DENSITY-DEPENDENCE MEDIATES CORAL ASSEMBLAGE STRUCTURE

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Study Description

Most coral reefs have experienced large declines in coral cover in the last few decades, thereby creating a coral reef crisis. Examples of recovery on denuded reefs rarely are encountered, and thus when it occurs, important opportunities are created to study the mechanisms favoring coral population growth on present-day reefs. Since 2005, the reefs of Mo'orea have provided a remarkable example of death and recovery of coral communities, with recovery driven by negative density-dependent recruitment by *Pocillopora* corals. Through manipulate experiment and time-series analysis, this study reveals how a classic ecological process – density dependence – can modulate coral community recovery.

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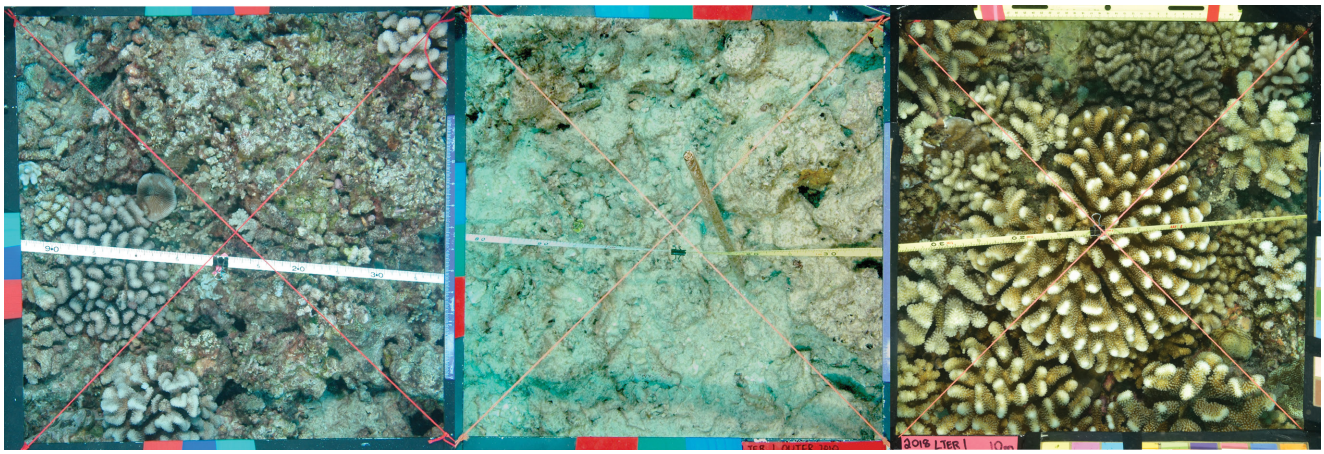

Photo 1. Three photoquadrats (each 0.5 × 0.5 m) recorded at 10-m depth on the outer reef of Mo'orea, French Polynesia, in 2005 (left), 2010 (center), and 2018 (right) that illustrate how the coral community has changed. An outbreak of the predatory seastar, *Acanthaster planci*, consumed live corals from about 2006 to early 2010, then Cyclone Oli removed the dead-in-place coral skeletons to leave a seascape of carbonate rock. Within a few years, massive recruitment of scleractinian corals has return coral cover to as high as 74% at some sites. Much of this growth has been fueled by recruitment and growth of *Pocillopora* corals which, as we show experimentally in this study, recruit in a negative density-dependent manner. When *Pocillopora* cover is low, recruitment is extremely high and then declines as the cover is established. Photo credit: Peter J. Edmunds.

Photo 2. Coral community at ~8-m depth on the outer reef of Mo'orea in April 2018, just 8 years after the conclusion of two catastrophic disturbance events. Strong negative density dependent recruitment has quickly established a high coral cover community, dominated by *Pocillopora*. Photo credit: Peter J. Edmunds.

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