SUSTAINABLE
SALMON
INITIATIVE

To: AYK SSI Steering Committee

From: STC Sub-Committee: Milo Adkison, Daniel Schindler

Date: May 23, 2016

Subject: Scope of Work for STC Recommended Project: Development of a Comprehensive Database on Changes in Quality of Chinook Salmon Escapement in the AYK Region

Hypothesis #6 ,"Escapement Quality," in the AYK SSI Chinook Salmon Research Action Plan addressed the observed trend of a decline over time in Chinook salmon length-at-age and age-at-maturation as well as the trend toward significantly male-biased sex ratios. These trends are likely to result in a lower number of eggs deposited on the spawning grounds per fish in the escapement. We define escapement quality as: Chinook salmon length-at-age, age-at-maturation, and ratio of females to males in fisheries and on the spawning grounds across in the AYK region. These declining trends have been documented in AYK Chinook salmon populations, including the populations in the Unalakleet, Yukon, Kuskokwim, Kanektok, and Goodnews Rivers in the AYK region, as well as elsewhere in the state (Lewis et al. 2015, Ruggerone et al. 2012).

The principal concern, as stated by the hypothesis, is the contribution of these trends to the decline of AYK region Chinook salmon populations. "Selective fishing and natural mortality have altered the genetic character of the stocks so that the expression of size, sex ratio, and composition of life history types have been altered and have contributed to declines in egg deposition to reduce recruitment in AYK Chinook salmon stocks" (Hypothesis #6). An additional problem for managers is that these trends of declining escapement quality can introduce bias into run reconstruction and spawner-recruit model results.

The AYK SSI research program has funded several research projects to date addressing this hypothesis, including:

- Retrospective analysis of Arctic-Yukon-Kuskokwim Chinook salmon growth by Greg Ruggerone (funded FY 2004)
- Selective fishery impacts: Yukon River Chinook salmon by Jeffrey Bromaghin (FY 2006)
- Fecundity of Yukon River Chinook salmon by Jeffrey Bromaghin (FY 2008)
- Norton Sound Chinook salmon growth and production by Greg Ruggerone (FY 2008)

Prior to funding additional work on the topic and in order to address this topic in a more complete, step-wise fashion, the STC recommended to the SC development of a comprehensive database on escapement quality in the AYK region.

Based on an STC Project Prospectus presented at their April 15th meeting, the SC requested the Subcommittee to come back to them in 4-6 weeks with a proposed Scope of Work – presented below- to accomplish this project under the direction of a specially appointed Expert Panel.

OBJECTIVE:

Under the direction of an expert panel, compile and organize within an open-source database, comprehensive data on Chinook salmon length-at-age, age-at-maturation, and ratio of females to males in fisheries and on the spawning grounds across the AYK region.

METHODS:

Figure 1 below provides an overview of the phased development of "AYK Region Escapement Quality Database by an Expert Panel process. The three principal phases of the project are shown in the figure and described below.

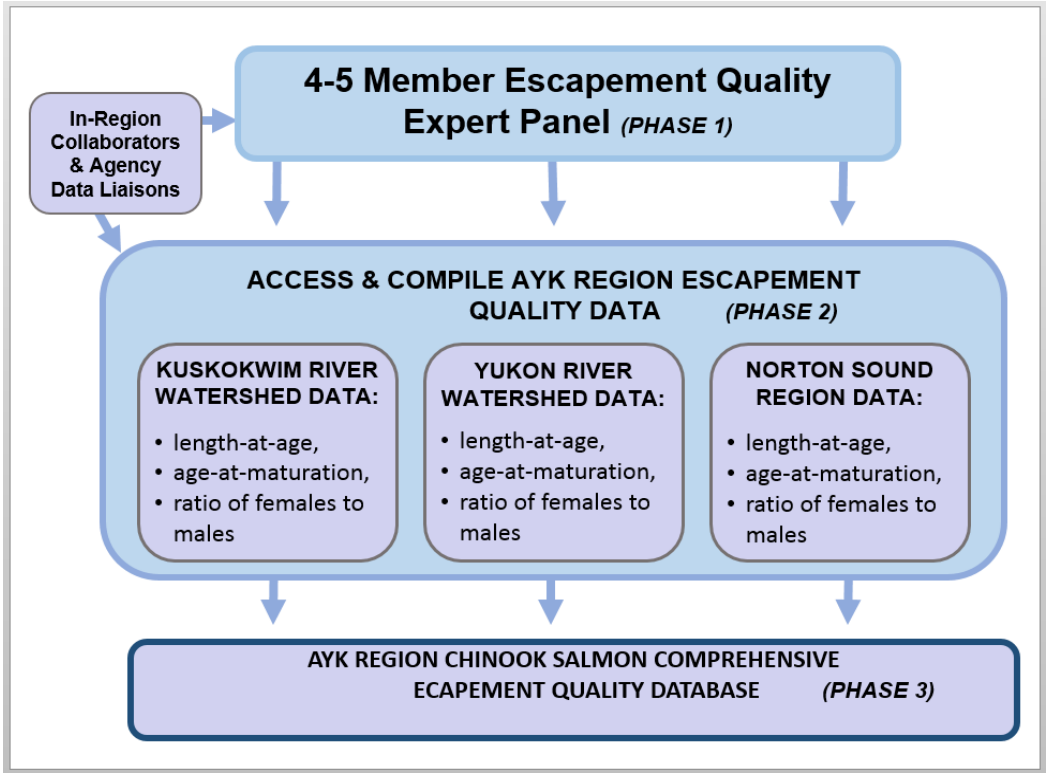

FIGURE 1: Development of AYK Region Escapement Quality Database by an Expert Panel Process

Phase 1: Appointment of Independent Peer Review Panel members / Identify In-Region Collaborators & Agency Data Liaisons

Four to five fisheries scientists with a range of appropriate expertise will be appointed by the full AYK SSI STC by September 2016 to oversee the compilation of data and design, development and implementation of a comprehensive database. With assistance of the STC and AYK SSI staff, the Panel will identify and request assistance from key in-region collaborators and agency data liaisons in ADF&G and the USFWS.

Phase 2: Access and compile existing data / Database design, build and documentation

This proposal design includes direction and oversight by a specially appointed Expert Panel, per the request of the SC. However in order to make use of the experts appointed to the panel to effectively address the data challenges across this large region, the STC Subcommittee strongly recommends allowing the Expert Panel the flexibility to select and commission contractors with the necessary skillsets and experience to implement key aspects of the project, within the constraints of the budget.

- This will facilitate addressing in a timely way the challenges associated with key Phase 2 activities:
  - Exhaustive effort to locate, access and document Chinook salmon age, size and sex-ratio data and metadata in cooperation with ADF&G, federal and NGO partners in the three sub-regions (beginning with the ADF&G ASL database and USFWS database).
  - Document data sources
  - Review data quality to assess potential sources of bias (e.g., biased sex ratios from visual inspection vs. dissection).

- This also provides the Panel with the flexibility needed to integrate in a more seamless way efforts with in-region cooperators to compile existing data with the work of a contractor to design or adapt and populate the database. The exact composition of the team of contractors needed would be determined by the Panel after they have initially assessed the suite of existing data sets in each of the three sub-regions.

Phase 3: Populate & Post Downloadable Database / Produce Synthesis of trends

The final phase includes populating and error checking the database. Once complete, the Panel will identify entities willing to post this open-source database for free download from the web.

The Panel will oversee analysis and syntheses of trends in Chinook age, length and sex, producing a journal quality manuscript. The Panel will also oversee production of technical report providing full database documentation.

AYK SSI Support for Escapement Quality Expert Panel Process:

As with other AYK SSI expert panel processes (i.e. The Escapement Goal and Chinook Salmon Action Plan Expert Panels) the AYK SSI staff Research Coordinator and Program Manager are available to assist the panel Chair and members in implementing this project.

PROJECT DELIVERABLES:

1) Comprehensive web accessed open-source database providing access to data and associated meta-data on sex-specific (where possible) length-at-age and age-at-maturation, and ratio of females to males for Chinook salmon populations in the AYK region.

2) Technical report documenting database.

3) A synthesis of Chinook salmon escapement quality, in the form of a journal quality manuscript quantifying the dominant trends in the data.

PEER REVIEW PANEL PROCESS TIMELINE:

TASKS	**2016** Jun-Dec	**2017** Jan-June	**2017** July-Dec	**2018** Jan- Jun
Appoint Expert Panel /	Peer Review Panel Appointed by Sept.1			
Expert Panel meets to discuss existing data sources and contracting needs	In-person Expert Panel Meeting by Oct. / Identify In-Region Collaborators & Agency Data Liaisons / assess contracting needs based on data sources			
Identify and Compile Escapement Quality data / Updates with Expert Panel	Work with Escapement Quality Data Contractors and Collaborators to identify and compile data / Panel meets via teleconf. as needed			
Design & Develop & Populate Database		Contractor designs and builds database	Panel meets via teleconf. as needed	
Prepare synthesis of escapement quality trends / Release database			Contractor prepares synthesis of escapement quality trends / post database for free download from the web	
Panel Meeting to review synthesis report & final products				Panel meeting Early 2018draft project deliverables produced by Jan 2018 / finalized by March 30, 2018

References:

Lewis B, Grant WS, Brenner RE, Hamazaki T (2015) Changes in Size and Age of Chinook Salmon *Oncorhynchus tshawytscha* Returning to Alaska. PLoS ONE 10(6): e0130184. doi:10.1371/journal.pone.0130184. pmid:26090990

Ruggerone GT, BA Agler, L Wilson and TT Baker. 2012. Growth and productivity of Nushagak Chinook salmon. Prepared for the Alaska Sustainable Salmon Fund, Juneau, AK.