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## EXECUTIVE SUMMARY

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The hard coral community at Green Island Reef is in the early stages of recovery following major damage caused from predation by Acanthaster planci between 1979 and 1981. Five years after the outbreak, in 1985, the coral community was dominated by juvenile corals mainly of the family Acroporidae. Of 20 sites surveyed by line transect, only 5 had a hard coral cover greater than 10%. Some Pocillopora damicornis was apparently undamaged by A. planci, and some staghorn Acropora thickets were regenerating from small parts of colonies which had escaped predation.

There was no significant change in hard coral cover at any of 12 sites resurveyed one year later in 1986. The absence of an increase in hard coral cover over the one year period is probably partly due to the early successional stage of the coral community, but it might also be partly attributable to the effects of Cyclone Winifred which passed through the area in February 1986.

While soft corals are abundant in some areas, they have not dominated the reef at most sites following destruction of the hard corals. Soft coral cover did not change at 10 of the 12 sites between 1985 and 1986; it was greater at one site and less at another.

Racks of settlement plates were placed on forereef and backreef sites at Green Island, Upolu and Michaelmas Reefs, during winter 1985, summer 1985/86, and winter 1986. Settlement was higher in summer than in winter (2200, cf. 61 and 220). Acroporids generally dominated summer plates while pocilloporids dominated winter plates. Settlement was significantly higher on the backreef than on the forereef during summer.

Recruitment was highest at Green Island Reef, despite its relatively depauperate adult fauna. Inter-reef dispersal is probably the dominant factor in determining the number of recruits. This indicates that badly damaged reefs should be able to recover quickly provided that there is a source of larval coral recruits 'upstream' from them.

Juvenile coral populations were mapped and measured in square metre quadrats at Green Island Reef. The abundance, recruitment rate, mortality rate, and growth rate of the juvenile corals over a 10-month period are presented. Acroporid corals were the most abundant family of juvenile corals, they recruited most rapidly and grew fastest during the study period. Juvenile corals were more abundant and recruitment was more rapid on the backreef site, but corals grew faster on the forereef site.

There were similarities in the patterns of abundance of coral spat on recruitment plates, recruitment of juveniles in marked quadrats in the field, and the pre-existing coral fauna on the quadrats. This suggests that recruitment patterns of corals at the family level have been consistent at Green Island Reef for at least seven years.

Juvenile coral dynamics indicate a clear recovery process following predation by A. planci, and the early stages of the recovering coral community are dominated by Acropora, the preferred prey species of the starfish. In the next few years there should be a rapid increase in hard coral cover on this reef.

Green Island Reef currently supports a small population of juvenile A. planci. It is impossible to predict at this time whether the starfish population will reach an equilibrium with the recovering corals, or whether as the coral population increases, we might see the resurgence of a large starfish population on a reef dominated by the preferred prey species, Acropora.

#### **Recommendations:**

Because outbreaks were first observed on Green Island Reef in both episodes of A. planci on the Great Barrier Reef, and because of its importance as a tourist destination, we recommend that a comprehensive monitoring program be undertaken on this reef. It is also important that the monitoring commenced in these studies be continued to establish long-term trends.

The following should be monitored:

- . coral recruitment on settlement plates to examine the interconnectivity of reefs;
- . regeneration of the coral community;
- . recruitment and dynamics of A. planci (as an 'early warning' of possible future outbreaks on the GBR);
- . environmental parameters (e.g. rainfall, nutrient levels) in an attempt to establish those factors causing, or contributing to outbreaks.