

DRAFT

2022 KUSKOKWIM RIVER SALMON MANAGEMENT AND HARVEST STRATEGY



Draft of April 15, 2022

PURPOSE: This 2022 Kuskokwim River Salmon Management and Harvest 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 (Refuge). As partners the Commission and the Refuge are committed to collaboratively utilizing this Strategy in the 2022 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 and chum 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. (Note that few escapement targets and no biological escapement goals currently exist for chum salmon in the drainage.)

- Take a conservation-based approach to management by considering sources of uncertainty and external risk factors which are out of direct management control, including the cumulative effects of multiple risk factors.
- Implement Chinook and chum 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 holistic 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 species within the Kuskokwim River watershed to avoid collective overharvest.**
- **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 the Refuge established under the MOU.**
- **Integrate meaningful local and Indigenous Knowledge** into the fisheries management decision-making process.
 - Actively consider and utilize local and Indigenous 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 and chum salmon rebuilding phase, strive to provide maximum opportunity for customary and traditional harvest of salmon for Federally qualified subsistence users without jeopardizing drainage-wide and tributary escapements of Chinook and chum 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 2021 season harvest and abundance information used in the Kuskokwim River Chinook salmon run reconstruction model, the preliminary 2021 estimate of total run for Kuskokwim River Chinook salmon is **129,005** (95% CI: 93,700–177,600) fish, with an estimated escapement of **101,203** (95% CI: 65,900–149,800) fish (Smith 2021). Note: Because Kwethluk weir project and aerial surveys were not operated in 2021 season, the 2021 estimate of escapement is highly uncertain.

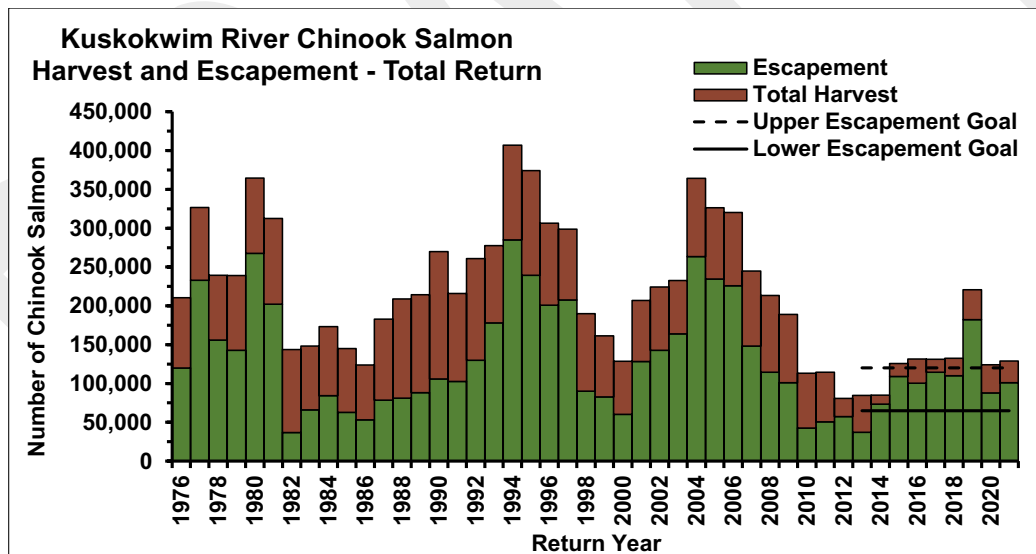


Figure 1: Kuskokwim River Chinook salmon escapement and total harvest by all user groups during 1976–2020. *Source: Kuskokwim River Salmon Management Group November 10, 2021, meeting packet, Alaska Department of Fish & Game.*

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, *Draft of April 15, 2022*

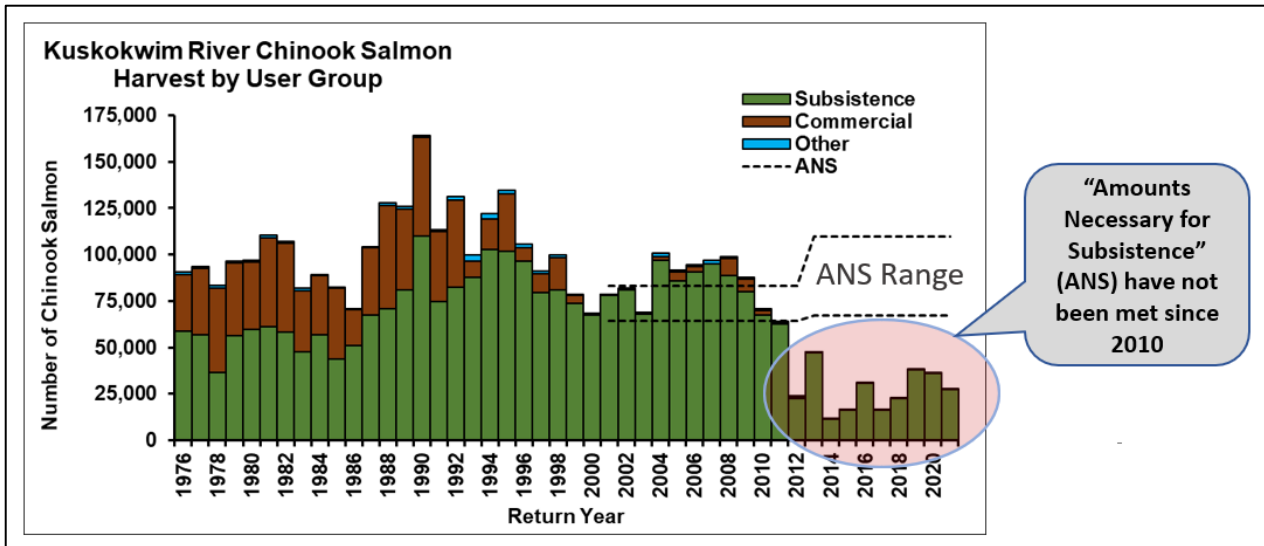


Figure 2. Kuskokwim River Chinook salmon harvest by user groups during 1976—2020, showing that long-term subsistence harvest needs in the watershed have not been met since 2010. (Subsistence harvest needs are based on Amounts Necessary for Subsistence as determined by the Board of Fish). *Source: Kuskokwim River Salmon Management Working Group November 10, 2021, meeting packet, ADF&G and Smith 2021.*

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.

Chum Salmon Concerns:

In the recent decade, chum salmon have been the most abundant species in the river, as shown in Figure 8. However, available information sources align to support the conclusion that the 2021 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.)

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.

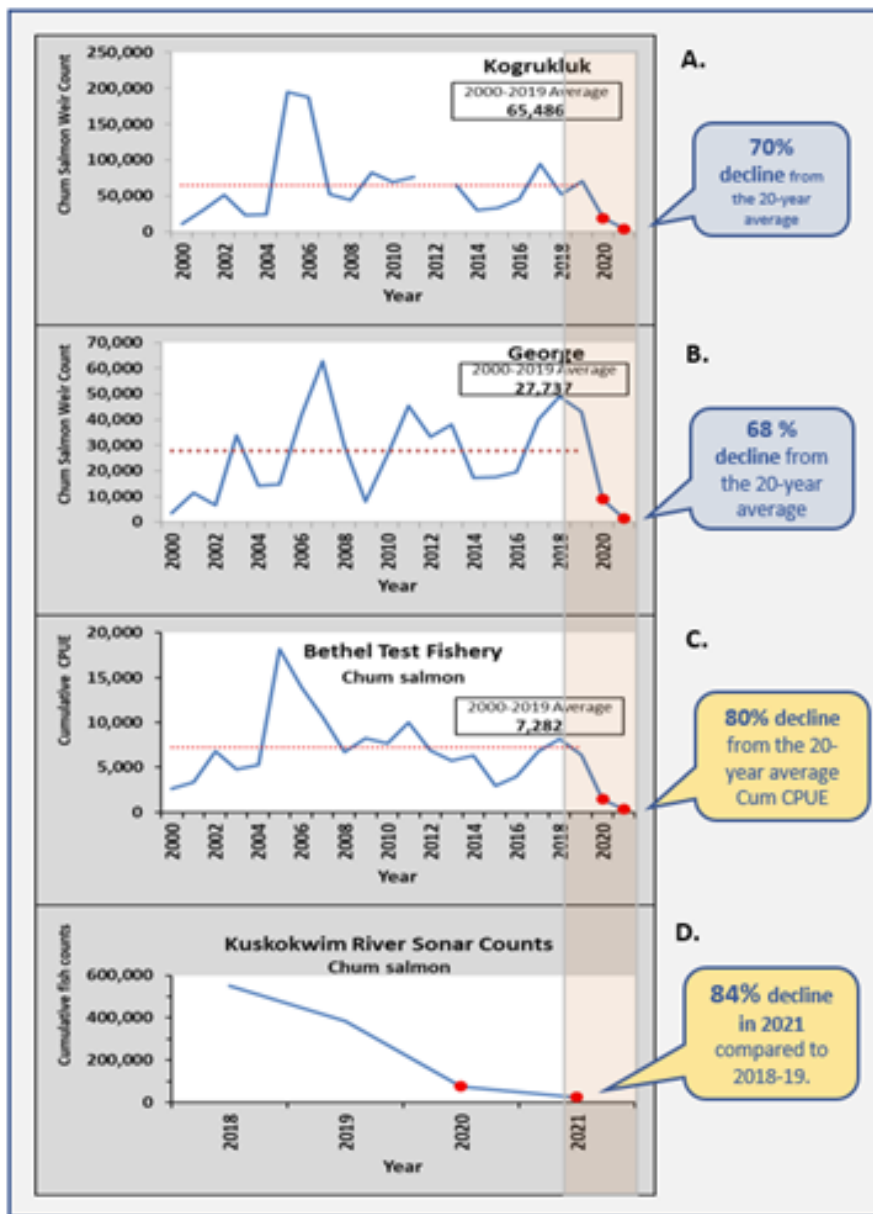


Figure 3: Evidence of continued severe decline of the Kuskokwim River chum salmon populations. Annual chum salmon weir counts, and the long-term averages, for the **A.** George River 2000–2021. **B.** Kogrukluk river, 2000–2021. **C.** Cumulative end-of-season CPUE of chum salmon caught in the Bethel Test Fishery, 2000–2021. **D.** Cumulative annual counts of chum salmon from the Kuskokwim River sonar project, 2018–2021. **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. ADF&G, unpublished data. Informational packet for the November 10, 2022, meeting of the Kuskokwim River Salmon Management Working Group. ADF&G, Bethel Test Fishery, ADF&G, 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 (Kogrukluk River weir and George River weir). This disastrously low chum abundance in 2021 was also confirmed by the direct observation by fishers, as reported to the *Draft of April 15, 2022*

Commission in-season managers and via the Commission’s Community Based Harvest Monitoring (CBHM) project. As an indicator of the poor 2021 chum run, Bethel sonar project recorded the passage of more Chinook salmon than chum salmon – even though the 2021 Chinook run was relatively poor.

Risk Factors & Management Challenges Facing the 2022 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.

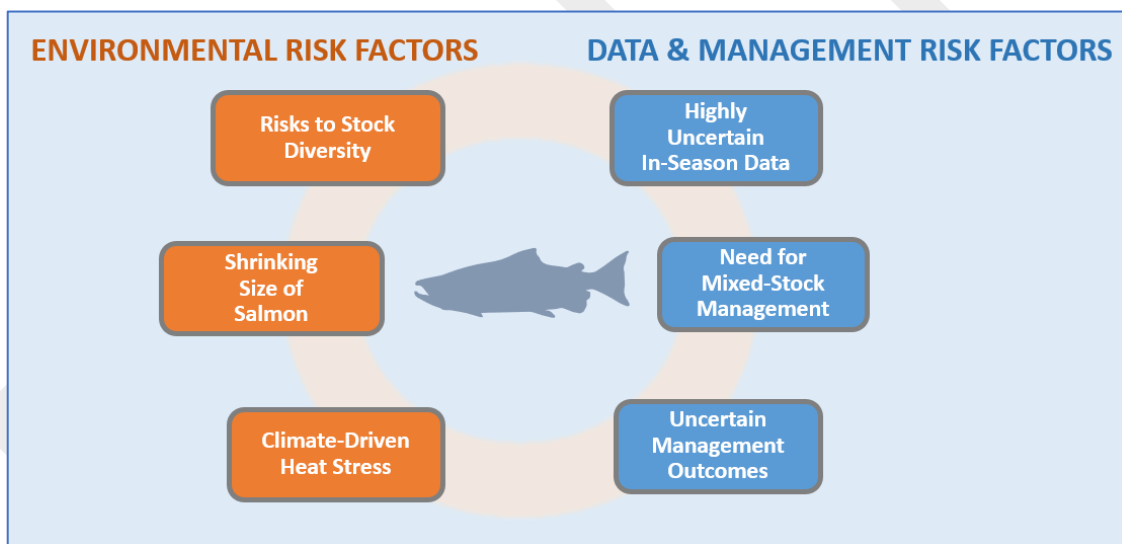


Figure 4: Overview of environmental/ecological risk factors, and data and management related risk factors.

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 Chinook Salmon:

An independent expert panel that reviewed declines in the size and reproductive potential of Arctic-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.

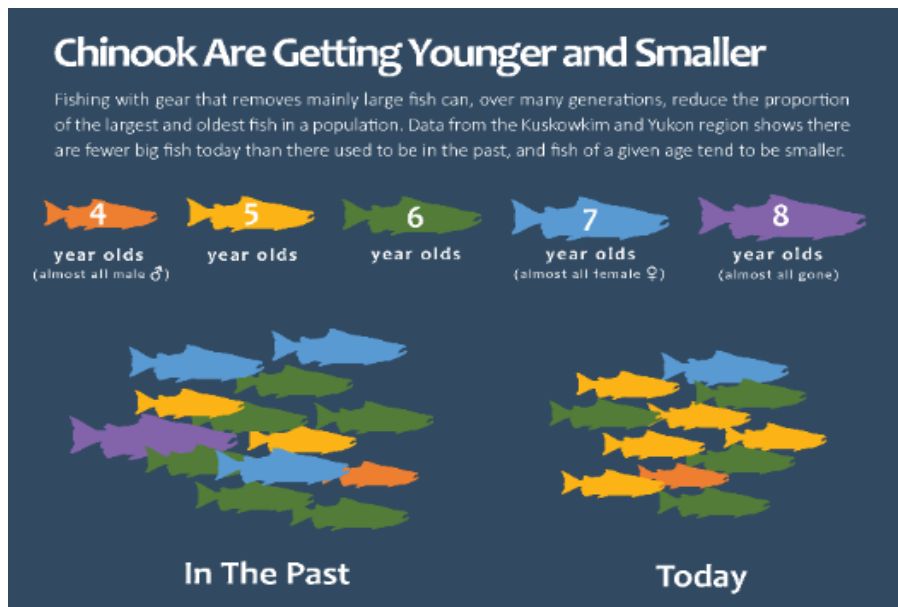


Figure 6: Data from the Kuskokwim and Yukon region shows that there are fewer big fish today than in the past, and fish of a given age class tend to be smaller (Ohlberger et al. 2019).

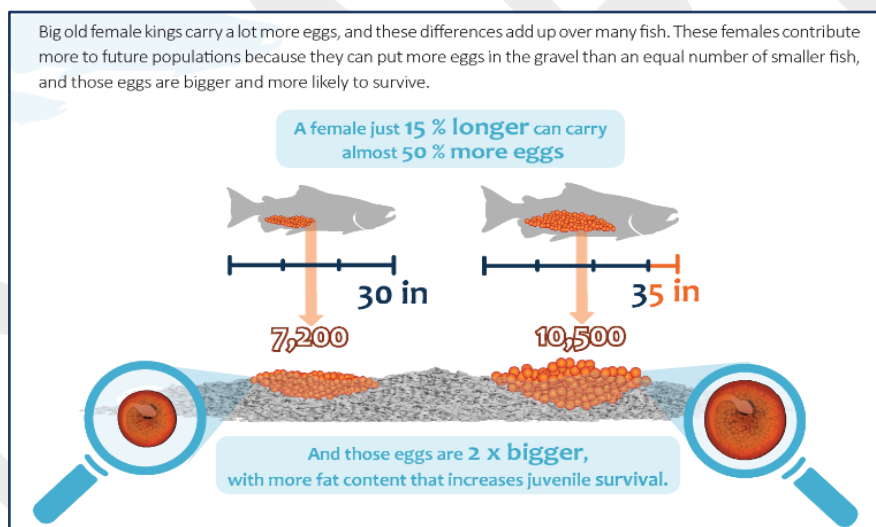


Figure 7: Adult Chinook salmon in the Yukon and Kuskokwim Rivers are increasingly younger and smaller, which means female spawners are depositing fewer and smaller eggs in the gravel. Smaller egg size can have a significant impact on the survival of the resulting juvenile salmon (Ohlberger et al. 2019).

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 Sonar Project**, while being a fairly new in-season indicator of run strength/run timing and remains experimental, 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.
- **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 based on information from the past 25 years, the Bethel Test Fish Project is a very imprecise in-season indicator of the total run size (which is only available post-season).

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 Salmon Conservation: From mid-June to mid-July the run timing of Chinook, chum, and sockeye salmon overlaps (Figure 8). That means that during most Chinook and chum 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 and chum salmon during the length of their runs (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. Additionally, with our current chum conservation concerns, it is imperative to uphold a precautionary management approach in this mixed stock fishery.

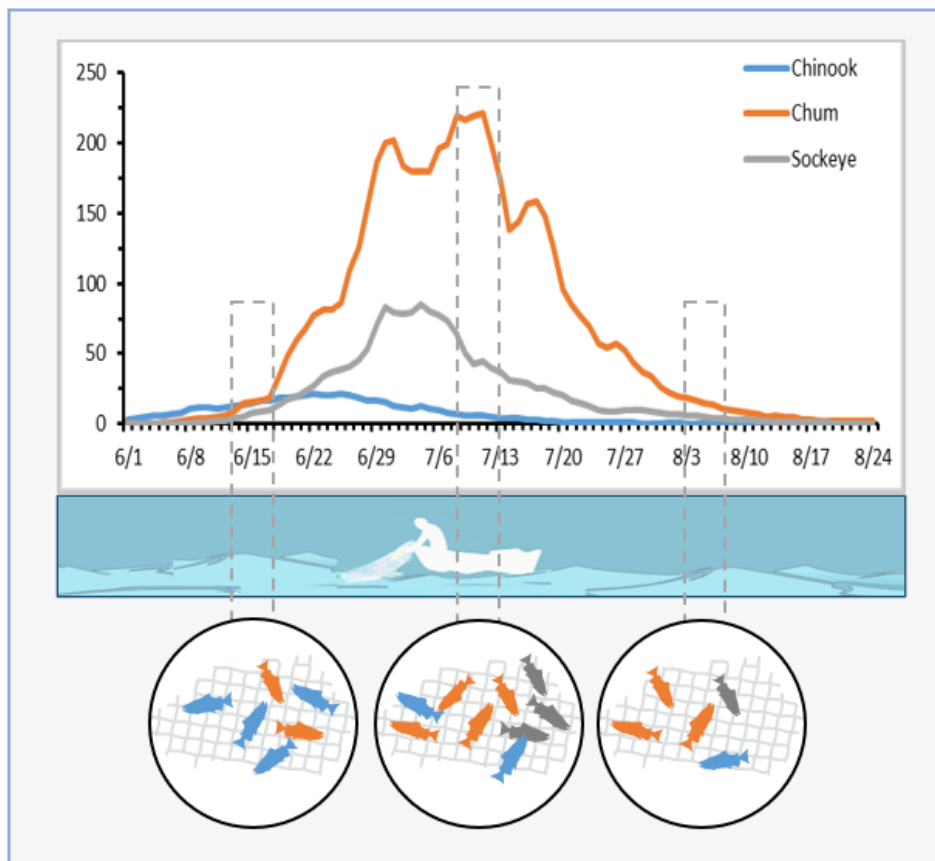


Figure 8: Average run timing from Bethel Test Fish data for the past 11 years shows the overlapping run timing of kings, chum and red salmon. Harvesting with driftnets that harvest all species requires the management of chum and sockeye in order to ensure Chinook conservation and rebuilding. (Note: Numbers on the left side of the figure are not numbers of salmon, but simply an index of abundance based on many year of information from Bethel Test Fish Fishery Project.)

Given the overlapping run timing and use of non-selective fishing gear, we anticipate that it will be necessary to continue careful mixed-stock management in 2022 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 and 2021 chum salmon runs were alarmingly low as indicated in Figure 3. If chum numbers remain significantly depressed in 2022, 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 Refuge;
- 2) The later portion of Chinook salmon 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 and chum salmon management is an important reminder of why this 2022 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 2022 PRESEASON & IN-SEASON MANAGEMENT APPROACH: Ensuring Conservation-Based Harvest Management of Chinook and chum runs

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 eighth year in a row, the 2022 salmon season will begin under the authority of the Federal in-season manager** with harvest limited to federally qualified subsistence users per the provisions of Title VIII of ANILCA.
- **We will work to support and strengthen the relationship between the Commission and USFWS/the Refuge 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 a 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 Refuge 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 Indigenous 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 CPUE data from subsistence harvester that will be integrated into the in-season management decision-making process.
- **We will carefully monitor the chum salmon run** and anticipate the need to extend our conservation-based management approach to the 2022 chum salmon season based on the disastrously low runs of chum salmon in 2020 and 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.
- **In response to the cumulative effects of sources of uncertainty and multiple risk factors (Figure 9) we will adopt a precautionary Chinook salmon escapement target of 100,000-120,000, focused on the upper end of the current escapement goal range of 65,000 to 120,000.**
- Due to several sources of uncertainty and the imprecision of management actions, it will never be possible to precisely achieve any specific salmon escapement number. Therefore, it is appropriate to structure our escapement target as a range. Management uncertainties and challenges include:
 1. A high degree of uncertainty about in-season abundance and salmon run timing.
 2. Uncertainty about how many salmon will be harvested in any given harvest opportunity.
 3. A 6-to-8 week time lag between the time when harvest decisions are made (May through July) and when we can estimate the effect of those decisions on meeting our escapement target (end of September).

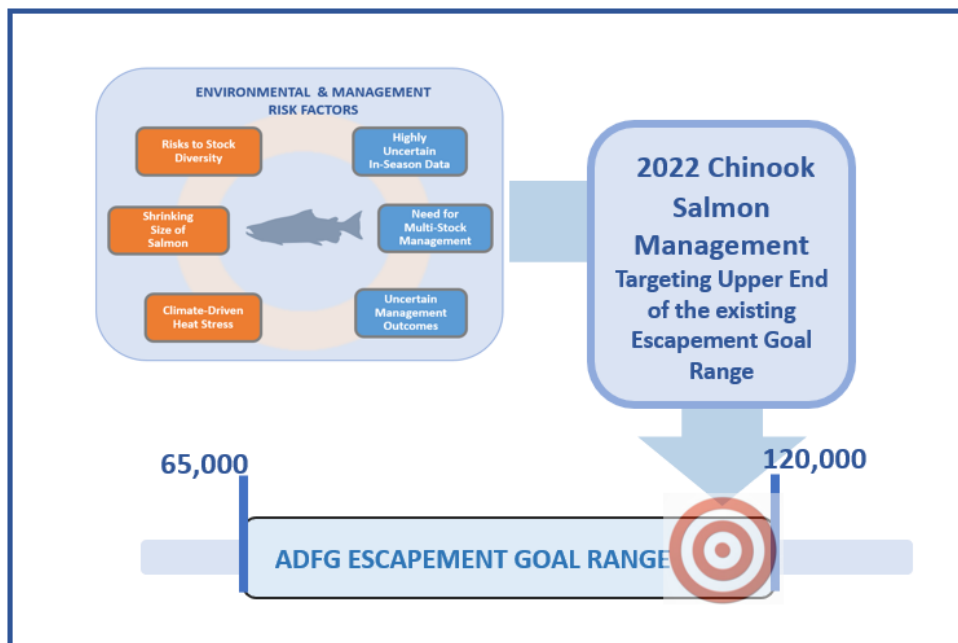


Figure 9: The 2022 precautionary escapement target aims at the upper end of the current escapement goal range (65,000-120,000 Chinook salmon) in response to cumulative effects among multiple risk factors and sources of uncertainty and the need to conserve and rebuild the population.

Our Approach to Using Information to Make Harvest Decisions:

- No single source of information about Kuskokwim salmon abundance or harvest levels provides a reliable *in-season indicator* of run abundance on its own. So, it is important to not focus on a single source of information, but to consider multiple sources of information that together point toward the same direction regarding run abundance and run timing.
- Due to very high uncertainty associated with recent prior-year forecasts, **our approach will be to prioritize in-season indicators of run strength and run timing using information from a set of fisheries projects that operate during the Chinook salmon season over using the pre-season forecast.**
- Total run abundance can be estimated with greater confidence only late in the Chinook and chum salmon runs.
- Each of the in-season information sources listed below has significant limitations, especially during the first half of the Chinook salmon run.
- Early in the season, we face the challenge of very minimal and often conflicting information from the currently available in-season data sources regarding the size and timing of the run. Therefore, we need to proceed with caution, especially during the first half of the run.

- Later in the season – sometime after June 21 – these sources of information taken together begin to paint a picture of how abundant the Chinook salmon run size is this year.
- It is important to remember that based on existing information sources it is not possible to put hard numbers on the size of run *in-season*. Rather the size of the run can only be assessed in rough categories such as: likely low abundance/poor run; likely a fair run; likely a strong run; likely a very abundant run. As the season progresses our confidence in our categorical assessment of the run abundance increases.

Key Sources of In-Season Information

We draw on four key sources of in-season information, each of which is valuable and helps inform decisions:

Indigenous Knowledge and local observations from Commission In-Season Managers and other rural subsistence users help inform assessment of run strength and run timing is combined with these three key sources of information described in more detail above:

- **Bethel Sonar Project**
- **Community-Based Harvest Data**
- **Bethel Test Fish Project**

Harvest Opportunities: Early Season June 1 – 11

BEFORE JUNE 1: Historic data from the Bethel Test Fishery and telemetry work suggests that Chinook salmon are unlikely to be present in large numbers within Refuge waters before June 1.

FEDERAL CLOSURE DATE, JUNE 1:

There are no significant changes from the 2020 Section 804 subsistence user prioritization analysis approved by the Federal Subsistence Board (FSB) that warrant revisiting the 804 analyses. Except for one of the past 11 years (2019), the Kuskokwim River Chinook salmon run continues to experience low abundance and productivity. Due to this prolonged decline and low productivity, Kuskokwim River Chinook salmon runs have not been abundant enough to meet subsistence needs since 2010. In addition, available information sources align to support the conclusion that the 2020 and 2021 chum salmon returns were alarmingly low and among the lowest in the past two decades.

The effective date chosen for the requested action are to begin June 1 and continue through the Chinook salmon season, or until rescinded by subsequent Federal Action. Federal subsistence

fisheries regulations are already in place to prevent use of 6”-or-less mesh-sized gillnets before June 1, unless superseded by Federal special action. Therefore, we feel that closure on June 1 will provide adequate protection measures at the front-end of the salmon returns.

EARLY SEASON SET NET OPPORTUNITIES DURING JUNE 1 – 11:

During early June, many local subsistence users opportunistically harvest Chinook salmon while actively fishing for whitefish species. Historic data from the Bethel Test Fishery and telemetry work suggests that Chinook salmon numbers increase about 1 percent per day, making them much more vulnerable to harvest during the June 1 through June 11 period. Telemetry projects indicate that early run Chinook salmon are disproportionately composed of headwater stocks. In an effort to conserve and rebuild these headwater stocks and to allow for a fair and equitable harvest of Chinook salmon species, the closure to the use of gillnets for the harvest of salmon in Federal public waters of the Kuskokwim River from June 1 through June 11 is important.

As has been provided in the past seven years, **in 2022 we propose three (3) 16-hour set gillnet opportunities for Federally qualified subsistence users**, which includes residents of the Kuskokwim River drainage and the villages of Cheforanak, Kipnuk, Kwigillingok, and Kongiganak, to harvest Chinook salmon on Federal public water of the Kuskokwim River mainstem, except for the waters of the area referred to as the Aniak Box. The dates of the three opportunities are **[STILL DRAFT AS OF APRIL 15: June 1, June 4, and June 8, with the following start time and end time for each opportunity: 6:00 a.m. to 10:00 p.m.]**

Harvest Opportunities: Mid-Season June 12 – 20

MANAGEMENT OF MIXED STOCK SALMON FISHERIES:

During the mid-season period (June 12 through June 20), the fishery becomes a mixed stock fishery with overlapping run timing of Chinook, chum, and sockeye salmon. As shown in Figure 8 above, from mid-June to mid-July the run timing of Chinook, chum and sockeye salmon overlap. That means that during the majority of the Chinook salmon subsistence harvest opportunities, subsistence fishers are harvesting salmon in a mixed-stock fishery in Federal waters of the Kuskokwim River. When 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.

Each year for the past seven years, the need for conservation actions aimed at conserving and rebuilding Chinook salmon stocks have required Federal in-season management actions impacting the harvest of all three species in Federal waters due to their overlapping run timing during the bulk of

the Chinook salmon run. Numerous management actions (via emergency special action) closing fishing to all species of salmon for all users between short-duration subsistence harvest opportunities for Federally qualified subsistence users, until such time that in-season Chinook salmon conservation measures are no longer needed.

There is no practical way to conserve and rebuild Chinook salmon populations within this mixed stock gillnet fishery without also taking management actions that restrict the harvest of chum and sockeye salmon during closed fishing periods. Given the current forecast, in 2022 we anticipate the need for fishery closures restricting the use of all gillnets during closed periods to provide for the conservation of Chinook salmon.

DRIFT AND SET NET OPPORTUNITIES, JUNE 12-20:

We propose to pre-announce a total of [STILL DRAFT AS OF APRIL 15: two (2) 12-hour drift and set gillnet opportunities for Federally qualified subsistence users to harvest Chinook salmon] on Federal public water of the Kuskokwim River mainstem, except for the waters of the area referred to as the Aniak Box. Additional drift and set gillnet harvest opportunities Federally qualified subsistence users may be announced during this period depending on in-season assessment of Chinook run abundance and the need for conservation measures.

Additional details including allowable means and methods and details regarding closures of tributaries and other special areas to the harvest of salmon with gillnets will be provided in in-season Federal special actions.

When each of these 12-hour harvest opportunities expire, Federal public waters of the Kuskokwim River, will remain closed to the harvest of Chinook salmon with gillnets until opened again by Federal special actions and Federal public waters of the Kuskokwim River will remain open Federally qualified subsistence users with all other allowable means and methods.

Harvest Opportunities: Late Season June 21 – 30

We anticipate that sometime after June 21, the in-season data from the four information sources listed above will begin to converge to give us greater confidence in our assessment of how abundant the Chinook salmon run size is this year. However, it is important to use all these information sources together to get an idea of Chinook salmon total run abundance and not only after the season is over can run size estimates be produced. Additional drift and set gillnet harvest opportunities Federally qualified subsistence users may be announced during this period depending on the results in-season assessment of Chinook and chum salmon run abundance and the need for conservation measures.

In addition, we intend to continue to carefully monitor the chum salmon run and will adapt our management approach as needed in the event of low chum abundance in 2022.

End of Federal Season

The Federal in-season manager anticipates relinquishing Federal management back to the State of Alaska when there is no longer a demonstrable need for Chinook and/or chum conservation measures requiring limiting harvest of salmon to Federally qualified subsistence users.

REFERENCES

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Smith, N. letter provided to the North Pacific Fisheries Management Council from ADF&G is attached to this email. The letter can also be downloaded at:

<https://meetings.npfmc.org/CommentReview/DownloadFile?p=73525360-d677-4355-ab79-e75fc441f969.pdf&fileName=B5%202021%20Chinook%20index%20letter%20to%20NMFS.pdf>

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