Session IV: Ocean

Intro to Ocean Conditions

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Not long ago the oceans were thought to have unlimited capacity for growth and survival of salmonids. Therefore their early ocean life was seldom studied. Three major events radically changed this myth. First, big 1982-83 El Nino with its warm waters and subdued upwelling severely impacted salmon in the Pacific Northwest. Another was the major interannual change in ocean conditions that occurred in 1976-77, when cool waters replaced by warm-nutrient-poor along the coast for the next twenty years. Finally, the finding that the survival of juvenile salmon and the size of the adult run was often well correlated with the intensity and timing of coastal upwelling.

I will give a general introduction (20 -30 minutes) that stresses the variability of ocean conditions and elaborates on each of these events: El Nino, Pacific Decadal Oscillation and coastal upwelling. The take-home message is that much of the mortality of salmon occurs in the ocean and that growth and survival vary depending on conditions that prevail during early life with a year, among years and among decades. Hypothesized mechanisms linking survival to ocean conditions during the first critical year of ocean life include ocean productivity, prey availability and growth, and predation.

General reading:

Return to the River, Chapter 10
Ocean Ecology of North Pacific Salmonids, W.G. Pearcy (out of print)

Other References:

Scheuerell and Williams. 2005. Forcasting climate-induced changes in the survival of Snake River spring/summer Chinook salmon (Oncorhynchus tshawytscha). Fisheries Ocanography 14: 448-457.

Mantua et al. 2001. A Pacific interdecadal climate oscillation with impacts on salmon production. Bull. American Meteorological Soc. 78: 1069-1079.

Logerwell et al. 2003. Tracking environmental processes in the coastal zone for understanding and predicting Oregon coho (Oncorhynchus kisutch) marine survival. Fisheries Oceanography 12: 554-568.