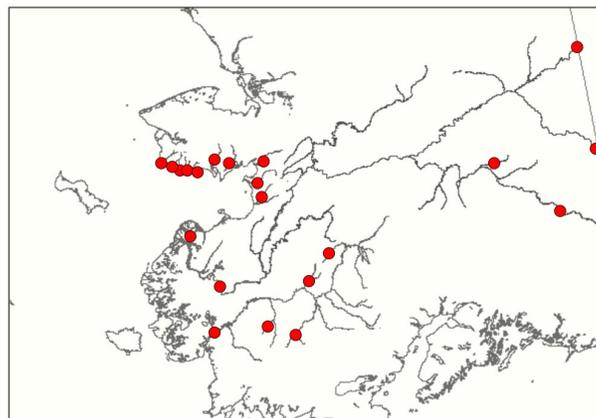


# 2020 preliminary results suggest poor survival of age-4 chum salmon contributed to low runs across Arctic-Yukon-Kuskokwim

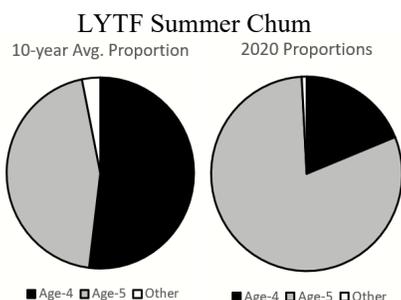


**P**reseason expectations were that average run sizes of chum salmon would be observed throughout the Arctic-Yukon-Kuskokwim (AYK) Region in 2020. In a typical year, more than 90% of the total chum salmon run is made up of age-4 and age-5 fish. Modest escapements were observed across AYK in 2015 and 2016, providing evidence that adequate numbers of age-4 and age-5 chum salmon would return in 2020 to meet escapement needs, support “normal” subsistence fishing activities, and provide for commercial harvest.



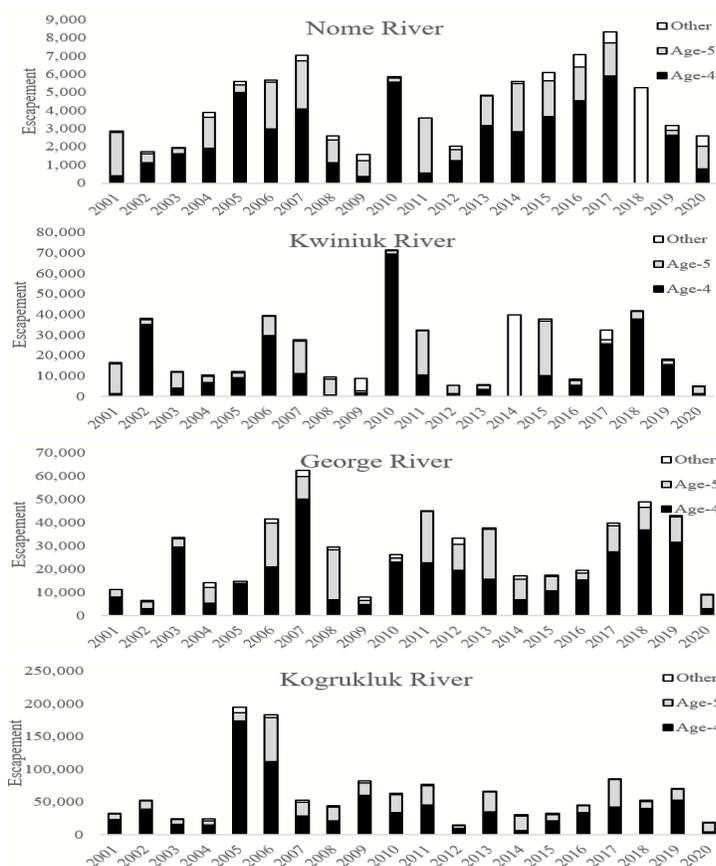
Locations (red dots) of chum salmon assessment projects operated in 2020.

**I**nseason information from the Yukon and Kuskokwim rivers indicated chum salmon run sizes were considerably lower than expected. The Lower Yukon Test Fishery (LYTF) is the only assessment project in the AYK Region where chum salmon age composition is evaluated inseason. Early in the summer chum salmon run it was evident that age-4 chum salmon made up a substantially smaller component of the run compared to average. From 2010—2019, age-4 chum averaged 52% of the summer chum salmon catch at LYTF compared to only 19% in 2020. The pattern of few age-4 fish continued throughout the Yukon River fall chum salmon run; age-4 fish represented 46% of the catch at LYTF compared to the 10-year average of 70%.



**P**ostseason evaluation of chum salmon age information from four representative escapement assessment projects from the Kuskokwim River and Norton Sound provided preliminary evidence that poor returns of age-4 chum salmon were widespread across AYK. At each location, both the percent contribution and total abundance of age-4 fish was near or at record low levels in 2020.

There are 15 escapement goals for chum salmon in the AYK region and two U.S./Canada Treaty goals. **Escapement goals were achieved for Nome and Eldorado rivers in Norton Sound, Yukon River summer chum (drainagewide), and the Kogrukluk River in the Kuskokwim Area.** All other goals are unlikely to be met in 2020 or were not assessed.



Note: Updated run, harvest, escapement, and age data will be available early 2021.

# Northern Bering Sea juvenile salmon trawl surveys may help explain the low 2020 chum salmon returns to AYK

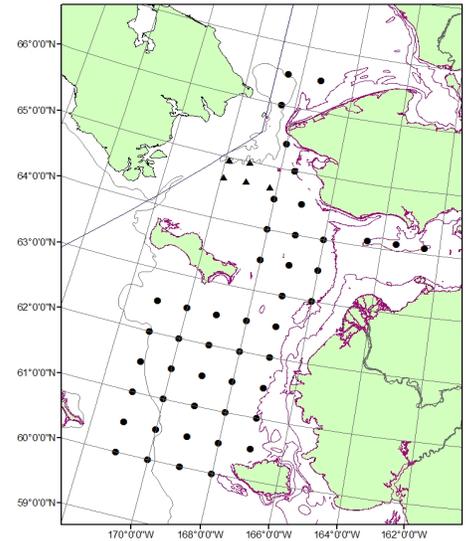
**S**urface trawl surveys in the Northern Bering Sea catch AYK juvenile chum salmon after they have spent their first summer at sea. Juvenile Chinook salmon catches from these surveys are used to forecast returns of Chinook salmon to the Yukon River, and similar models are being developed for chum salmon. Juvenile chum salmon caught in the Northern Bering Sea surveys are age-1 and will typically return to their spawning streams three years later as age-4 or four years later as age-5. The age-4 chum salmon returning in 2020 would have been represented in the 2017 survey.

**P**reliminary model outputs show that the 2017 juvenile chum salmon abundance in the Northern Bering Sea was the 2<sup>nd</sup> lowest since 2003. The low abundance suggests high mortality during either the freshwater or early marine phase (or both) and may help explain the low

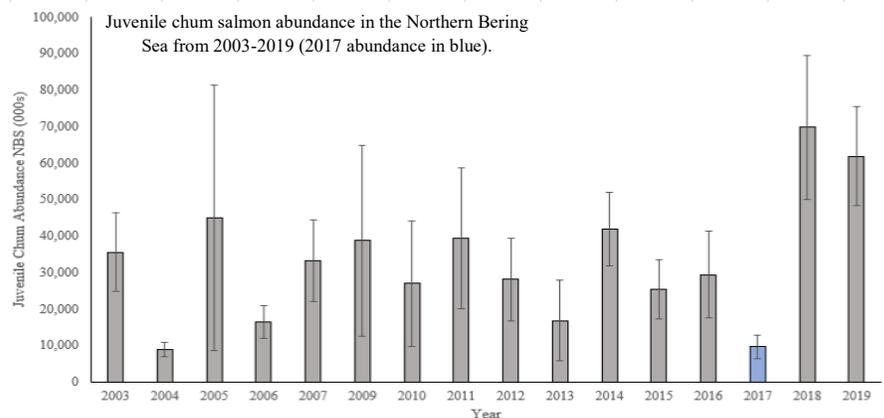
return of age-4 chum salmon throughout AYK in 2020. Although Yukon and Norton Sound juvenile chum are primarily caught in the survey, the low age-4 returns to the Kuskokwim River suggest similar factors are affecting that stock. The lowest juvenile chum salmon abundance, observed in 2004, did not result in low returns for that cohort in AYK rivers. The relationship between juvenile abundance in the

ocean and adult returns to specific rivers is complicated because the juvenile chum salmon captured in the survey are a mixture of stocks from many locations. Work is ongoing to further develop the model to include genetic analysis, which allows us to calculate stock-specific juvenile abundances and identify if a relationship exists between juvenile abundance and adult returns (necessary for forecasting adult runs). This research also helps us understand other aspects of early marine ecology, such as diet and energetic density, and how they may be affected by warming climate conditions.

**T**he future for AYK chum salmon is uncertain, but there are reasons to be optimistic. Although the low returns of age-4 chum salmon from the 2017 juveniles may forewarn a low return of age-5 chum salmon in 2021, the large numbers of juveniles observed in 2018 and 2019 may result in healthy age-4 returns in 2021 and 2022 and age-5 returns in 2022 and 2023. The Bering Sea has seen unprecedented warming in recent years, and research is ongoing to understanding how ocean temperatures may affect AYK salmon stocks. Hopefully, juvenile data can help managers and fishermen plan for the future.



Black dots represent typical stations sampled with surface trawl gear during the Northern Bering Sea survey.



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