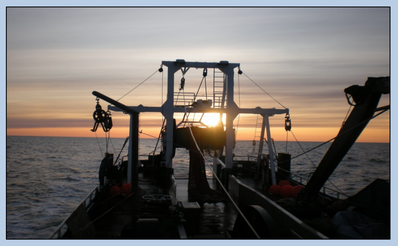
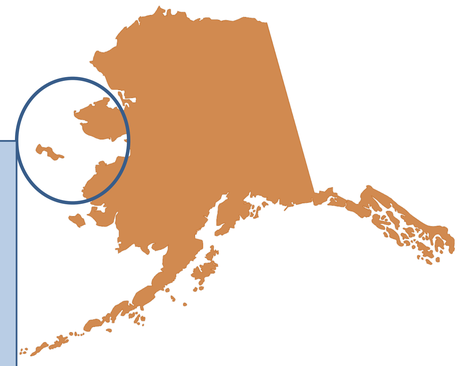
Response of juvenile Chinook salmon (*Oncorhynchus tshawytscha*) to warm and cold year environments in the northern Bering Sea

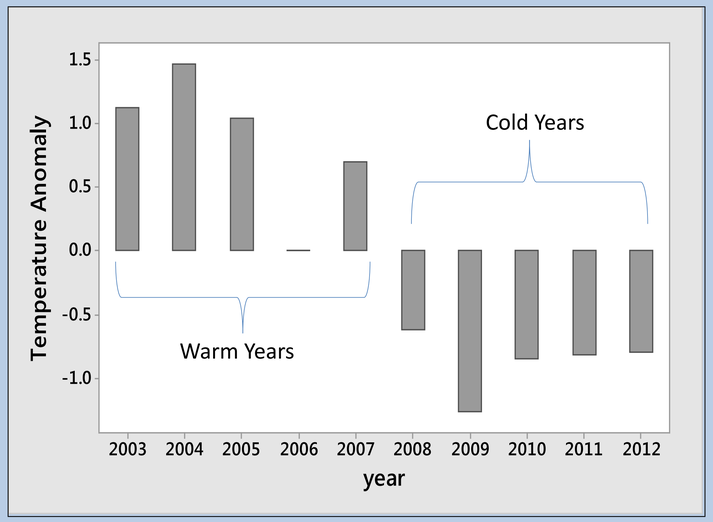
Jeanette C. Gann, Jordan T. Watson, Edward V. Farley, Jr.
Jeanette.gann@noaa.gov



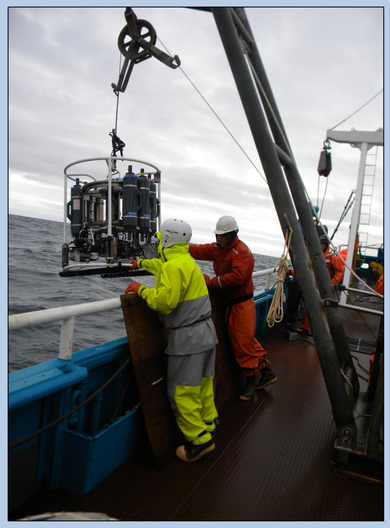
Data were collected by the Ecosystem Monitoring and Assessment (EMA) program on Bering, Arctic, sub-Arctic, integrated surveys (BASIS) during late summer/early fall in the eastern Bering Sea.



Oceanography

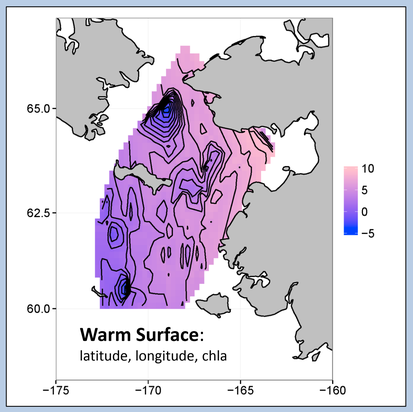


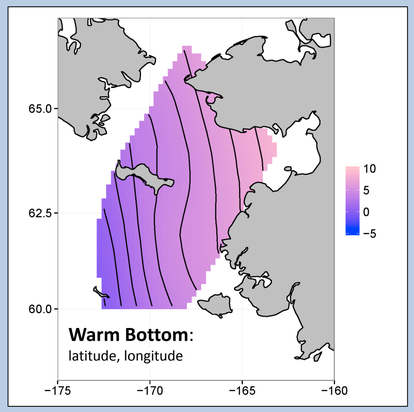
Temperature anomalies in the southern Bering Sea serve as a proxy for northern Bering Sea conditions due to consistent winter ice cover in the north combining with predominant northward currents. Years were categorized as warm or cold based on sea surface temperatures (top 10m averaged) from CTD profiles during late summer in the southern Bering Sea (<60 °N).



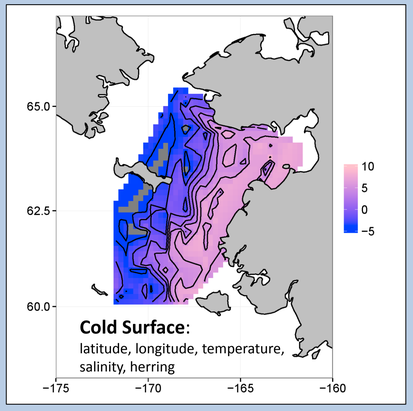
Oceanographic parameters (temperature, chlorophyll-a (chla), salinity, silicate) for surface (top 10m avg) and bottom waters (bottom 10m avg) were parsed out for warm and cold years. These four categories (warm surface, warm bottom, cold surface and cold bottom) were paired with surface trawl data for juvenile Chinook salmon, Pacific Herring and Capelin, and fit with generalized additive models (GAMs).

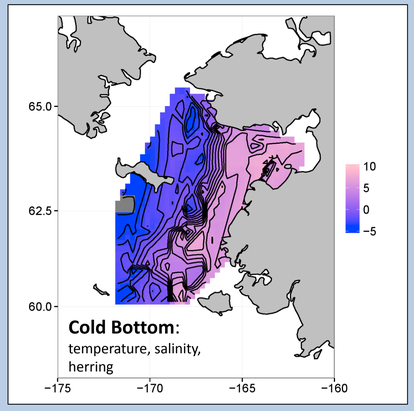
Juvenile Chinook biomass fitted to environmental data





GAMs were fit with environmental covariates and selected by generalized cross validation (GCV), deviance explained, and covariate significance ($p < 0.05$). Each category revealed different sets of significant environmental predictors.





GAMs from both warm year categories showed juvenile Chinook farther north and offshore with broader overall distributions, while both cold year models revealed juvenile Chinook farther south and closer to shore, with more concentrated distributions.

Conclusions

Chinook salmon, *Oncorhynchus tshawytscha* by Zureks - Treball propi.

- Juvenile Chinook distributions varied between warm and cold years, both in terms of biomass and in terms of their model fits. Both cold year categories had higher deviances explained (>50%) and significant associations with a greater number of environmental covariates. Warm years had fewer significant environmental relationships and less robust model fits (< 21% deviance explained).
- Temperature and salinity were significant for both cold year categories, and for neither of the warm year categories. Thus, water column stability during summer may be an important factor for juvenile Chinook salmon and this will be investigated further.

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