

Project Title: Spatio-temporal variation of Chinook salmon in AYK rivers

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Study Location: Yukon and Kuskokwim rivers

Abstract: Chinook salmon in the Yukon and Kuskokwim rivers support important subsistence, commercial, and recreational fisheries that are stabilized by complexity in the biological composition of the stocks, and the diversity of habitats fish spawn, rear, and migrate through in these vast watersheds. This biocomplexity remains poorly described and the stabilizing effects of the diversity in population dynamics of fish in different tributaries has not been rigorously quantified. We propose to use a recently developed framework to quantify the inter-annual variability in the spatial patterns of Chinook salmon production across the Yukon and Kuskokwim rivers over much of the last decade. Our approach uses natural markers (i.e., strontium isotopes in otoliths, and DNA) to accurately determine the natal origins of individual fish from which production patterns of Chinook salmon can be constructed across these remote rivers. These data will also be used to develop tributary-specific adult migration patterns, which are a principal determinant of vulnerability to lower river fisheries, and one of only a few manageable attributes of Chinook salmon in these ecosystems. By quantifying how the spatial patterns of Chinook salmon production shift among years, we will provide novel insights into how the biocomplexity of these large rivers influences the stability of the overall production at the scale of the entire Yukon and Kuskokwim watersheds. Patterns of variation and co-variation among stocks will be quantified from returning adults sampled in several years since 2010 in the Yukon River, and continuously since 2017 in the Kuskokwim River. This proposal will analyze new and existing otolith and genetics collections, to complement existing data from previous projects. The products from this synthesis will be directly applicable to developing and assessing management and conservation strategies for sustaining fisheries in the face of increasingly uncertain futures.