

# Cyclic climate changes and production of Pacific salmon.

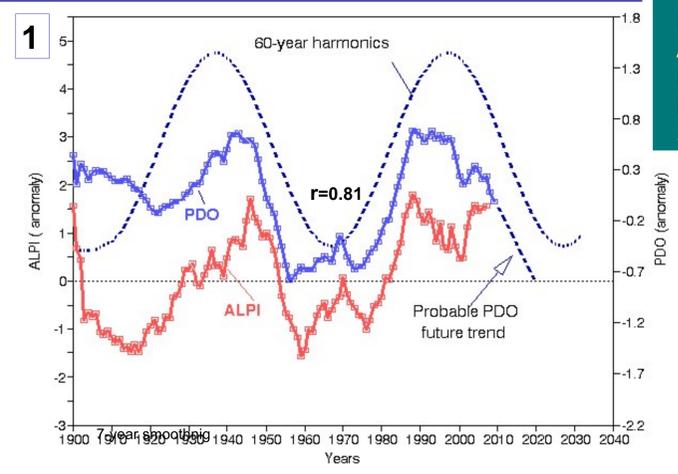
## Possibility of forecasting

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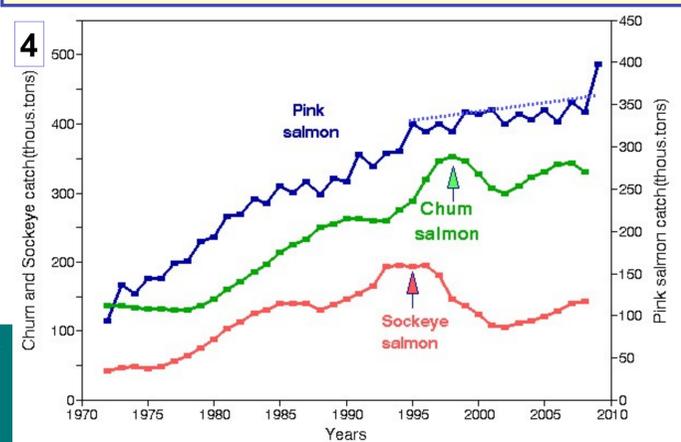
1 Comparative dynamics of PDO, ALPI and 60-year harmonics



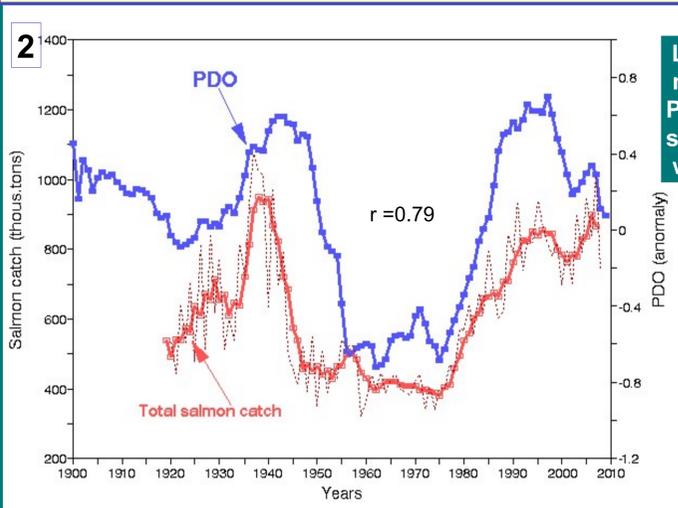
Main climatic indices for the North Pacific are: PDO (mean ocean surface temperature) and ALPI (mean area of low atmospheric pressure). Long-term of PDO and ALPI show maxima in the 1930-40s and 1990-2000s and can be approximated by the 60 year harmonics

Both Chum salmon and Sockeye salmon productions reached the maximum in the middle of 1990s while Pink salmon production, though slowed down, still continue to grow.

4 Comparative dynamics of total production Pink, Chum and Sockeye salmon 1972 – 2009



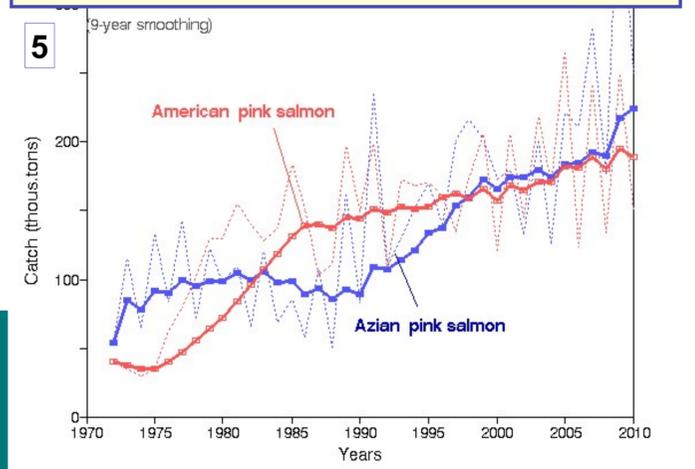
2 Comparative dynamics of PDO and total Pacific salmon production



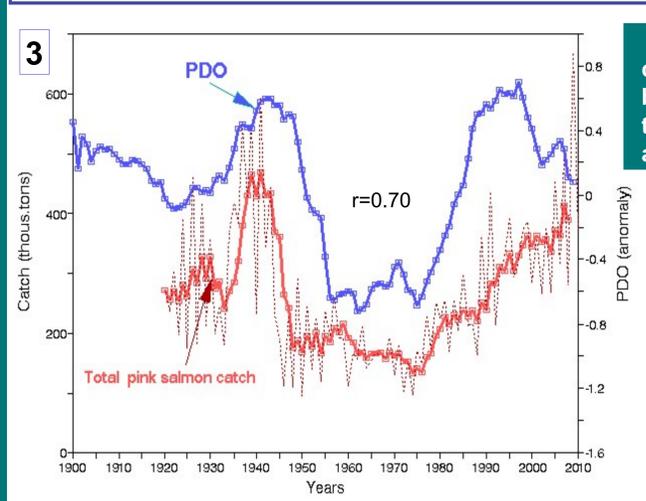
Long-term variation of ocean temperature (PDO) may influence biological productivity in the North Pacific. The long-term changes in total Pacific salmon catch dynamics follow the PDO variation with the maxima attributed to the 1930s and 2000s.

Fast growth of "American" Pink salmon production took place in 1970-1980s and that of "Asian" Pink salmon – 1990-2000s. Last years, the dynamics of total Pink salmon production at both continents is rather synchronous.

5 Comparative dynamics production of "Asian" and "American" Pink salmon 1972–2009



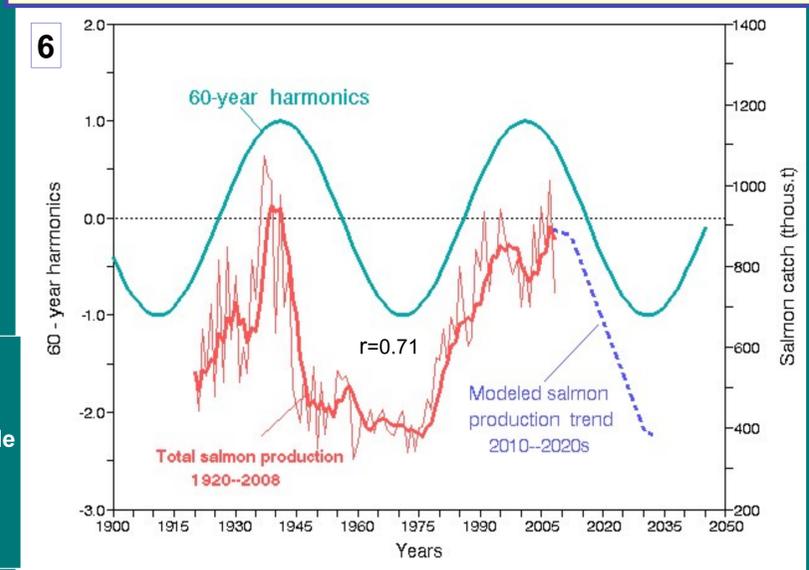
3 Comparative dynamics of PDO and Pink salmon production



Total Pink salmon production dynamics corresponds to the age-long PDO variation but unlike the total Pacific salmon catch, the Pink salmon production does not show any peak and continues to grow after the 2000s.

Age-long dynamics of the total Pacific salmon production correlates with the PDO dynamics and corresponds to 60-year harmonics. This makes it possible to anticipate the descending trends in total Pacific salmon dynamics and in particular Pink salmon production for the next 10-15 years.

6 Age-long dynamics of Pacific salmon production, 60-year harmonics and modeled production trend 2010–2020s



### Conclusion

A simple stochastic model based on the 60-65 year cyclic climate changes can be used to foresee main trends in the Pacific salmon population on a decadal scale. The model indicates that a general decrease in the total Pacific salmon and in particular Pink salmon production is likely to take place in the 2010-2020s.

A stochastic model of climate and fish population dynamics is discussed in detail in the book. This book considers relationships between climate changes and fish productivity of ocean ecosystem.

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