DISENTANGLING BIOPHYSICAL FACTORS AFFECTING REEF FISH

RECRUITMENT IN WEST HAWAI'I ISLAND

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ABSTRACT

Understanding what impacts the number of fish surviving to replenish a population (i.e. recruitment) is a daunting task because of the many biological and physical variables that can affect individual survival and dispersal. To explore these ideas, I co-developed an individual based model (IBM) coupled to a physical model to explore how date of birth, location of birth, and pelagic larval duration impact recruitment success. Here I found that when comparing the date of birth of all individuals who settled back to Hawai'i Island, there are peaks in recruitment from January to April, and from Mid-May to November, full moon and other moon phases being statistically significant from one another, but more significant that the new moon phase. Individuals born in shallow and sheltered bays have higher rates of settlement compared to individuals born in unsheltered locations. Shorter pelagic larval durations (PLDs) are seen to be more advantageous throughout the year, while longer durations can also result in successful recruitment during months with sustained eddies (e.g. March – July, September, November, December). During the months of April to October of 2011, a median PLD of about 59 days is seen amongst settlers. This study provides a baseline understanding of how biophysical factors interact to impact recruitment in western Hawai'i Island. Output can be used to explain species-specific variation in recruitment among years and can be expanded to include other biological variables e.g. larval swimming speed and size-dependent mortality.