Dispersal of barnacle larvae along the central California coast: A modeling study

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ABSTRACT: To investigate the biological and physical mechanisms affecting larval dispersal, we embedded a model of *Balanus glandula* larval development and behavior into physical circulation fields of waters along the central California coast. Physical circulation fields were generated by a three-dimensional ocean circulation model with a horizontal resolution of 1.5 km and 20 topography-following layers in the vertical. The ocean circulation model was forced by air-sea fluxes derived from a mesoscale atmospheric model and assimilated temperature and salinity data from the Autonomous Ocean Sampling Network II experiment. An ecosystem model that calculated chlorophyll a (a proxy for larval food concentration) was also coupled to the ocean circulation model. The coupled model of larval development, larval behavior, food concentration, and physical circulation was used to run simulations of larval dispersal. Simulation results predicted a greater return of larvae to the nearshore waters with relaxation circulation patterns than with upwelling. More larvae were supplied to the coast north of Monterey Bay than to the south, and larvae that successfully returned to the nearshore waters generally had limited dispersal distances. These modeling results agree with previous observations of B. glandula population dynamics in central California.

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