Alaska Fisheries Science Center
NATIONAL MARINE FISHERIES SERVICE – NOAA FISHERIES

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Juvenile Salmon Trophic Relationships in Southeast Alaska for Warm and Cold Years

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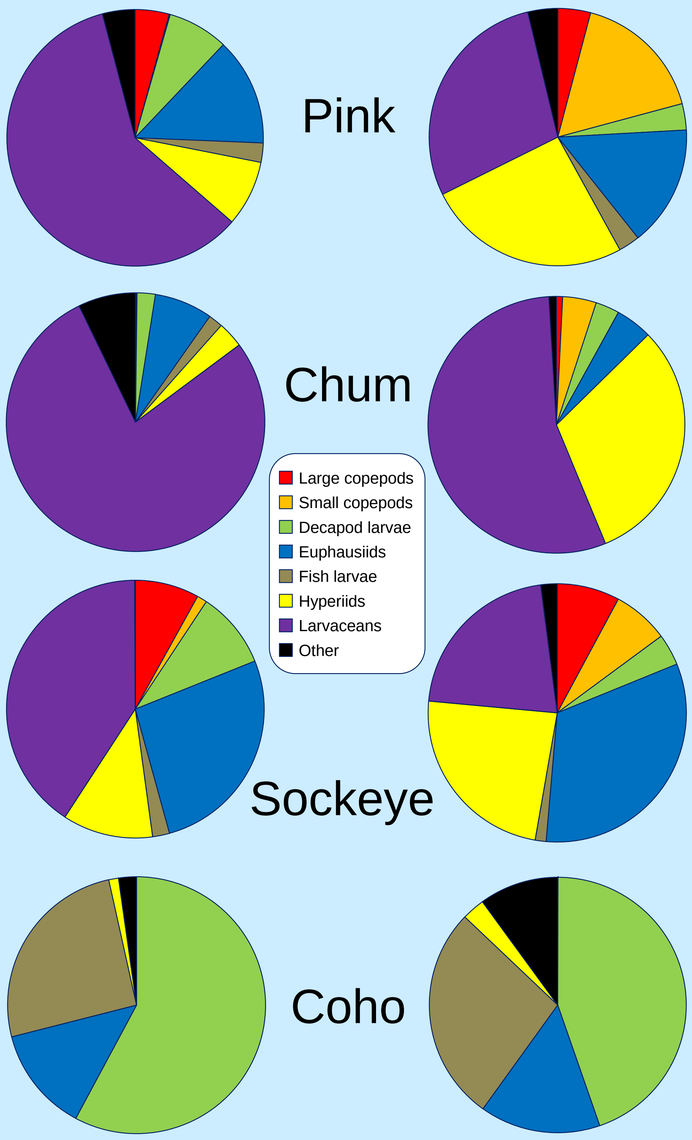
Diet Composition

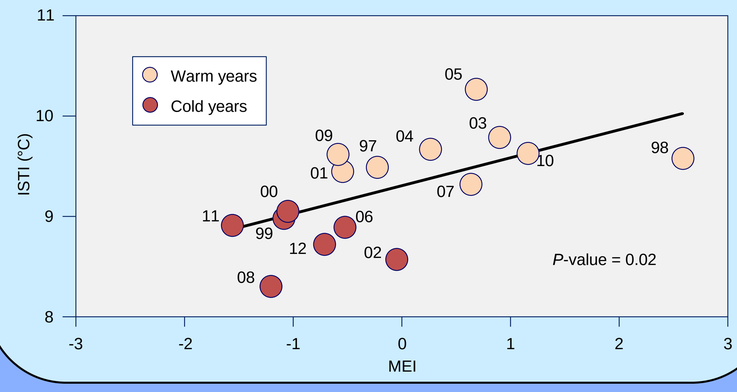


Overview

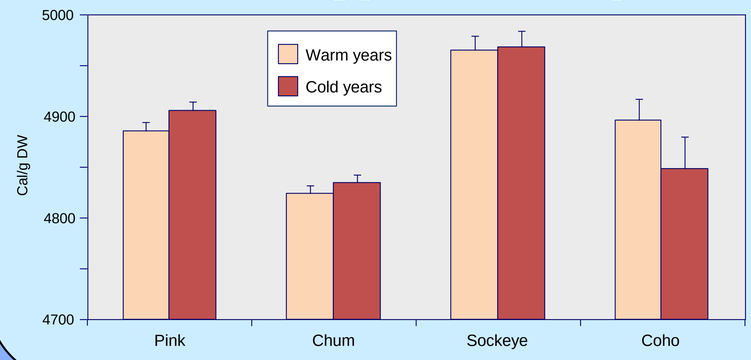
A 16-year time series of July diet composition (%wt), gut fullness index (%BW), energy density (cal/g DW), and size (fork length, mm; weight, g) of juvenile pink, chum, sockeye, and coho salmon was examined from Icy Strait, SEAK by warm and cold years. Subsamples of $n \leq 20$ fish per species and year were selected from annual Southeast Coastal Monitoring (SECM) project collections from 1997-2012.

Local marine conditions were compared with a multivariate climate index. Warm and cold years were categorized by annual deviations from the Icy Strait Temperature Index (ISTI, 20-m integrated mean °C in May-August), and then correlated with the Multivariate ENSO Index (MEI, November-March lagged by one year).

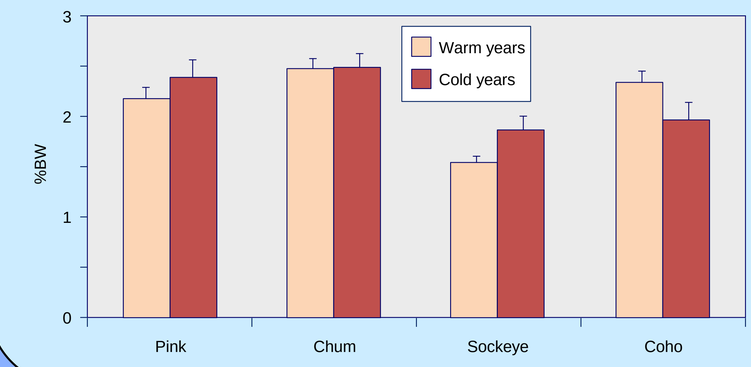
Marine Temperature



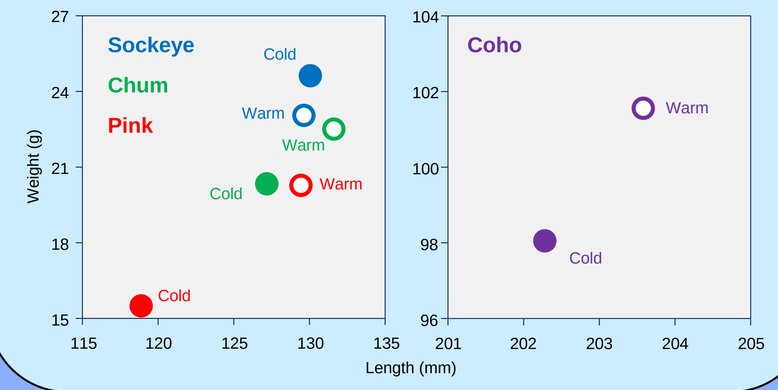
Energy Density



Gut Fullness



Size



Summary

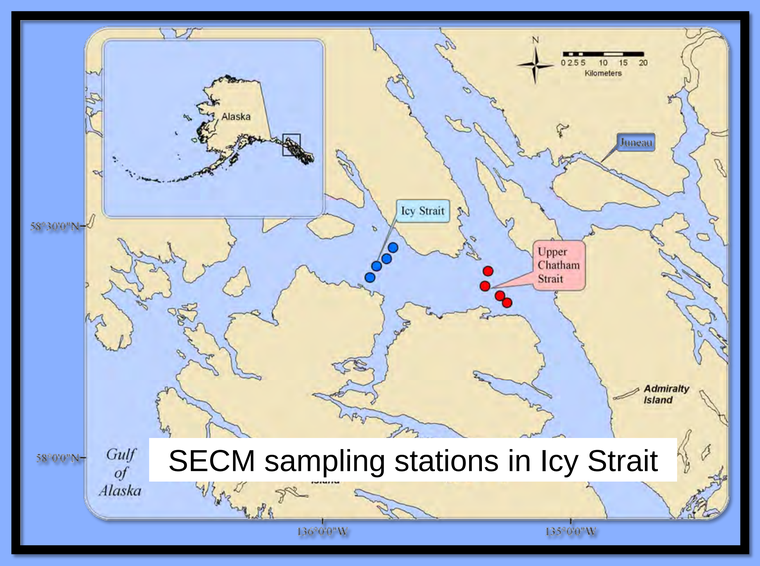
- From warm years to cold years, prey utilization by planktivorous pink, chum, and sockeye shifted from large to small copepods and from larvaceans to hyperiids, with an overall decrease in consumption of decapod larvae. Consumption of decapod larvae by coho also decreased, but fish prey were important in the diet in both warm and cold years.

- Nutritional condition and feeding intensity of juvenile salmon did not differ between warm and cold years.

- Energy density was lowest for chum and highest for sockeye, whereas gut fullness followed the inverse pattern. These contrasts may reflect the predominance of low energy, rapidly-digested larvaceans in chum diet vs. high energy crustaceans such as euphausiids in sockeye diet.

- Most salmon species were larger in warm years than in cold years. However, emigration of more small, age-0 sockeye in warm years could explain lack of a size difference for sockeye.

- Overall, our results suggest that trophic dynamics of co-evolving juvenile salmon are adapted to climate change.



SECM sampling stations in Icy Strait

http://www.afsc.noaa.gov/ABL/MSI/msi_secm.htm