

## Effects of larval condition and benthic habitat quality on the recruitment of coral reef fishes

Final Report of Research Authorization Number 204/MIDCR, a permit issued for work to be conducted from March 2002-March 2003

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Understanding the factors that drive variation in recruitment remains a central focus of marine ecologists. To date, much research has addressed the role of variation in *numbers* of settlers arriving to reefs (Jones 1991, Shima 1999), yet relatively few studies have examined the contribution of variation in *individual quality*, or condition (e.g., Phillips 2002). Recent evidence from studies of reef fishes suggests that individual quality can strongly affect patterns of survival after settlement (e.g., Shima and Findlay 2002). Our research program (a collaboration between Drs Jeff Shima and Craig Osenberg) addresses this fundamental issue as it affects dynamics of the reef fish *Chromis viridis* on Moorea, French Polynesia.

We conducted preliminary research from 22 March through 09 April 2002. This work consisted of field observations, fish collections and field density manipulations targeting the Blue-Green Chromis, *Chromis viridis*, Family Pomacentridae. At a site north west of the Gump Research Station, we constructed an array of 20 experimental patch reefs by attaching small (15-20cm diameter) colonies of *Pocillopora eydouxi*, *P. meandrina*, or *P. verrocosa* to 51x19x11cm concrete blocks using Z-Spar Splash Zone marine epoxy. To these reefs, we transplanted recently settled *Chromis viridis* in varying densities, and followed survivorship over the following week. Preliminary analyses of these data suggest patterns of density-independent survivorship, or weak inverse density-dependence (i.e., facilitation) over the range of densities explored (roughly 0.001-0.02 fish/cc *Pocillopora*). Because our preliminary observations indicated substantial migration from these reefs (particularly from smaller reefs, and/or those composed of *P. meandrina* or *P. verrocosa*), we conducted a subsequent factorial experiment designed to test the separate and joint effects of colony size and coral species on Chromis retention rates. Preliminary analyses of these data (as well as ancillary surveys) suggest Chromis recruits may exhibit reduced retention rates on smaller reefs, and may exhibit a slight preference for *P. eydouxi*. At the end of both experiments, we collected and preserved all survivors, for later otolith analyses. We intend to compare otolith characteristics (we will use these as an indicator of individual condition) from fish sampled at the outset of each experiment with otolith characteristics of the survivors to evaluate the extent to which patterns of loss (migration and/or mortality) are selective, as a function of individual traits reflected in growth histories. This component of our program remains a work-in-progress. We view the work described here as preliminary, and intend to continue this line of study in future field trips to Moorea—the details of which are to be outlined in future requests for research permit, to be submitted to the High Commissioner.

### References:

Jones, G. P. (1991). Postrecruitment processes in the ecology of coral reef fish populations: a multifactorial perspective. *The Ecology of fishes on coral reefs*. P. F. Sale. New York, Academic Press: 294-328.

Phillips, N. E. (2002). "Effects of nutrition-mediated larval condition on juvenile performance in a marine mussel." *Ecology* 83: 2562-2574.

Shima, J. S. (1999). "Variability in relative importance of determinants of reef fish recruitment." *Ecology Letters* 2: 304-310.