

TITLE: SUPPLY-SIDE ECOLOGY WORKS BOTH WAYS: THE LINK BETWEEN BENTHIC ADULTS, FECUNDITY, AND LARVAL RECRUITS

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ABSTRACT:

Ecology Volume 81, Issue 8 p. 2241-2249 Article SUPPLY-SIDE ECOLOGY WORKS BOTH WAYS: THE LINK BETWEEN BENTHIC ADULTS, FECUNDITY, AND LARVAL RECRUITS T. P. Hughes, T. P. Hughes Department of Marine Biology, James Cook University, Townsville, QLD 4811, Australia E-mail: [terry.hughes@jcu.edu.au](mailto:terry.hughes@jcu.edu.au) Search for more papers by this author A. H. Baird, A. H. Baird Department of Marine Biology, James Cook University, Townsville, QLD 4811, Australia Search for more papers by this author E. A. Dinsdale, E. A. Dinsdale Department of Marine Biology, James Cook University, Townsville, QLD 4811, Australia Search for more papers by this author N. A. Moltschaniwskyj, N. A. Moltschaniwskyj Department of Marine Biology, James Cook University, Townsville, QLD 4811, Australia Present address: School of Aquaculture, University of Tasmania, Launceston, P.O. Box 1214, TAS 7250, Australia. Search for more papers by this author M. S. Pratchett, M. S. 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Apart from the applied fisheries literature, the converse link between adults and the production of cohorts of recruits has received much less attention. We used a hierarchical sampling design to investigate the relationships between adult abundance, fecundity, and rates of larval recruitment by acroporid corals on 33 reefs in five sectors (250–400 km apart) stretching from north to south along the length of the Great Barrier Reef, Australia. Our goal was to quantify patterns of recruitment at multiple scales, and to explore the underlying mechanisms. Specifically, we predicted that large-scale patterns of recruitment could be driven by changes in the abundance of adults and/or their fecundity, i.e., that corals exhibit a stock–recruitment relationship. The amount of recruitment by acroporids in each of two breeding seasons varied by more than 35-fold among the five sectors. Adult density varied only twofold among sectors and was not correlated with recruitment at the sector or reef scale. In contrast, fecundity levels (the proportion of colonies on each reef that contained ripe eggs) varied from 15% to 100%, depending on sector, year, and species. Spatial and temporal variation in the fecundity of each of three common *Acropora* species explained most of the variation (72%) in recruitment by acroporids, indicating that the production of larvae is a major determinant of levels of recruitment at large scales. Once fecundity was accounted for, none of the

other variables we examined (sector, reef area, abundance of adults, or year) contributed significantly to variation in recruitment. The relationship between fecundity and recruitment was nonlinear, i.e., rates of recruitment increased disproportionately when and where the proportion of gravid colonies approached 100%. This pattern is consistent with the hypothesis that enhanced fertilization success and/or predator satiation occurs during mass-spawning events. Furthermore, it implies that small, sublethal changes in fecundity of corals could result in major reductions in recruitment.

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