United States Department of the Interior

FISH AND WILDLIFE SERVICE
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REPLY REFER TO: YDNWR

April 30, 2020

TO: Anthony Christianson, Chairman,
Federal Subsistence Board
Office of Subsistence Management
1011 E. Tudor Road
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FROM: Ray Born, Acting Refuge Manager, Federal In-Season Manger
Yukon Delta National Wildlife Refuge (YDNWR)

RE: U. S. Fish and Wildlife Service (FWS) Kuskokwim River In-Season Management Strategy for 2020

For the 2020 season, the goal is to incorporate what has been learned in recent years and implement a robust fishery management strategy that will reflect a balance of Chinook Salmon conservation and meet the needs of Federally qualified subsistence users within the Kuskokwim River drainage. The following document describes the objectives, intent, and perspectives on management for the 2020 Chinook Salmon season, and also describes current agreements that have been made by the parties identified in the Delegation of Authority Letter (DOAL) based on the March 13th, Kuskokwim River 2020 Pre-Season Chinook Management meeting with Kuskokwim River Inter-Tribal Fish Commission, Alaska Department of Fish and Game, Western Interior Alaska Subsistence Regional Advisory Council, and Yukon –Kuskokwim Delta Subsistence Regional Advisory Council. This additional information is provided for your consideration, as the Federal Subsistence Board (FSB) deliberates on Fishery Special Actions 20-01, 20-02, and 20-03.

2020 Federal Management Objectives for the Kuskokwim River Drainage

Throughout the season, the Federal in-season manager plans to coordinate and collaborate with our partners to promote Refuge management objectives similar to the Kuskokwim River In-Season Management Strategy Letter submitted to the FSB in April 2019. The primary strategic objectives continue to be:

1.) Ensure enough escapement to maintain stock productivity under a range of potential environmental factors

2.) Maintain diverse salmon populations (i.e. consider management effects on weak stocks and declining age and size structure of Chinook Salmon)

3.) Maintain protection for early running headwater stocks of Chinook Salmon

4.) Provide meaningful harvest opportunities for Chinook Salmon to protect the continuation of subsistence uses.

5.) Equitably distribute harvest opportunities to users throughout the drainage.

6.) Proactively announce harvest opportunities for Chinook Salmon in advance of the season, and use an adaptive harvest strategy when in-season data is made available.

2019 Chinook Salmon Run Size and 2020 Preseason Forecast

For the first time since 2008, Kuskokwim River Chinook Salmon run-sizes in 2019 were above 200,000 fish and near long-term averages (~ 216,000 Chinook Salmon from 1976 to 2019). The 2019 run-size estimate for Chinook Salmon was 226,987 fish (95% Confidence Limits (CL)) of 182,811 – 281,839).

The 2020 Chinook Salmon run-size forecast produced by the Alaska Department of Fish and Game (ADF&G) is 193,000 – 261,000 Chinook Salmon, with a midpoint of 227,000 fish. If the 2020 Chinook Salmon run size occurs within ADF&G's forecasted range, the drainage wide sustainable escapement goal would be met or exceeded [65,000 – 120,000] and harvest could occur within the historical, generally unrestricted, range [67,000 – 110,000].

In addition to the forecast utilized by ADF&G, two other Bayesian-based Chinook Salmon run forecasts are available to inform the Federal in-season manager for the 2020 season: (1) The BayesTool[1] forecasts a Chinook Salmon run size of 125,000 – 380,000 [95% CL means that 95% certain the run will fall within this range estimate] and (2) Curry Cunningham's forecast a Chinook Salmon run size of 110,000 – 328,000 [95% CL means that 95% certain the run will fall within this range estimate]. Based on these Bayesian forecasts, it is highly unlikely (<5%) chance that the 2020 Chinook Salmon run-size reverts back to run-sizes similar to 2010 – 2018 (range: 75,000 -136,000) (**Table 1**). It is important to note, the Bayesian-based forecast have larger Confidence Level intervals than the ADF&G forecast because the Bayesian forecasts utilize the entire time-series of information from 1976 to present, while ADF&G's only uses the previous seven-years.

To use the Bayesian forecasts to guide management decisions, the Federal in-season manager must identify a minimum Chinook Salmon escapement limit (65,000) and associated risk tolerance (20%) for going below the minimum desired escapement limit. For the 2020 season, the Federal in season manager wants to limit the possibility of going below the lower bound of ADF&G's drainage wide sustainable escapement goal of 65,000 Chinook Salmon to a 20% chance. Centered on this lower limit (65,0000) and risk tolerance (20%), this implies a potential harvest of 106,000 Chinook Salmon, with an expected escapement of 121,000 Chinook Salmon, which is coincidently at the upper bound of the drainage wide sustainable escapement goal range (**Table 1**).

2020 FWS Management Strategy Discussion

Based on the forecasts, the Federal in-season manager believes none of the following reasons for enacting Federal closures are valid for the 2020 season: (1) conservation of populations of Chinook Salmon, (2) Chinook Salmon viability, and (3) continuation of subsistence uses for Chinook Salmon. Given only the forecasts available to the Federal in season manager, in combination with his risk tolerance at his preferred escapement limit, it is likely that the escapement goals (65,000 - 120,000) and historical harvest goals (67,500 - 110,000) can be achieved for the 2020 season. It is important to remember that the preseason forecast is the primary guiding tool for most of the Chinook Salmon subsistence fishery season as other in-season monitoring of run abundances are only indices and normally variable in suggesting true run-sizes in-season and are unreliable for providing in-season run-size predictions.

Concerns Identified by Partners

Federal special action requests (FSA20-01/02/03) expressed concerns about 1) declines in Chinook Salmon escapement quality (i.e. decrease in per capita fecundity, smaller Chinook salmon at a given age than historically.

[1] **Created and updated by Ben Staton (2020), https://bstaton.shinyapps.io/*BayesTool*/**

lower relative abundance of females, and fish maturing at younger ages), 2) sub-stock diversity, 3) climate driven heat stress, and 4) uncertainty in the pre-season Chinook Salmon forecasts. The following briefly addresses each of these concerns.

The Federal in-season manager recognizes that user groups have concerns to include:

Escapement quality: The quality of Chinook Salmon escapement can be managed in-season by mesh size restrictions. (i.e. less than or equal to six-inch mesh). During the course of the run, restricting mesh size to less than or equal to six-inch mesh is appropriate to protect larger fish, that are often female Chinook Salmon, while still allowing for the harvest of more abundant smaller and younger Chinook Salmon. Based on an analysis conducted by Matt Catalano and Ben Staton, found lower escapement goals can be implemented if stakeholders are willing to accept smaller mesh size restrictions (Ohlberger et al. 2020[2]). The current ADF&G management strategy indicates managers will institute these six-inch mesh size restrictions during the 2020 season (ADF&G 2020 YK RAC briefing). Based on the estimated run forecast and the 2020 ADF&G management strategy, this concern will be addressed similar to a federal management strategy and thus does not necessitate additional Federal restrictions.

Protection of sub-stock diversity: Based on a recent analysis performed by Conners et al. 2019[3], harvest policies focused on meeting minimum subsistence needs are unlikely to jeopardize long-term prospects for basin-wide sustainable use. The study suggests that subsistence needs and spatial equity in access to fish can be met with relatively low risk to population diversity even when the escapement goal is very low. However, if harvest goals for Chinook Salmon are expected to increase above those historically required to meet subsistence needs (Chinook Salmon harvest greater than 150,000), it would be necessary to manage for the upper end of the escapement goal to minimize risks to sub-stock diversity. The implementation of a front-end closure (June 1-12); use of six-inch or less mesh size gillnets, and presence of average to above average Chum/Sockeye salmon runs, will all act to minimize the effectiveness of harvesting large numbers of Chinook Salmon (i.e. 150,000 +). In addition, based on the strong and negative linear relationship between Chinook Salmon subsistence harvest rates and Chinook Salmon run abundances (**Figure 1**), it is unlikely that subsistence harvest rates will be higher than 40% (at 40% harvest rates, ~ 10% of stocks are at risk of extirpation)[4]. In conclusion, the Federal in-season manager recognizes that protecting sub-stock diversity is important, however the current 2020 ADG&F management strategy will implement the available protections to address this concern, and are similar to the actions that would be taken by Federal management. Subsequently, Federal management is not currently warranted to address this concern.

Climate Change Driven Heat Stress: Climate change threats are unfortunately affecting many fish and wildlife populations. This is an important consideration, as concerns about heat stress on Chinook Salmon will continue into the future, no matter who is managing the fishery. Currently, science is not at the level that we can accurately or precisely predict river water temperatures for 2020. It is unknown if mainstem or tributary water temperatures in 2020 will exceed critical thresholds (19 – 20 degrees Celsius). Based on data from temperature monitors in specific tributaries, only three weirs have registered temperatures above 20 degrees Celsius between 2009 and 2017 (Tatlawiksuk, Takotna, and Salmon Pitka Fork). On average, the 20-degree Celsius threshold occurred for one to three days during the field season. Long-term (1984-2018) water temperatures at the Bethel

[2] **https://www.aykssi.org/wp-content/uploads/1615-AYK_SSI-EQ-Expert-Panel-Full-Final-Report-April-2020.pdf**

[3] **: https://www.aykssi.org/wp-content/uploads/Connors_et_al-diversity-tradeoffs-Project1503-full-final-w-link-10-29-19.pdf**

[4] **Conners et.al 2019**

Test Fishery (BTF) average near 15 degrees Celsius during the peak of the summer; however, the latest five-year average is closer to 17 degrees Celsius. In 2019, the BTF recorded 12 days in a row (7/6 – 7/17) of water temperatures greater than or equal to 20 degrees Celsius. Climate change driven heat stress is an important factor that should be considered by any manager. These heat wave events are not a regular, predictable occurrence, but may become common in the future. Federal and State managers will continue to monitor river temperatures throughout the season. If Federal management identifies that it can improve in season management of the fishery to reduce heat stress, beyond actions taken by ADF&G, then Federal management can be invoked.

Uncertainty in the pre-season Chinook Salmon forecasts: The management of most fish and wildlife populations is inherently uncertain; this is no different for the Kuskokwim River Chinook Salmon fisheries. Unlike past fisheries (pre-2017), tools (BayesTool, Pstar) now exists for Kuskokwim area managers to consider uncertainty more now than ever before, particularly as it relates to the preseason forecasts. As shown in the preceding discussion, the Federal in-season manager understands cumulative risks involved in the fishery based on the concerns of subsistence users and has accounted for them in his management recommendation to the Federal Subsistence Board.

FWS 2020 Kuskokwim Chinook Salmon Management Conclusion

Based on the 2020 pre-season Chinook Salmon forecasts and the additional concerns identified in FSA20-01/02/03 discussed above, the Federal in-season manager does not recommend restricting the Kuskokwim River Chinook Salmon subsistence fisheries to only Federally qualified subsistence users. Provided with a pre-season forecast of 193,000 – 261,000 Chinook Salmon, with a midpoint of 227,000 fish, enacting a Federal closure is not currently warranted for the conservation of healthy Chinook Salmon populations or to allow for the continuance of subsistence uses for the 2020 season. Additionally, other forecast that incorporate uncertainty and the Federal in-season manager's risk tolerance indicate it is likely that the escapement goals (65,000-120,000) and historical harvest goals (67,500 -110,00) can be achieved for the 2020 season It is important to note, that the preseason forecast is the primary guiding tool used to manage the Chinook Salmon subsistence fishery season. Other in-season monitoring of run abundances are only indices, and normally variable in suggesting true run-sizes in-season, and are unreliable for providing in-season run-size predictions. The primary use of other in-season monitoring tools (sonar, harvest monitoring) are used primarily for informing harvest management decisions

The Federal in-season manager will continue to work with the ADFG&G and partners to monitor the strength of the 2020 Chinook Salmon return, and the harvest, as the season progresses starting on June 1, 2020. The Federal in-season manager still reserves the right, through the delegation of authority via the Federal Subsistence Board, to restrict the fishery to Federal qualified users in 2020 if the run appears to come in significantly lower than 193,000 (the lower bound of the 2020 preliminary pre-season forecast).

The Federal in-season manager also recognizes that the current projects monitoring in-season run abundances are only indices of abundance, which makes it relatively difficult to determine if the preseason forecast project is materializing (especially early in the season). Despite the in-season uncertainty in run abundances, the Federal in-season manager believes restrictions to the fishery after June 11 would only be necessary if the cumulative passage of Chinook Salmon before June 11 were little to none at Bethel Test Fishery, Bethel area sonar operations, and the subsistence fishermen were not catching any Chinook on the first drift net opener. This management action would be taken out of an abundance of caution given little to no Chinook Salmon passage before June 12 does not necessarily mean the run is small or large (i.e. could be a late run).

The Federal in-season manager will continue to work collaboratively with the Kuskokwim River Inter-Tribal Fish Commission, ADF&G area manager, the Kuskokwim Salmon Management Working Group, Regional Advisory Committee members and other parties denoted in the Delegation of Authority Letter, even though the

Federal in-season manager is not recommending restricting the Kuskokwim River Chinook Salmon subsistence fisheries to only Federally qualified users.

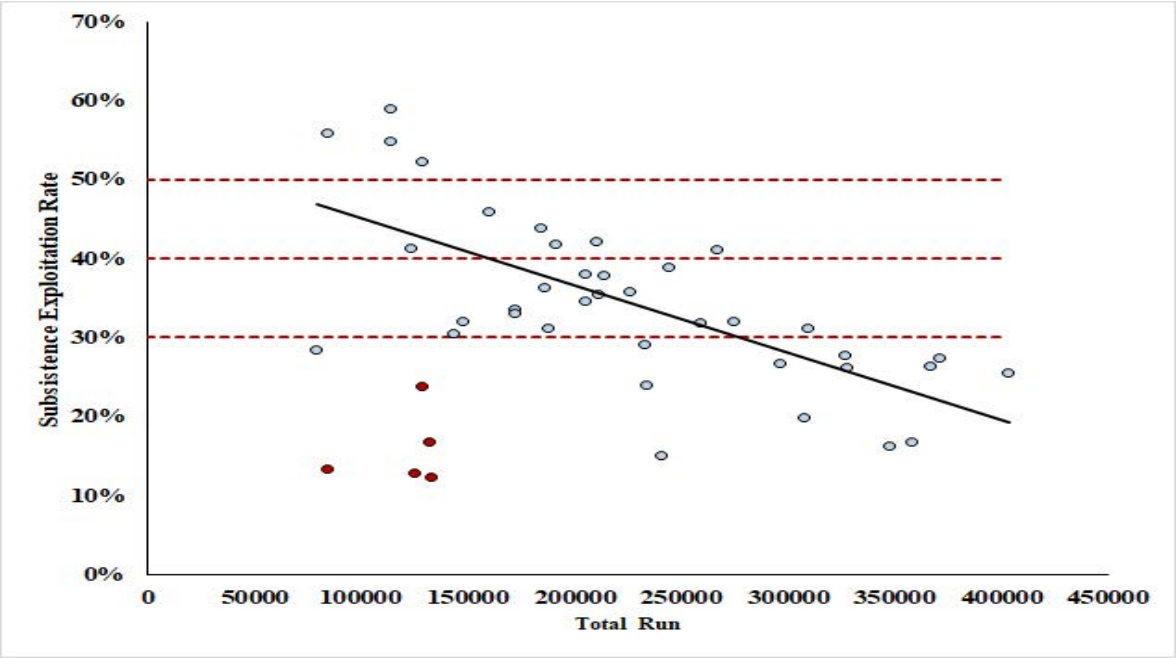

Figure 1. Historical (1976-2019) exploitation rate of Chinook Salmon in the subsistence fishery on the Kuskokwim River. As run size increases, the exploitation decreases, likely a function of the processing and needs of the subsistence fishery in the area. Red dots indicated years with restricted subsistence fishery (2014 – present). Red dashed lines represent exploitation rates that lead to 20%, 10%, and 5% of stocks at risk of extirpation.

Table 1. The left table displays the forecasts generated by the BayesTool methodology. Forecasts are summarized by the mean, standard deviation, and certain selected percentiles (2.5%, 10%, 25%, 50%, 75%, 90%, 97.50%). The fourth row of this table can be interpreted as: "the probability of the 2020 run returning below 125,000 is 2.5%". Table on right represents the implied harvest and associated probability outcomes in comparison to certain escapement levels given the Refuge manager's risk tolerance (0.2) at 65,000 escapement level. Pr stands for probability and S stands for escapement. For example, the fourth row of the right table can be stated as: the probability of escapement between 65,000 and 120,000 is 35%.

Mean = 227,000, **CV** = 0.29	
Statistic	**Forecast**
Mean	227,000
SD	66,000
2.50%	125,000
10%	151,000
25%	180,000
50%	218,000
75%	264,000
90%	314,000
97.50%	380,000

Quantity	**Forecast**
Implied Harvest	106,000
Expected Escapement	121,000
Pr(S < 65,000)	0.2
Pr(65,000 < S < 120,000)	0.35
Pr(S > 120,000)	0.45
Pr(S < 95,000)	0.39
Pr(S < 110,000)	0.49

Thank you for considering the above information. I ask you to support the collaborative decision making process that has been operating since 2016 that integrates regular consultations with the KRITFC as part of management for the Kuskokwim River fishery and provides an opportunity for all stakeholders to participate.

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Kuskokwim River Salmon Management Working Group Co-Chairs
Interagency Staff Committee
Administrative Record