Influence of Reef-Associated Predators on Adjacent Soft-Sediment Communities

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Frontispiece

A large *Dosinia subrosea* shell with distinct markings of predation by a large *Jasus edwardsii* (see Chapter 4).

This thesis is dedicated to Ruth and Leslie (Brockie) Brocklehurst,
Mary and Fred (Pépère) Langlois,
and Jack Taylor.

Abstract

'Infaunal haloes' of either decreasing or increasing abundances of individual soft-sediment species with distance from reefs have been suggested to be caused by reef-associated predators. A large-scale mensurative experiment was used to investigate the distribution of two size classes of macrofauna with distance from the reef edge across three locations in northeastern New Zealand. The role of reef-associated predators, the snapper (*Pagrus auratus* Sparidae) and rock lobster (*Jasus edwardsii* Palinuridae), was investigated using established marine reserves at each location. Consistent patterns were found in a few large-bodied fauna. The hermit crab *Pagurus novizelandiae* occurred more frequently near the reef edge, whilst the heart urchin *Echinocardium cordatum* and bivalve *Dosinia subrosea* were more abundant further away from the reef. *Dosinia subrosea* and another bivalve, *Myadora striata*, exhibited lower biomass at sites with higher densities of snapper and rock lobster. In contrast, small-bodied macrofauna showed no consistent patterns with distance from the reef or among sites with different predator populations.

It was hypothesised that predation was driving the distribution of large bivalves. An experiment was done to investigate this model using *D. subrosea*. Equal densities of this bivalve were established in plots either with or without cages at sites either inside or outside of reserves. Significant predation was detected, but only inside reserves. Much of this mortality could be specifically attributed to predation by large rock lobsters, given the distinctive marks on the valves of dead *D. subrosea*.

Inside reserves, predators are not only more abundant but also larger. It was hypothesised that different size classes of predators would result in different levels of predation. Laboratory feeding experiments were used to investigate this model. Lobsters of all sizes chose *D. subrosea* over the heavier shelled *D. anus*. Small lobsters chose to prey on small *D. subrosea* and large lobsters more frequently chose larger prey. The distributions of these two bivalve species at protected (large predators) and fished sites (small predators) reflected the feeding choices observed in the laboratory.

Results suggested that rock lobster populations are capable, where their size structure is not truncated by fishing pressure, of controlling population-level dynamics of bivalve communities adjacent to reefs.

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