

Resurvey of the Aua Transect After the Ship Removal

2000

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On 16-17 May 2000, exactly 7 months after the prior survey, we measured 570 coral colonies and counted macroinvertebrates in 649 quadrats taken at 9 stations along Mayor's 271 m Aua Line. The abundances of 29 species of corals along the transect are given in Table 1. The size distributions of 27 species of coral are given in Table 2. The percent living coral cover and number of coral colonies per m² are given in Table 3 and the abundances of macroinvertebrates are given in Table 4.

The most striking event that has occurred in the past 7 months, during which time ships 8 and 9 were removed from the reef flat south of the transect, was a 67% drop in coral abundance and a 58% decrease in living coral cover in the outer reef margin of the reef flat on the Aua Transect. In October 1999, there were 75 corals per m² and 24% percent living coral cover, but 7 months later, the number of colonies per m² was 25 and the living coral cover was 10%.

However, we cannot clearly attribute these changes in the coral communities along the Aua Transect to the effects of human activities during the ship removal. Most of the dramatic changes in abundances were in the outer 2 stations where the predominant corals were *Acropora nana* and *Pocillopora danae*. The delicately branching *Acropora nana* was especially abundant because of a massive recruitment prior to October 1999. There were 35.8 *Acropora nana* per m² in late 1999, but most were new recruits of this species. There were only 11.1 *A. nana* per m² this past May. Likewise, there was an abundant recruitment of small *Pocillopora danae*, but they decreased to about a quarter of their previous populations densities in the outer three stations over the past 7 months.

Between 1998 and 1999, the living coral cover increased by 78% and the population density of corals increased three-fold. This increase was mainly a result of the recruitment of *Acropora nana* and *Pocillopora danae*. Most of this spectacular decrease in abundance and living coral cover in the outer two stations is probably the natural mortality of small juvenile corals after an exceptionally abundant recruitment. The other species of corals have not changed in abundance and the mean diameters of corals in the outer three stations have generally increased by 1 or 2 cm over the past 7 months: 271 m station – 6.5 cm in October 1999 to 7.2 cm in May 2000; 259 m – 6.2 cm to 8.8 cm; 247 m – 5.3 cm to 7.5 cm. This may not be because of rapid growth, but because of greater mortality among the small recruits. With survival of the larger colonies and elimination of many of the smaller colonies, the mean size would tend to increase more rapidly than the growth rate would predict.

There was no increase in sediment or rubble laying around the transect area. The water was reasonably clear, especially considering the wave action during our survey. The

corals appeared in good health. There were large colonies of *Porites* sp., *Pocillopora verrucosa*, and *Acropora formosa* observed along the transect, but they were not encountered in the quadrats. There was even a healthy 19 cm *Acropora hyacinthus* observed near the transect line.

Ten species observed in October 1999 were not seen this time: *Acropora digitata*, *Acropora aspera*, *Montipora grisea*, *Porites* sp. 2, *Porites lichen*, *Pavona explanulata*, *Galaxea fascicularis*, *Favia mathaii*, *Favites abdita*, and *Goniastrea retiformis*. Eight species not observed in October, were found in this survey: *Acropora muricata*, *Acropora valida*, *Montipora granulosa*, *Montipora efflorescens*, *Montipora foveolata*, *Porites cylindrica*, *Pavona varians*, and *Goniastrea edwardsi*. *Montipora verrilli* in the October survey is now called *Montipora hispida*.

Other indications of good health of the reef community were the prevalence of crustose coralline algae (probably *Porolithon onkodes*) and the abundant sponges (*Dysidea herbacea*) and ascidians (*Lissoclinum patella* and *Diplosoma similis*) which depend on symbiotic algae in their tissues. The symbiotic algae are sensitive to turbid water, so the prevalence of these species indicates good conditions for corals.

In summary, we observed some drastic changes in the coral communities in the outer two stations of the Aua Transect during the past two years, a three-fold increase in abundance between 1998 and 1999 and a 67% decrease between 1999 and 2000, as well as a 78% increase in living coral cover between 1998 and 1999 and a 58% decrease between 1999 and 2000. We attribute this mainly to the exceptionally abundant recruitment of *Acropora nana* and *Pocillopora danae*, followed by what may be natural mortality of a portion of the abundant juveniles. The rest of the reef flat community of animals appeared natural and healthy, and there was no increase in sediment or rubble observed in the area.

The spectacular changes in abundance that we were able to document quantitatively indicates the value of the Aua Transect. The quantitative record of the coral community since Alfred Mayor began in 1917 provides science with an especially valuable long-term record of a coral-reef community under various environmental conditions and events.

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Table 1. Numbers of corals per m ² along the Aua Transect in April 2000.									
			Distance from shore (m)						
			259	247	233	213	183	160	140
			271	247	233	213	183	160	140
<i>Pocillopora damicornis</i>			271	247	233	213	183	160	140
<i>Pocillopora danae</i>			2.0	1.0	0.9	0.1	0.2	0.3	122
<i>Pocillopora verrucosa</i>			2.5	0.8	0.6	0.2		0.1	0.1
<i>Pocillopora meandrina</i>			0.7	0.5			0.2		
<i>Acropora nana</i>			0.8	0.3	0.1	0.1	0.1	0.1	+
<i>Acropora verweyi</i>			11.1	1.6					
<i>Acropora hyacinthus</i>			0.3	0.1					
<i>Acropora formosa</i>				+					
<i>Acropora valida</i>									+
<i>Montipora hispida</i>					0.1				
<i>Montipora granulosa</i>			0.1	0.2	0.1				
<i>Montipora efflorescens</i>			0.2	0.2	0.1				
<i>Montipora foveolata</i>				0.1	0.3				
<i>Montipora venosa</i>				0.2					
<i>Porites</i> sp. (mound)			0.1	0.1	0.1				
<i>Porites</i> (<i>Synaraea</i>) <i>rus</i>			0.1	0.2		0.2	0.1		
<i>Porites</i> <i>cylindrica</i>								0.6	
<i>Stylaraea punctata</i>						0.1		0.1	
<i>Psammocora contigua</i>			0.4	3.7	0.4	0.4	0.1		
<i>Pavona divaricata</i>			5.2	0.9	0.2	0.1			
<i>Pavona decussata</i>						0.1			
<i>Pavona varians</i>						0.1			
<i>Favites pentagona</i>			0.1						
<i>Goniastrea edwardsi</i>			0.1						
<i>Leptastrea purpurea</i>			0.3	0.2	0.1	0.3	0.1	0.2	0.1
<i>Cyphastrea</i> sp.									0.04
<i>Millepora platyphylla</i>			0.4	0.1	1.2	1.2	1.3	0.1	
<i>Millepora tuberosa</i>			0.1		0.1				
<i>Pocillopora eydouxi</i>			0.1						

