Genetic Analysis of Chum Salmon Bycatch Samples from the Bering Sea Groundfish Trawl Fisheries

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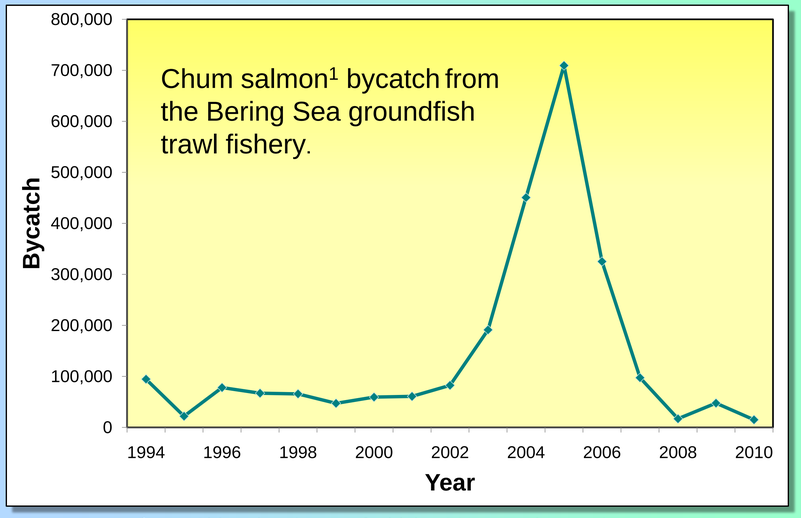
Introduction

Protection of western Alaska chum salmon populations is of primary concern for salmon bycatch managers in the U.S. Bering Sea groundfish fisheries. The Bering Sea is a known feeding habitat for multiple brood years of chum salmon (*Oncorhynchus keta*) from many different localities in North America and Asia. Because large numbers of chum salmon are incidentally caught in the federally managed Bering Sea groundfish fisheries in some years, it is important to determine the geographic origin of salmon caught in these fisheries to better understand whether management could address conservation concerns.



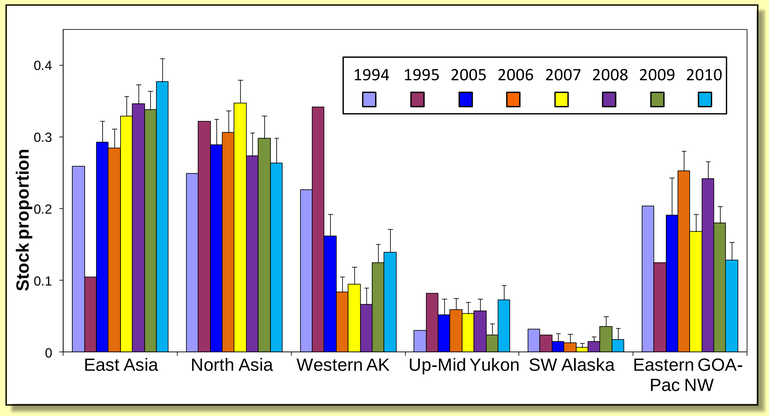
[1]Non-Chinook salmon, of which >98% are chum salmon.

Our Approach

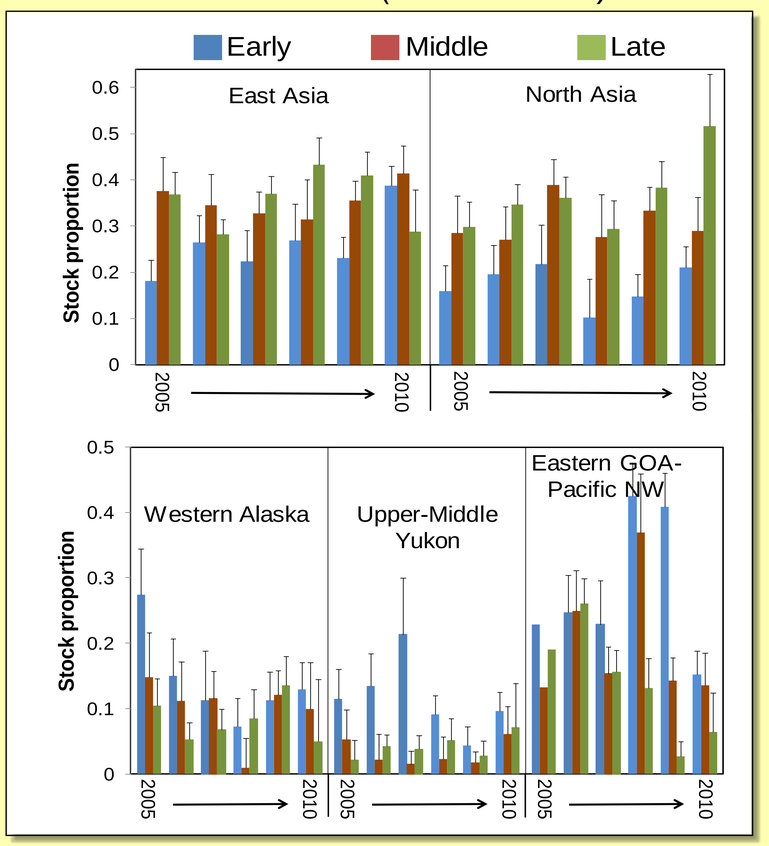
- Chum salmon caught in the Bering Sea groundfish trawl fisheries were sampled in 2005-2010 by National Marine Fisheries Service (NMFS) observers.
- We compared genetic information (11 microsatellites) from chum salmon bycatch samples to the Fisheries and Oceans Canada microsatellite baseline (381 populations) to identify their origin**.** 1994-95 samples were analyzed by using allozymes with a different but overlapping genetic baseline.
- Seasonal stratification (early, middle late time periods) of the bycatch samples were compared across years.
- Sample bias was evaluated by comparing the number of bycatch samples to the total bycatch by statistical area over time.

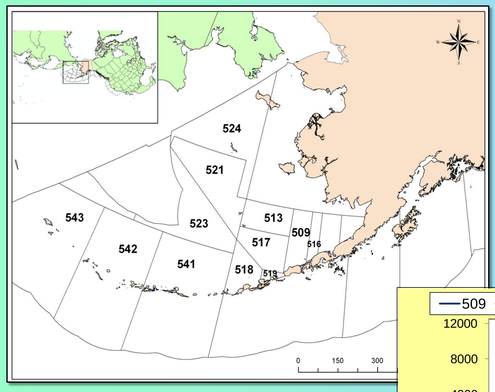
Origin

Stock composition estimates of total chum salmon genetic samples from the Bering Sea bycatch.



Seasonal stock composition estimates from **early**, **middle**, and **late** strata of the "B" season (June-October).



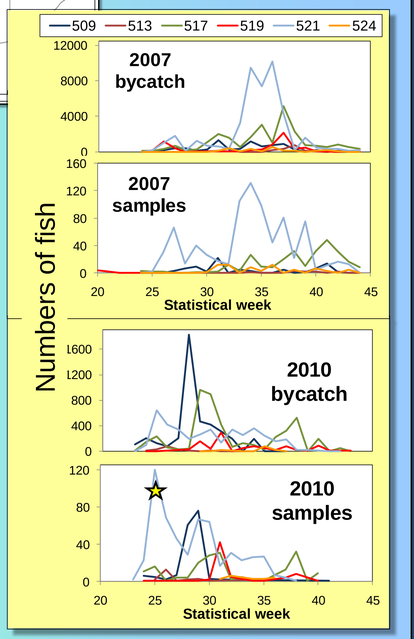


Statistical fishery areas of the Bering Sea.

Sample bias

Sample and bycatch distribution by area were very similar in 2007.

But, in 2010 spatial bias occurred with the over-representation of genetic samples in area 521 early in the season (☆).



Summary

- Overall, chum salmon collected from the bycatch were predominantly from Asia, although substantial contributions were also from the eastern Gulf of Alaska/Pacific Northwest, followed by western Alaska and the upper and middle Yukon River.
- Relative contributions shifted over the course of the fishing season. The Asian contribution increased and the North American contribution decreased during the "B" season, a time when the majority of the chum salmon are caught in the Bering Sea groundfish fishery.
- Temporal and spatial bias exists in the bycatch sample sets and limits their application as stock composition estimates for the entire chum bycatch. However, our analysis provides a rough measure of stock distribution and, at a minimum, indicates the presence and/or absence of specific stock groups within the bycatch. In 2011, the NMFS amended the fishery management plan for groundfish of the Bering Sea and Aleutian Islands Management Area to implement a systematic sampling design to alleviate sample bias.

References

Guyon, J.R., Kondzela, C., McCraney, T., Marvin, C., and Martinson, E. (2010). Genetic Stock Composition Analysis of Chum Salmon Bycatch Samples from the 2005 Bering Sea Groundfish Fishery. NPFMC Report, pp. 31.

Marvin, C.T., Wildes, S.L., Kondzela, C.M., Nguyen, H.T. and Guyon, J.R. (2011). Genetic Stock Composition Analysis of Chum Salmon Bycatch Samples from the 2006 Bering Sea Groundfish Fisheries. NOAA Technical Memorandum, NMFS-AFSC-220.

Gray, A.K., McCraney, W.T., Marvin, C.T., Kondzela, C.M., Nguyen, H.T. and Guyon, J.R. (2011). Genetic Stock Composition Analysis of Chum Salmon Bycatch Samples from the 2007 Bering Sea Groundfish Fisheries, NOAA Tech Memo, NMFS-AFSC-221.

Gray, A.K., McCraney, W.T., Marvin, C.T., Kondzela, C.M., Nguyen, H.T. and Guyon, J.R. (2011). Genetic Stock Composition Analysis of Chum Salmon Bycatch Samples from the 2009 Bering Sea Groundfish Fisheries, NOAA Tech Memo, NMFS-AFSC-222.

Kondzela, C.M., McCraney, W.T., Nguyen, H.T. and Guyon, J.R. (2012). Genetic Stock Composition Analysis of Chum Salmon Bycatch Samples from the 2010 Bering Sea Groundfish Fisheries, NOAA Tech Memo.

Wilmot, R.L., Kondzela, C.M., Guthrie, C.M., and Masuda, M.M. (1998). Genetic stock identification of chum salmon harvested incidentally in the 1994 and 1995 Bering Sea trawl fishery. North Pacific Anadromous Fish Commission Bulletin No. 1, 285-299.

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