

FACTORS AFFECTING 2022 KUSKOKWIM AND YUKON CHINOOK SALMON RUNS AND SUBSISTENCE HARVESTS

1



PARENT SPAWNERS & EGGS
2016 & 2017

Marine heatwave conditions prior to run, stressful river temperatures, decreased body size.

2



FRY
2017 & 2018

Low summer water levels, continued warm river conditions.

3



MARINE JUVENILES
2019

Large marine heatwave, empty stomachs, weakened condition.

"They're coming up a lot later; the fish that are coming in are a lot smaller; and they're in smaller numbers now."
-Sam Berlin, Kasigluk (Kuskokwim)

"The [2017 summer] water level was really too low for starters in June. It was too low and too warm....The first part of the summer wasn't too good for all sorts of salmon."
-John Andrew, Kwethluk (Kuskokwim)

"We had a fairly mild winter [in 2017], so we barely had any snow over the winter. The snow melted really early. We had [an] early...fast breakup."
-Dale Smith, Mekoryuk (Coastal)

"I'm really saddened and devastated for our Tribal families upriver who haven't had a chance to catch Chinook or chum salmon, and now there's no silver fishing in 2022....The fish aren't there and something is happening...I hope they take action and start doing more than they're doing now."
-Betty Magnuson, McGrath (Kuskokwim)

"We are experiencing climate change impacts on our river with salmon dying [in 2019], and also warming and other things happening in the high seas where they go out and then before they return."
-Mike Williams Sr., Akiak (Kuskokwim)

"I think [the causes of salmon declines] are a combination of climate and bycatch: Irresponsible or unsustainable fishing in the oceans coupled with climate change."
-Anonymous (Kuskokwim)

"[In 2019] the weather was 80 degrees, [and] when you put your hand in the river, the river was warm. [It was the] first time I ever heard [of] fish floating down the river."
-James Landlord, Mountain Village (Yukon)

6



ADULT RUNS
2022

Amounts necessary for subsistence not met since 2010, directed fisheries remain closed, high occurrence of Ichthyophonus.

5



MATURING ADULTS
2022

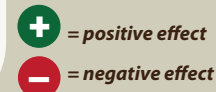
Marine temperatures decreased from marine heatwave conditions.

4



IMMATURES
2019-2021

~28,300 Western Alaska Chinook salmon caught as bycatch 2019-2020. 2021 bycatch estimates N/A.



Factors Affecting 2022 Western Alaska Chinook Salmon Runs & Subsistence Harvest

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Western Alaska Chinook salmon runs have concurrently declined to low abundance levels for over a decade (ADF&G, 2013; Schindler et al., 2013; KRITFC, 2022; Liller, 2021)¹. Salmon are integral to the Western Alaska ecosystem, bridging marine and freshwater habitats, filling both prey and predator niches, and supporting vital subsistence harvests (Courtney et al., 2019; KRITFC, 2022). The figure on page 1 highlights the factors that contributed to the 2022 run sizes of Chinook salmon across Western Alaska as evidenced by Western science, Indigenous Knowledge, and community observations from the Kuskokwim and Yukon rivers.

Cumulative ecosystem factors since 2016 impacted the spawning adults, to the marine-stage juveniles, and ultimately the returning adults in 2022. For the parent spawners in 2016 and 2017, marine heatwave conditions (Hennon et al., 2022), smaller and younger size at maturity (Lewis et al., 2015; Oke et al., 2020), and warm river temperatures during the adult spawning migration likely contributed to reduced reproductive success (von Biela et al., 2020; Howard & von Biela, in review). Low summer water levels and warm river conditions had the potential to impact eggs (2016–2017), and freshwater conditions could continue to influence fry and smolt growth and survival (2017–2018), but those relationships vary in different places depending on the absolute values of temperature, flow, and water level and are not fully understood across different tributaries.

Marine juveniles experienced heatwave conditions again in the eastern Bering Sea in 2019 when low zooplankton productivity (Kimmel et al., 2022) contributed to empty stomachs and decreased fish condition (Murphy et al., 2021). In 2019 and 2020 combined, approximately 28,300 immature Chinook salmon from Western Alaska (Yukon and Coastal Western Alaska regions) were caught as bycatch²). The estimated impact rate of bycatch to combined Western Alaska Chinook salmon stocks averaged 1.9% for the 2011–2021 runs (see Table 9 here³) or annual estimates of 6,331–10,614 fewer spawners to Western Alaska (see Table 7 here³). The impact rate for the 2022 run is not yet available, but is expected to be higher based on low run sizes in 2022 (i.e., impact rate is inversely related to run size).

Marine temperatures largely relaxed to average conditions over the past year (Siddon, 2022), which may have a positive effect on 2022 spawning success. However, amounts necessary for subsistence use of Chinook salmon in Kuskokwim and Yukon communities have not been met since 2010 and were not met again in 2022. Food security impacts associated with Chinook salmon declines in Western Alaska have been compounded by declines regionally in other salmon species, such as coho and chum salmon (KRITFC, 2022).

Please see the complete 2022 Eastern Bering Sea Ecosystem Status Report for referenced material:
Siddon, E. 2022. Ecosystem Status Report 2022: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

¹https://static1.squarespace.com/static/5afdc3d5e74940913f78773d/t/6359792089ec3e15693c80dd/1666808118921/Salmon+Sit+Report+2022_10-03-22_FINAL.pdf

²<https://meetings.npfmc.org/CommentReview/DownloadFile?p=38f9b0d4-52be-4718-8dc7-d837d1be531c.pdf&fileName=D1b%20Bering%20Sea%20Chinook%20Genetics%202020.pdf>

³<https://meetings.npfmc.org/CommentReview/DownloadFile?p=c16a58bc-e94e-4fd3-a23f-08909946bf20.pdf&fileName=D1c%20Chinook%20Salmon%20AEQ.pdf>