ICES/PICES 6ZPS 2016/S2

Climate and local variability influence zooplankton exchange between the coastal ocean and an estuarine fjord.

Julie E. Keister and Bethellee Herrmann
School of Oceanography, University of Washington

Understanding the specific mechanisms of how large-scale climate variability influences local zooplankton composition is critical for understanding variability in local fish populations. In the Northeast Pacific, the Strait of Juan de Fuca (SJF) connects the North Pacific Ocean to the Salish Sea between the U.S. and Canada. Multiple physical influences—including advection from the Strait of Georgia (British Columbia), Puget Sound (Washington State), and the California Current—create a complex, highly advective environment in the SJF, with strong climate influences reflected through processes such as river run-off and coastal upwelling. In this presentation, we will explore how zooplankton behavior and environmental variability interact to affect observed zooplankton composition using a monthly time series sampled in the SJF. Here we show that the SJF zooplankton species composition reflects large-scale climate variability (e.g., correlates with the Pacific Decadal Oscillation) and regional physical variability (especially freshwater inputs). Interestingly, the species composition is strongly correlated (R^2>0.8) with survival of coho salmon populations that return to some of the local rivers, but very poorly correlated (R^2<0.10) with survival of coho that return to other, neighboring, rivers. Such strong, yet spatially variable, local correlations could help fishery managers understand processes that control salmon abundance and potential response to future climate change. The mechanisms that control the SJF zooplankton composition differ substantially from those that control California Current zooplankton communities, illustrating the importance of regional controls on zooplankton biogeography and links to fish.

Keywords: ocean-estuary exchange, advection, bio-physical coupling, climate, copepod community

Contact author: Julie Keister, University of Washington, Seattle, WA, U.S.A., jkeister@u.washington.edu