

Recently Asked Questions

2017 Kuskokwim River Chinook salmon run and escapement

Prepared by:

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Questions about the 2017 Chinook salmon Run and Escapement Estimates:

1. How was Chinook salmon escapement monitored throughout the Kuskokwim River in 2017?

Kuskokwim River Chinook salmon escapement was monitored using 8 weirs and flying 11 aerial surveys during the summer of 2017 (Table). Drainagewide escapement is currently being assessed postseason using the Kuskokwim River Chinook salmon Run Reconstruction model.

2. Did the weirs have any operational problems this season?

Yes, however, the operational issues did not affect our ability to assess Chinook salmon escapement at any weir location. Missed passage ranged from 2% at George, 6% at Tatlawiksuk, 21% at Takotna, and 22% at Kogrukluk River weirs. Standard methods were used to estimate missed passage during inoperable periods. At this time, the Kwethluk, Tuluksak, Salmon (Aniak drainage), and Salmon (Pitka Fork drainage) weirs are thought to have operated with no or negligible missed passage.

3. What exactly is a weir and do weirs hurt the fish?

No, weirs do not hurt fish. Weirs have been used safely for many decades to count adult salmon throughout Alaska, Canada, and the Pacific NW. For example, the Karluk River weir on Kodiak Island has operated since 1921. Weirs are used to visually count salmon as they migrate to their spawning grounds. A weir is essentially a fence across a river that directs fish to swim through an open gate. Technicians count, without handling, how many salmon of each species swim upstream through the weir. It is often noted by staff and local residents that salmon hangout below weirs. This behavior does not harm the salmon. Weir staff spend many hours each day sitting atop the weir with the gate open so salmon can pass through the weir when they are ready. Of all the assessment tools available to count fish, a weir gives the most accurate, verifiable count of the number of fish moving to spawning grounds.

4. What is an aerial survey

Aerial surveys are a common cost-effective method used throughout Alaska since the early 1930s to monitor salmon escapement to specific tributary locations. Aerial surveys do not provide a

complete count of all spawning salmon in a tributary. Instead, they provide a general impression about the change in escapement over time. For example, an aerial survey count can be used to determine if the escapement this year was larger or smaller compared to previous years at the same location. Throughout the Kuskokwim Area, surveys are flown once per year during the peak of spawning activity. Surveys are flown by an experienced pilot and surveyor in a fixed-wing airplane (e.g., like a super cub) at slow speeds and low elevations following the river channel. Surveys are conducted at the same locations each year so results are comparable among years. The surveyor counts all Chinook salmon observed during the survey flight. Once all the surveys are complete, managers and researchers compare the survey results to historical trends to determine current year escapement performance.

5. Were aerial surveys successful this season?

Yes, surveys were successfully flown on headwaters and middle river tributaries. Most of the surveys conducted this season occurred prior to peak spawning activity. Headwaters and middle river surveys reported good survey conditions. Only one scheduled survey was not flown. The Kisaralik River survey was not conducted due to poor weather conditions.

6. How is the total run and escapement of Kuskokwim River Chinook salmon estimated?

Total run and escapement of Kuskokwim River Chinook salmon is estimated using a run reconstruction model that was published by ADF&G in 2012. The model combines information on subsistence harvest, commercial catch and effort, sport harvest, test fish harvest and catch per unit of effort at Bethel, mark-recapture estimates of inriver abundance, counts of salmon at 6 weirs, and peak aerial counts from 14 tributaries spread throughout the Kuskokwim River drainage.

7. How was total run and escapement estimated prior to 2012?

Total run and escapement of Kuskokwim River Chinook salmon was not estimated prior to publishing the Chinook salmon run reconstruction model in 2012. Prior to the run reconstruction model, managers and researchers made general conclusions about drainagewide Chinook salmon run and escapement performance by looking at how each tributary specific project and postseason harvest estimates compared to prior years. Mark-recapture studies were conducted upriver from Kalskag between 2002 and 2007. While these mark-recapture studies provided total abundance estimates upriver from Kalskag, they did not provide an estimate of drainagewide abundance or escapement.

8. Are there alternative models to the one used by ADF&G?

Not at this time. The run reconstruction model used by ADF&G is the only published model available for estimating the total run and escapement of Kuskokwim River Chinook salmon. Other researchers have used variations of the ADF&G model as a component of their work and in doing so has identified options for improving the model in the future.

9. Has the run reconstruction model been run yet and are estimates finalized?

Yes, the model has been run. Preliminary run reconstruction model results were provided to the North Pacific Fishery Management Council on October 1. The preliminary model results were informed by the 2017 escapement observed at 17 locations and a preliminary estimate of total subsistence harvest. Run reconstruction model estimates have not been finalized at this time because postseason subsistence harvest surveys have not been conducted.

10. Where there any changes to the run reconstruction model for 2017?

No, the same run reconstruction model that had previously been used to estimate Chinook salmon was used again in 2017. The starting value of the harvest effort component of the model was adjusted to ensure that the model worked properly across all likely harvest values. The model's sensitivity to starting values is well known and will be addressed as we continue to improve the model.

11. Has the run reconstruction model estimate always been publicly available at this time of year?

No it has not. ADF&G has regularly shared preliminary results with agency partners in late fall or early winter. However, ADF&G has typically waited until the spring to publish and publicly share the final model results for the past year. That timeline was necessary to make sure all escapement and harvest data used in the model were complete and accurate. In April 2015, the North Pacific Fishery Management Council adopted an action that lowers Chinook salmon bycatch caps in the Bering Sea pollock fishery when Chinook salmon abundance in Western Alaska is at historically low levels using a combined 3-system index of in-river adult Chinook salmon run sizes from the Unalakeet, Upper Yukon, and Kuskokwim rivers. The Council's action also specified a process by which ADF&G would provide preliminary postseason abundance estimates to the National Marine Fisheries Service by October 1, following the salmon season each year, to determine if the combined adult Chinook salmon abundance in the indexed systems falls at or below the threshold level. ADF&G has complied with this process annually since 2015.

12. When will the final total run and escapement estimates be available and will they change much?

Final run reconstruction model estimates are anticipated by March 2018. Changes to the final estimates will be dependent on results from the postseason subsistence harvest surveys. Preliminary conclusions about the 2017 Chinook salmon run are unlikely to change.

13. What are the preliminary conclusions about this year's total run and escapement?

The 2017 Chinook salmon run was smaller than the long-term average, but showed improvement compared to the recent years of low run sizes (2010–2014). The total run fell within the preseason Kuskokwim River Chinook salmon total run forecast range. Because of the sacrifices made by local subsistence users, Chinook salmon escapement in 2017 met or exceeded the published drainagewide escapement goal. There are 10 tributaries with established escapement goals, of which 9 were assessed in 2017. Of those, 1 was below the lower bound of the goal, 6 were within the goal range, and 2 exceeded the upper bound of the goal.

14. What are the preliminary 2017 total run and escapement estimates for Kuskokwim River Chinook Salmon?

Preliminary 2017 Kuskokwim River Chinook salmon drainagewide run and escapement was estimated to be 165,102 (95% CI: 128,864–211,530) and 149,729 (95% CI: 113,491–196,457) fish, respectively. Preliminary estimates will be updated in early 2018 using final escapement and subsistence harvest estimates. For reference, if the model starting value had not been changed, the model would have produced a slightly smaller, but incorrect, estimate of total run and escapement. The general conclusions about the 2017 and historical run sizes are, however, the same.

15. Why is the post season total run estimate so much larger than what was expected based on inseason Bethel Test Fishery and sonar data?

In hindsight, inseason assessment information did not capture the true size of the 2017 Chinook salmon run. Inseason assessment overwhelmingly indicated the total run was very small and we were unlikely to meet escapement goals. This was not the case; however, conservative management was warranted. Unprecedented low, clear, and warm water throughout the 2017 season may have affected our mainstem assessment projects. Fortunately, postseason data provides a very reliable estimate of total run size because we have the benefit of looking at the whole picture after all assessments are complete. Our best understanding of the Chinook salmon run comes postseason from escapement counts of real fish on the spawning grounds. Escapement data indicates that the 2017 run of Chinook salmon to the Kuskokwim River was generally improved compared to the most recent years of low run size (Table). A total of 14 (82%) escapement monitoring projects reported higher escapements in 2017 compared to the recent 5-year average, 11 (64%) projects exceeded the recent 10-year average, and 5 (28%) projects exceeded the long-term average.

16. Why has the model not been updated with 2014–2016 mark-recapture abundance estimates?

The 2014–2016 mark-recapture estimates are not directly comparable to the 2003–2007 estimates due to changes in tag site location and changes in how escapement to lower river tributaries was determined. Therefore, all mark–recapture estimates need to be standardized before inclusion into

the model. Standardization of mark–recapture data is one of the many objectives of an ongoing model review which includes an interagency review team and an independent peer review team. Until such time that all ongoing model reviews and updates are completed, the published run reconstruction model remains the most appropriate tool for evaluating total run and escapement.

17. Do you have an update of the model review process?

ADF&G has initiated a 2-step process to review and update the Chinook salmon run reconstruction model. The first step involved a 3-year effort (2014–2016) to estimate total run size using mark–recapture and aerial survey methods as a means to ground truth model results during years of low run abundance. The second step involved convening a Kuskokwim River Interagency Model Development Team (KRIMDT) to consider options for incorporating new abundance data and improving the model. The KRIMDT consists of representatives from ADF&G, U.S. Fish and Wildlife Service Office of Subsistence Management, Bechtol Research, and Auburn University. The KRIMDT is charged with the following tasks: 1) develop a model or set of candidate models capable of estimating run size, escapement, and productivity of Kuskokwim River Chinook salmon; 2) co-author a report detailing the development process, preferred model(s), and results of sensitivity or simulation analyses, data inputs, and model code; and 3) engage agency and public stakeholders in the model development process. The timeline for KRIMDT has not been constrained, but we hope to have results available in time for the 2019 Alaska Board of Fisheries meeting addressing the Kuskokwim Area.

The Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYKSSI) has also commissioned an independent peer review of the Kuskokwim Chinook Salmon run reconstruction model. That review is ongoing and we anticipate a final report in late 2017, followed by 2 collaborative modeling sessions in early 2018. The results of this independent review will be considered by the KRIMDT to advance the run reconstruction model for future years.

18. How can I learn more about the Chinook Salmon run reconstruction model or 2017 salmon escapement?

To learn more about the Chinook salmon run reconstruction model, please contact Nicholas Smith (nick.smith@alaska.gov) or Zachary Liller (zachary.liller@alaska.gov).

Kuskokwim River Salmon, Recently Asked

Table -. Historical and recent year observations of Kuskokwim River Chinook salmon abundance. All data are preliminary and subject to change. All Kuskokwim Area assessment data can be accessed at the fish counts page (<http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.salmon#fishcounts>) and the AYK Database (<http://www.adfg.alaska.gov/CommFishR3/Website/AYKDBMSWebsite/Default.aspx>).

Method	Location	Number of years of data (1976-2017)	Historical average (1976-2016)	10-yr average (2007-2016)	5-yr average (2012-2016)	2016	2017
Weir	Kwethluk ^a	16	8,795	5,501	4,953	7,619	7,404
	Tuluksak ^a	21	1,005	461	537	909	609
	Salmon (Aniak) ^b	8	3164	-	1,595	-	2,446
	George	19	3,426	2,371	2,086	1,663	3,671
	Kogrukuk	32	10,139	6,564	5,172	7,056	9,984
	Tatlawiksuk	18	1,631	1,383	1,623	2,494	2,147
	Salmon (Pitka) ^c	3	-	-	-	6,326	8,003
	Takotna ^d	17	417	254	163	-	297
Aerial Survey	Kwethluk ^e	11	2,183	826	1,165	-	-
	Kisaralik	24	1,143	643	628	622	-
	Tuluksak ^e	12	392	128	83	-	-
	Salmon (Aniak)	31	814	519	378	-	423
	Kipchuk	25	1,018	852	698	898	889
	Aniak	22	2,698	2,376	1,558	718	1,781
	Holokuk	16	348	196	73	100	140
	Oskawalik	21	291	136	84	47	136
	Holitna	20	1,637	784	784	1,157	676
	Cheeneetnuk	23	702	255	231	217	660
	Gagaryah	22	447	244	153	135	453
	Pitka ^f	12	221	144	-	-	234
	Bear	19	273	350	654	580	492
	Salmon (Pitka)	29	1,020	1,011	1,320	1,578	687
Harvest	Subsistence	42	68,052	52,860	25,538	30,676	15,000
	Commercial	42	19,630	2,003	169	0	0

Note: Not all projects were operated in all years.

^a Weir operated by USFWS.

^b Weir operated by Native Village of Napaimute under agreement with ADF&G.

^c Weir cooperatively operated by ADF&G and MTNT.

^d Weir operated by MTNT in 2017 under agreement with ADF&G.

^e Aerial surveys not flown since 2013 because system is monitored by a weir.

^f 2017 survey was the first since 2011.