Insights Into the Marine Ecology and Survival of Chinook Salmon

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Poor marine survival is a contributing factor to low returns of Chinook salmon throughout SE Alaska.
Southeast Alaska Coastal Monitoring
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Surface Trawl Catch of Juvenile Salmon by Habitat and Month

- Pink Salmon
- Chum Salmon
- Sockeye Salmon
- Coho Salmon
- Chinook Salmon

Catch per Haul

Month: 6, 7, 8, 9
Juvenile Chinook Diet
(Weitkamp and Sturdevant, 2008)

- Euphausiid (krill)
- Herring
- Capelin
- Sandlance
- Crab
- Other Invert
- Other Fish
Coded Wire Tag Recoveries by Habitat

Inshore
- Ocean age 0
  - NSE

Strait
- Ocean age 1
  - NSE
  - WA
  - SSE

Coastal
- OR
- WA
- SSE
- NSE

Ocean age 0
- NSE

Ocean age 1
- NSE
Surface trawl catches of ocean age 1 Chinook in Icy Strait is typically correlated with marine survival of northern SE Chinook salmon stocks.

\[ y = 0.0703x + 0.0033 \]

\[ R^2 = 0.7569 \]
1. Critical Size and Period Hypothesis

Two critical periods within the first year at sea contribute to variation in marine survival.

Critical Periods

First Spring

Larger salmon escape predation and can feed on larger prey species.

First Winter

Larger salmon with higher fat content can survive longer periods with limited forage (winter).
Early marine growth (IGF1) and adult returns of Columbia River Chinook salmon (Brian Beckman)

\[ r^2 = 0.76 \]

Graph showing the correlation between mean Chinook salmon IGF1 and adult returns, with a correlation coefficient of 0.76.
Size-selective mortality of juvenile Yukon River Chinook Salmon

Juvenile Chinook salmon abundance in the northern Bering Sea (Sep) is correlated to adult returns to the Yukon River

Data Tags: Migration, Distribution, and Predation
Vertical Migration of Chinook Salmon
(Coastal SE Alaska and BC)
(Murphy and Heard, 2001)
Vertical Migration of Chinook Salmon (Central Gulf of Alaska) (Seitz et al. 2016)
Vertical Migration of Chinook Salmon
(Bering Sea)
(Walker et al. 2009)
Salmon Shark Predation on Chinook Salmon in the Bering Sea
(Seitz et al. 2016)
Final Thoughts…

- Poor marine survival is the primary reason for the decline of Chinook Salmon stocks throughout Southeast Alaska.

- Variation in marine survival of northern Southeast Chinook salmon stocks appears to typically occur within their first year at sea.

- Migratory patterns of Chinook salmon are complex and highly variable, and may be linked to feeding behavior.

- Apex predators (sharks and marine mammals) are an important source of marine mortality in salmon.
Highseas coded-wire tag recoveries of SE Alaska Chinook salmon

Southeast Alaska Chinook Salmon
- Previously-reported CWT recoveries (n = 203)
- New CWT recoveries (n = 8)
Timing of ocean entry and survival of Columbia River Chinook salmon (Scheurell et al. 2009)
Warming Climate in Southeast Alaska

Icy Strait Temperature Index

Pelagic Species Composition
Fish ID #129840

- 79.0 cm Fork length
- Captured and released in Unalaska Bay on 17 December 2014
- Reported to satellites on 7 Jan. 2015
- Minimum transit of 130 km
- Warm-blooded predation event
Preliminary Results

Fish ID #129843
- 85.0 cm Fork length
- Captured and released in Unalaska Bay on 18 December 2013
- Reported to satellites on 9 April 2014 from the central Gulf of Alaska
- Minimum transit of 1,470 km