

FACTORS REGULATING MIGRATION OF DEMERSAL ZOOPLANKTON ON CORAL REEFS

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Introduction

Demersal zooplankton are small, actively swimming animals, predominantly crustaceans and polychaete worms, that hide in the substrate of the reef during the day but periodically migrate up into the water column at night. They are a major source of food for nocturnal fish, and corals on coral reefs. Yet little is known regarding the factors which regulate their migration out of the bottom and their availability to predators. During May and June, 2003, I investigated 3 factors affecting the emergence of demersal zooplankton from the shallow sand flats on the back reef near Cook's Bay, Moorea. These included 1) the availability of food in the sand; 2) the concentration of demersal zooplankton in the sand; and 3) the presence of fish in the water above the sand. Results from this study will allow us to assess the qualities of the substrate that might best promote both high populations of resident demersal zooplankton and high emergence behavior. Such information could be used in selecting areas as marine reserves that have the highest potential for retaining fish that feed on demersal zooplankton.

Methods

Demersal zooplankton were captured in 2 types of traps. Emergence traps (inverted cones placed over 0.06 m² of bottom; Alldredge and King, 1980; Alldredge 1985) captured animals which migrated at least 30 cm above the bottom. Reentry traps (shallow plastic boxes 0.06 m² in area filled with clean sand; Alldredge and King, 1985), captured animals when they reentered the bottom. Traps were set out during daylight at a station located on the back reef sand flat a few hundred meters west of Cooks Bay (17° 28.2" S, 149° 50.0 " W) and collected the following morning. Three major hypotheses were tested: 1) Abundant food in the substrate deters migration into the water column - Ground shrimp, ground fish, or dried algae were added to injected into the natural sand bottom under emergence traps and the number of animals emerging compared with control traps. 2) Food in the substrate attracts animals reentering the substrate – ground fish, shrimp and algae were added to clean sand in reentry traps and the number of animals captured compared to control traps. 3) Emergence is deterred by the presence of fish above the substrate - Juvenile squirrel fish (*Sargocentron microstoma*) were placed in the traps and zooplankton emergence compared with controls.

Results and Discussion to Date

I collected 380 emergence trap samples and 180 reentry trap samples over a 6 week period. These zooplankton samples will take several years to count. Migrating animals included copepods, amphipods, polychaetes, ostracods, isopods, decapod larvae, shrimp, and various larvae. Most were small (< 1 mm) in size. Approximately 1000 animals migrated per m² from the sand into the water column each night at the study site in May, 2003. One experiment has been counted and analyzed. The number of animals migrating from natural sand bottom enriched with ground algae (soaked nori) or ground fresh shrimp was not different from non-enriched controls indicating that migration is not deterred if potential food is abundant in the sediment (Table 1). It has been suggested that demersal zooplankton migrate to search for benthic habitats with higher food. Thus we expected them to migrate in lower abundances from sediment that was already enriched in food.

Table 1: Number of animals migrating each night out of sand enriched with algae or ground shrimp. Each treatment is the mean of 12 replicate samples.

	Mean emergence (Number animals m ⁻²)		
	<u>CONTROL</u>	<u>ALGAE</u>	<u>SHRIMP</u>
Total Harp. Copepods	837 ± 734	654 ± 337	732 ± 544
Total Polychaetes	22 ± 27	18 ± 19	38 ± 22
Total Amphipods	28 ± 29	24 ± 28	20 ± 22
Total Zooplankton	1222 ± 849	898 ± 406	1087 ± 538

Future Analysis

I will continue to count samples and plan to publish the results in a single publication in a scientific journal.

Literature Cited

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