197,821	166,357	39,384	26,599	
2014–2018	1,025,894	35,244	278,213	273,094	125,200	209,381	193,409	40,327	24,243	
BEG Range	300,000	^t 7,000	^u 61,000	^v 85,000	^u 50,000	^v 104,000	> 80,000	^w	50,000	
	600,000	20,000	136,000	234,000	104,000				120,000	
Interim Escapement Objective							70,000-104,000	^x	22,000-49,000	

-Continued-

Table 6.–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 (1999–2002), 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 early, sonar passage estimate was 18,652 (62% of normal run timing). The total sonar passage estimate, 30,083, was expanded to reflect the 1986–1999 average run timing through September 24.
- ^j Project ended on peak daily passage in 2003 due to late run timing, estimate was expanded based on run timing (87%) at Rapids.
- ^k 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.
- ^l 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).
- ^m 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.
- ⁿ Extreme low water levels were experienced in 2009, affecting species apportionment, therefore passage estimates are not used.
- ^o Project ended early, estimate based on regression of Chandalar to Fishing Branch River plus Mainstem Border from 1995–2009.
- ^p Peak counts from foot surveys unless otherwise noted.
- ^q Preliminary estimate based on regression of Tanana with mainstem Yukon River Canada from 1995 to 2012 excluding 2005 from 2013–2017. Used mixed stock analysis for 2018 and 2019.
- ^r 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.
- ^s Data is 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 discontinued 2019, Sheenjek escapement goal was discontinued in 2016.
- ^w Escapement goal as written in the Pacific Salmon Treaty.
- ^x Interim Management Escapement Goal (IMEG) established 2008. Based on percentile method.
- ^y IMEG of 70,000 to 104,000 was established for 2010 to present is based on Canadian stock Ricker model.

Table 7.—Coho salmon passage estimates or escapement estimates for selected spawning areas, Yukon River drainage, 1999–2019.

Year	Yukon River Mainstem Sonar Estimate ^a	Upper Tanana River Drainage														
		Nenana River Drainage								Delta Clearwater River ^c	Clearwater Lake and Outlet	Richardson Clearwater River				
		Lost Slough	Nenana Mainstem ^b	Wood Creek	Seventeen Mile Slough											
1999	76,174	1,002	(h) ^d	745	(h) ^d	370	(h)	662	(h) ^d	10,975	(b)	–	–			
2000	206,365	55	(h) ^d	68	(h) ^d	–	^e	879	(h) ^d	9,225	(b)	1,025	(b)	2,175	(h)	
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	–	^f	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	^g	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)	
SEG ^h										5,200-17,000						
Average																
1999–2018	168,877	^f	540	646	905	1,863	19,166	2,767	1,777							
2014–2018	175,116	802	990	1,156	1,962	8,619	1,485	2,002								

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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 confluence's of Lost Slough and Teklanika River.
- ^c Index area is lower 17.5 miles of system.
- ^d Poor survey.
- ^e No survey of Wood Creek due to obstructions in creek.
- ^f Extreme low water levels were experienced in 2009, affecting species apportionment, therefore passage estimates are not used.
- ^g Data is preliminary.
- ^h 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.