

Yukon River Salmon Bycatch Summary

Updated April 2024

The Yukon River Salmon Agreement identifies the need to identify, quantify, and undertake efforts to reduce marine catches and bycatch of Yukon River salmon. This section provides an overview of information on U.S. groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) management region, bycatch regulations, and bycatch impacts on Yukon River Canadian-origin salmon.

Bycatch impacts on Canadian-origin salmon

Yukon River Canadian-origin salmon are caught as bycatch in BSAI groundfish fisheries along with other salmon stocks from Alaska, the west coast of Canada and the United States, eastern Asia, and Russia. The total number of salmon captured as bycatch is always much greater than the number of returning adult Canadian-origin salmon that are removed from the Yukon River due to bycatch. For example, the total annual bycatch of Chinook salmon in BSAI pollock fishery has varied from approximately 5,000 to 122,000 (Table 1), but the adult equivalent (AEQ) bycatch of Canadian-origin Chinook salmon varied from approximately 320 to 2,300 fish over the same time period (Table 2). The average bycatch impact rate by the pollock fishery on the Canadian-origin Chinook salmon run is estimated to be 1.0% with an annual impact rate less than 2.8% (Table 2). Average bycatch impact rates to western Alaska chum salmon (not Canadian-origin chum salmon) is estimated to be 0.4% with an annual rate less than 1.3% (Murphy et al. 2017). Ongoing regulatory and management measures implemented by the North Pacific Fisheries Management Council (NPFMC) are a key factor limiting bycatch impact rates on Canadian-origin salmon in BSAI groundfish fisheries.

Current BSAI bycatch information

- Total bycatch of Chinook salmon in BSAI groundfish fisheries (pelagic trawl, bottom trawl, and hook-and-line fisheries) during 2023 was 14,616 fish, which was 32% lower than the recent 5-year average (excluding 2023) (Table 1). Chinook salmon bycatch in the BSAI pollock fishery was 11,855 fish and accounted for 81% of the bycatch during 2023.
- Total bycatch of non-Chinook salmon (primarily chum salmon) in BSAI groundfish fisheries (pelagic trawl, bottom trawl, and hook-and-line fisheries) during 2023 was 116,714 fish, which was 68% below the recent 5-year average (Table 1). Bycatch of non-Chinook salmon in the BSAI pollock fishery was 112,303 fish and accounted for 99% of the bycatch during 2023.
- Bycatch impacts to Canadian-origin Chinook salmon by BSAI Pollock fishery is estimated by run year. The 2021 run is the most recent year for which bycatch impact estimates are available for Canadian-origin Chinook salmon.
 - The total Canadian-origin Chinook salmon run in 2021 was 32,970. Adult equivalent models estimate that an additional 493 Canadian-origin Chinook salmon would have contributed to the 2021 run if they had not been captured as bycatch in the BSAI pollock fishery (Table 2). This represents an impact rate of 1.47% on the Canadian-origin Chinook salmon run during 2021.

Background Information

Bycatch management

- U.S. groundfish trawl fisheries in the BSAI management area are managed to limit the bycatch of salmon under the Magnuson-Stevens Fisheries Conservation and Management Act by the NPFMC and are regulated by National Marine Fisheries Service (NMFS).
- The pollock fishery is the primary focus of bycatch management as it accounts for an average of 88% of the total Chinook salmon bycatch and 99% of the non-Chinook salmon bycatch in the BSAI management area.
- The pollock fishery is managed according to the Fishery Management Plan (FMP) for Groundfish of the BSAI Management Area.

<https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf>

Bycatch regulations

- The BSAI groundfish FMP contains regulatory measures to reduce salmon bycatch.
- The BSAI pollock fishery is one of the most heavily regulated and monitored fisheries in the world and includes 100% observer coverage.
- Notable bycatch reduction measures include amendment 91 and amendment 110.
- Amendment 91 (<https://alaskafisheries.noaa.gov/rules-notices/search>) was implemented in 2011 and, among other things, established bycatch caps.
- Amendment 110 (<https://alaskafisheries.noaa.gov/rules-notices/search>) was implemented in 2016 and, among other things, established abundance-based bycatch caps to further protect western Alaska and Canadian-origin Chinook salmon stocks harvested for subsistence purposes. Bycatch caps are set relative to the combined in-river run size for the Unalakleet, Upper Yukon (Canadian-origin), and Kuskokwim River Chinook salmon stock groups (termed the three-system index).

Bycatch impact methods

- The number of salmon captured as bycatch in a given year is not equivalent to the number of adult salmon that would have returned to the Canadian portion of the Yukon River drainage in that year for two reasons.
 - Salmon stocks throughout the North Pacific are captured as bycatch in the BSAI groundfish fisheries. Information on stock origin is required to evaluate the impact of bycatch to a given stock or stock group.
 - Salmon are predominately captured as bycatch during their immature life-history stage and will spend one or more years in the ocean before returning to freshwater as mature adults to spawn. Bycatch numbers of immature salmon require an adjustment for natural mortality before they can be compared to the number of mature adults returning to freshwater. Bycatch estimates that are adjusted for natural mortality are referred to as Adult Equivalent (AEQ) bycatch.
- Bycatch impacts on Yukon River Canadian-origin salmon require stock-specific Adult Equivalent (AEQ) estimates of bycatch. These estimates rely on the following data inputs: total salmon bycatch, bycatch stock mixtures, bycatch age composition, salmon maturity schedules, and assumptions on the natural mortality of salmon in marine habitats (Ianelli and Stram 2014, NPFMC 2022).

- AEQ analysis is updated as required for regulatory application by the NPFMC. Updated estimates of AEQ bycatch are reported in the annual Yukon River Panel bycatch summary as they are made publicly available.
- In October 2021 the NPFMC requested an analysis on the estimated impacts of salmon bycatch in the BSAI pollock trawl fishery that includes:
 - An updated Chinook salmon bycatch AEQ and impact analysis for Western Alaska stocks caught in the Bering Sea pollock fishery.
 - Recommendations on the best way to evaluate impacts of chum salmon bycatch in the Bering Sea pollock fishery on Western Alaska stocks using currently available data.
 - A request for the State to provide the Council with a stock status update on Western Alaska Chinook and chum salmon.
 - Intent to draft a letter to the Secretary of State to request help identifying stock composition of salmon catch outside of US waters and a letter to the Secretary of Commerce for increased and dedicated funding for salmon research.
- NPFMC support staff completed an update to the Chinook salmon bycatch AEQ analysis for the BSAI pollock fishery through the 2021 season. Table 2 of this report has been updated to include AEQ, run size, and impact rate for Canadian-origin Chinook salmon through 2021.

Additional resources

- Bycatch numbers are reported by the National Marine Fisheries Service, available at: <https://alaskafisheries.noaa.gov/fisheries-catch-landings?tid=286>
- Bycatch updates are reported by the North Pacific Fisheries Management Council, available at: <https://www.npfmc.org/bsai-salmon-bycatch/>

References

- Ianelli, J. N. and D. L. Stram. 2014. Estimating impacts of the pollock fishery bycatch on western Alaska Chinook salmon. *ICES J. Mar. Sci.* **72**: 1159-1172. doi:10.1093/icesjms/fsu173
- North Pacific Fisheries Management Council (NPFMC). 2022. Update on Chinook salmon mortality and impacts due to bycatch in the EBS pollock fishery. Available online at: <https://meetings.npfmc.org/CommentReview/DownloadFile?p=c16a58bc-e94e-4fd3-a23f-08909946bf20.pdf&fileName=D1c%20Chinook%20Salmon%20AEQ.pdf>
- Murphy, J.M. E.V. Farley, J.N. Ianelli, and D.L. Stram. 2017. Distribution, diet, and bycatch of chum salmon in the Eastern Bering Sea. *N. Pac. Anadr. Fish. Comm. Bull.* **6**:219-234. doi: 10.23849/npafcb6/219.234

Table 1.—Numbers of Chinook and non-Chinook (chum) salmon captured as bycatch in the Bering Sea-Aleutian Islands (BSAI) groundfish fisheries by season (A-season: winter, B-season: summer/fall), 1991-2023.

Year	BSAI Chinook Salmon Bycatch						BSAI Non-Chinook Salmon Bycatch					
	A-season		B-season		Annual		A-season		B-season		Annual	
	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries
1991 ^a	38,791	46,392	2,114	2,488	40,906	48,880	2,850	3,016	26,100	27,246	28,950	30,262
1992 ^a	25,691	31,419	10,259	10,536	35,950	41,955	1,950	2,120	38,323	39,329	40,273	41,450
1993 ^a	17,264	24,688	21,252	21,326	38,516	46,014	1,593	1,848	240,597	241,422	242,190	243,270
1994	28,451	38,921	4,686	4,900	33,136	43,821	3,990	5,599	88,680	88,949	92,670	94,548
1995	10,579	18,939	4,405	4,497	14,984	23,436	1,707	3,033	17,555	18,842	19,262	21,875
1996	36,068	43,316	19,554	19,888	55,623	63,205	221	665	77,013	77,395	77,234	78,060
1997	10,935	16,401	33,973	34,129	44,909	50,530	2,083	2,710	63,903	64,285	65,986	66,994
1998	16,132	19,870	40,308	40,679	56,440	60,549	4,090	4,608	60,865	62,004	64,955	66,612
1999	6,352	8,794	5,627	5,805	11,978	14,599	362	393	44,909	46,841	45,271	47,234
2000	3,422	6,568	1,539	1,655	4,961	8,223	212	350	58,357	58,977	58,569	59,327
2001	18,484	24,871	14,961	15,676	33,444	40,547	2,386	2,903	54,620	57,828	57,006	60,731
2002	21,794	26,277	12,701	13,407	34,495	39,684	1,377	1,698	79,274	80,785	80,651	82,483
2003	32,606	40,058	13,055	13,603	45,661	53,661	3,831	3,831	184,513	184,559	188,344	188,390
2004	23,099	30,767	28,663	29,274	51,762	60,040	426	429	451,907	452,131	452,333	452,560
2005	27,323	33,622	40,861	41,462	68,184	75,084	594	594	710,196	710,926	710,790	711,520
2006	58,390	62,547	24,362	24,568	82,752	87,114	1,323	1,323	305,674	305,852	306,997	307,175
2007	70,414	78,157	51,781	51,854	122,195	130,011	8,481	8,489	84,387	85,152	92,868	93,641
2008	16,495	18,829	4,811	5,009	21,307	23,838	247	247	14,732	14,732	14,980	14,980
2009	9,882	11,377	2,697	2,894	12,579	14,272	48	48	45,397	45,397	45,445	45,445
2010	7,668	9,502	2,069	3,012	9,737	12,515	40	40	13,243	13,243	13,283	13,283
2011	7,137	7,602	18,362	19,007	25,499	26,609	297	414	191,138	194,405	191,435	194,819
2012	7,765	8,989	3,578	3,948	11,343	12,937	11	307	22,172	23,766	22,183	24,073
2013	8,219	9,188	4,797	6,896	13,016	16,084	215	447	125,101	126,554	125,316	127,001
2014	11,539	13,839	3,498	4,365	15,037	18,204	577	1629	218,865	222,634	219,442	224,263
2015	12,304	17,534	6,025	7,755	18,329	25,289	4,756	6,158	232,996	237,196	237,752	243,354
2016	16828	26,086	5,098	6,839	21,926	32,925	3,903	4,838	339,098	342,503	343,001	347,341
2017	21,828	27,007	8,248	9,272	30,076	36,280	1,906	2,313	465,772	469,134	467,678	471,447
2018	8,645	11,264	5,095	6,135	13,740	17,399	1,201	2,120	293,863	306,925	295,064	309,045
2019	15,781	20,088	9,203	11,378	24,984	31,467	2,239	4,509	345,643	354,294	347,882	358,804
2020	18369	20,442	13925	14,534	32,294	34,976	807	1161	343,014	345,214	343,821	346,375
2021	9,503	10,719	4,281	5,177	13,784	15,896	159	371	545,883	550,327	546,042	550,698
2022	5,185	6,308	1,152	2,034	6,337	8342	66	633	242,309	244,637	242,375	245,269
2023	10,685	12,899	1,170	1,718	11,855	14,616	475	1,158	111,819	115,548	112,294	116,705

^a Community Development Quota (CDQ) bycatch not included.

Table 2. – Estimated adult equivalent (AEQ) bycatch of Canadian-origin Chinook from the Yukon River in the Bering Sea-Aleutian Islands (BSAI) pollock fisheries by run year, run size of the Canadian-origin Chinook salmon, and bycatch impact rates (1994–2021) (NPFMC, 2022).

Run Year	Canadian-Origin AEQ Bycatch	Canadian-Origin Run	Canadian-Origin Impact Rate
1994	1,048	172,885	0.60%
1995	619	168,502	0.37%
1996	921	182,564	0.50%
1997	1,116	161,700	0.69%
1998	1,193	88,282	1.33%
1999	832	110,446	0.75%
2000	466	52,842	0.87%
2001	476	85,663	0.55%
2002	729	81,486	0.89%
2003	956	149,980	0.63%
2004	1,151	117,246	0.97%
2005	1,478	123,612	1.18%
2006	1,900	119,485	1.57%
2007	2,292	88,018	2.54%
2008	1,812	62,611	2.81%
2009	863	87,221	0.98%
2010	358	59,741	0.60%
2011	322	71,725	0.45%
2012	400	48,498	0.82%
2013	342	37,177	0.91%
2014	351	64,886	0.54%
2015	444	87,323	0.51%
2016	708	83,043	0.85%
2017	865	92,622	0.93%
2018	668	76,530	0.87%
2019	537	72,620	0.73%
2020	594	45,501	1.29%
2021	493	32,970	1.47%