

Coral Transects and Benthic Habitats

In February 2002, live coral cover around Aldabra ranged from 2% - 29% in shallow water and 0.7% to 38% in deep water (Figure 8). Comparison with previous years shows a tendency for live coral cover to increase in shallow water at all sites, with the exception of Sites 7 and 5 that have remained relatively unchanged, and Site 1 which has shown a 6% decrease (Figures 9 and 10). In deep water the tendency was similar with all sites showing an increase in live coral cover, with the exception of Sites 1, 5 and 7 that remained relatively unchanged, and Site 4 where live coral cover decreased by 8% (Figures 10 and 11). Most growth occurred at Site 8 where shallow water corals increased by 7% and deep water by 7.6% in only one year. If yearly changes in live coral cover are averaged for all sites, shallow water corals increased 0.8% between 1999 and 2001 and 1.5% between 2001 and 2002. Deep water corals increased 1.6% between 1999 and 2001 but decreased 0.1% between 2001 and 2002. The overall increase in live coral cover is a modest 1% per year, but this value has been reduced by the decreases in coral cover at Site 1 in shallow water and Site 4 in deep water. There were no notable changes in algal cover between 2001 and 2002, with the exception of Site 5 where deep water cover of *Halimeda* increased by approximately 20%. Dead coral cover continued decreasing between years as would be expected from breakdown of colonies or coating with algae.

Lagoon sites did not change significantly between 2001 and 2002. The greatest increase in live coral cover occurred at Site 9 where there was a 7% increase (Figure 12). Live coral cover remained virtually unchanged at Sites 10 and 11. Algal cover also remained unchanged with the exception of Site 10 where cover of coralline algae increased by 16%, probably due to further colonisation of dead coral and consolidation of rubble.

The sites at Assumption and St. Pierre had benthic compositions comparable to those of the northern coast of Aldabra (Figure 13). Astove was peculiar in having a higher coral cover (32.4%) in shallow water than at any other sites (Figure 13), and a lower coral cover than expected in deeper water (17.4%), coupled with a very high algal cover due to a “carpet” of *Caulerpa*. The shallow site at Astove is the only site with surviving *Acropora* sp. plate colonies. Several branching forms of *Acropora* not common at other sites suggest that the site escaped some of the bleaching in 1998. However, there is evidence of coral mortality at this site, and elsewhere along the coast of Astove there has been greater damage to colonies.

During Phase I and II expeditions to Aldabra in 1999 and 2001 forty one scleractinian coral genera and 57 species were recorded (see www.aldabra.org for reports). During Phase III only three new species of coral, *Echinopora hirsutissima*, *Halomitra pileus* and *Favites vasta*, were identified. This brings the total to 42 genera and 60 species. Additional species previously not seen on AMP expeditions include *Pavona clavus* and *P. duerdenii* from St. Pierre.



Octocorals of Aldabra: 1 – *Sarcophyton*; 2 – *Dendronephthya*; 3 – *Heliopora*; 4 – *Gorgonian*.

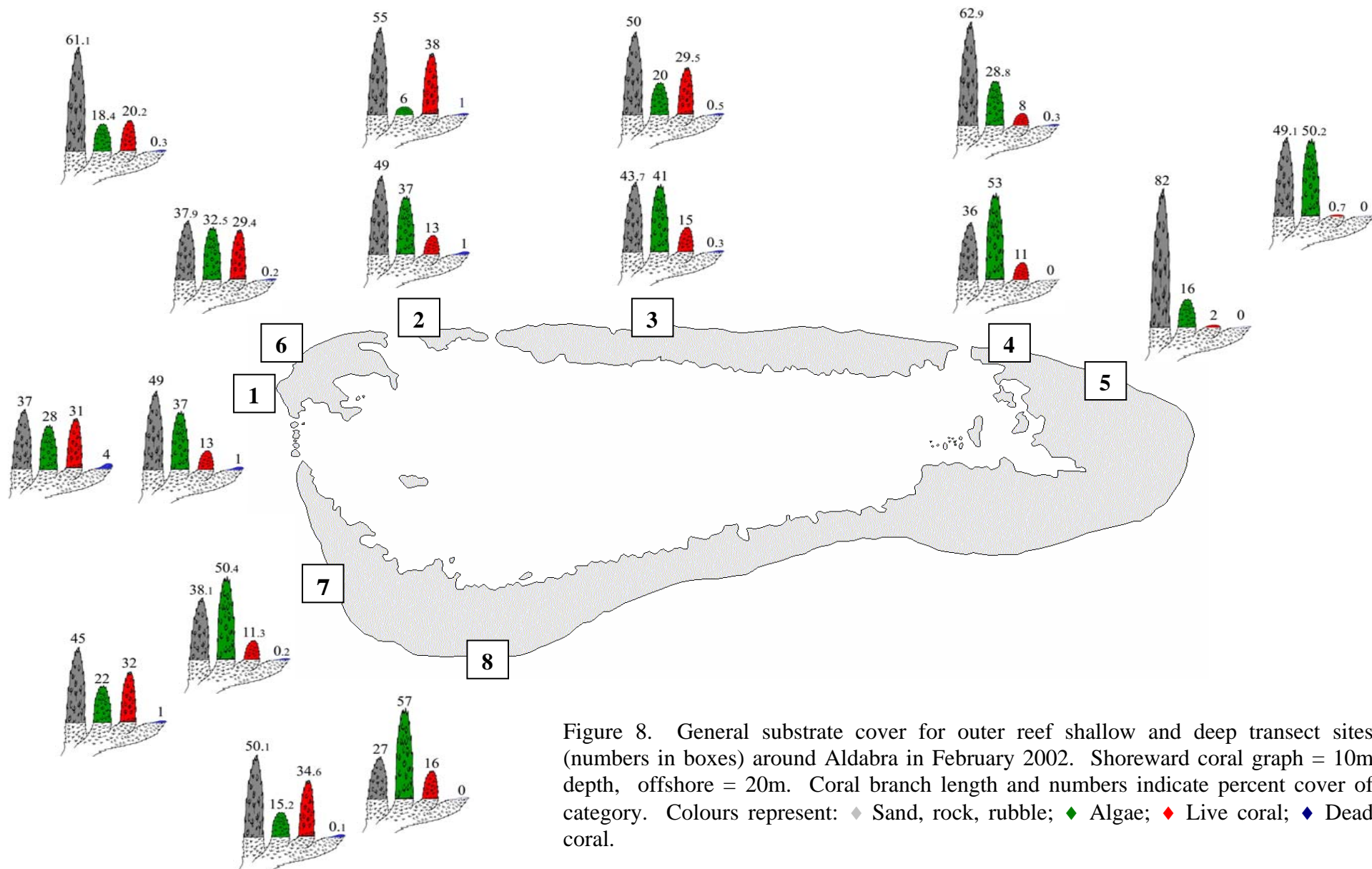


Figure 8. General substrate cover for outer reef shallow and deep transect sites (numbers in boxes) around Aldabra in February 2002. Shoreward coral graph = 10m depth, offshore = 20m. Coral branch length and numbers indicate percent cover of category. Colours represent: ♦ Sand, rock, rubble; ♦ Algae; ♦ Live coral; ♦ Dead coral.

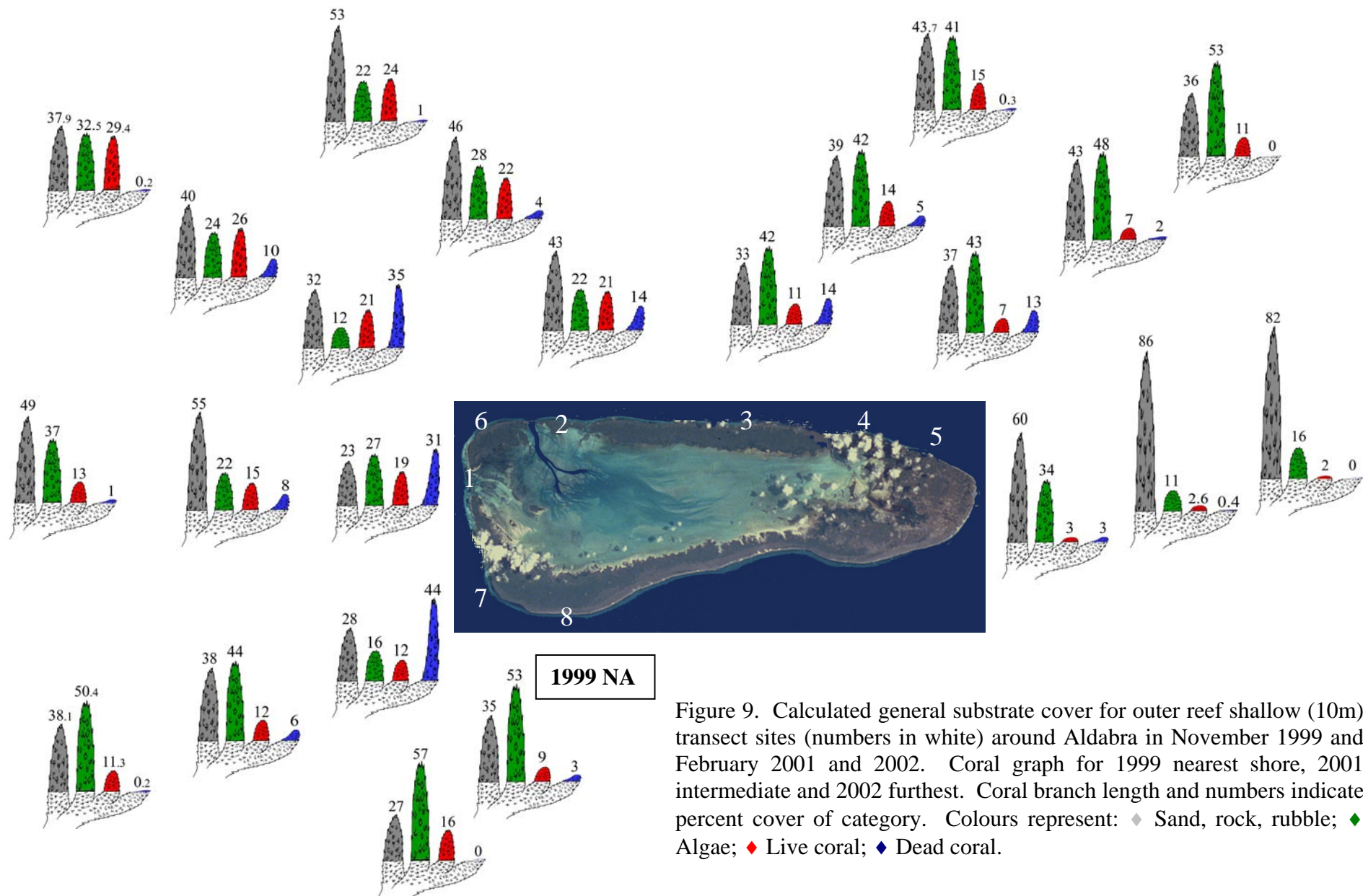


Figure 9. Calculated general substrate cover for outer reef shallow (10m) transect sites (numbers in white) around Aldabra in November 1999 and February 2001 and 2002. Coral graph for 1999 nearest shore, 2001 intermediate and 2002 furthest. Coral branch length and numbers indicate percent cover of category. Colours represent: ♦ Sand, rock, rubble; ♦ Algae; ♦ Live coral; ♦ Dead coral.

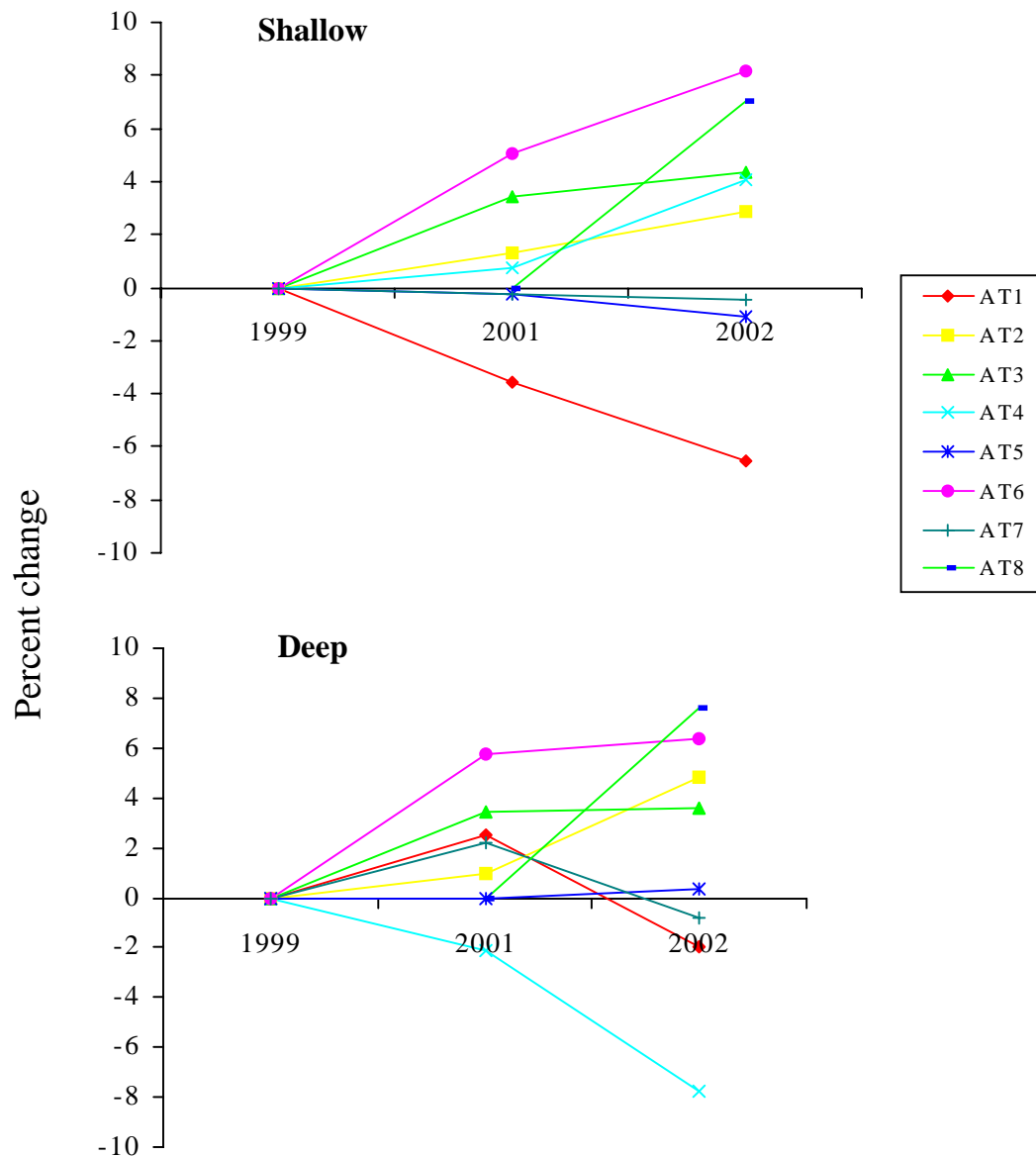


Figure 10. Percent change in live coral cover at Aldabra Atoll between 1999 and 2002 in shallow (10m) and deep (20m) water. Legend shows site number by colour and symbol.

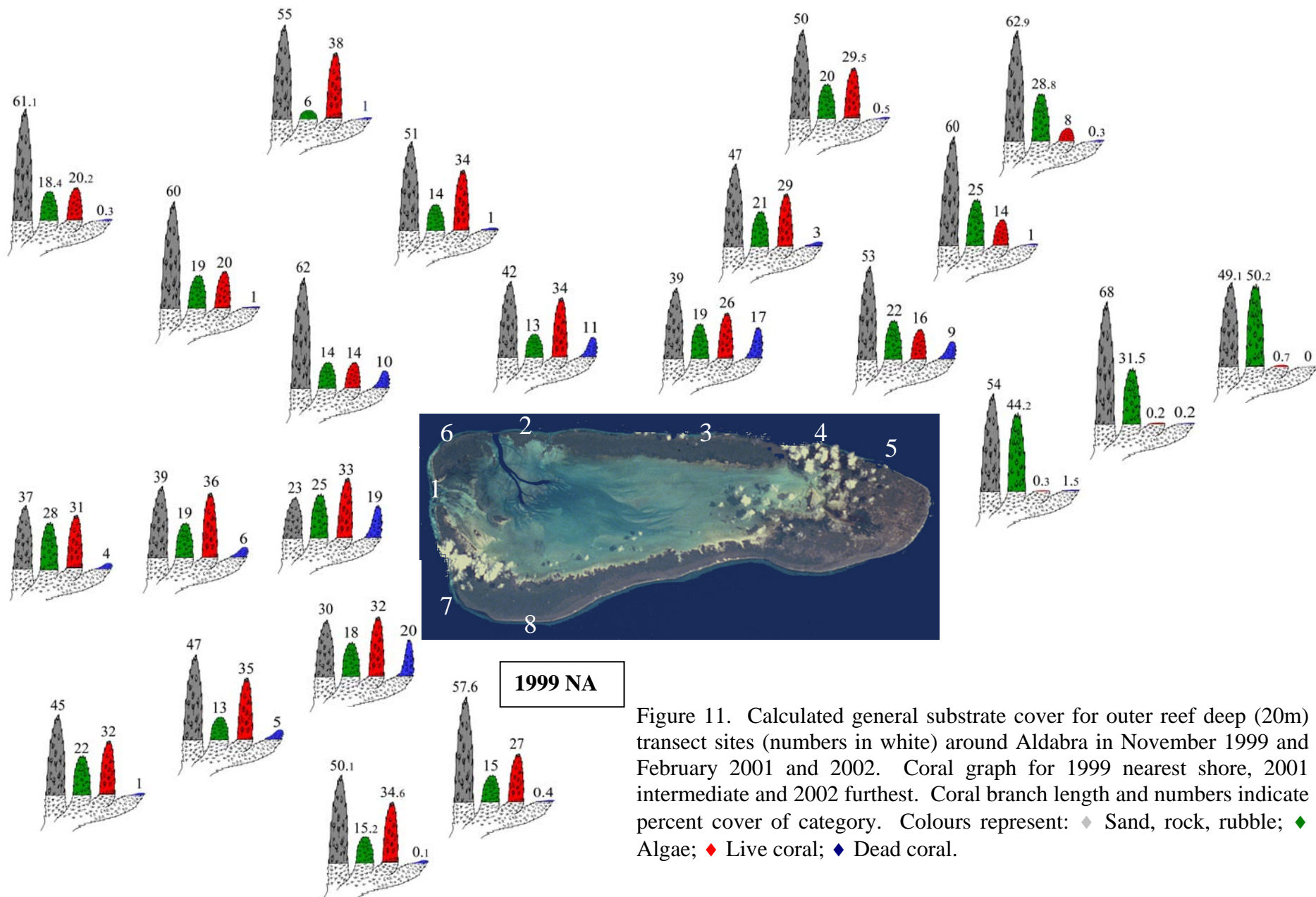


Figure 11. Calculated general substrate cover for outer reef deep (20m) transect sites (numbers in white) around Aldabra in November 1999 and February 2001 and 2002. Coral graph for 1999 nearest shore, 2001 intermediate and 2002 furthest. Coral branch length and numbers indicate percent cover of category. Colours represent: ♦ Sand, rock, rubble; ♦ Algae; ♦ Live coral; ♦ Dead coral.

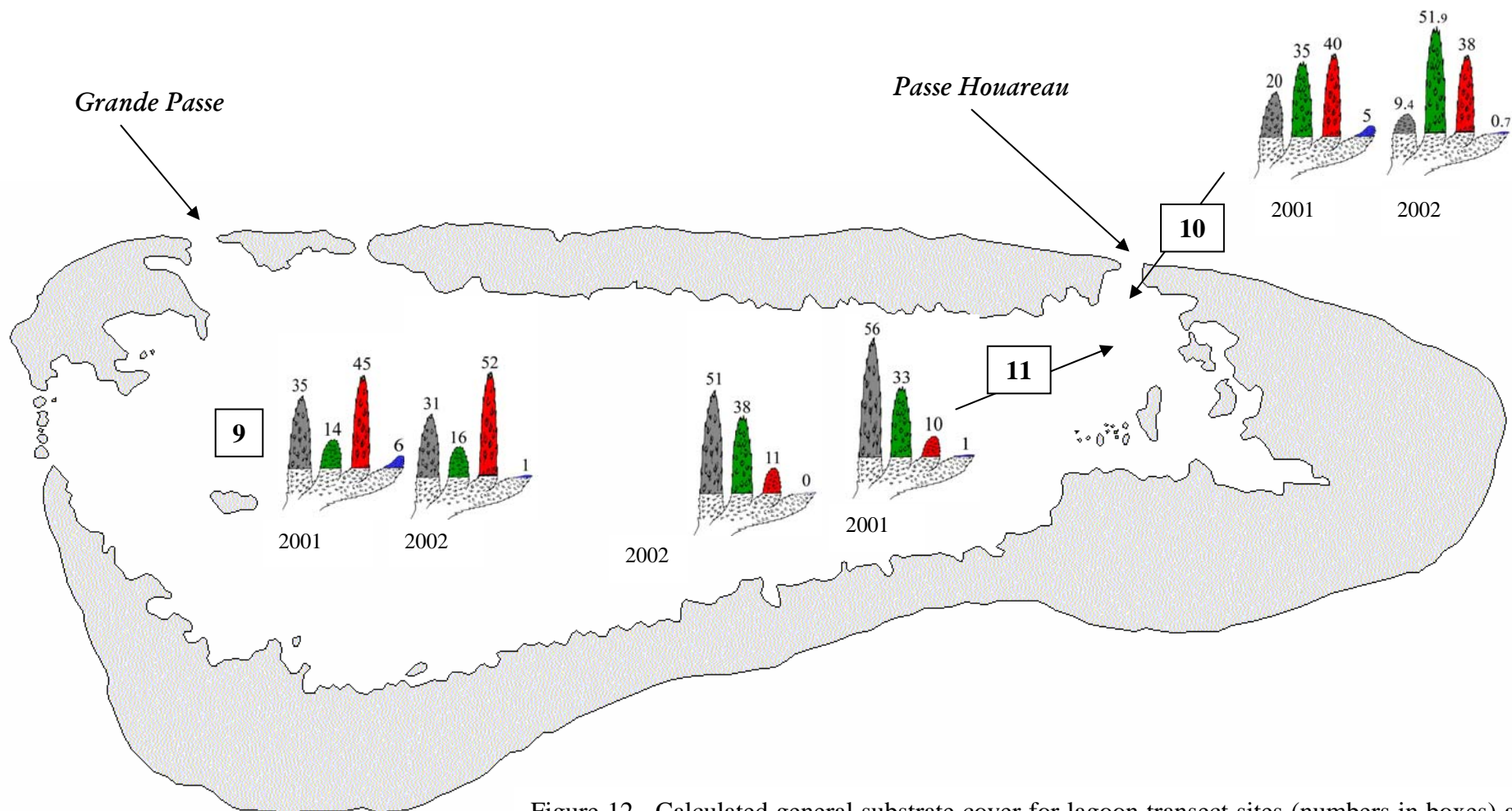


Figure 12. Calculated general substrate cover for lagoon transect sites (numbers in boxes) at Aldabra in February 2001 and 2002. Coral branch length and numbers indicate percent cover of category. Colours represent: ♦ Sand, rock, rubble; ♦ Algae; ♦ Live coral; ♦ Dead coral.

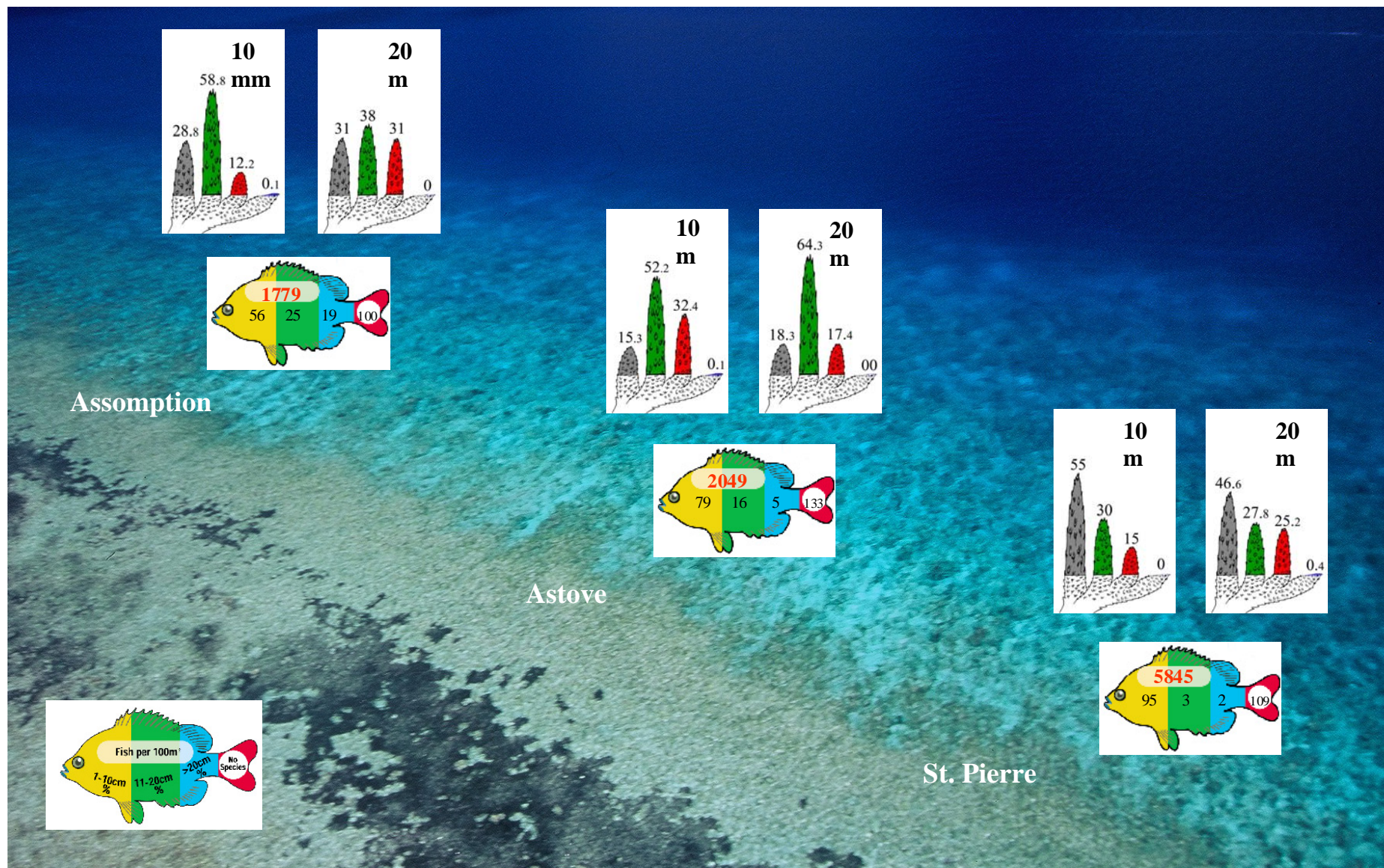


Figure 13. Calculated general substrate cover for new shallow (10m) and deep (20m) sites, and pattern of fish species distribution, at Assomption, Astove and St. Pierre in February 2002. Coral branch length and numbers indicate percent cover of category. Colours represent: ♦ Sand, rock, rubble; ♦ Algae; ♦ Live coral; ♦ Dead coral.

Coral Recruitment and Tagging

Sampling efficiency

The number of quadrats surveyed in February 2002 was decreased to an optimum of 24 from 34 in the previous year. Sampling precision graphs generated using February 2001 data showed that in most cases little was gained by sampling more than 20-24 quadrats (see examples in Figure 14). Reducing the quadrats surveyed was very important due to limited time availability during expeditions.

Number of recruits

The average number of recruits per m² at each of the sampling sites is given in Table 3 along with average figures for February 2001. Recruitment figures for February 2002 did not differ significantly from those found in February 2001, with the exception of Sites 2 (P (T<=t) 2 tailed 0.0011) and 6 (P (T<=t) 2 tailed 0.00004) in deep water and Site 10 (P (T<=t) 2 tailed 0.0008) in shallow water. Recruit numbers at all of these sites increased significantly between 2001 and 2002. As in 2001, average number of recruits per m² pooled for all sites varied with depth¹ from 5 recruits at 6m depth (s. e. ± 0.47 , n° recruits = 217, 46 1m² quadrats), to 7 recruits at 10m depth (s. e. ± 0.42 , n° recruits = 1079, 159 1m² quadrats), and 5 recruits at 20m depth (s. e. ± 0.03 , n° recruits = 802, 177 1m² quadrats). These results are almost identical to those from February 2001, with the exception of recruitment for 6m which averaged 2 recruits lower in 2002, most probably due to the very small number of sites surveyed due to high swells. Coral recruitment for Assomption and St. Pierre was similar to that found on Aldabra, with recruitment again being higher in shallow water than deep (Table 3). At Astove recruitment was very poor at 1 recruit per m² in both shallow and deep water.

¹ Figures for Site 7 were excluded due to recording depth differences

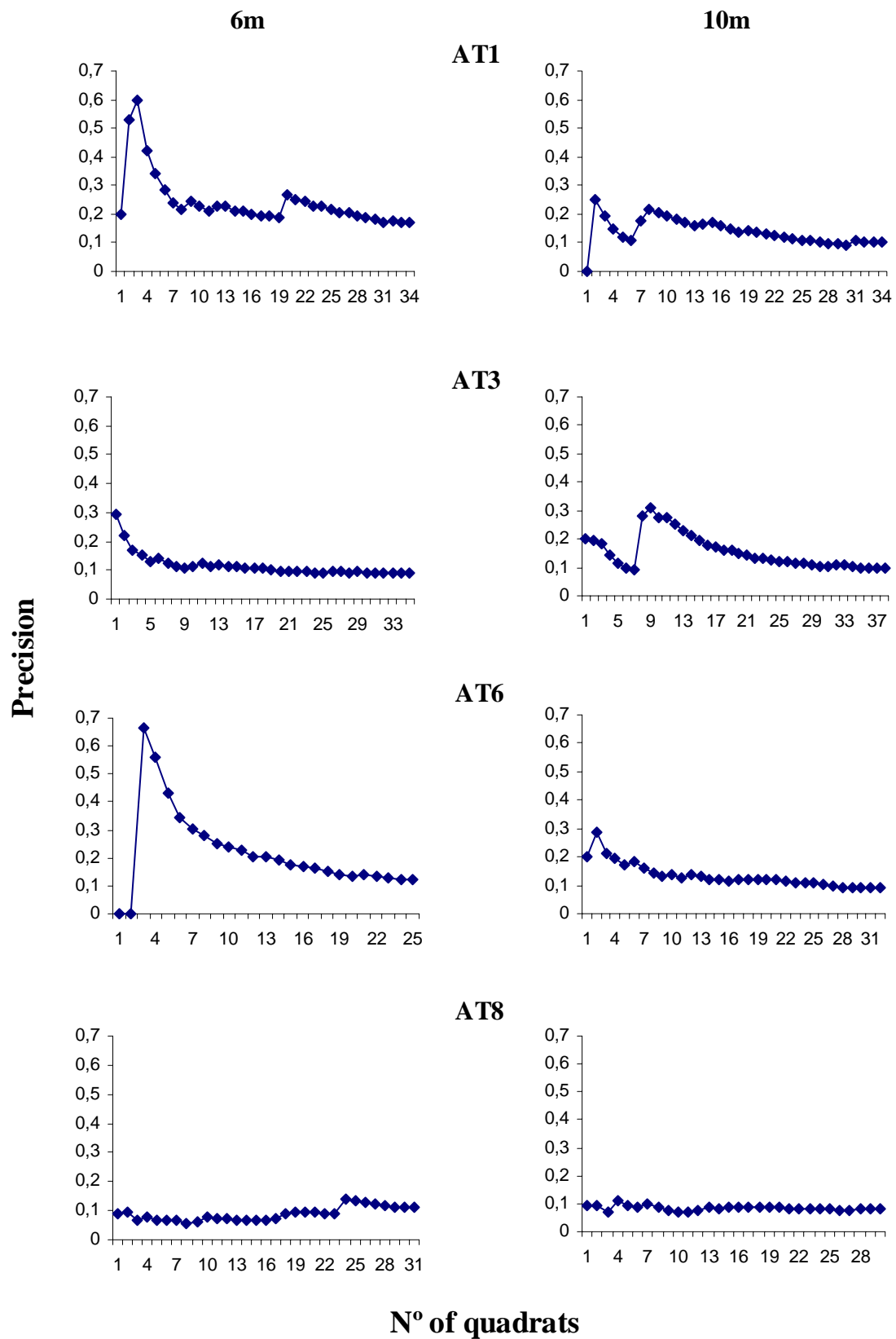


Figure 14. Examples of precision estimate graphs for selected 6m and 10m sites.

Table 3. Average number of recruits/m² for three depths at Aldabra Atoll, and new sites at Assumption (ASS), Astove (AST) and St. Pierre (STP). All figures are for February 2002 with the exception of mean 2001 recruit numbers given for comparative purposes. Grey cells represent means that differ significantly between 2001 and 2002. s. e. mean = standard error of the mean, s = standard deviation, max n° = maximum number of recruits per quadrat and n = total number of recruits.

Depth	Statistic	Site number													
		1	2	3	4	5	6	7*	8	9	10	11	ASS	AST	STP
6m	Mean	3.4					2.8			7.7	10.1	11.8			
	2001 mean	3.5	3.8	7.9	8.1	8.7	3.6	7		7.8	3.9	10.6			
	s.e. mean	0.4					0.5			1.4	1.6	1.6			
	s	1.6					1.7			6.2	7.7	7.5			
	Max n°	6					5			26	34	30			
	n	54					34			153	243	271			
	# quadrats	16					12			20	24	23			
10m	Mean	5.0	5.6	8.6	10.6	3.8	2.9	7.2	13.5				11.5	1.1	12.9
	2001 mean	4.6	5.6	8.7	8.6	5.6	2.2	8.6	12.6						
	s.e. mean	0.6	0.7	0.8	1.4	0.9	0.5	0.8	1.4				1.3	0.2	1.9
	s	3.2	3.5	3.9	5.5	4.3	2.5	3.4	6.1				6.3	0.9	8.9
	Max n°	17	16	17	20	19	11	14	32				24	3	37
	n	134	139	206	170	92	70	129	269				275	27	283
	# quadrats	27	25	24	16	24	24	18	20				24	24	22
20m	Mean	5.5	6.5	6.3	4.2	0.5	4.3	7.6	4.4				4.7	1.1	8.8
	2001 mean	5.8	3.1	6.3	4.1	0.7	1.7		5.7						
	s.e. mean	0.6	0.9	0.8	0.5	0.2	0.5	1.2	0.7				0.6	0.2	0.9
	s	3.1	4.3	4.1	2.5	0.9	2.4	5.5	3.3				2.9	0.9	4.6
	Max n°	12	18	16	10	3	9	20	15				10	3	18
	n	132	157	151	136	11	104	152	111				113	26	247
	# quadrats	24	24	24	32	24	24	20	25				24	24	28

* Note that at Site 7 the recruit estimates labelled 10m and 20m were made at 5m and 15m respectively.

Coral recruit size frequencies in February 2002 were very similar to February 2001. The distribution for *Pocillopora* was once again negatively skewed suggesting a second older cohort of recruits, though in February 2002 the frequency of larger colonies was slightly reduced (Figure 15). The distribution for *Acropora* still retained a bimodal shape suggesting two cohorts. Both peaks shifted to the right by 0.5 cm in February 2002 which would be expected as colonies grow. The distribution for *Favia* remained normally distributed with some suggestion of a new 1cm diameter cohort coming in. *Pavona* (n = 302) retained a normal distribution while *Psammocora* (n = 150), that had a very small negative skew in 2001, became much more skewed in 2002 suggesting a new cohort of recruits.



Porites (right) and *Millepora* (left).

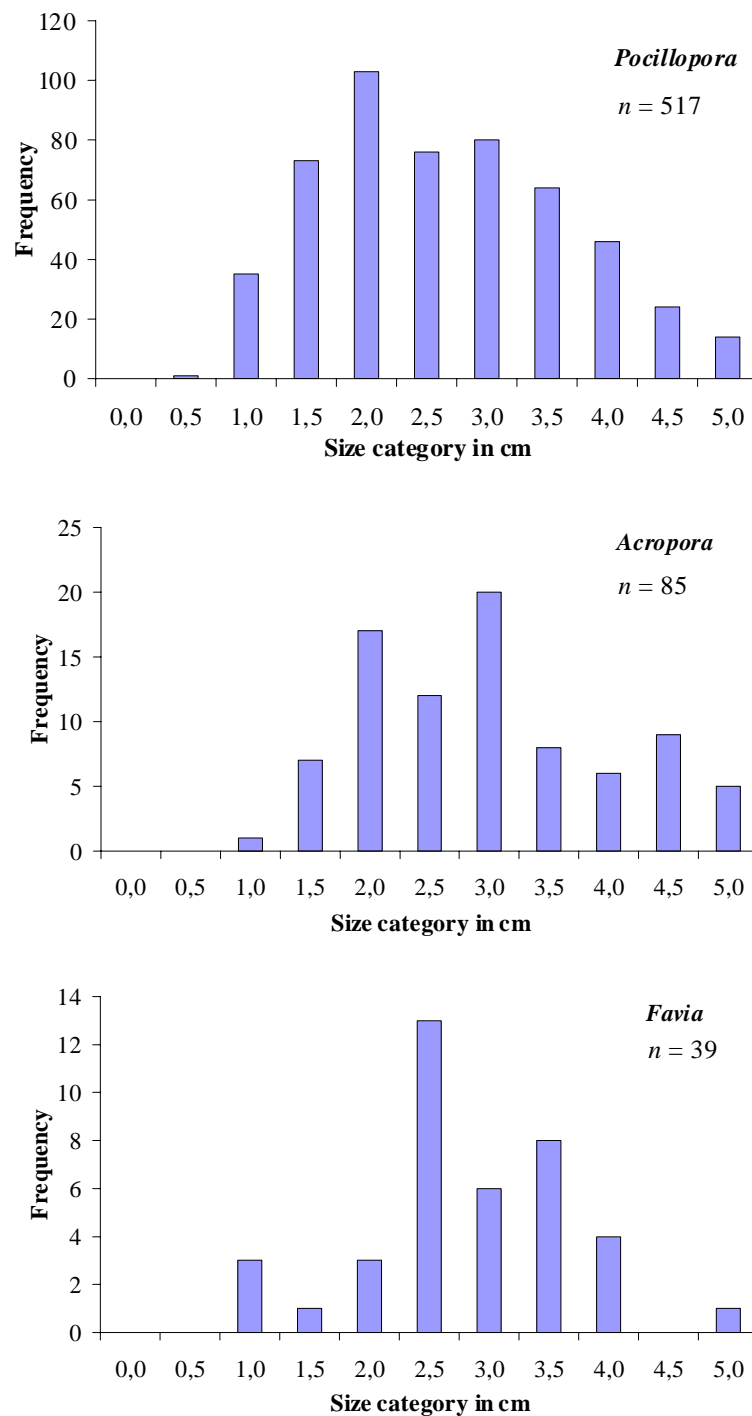
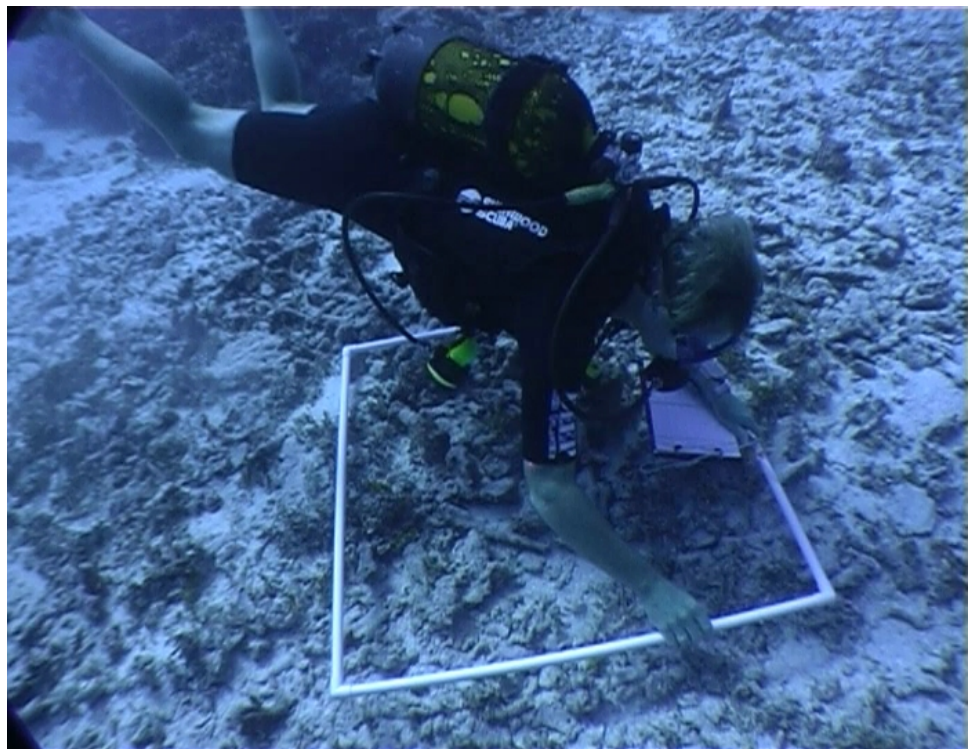


Figure 15. Size frequencies of three species of coral recruits at Aldabra in February 2002.



Divers tagging corals (top) and counting coral recruits in a quadrat (bottom).

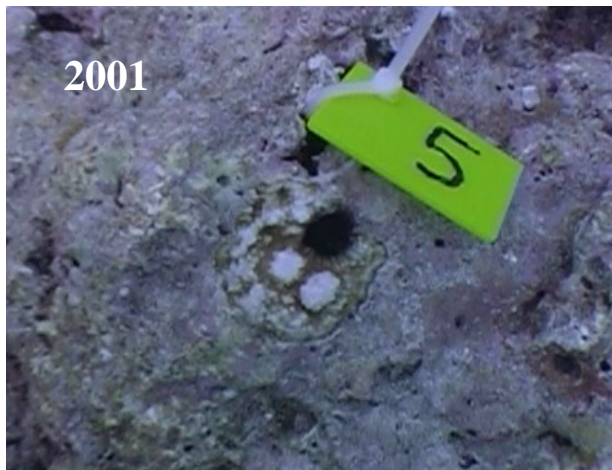
Coral tagging

The mean diameter of *Pocillopora* recruits at Aldabra grew 1.2 cm between February 2001 and February 2002 (s.e. ± 0.1 , min = 0, max = 4.35, n = 93). *Acropora* recruits grew faster with an average increase in mean diameter of 1.9 cm (s.e. ± 0.3 , min = 0.1, max = 3.7, n = 15). Growth of the seven other species ranged from faviids that grew between 0 and 3.4 cm and single colonies of *Pachyseris*, *Pavona* and *Pectinia* that grew 1.7, 1.4 and 2.1 cm respectively.

A total of 131 *Pocillopora* colonies were tagged in February 2001, of which 21 were lost or not found, 17 died and 93 survived and were re-measured. Mortality of *Pocillopora* recruits was therefore 18.7%. Of 23 *Acropora* colonies tagged, 3 were lost or not found, 5 died and 15 survived giving a mortality of 25%. For the remaining 13 species tagged, 3 were lost or not found, 3 died and 7 survived giving a mortality of 30%. These mixed species consisted of 6 faviids, 3 *Pavona*, and 1 colony each of *Pectinia*, *Gardineroseris*, *Leptastrea* and *Pachyseris*.



Diver at the Assomption site – *Gnathodentex aureolineatus* in foreground.



Examples of Tagged coral recruits changes between 2001 and 2002. Numbers 5 & 12 are *Pocillopora*, 13 is *Acropora*. Tags measure 6 x 4 cm.

Fish Transects

Aldabra

The same format for reporting the results of the fish transect surveys in 1999 and 2001 is repeated here for 2002. Comparisons are made of the species of fish counted over the three survey years at all outer reef sites at Aldabra, as well as the species sighted off transect (Table 4, Appendix 1). The data for 2002 is presented by survey transect depth and fish size category (Table 5, Appendix 2). The survey data is also summarised for Sites 1-8 for 1999, 2001 and 2002 (Figures 16 & 17), and comparisons of the key counts are made for these years (Table 6).

Number of Species Recorded

The species counted within the transect boundaries numbered 179 in 2002. This falls roughly midway between the species count of 1999 and 2001 (165 and 191, respectively). However, the total number of 221 species, which includes those identified outside the transect area, is the highest recorded so far. A total 38 families were identified. In 1999 the count was 35 families, and in 2001 it was 40 families. During the surveys at Aldabra in 1999, 2001 and 2002, AMP has identified a total of 289 species, representing 45 families.

Table 4. Summary of fish species counted in the transects and sighted off transect during the Aldabra Marine Programme surveys in February 2002, February 2001 and November 1999.

	2002	2002	2001	2001	1999	1999
	SITES 1-8	SITES 1-8	SITES 1-8	SITES 1-8	SITES 1-7	SITES 1-7
	Number in transects	Sighted off transect	Number in transects	Sighted off transect	Number in transects	Sighted off transect
Total Fish Counted	71999		34901		61939	
Total Area Surveyed	2400m ²		2325m ²		2100m ²	
Fish/100m ²	3000		1501		2949	
Number of Families	30	23	32	13	29	21
Number of Species	179	41	191	14	165	46
Total Number Species Identified	221		205		211	

Table 5. Summary of the number of fish counted, by transect depths and fish size groups, during the Aldabra Marine Programme surveys in February 2002.

Survey Transect Depths	10 m (Site 7 = 5m)				20 m (Site 7 = 15m)				10m + 20m
Total Area Surveyed	1600m ²				800m ²				2400m ²
Fish Size Group (Total Length)	<1-10cm	>10 - 20cm	>20cm	Total	<1-10cm	>10 - 20cm	>20cm	Total	Total
Total Fish Counted	49781	1200	717	51704	19144	601	550	20295	71999
Number of Families	17	20	21	27	22	18	15	26	30
Number of Species	79	80	65	147	75	71	55	137	179
Fish/100m ²	3111	75	45	3232	2393	75	69	2537	3000



Feeding *Acanthurus leucosternon*.