Proposal to Bristol Bay-RSDA. December 2013

Title: Using strontium otoliths to determine the natal origin and habitat use of salmon caught in the Nushagak commercial fishery

Proposer: Daniel Schindler, Sean Brennan; University of Washington, FRI; deschind@uw.edu; 206-616-6724 * We have read BB-RSDA strategies and bylaws

BB-RSDA Strategic Objective: *#4 Maintain sustainability of the fishery - Protect habitat needed for diverse and abundant salmon populations*

Project Description:

The Nushagak River is a vast watershed that supports commercially- and socially important fisheries for sockeye and Chinook salmon. However, it remains unclear which regions of the Nushagak watershed produce the majority of Chinook and sockeye salmon, and whether the importance of different tributaries varies through time. Recent research by S. Brennan (UAF) shows that naturally occurring geochemical tracers in Nushagak river waters enable determination of the natal origins of Chinook and sockeye salmon. The most powerful tracer is the ratio of two isotopes of the trace element strontium (Sr), which is incorporated from river waters into juvenile salmon otoliths (ear-bones) which provide a chemical history of each fish's entire life. An existing baseline dataset (see attached map) quantifying the strontium ratios of potential habitats for Chinook and sockeye salmon will be able to identify which regions of the Nushagak produce the most fish.

We propose to: **1)** fill in data holes in the baseline, which reside in headwater habitats, **2)** finalize the high-resolution geospatial model of all potential natal sources of Chinook and sockeye salmon using existing and new data **3)** use this baseline to assign natal origins of Chinook and sockeye salmon caught in Nushagak Bay fisheries. Brennan is currently finalizing an analysis of 250 Chinook salmon caught in the Nushagak fishery in 2011, to assign them to their habitat of origin. In this proposal we will extend this analysis to two additional years (2014&15), and add sockeye salmon to the analysis. Such data will complement the work proposed by UW-FRI to quantify Chinook and sockeye habitat throughout the Nushagak and Mulchatna rivers.

Estimated total cost of project: ~ $400,000 ($210,000 from a previous AK Sea Grant project + the amount requested here from BB-RSDA)

Amount requested from BB-RSDA: $188,726[i]

Approximate date of project completion: June 2016

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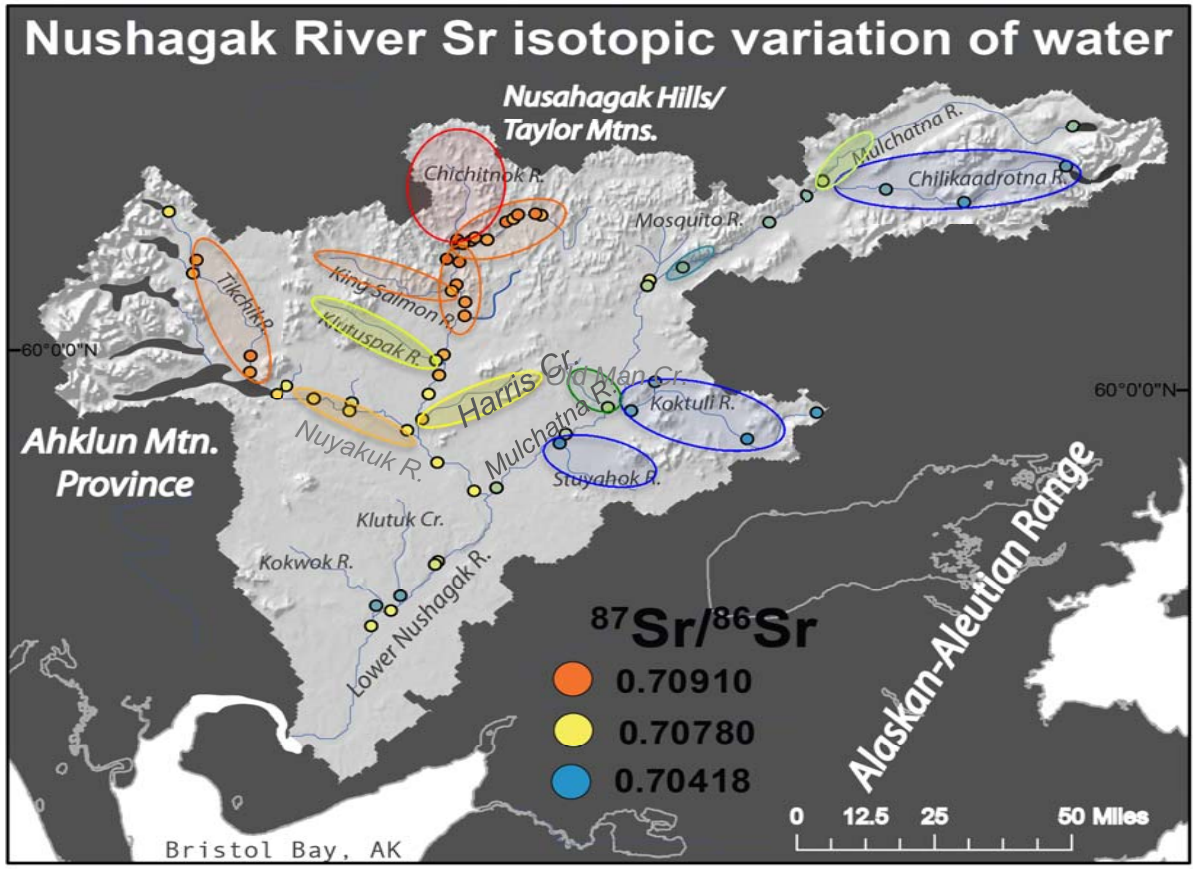
[i] This assumes a two-year project where we process 250 samples/yr from the fishery. A one-year project that processed 250 samples total would cost $99,000. The only salaries requested are for S.Brennan (as a post-doc) and for hourly technician support.



(Unpublished data from Alaska Sea Grant Project #R/100-02, Brennan and Wooller)

Dots denote locations of existing samples that characterize the Sr isotope characteristics in different sections of the Nushagak watershed. Different colors of ellipses show groups of tributaries that are distinct from one another.