Western Alaska Salmon Committee

Research Recommendations

General Recommendations:

1 Develop state bycatch research priorities, possibly across departments, to share with funding entities that would help identify and acquire research funds.

2. Implement strategies to encourage and facilitate industry/agency cooperation research to reduce bycatch and associated mortality.

3. Create methods, such as an annual workshop, to collaborate with other research entities to better track bycatch research proposed or funded, along with collaboration opportunities and findings of funded research.

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Alaska Department of Fish and Game

Salmon Ocean Ecology Program

https://www.adfg.alaska.gov/index.cfm?adfg=salmonoceanecology.main

Email from Katie Howard-SOEP

In general, we recommend two types of research:

1. Research that can provide an additional (non-adult) abundance estimate. We've found this to be really powerful for helping us triangulate which life stages are most important for determining good or poor productivity.
    a. An excellent example of this is the northern Bering Sea pelagic trawl survey.
    b. We are also planning to conduct similar research in the southern Bering Sea so we can have a more comprehensive assessment of Western Alaska Chinook and chum.
    c. Neither of these projects are funded beyond 2023.
2. Research that helps us understand the relative importance of particular mechanisms for driving abundance of Western AK Chinook and chum. Among other things, this can include:
    a. Studies that help us understand how ocean/climate conditions impact future runs
        i. Marine pelagic trawl surveys in the northern and southern Bering Sea can help us address this (see above)
        ii. NOAA and ADF&G are collaborating on using International Year of the Salmon (IYS) catches and samples to examine immature AYK chum salmon in the North Pacific Ocean during winter. This is not yet funded.
        iii. Immature salmon surveys (like the IYS surveys) in the Bering Sea and North Pacific Ocean
        iv. Additional studies could be done using industry vessels as platforms for data collection
    b. Studies that help us understand the role of diet, health and disease on the survival and spawning success of Western AK Chinook and chum.

i. Understanding vectors of Ichthyophonus infection for Yukon Chinook salmon, and whether it is causing significant en route mortality during the spawning migration

ii. Understanding diet, nutrition and condition of Western AK Chinook and chum stocks at juvenile (marine pelagic trawl surveys in the northern and southern Bering Sea – see above), immature (IYS surveys, industry catches, etc.), and adult life stages (returning samples from lower river test fisheries- pilot work started for Yukon Chinook, but only funded through 2022)

c. Studies that help us understand the relative role of marine interceptions and bycatch

i. Improved information on marine migration patterns and its relation to fishery locations and timing

1. The projects Ed mentioned that Sabrina (Chinook) and Wes (chum) are leading in the Bering Sea
2. A tagging project of immature chum salmon in the North Pacific Ocean to help us understand their destination, timing and maturity
3. A synthesis of marine migration information from fishery dependent data sources, marine surveys, and tagging studies, and how these patterns have changed with a changing climate

ii. Improved information on the characteristics of fishery catches

1. There are still improvements that can be made in our ability to assess age, and specifically stock-specific age of Chinook and chum salmon caught in any marine fisheries.

iii. Improved information to help understand fishery impacts

1. Particularly for western AK chum salmon, AEQ analyses are limited by:
   a. data gaps in adult chum abundance across all of the WAK stock reporting group. So studies that improve our ability to estimate abundance of all chum in the WAK stock reporting group would be helpful
   b. and/or our ability to break up that reporting group. This might be remedied by using technologies that go beyond genetic assignment alone (use of pathogens, stable isotopes, etc.).

Alaska Fisheries Science Center

Salmon Ecology
Genetics
Conservation and Engineering

<u>Email from Ed Farley-AFSC</u>

1. Bycatch tools
   - Model ocean distribution and migration of AK Chum and Chinook salmon stocks in the Bering Sea to predict distribution and hotspots
   - Improved AEQ modeling through 'stock specific' Chinook and Chum salmon bycatch age classification
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2. Population Dynamics Tools
   - Understand critical survival periods for western Alaska salmon through integrated ecosystem assessment surveys

- Ecosystem indicators: summer sea temperature, phytoplankton/zooplankton community structure; salmon and pelagic fish catch per unit effort, distribution, energy density for fitness, size, stomach contents.
    - These indicators are being utilized to understand climate impact on the northern Bering Sea ecosystem, fish fitness and survival. The recent information from the northern Bering Sea pelagic trawl survey suggests that the marine heat wave within the NBS during 2016 to 2019 negatively affected juvenile Chum salmon fitness (shift to low quality prey, increased metabolic rates due to higher SST), likely leading to high winter mortality. The data suggest that Chinook salmon abundance is impacted by factors affecting them in freshwater and early marine residence.
- Data from the survey are utilized by the Yukon Panel and the ADFG for salmon forecasts and management to the western Alaska river systems
    - The Yukon River Panel, the portion of the PSC that deals with the Yukon River has identified that the juvenile forecasts that predict adult returns of Chinook salmon to the Yukon River are a priority. The Joint Technical Committee currently uses the juvenile forecast in their pre-season outlook for the Yukon River. Nearly all of the management decisions (1st half of the run) are based on the pre-season outlook. The JTC is also working on a new model that would integrate the pre-season and in-season forecasts for the Canadian-origin run. There is also a request to build a juvenile forecast for Chum salmon from our NBS survey data to forecast adult returns to the Yukon River.

Funding
For 1, there is a proposal to AYK SSI to fund a postdoc to do the Chum salmon distribution modeling; we will not know if that is successful until September; ADFG's Sabrina Garcia is working on a PhD project for the Chinook distribution

For 2, there is no directed funding support for:

- Charter vessel to conduct the survey
- Collecting and processing samples
- Paying for gear and supplies

Bering Sea Fishermen's Association

<u>Email from Karen Gillis</u>

1. Density-dependent effects and overcompensation
    - Comparative stock-recruitment analyses
    - Comparison of metrics to produce biological reference points
    - Density-dependent processes
2. Freshwater mortality
    - Environmental variables in streams
3. Ocean mortality
    - Forecasting adult salmon returns
    - Early marine survival
4. Anthropogenic changes to marine ecological processes

- Stressors to abundance and productivity

5. Escapement quality
   - Causality of genetic changes vs. environmental variables
   - Variables affecting spawning and reproductive fitness
6. Pathogens
   - Past and current status of Ichthyophonus infections
   - Lethal and sub-lethal effects of Ichthyophonus infections

North Pacific Fishery Management Council

https://www.npfmc.org/how-we-work/research-priorities/
https://research.psmfc.org/
Salmon Ecology
PSC Bycatch

The updated NPFMC five-year research priorities are provided to the Secretary of Commerce, the Alaska Fishery Science Center, as well as research and funding entities including the

- University of Alaska
- University of Washington
- Oregon State University
- North Pacific Research Board
- Alaska Department of Fish and Game
- Alaska Ocean Observing System

North Pacific Research Board

https://www.nprb.org/core-program/about-the-program/