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ELIZABETH SARAF (Marine Biology)

Particle tracking reveals Pelagic Red Crabs as indicators of climate-driven range expansion in the California Current

Sponsor: Jacqueline Webb (Biological Sciences)

Since their first recorded occurrence in 1859, Pelagic Red Crabs (PRC; *Pleuroncodes planipes*) have experienced increased frequency of episodic mass stranding events in the Eastern Pacific Ocean. PRC's are transported over 1,000 km northward of their central domain from the coast of central Baja California, Mexico. They have been reported by the thousands on the beaches of central and southern California. Their presence influences the surrounding ecosystem and commercial fisheries because they are nutritional prey items and large predators change their diet to incorporate PRC's when they are available. Seasonal coastal currents and the California Undercurrent transport warmer waters northward by a process called advection, presumably carrying the PRC's with them. The Poleward Advection Hypothesis predicts that the California Current is responsible for the northward range expansion of the PRCs. Further, this suggests that PRC's can be used as indicators of anomalous (intermittent) conditions in the California Current Ecosystem. We tested this hypothesis by using daily sea surface (GlobCurrent data, <http://www.globcurrent.org/>) and subsurface current velocity (GLORYS data, <https://www.mercator-ocean.fr/en/ocean-science/glorys/>) from 1997-2020 to generate simulations of particle (PRC) transport from Baja California, Mexico northward to Monterey Bay, California. We found that anomalous current velocities correlate with historical PRC stranding events (1997-2020) and simulations indicated that PRC transport is influenced by the California Undercurrent and may be affected by El Niño. By understanding climate-driven variability in the California Current Ecosystem, we can predict the timing and location of PRC mass stranding events. Initial stages of this study were funded by a 2020 NOAA Hollings Scholarship summer internship and this work was done in collaboration with scientists at the NOAA Southwest Fisheries Science Center, Monterey CA.