

DRAFT

2021 KUSKOKWIM RIVER SALMON MANAGEMENT STRATEGY



Draft of April 30, 2021

PURPOSE: This 2021 Kuskokwim River Salmon Management Strategy (Strategy) is intended to provide guidelines for a conservation and cooperative management framework for the Kuskokwim River Inter-Tribal Fish Commission (Commission) and the U.S. Fish and Wildlife Service (USFWS) at the Yukon Delta National Wildlife Refuge (YDNWR). As partners the Commission and the YDNWR are committed to collaboratively utilizing this Strategy in the 2021 salmon season, and to further develop this Strategy into a longer-term salmon management plan as per the Memorandum of Understanding (MOU) signed by both entities in 2016.

Guiding Principles & Objectives

- **Avoid collective overharvest of salmon and rebuild Chinook salmon populations** within the Kuskokwim River watershed through application of a precautionary approach to harvest management.
 - Prioritize meeting drainage-wide and tributary escapement targets over other objectives during the near-term Chinook salmon recovery and rebuilding phase.
 - Take a conservation-based approach to management by considering sources of uncertainty and external risk factors, out of direct management control, including the cumulative effects of multiple risk factors.

- Implement Chinook salmon conservation and management actions based on a mixed stock / multi-stock management approach, that addresses the inherent differences in productivity among various stocks.
- Due to very high uncertainty associated with recent prior-year forecasts, prioritize in-season indicators of run strength, and run timing over the pre-season forecast.
- Take a wholistic view of all pertinent sources of in-season information, including measures of abundance, run timing, and species composition provided by agencies as well as harvesters
- **Sustainably manage other currently healthy salmon populations within the Kuskokwim River watershed.**
 - Consider the impacts that harvesting currently healthy stocks will have on stocks that are less productive or already at low relative abundance.
- **Uphold fish conservation/diversity mandates within the Alaska National Interest Lands Conservation Act (ANILCA) and within YDNWR which enable legislation and management plans.**
- **Work to support and strengthen the relationship between the Commission and YDNWR established under the MOU.**
- **Integrate meaningful local and traditional knowledge** into the fisheries management decision-making process.
 - Actively consider and utilize local and traditional knowledge to help inform in-season fisheries management decisions.
 - Strive to consider local observations in the same context as standardized fishery abundance indices and statistical tools.
- **Strive to provide for continued customary and traditional subsistence harvest.**
 - Provide as much customary and traditional subsistence harvest of currently healthy salmon stocks by rural residents as possible, informed by sustainable salmon management practices that clearly address the mixed-stock challenge of these fisheries.
 - During the Chinook salmon rebuilding phase, strive to provide maximum opportunity for customary and traditional harvest of salmon for federally qualified users without jeopardizing drainage-wide and tributary escapements of Chinook salmon essential for future salmon returns.
 - Provide equity of harvest opportunity across the entire watershed.

Salmon Declines and Unmet Subsistence Needs

Chinook Salmon Concern:

Except for one of the past 11 years (2019), the Kuskokwim River Chinook salmon run continues to experience low abundance and productivity (Figure 1).

Due to this prolonged decline and low productivity, Kuskokwim River Chinook salmon runs have not been abundant enough to meet defined subsistence needs since 2010 (Figure 2). Based on the 2020 data inputs into ADF&G's Kuskokwim River Chinook salmon run reconstruction model, the 2020 total run was estimated to be 124,486 fish (95% CI: 102,661–150,952) and escapement was estimated to be 88,285 fish (95% CI: 66,460–114,751) (Larson 2021).

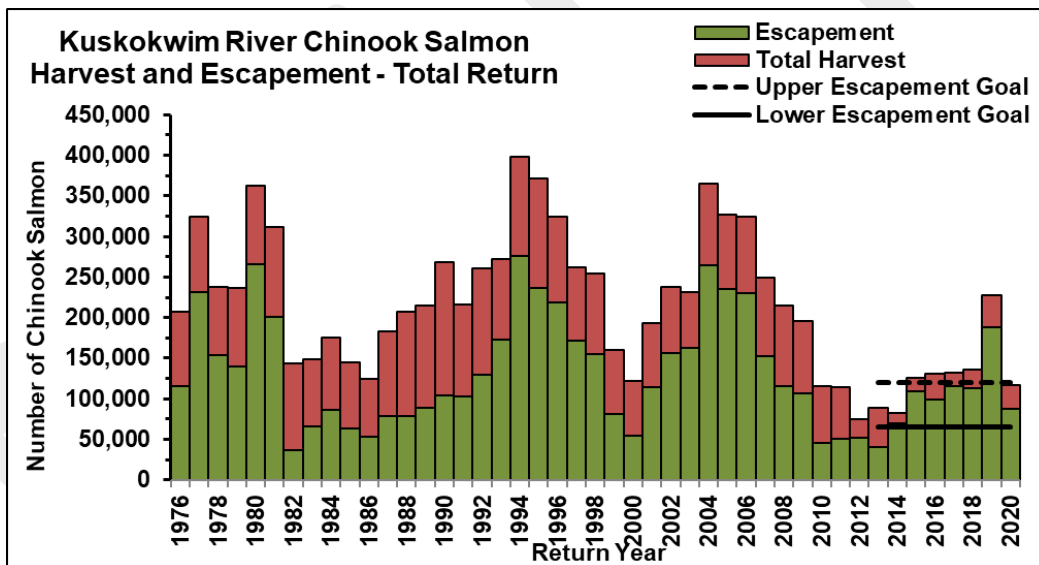


Figure 1: Kuskokwim River Chinook salmon escapement and total harvest by all user groups during 1976—2020. *Source: Kuskokwim River Salmon Management Working Group November 18, 2020, meeting packet, Alaska Department of Fish & Game.*

Subsistence needs here are based on analysis of the long-term average harvests in the watershed, which are also reflected in an amount necessary for subsistence¹ (ANS) determination by the Alaska Board of Fish (BOF) in 2001 and updated in 2013.

¹ In the absence of a formal Federal metric used by the Federal Subsistence Management Program to evaluate whether subsistence needs are being adequately provided, we reference the only available subsistence metric for Kuskokwim River salmon stocks, which is found in Alaska BOF regulations (5 AAC 01.286(b)). The Alaska BOF established the current ANS uses of Kuskokwim River salmon in 2013, based upon the harvest history beginning in 1990. If the Federal Subsistence Board decides to establish a similar metric regarding Federal subsistence use amounts, it is likely to be based upon the same historical harvest data given that those data represent only the harvests by Federally qualified rural residents.

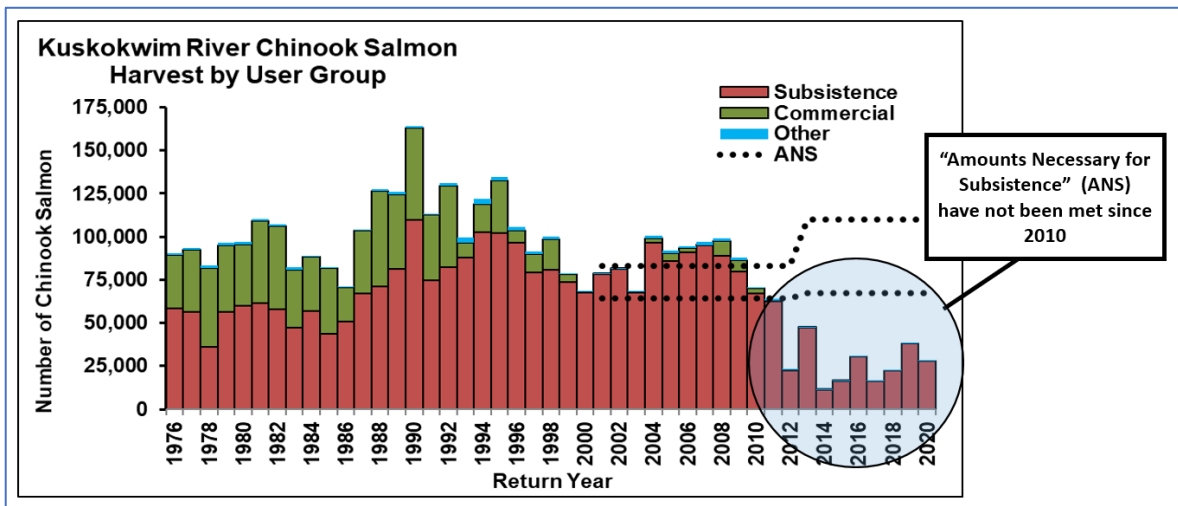


Figure 2. Kuskokwim River Chinook salmon harvest by user groups during 1976—2020, showing that long-term subsistence harvest needs in the watershed have not been met since 2010. (Subsistence harvest needs are based on Amounts Necessary for Subsistence as determined by the Board of Fish). *Source: Kuskokwim River Salmon Management Working Group November 18, 2020, meeting packet, ADF&G.*

In addition to this decline in abundance and adult productivity, a recent and significant decline in the freshwater productivity of Kwethluk River salmon (surviving out-migrating juveniles produced per returning adult) of about 50% each year from 2015 to 2018 has been [documented by USFWS biologists](#). The Kwethluk River is one of the two most productive tributaries currently monitored in the entire Kuskokwim River drainage.

2020 Chum Salmon Concerns:

In the recent decade, chum salmon have been the most abundant species in the river, as shown in Figure 8 below. However, available information sources align to support the conclusion that the 2020 chum salmon return was alarmingly low and among the lowest in the past two decades. (Note: no drainage wide estimates of total run or total escapement are available for Kuskokwim chum salmon.)

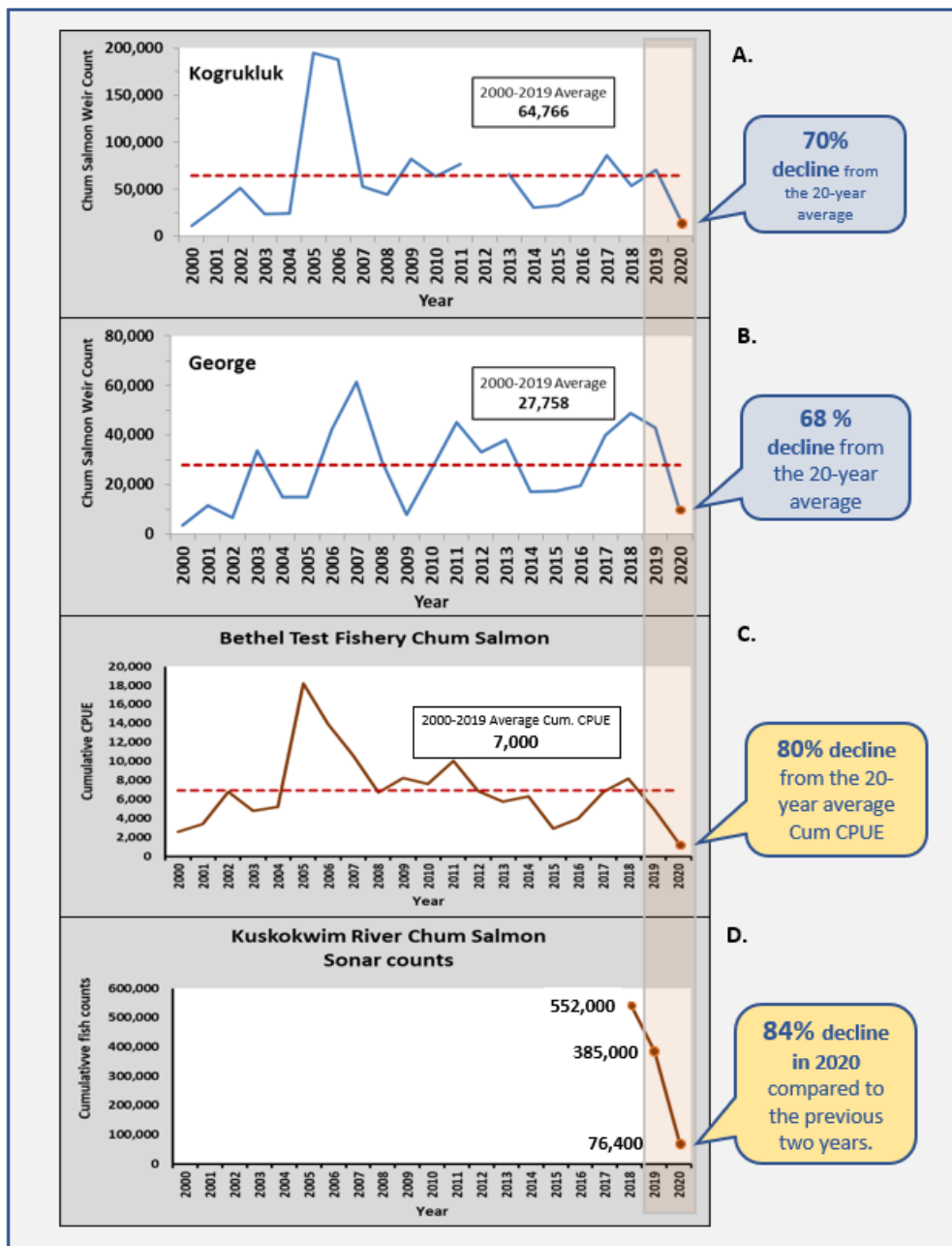


Figure 3: Evidence of very low 2020 Kuskokwim River chum salmon abundance. Annual chum salmon weir counts, and the long-term averages, for the **A.** George River and **B.** Kogrukluk river, 2000–2020 (*data for 2020 are preliminary*). **C.** Cumulative end-of-season CPUE of chum salmon caught in the Bethel Test Fishery, 2000–2020. **D.** Cumulative annual counts of chum salmon from the Kuskokwim River sonar project, 2018–2020.

Sources: Tiernan et al. (2018); ADF&G, unpublished data. Tiernan, A., C. Lipka, and N. Smith. 2018. *Kuskokwim River salmon stock status and Kuskokwim area fisheries, 2019: a report to the Alaska Board of Fisheries*. Alaska Department of Fish and Game, Special Publication No. 18-19, Anchorage. DF&G (Alaska Department of Fish and Game), unpublished data. Informational packet for the November 18, 2020, meeting of the Kuskokwim River Salmon Management Working Group. ADF&G, Bethel Test Fishery, ADF&G (Alaska Department of Fish and Game), AYK Database Management System.

Figure 3 above shows the evidence of this decline based on two in-season indicators (Bethel Test Fish Project cumulative catch-per-unit-effort (CPUE) and Bethel sonar project) and two tributary escapement monitoring projects (Kogrugluk River weir and George River weir). This disastrously low chum abundance in 2020 was also confirmed by the direct observation by fishers, as reported to the KRITFC in-season managers and via KRITFF/BSFA Community Based Harvest Monitoring Project. As an indicator of the 2020 poor chum run, Bethel sonar project recorded the passage of more Chinook salmon than chum salmon - even though the 2020 Chinook run was relatively poor.

Risk Factors & Management Challenges Facing the 2021 Run(s)

In addition to uncertainties in forecasts and in-season data that present challenges in meeting our management objectives, new research has documented several risk factors (Figure 4) most of which are not accounted for in salmon Biological Escapement Goal or management metrics.

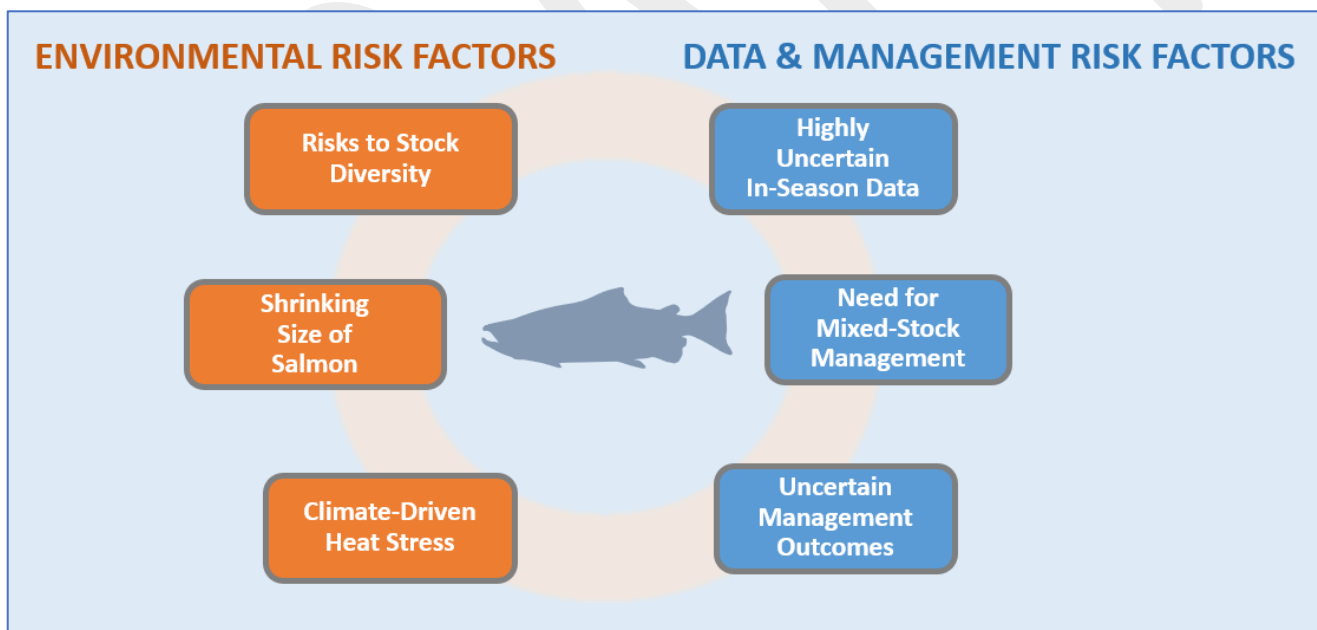


Figure 4: Overview of environmental / ecological risk factors, and data and management related risk factors.

ENVIRONMENTAL RISK FACTORS

Risks to Stock Diversity

Stock Diversity in a Mixed Stock Fishery: Protecting diversity is hard when many salmon stocks are harvested in a **mixed fishery** because not all salmon stocks are productive enough to sustain the same level of harvest as shown in (Figure 5). (Connors et al. 2020)



Figure 5: Overview of the benefits of maintaining salmon population diversity on the long term stability of salmon runs.

Shrinking Size of Salmon

Significant Long-Term Decline in the Size of Returning Adult Salmon: An independent expert panel that reviewed declines in the size and reproductive potential of Alaska-Yukon-Kuskokwim region Chinook salmon found a 40% decline in average total reproductive potential of Kuskokwim River Chinook salmon over the period 1976-2018 (Ohlberger et al. 2019) (Figures 6 and 7).

Decline in Caloric Value of Salmon: Due to this documented long-term decline in the size of returning adult Chinook salmon, we now know that 100 fish caught in the early 1970s provided on average the same amount of caloric energy as approximately 138 fish caught in recent years in the Kuskokwim River.

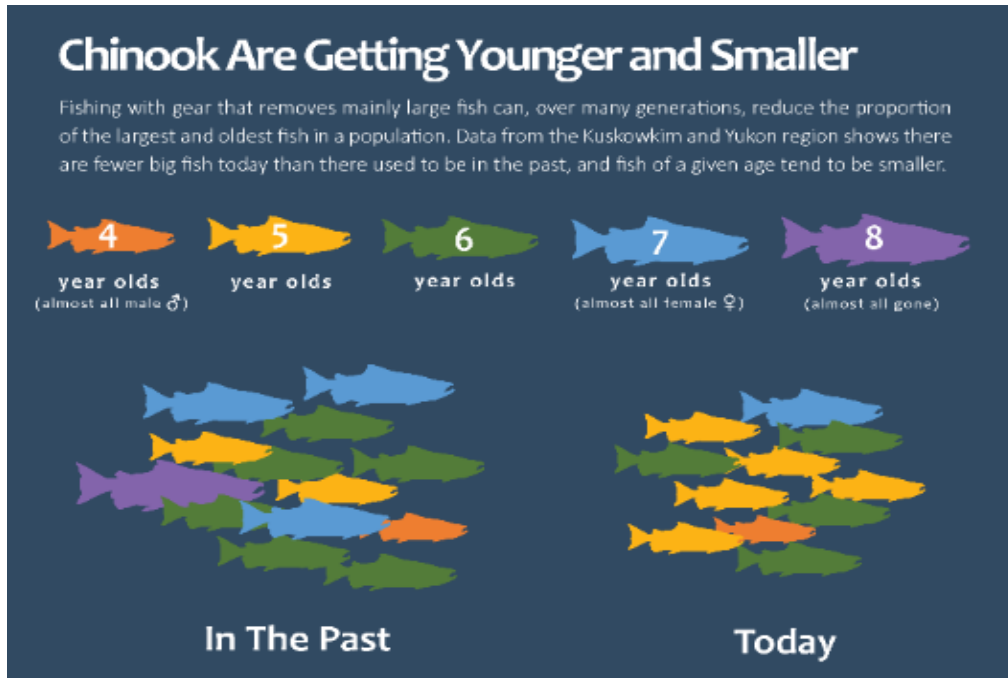


Figure 6: Data from the Kuskokwim and Yukon region shows that there are fewer big fish today than in the past, and fish of a given age class tend to be smaller (Ohlberger et al. 2019).

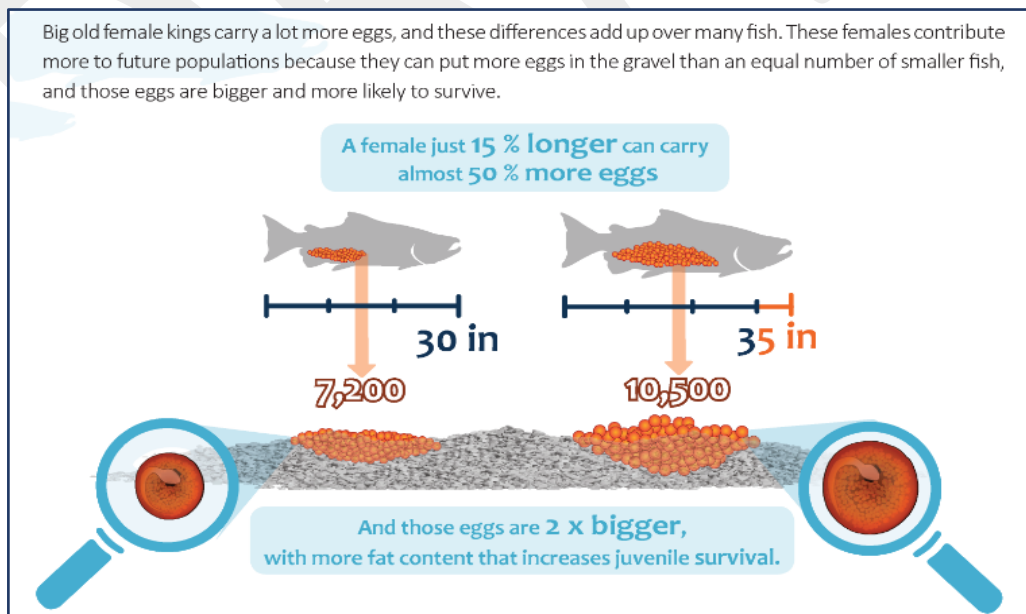


Figure 7: Adult Chinook salmon in the Yukon and Kuskokwim Rivers are increasingly younger and smaller, which means female spawners are depositing fewer and smaller eggs in the gravel. Smaller egg size can have a significant impact on the survival of the resulting juvenile salmon (Ohlberger et al. 2019).

Climate-Driven Heat Stress

Heat Stress in Migrating Spawners: Heat events that result in water temperatures above 65°F, such as the one that occurred in 2019, pose risks to migrating adult salmon (*von Biela et al. 2020*).

DATA & MANAGEMENT RISK FACTORS

Highly Uncertain In-Season Data

Sources of Uncertainty: Management decisions within Federal waters of the Kuskokwim River must be made using **limited in-season run abundance and run timing information:**

- **High Forecast Uncertainty:** The level of uncertainty associated with the prior-year forecast method currently used to produce the Kuskokwim River Chinook salmon preseason forecast is very high, making a practice of managing to the forecast risky.
- **Bethel Test Fish Project** is a long-term index of run strength and run timing which serves as the main formal management tool. While it provides general categorical (high, med. Low) measure of abundance, is a very imprecise in-season indicator of the total run size (which is only available post-season).
- **Bethel Sonar Project** is fairly new in-season indicator of run strength/run timing and remains experimental. It has served as an increasingly helpful and informative additional source of run strength and run timing information in recent years.
- **Community-Based Harvest Data** from Bethel and a subset of lower river communities provides critical information about harvest during openings, including species ratios and catch per unit effort. This in turn provides immediate information about salmon abundance during a harvest opportunity. This community-based information is particularly valuable because it is provided directly by harvesters and therefore is seen as highly credible.

Even when these data sources are combined, it can be very difficult to accurately assess run timing and run strength. This uncertainty translates into risk of not meeting our management objectives. Therefore, we either need to know more, or take a precautionary approach to harvest management.

Need for Mixed-Stock Management

Importance of Multi-Stock Management for Conserving Chinook Salmon:

From mid-June to mid-July the run timing of Chinook, chum, and sockeye salmon overlaps (Figure 8). That means that during most Chinook salmon subsistence harvest opportunities, subsistence fishers are harvesting salmon

in a mixed-stock fishery in Federal waters of the Kuskokwim River; this results in harvests of various ratios of Chinook, chum, and sockeye salmon across the season. Because salmon in this mixed stock fishery are harvested using non-selective 6” mesh gillnet gear, it is not possible to target chum and sockeye salmon without potentially impacting Chinook salmon during the length of the Chinook salmon run (Figure 8).

For the past seven years, YDNWR conservation actions aimed at Chinook salmon effectively required YDNWR to manage all three species in Federal waters due to their overlapping run timing during the bulk of the Chinook salmon run. For example, numerous Federal management actions during this period that closed fishing to all species of salmon between directed Chinook salmon harvest opportunities were intended to avoid overharvesting declined Chinook salmon. Due to the mixed stock nature of the fishery, these Chinook salmon conservation actions significantly limited the ability of subsistence users to harvest of chum and sockeye salmon, even during years when chum and sockeye salmon were abundant.

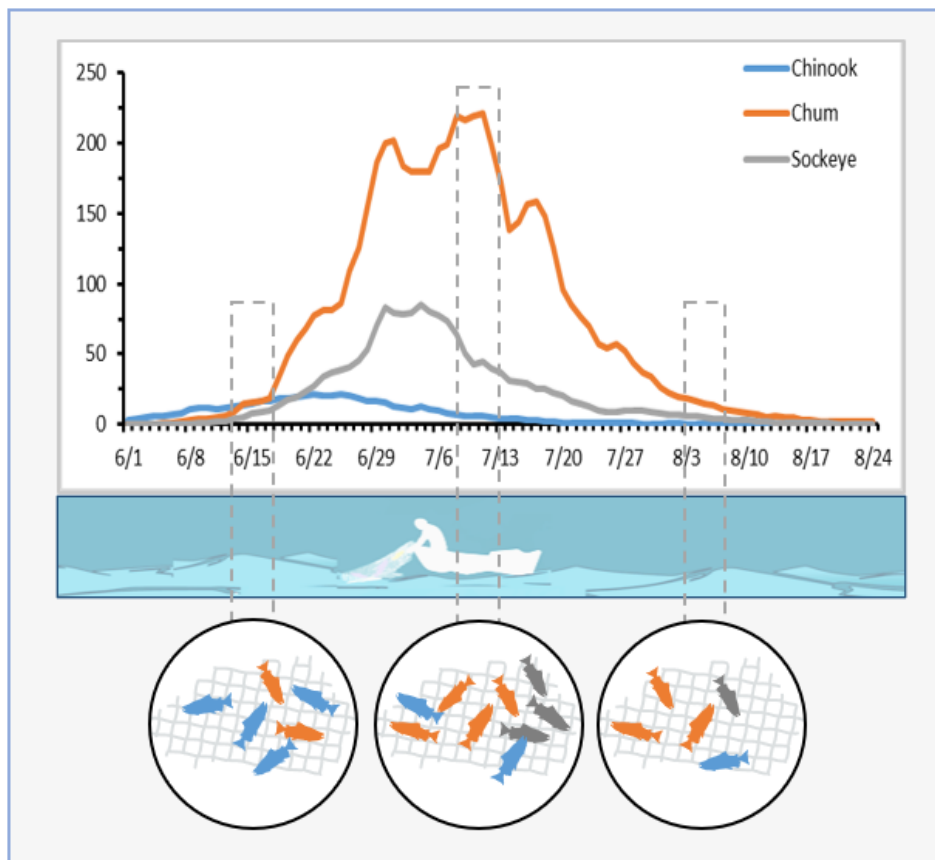


Figure 8: This figure of the average run timing from Bethel Test Fish data for the past ten years shows the overlapping run timing of kings, chum and red salmon. Harvesting with driftnets that harvest all species requires the management of chum and sockeye in order to ensure Chinook conservation and rebuilding. [Note: Numbers on the left side of the figure are not numbers of salmon, but simply an index of abundance (Bethel Test Fish Cumulative CPUE.)]

Given the realities run timing and use of non-selective fishing gear, we anticipate that it will be necessary to continue careful mixed-stock management in 2021 because there is no practical way to conserve and rebuild Chinook salmon populations within this mixed stock gillnet fishery without also managing chum and sockeye salmon.

The 2020 chum salmon run was alarmingly low as indicated in Figure 3. If chum numbers remain significantly depressed in 2021, it may impact in-season salmon management in **two ways**:

- 1) measures may be needed to ensure that chum salmon are sustainably managed and not overharvested within Federal waters, per the conservation mandates of the YDNWR;
- 2) the later portion of Chinook run may need additional conservation measures if the ratio of chum-reds to Chinook makes Chinook more vulnerable to harvest, compared with a similar time in the recent past when the fishery was primarily targeting chum salmon.

This interaction between Chinook salmon and chum salmon management is an important reminder of why this 2021 Management Strategy must embrace a mixed-stock approach to fisheries management and why it is critical to continue to closely monitor and assess chum in-season abundance and escapement.

OVERVIEW OF 2021 PRESEASON & IN-SEASON MANAGEMENT APPROACH: Ensuring Conservation-Based Harvest Management

To provide harvest opportunities while also (1) addressing the environmental and management risk factors listed above and (2) meeting essential conservation objectives, ***we support the following management approach:***

- **Due to ongoing conservation concerns, for the seventh year in a row, the 2021 salmon season will begin under the authority of the Federal in-season manager** with harvest limited to federally qualified users per the provisions of Title VIII of ANILCA.
- **We will work to support and strengthen the relationship between the Commission and USFWS/YDNWR established under the Memorandum of Understanding (MOU).** The 2016 MOU between the Commission and YDNWR formalized the fishery management partnership between the parties. The MOU shall guide the relationship between the Commission and YDNWR, and both the Commission and YDNWR shall comply with its terms when collaboratively making fisheries management decisions and implementing fishery management projects.

- **We will review preseason forecast and forecast uncertainty.**
- **We will support preseason salmon harvest closure from June 1 - June 11 to protect headwaters stocks.**
- **We will carefully evaluate in-season salmon population data and harvest assessment data between harvest opportunities.** The Commission and YDNWR in-season managers will regularly examine a variety of in-season indices when making in-season management decisions.
- **We will review risk factors and sources of uncertainty impacting harvest management** (see Figure 9 below).
- **We will use local and traditional knowledge** from Commission in-season managers and other rural subsistence users to help inform assessment of run strength and run timing.
- **We will collect and use in-season subsistence harvest data.** The Community-Based Harvest Monitoring (CBHM) program provides valuable real-time in-season harvest and catch-per-unit-effort data for the subsistence fleet data that should be integrated into the in-season management decision-making process.
- **We will carefully monitor the chum salmon run** and adapt our management approach as needed to respond to low chum abundance in 2021.
- **We will communicate to Federally qualified subsistence users the need for a conservative management approach based on assessment between openings to avoid overharvest, which includes:**
 - Communicating the possibility that taking management action to avoid overharvest, as occurred in 2013, can result in some foregone harvest/ underharvest.
 - Communicating that foregone/underharvest, if it occurs, can help provide equity of harvest across the watershed, rebuild salmon populations, and protect salmon population diversity.
- **We will adopt a 2021 Chinook salmon escapement target at the upper end of the existing escapement goal range to provide conservation-focused approach to fisheries management when faced with the cumulative effects of multiple uncertainty and risk factors (Figure 9).** Specifically, we will adopt a precautionary escapement target of **110,000 Chinook salmon**, which is the same escapement target which has informed Federal Chinook salmon management for the past four years. An important reason for adopting this precautionary escapement target is that salmon management on this river is made difficult and more risky by the months-long time lag between when harvest decisions are made and when we know the effect of those decisions on meeting our annual escapement target. This time lag, combined with the risk factors and sources of uncertainty listed above necessitates a precautionary approach to avoid collective overharvest.

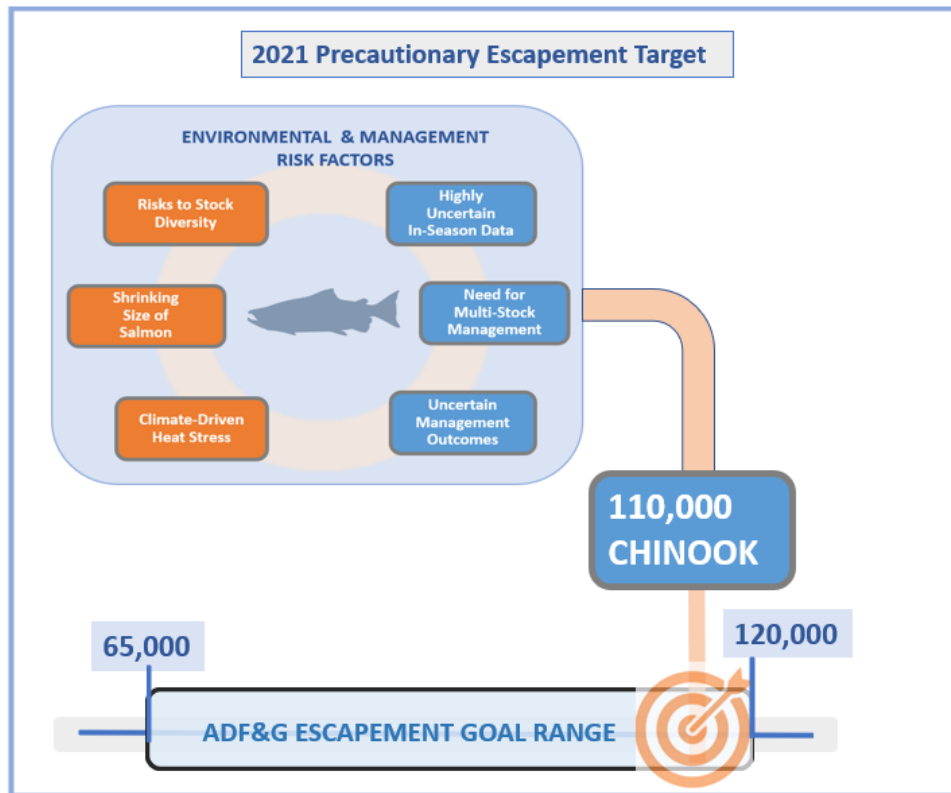


Figure 9: 2021 Precautionary Escapement Target is focused on the upper end of the current ADF&G Escapement Goal Range (65,000-120,000 Chinook salmon) in response to direct effects and cumulative effects among multiple risk factors and sources of uncertainty and the need to conserve and rebuild the population.

Develop a 2021 Kuskokwim River Salmon Harvest Strategy: In addition to the conservation and management framework presented here, we will cooperatively develop a more detailed 2021 Kuskokwim River Salmon Harvest Strategy prior to the beginning of the 2021 salmon run which will lay out how we will implement this conservation-based management approach during the early run period, mid-run period, and late run period.

REFERENCES

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