Direct evidence of a biophysical retention mechanism for coral reef fish larvae

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ABSTRACT: We examine the hypothesis that reef fish larvae have some direct influence on their own dispersal and ability to recruit to their natal reef by tracking cohorts of bicolor damselfish (*Stegastes partitus*) from hatching to settlement onto the reef, about 30 d later. We conducted high-resolution sampling during two consecutive years in a small area (15 km x 20 km) off the west coast of Barbados, extending from depths of 0 to 100 m. Observations of discrete stage-specific larval patches of mean size of 29.4 and 13.2 km² for preflexion (1-5-d old) and flexion/postflexion (.5-d old) stages extending ca. 30 m in the vertical indicated that larvae initially dispersing as patches tend to stay in coherent patches throughout their pelagic duration. Highest concentrations of preflexion larvae within a patch were in the upper 20 m, while those of older larvae were always deeper. Downward migration of about 60 m throughout ontogeny within stratified currents represented a retention mechanism for locally spawned larvae. Most of the variability in estimated retention rates between daily cohorts occurred during the earliest stages as a result of the dynamic nature of surface currents experienced by larvae prior to the onset of vertical migration. Differences in residence time between experiments were consistent with observed intermonthly variability in recruitment strength, implying that pelagic processes can explain recruitment rates. These results provide empirical evidence for larval retention of coral reef fishes and stress the role of active behavior in larval transport.

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