

## THE EFFECT OF THE EL NIÑO-SOUTHERN OSCILLATION EVENT ON THE DISTRIBUTION OF REEF-ASSOCIATED LABRID FISHES IN THE EASTERN PACIFIC OCEAN

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### ABSTRACT

We surveyed the labrid fishes of the eastern Pacific ocean at multiple sites before, during, and after the 1997-98 ENSO event. Our observations showed that reef fish communities in general did not appear to change markedly as a result of the ENSO. Recruitment of labrids at the Galápagos Islands, Clipperton Atoll and Baja California was generally high near the end of the ENSO, indicating no negative effect on populations. Two labrid species did extend their known range during the ENSO: *Stethojulis bandanensis* settled onto the tip of Baja California and to the Galápagos Islands, while *Thalassoma virens* recruited heavily to sites along the southern Sea of Cortez in Baja California. We discuss the oceanographic conditions during the ENSO that may have promoted the range extensions. Adults of these species were present in Baja California and Galápagos 2 yrs after the end of the ENSO. Our observations raise the question why these species do not colonize these sites in normal years, given the potential for long larval durations (up to a maximum of 104 d in *T. virens*) and rapid long-distance transport between islands in the region (recruits of *S. bandanensis* spent only about 32 d in the plankton).

The recent El Niño-Southern Oscillation (ENSO) event of 1997-98 is considered to be one of the most intense of the past few centuries and has had a profound effect on the marine environment of the eastern Pacific Ocean (Glynn et al., this issue). The most significant and lasting result has been widespread mortality of reef-building corals throughout the region. The effect on reef-associated fishes is less dramatic and less well-documented, yet may be important to explaining the biogeography of fishes in the eastern Pacific Ocean. The epicenter of the temperature anomalies during the ENSO is near the Galápagos Islands, where the normal cool annual upwelling cycle disappears, the thermocline deepens, and a vast region of exceptionally warm surface water develops and persists for many months (reviewed in Enfield, this issue). In addition, the eastward flowing North Equatorial Countercurrent (NECC) speeds up considerably, and warm tropical water builds up in the eastern Pacific and flows towards more temperate regions (Wyrтки, 1985; Lea and Rosenblatt, 2000).

The eastern Pacific region is particularly well-suited to an analysis of how oceanographic anomalies such as the ENSO affect reef fish biogeography. The distribution of habitats is simple: a long north-south stretch of thin continental shelf with several isolated island groups at varying distances from the coast (Fig. 1). There are marked temperature variations, both seasonal and latitudinal, distinct regions of upwelling, and clearly delineated areas of rocky coastline, coral reefs, and soft sediment (Glynn and Ault, 2000). Furthermore, the whole region is separated from the complex biogeographical regions of the central and western Pacific by a vast ocean expanse, the East Pacific Barrier, over 5000 km without island stepping stones (Leis, 1984; Grigg and Hey, 1992). As a result, the vast majority of reef fish species in the area are endemic to the eastern Pacific and, furthermore, exhibit a great variety of patterns of distribution within the region (Briggs, 1974; Allen and Robertson, 1994; Victor and Wellington, 2000).

