KUSKOKWIM RIVER
INTER-TRIBAL FISH COMMISSION
OUR RIVER, OUR PEOPLE, OUR FISH
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January 31, 2025

Dr. Sherri Dressel, Dr. Jason Gasper, and Dr. Ian Stewart
Co-Chairs, Scientific and Statistical Committee
North Pacific Fishery Management Council
1007 West Third Ave., Suite 400
L92 Building, 4th Floor
Anchorage, AK 99501-2252

RE: Comments on C2: Chum Salmon Bycatch

Dear Co-Chairs and Members of the SSC:

The Kuskokwim River Inter-Tribal Fish Commission (KRITFC) works to represent the 33 federally recognized Tribes of the Kuskokwim River watershed in fisheries management, research, and monitoring. In seeking to protect and sustain Kuskokwim salmon fisheries and traditional ways of life, KRITFC is guided by our Tribes' Indigenous Knowledge and values, as well as the best available Western science.

KRITFC would like to flag the following for the Scientific and Statistical Committee's (SSC) attention as it reviews and provides methodological and analytical recommendations for the Council on the preliminary draft Environmental Impact Statement (PDEIS) analysis for chum salmon bycatch.

1. <u>Assessment of Kuskokwim Sonar as alternate metric for Alternative 3, Option 1</u>

The SSC has been made aware that operations of the Bethel Test Fishery (BTF) project are likely to be discontinued as soon as 2025. This poses a problem for Alternative 3, Option 1, in which BTF cumulative catch-per-unit-effort (CCPUE) has been proposed to establish an abundance threshold for Kuskokwim River chum salmon.

KRITFC has evaluated the alternate metrics for this threshold provided in Appendix 2. We believe the Kuskokwim River Sonar Project is the most appropriate substitute based on its strong regression relationship to BTF, as well as its reliability and accuracy as a widely-used, standard tool for in-season salmon management, availability in the early post-season period (~by September each year), and projected continuation in subsequent years.

Please see our appended analysis of the alternate metrics. We also point you to Appendix 7, section 6 (pages 33-38 of Appendix 7, or pages 238-244 of the combined appendix document), which outlines the relative advantages of the Kuskokwim River Sonar Project for the goals of Alternative 3.

2. Lack of LKTK in AEQ/impact rate models

The SSC asked Council staff to prepare a simplified adult equivalency (AEQ) analysis and impact rate for pollock trawl bycatch on Western Alaska chum salmon. While AEQ and impact rate models can be useful, they ultimately fail to account for the ecological, sociocultural, economic, and spiritual importance of a single fish returning to a river to spawn, particularly if that fish hails from a discrete spawning population that is under extreme fishing pressure (see Appendix 7 pp. 27-28, or pp. 232-233 of combined appendix document). The PDEIS notes that healthy female chum salmon who evades marine trawl nets and predators may spawn up to 4,000 eggs (PDEIS Section 4.4.5.3.3, p. 314), feeding a spawner-recruit ratio that is critical for salmon restoration today.

Local and Traditional Knowledge (LKTK) holders from the Kuskokwim River and other rivers in Western and Interior Alaska have shared their observations about how each female chum salmon who survives her outmigration from her natal stream, successfully evades marine trawl nets and predators while rearing in the sea, manages not to succumb to climate change and heat stress, and then chooses not to give herself to subsistence fishers but instead swims on to lay her eggs in the gravel is invaluable for the sustainability and survival of a species—and of a Salmon People—and of an ecosystem dependent on the nutrients offered by her decaying carcass. These LKTK holders have repeatedly voiced the need to protect every salmon spawner given the dire state of salmon declines and subsistence fishery closures. They have noted, too, the looming presence of climate change complicating salmon restoration efforts, underscoring the need to reduce salmon bycatch—something over which we collectively have control. They have voiced the knowledge passed down for over 10,000 years that wasting fish is the ultimate show of disrespect for salmon that may convince them to stop coming back—and, in recent years, that bycatch is the ultimate form of waste, affecting salmons' decisions and ability to return (see PDEIS Sections 3.2.3.1.1.1, 4.3.3.2, 4.3.3.2.3, and 4.4.5.3.3; and combined Appendix document p. 220).

The methodology and results of the AEQ/impact rate models fail to factor in this LKTK about the value of every chum salmon for the people and ecosystems of our rivers and the warnings against wasting a single fish. KRITFC thus cautions the SSC to put too much weight on what the calculated models share about the relative impact of bycatch, and instead, to learn from what LKTK holders are striving to teach the Council about how it can improve its management practices for the holistic care and restoration of salmon. This approach would more closely align with the LKTKS Protocol of the Council.[1]

Additionally, and similarly, the simplified AEQ and impact rate approach in the PDEIS—in which Kuskokwim commercial and subsistence harvests of chum salmon are used as a proxy for a run reconstruction—does not reflect the true impacts of bycatch to subsistence users and communities. The SSC, Council, and Council staff must explore other ways to investigate bycatch impacts to subsistence Salmon People as informed by LKTK and Western science.

KRITFC asks the SSC to express these considerations in its recommendations and minutes to the Council.

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[1] See https://www.npfmc.org/wp-content/PDFdocuments/Publications/Misc/LKTKSprotocol.pdf.

3. <u>Salmon conservation approach: Higher abundance threshold percentile (Alternative 3)</u>

Salmon conservation and restoration should be the highest goals of this action and the SSC's recommendations to the Council. These are underpinned by the Purpose and Need for this action, which recognizes the importance of salmon and salmon fisheries to Alaskan ecosystems, economies, and people, and states that the Council is exploring chum salmon bycatch management measures in an effort to mitigate the impacts of pollock trawling on these stocks.

One of the ways in which the Council could support salmon conservation and restoration is by selecting a higher abundance threshold in Alternative 3. Doing so may indicate chum salmon declines at an earlier time and adjust allowable bycatch levels accordingly to protect declined stocks. This aligns with the SSC's recommendations, per its April 2024 minutes:

> *"…the SSC notes that a PSC [Prohibited Species Catch] limit would have only been put in place once the chum salmon runs had already declined [when evaluating an abundance threshold of 950,000 fish for Yukon summer chum]. Given the life history of chum salmon and age composition of the bycatch, to be effective one would want to limit the bycatch before that happens.* ***This would suggest that to meet the purpose of this action, higher thresholds would need to be explored****" (April 2024 SSC minutes, p. 10-11; emphasis included in the minutes).*

KRITFC appreciates maintaining a link between bycatch management/PSC limits and abundance, and stresses that any abundance metric must identify, at a minimum, years with low chum salmon as observed in-river by assessment projects, LKTK holders, and fishers. Better yet, this threshold would identify years with downwardly trending abundance so as to implement earlier, precautionary bycatch reduction measures.

We thus ask the SSC to recommend to the Council consider no less than the 50th percentile of each region's abundance assessment metric be established as a threshold in Alternative 3.

<u>Salmon conservation approach: Specific time/area and "backstop" PSC limit combination (Alternatives 2 or 3 + 5)</u>

An additional mechanism to conserve and restore salmon, particularly those from Western and Interior Alaska, could come from a two-fold PSC limit approach.

Genetics data since 2011 indicate there are specific times and areas where the pollock trawl fleet generally encounter higher numbers of Western and Interior Alaskan chum salmon. The Council and current PDEIS explore Alternative 5, which would create a time- and area-specific cap to alleviate fishing pressure when Western and Interior Alaska chum salmon are on the grounds. There is merit to this approach *if* caps are set low enough to meaningfully reduce fishing pressure during chum salmons' migrations.

However, the location of chum salmon in the Bering Sea fluctuates year-to-year. This can challenge attempts to fine-tune spatial/temporal closures so they are consistently applicable and meaningful. Moreover, it is unclear if Western and Interior Alaskan chum salmon migration routes may change as they adapt to a changing climate and food web—or if these changing conditions will alter pollock pathways and fleet movements, for that matter.

This uncertainty—coupled with the present lack of in-season genetics analyses to inform the fleet, managers, and Tribes of Western and Interior Alaskan chum salmon presence in real time —supports the use of a "backstop," Bering Sea-wide PSC limit, set at a low level, that would ensure a ceiling on the amount of chum salmon that can be removed from the Bering Sea.

In effect, this two-fold approach could look like Alternative 2 or 3 combined with Alternative 5. The PDEIS indicates such a combination could provide a path towards salmon conservation:

> "Regardless of which chum salmon PSC limit is driving behavior, either an overall chum salmon PSC limit or a corridor-specific PSC limit, adopting both in combination would likely have a positive impact on chum salmon bycatch by decreasing levels compared to status quo" (PDEIS pg. 320).

Ultimately, however, KRITFC stresses that any cap(s) should be set at a low level to be precautionary and conservation oriented, as well as responsive to Tribal comments and LKTK provided for this action.

Thank you for considering these comments and including them in your recommendations to the Council.

Quyana, Dogidinh, Chin'an, Tsen'anh,

Jonathan Samuelson
Chair

Attachment 1: KRITFC Analysis of Alternate Kuskokwim Metrics (Alternative 3)

KRITFC Analysis of Alternate Kuskokwim Metrics (Alternative 3)
Last updated January 30, 2025 by KRITFC

Recent analyses by NMFS/Council staff have examined the option of using the Bethel Test Fishery (BTF) cumulative CPUE (CCPUE), conducted by the Alaska Department of Fish and Game (ADF&G), to develop a Kuskokwim River chum salmon abundance threshold for Bering Sea pollock trawl fisheries. However, ADF&G has indicated that the BTF project is being discontinued beginning in 2025. This raises questions about what other options exist for establishing a population index for chum salmon returning to the Kuskokwim River.

If the Council wishes to advance Alternative 3, Option 1, it will need to (1) identify a new metric to establish a threshold, (2) establish the range of years for that threshold, and (3) establish a threshold below which Kuskokwim River chum salmon should be considered in low abundance, and set at a level that considers conservation concerns and goals for those chum salmon.

The data available for Kuskokwim River chum salmon, as outlined in Appendix 2 to the chum salmon bycatch preliminary DEIS, are:
(1) Kuskokwim River sonar;
(2) spawning escapements to Kuskokwim River tributaries, including Kogrukluk River (as a standalone or in combination with), Kwethluk River, Salmon-Aniak River, George River, and Takotna River;
(3) estimates of total harvests; and
(4) a drainage-wide run reconstruction, which is not yet available.

Regarding alternates listed in (2), the spawning escapements are based on weir counts at several Kuskokwim River tributaries, although the operation of individual weirs has been quite variable over time, especially due to funding and high-water events that inhibit weir operation.

Regarding alternates listed in (3), an initial subsistence harvest estimate based on the sum of daily lower river inseason subsistence harvest summaries is annually available early post-season (~September) but is an incomplete summary of the total drainage-wide harvests. A more comprehensive subsistence harvest survey is conducted by ADF&G with results usually (but not always) available the following year.

Sonar data (alternate 1), on the other hand, are collected daily in-season and compiled by the early post-season period (~September) and provide a stable, reliable indicator of abundance that tracks closely with BTF CCPUE. Core data for BTF and sonar are shown in Table 1. The sonar has only operated effectively since 2018, and while sonar operation ended in late July in 2018, 2019, and 2024 (vs. late August in other years), operation into late July does cover the majority of the chum salmon run based on historical run timing. ADF&G has communicated with

KRITFC staff that they are working to secure stable funding to consistently run the project into August and monitor as much of the annual chum salmon return as possible.

<u>Evaluating BTF and Sonar</u>

A simple linear regression of the sonar counts from BTF counts proved highly significant ($P << 0.01$), although the sample size is relatively small ($n = 7$ years). Figure 1 show the regression, while Figure 2 shows an extrapolation of the regression relationship to the years 1992–2017 for which sonar data are not available. (Note: While BTF data date to 1984, this analysis uses the time series 1992–2024 to align with the 1992–2022 time series used in the Council's analysis, with the addition of the two most recent years of available data.)

Table 1. Kuskokwim River chum salmon observations by BTF and sonar. 1992–2024.

Year	BTF	Sonar	Year	BTF	Sonar
1992	3,057		2009	8,255	
1993	2,586		2010	7,655	
1994	4,801		2011	10,028	
1995	3,986		2012	6,893	
1996	8,256		2013	5,737	
1997	1,965		2014	6,343	
1998	2,337		2015	2,945	
1999	549		2016	3,998	
2000	2,599		2017	6,785	
2001	3,396		2018	8,205	552,011
2002	6,798		2019	6,415	385,409
2003	4,816		2020	1,443	76,432
2004	5,247		2021	327	26,973
2005	18,192		2022	2,186	103,864
2006	13,927		2023	4,304	251,542
2007	10,655		2024	5,981	253,825
2008	6,749				

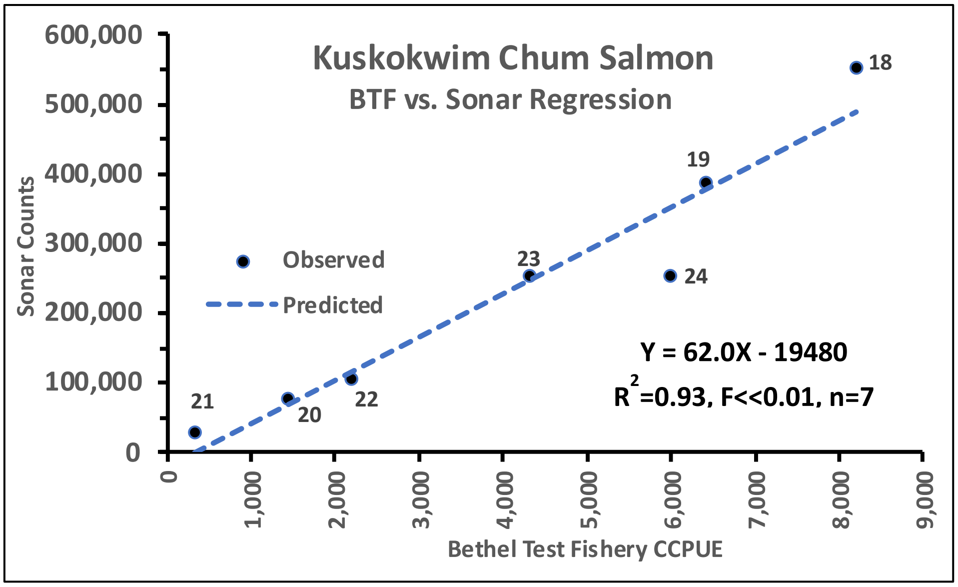

Figure 2. Regression of sonar data against BTF CCPUE for the years 2018–2024.

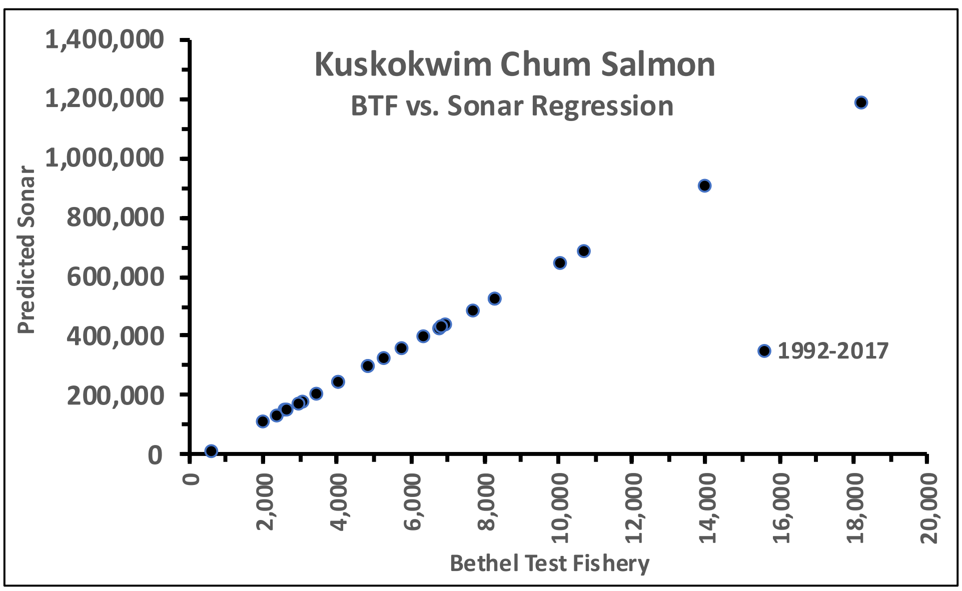

Figure 1. Regression of Kuskokwim River sonar onto BTF CCPUE to develop the time series for 1992–2017.

Combining the observed sonar counts for 2018–2024 with the extrapolated ("hindcasted") counts for 1992–2017 provides a potential time series for what the sonar counts of chum salmon returns to the Kuskokwim River might have looked like during 1992–2024. Thresholds based on the 25th and 50th percentiles (following the Council's current analysis of BTF CCPUE thresholds) as well as the 75th percentile (providing a more precautionary approach for comparison) of the time series are shown (Figure 3).

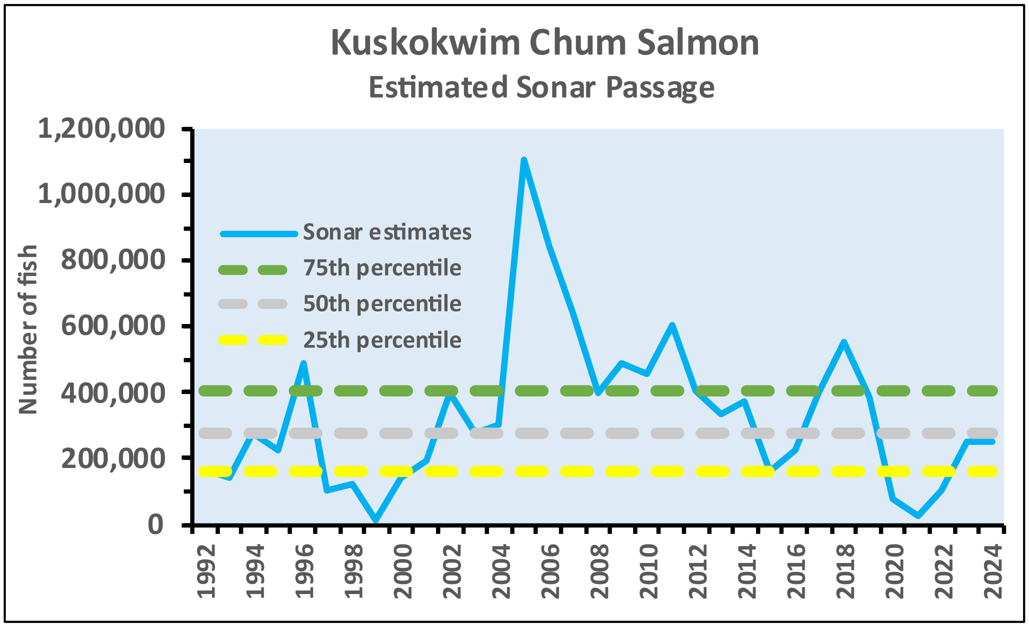

Figure 3. Time series of annual sonar counts of chum salmon returning to the Kuskokwim River compared to the 25th (yellow), 50th (gray), and 75th (green) percentiles for the time series, 1992–2024.

Table 2 shows the values for BTF in 1992–2024, and for Kuskokwim sonar as observed for 2018–2024 and predicted for 1992–2017, based on the regression. Highlighted are years with sonar and BTF at or below the 25th (yellow), 50th (gray), and 75th (green) percentiles. Note that the sonar values are predicted from the BTF values and are not independent so they should match closely in terms of percentile highlights.

During the 33 years from 1992–2024, KRITFC estimates that chum salmon assessments would have fallen below the abundance threshold set at the 25th percentile in 9 years, below the 50th percentile in 17 years, and below the 75th percentile in 25 years. Importantly, the recent low abundance period from 2020–2024 would have been flagged by the 50th and 75th percentiles, but not the 25th percentile.

Table 2. Observed BTF cumulative CPUE and observed (2018–2024) and estimated (1992–2017) sonar counts of Kuskokwim River chum salmon. Note that percentiles calculated below may vary from those in the current preliminary draft EIS due to the addition of 2023 and 2024 data.

Year	Sonar	BTF	Year	Sonar	BTF
1992	169,648	3,057	2009	491,847	8,255
1993	140,453	2,586	2010	454,656	7,655
1994	277,750	4,801	2011	601,747	10,028
1995	227,232	3,986	2012	407,423	6,893
1996	491,909	8,256	2013	335,784	5,737
1997	101,960	1,965	2014	373,319	6,343
1998	125,019	2,337	2015	162,683	2,945
1999	14,189	549	2016	227,947	3,998
2000	141,259	2,599	2017	400,738	6,785
2001	190,661	3,396	2018	552,011	8,205
2002	401,535	6,798	2019	385,409	6,415
2003	278,680	4,816	2020	76,432	1,443
2004	305,396	5,247	2021	26,973	327
2005	1,107,793	18,192	2022	103,864	2,186
2006	843,427	13,927	2023	251,542	4,304
2007	640,611	10,655	2024	253,825	5,981
2008	398,497	6,749			

Percentile	Sonar	BTF
25th	162,683	2,945
50th	278,680	5,247
75th	407,423	6,893

In addition to considering the close relationship between BTF and the sonar, KRITFC notes that ADF&G has indicated that the original intent of exploring a sonar project on the Kuskokwim was to phase out the BTF project, and that existing funding and operational capacity for BTF will be shifted to sonar once BTF is discontinued.

Evaluating Weir Escapements

Another consideration is to look at annual chum salmon escapement values for weirs on the Kogrukluk, Kwethluk, George, Salmon (Aniak), and Takotna rivers, particularly to explore consistency in "poor years" as identified by weir escapements compared to other potential metrics.

The Kogrukluk River has a formal ADF&G escapement goal range of 15,000–49,000, and years with escapements below 15,000 are identified with boxes in Table 3, including years prior to the escapement goal range establishment in 2005. Other tributaries lack formal escapement goals, but for exploratory purposes, we identified the years that were at or below the 25th (yellow), 50th (gray), and 75th (green) percentiles of escapement returns for all tributaries (Table 3). Years without escapement counts are left blank. (Note: While Kogrukluk escapement data exists back to the 1970s, this analysis begins the time series in 1992 to align with the 1992–2022 period in the Council's analysis.)

There is variability among tributaries and years in terms of whether a majority of the tributaries in a given year fell below a given percentile, but in most cases, years in which the Kogrukluk failed to meet the escapement goal were aligned with poor escapements in other operational tributaries.

Investigating the Kogrukluk River independently, from 1992–2024, KRITFC estimates that chum salmon assessments would have fallen below the abundance threshold set at the 25th percentile in 8 years, below the 50th percentile in 14 years, and below the 75th percentile in 21 years. Five of these years (1997, 1999, 2000, 2021, and 2022) also assessed spawner abundance that fell below the lower end of the escapement goal range (15,000 fish). Four years that fell below the 75th percentile also surpassed the upper end of the escapement goal range (49,000 fish; 2002, 2007, 2010, and 2018). All years in which the escapement goal was not met on the Kogrukluk also fell below the 25th percentile-based low abundance threshold for the sonar and BTF. Most (but not all) years in which abundance would have fallen below a threshold for the Kogrukluk River would have been mirrored according to the sonar and BTF thresholds, though not necessarily at the same percentile level.

Investigating the other tributary escapements together, from 1992–2024, KRITFC estimates that chum salmon assessments would have fallen below the abundance threshold set at the 25th percentile for one or more rivers in 12 years, below the 50th percentile in 18 years, and below the 75th percentile in 27 years.

As noted above, weir operation has been inconsistent due to funding, capacity, and climate-related high water events. Should the Council select one or more weir-based escapements to set an abundance threshold for the Kuskokwim, there will likely be a similar situation with a lack of operational funding or data limitations as has occurred over time. Additionally, it should be noted that the complexity of establishing an abundance threshold increases when based on more than one tributary escapement estimate – as does the potential vulnerability of the threshold should the weir(s) not operate in a given season – though this approach may more acutely link bycatch management with discrete spawning populations in distinct tributaries and regions of the Kuskokwim watershed.

Table 3. Kuskokwim River chum salmon escapements to the primary tributaries monitored by weirs, 1992–2024.

Year	Kogrukluk	Kwethluk	George	Salmon (Aniak)	Takotna
1992	36,085	30,595			
1993	30,021				
1994					
1995	32,466				
1996	48,225		19,368		2,873
1997	7,957		5,906		1,839
1998					
1999	14,140		9,834		
2000	11,426	11,708	3,486		1,265
2001	31,481		11,298		5,409
2002	52,912	34,714	6,530		4,463
2003	23,708	41,813	30,944		3,292
2004	24,429	38,759	14,172		1,636
2005	194,896		14,847		6,493
2006	183,743	48,257	41,596	41,159	12,658
2007	53,064	62,456	62,681	25,228	8,913
2008	44,717	20,757	29,616	9,459	5,705

Year	Kogrukluk	Kwethluk	George	Salmon (Aniak)	Takotna
2009	81,829	32,226	7,940	9,336	2,556
2010	63,612	18,919	26,187		4,039
2011	76,649	17,552	45,257		8,562
2012			33,277		6,039
2013	65,648	16,271	37,945	7,685	6,516
2014	30,697	17,942	17,183	2,777	
2015	33,091	23,071	17,554	5,511	
2016	45,234	31,666	19,469		
2017	85,793	52,202	39,971	9,754	6,557
2018	52,937		48,915	18,770	6,007
2019	71,006	31,100	43,072		5,618
2020	19,020		8,943	1,995	
2021	4,153		1,371	537	
2022	13,471	8,563	8,429	1,051	
2023			15,253		2,763
2024			20,243		

Kogrukluk escapement goal 15,000–49,000

Percentile	Kogrukluk	Kwethluk	George	Salmon -Aniak	Takotna
25th	24,249	18,186	9,611	2,582	2,846
50th	40,401	30,848	18,461	8,511	5,514
75th	64,121	37,748	34,444	12,008	6,499

To explore general agreement between sonar and escapement as metrics, Table 4 highlights years during 1992–2024 when (1) the sonar counts are estimated to have been below the 25th (yellow), 50th (gray), or 75th (green) percentiles of the time series, and (2) the weir escapement counts were below the escapement goal (Kogrukluk – dashed boxes) or the 25th (yellow), 50th (gray), or 75th (green) percentiles for at least one half of the tributaries monitored in a given year. There is alignment in many, but not all, years.

Table 4. Qualitative comparison of chum salmon returns to the Kuskokwim River based on observed and estimated sonar counts and tributary escapements, 1992–2024.

Year	Sonar	Escapement.		Year	Sonar	Escapement
1992				2009		
1993				2010		
1994				2011		
1995				2012		
1996				2013		
1997				2014		
1998				2015		
1999				2016		
2000				2017		
2001				2018		
2002				2019		
2003				2020		
2004				2021		
2005				2022		
2006				2023		
2007				2024		
2008						

Recommendations

In summary, given that the BTF program for the Kuskokwim River is being discontinued, and tributary weir escapements have been somewhat inconsistent over time and are potentially more complex and uncertain to evaluate, **KRITFC proposes using the regression relationship between BTF and sonar for 2018–2024 to hindcast sonar counts for 1992–2017 to expand the sonar count time series, and to use the Kuskokwim sonar project to establish a meaningful, conservation-oriented abundance threshold from those values.**

It is important to KRITFC that the late 1990s and early 2020s should be recognized by the chosen threshold as periods of "low chum salmon abundance," as these were the years with observed historic low abundances on the Kuskokwim River. Additionally, we flag the years 2015 and 2019–2024, when Amounts Necessary for Subsistence (ANS) for chum salmon were not met by Kuskokwim subsistence communities, which further indicates low abundance. From our analysis hindcasting sonar counts, **a threshold at the minimum of the 50th percentile (approximately 280,000 fish) would signal low abundance during these periods, and at the 75th percentile (approximately 410,000 fish) may be more precautionary and aimed at**

salmon conservation by signaling forthcoming low abundance. Meanwhile, a threshold at the 25th percentile would not capture these years as "low abundance," which would fail to align bycatch management measures with in-river harvest attainment and abundance data.