ID: W2783057380

TITLE: Climatic forcing and larval dispersal capabilities shape the replenishment of fishes and their habitat?forming biota on a tropical coral reef

AUTHOR: ['Shaun K. Wilson', 'Martial Depcyznski', 'Rebecca Fisher', 'Thomas H. Holmes', 'Mae M. Noble', 'Ben Radford', 'Michael Rule', 'George Shedrawi', 'Paul Tinkler', 'Christopher J. Fulton']

ABSTRACT:

Fluctuations in marine populations often relate to the supply of recruits by oceanic currents. Variation in these currents is typically driven by large-scale changes in climate, in particular ENSO (El Nino Southern Oscillation). The dependence on large-scale climatic changes may, however, be modified by early life history traits of marine taxa. Based on eight years of annual surveys, along 150 km of coastline, we examined how ENSO influenced abundance of juvenile fish, coral spat, and canopy-forming macroalgae. We then investigated what traits make populations of some fish families more reliant on the ENSO relationship than others. Abundance of juvenile fish and coral recruits was generally positively correlated with the Southern Oscillation Index (SOI), higher densities recorded during La Niña years, when the ENSO-influenced Leeuwin Current is stronger and sea surface temperature higher. The relationship is typically positive and stronger among fish families with shorter pelagic larval durations and stronger swimming abilities. The relationship is also stronger at sites on the coral back reef, although the strongest of all relationships were among the lethrinids (r = .9), siganids (r = .9), and mullids (r = .8), which recruit to macroalgal meadows in the lagoon. ENSO effects on habitat seem to moderate SOI-juvenile abundance relationship. Macroalgal canopies are higher during La Niña years, providing more favorable habitat for juvenile fish and strengthening the SOI effect on juvenile abundance. Conversely, loss of coral following a La Niña-related heat wave may have compromised postsettlement survival of coral dependent species, weakening the influence of SOI on their abundance. This assessment of ENSO effects on tropical fish and habitat-forming biota and how it is mediated by functional ecology improves our ability to predict and manage changes in the replenishment of marine populations.

SOURCE: Ecology and evolution

PDF URL: https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/ece3.3779

CITED BY COUNT: 25

PUBLICATION YEAR: 2018

TYPE: article

CONCEPTS: ['Coral reef fish', 'Coral reef', 'Pelagic zone', 'Coral', 'Abundance (ecology)', 'Reef', 'Ecology', 'Biological dispersal', 'Biology', 'Pomacentridae', 'Habitat', 'Predation', 'Juvenile', 'Ichthyoplankton', 'Sea surface temperature', 'Oceanography', 'Fishery', 'Population', 'Demography', 'Sociology', 'Geology']