

**Southeast Alaska Chinook Salmon Stock Assessment
(Years 4-7)
INTERIM REPORT**

Prepared by

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INTRODUCTION:

The SEAK Chinook salmon stock assessment program provides the information necessary to manage and prosecute Chinook salmon troll, gillnet, and sport fisheries as directed by the Pacific Salmon Treaty (PST) and the Southeast Alaska King Salmon Management Plan. This program at full implementation in 2007 had a budget of \$2.2M. The ADF&G, Division of Sport Fish oversees the program and due to the economic downturns, budget reductions resulted in the Chinook salmon stock assessment scaling back operations to function on a budget of less than \$1.0M. Chinook salmon in SEAK are harvested primarily by the U.S. commercial troll fleet and sport anglers and fish are also caught in U.S. commercial set gillnet, drift gillnet, and purse seine fisheries and in subsistence and personal use fisheries in the region. Harvests in SEAK are managed on an abundance-based approach, with an annual all-gear harvest limit provided by the Chinook Technical Committee (CTC) of the Pacific Salmon Commission (PSC) each spring. The harvest limit is based on a preseason forecast of the aggregate abundance of all Chinook salmon model stocks projected to be present in SEAK that year. The preseason forecast is estimated using a PSC Chinook model operated by the CTC and inputs to the model represent Chinook salmon indicator stocks spread throughout the Pacific Northwest that frequent SEAK waters. In SEAK there are seven Chinook salmon indicator stocks used by the CTC and stock assessment programs are in place on each to monitor stock status and these programs include the use of weirs, foot and aerial survey counts, detailed mark-recapture studies, and age, sex, and length sampling programs. On the Taku and Stikine Rivers, the two largest producers of Chinook salmon in SEAK, all of these methods are used to some extent. The programs in place on these two transboundary rivers are cooperative efforts among the ADF&G, Fisheries and Oceans Canada (DFO), and the First Nations Canada. Escapement goals have been developed for all of the SEAK indicator stocks, and in general, these programs are prime examples of how to effectively monitor and implement abundance-based management.

The U.S. section of the CTC developed data standards desirable for stock specific assessments of escapement, terminal runs, and forecasts of abundance against which existing stock assessment programs could be evaluated. The standard for escapement is as follows, "Escapement. Annual age and sex-specific estimates of total escapement should be available. Point estimates should be accompanied by variance estimates, and both should be based on annual sampling data." Providing high-quality escapement data for the SEAK Chinook salmon indicator stocks and ensuring these data meet minimum CTC standards is important for abundance-based management of PSC Chinook fisheries as the CTC uses the CTC Chinook model for coastwide management and evaluation of stock status. Abundance indices in the CTC model are based, in part, on escapement data. High quality escapement data is essential to ensure that both conservation and allocation fishery management objectives are realized. This work is also important for stock-specific abundance-based management regimes. Existing commercial, sport, subsistence, and personal use Chinook salmon fisheries on the Taku and Stikine River stocks of Chinook salmon are managed using information gathered from high quality stock assessment programs. In some years, runs of Chinook salmon to either river are large enough to allow directed Chinook salmon commercial fisheries in District 111 (Juneau area, Taku River) and District 108 (Wrangell/Petersburg area, Stikine River). These fisheries can only be opened if surplus production is identified and the stock assessment programs in place on both rivers generate the information necessary to identify surplus production on preseason, inseason, and post season basis. Goal 1 of the Northern Fund is development of improved information for resource management, including better stock assessment. In particular, the committee encourages projects involving catch accounting, harvest enumeration, and escapement enumeration of stocks harvested in both nations; data needed to estimate optimal escapement; and collection of data necessary to forecast returns.

Chinook salmon escapement estimates are a critical element in the strategy to improve Chinook salmon stock assessment and abundance-based management as outlined in Annex IV, Chapter 3 of the 2009 PST. The CTC uses seven indicator stocks in SEAK for which escapements are measured annually using a weir across the Situk River, a weir at the Klukshu River for expansion to total escapement for the Alsek River, mark-recapture studies on the Chilkat, Taku, Stikine, and Unuk Rivers, and aerial and foot surveys of spawning abundance at the Chickamin River and Andrew Creek; aerial and foot surveys are also made in the Chilkat, Taku, Stikine, and Unuk Rivers. Chapter 1 of the PST details harvest sharing arrangements and management programs in the Taku and Stikine Rivers in years having surplus abundance and these

programs are tied directly to preseason forecasts and inseason estimates and projections of terminal run that are generated using data gathered in the annual cooperative stock assessment programs on each river.

METHODS:

Analysis of Data for Use in the Pacific Salmon Treaty-

This project provides for salary and contractual funding of personnel whose expertise is needed for various Chinook salmon analyses on data gathered from the SEAK Chinook salmon stock assessment program for use in the CTC, the TTC and other relevant PST activities. Activities include escapement goal analyses and applications both inside and outside of Alaska, participation in meetings and research and analyses regarding Chinook salmon stock status and assessment efforts in the Pacific Northwest and Canada. Successful salmon management depends on establishing and implementing biologically based salmon escapement goals and processes for effective estimation and monitoring of escapement. This project helps ensure that appropriate methods and analyses are used for both stocks originating in SEAK and for stocks from other areas that contribute to SEAK fisheries.

Analysis of Aerial Survey, Age, Sex, and Length Composition, Mark-Recapture, Harvest, and Smolt Data for SEAK Indicator Stocks-

This project provides for salary and contractual funding of personnel whose expertise is needed for various analyses associated with the SEAK Chinook salmon stock assessment program. In this program, aerial counts, age, sex, and length composition, mark-recapture, smolt, and harvest data for the SEAK indicator stocks are gathered annually. Aerial surveys of spawning Chinook salmon take place annually in the Taku, Stikine, Unuk, and Chickamin Rivers and Andrew Creek and counts occur shortly before, during, or just after the peak of spawning. Age, sex, and length composition data are gathered in the Situk, Chilkat, Taku, Stikine, Unuk, and Chickamin Rivers and in Andrew Creek. Fish are systematically sampled for scales and scales are taken from the preferred side of the fish which is the left side of the fish and 2 rows up from the lateral line on an imaginary line from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. Mark-recapture experiments occur each year to estimate the number of Chinook salmon spawning grounds in the Chilkat, Taku, Stikine, and Unuk Rivers. As part of event 1 of a two-event mark-recapture study, personnel capture Chinook salmon in the lower river using a variety of gear types and later recapture fish upriver using a variety of gear. Abundance is most often estimated using a Petersen model with Chapman's modifications, or a stratified model using the methods of Darroch to estimate total abundance past Canyon Island. Separate mark-recapture experiments are performed on smolt in the Chilkat, Taku, Stikine, and Unuk Rivers. Smolt are tagged and marked as the first of two sampling events. Minnow traps and seines are typically used to capture smolt and all Chinook smolt >50 mm FL captured each day are tranquilized, injected with a CWT, and have their adipose fin excised. All fish are then held overnight and checked the next day for overnight mortality. A subsample of these fish is checked to determine tag retention rates. Then, 1 to 5 years later, adult Chinook salmon are inspected for missing adipose fins in each river as the second sampling event for use in smolt abundance estimates. A Petersen model with Chapman's modifications is employed to estimate smolt abundance and associated variance. Harvest is also estimated using CWT information and associated harvest statistics gathered in the various marine fisheries in SEAK. One to five years after juveniles are injected with CWTs, adults are inspected for missing adipose fins. ADF&G personnel sample the troll, purse seine, gillnet and sport fisheries in SEAK and the ADF&G Mark, Tag and Age Laboratory in Juneau reports the sampling data and estimated catch by time, area, and fishery for each recovered CWT. Intensive sampling programs are established for the Juneau area sport fishery and District 111 gillnet fishery and the Wrangell/Petersburg sport fishery and District 108 gillnet/troll fisheries, respectively, in response to the Taku and Stikine River stock assessment programs, management, and the PST agreements governing directed Chinook salmon fisheries in these transboundary rivers. These data are then used to estimate Chinook salmon harvest, distribution and timing in various SEAK fisheries.

RESULTS:

Analysis of Data for Use in the Pacific Salmon Treaty-

Personnel funded through this project were involved in various Chinook salmon analyses using data gathered from the SEAK Chinook salmon stock assessment program. Results for Years 4-7 were used in part to draft the CTC's [TCCHINOOK \(17\)-2](#) "Annual Report of Catch and Escapement for 2016", [TCCHINOOK \(18\)-2](#) "Annual Report of Catch and Escapement for 2017", and [TCCHINOOK \(18\)-1 V1](#) "2017 Exploitation Rate Analysis and Model Calibration. Volume 1" manuscripts and were also useful for the TTC's [TCTR \(16\)-1](#) "Salmon Management and Enhancement Plans for the Stikine, Taku and Alsek Rivers, 2016", [TCTR \(17\)-3](#) "Salmon Management and Enhancement Plans for the Stikine, Taku and Alsek Rivers, 2017", and [TCTR \(19\)-1](#) "Final Estimates of Transboundary River Production, Harvest and Escapement and a Review of Joint Enhancement Activities in 2016." Personnel funded through this endeavor provided oversight, valuable input, analyses necessary for preseason forecasts, inseason management, and postseason run reconstruction for PST Chinook salmon stocks and also gathered data inseason at various Chinook salmon stock assessment projects.

Analysis of Aerial Survey, Age, Sex, and Length Composition, Mark-Recapture, Harvest, and Smolt Data for SEAK Indicator Stocks-

Various analyses are currently under review and draft manuscripts covering these efforts on in preparation. A final report will summarize the results of this work.

BUDGET:

Through Feb 28, 2019, a total of \$344,000 in prepaid checks were received from the Northern Endowment Fund. Total expenditures through this same period totaled \$372,672 and these expenses occurred mostly in costs associated with Personal Services (\$233,612), Contract Services (\$67,360), Operating Supplies (\$15,864) and Travel (\$6,446). A total cost of \$49,391 was germane to administrative overhead (Table 1).

SUMMARY:

Salmon escapement estimates are a critical element in the strategy to improve Chinook salmon stock assessment and abundance-based management as outlined in Annex IV, Chapter 3 of the 2009 PST. The CTC uses seven indicator stocks in SEAK for which escapements are measured annually using a weir across the Situk River, a weir at the Klukshu River for expansion to total escapement for the Alsek River, mark-recapture studies on the Chilkat, Taku, Stikine, and Unuk Rivers, and aerial and foot surveys of spawning abundance at the Chickamin River and Andrew Creek; aerial and foot surveys are also made in the Chilkat, Taku, Stikine, and Unuk Rivers. Chapter 1 of the PST details harvest sharing arrangements and management programs in the Taku and Stikine Rivers in years having surplus abundance and these programs are tied directly to preseason forecasts and inseason estimates and projections of terminal run that are generated using data gathered in the annual cooperative stock assessment programs on each river.

Table 1.- State of Alaska budget allocations, expenditures, and balances for the Northern Fund project Southeast Alaska Chinook Salmon, Years 4 to 7.

Line item	Allocations	Expenditures	Balance
Wages & Salaries	220,099	233,612	-13,513
Travel	6,447	6,447	
Contract Services	55,274	67,360	-12,086
Site/Project Costs	15,864	15,864	
AOH	46,318	49,391	-3,073
Total	344,002	372,674	-28,672