

RESULTS

CORAL COVER

Raw data and preliminary analyses for all the groups of encrusting organisms recorded in the permanent transects are included in appendix 1 and summarised in table 1.

Norman Reef has a very rich cover of hard coral compared with most other outer shelf or mid-shelf reefs on the GBR. Coral cover at the start of the survey ranged from 45.1-53.1% for the shallow sites, and from 43.4-61.1% for the deep sites. For comparison, mean coral cover measured on the back reef of 9 Central Section outer shelf reefs measured using ten 10m line intersect transects was 27.7% (range from 21.2-35.2%), while coral cover on 19 mid-shelf reefs unaffected by *Acanthaster* grazing in the same area was 26.7% (range from 15.2-48.8%) (data from Ayling and Ayling, 1985). Similarly, mean coral cover on 38 Capricorn Section reefs was 22.6% (Data from Ayling and Ayling, 1986).

Initially (1987 survey) there was no significant difference in coral cover, either between sites or between depths. However, the composition of the coral community was different between the two depth strata. In the shallow transects plate acroporids (10% cover) and small clumping acroporids (12%) were the major components of the coral community, along with poritids (11%), pocilloporids (2.5%) and faviids (4.8%). In contrast poritids were strongly dominant in deeper water (34% cover), faviids were similar to shallow areas (4.3%), while small clumping acroporids (6%), plate acroporids (0.1%) and pocilloporids (1%) were markedly less abundant than in the shallow transects (see table 2).

In overall hard coral cover there were increases in several groups of counts over the time of the survey but this was only significant at the semi-sub shallow site where the percentage cover of corals increased from 53 to almost 64. A significant increase in plate acroporids was the main component of this change (see table 2). The only real reduction, although non-significant, was recorded at the deep pontoon site where shading killed some corals and damage from moorings and chain abraded others, resulting in a drop from 61 to 57% cover.. This was reflected in non-significant reductions in the cover of poritids, staghorn acroporids and small clumping acroporids.

CORAL HEIGHTS

The measure of coral height indicated a slight but non-significant increase in height at both DSDD sites (see table 3), and a strongly significant decrease at the deep pontoon site. This decrease was caused by the shading death of some large staghorn corals beneath the pontoon and damage to some branching corals by the moorings and chain.

OTHER ENCRUSTING ORGANISMS

There were no significant changes in the cover of soft corals, macroalgae, turfing algae or sponges at any of the sites, although there was a decrease in macroalgae on the shallow pontoon site, and an increase in turfing algae at both DSDD sites and the deep control site (see table 1).

FISHES

Raw data from all fish counts, along with preliminary analyses, are tabulated in appendix 2. Abundance summaries and the results of 2 factor analyses of variance for the totals for the common families are shown in table 4.

Observation showed that some groups and species of fishes gathered at the sites of tourist activity, most of them attracted by the feeding. At the DSDD site fish feeding activities were irregular and involved throwing over of a few food scraps after meals and some feeding of scraps to fish by the divers while underwater. As a result there were usually a few schools of fusiliers present in the vicinity of the moored boat, while 2-10 individuals of the species *Platax orbicularis* (batfish), *Lethrinus nebulosus* (spangled emperor) and *Hipposcarus longiceps* (yellow-tailed parrotfish) were attracted to the site when divers were in the water. Beneath the pontoon there were also schools of fusiliers, as well as large schools of *Lutjanus bohar* (red bass) and *L. gibbus* (paddle-tails). There were also a few spangled emperors, some parrotfishes, and one or two medium sized cod and coral trout at this site at the end of the survey period.

There were strong site effects for scarids, with high numbers at the pontoon site for all surveys compared with the other two sites. This was a result of the features of the site itself rather than the presence of the pontoon; there were high numbers here before the pontoon was installed and no significant time effects. Numbers of fusiliers were very variable with standard deviations mostly considerably greater than the mean, and although there was a numerical increase in density both at the pontoon site and the DSDD site this was not significant. There was a significant site effect for fusiliers: densities at the pontoon site and DSDD site were higher than at the control site in the second survey. Lutjanids showed a dramatic and significant increase in density at the pontoon site with large resting schools of *Lutjanus bohar* and *L. gibbus* beneath the pontoon in the June 1988 survey, along with small numbers of *L. fulvus* (blacktail snapper) This also gave a significant site effect.