

TOWNSVILLE/XYZ

CROWN-OF-THORNS STUDY

1985

An assessment of the distribution and effects  
of the starfish Acanthaster planci (L) on  
the Great Barrier Reef:

8. TOWNSVILLE SECTOR

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**The Crown-of-Thorns Study**

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**8. Townsville Sector**

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## Executive Summary

- 21 reefs were surveyed in an area designated the Townsville sector.
- 6 of these reefs were subjected to additional detailed line transect survey of their benthic community.
- Acanthaster planci was found in large numbers ( 100 individuals) on 9 reefs (Dip, Kelso, Glow, Hopkinson, Yankee, John Brewer, Helix, Grub and Keeper Reefs). High coral mortality was observed on many of these reefs.
- Moderate numbers (20-99 individuals) of starfish were observed on a further 7 reefs (Needle, Faraday, Arc, Slashers S.W., Knife, Lodestone and Wheeler).
- Starfish were observed in low densities on another 3 reefs in this sector (Chicken, Centipede and Davies Reefs).
- The remaining 2 reefs (Coil and Bowl Reefs) displayed no evidence of A. planci.

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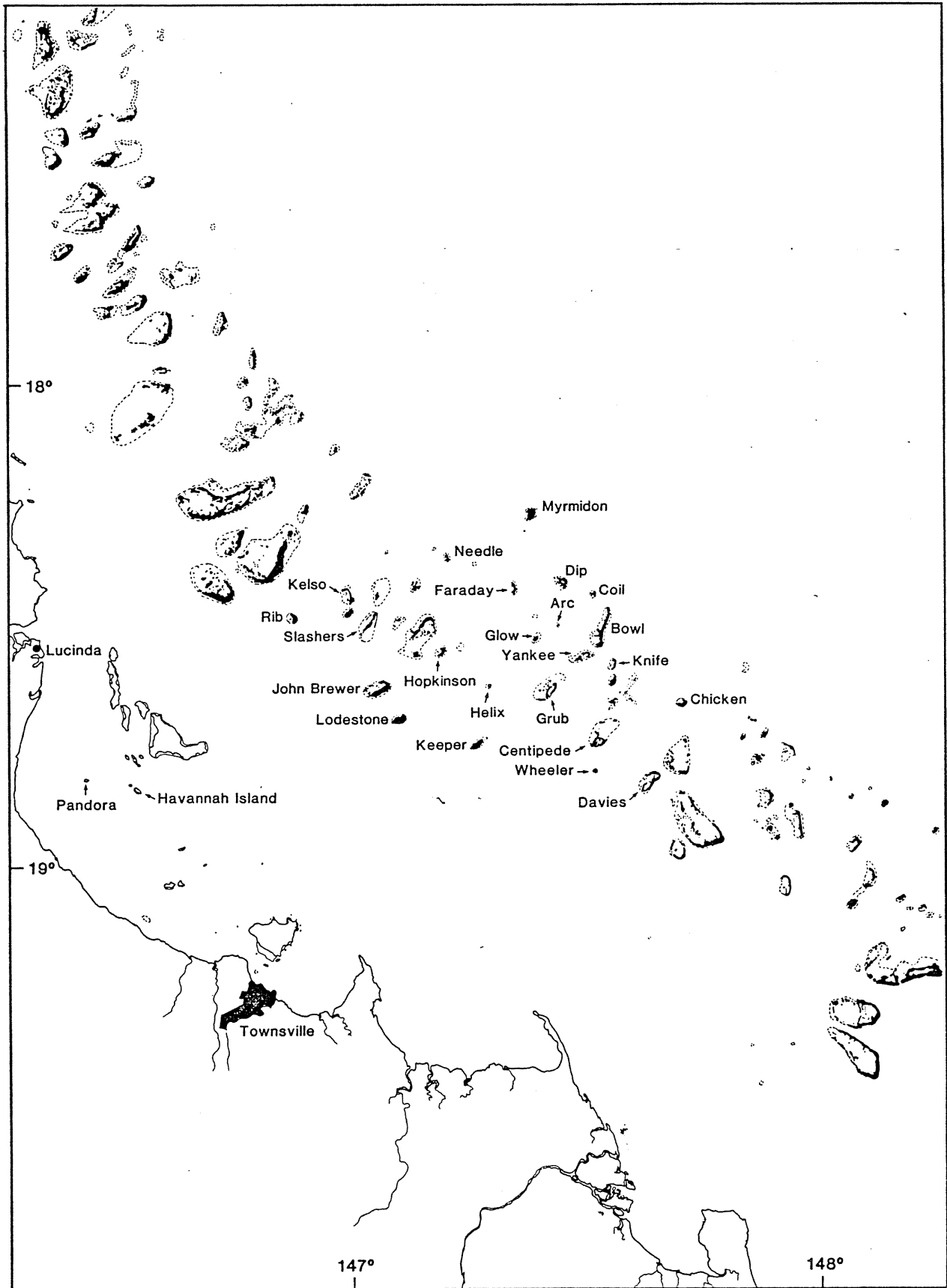
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Figure 1. Townsville sector map.





## INTRODUCTION

The area of study designated as the Townsville sector included 21 reefs lying between latitudes 18°20'S and 18°50'S.

The surveys were undertaken in accordance with the research protocol adopted for the assessment of the distribution and abundance of the Crown-of-thorns starfish, Acanthaster planci, as detailed in Volume I of this series (COT-CCEP.: 1, 1986) and the study of morphological components of the reefal benthic communities (Bradbury et al., 1985) on the Great Barrier Reef (GBR).

There was a period during the late 1960's to mid 1970's when considerable public and political pressure arose to identify those areas of the GBR which were experiencing abnormal or aggregated populations of A. planci (Kenchington, 1978). Extensive surveys were carried out at this time (Pearson and Endean, 1969; Endean, 1974; Kenchington, 1976; Pearson and Garrett, 1976). More recent reports by Nash and Zell (1981), the Great Barrier Reef Marine Park Authority (Ayling and Ayling, 1985), Moran et al., (1985) and Done (1985) have contributed greatly to the build up of knowledge on Acanthaster in this region of the G.B.R. Many workers have advocated continued surveying of reefs in order to assemble a spatial and temporal understanding of Crown-of-thorns activity (Endean, 1974; Kenchington and Pearson, 1981; Moran, 1986). In order to view the present study in perspective, the findings of previous surveys are summarized in Table 9. When comparing these results with those from past surveys it should be noted that in most cases vastly different techniques of data collection have been used.

Although the availability of this data has provided an insight into the spatial and temporal distribution of Acanthaster in the Townsville region, information which would have provided similar retrospective analysis on the dynamics of the associated benthic communities has been largely unavailable until recently (Pearson, 1981; DeVantier et al., 1985). Previous workers have not concurrently addressed both predator and prey such that various levels of A. planci predation may be compared with the morphologies of the reefal benthic communities.

The results of manta surveys in conjunction with the line transects on selected reefs are presented for the Townsville Sector. The data were collected over numerous cruises between March 1985 and January 1986. For the purposes of comparison, these are considered within the one time period.

The criteria used to nominate the site where sampling of the benthos was to be undertaken were sufficiently flexible to enable alternative sites to be chosen during

adverse weather conditions or currents. However, in all instances benthic line transect sites were established on representative or typical areas of the reef.

The results presented provide the most accurate information currently available on A. plani activity and the state of the benthic communities on reefs in the Townsville region.

Table 1. Classification, location and priority of reefs surveyed in the Townsville sector.

Reef Name	Code Number	Position	Priority	Reef Type	Survey Date
Needle Reef	18037	18 22'S 147 12'E	2	Cresentic	11.10.1985
Dip Reef	18039	18 25'S 147 27'E	2	Cresentic	11.8.1985
Kelso Reef	18030	18 26'S 147 00'E	2	Cresentic	28.1.1985
Faraday Reef	18041	18 26'S 147 21'E	2	Cresentic	10.10.1985
Coil Reef	18046	18 30'S 147 27'E	2	Patch	13.8.1985
Bowl Reef	18080	18 31'S 147 32'E	1	Ribbon	12.8.1985
Slashers S.W. Reef	18069	18 32'S 147 09'E	2	Patch: sand cay	27.1.1986
Glow Reef	18071	18 32'S 147 24'E	2	Patch	13.8.1985
Hopkinson Reef	18073	18 34'S 147 12'E	2	Cresentic	13.8.1985
Yankee Reef	18074	18 34'S 147 30'E	1	Patch	12.8.1985
Knife Reef	18081	18 35'S 147 34'E	2	Cresentic	10.10.1985
John Brewer Reef	18075	18 38'S 147 04'E	2	Lagoonal	7.3.1985
Helix Reef	18076	18 38'S 147 18'E	1	Patch	11.10.1985
Grub Reef	18077	18 38'S 147 25'E	1	Lagoonal	14.8.1985
Chicken Reef	18086	18 40'S 147 43'E	2	Cresentic	10.10.1985
Lodestone Reef	18078	18 42'S 147 06'E	2	Planar	12.3.1985
Centipede Reef	18088	18 44'S 147 32'E	2	Cresentic	9.10.1985
Keeper Reef	18079	18 45'S 147 16'E	2	Planar	9.8.1985
Wheeler Reef	18095	18 48'S 147 32'E	1	Planar: sand cay	8.8.1985
Davies Reef	18096	18 50'S 147 39'E	1	Lagoonal	18.12.1985

Code numbers drawn from Great Barrier Reef Gazetteer.

## RESULTS

PRIORITY I REEFSBOWL REEF

Bowl Reef is a narrow reef with a length of approximately 10 km. The front reef slopes are well defined, facing slightly to the south of east. The reef is located near the outer shelf, north-east of Townsville (Figure 1).

No A. planci were observed around the slopes of Bowl Reef. Live hard coral cover was good, predominantly 30 to 50 percent. Coral cover was, however, very patchy in distribution (Figure 2a). Dead corals were most often recorded at less than 10 percent around the entire perimeter of Bowl Reef (Figure 2a).

The front reef transect site displayed similar live hard coral cover at all depths (5, 10 and 15 m), ranging from 49-57 percent (Figure 2b; Tables 2a-c). Branching and tabulate Acropora were dominant at the shallow depths whilst non-Acropora forms constituted the majority of coral cover at lower depths. At 15 m, 80 percent of the hard coral were non-Acropora morphologies. No recently dead corals were recorded from the front site. Cover attributable to algal communities was low, particularly at 5 m depth. At 10 m depth, the transect was characterised by a relatively high cover of sponges (12 percent). Soft coral and other benthic life forms were not well represented on the front site transects of Bowl Reef.

In contrast to the front site, the back reef site had lower covers of live coral (26 to 35 percent) and higher covers of algal-covered dead coral (55 percent at 5 m) (Tables 2d-f). Branching non-Acropora corals contributed 16 percent towards the maximum coral cover (35 percent) at 10 m. Branching and tabulate Acropora were again more prevalent at 5 m and decreased substantially with increasing depth. Sand and rubble constituted more than 20 percent of cover at 15 m depth (Figure 2b).

## YANKEE REEF

Yankee Reef may best be described as irregularly shaped reef patches. Live coral cover was recorded at moderate to high levels (30 to 75 percent) on the northern back reef and front slopes of Yankee Reef (Figure 3a). It was more patchy and variable over the central and southern back reef slopes, and generally below that recorded elsewhere. Dead coral was abundant (30 to 75 percent) over most of these back slopes, whilst much lower on the front edge. A. planci were largely restricted to the back reef slopes where 80 individuals were recorded.

Only one transect site, on the back reef slope, was surveyed on this reef. Maximum hard coral cover at this site (34 percent) occurred at 3 m depth, and comprised mainly Acropora forms (13 percent) and other coral morphologies (21 percent) (Figure 3b). While the cover of Acropora decreased with increasing depth, relative cover of dead coral was generally greater with depth. Overall, algal communities were poor in cover and soft corals occurred frequently at all depths, contributing up to 9 percent relative cover (Tables 3a-c).

## HELIX REEF

Helix Reef is a small, isolated reef, with irregular indentations around its perimeter.

A total of 329 Acanthaster planci were observed around the perimeter of this small reef with 2 large concentrations being reported on the NE and eastern slopes.

This distribution of starfish correlates with the observed areas of highest hard coral mortality on the NE side. Although there was a consistent cover of dead coral on all slopes, the remainder of the reef supported the highest covers of living corals where estimates reached 50 to 75 percent (Figure 4a).

The front reef site of Helix Reef was characterized by 36 to 59 percent cover of live coral. Acropora species were predominant, particularly at 3 m depth (Figure 4b) (Tables 4a-b). Large areas of dead standing coral were recorded at 6 m depth (41 percent). Almost 8 percent of this was recently dead coral and most likely attributable to predation by A. planci. Algal communities and other benthic fauna were not well represented on the front of Helix Reef. Surveys were not conducted at 12 m depth as the site comprised mainly sand and rubble.

In contrast to the reef front, the back slope of Helix Reef had a low cover (9 percent) of live hard coral. This cover decreased further with depth to 3 percent at 12

m (Figure 4b). However, there was a corresponding increase with depth of dead coral, reaching a maximum of 79 percent at 12 m. Algae were common at all depths, but especially at 6 m, where beds of Halimeda accounted for 21 percent of the transect (Tables 4c-e). The combination of dead coral and algae was the most visually dominant feature at this site, contributing at least 71 percent to the total cover. These changes in the coral cover were most likely due to the effects of A. planci predation.

### GRUB REEF

Grub Reef is a large reef characterised by an extensive lagoonal area and irregular edge (Figure 1).

Moderate (30 to 50 percent) live coral cover was most frequently recorded from the slopes of Grub Reef (Figure 5a). Dead standing coral was particularly abundant over the northern front slopes where large numbers of A. planci were sighted. The southern front and back reef slopes supported slightly lower covers of live and dead coral. Very few A. planci were recorded throughout these areas.

Only one transect site was surveyed and this was on the back of the reef. At all depths coral cover was composed primarily of non-Acropora forms (Figure 5b). Maximum Acropora (primarily branching forms) coverage of 12 percent occurred at 3 m depth. Newly dead coral was recorded and this increased with depth while generally algal covered dead coral was recorded at all depths. Sand and rubble accounted for 10 percent of the line transect at 12 m (Tables 5a-c).

### WHEELER REEF

The 35 Crown-of-thorns starfish observed on this reef were recorded over a short distance on the south side (Figure 6a). Live coral cover in this area was considerably lower (0-10 percent) than for the remainder of the reef where levels of 50 to 75 percent were common.

A consistent cover of up to 10 percent dead coral was reported around the reef, with areas of higher mortality (30 to 50 percent) being restricted to the SE slopes (Figure 6a).

On the front slopes of the reef maximum hard coral cover of 41 to 44 percent occurred at the 3 m and 6 m depth transects respectively. The shallow depth displayed a higher cover of non-Acropora morphologies, whereas on the 6 m line transect branching Acropora constituted almost 32 percent cover (Figure 6b, Tables 6a-c). Coral cover decreased to 23 percent (11 percent Acropora branching forms) at 12 m depth. No recently dead coral was recorded from the front slope of Wheeler reef, however algal encrusted dead coral increased with depth from 34 percent at 3 m to 48 percent at 12 m.

Algal communities were not well represented at this front site. However, Halimeda comprised 10 percent of the cover on the shallow transect. The abundance and cover of soft corals increased with depth to a relatively high level (17 percent) at 12 m.

Coral cover at the back reef site was high (48 percent) along the shallow, 3 m line transect. This cover decreased substantially with depth to 7 percent at 12 m (Figure 6b). Branching Acropora and encrusting and massive morphologies dominated the hard coral cover at all depths (Tables 6d-f). Recently dead coral was recorded at 9 percent from the deep transect, whilst 36 to 47 percent of the cover at this back reef site was composed of algal covered dead coral.

Many small soft coral colonies accounted for 9 percent of the cover at the 12 m line transect. Algal communities and other benthic morphologies were rare in terms of both occurrence and relative cover. Sand and rubble constituted 23 percent of the transect at 12 m depth (Figure 6b).

### DAVIES REEF

Davies Reef is a mid-shelf lagoonal reef having a straight front and broken up back reef area.

Hard coral cover along the back reef slopes was recorded at less than 30 percent and most frequently observed below 10 percent (Figure 7a). While the cover of live corals reached 75 percent on the eastern slope of Davies Reef, values of 10 to 50 percent were most frequently recorded. Dead coral was generally very low, being observed at 10 to 30 percent on only 3 tows around the entire perimeter of the reef. A small number of A. planici were observed on the back slope of this reef (Figure 7a).

Acropora species accounted for approximately one-third of all of the live hard coral on the front of Davies Reef at all three sample depths. Branching Acropora were predominant, with a lesser proportion of tabulate forms. Live coral cover decreased with depth from nearly 65 percent at 5 m to 32 percent at 15 m (Figure 7b, Tables 7a-c).

Halimeda was the major type of alga present at 5 and 10 m depths accounting for 7 and 6 percent of the total covers respectively. Soft corals were present at all depths, reaching a maximum of 10 percent at 15 m.

In contrast, the back reef site had approximately half the live coral coverage observed on the front. Despite this the proportions of coral life forms were similar to those observed on the front site (Tables 7d-f).

Algal communities accounted for less of the total cover on back reef transects than those on the front slope, reaching a maximum of 2 percent at 5 m depth. Halimeda was present infrequently (Tables 7d-f). Although no recently dead coral was recorded at this site algal encrusted dead coral accounted for 51 percent of the cover along the 10 m line transect. Soft corals were prevalent at 15 m (17 percent) while sponges constituted 7 percent of the transect at this depth.



## PRIORITY 2 REEFS

### NEEDLE REEF

This reef is characterised by a broken up appearance and lacks the continuous distinct slopes of other reefs in this sector. The reef, which basically consists of two large shoals is positioned on the outer edge of the continental shelf.

Live coral cover was consistently low (less than 10 percent) around the reef, except for isolated areas where it reached up to 50 percent in one instance (Figure 8). Areas such as these occurred only in shallow water. A high dead coral cover of between 30 and 50 percent was recorded for over half the number of tows, with the remainder covering between 50 and 75 percent. A total of 73 A. planci were recorded, being patchily distributed around the reef, with the largest concentration occurring over tows 3 and 4 on the northern face. These individuals mostly were 10-20 cm in diameter.

### DIP REEF

A total of 242 starfish were sighted on this small reef, essentially in two main areas (Figure 9). One concentration was located on the sheltered NW back reef, and the other was on the exposed SE reef front. In both these areas, the estimated coverage of standing dead corals was higher than for areas without Crown-of-thorns, where consistent estimates of less than 10 percent were recorded. With few exceptions, the reef had good live coral cover (30 to 50 percent) except for the western back reef where rubble areas on the steep slopes reduced this value to 10 to 30 percent.

### KELSO REEF

Kelso Reef is narrow and curved to the north and south with a large lagoonal back reef area which is scattered with several large patch reefs.

Crown-of-thorns starfish were patchily distributed around the entire perimeter of Kelso Reef (Figure 10). A total of 142 individuals were recorded. Live coral cover was generally poor (less than 10 percent) on the front reef slope. Similar values were recorded for the back reef, though some isolated areas had a slightly higher cover (up

to 30 percent). Throughout the perimeter of this reef dead coral cover was most frequently recorded in the 1 to 30 percent category. An exception was the SE corner, which had 30 to 50 percent dead coral cover. This mortality is most likely to be due to predation by Acanthaster.

### FARADAY REEF

The survey indicated that both live and dead coral cover varied between the more exposed eastern front and the sheltered western back (Figure 11). Dead coral cover (up to 50 to 75 percent) was higher for the eastern front slopes than for the back reef areas. This coincided with a larger cover of live corals (up to 75 to 100 percent) for tows along the sheltered western slope. A total of 38 A. planci were observed during the survey and these were distributed patchily around the southern half of the reef, including both sheltered and more exposed slopes.

### COIL REEF

No Crown-of-thorns starfish were observed on this small reef during the manta tow survey (Figure 12). Dead corals were observed only on the southern half of the reef, where it was estimated that they covered up to 30 percent of the area. High live coral cover was recorded for the entire reef perimeter, with all estimates being within the ranges 30 to 50 percent and 50 to 75 percent of the total substrate.

### ARC REEF

This very small reef consists of solid irregularly shaped reef patches.

Generally, live coral cover was observed at less than 30 percent around the perimeter of this reef (Figure 13). Dead coral cover was very high, being frequently recorded in the range 50 to 75 percent. Crown-of-thorns starfish were prevalent on the SE slopes. A total of 24 A. planci were recorded from this reef.

### SLASHERS S.W. REEF

With few exceptions, live corals covered less than 10 percent of the substrate around this entire reef. In contrast, there was a variable and often high cover of dead corals with estimates ranging from low (0 to 10 percent) to high (50 to 75 percent) (Figure 14).

The detached NE section of this reef notably had higher dead coral cover than the remainder of the reef where the cover was higher on the western, rather than eastern side. Those sites where dead coral cover was generally higher, also correspond roughly with the two main areas of A. planci. A total of 88 individual starfish were observed, most being located on the NE section of the reef (Figure 14).

### GLOW REEF

Glow Reef is small and has an irregularly shaped perimeter (Figure 15).

The front reef slope was characterized by an even cover of live (10 to 30 percent) and dead (1 to 10 percent) coral. Live coral cover was similar on the back reef slope, only reaching 30 to 50 percent on two occasions. Dead coral cover was very high on the back reef slopes being recorded at 50 to 75 percent most frequently. A total of 130 A. planci were observed around the perimeter of this reef.

### HOPKINSON REEF

Hopkinson Reef is a crescentic mid-shelf reef with a long curving front crest and extensive lagoonal area to the north-west.

The front of this reef displayed patchy live coral cover of 1 to 30 percent, whereas live coral cover was consistently recorded at less than 10 percent along the back reef slope (Figure 16). The distribution of dead corals was patchy and high around the entire reef perimeter, consistently being recorded at greater than 50 percent. A substantial number of Crown-of-thorns starfish (965) were recorded over much of the reef.

### KNIFE REEF

This crescentic reef has distinct front and back reef regions. The back reef area is further characterised by a number of large isolated bommies.

Manta tow records for the front reef slopes indicate moderate live coral cover in the range 10 to 50 percent (Figure 17). Around the back reef margins, live coral cover was lower and patchily distributed in the ranges: 1 to 10 percent and 10 to 30 percent. Dead coral cover was variable around the perimeter of Knife Reef with maximum values of up to 50 percent regularly observed on the back reef. Front reef slopes had slightly lower dead coral cover in the range of 1 to 30 percent. Nineteen A. planci were recorded from the NW slope of Knife Reef.

### JOHN BREWER REEF

A large population of 382 Crown-of-thorns starfish were observed during the manta tow surveys (Figure 18). Whilst individuals were found around the entire perimeter there was one area of concentration on the NE corner. Live corals generally covered less than 10 percent of the substrate at most sites, occasionally reaching up to 30 percent.

Although the cover of dead corals was irregular (particularly along the northern fore-reef slope), it was much higher, with areas of 50 to 70 percent commonly being recorded.

### CHICKEN REEF

Only two Crown-of-thorns starfish were sighted on this reef, along the north western corner (Figure 19). A consistently lower cover of dead coral (less than 10 percent) was observed around the entire reef perimeter. The western slopes comprised large sand patches and a correspondingly low live coral cover (approx. 10 percent). Live coral cover on the remaining reef front was luxuriant although highly variable ranging from 0 to 10 and 75 to 100 percent.

### LODESTONE REEF

Although a total of 66 Acanthaster planci were observed on this reef, their distribution was restricted to the SE reef front over a distance covered by 20 (2 minute) manta tows (Figure 20). Total coral cover in this area was similar to the rest of the reef, but with a higher proportion of live colonies.

Live coral cover over most of the reef was less than 10 percent, whereas the level of dead coral cover was approximately 30 to 50 percent. The cover of dead coral was far more variable between adjacent tows, than was live coral.

### CENTIPEDE REEF

This large reef consists of scattered patch reefs and elongated shoals with sandy slopes. There was a consistently low cover of dead corals (1 to 10 percent) over much of the reef which reached higher levels (10 to 30 percent) only in isolated areas along the southern face (Figure 21). Live coral cover was highly variable reaching 50 to 75 percent in some areas. The enclosed NE slope (tows 60 to 88), generally exhibited lower live coral cover than the other areas surveyed. Only 4 individual A. planci were sighted, and these occurred at various positions along the northern side of the reef.

### KEEPER REEF

Crown-of-thorns starfish were observed at uniform levels around the entire perimeter of Keeper Reef (Figure 22). A total of 182 individuals were recorded.

Live coral cover was low, being recorded consistently in the category 1 to 10 percent. In contrast, there was a relatively high cover of dead coral - ranging from 30 to 75 percent over most of the reef.

## DISCUSSION

The most notable feature of the results for the Townsville sector, is the very high proportion of surveyed reefs on which A. planci activity was reported. Of the 21 reefs surveyed, 19 were found to have A. planci present. Of these 9 had large numbers of individuals while a further 7 had moderate numbers of starfish. These reefs displayed extensive coral mortality (Table 10). The remaining 3 reefs had only small numbers of starfish. Of the 11 sectors of the Great Barrier Reef surveyed in this program, Townsville emerges as the sector with most concentrated Acanthaster activity. There appears to be no distinct spatial pattern in the distribution of outbreaking reefs in the Townsville sector. Fourteen out of the 21 reefs surveyed in this program were reported as having outbreaks of A. planci during the 1960's and 1970's.

Based on the median categories of live and dead coral cover for each reef (see Table 8), a broad classification of current reef states, involving 3 distinct groups, emerges for the Townsville Sector.

The first group comprises those reefs which displayed high live coral cover and low dead coral cover, that may be considered to be largely unaffected by Crown-of-thorns at this time. These reefs are listed in Category A of Table 10 (below), and include some which have had moderate to large numbers of starfish on them for several years (i.e. Dip and Faraday reefs) (Table 9). Since large numbers of Acanthaster have only recently occurred on Grub Reef, it would seem that coral mortality could increase substantially on this reef in the near future.

The second group contains reefs such as Kelso, Knife and Wheeler, (Category B, Table 10), which had approximately equal amounts of live and dead coral cover. Such reefs could be considered at an intermediate stage in relation to Acanthaster effects because whilst the starfish have already caused significant coral mortality, there remains potential for more extensive feeding effects. Reefs such as Kelso, Southwest Slashers and Centipede, which have large sand covered areas, may not experience further extensive damage while those such as Helix, Wheeler, Knife and Yankee which still have both large proportions of live coral and an abundance of Acanthaster, may continue to experience further coral mortality.

The third group, (Category C, Table 10), includes those reefs which have suffered extensive coral mortality. For example, Hopkinson Reef was identified to be in the final stages of an outbreak, with large numbers of Crown-of-thorns starfish still present on the reef slopes, despite extensive destruction of the hard corals.

Table 10. Classification of reefs in the Townsville sector with respect to the relative median covers of Live and Dead Corals.

CATEGORY A high live, low dead				CATEGORY B equal live and dead				CATEGORY C low live, high dead			
Reef	L.	D.	COTS*	Reef	L.	D.	COTS*	Reef	L.	D.	COTS*
Dip	3	1	242	Kelso	1	1	142	Needle	1	3	73
Faraday	3	1/2	37	Slashers S.W.	1	2	88	Arc	2	4	24
Coil	3/4	0	0	Glow	2	3	130	Hopkinson	1	4	965
Bowl	3	1	0	Knife	2	2	73	J.Brewer	1	3	382
Grub	3	1	499	Helix	2/3	2/3	329	Lodestone	1	3	66
Chicken	3	1	2	Centipede	2	1	5	Keeper	1	3	182
Davies	2	0/1	5	Wheeler	3	2	35				
				Yankee	3	2	116				

\* L. = Median Category of Live coral.

D. = Median Category of Dead coral.

COTS = Number of A. planci. (see Table 8).

## NOTES ON INTERPRETING DATA REPRESENTATIONS

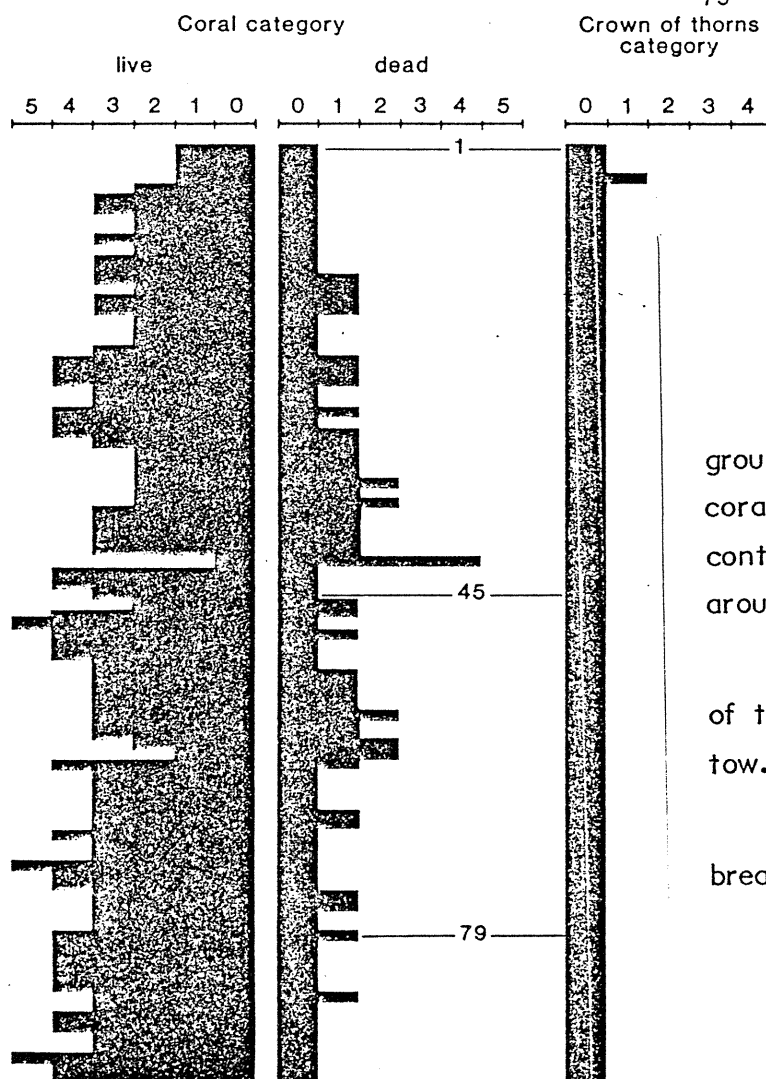
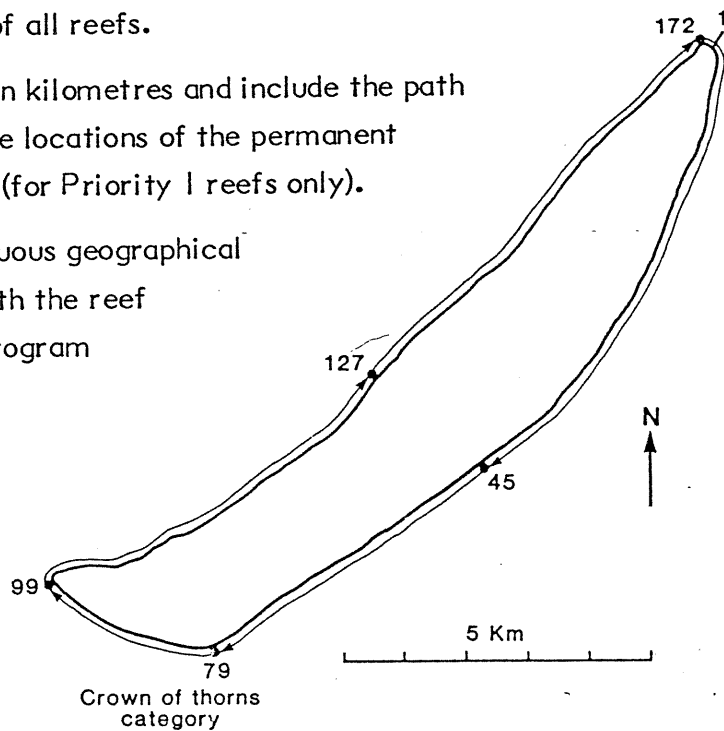
The graphic and tabular data representations designed for this report series are of 3 types.

1. The first is a combination map/pseudo-histogram displaying grouped data collected from the manta tow survey of all reefs.

Maps are oriented north, scaled in kilometres and include the path taken by the manta tow survey, and the locations of the permanent sites for the benthic life form surveys (for Priority I reefs only).

Tow numbers relating to conspicuous geographical and or data features are marked on both the reef map and the corresponding pseudo-histogram to facilitate easy cross reference.

The terms 'back' and 'front' are used on the maps of Priority I reefs to locate the benthic survey sites.



The pseudo-histograms display grouped data on live coral cover, dead coral cover and *A. planci* occurrences contiguously for every tow conducted around the perimeter of each reef.

Each vertical 1.5 mm increment of the pseudo-histogram represents 1 tow.

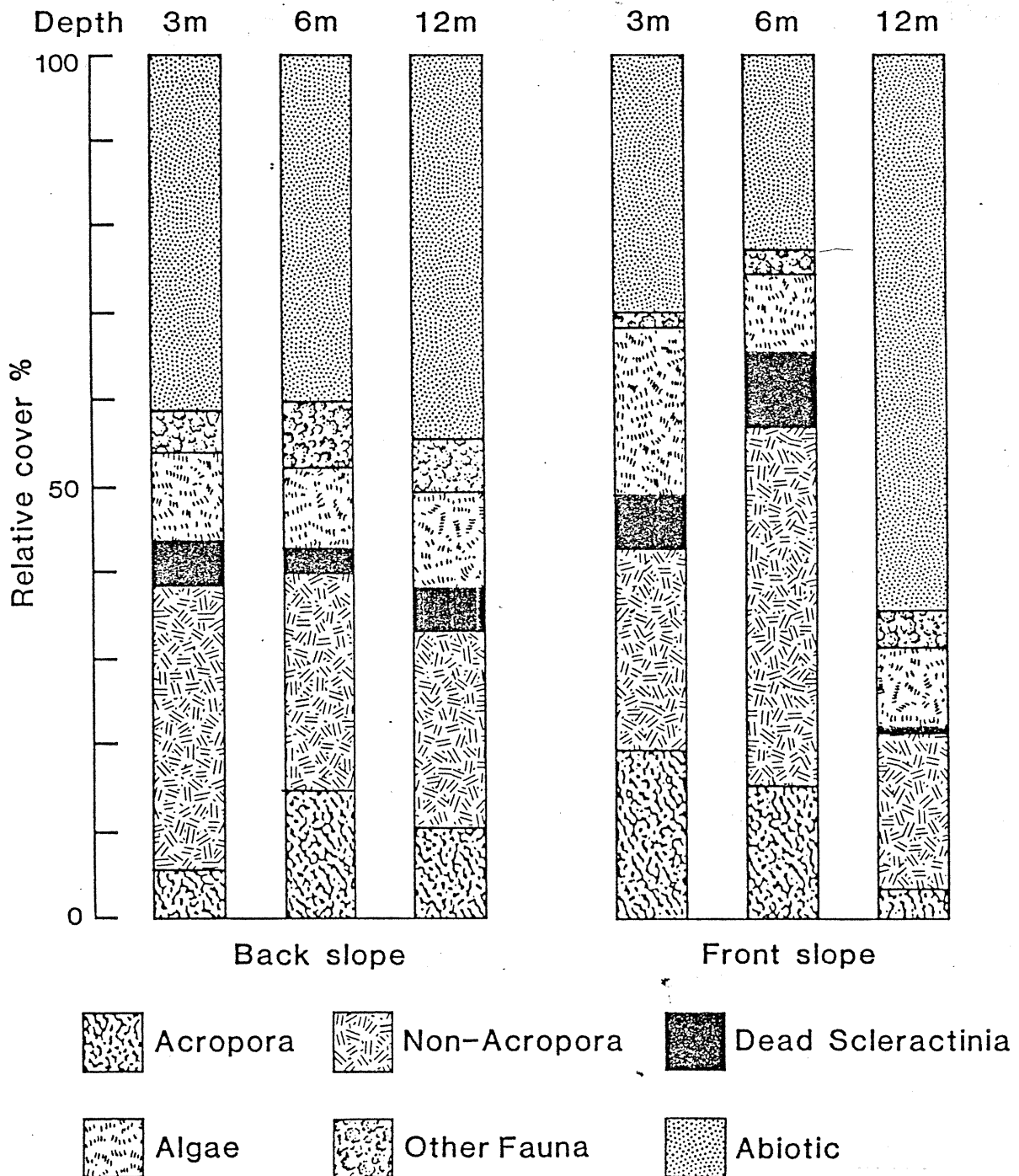
7 mm vertical gaps represent a break in the manta tow survey.



2. Benthic transect survey data are initially displayed in the form of compound histograms (1 per reef) containing the data from each of the individual depth sites (up to 3 - at 3, 6 and 12 m) at each of the transect sites (back and front slope; with some noted variations).

The data are grouped into 6 broad structural-physiognomic life form categories: Acropora corals, non-Acropora corals, dead Scleractinia, Algae, Other Fauna and the Abiotic component.

The data are displayed as a percentage of the total substrate, and are represented by proportional shaded blocks.



3. The third form of data presentation is tabular. The benthic life form data are presented as relative cover and abundance tables for each Priority I reef.

The breakdown of data follows that used in the life form histograms, but also contains the full 21 sub-categories used to record the data in the field.

Also included are the categories codes, actual occurrence numbers, and broad category totals (as a percentage of the total cover).

Date Sampled : 05/22/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Acropora</b>					
Branching	ACB	41	16.72		
Tabulate	ACT	3	1.88		
Encrusting	ACE	1	0.48		
Submassive	ACS	1	0.12	19.20	
<b>Non-Acropora</b>					
Branching	CB	11	2.34		
Massive	CM	45	13.61		
Encrusting	CE	16	3.84		
Submassive	CS	6	1.27		
Foliose	CF	5	2.41	23.47	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	10	5.95	5.95	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	1	0.10		
Coralline	CA	5	1.47		
Halimeda	HA	0	0.00		
Algal assemblage	AA	47	17.82	19.39	
<b>Other Fauna</b>					
Soft Corals	SC	6	1.42		
Sponge	SP	2	0.45		
Other	OT	0	0.00	1.87	
<b>Abiotic</b>					
Sand & Rubble	SR	45	29.86		
Water	WA	1	0.26	30.12	

Figure 2a). Tow path, coral cover and A. planci numbers for: Bowl Reef.

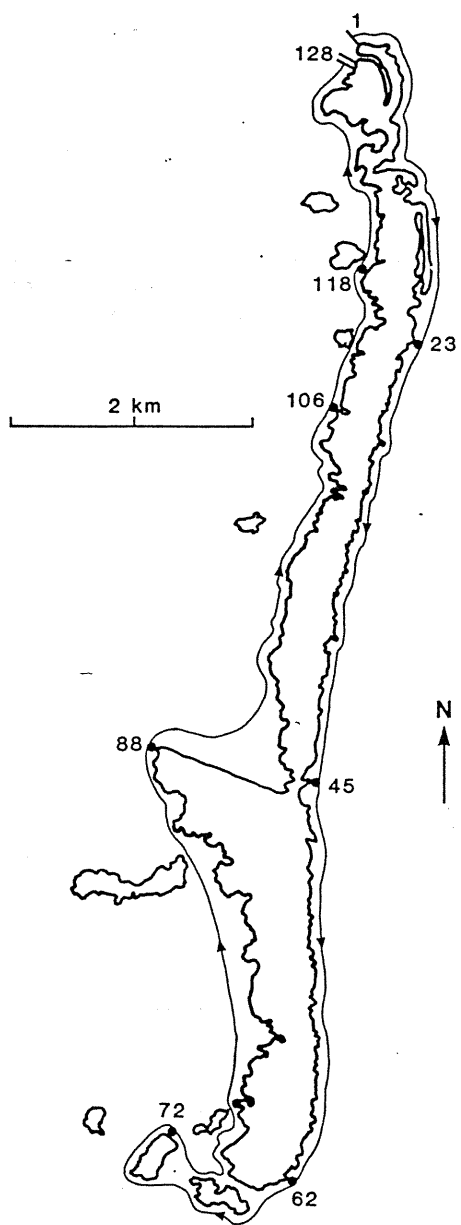
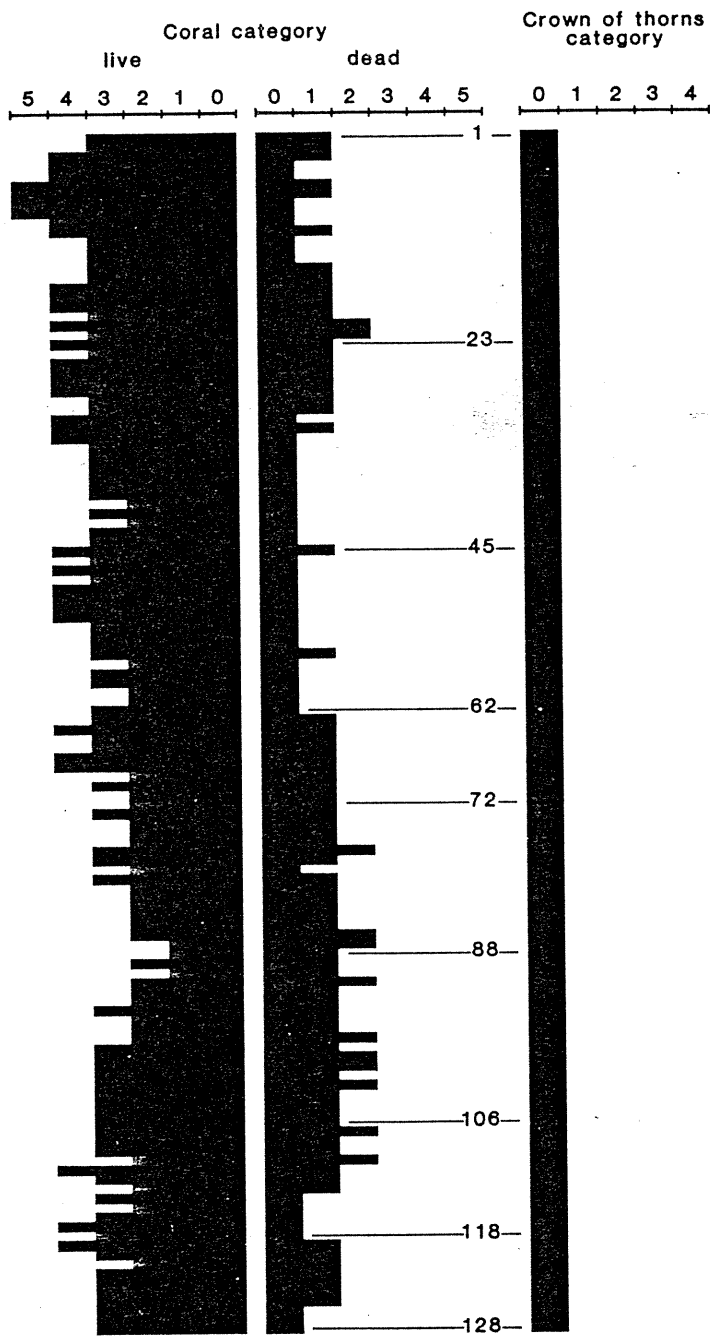


Figure 2b). Relative cover and abundance of life form categories on: Bowl Reef.

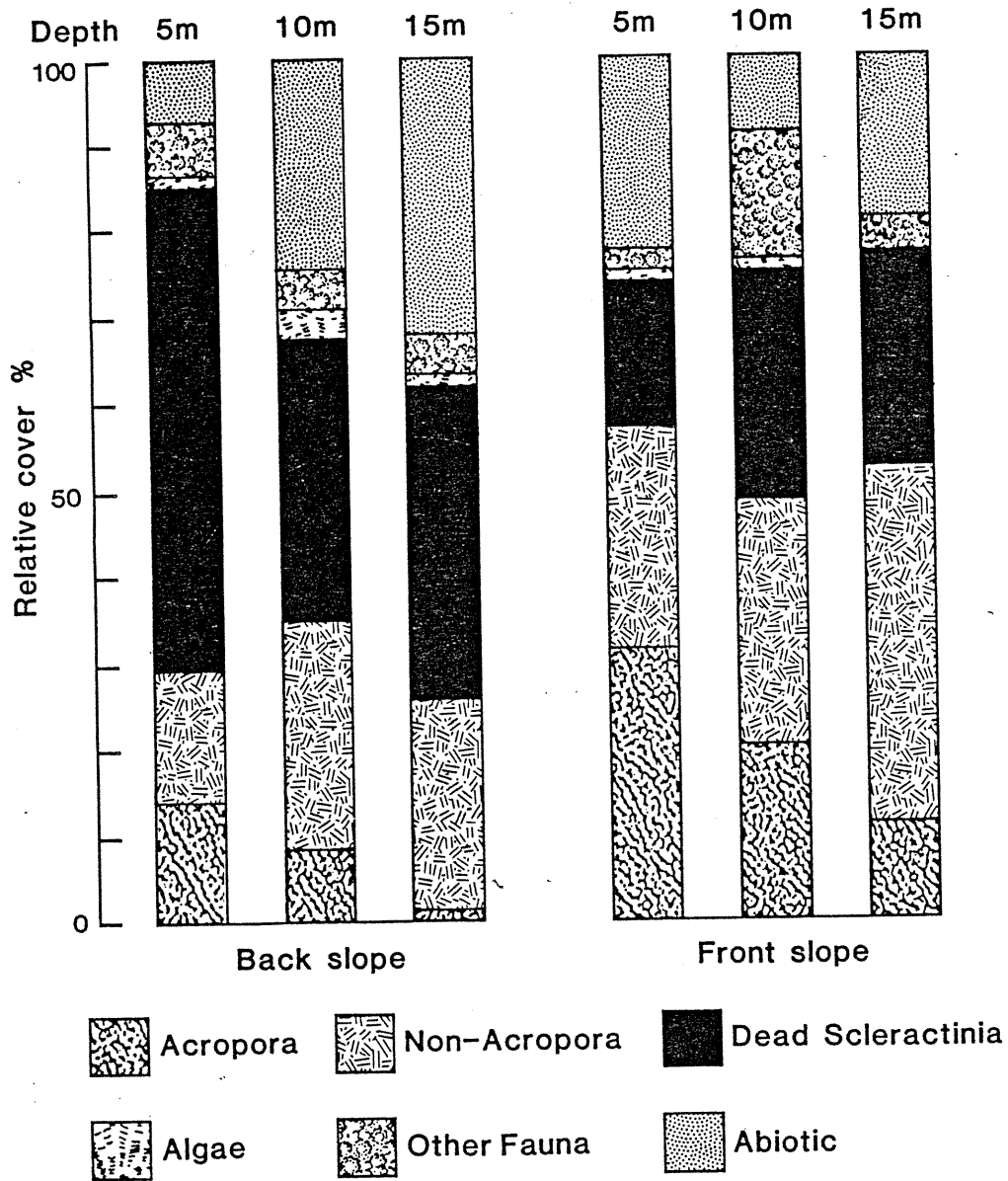


Figure 3a). Tow path, coral cover and *A. planci* numbers for: Yankee Reef.

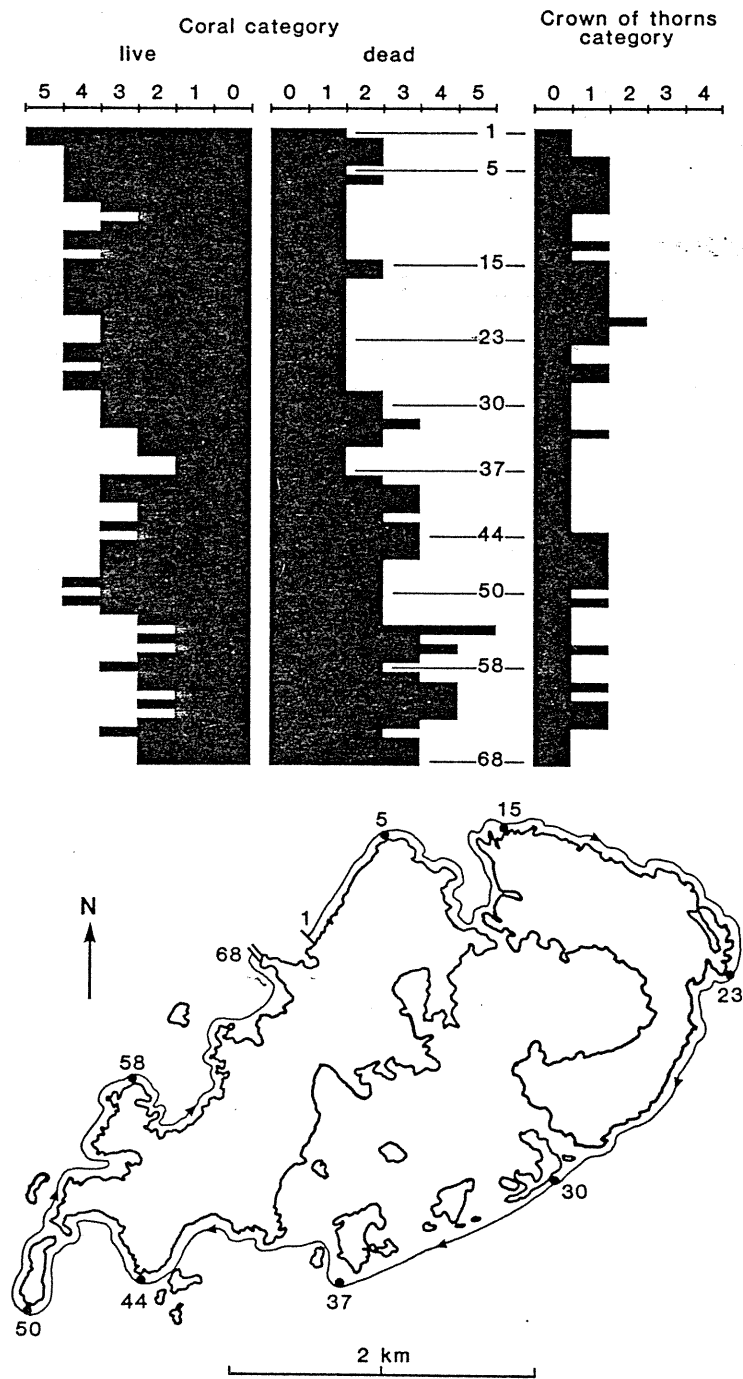


Figure 3b). Relative cover and abundance of life form categories on: Yankee Reef.

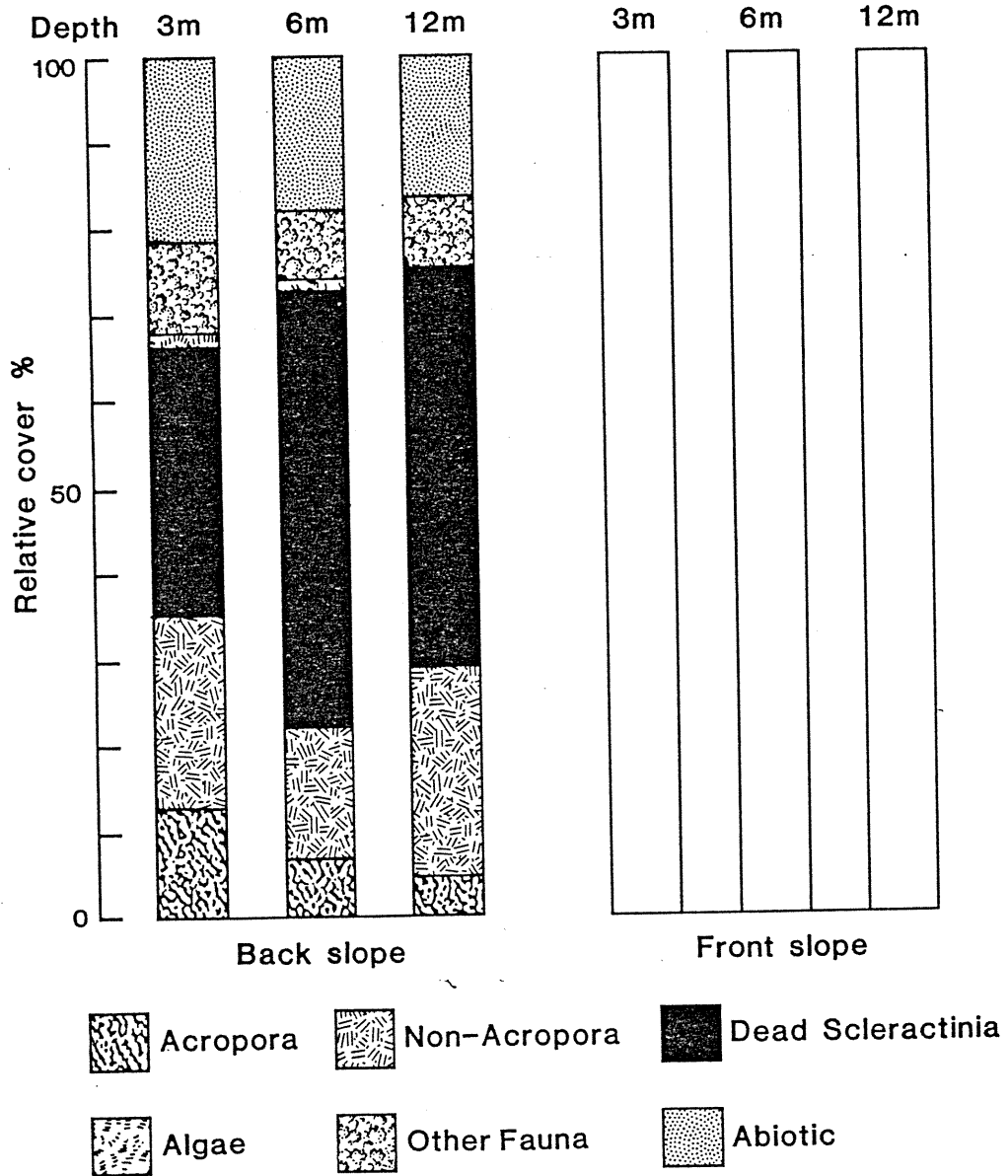


Figure 4a). Tow path, coral cover and A. planci numbers for: Helix Reef.

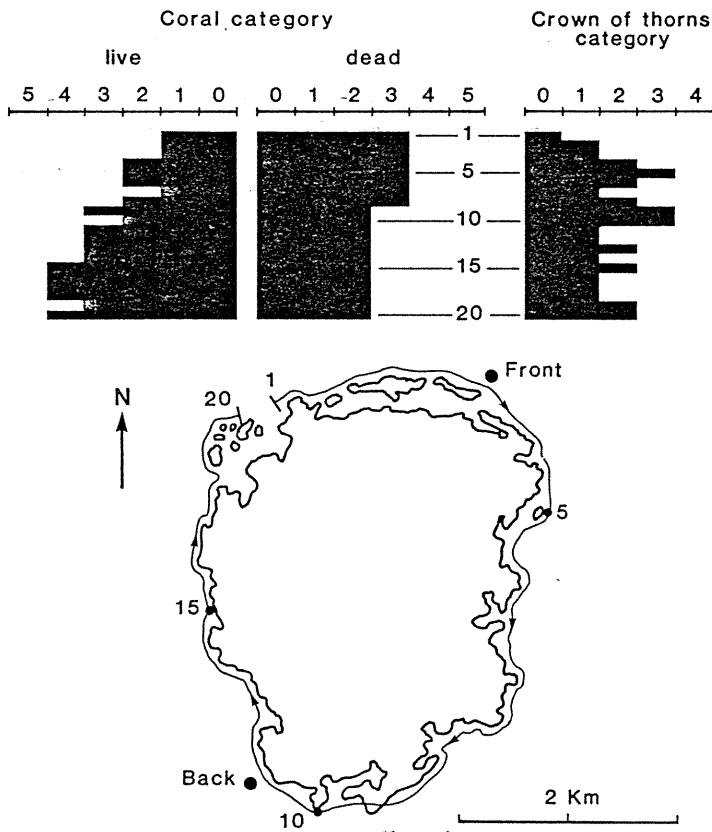






Figure 5a). Tow path, coral cover and *A. planci* numbers for: Grub Reef.

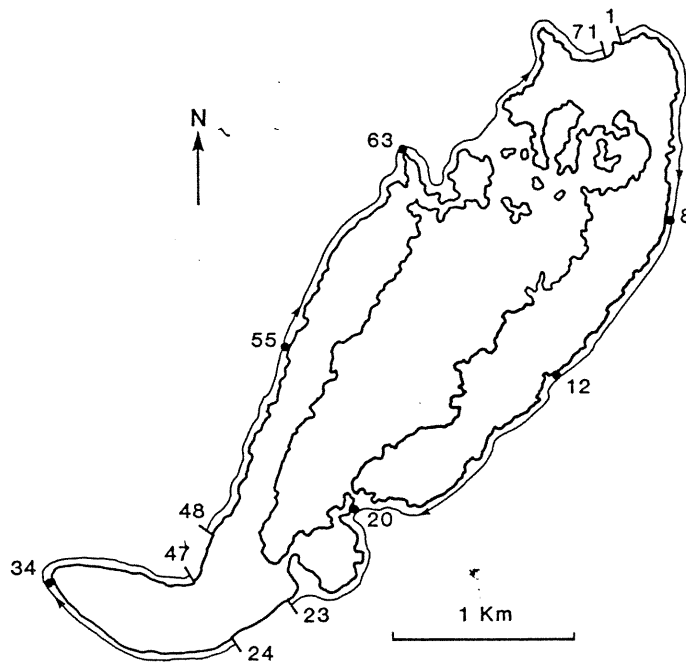
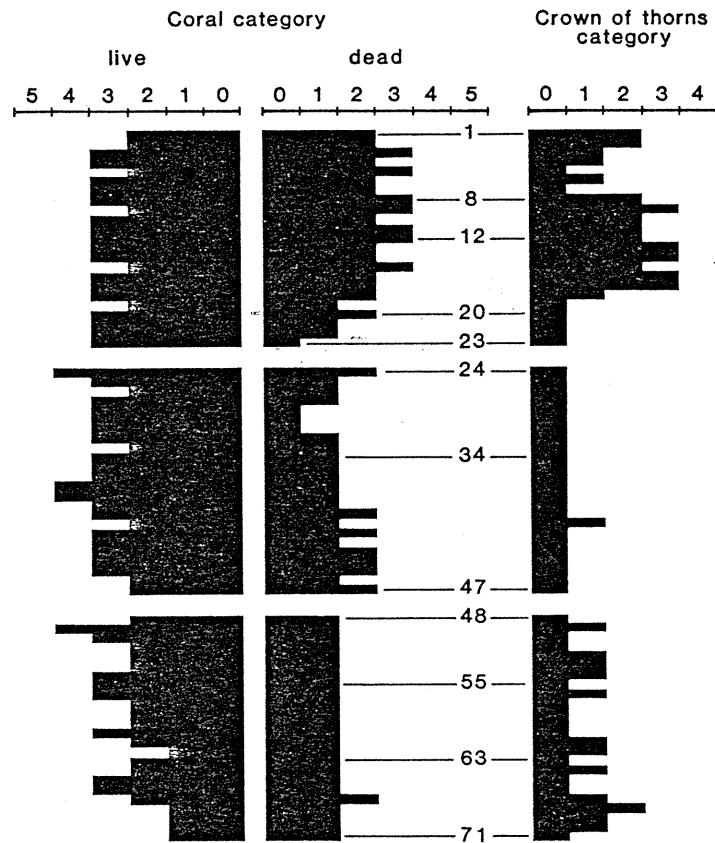


Figure 5b). Relative cover and abundance of life form categories on: Grub Reef.

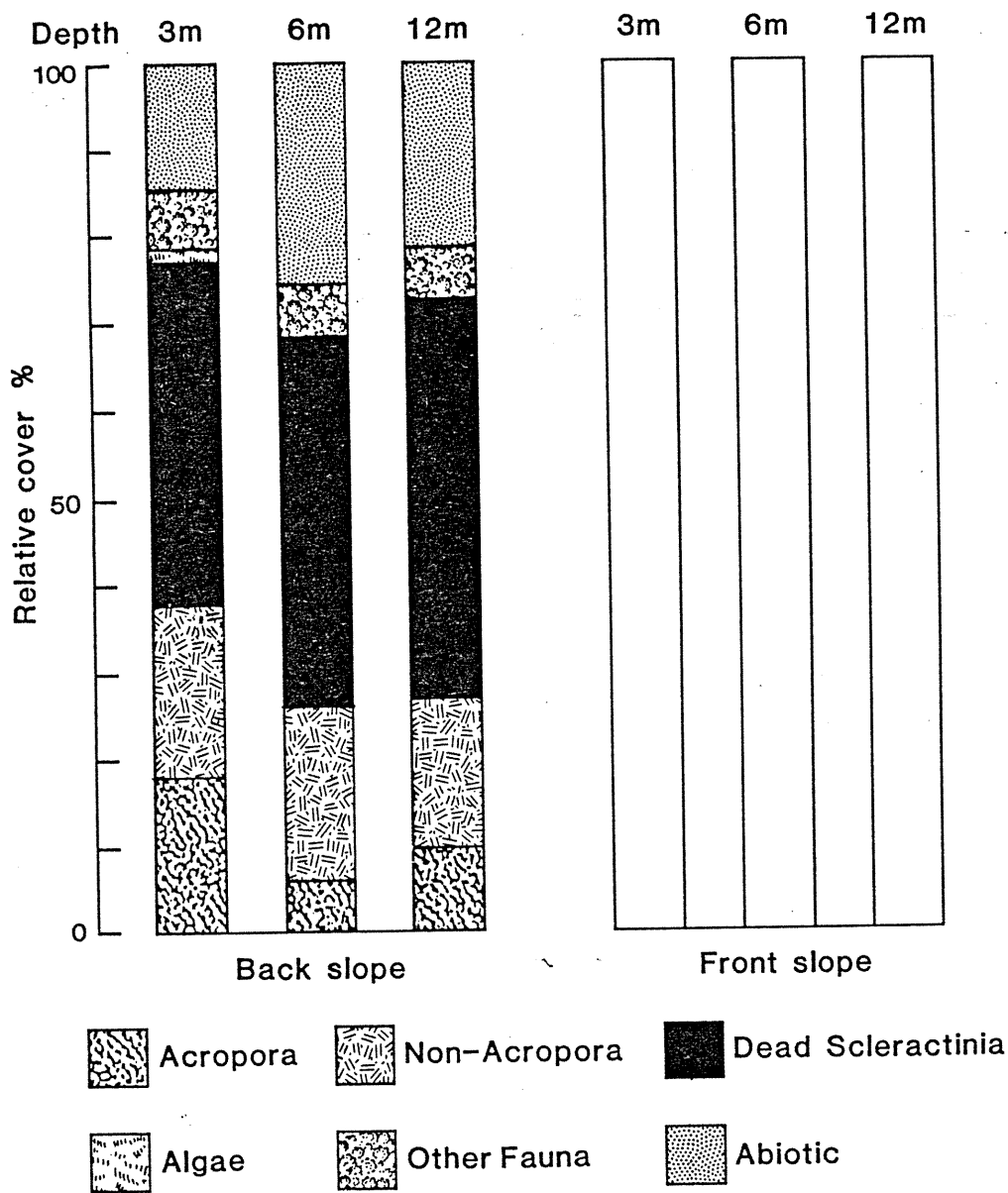


Figure 6a). Tow path, coral cover and *A. planci* numbers for: Wheeler Reef.

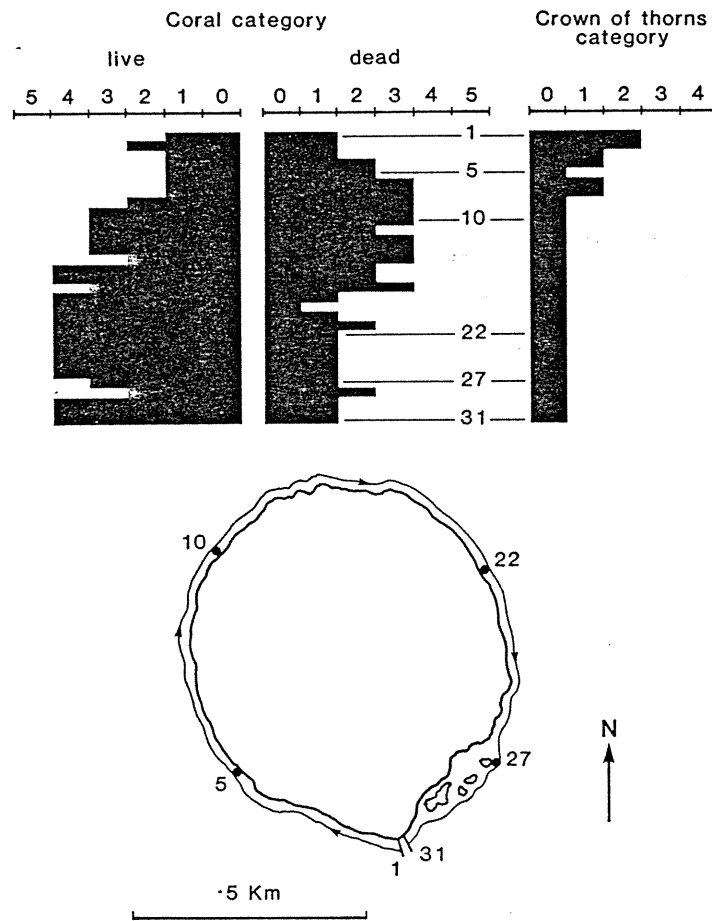


Figure 6b). Relative cover and abundance of life form categories on: Wheeler Reef.

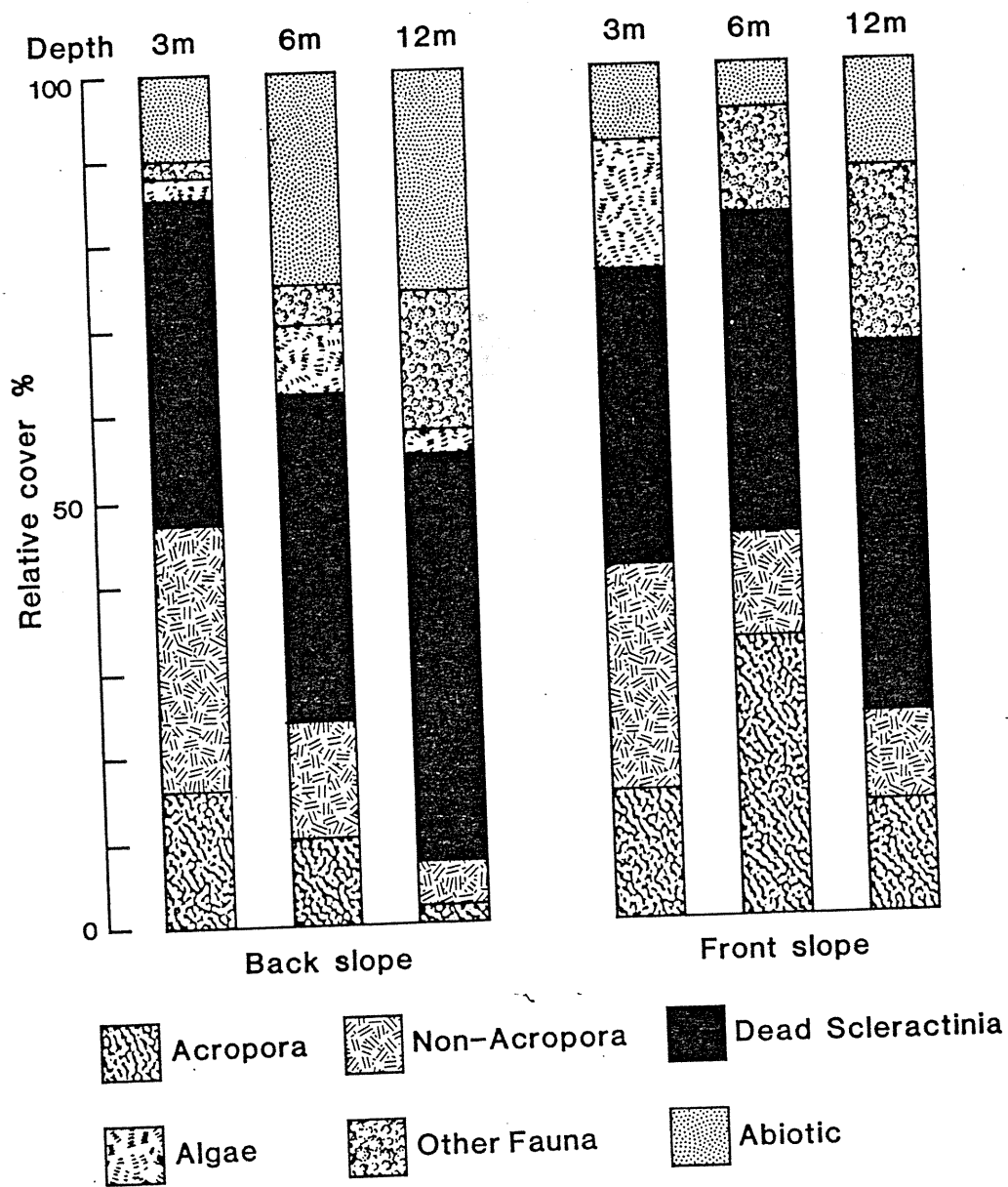
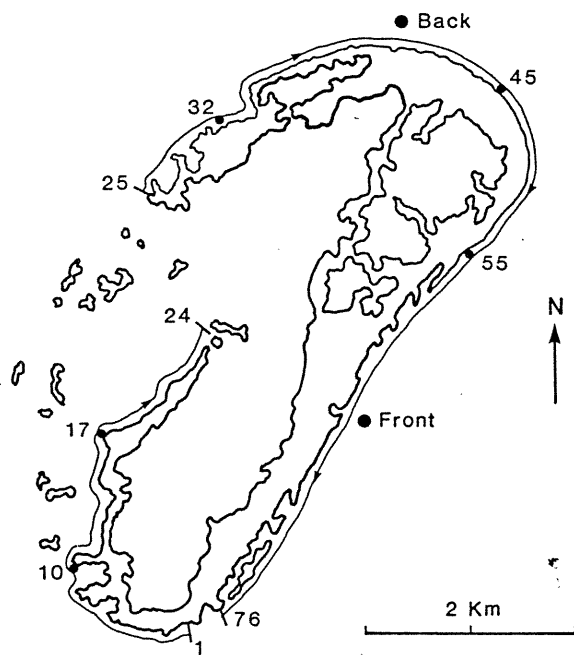
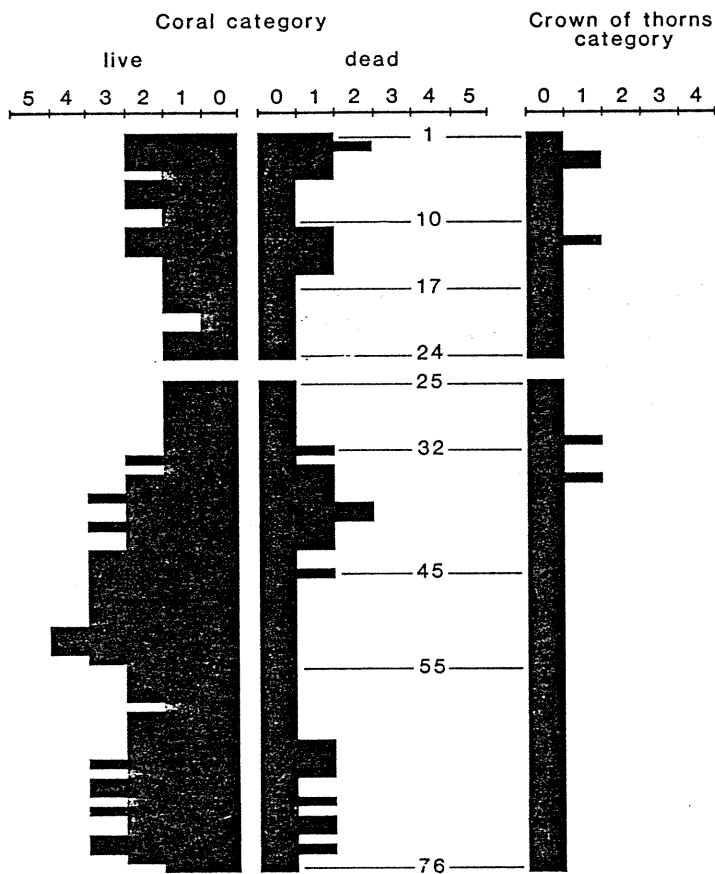


Figure 7a). Tow path, coral cover and A. planci numbers for: Davies Reef.



As.1

Figure 7b). Relative cover and abundance of life form categories on: Davies Reef.

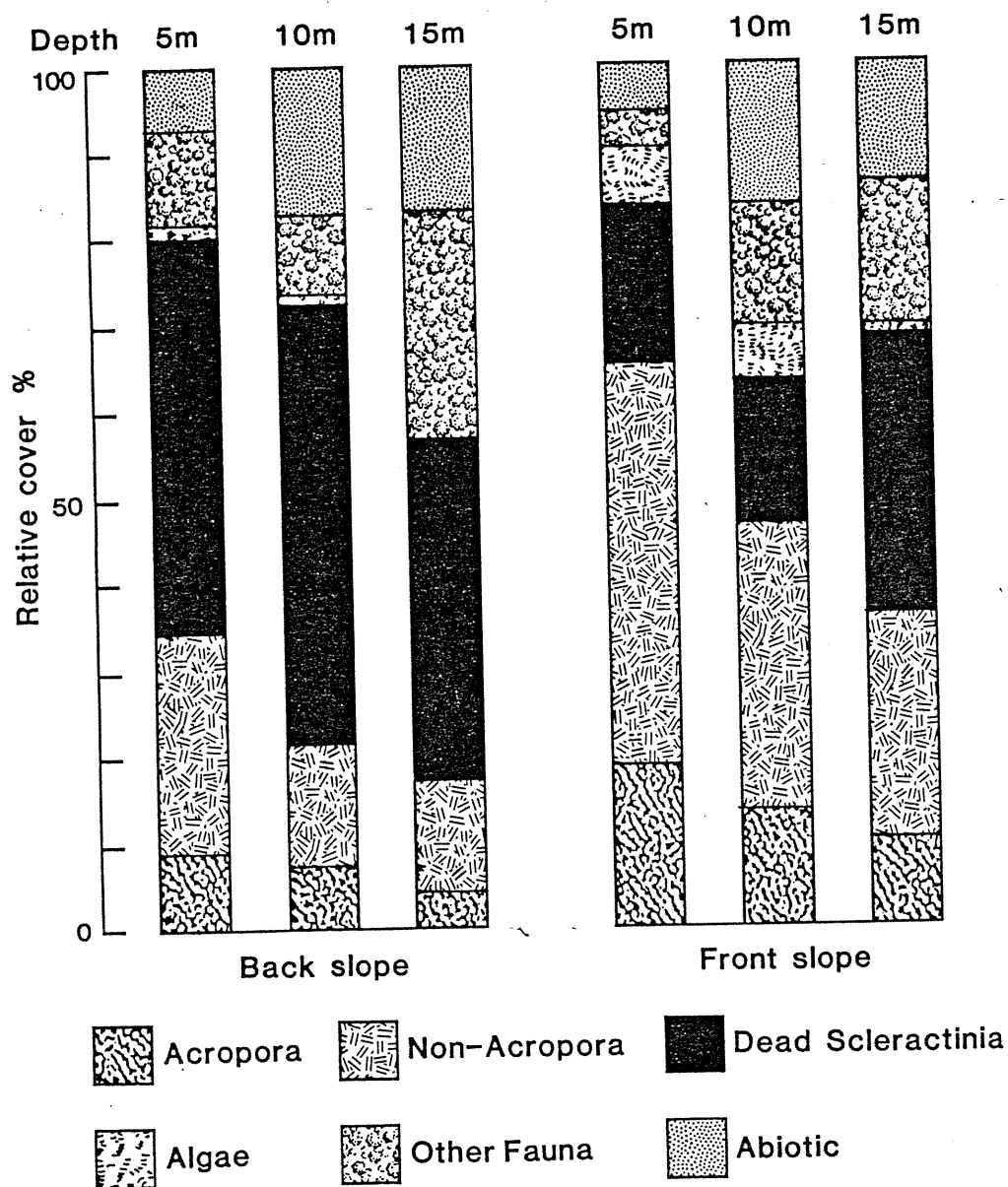


Figure 8. Tow path, coral cover and *A. planci* numbers for: Needle Reef.

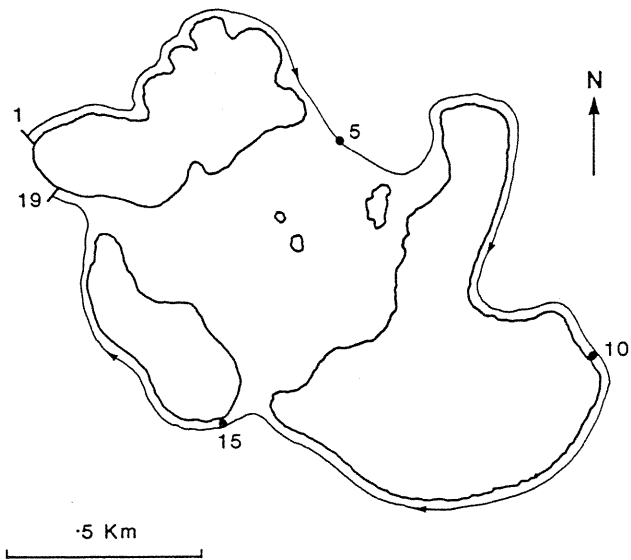
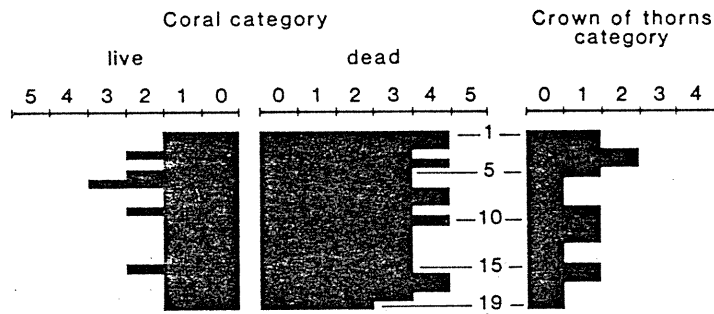


Figure 9. Tow path, coral cover and *A. planci* numbers for: Dip Reef.

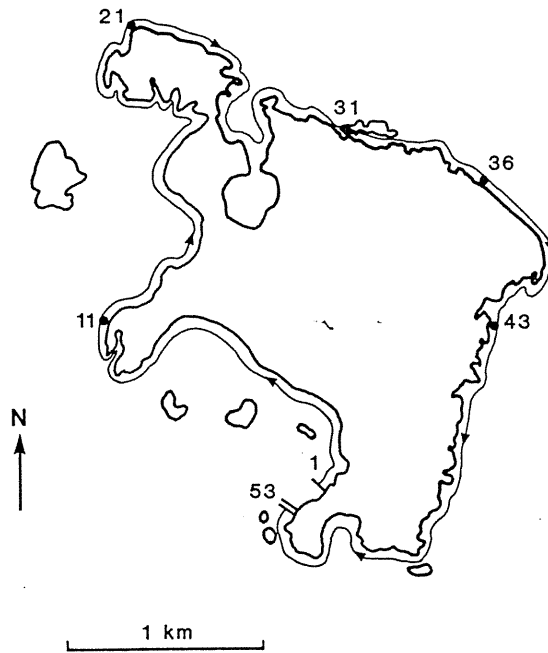
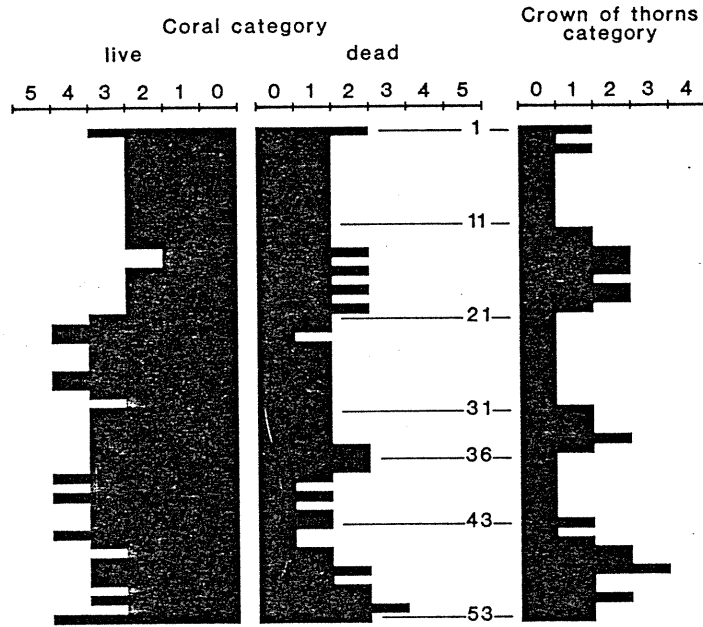




Figure 10. Tow path, coral cover and *A. planci* numbers for: Kelso Reef.

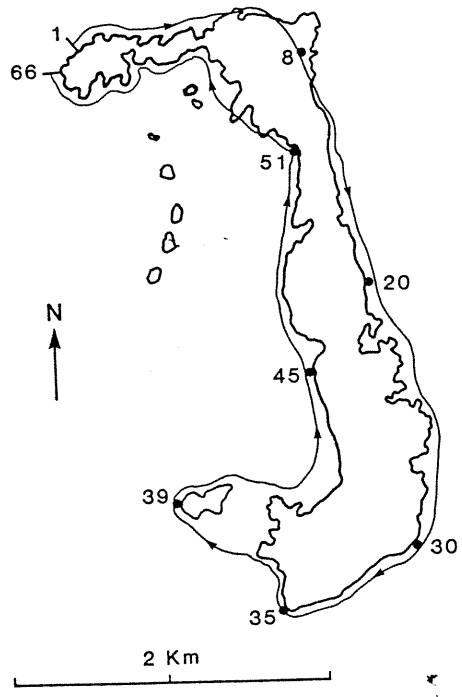
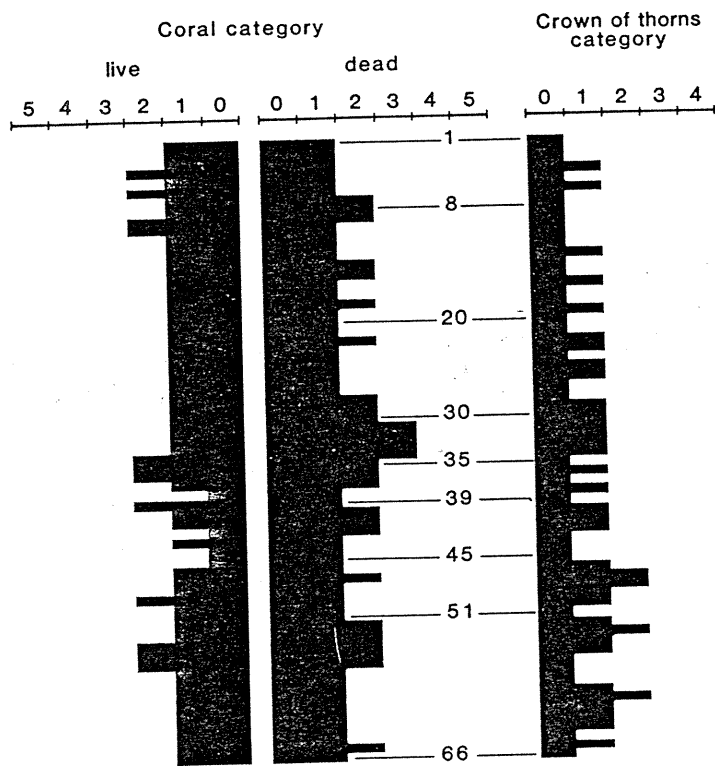


Figure 11. Tow path, coral cover and *A. planci* numbers for: Faraday Reef.

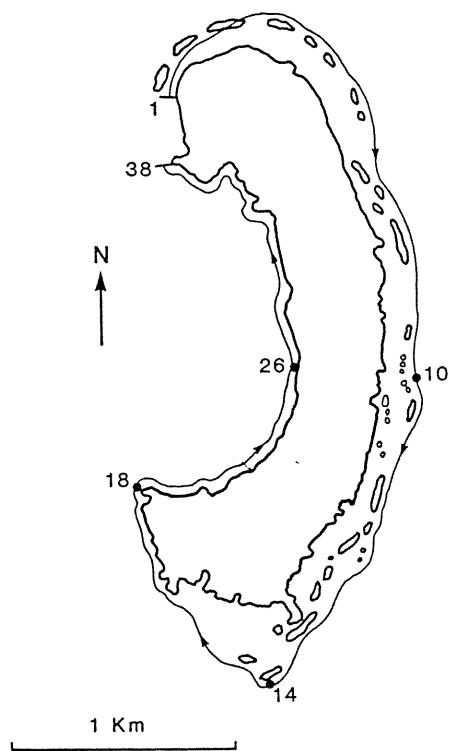
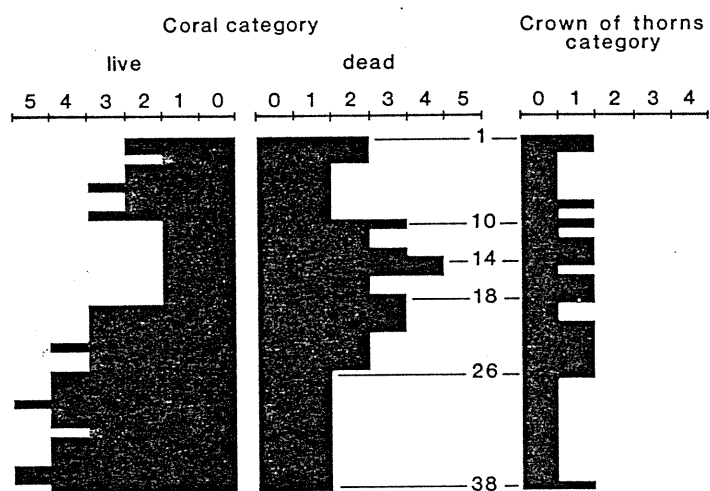


Figure 12. Tow path, coral cover and *A. planci* numbers for: Coil Reef.

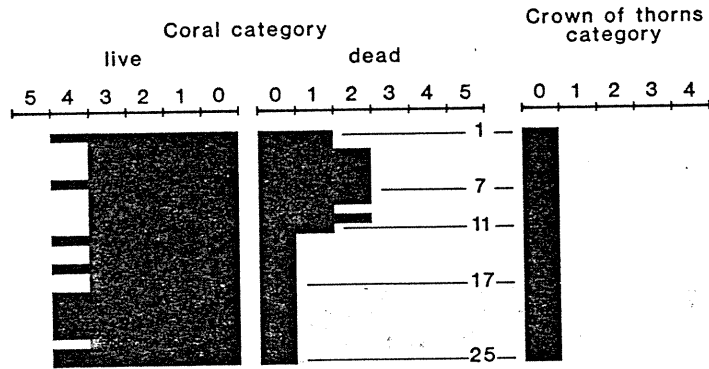


Figure 13. Tow path, coral cover and *A. planci* numbers for: Arc Reef.

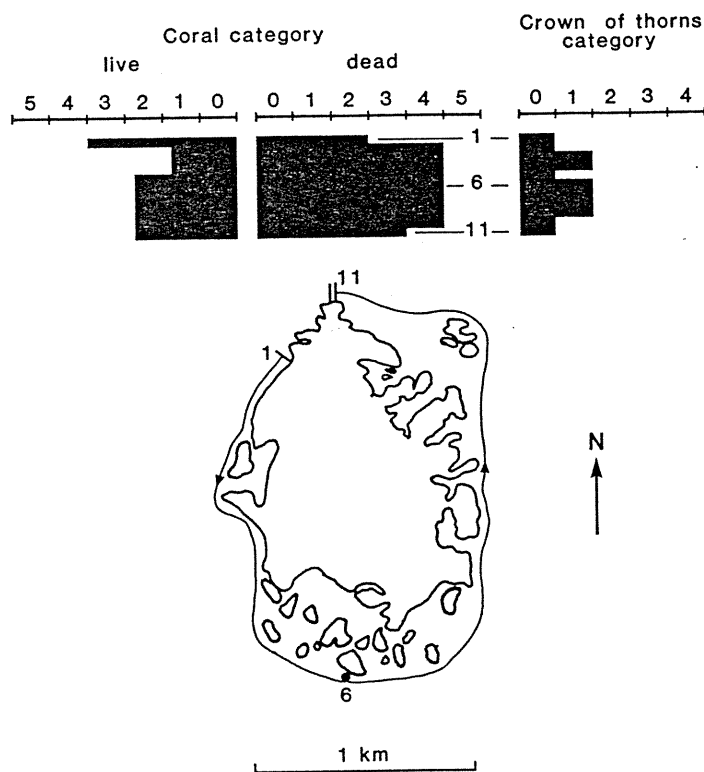


Figure 14. Tow path, coral cover and *A. planci* numbers for: Slashers S.W. Reef.

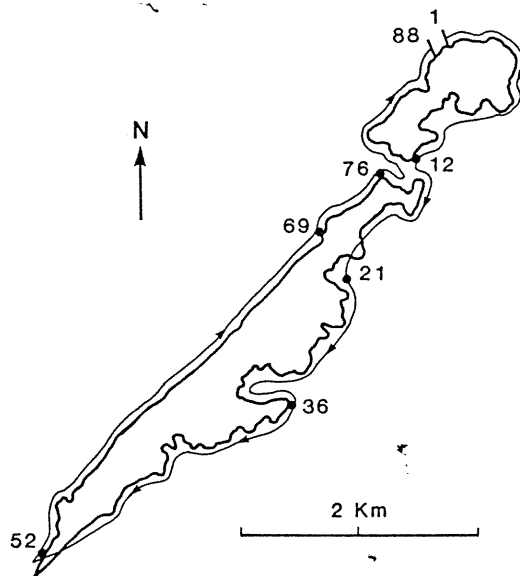
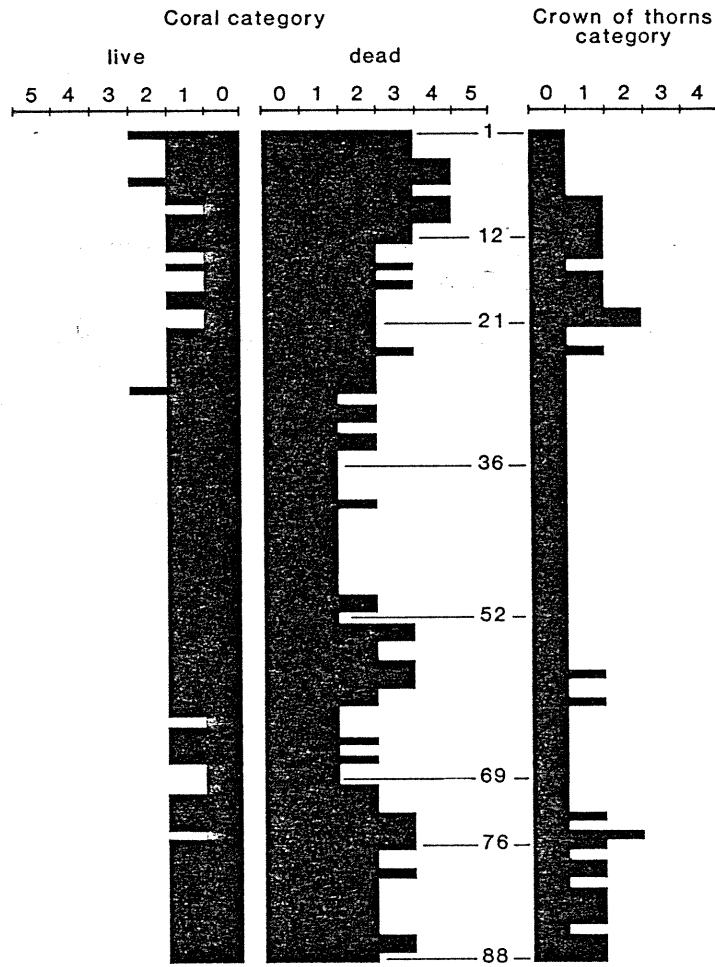


Figure 15. Tow path, coral cover and *A. planci* numbers for: Glow Reef.

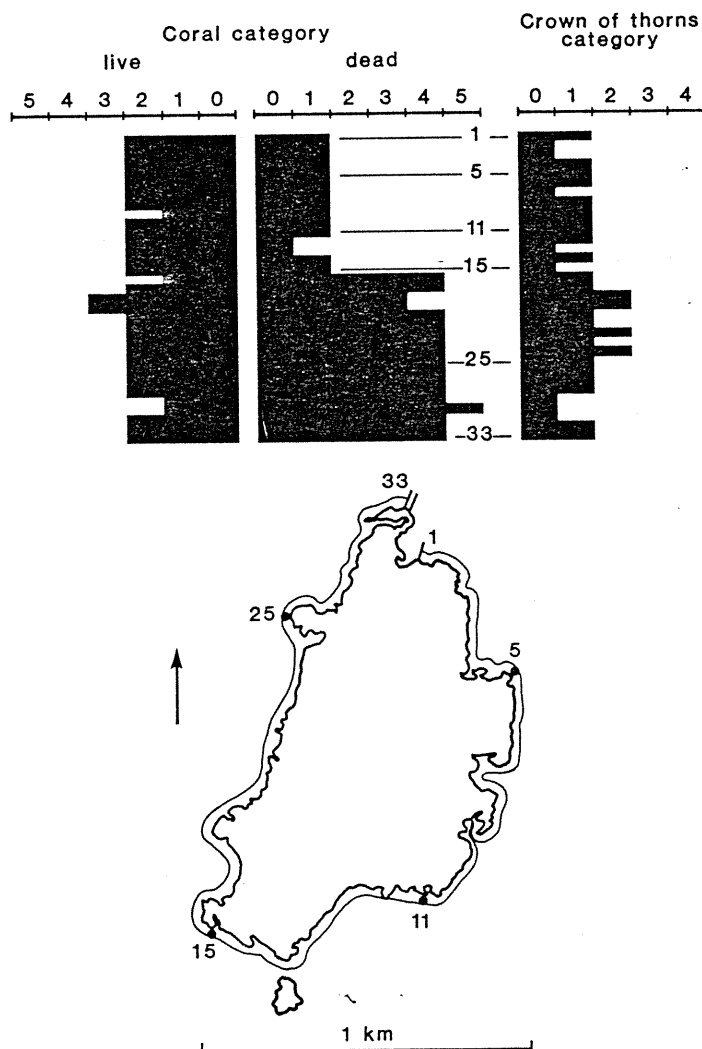


Figure 16. Tow path, coral cover and *A. planci* numbers for: Hopkinson Reef.

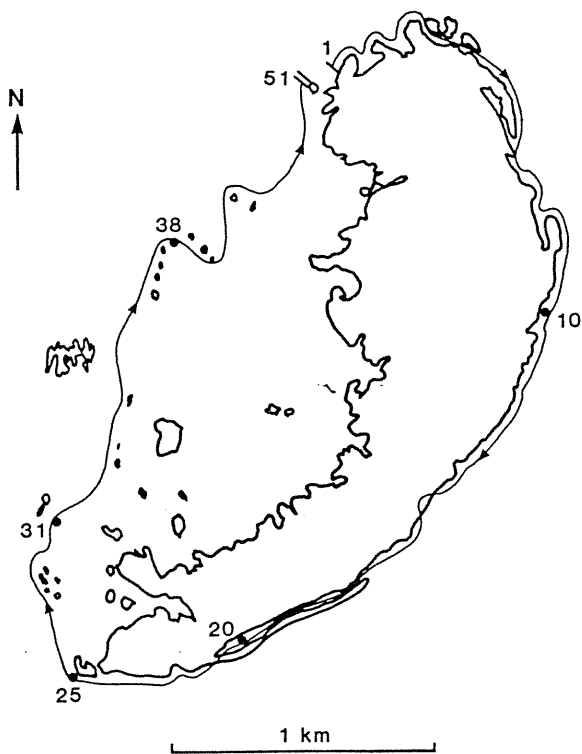
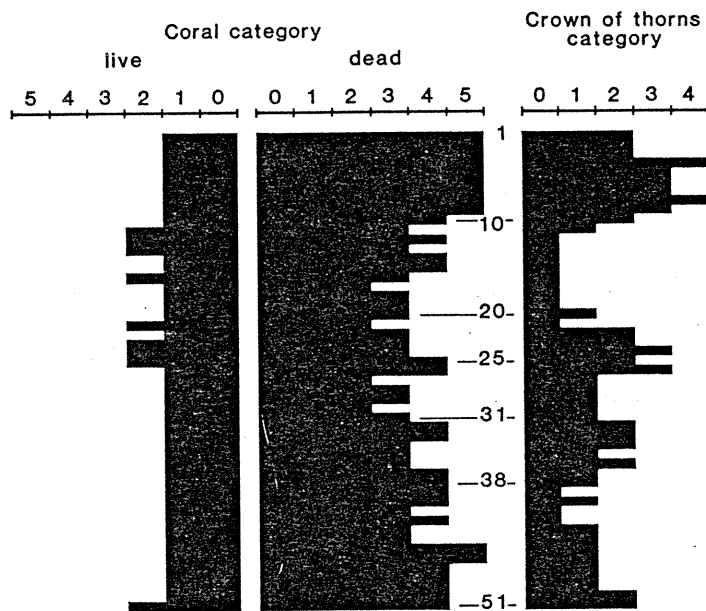


Figure 17. Tow path, coral cover and *A. planci* numbers for: Knife Reef.

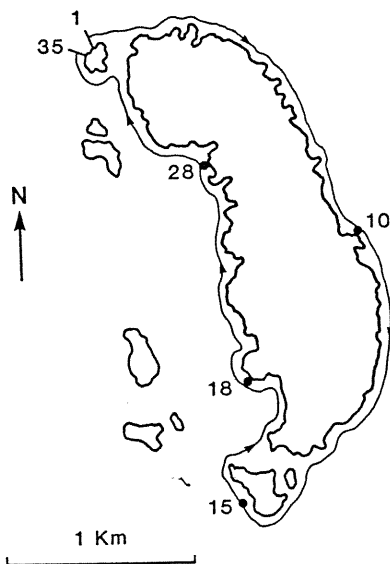
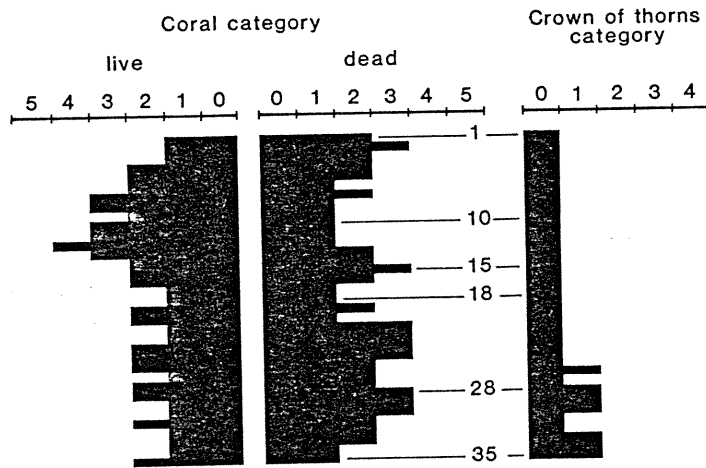




Figure 18. Tow path, coral cover and *A. planci* numbers for: John Brewer Reef.

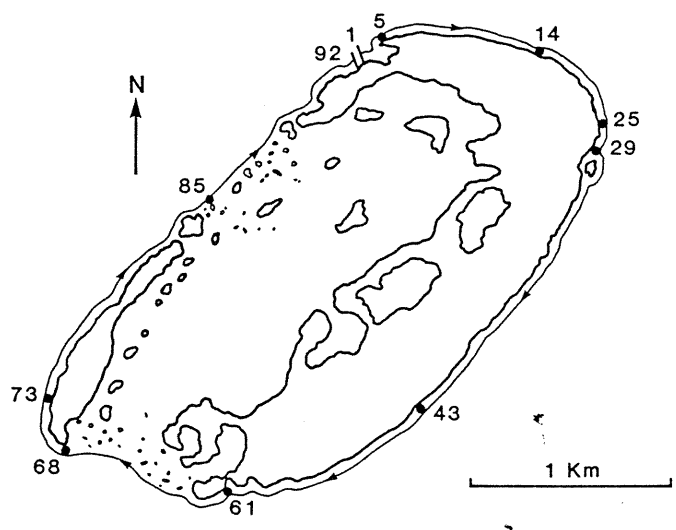
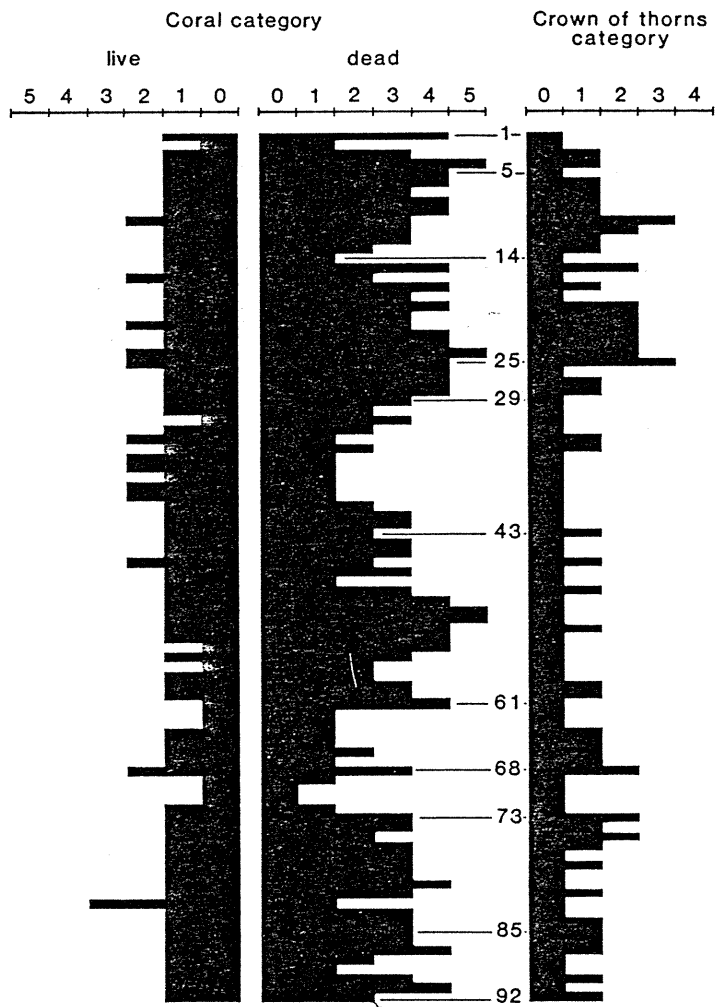


Figure 19. Tow path, coral cover and *A. planci* numbers for: Chicken Reef.

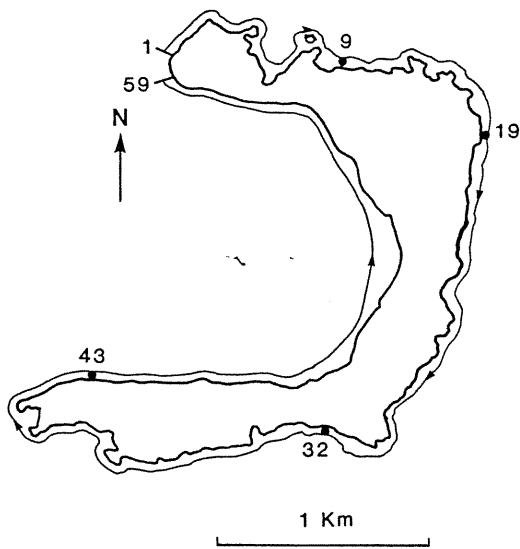
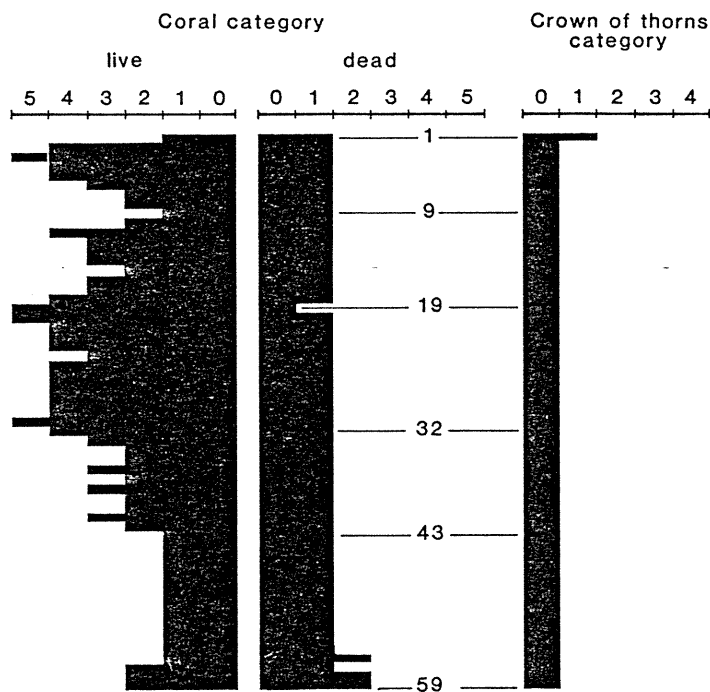


Figure 20. Tow path, coral cover and *A. planci* numbers for: Lodestone Reef.

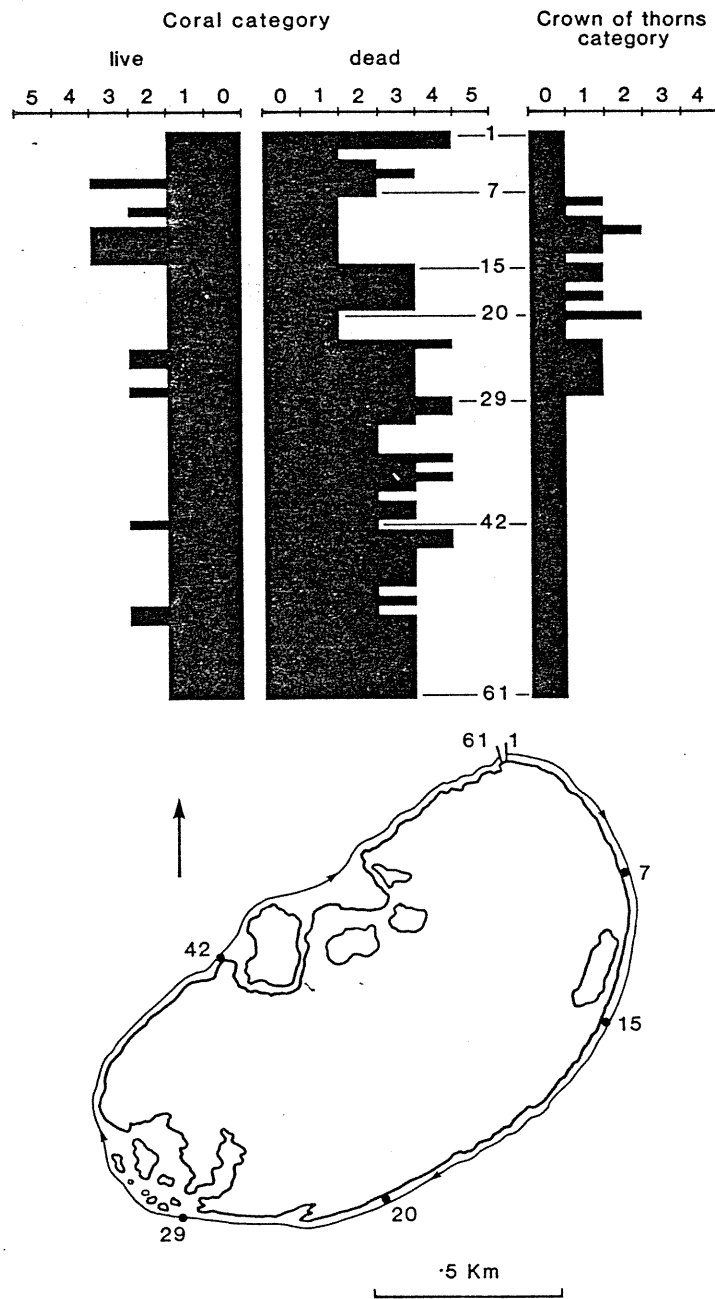


Figure 21. Tow path, coral cover and *A. planci* numbers for: Centipede Reef.

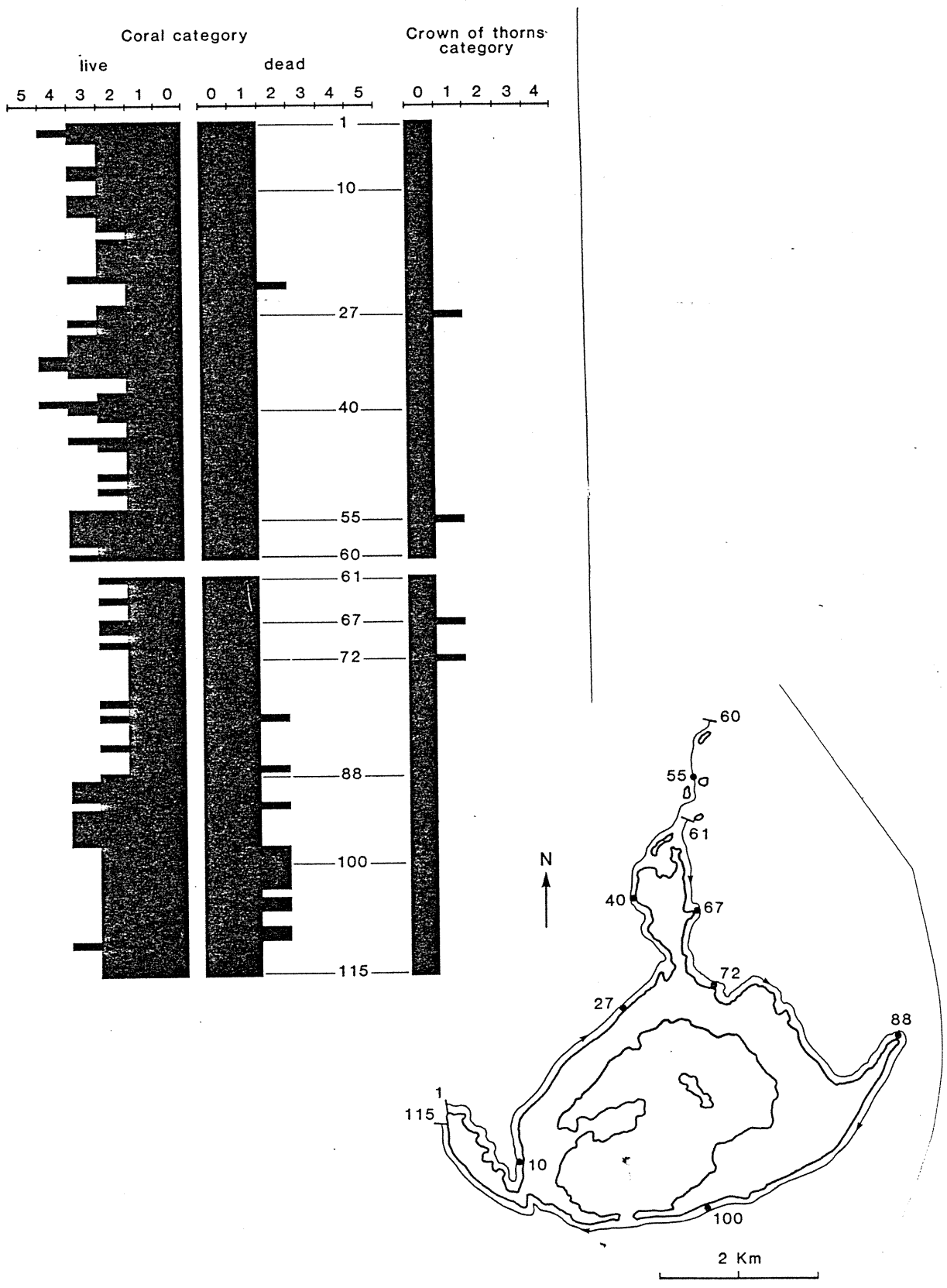


Figure 22. Tow path, coral cover and *A. planci* numbers for: Keeper Reef.

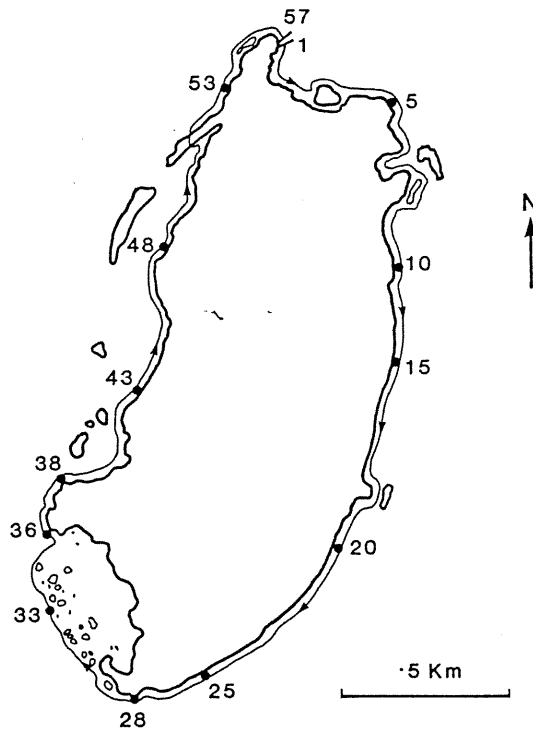
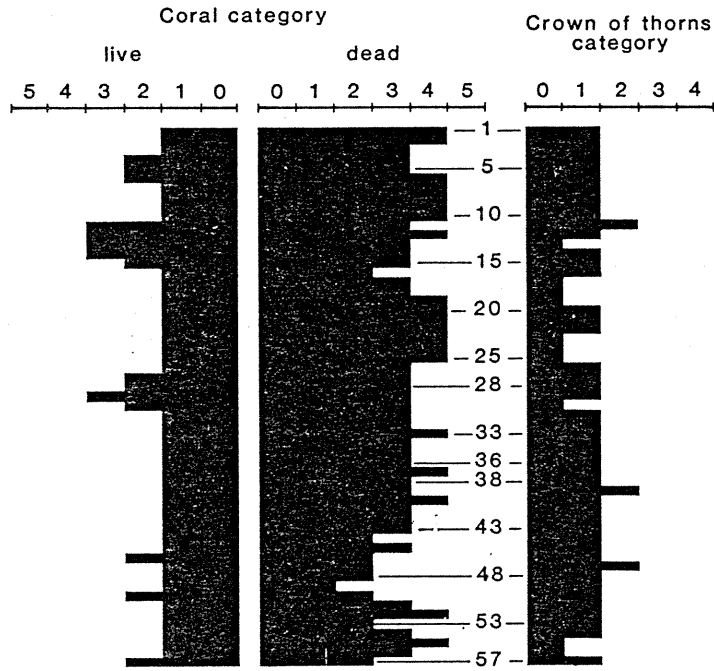


Table 2a). Relative cover and abundance of life form categories on: Bowl Reef:  
front: 5 m depth.

Date Sampled : 05/25/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	22	13.17		
Tabulate	ACT	25	18.37		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				31.54	
<b>Non-Acropora</b>					
Branching	CB	19	6.64		
Massive	CM	16	5.81		
Encrusting	CE	25	9.34		
Submassive	CS	0	0.00		
Foliose	CF	9	3.73		
				25.52	
				57.06	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	40	16.89		
				16.89	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	2	0.56		
Halimeda	HA	1	0.09		
Algal assemblage	AA	1	0.04		
				0.69	
<b>Other Fauna</b>					
Soft Corals	SC	6	1.45		
Sponge	SP	2	0.53		
Other	OT	5	0.56		
				2.54	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	15	22.82		
				22.82	

Table 2b). Relative cover and abundance of life form categories on: Bowl Reef:  
front: 10 m depth.

Date Sampled : 05/26/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	30	14.40		
Tabulate	ACT	4	5.62		
Encrusting	ACE	1	0.22		
Submassive	ACS	0	0.00		
				20.24	
<b>Non-Acropora</b>					
Branching	CB	32	9.15		
Massive	CM	17	4.90		
Encrusting	CE	35	11.08		
Submassive	CS	0	0.00		
Foliose	CF	8	3.59		
				28.72	
				48.96	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	46	24.74		
				24.74	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	0	0.00		
Algal assemblage	AA	6	1.67		
				1.67	
<b>Other Fauna</b>					
Soft Corals	SC	6	0.89		
Sponge	SP	9	12.17		
Other	OT	6	1.46		
				14.52	
<b>Abiotic</b>					
Sand & Rubble	SR	1	0.15		
Water	WA	9	9.96		
				10.11	

Table 2c). Relative cover and abundance of life form categories on: Bowl Reef:  
front: 15 m depth.

Date Sampled : 05/26/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	26	10.41		
Tabulate	ACT	3	1.07		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				11.48	
<b>Non-Acropora</b>					
Branching	CB	39	18.78		
Massive	CM	7	2.96		
Encrusting	CE	35	15.76		
Submassive	CS	2	0.49		
Foliose	CF	5	3.31		
				41.30	
				52.78	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	48	23.66		
				23.66	
<b>Algae</b>					
Macro	MA	1	0.21		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	0	0.00		
Algal assemblage	AA	1	0.17		
				0.38	
<b>Other Fauna</b>					
Soft Corals	SC	3	0.46		
Sponge	SP	7	2.36		
Other	OT	3	0.38		
				3.20	
<b>Abiotic</b>					
Sand & Rubble	SR	1	0.08		
Water	WA	16	19.90		
				19.98	



Table 2d). Relative cover and abundance of life form categories on: Bowl Reef:  
back: 5 m depth.

Date Sampled : 05/26/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
Acropora				
Branching	ACB	23	9.80	
Tabulate	ACT	10	4.47	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	
				14.27
Non-Acropora				
Branching	CB	23	4.50	
Massive	CM	15	4.48	
Encrusting	CE	18	5.34	
Submassive	CS	0	0.00	
Foliose	CF	4	0.67	
				14.99
				29.26
<b>Dead Scleractinia</b>				
(recent)	DC	0	0.00	
(algal covering)	DCA	70	55.06	
				55.06
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	0	0.00	
Halimeda	HA	0	0.00	
Algal assemblage	AA	2	0.28	
				0.28
<b>Other Fauna</b>				
Soft Corals	SC	12	3.69	
Sponge	SP	8	1.59	
Other	OT	5	1.22	
				6.50
<b>Abiotic</b>				
Sand & Rubble	SR	0	0.00	
Water	WA	16	8.90	
				8.90

Table 2e). Relative cover and abundance of life form categories on: Bowl Reef:  
back: 10 m depth.

Date Sampled : 05/26/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number Occurrences	of Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	22	6.79		
Tabulate	ACT	7	2.15		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				8.94	
<b>Non-Acropora</b>					
Branching	CB	41	16.52		
Massive	CM	4	0.60		
Encrusting	CE	25	6.22		
Submassive	CS	2	1.66		
Foliose	CF	3	1.02		
				26.02	
				34.96	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	52	32.63		
				32.63	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	3	1.89		
Halimeda	HA	0	0.00		
Algal assemblage	AA	2	0.27		
				2.16	
<b>Other Fauna</b>					
Soft Corals	SC	7	1.15		
Sponge	SP	11	3.89		
Other	OT	8	1.20		
				6.24	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	24	24.01		
				24.01	

Table 2f). Relative cover and abundance of life form categories on: Bowl Reef:  
back: 15 m depth.

Date Sampled : 05/26/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	4	0.97		
Tabulate	ACT	2	0.46		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				1.43	
<b>Non-Acropora</b>					
Branching	CB	19	7.66		
Massive	CM	12	4.80		
Encrusting	CE	23	8.27		
Submassive	CS	4	1.53		
Foliose	CF	4	2.48		
				24.74	
				26.17	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	58	36.40		
				36.40	
<b>Algae</b>					
Macro	MA	1	0.34		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	1	0.12		
Algal assemblage	AA	3	0.76		
				1.22	
<b>Other Fauna</b>					
Soft Corals	SC	15	3.35		
Sponge	SP	5	1.14		
Other	OT	2	0.49		
				4.98	
<b>Abiotic</b>					
Sand & Rubble	SR	23	23.12		
Water	WA	11	8.11		
				31.23	

Table 3a). Relative cover and abundance of life form categories on: Yankee Reef: back: 3 m depth.

Date Sampled : 05/27/85

Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	20	6.72	
Tabulate	ACT	9	6.27	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	12.99
<b>Non-Acropora</b>				
Branching	CB	14	3.61	
Massive	CM	18	6.51	
Encrusting	CE	15	8.69	
Submassive	CS	2	2.65	
Foliose	CF	0	0.00	21.46
				34.45
<b>Dead Scleractinia</b>				
(recent)	DC	2	0.56	
(algal covering)	DCA	58	30.08	30.64
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	1	0.23	
Halimeda	HA	1	0.12	
Algal assemblage	AA	1	1.44	1.79
<b>Other Fauna</b>				
Soft Corals	SC	14	8.42	
Sponge	SP	8	1.97	
Other	OT	5	0.39	10.78
<b>Abiotic</b>				
Sand & Rubble	SR	0	0.00	
Water	WA	23	22.34	22.34

Table 3b). Relative cover and abundance of life form categories on: Yankee Reef: back: 6 m depth.

Date Sampled : 05/27/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	13	5.34		
Tabulate	ACT	4	1.57		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				6.91	
<b>Non-Acropora</b>					
Branching	CB	30	6.43		
Massive	CM	23	4.85		
Encrusting	CE	9	0.98		
Submassive	CS	9	3.09		
Foliose	CF	2	0.19		
				15.54	
				22.45	
<b>Dead Scleractinia</b>					
(recent)	DC	1	0.12		
(algal covering)	DCA	83	51.01		
				51.13	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	1	0.33		
Algal assemblage	AA	0	0.00		
				0.33	
<b>Other Fauna</b>					
Soft Corals	SC	25	7.12		
Sponge	SP	5	0.47		
Other	OT	3	0.20		
				7.79	
<b>Abiotic</b>					
Sand & Rubble	SR	1	0.20		
Water	WA	13	18.10		
				18.30	

Table 3c). Relative cover and abundance of life form categories on: Yankee Reef: back: 12 m depth.

Date Sampled : 05/27/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	8	5.01		
Tabulate	ACT	0	0.00		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00	5.01	
<b>Non-Acropora</b>					
Branching	CB	36	15.88		
Massive	CM	10	1.43		
Encrusting	CE	25	4.57		
Submassive	CS	4	1.62		
Foliose	CF	2	0.57	24.07	
				29.08	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	69	46.09	46.09	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	0	0.00		
Algal assemblage	AA	0	0.00	0.00	
<b>Other Fauna</b>					
Soft Corals	SC	13	5.15		
Sponge	SP	7	0.99		
Other	OT	5	2.18	8.32	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	19	16.51	16.51	

Table 4a). Relative cover and abundance of life form categories on: Helix Reef:  
front: 3 m depth.

Date Sampled : 05/28/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
Acropora					
Branching	ACB	19	11.99		
Tabulate	ACT	26	28.89		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				40.88	
Non-Acropora					
Branching	CB	18	11.49		
Massive	CM	4	0.99		
Encrusting	CE	10	5.03		
Submassive	CS	1	0.09		
Foliose	CF	2	1.12		
				18.72	
				59.60	
<b>Dead Scleractinia</b>					
(recent)	DC	2	0.51		
(algal covering)	DCA	41	26.98		
				27.49	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	1	0.50		
Coralline	CA	9	3.99		
Halimeda	HA	0	0.00		
Algal assemblage	AA	0	0.00		
				4.49	
<b>Other Fauna</b>					
Soft Corals	SC	3	1.76		
Sponge	SP	0	0.00		
Other	OT	2	0.86		
				2.62	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	11	5.80		
				5.80	

Table 4b). Relative cover and abundance of life form categories on: Helix Reef:  
front: 6 m depth.

Date Sampled : 05/28/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	22	10.38	
Tabulate	ACT	16	6.70	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	17.08
<b>Non-Acropora</b>				
Branching	CB	24	14.13	
Massive	CM	3	2.06	
Encrusting	CE	9	2.97	
Submassive	CS	1	0.11	
Foliose	CF	0	0.00	19.27
				36.35
<b>Dead Scleractinia</b>				
(recent)	DC	10	7.74	
(algal covering)	DCA	46	33.90	41.64
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	1	0.25	
Halimeda	HA	0	0.00	
Algal assemblage	AA	0	0.00	0.25
<b>Other Fauna</b>				
Soft Corals	SC	5	2.80	
Sponge	SP	0	0.00	
Other	OT	4	1.22	4.02
<b>Abiotic</b>				
Sand & Rubble	SR	11	6.93	
Water	WA	4	10.81	17.74



Table 4c). Relative cover and abundance of life form categories on: Helix Reef:  
back: 3 m depth.

Date Sampled : 05/28/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	4	2.41	
Tabulate	ACT	0	0.00	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	
				2.41
<b>Non-Acropora</b>				
Branching	CB	4	2.36	
Massive	CM	1	0.10	
Encrusting	CE	13	3.84	
Submassive	CS	0	0.00	
Foliose	CF	1	0.24	
				6.54
				8.95
<b>Dead Scleractinia</b>				
(recent)	DC	4	0.47	
(algal covering)	DCA	62	56.73	
				57.20
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	6	1.27	
Coralline	CA	15	3.90	
Halimeda	HA	17	4.40	
Algal assemblage	AA	12	5.05	
				14.62
<b>Other Fauna</b>				
Soft Corals	SC	11	2.85	
Sponge	SP	8	1.39	
Other	OT	1	0.17	
				4.41
<b>Abiotic</b>				
Sand & Rubble	SR	0	0.00	
Water	WA	10	14.82	
				14.82

Table 4d). Relative cover and abundance of life form categories on: Helix Reef:  
back: 6 m depth.

Date Sampled : 05/28/85      Transect length sampled : 100 metres

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Benthic Life Form	Code	Number Occurrences	of	Percent Cover	Category Totals
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	2		0.79	
Tabulate	ACT	0		0.00	
Encrusting	ACE	0		0.00	
Submassive	ACS	0		0.00	0.79
<b>Non-Acropora</b>					
Branching	CB	3		0.75	
Massive	CM	3		0.28	
Encrusting	CE	4		0.71	
Submassive	CS	1		0.07	
Foliose	CF	1		0.06	1.87
					2.66
<b>Dead Scleractinia</b>					
(recent)	DC	3		0.72	
(algal covering)	DCA	43		58.33	59.05
<b>Algae</b>					
Macro	MA	0		0.00	
Turf	TA	0		0.00	
Coralline	CA	1		0.10	
Halimeda	HA	35		20.86	
Algal assemblage	AA	4		3.13	24.09
<b>Other Fauna</b>					
Soft Corals	SC	6		1.46	
Sponge	SP	3		0.71	
Other	OT	1		0.52	2.69
<b>Abiotic</b>					
Sand & Rubble	SR	0		0.00	
Water	WA	4		11.51	11.51

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Table 4e). Relative cover and abundance of life form categories on: Helix Reef:  
back: 12 m depth.

Date Sampled : 05/28/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number Occurrences	of Percent Cover	Category Totals	
<b>Scleractinia</b>					
Acropora					
Branching	ACB	3	2.55		
Tabulate	ACT	0	0.00		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00	2.55	
Non-Acropora					
Branching	CB	1	0.16		
Massive	CM	0	0.00		
Encrusting	CE	5	0.78		
Submassive	CS	1	0.02		
Foliose	CF	0	0.00	0.96	
				3.51	
Dead Scleractinia					
(recent)	DC	0	0.00		
(algal covering)	DCA	44	78.95	78.95	
Algae					
Macro	MA	3	0.70		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	20	5.95		
Algal assemblage	AA	0	0.00	6.65	
Other Fauna					
Soft Corals	SC	5	1.26		
Sponge	SP	1	0.18		
Other	OT	5	1.63	3.07	
Abiotic					
Sand & Rubble	SR	3	2.24		
Water	WA	4	5.58	7.82	

Table 5a). Relative cover and abundance of life form categories on: Grub Reef:  
back: 3 m depth.

Date Sampled : 05/28/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number Occurrences	of Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	24	11.61		
Tabulate	ACT	12	5.45		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				17.06	
<b>Non-Acropora</b>					
Branching	CB	34	6.59		
Massive	CA	25	7.08		
Encrusting	CE	22	4.64		
Submassive	CS	5	1.07		
Foliose	CF	4	0.85		
				20.23	
				37.29	
<b>Dead Scleractinia</b>					
(recent)	DC	3	0.83		
(algal covering)	DCA	79	38.65		
				39.48	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	1	0.24		
Coralline	CA	2	0.43		
Halimeda	HA	0	0.00		
Algal assemblage	AA	2	1.17		
				1.84	
<b>Other Fauna</b>					
Soft Corals	SC	7	4.96		
Sponge	SP	7	0.60		
Other	OT	7	1.51		
				7.07	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	18	14.32		
				14.32	

Table 5b). Relative cover and abundance of life form categories on: Grub Reef:  
back: 6 m depth.

Date Sampled : 05/28/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	7	3.04		
Tabulate	ACT	6	1.95		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				4.99	
<b>Non-Acropora</b>					
Branching	CB	25	5.82		
Massive	CM	13	5.07		
Encrusting	CE	26	8.62		
Submassive	CS	1	0.08		
Foliose	CF	3	0.62		
				20.21	
				25.20	
<b>Dead Scleractinia</b>					
(recent)	DC	4	1.58		
(algal covering)	DCA	55	41.92		
				43.50	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	2	0.24		
Algal assemblage	AA	0	0.00		
				0.24	
<b>Other Fauna</b>					
Soft Corals	SC	2	2.68		
Sponge	SP	7	1.77		
Other	OT	7	1.58		
				6.03	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	21	25.03		
				25.03	

Table 5c). Relative cover and abundance of life form categories on: Grub Reef:  
back: 12 m depth.

Date Sampled : 05/28/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	15	5.92	
Tabulate	ACT	4	3.00	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	8.92
<b>Non-Acropora</b>				
Branching	CB	17	8.55	
Massive	CM	5	1.68	
Encrusting	CE	16	4.97	
Submassive	CS	4	1.92	
Foliose	CF	2	0.46	17.58
				26.50
<b>Dead Scleractinia</b>				
(recent)	DC	5	5.96	
(algal covering)	DCA	57	40.88	46.84
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	0	0.00	
Halimeda	HA	0	0.00	
Algal assemblage	AA	1	0.07	0.07
<b>Other Fauna</b>				
Soft Corals	SC	8	3.37	
Sponge	SP	6	1.06	
Other	OT	4	1.79	6.22
<b>Abiotic</b>				
Sand & Rubble	SR	14	9.76	
Water	WA	9	10.61	20.37

Table 6a). Relative cover and abundance of life form categories on: Wheeler Reef: front: 3 m depth.

Date Sampled : 05/23/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	20	11.06	
Tabulate	ACT	4	2.07	
Encrusting	ACE	4	2.00	
Submassive	ACS	0	0.00	15.13
<b>Non-Acropora</b>				
Branching	CB	19	4.89	
Massive	CM	7	3.29	
Encrusting	CE	30	10.24	
Submassive	CS	2	0.54	
Foliose	CF	12	7.00	25.96
				41.09
<b>Dead Scleractinia</b>				
(recent)	DC	0	0.00	
(algal covering)	DCA	80	34.07	34.07
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	1	0.12	
Coralline	CA	5	2.47	
Halimeda	HA	40	10.19	
Algal assemblage	AA	5	2.43	15.21
<b>Other Fauna</b>				
Soft Corals	SC	2	0.43	
Sponge	SP	2	0.45	
Other	OT	0	0.00	0.88
<b>Abiotic</b>				
Sand & Rubble	SR	1	1.46	
Water	WA	10	7.29	8.75

Table 6b). Relative cover and abundance of life form categories on: Wheeler  
Reef: front: 6 m depth.

Date Sampled : 05/23/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	27	31.77	
Tabulate	ACT	2	0.36	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	
				32.13
<b>Non-Acropora</b>				
Branching	CB	8	1.71	
Massive	CM	5	1.37	
Encrusting	CE	8	4.19	
Submassive	CS	5	1.72	
Foliose	CF	5	2.84	
				11.83
				43.96
<b>Dead Scleractinia</b>				
(recent)	DC	0	0.00	
(algal covering)	DCA	46	37.30	
				37.30
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	0	0.00	
Halimeda	HA	0	0.00	
Algal assemblage	AA	1	0.32	
				0.32
<b>Other Fauna</b>				
Soft Corals	SC	27	11.94	
Sponge	SP	3	0.41	
Other	OT	1	0.21	
				12.56
<b>Abiotic</b>				
Sand & Rubble	SR	0	0.00	
Water	WA	9	5.86	
				5.86



Table 6c). Relative cover and abundance of life form categories on: Wheeler Reef: front: 12 m depth.

Date Sampled : 05/23/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	18	11.14	
Tabulate	ACT	4	0.85	
Encrusting	ACE	1	0.91	
Submassive	ACS	0	0.00	12.90
<b>Non-Acropora</b>				
Branching	CB	1	2.78	
Massive	CM	7	1.39	
Encrusting	CE	12	2.73	
Submassive	CS	3	0.79	
Foliose	CF	5	2.52	10.21
				23.11
<b>Dead Scleractinia</b>				
(recent)	DC	2	0.85	
(algal covering)	DCA	71	42.06	42.91
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	2	0.21	
Coralline	CA	0	0.00	
Halimeda	HA	1	0.19	
Algal assemblage	AA	2	0.47	0.87
<b>Other Fauna</b>				
Soft Corals	SC	30	16.90	
Sponge	SP	12	2.81	
Other	OT	3	0.56	20.27
<b>Abiotic</b>				
Sand & Rubble	SR	1	0.57	
Water	WA	11	12.27	12.84

Table 6d). Relative cover and abundance of life form categories on: Wheeler  
Reef: back: 3 m depth.

Date Sampled : 05/23/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	18	13.00	
Tabulate	ACT	5	2.73	
Encrusting	ACE	3	0.71	
Submassive	ACS	0	0.00	
				16.44
<b>Non-Acropora</b>				
Branching	CB	10	3.77	
Massive	CM	23	8.91	
Encrusting	CE	37	12.49	
Submassive	CS	8	2.39	
Foliose	CF	7	3.77	
				31.33
				47.77
<b>Dead Scleractinia</b>				
(recent)	DC	1	0.20	
(algal covering)	DCA	55	36.46	
				36.66
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	4	0.76	
Coralline	CA	1	0.31	
Halimeda	HA	4	0.76	
Algal assemblage	AA	3	0.83	
				2.66
<b>Other Fauna</b>				
Soft Corals	SC	1	1.26	
Sponge	SP	1	0.36	
Other	OT	4	0.73	
				2.35
<b>Abiotic</b>				
Sand & Rubble	SR	0	0.00	
Water	WA	13	10.56	
				10.56

Table 6e). Relative cover and abundance of life form categories on: Wheeler Reef: back: 6 m depth.

Date Sampled : 05/23/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	11	9.23	
Tabulate	ACT	3	0.98	
Encrusting	ACE	2	0.35	
Submassive	ACS	0	0.00	10.56
<b>Non-Acropora</b>				
Branching	CB	8	2.08	
Massive	CM	15	4.72	
Encrusting	CE	18	4.87	
Submassive	CS	3	0.48	
Foliose	CF	5	1.41	13.56
				24.12
<b>Dead Scleractinia</b>				
(recent)	DC	2	0.90	
(algal covering)	DCA	49	37.85	38.75
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	2	0.55	
Halimeda	HA	6	1.30	
Algal assemblage	AA	3	5.94	7.79
<b>Other Fauna</b>				
Soft Corals	SC	7	1.72	
Sponge	SP	5	1.89	
Other	OT	5	1.18	4.79
<b>Abiotic</b>				
Sand & Rubble	SR	3	17.79	
Water	WA	15	6.76	24.55

Table 6f). Relative cover and abundance of life form categories on: Wheeler  
Reef: back: 12 m depth.

Date Sampled : 05/22/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	10	1.51	
Tabulate	ACT	0	0.00	
Encrusting	ACE	1	0.60	
Submassive	ACS	0	0.00	2.11
<b>Non-Acropora</b>				
Branching	CB	4	0.59	
Massive	CM	8	1.73	
Encrusting	CE	8	2.09	
Submassive	CS	1	0.50	
Foliose	CF	2	0.32	5.23
				7.34
<b>Dead Scleractinia</b>				
(recent)	DC	7	9.18	
(algal covering)	DCA	49	38.00	47.18
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	4	1.17	
Coralline	CA	1	0.13	
Halimeda	HA	3	1.63	
Algal assemblage	AA	2	0.31	3.24
<b>Other Fauna</b>				
Soft Corals	SC	30	8.76	
Sponge	SP	12	3.02	
Other	OT	3	4.50	16.28
<b>Abiotic</b>				
Sand & Rubble	SR	23	22.77	
Water	WA	3	3.19	25.96

Table 7a). Relative cover and abundance of life form categories on: Davies Reef: front: 5 m depth.

Date Sampled : 05/25/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	34	14.23		
Tabulate	ACT	3	4.26		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				18.49	
<b>Non-Acropora</b>					
Branching	CB	47	16.43		
Massive	CM	19	5.58		
Encrusting	CE	56	19.56		
Submassive	CS	2	0.58		
Foliose	CF	13	4.21		
				46.36	
				64.85	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	50	17.70		
				17.70	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	6	1.61		
Halimeda	HA	21	5.30		
Algal assemblage	AA	1	0.11		
				7.02	
<b>Other Fauna</b>					
Soft Corals	SC	10	2.32		
Sponge	SP	10	1.50		
Other	OT	0	0.00		
				3.82	
<b>Abiotic</b>					
Sand & Rubble	SR	0	0.00		
Water	WA	14	6.61		
				6.61	

Table 7b). Relative cover and abundance of life form categories on: Davies  
Reef: front: 10 m depth.

Date Sampled : 05/24/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	31	12.05		
Tabulate	ACT	4	1.09		
Encrusting	ACE	0	0.00		
Submassive	ACS	0	0.00		
				13.14	
<b>Non-Acropora</b>					
Branching	CB	42	12.08		
Massive	CM	21	6.96		
Encrusting	CE	47	9.89		
Submassive	CS	5	0.64		
Foliose	CF	19	3.09		
				32.66	
				45.80	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	63	17.02		
				17.02	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	16	5.50		
Algal assemblage	AA	1	0.05		
				5.55	
<b>Other Fauna</b>					
Soft Corals	SC	31	9.10		
Sponge	SP	15	2.54		
Other	OT	10	2.42		
				14.06	
<b>Abiotic</b>					
Sand & Rubble	SR	16	10.39		
Water	WA	9	7.18		
				17.57	

Table 7c). Relative cover and abundance of life form categories on: Davies Reef: front: 15 m depth.

Date Sampled : 05/25/85		Transect length sampled : 100 metres			
Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals	
<b>Scleractinia</b>					
<b>Acropora</b>					
Branching	ACB	31	8.98		
Tabulate	ACT	2	0.54		
Encrusting	ACE	0	0.00		
Submassive	ACS	1	0.18	9.70	
<b>Non-Acropora</b>					
Branching	CB	30	7.54		
Massive	CM	14	2.17		
Encrusting	CE	37	7.25		
Submassive	CS	1	0.91		
Foliose	CF	26	7.90	25.77	
				35.47	
<b>Dead Scleractinia</b>					
(recent)	DC	0	0.00		
(algal covering)	DCA	87	32.61	32.61	
<b>Algae</b>					
Macro	MA	0	0.00		
Turf	TA	0	0.00		
Coralline	CA	0	0.00		
Halimeda	HA	2	0.23		
Algal assemblage	AA	1	0.43	0.66	
<b>Other Fauna</b>					
Soft Corals	SC	49	10.46		
Sponge	SP	13	3.46		
Other	OT	9	2.47	16.39	
<b>Abiotic</b>					
Sand & Rubble	SR	17	13.70		
Water	WA	4	1.17	14.87	

Table 7d). Relative cover and abundance of life form categories on: Davies Reef: back: 5 m depth.

Date Sampled : 05/25/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	8	4.21	
Tabulate	ACT	0	0.00	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	4.21
<b>Non-Acropora</b>				
Branching	CB	8	2.05	
Massive	CM	23	4.99	
Encrusting	CE	22	2.95	
Submassive	CS	1	0.06	
Foliose	CF	9	2.62	12.67
				16.88
<b>Dead Scleractinia</b>				
(recent)	DC	0	0.00	
(algal covering)	DCA	93	38.96	38.96
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	0	0.00	
Halimeda	HA	0	0.00	
Algal assemblage	AA	1	0.16	0.16
<b>Other Fauna</b>				
Soft Corals	SC	50	17.01	
Sponge	SP	29	6.72	
Other	OT	10	2.19	25.92
<b>Abiotic</b>				
Sand & Rubble	SR	21	14.48	
Water	WA	8	3.60	18.08



Table 7e). Relative cover and abundance of life form categories on: Davies Reef: back: 10 m depth.

Date Sampled : 05/25/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	12	6.93	
Tabulate	ACT	1	0.21	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	7.14
<b>Non-Acropora</b>				
Branching	CB	6	1.95	
Massive	CM	28	4.33	
Encrusting	CE	20	3.16	
Submassive	CS	3	4.13	
Foliose	CF	3	0.49	14.06
				21.20
<b>Dead Scleractinia</b>				
(recent)	DC	0	0.00	
(algal covering)	DCA	86	50.67	50.67
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	1	0.09	
Halimeda	HA	0	0.00	
Algal assemblage	AA	3	0.51	0.60
<b>Other Fauna</b>				
Soft Corals	SC	25	6.16	
Sponge	SP	9	0.91	
Other	OT	13	2.59	9.66
<b>Abiotic</b>				
Sand & Rubble	SR	8	2.64	
Water	WA	18	15.23	17.87

Table 7f). Relative cover and abundance of life form categories on: Davies  
Reef: back: 15 m depth.

Date Sampled : 05/25/85      Transect length sampled : 100 metres

Benthic Life Form	Code	Number of Occurrences	Percent Cover	Category Totals
<b>Scleractinia</b>				
<b>Acropora</b>				
Branching	ACB	24	7.48	
Tabulate	ACT	4	1.31	
Encrusting	ACE	0	0.00	
Submassive	ACS	0	0.00	8.79
<b>Non-Acropora</b>				
Branching	CB	27	7.97	
Massive	CM	37	8.50	
Encrusting	CE	40	7.95	
Submassive	CS	2	0.26	
Foliose	CF	3	0.75	25.43
				34.22
<b>Dead Scleractinia</b>				
(recent)	DC	0	0.00	
(algal covering)	DCA	93	44.87	44.87
<b>Algae</b>				
Macro	MA	0	0.00	
Turf	TA	0	0.00	
Coralline	CA	2	0.32	
Halimeda	HA	2	0.42	
Algal assemblage	AA	3	0.93	1.67
<b>Other Fauna</b>				
Soft Corals	SC	13	5.61	
Sponge	SP	11	1.69	
Other	OT	13	3.42	10.72
<b>Abiotic</b>				
Sand & Rubble	SR	2	0.65	
Water	WA	18	7.87	8.52

Table 8a). Frequency and median of hard coral cover and A. planci numbers from manta surveys.

Reef	Live Coral							Med- ian	Dead Coral							Med- ian	<u>A. planci</u>
	0	1	2	3	4	5	0		1	2	3	4	5				
Needle	0	14	4	1	0	0	1	0	0	1	10	8	0	3	73		
Dip	0	2	21	22	8	0	3	5	34	12	1	0	0	1	242		
Kelso	4	50	11	1	0	0	1	0	39	23	4	0	0	1	142		
Faraday	0	10	6	9	10	3	3	0	19	11	6	2	0	1/2	37		
Coil	0	0	0	14	11	0	3/4	14	4	7	0	0	0	0	0		
Arc	0	3	7	1	0	0	2	0	0	1	1	9	0	4	24		
Bowl	0	3	29	63	29	4	3	46	70	12	0	0	0	1	0		
Slashers SW	11	74	3	0	0	0	1	0	23	38	21	6	0	2	88		
Glow	0	4	27	2	0	0	2	2	13	0	2	15	1	3	130		
Hopkinson	0	42	9	0	0	0	1	0	0	4	19	17	11	4	965		
Yankee	0	6	17	23	20	2	3	0	25	22	15	5	1	2	116		
Knife	0	13	16	5	1	0	2	0	11	15	9	0	0	2	73		
John Brewer	10	69	12	1	0	0	1	2	18	14	32	22	4	3	382		
Helix	0	4	5	6	5	0	2/3	0	0	12	8	0	0	2/3	329		
Grub	0	5	22	40	4	0	3	4	40	20	7	0	0	1	499		
Chicken	0	16	13	11	16	4	3	1	56	3	0	0	0	1	2		
Lodestone	0	48	7	5	0	0	1	0	48	7	5	0	0	3	66		
Centipede	0	34	47	30	4	0	2	0	101	14	0	0	0	1	5		
Keeper	0	42	10	5	0	0	1	0	1	8	28	20	0	3	182		
Wheeler	0	6	4	7	14	0	3	1	14	7	9	0	0	2	35		
Davies	2	22	32	16	3	0	2	46	26	3	0	0	0	0/1	5		

Table 8b). Categories used for live and dead coral cover and A. planci.

Category	Live and Dead Coral (percent)	Category	<u>A. planci</u> (No. of individuals)
0	0	0	0
1	1-10	1	1-9
2	10-30	2	10-39
3	30-50	3	40-100
4	50-75	4	100
5	75-100		

Table 9. Summary of previous surveys conducted on reefs in the Townsville Sector.

Reef	Date	Crown-of-Thorns	Live Coral Cover	Reef Zone	Methods	Author <sup>2</sup>
Needle Reef	11/70	0	L	whole	spot check	Pearson GBRMPA
	12/84	50	M	lagoon	snorkel	
Dip Reef	-/70	40+	H	front	swim	Endean Pearson Ayling GBRMPA GBRMPA GBRMPA
	06/71	4	M	whole	spot check	
	06/83	0	M	back	transects	
	06/83	40+	M	front	scuba	
	01/84	400	L	front	scuba	
	02/85	175	M	back	scuba	
Kelso Reef	11/70	678	M	whole	spot check	Pearson GBRMPA GBRMPA GBRMPA GBRMPA
	10/76	0	-	whole	scuba	
	10/82	6	M	back	scuba	
	11/83	10	M	front	scuba	
	09/84	30	M	back	scuba	
Faraday Reef	11/70	0	L	whole	spot check	Pearson GBRMPA Moran
	10/82	0	M	back	scuba	
	03/84	9	-	whole	manta tow	
Coil Reef	-/70	40+	H	front	swim	Endean Pearson Moran
	06/71	172	H	whole	spot check	
	03/84	0	-	whole	tow	
Arc Reef	05/84	184	-	whole	manta tow	Moran
Bowl Reef	-/70	0	L	back	swim	Endean Pearson Pearson Moran GBRMPA
	11/70	0	L	whole	spot check	
	06/71	314	L	whole	spot check	
	03/84	0	-	front	tow	
	11/84	40+	M	back	scuba	
Slashers Reef	05/84	301	-	back	tow	Moran
Glow Reef	07/70	40	L	back	swim	Endean Endean Endean Endean Pearson Moran
	07/70	60	H	front	swim	
	01/71	40+	-	back	swim	
	01/71	40+	L	front	swim	
	06/71	264	L	whole	spot check	
	03/84	40+	-	whole	tow	
Hopkinson Reef	05/84	72	-	front	tow	Moran GBRMPA
	12/84	121	L	front	scuba	
Yankee Reef	05/84	204	M	back	manta tow	Moran Moran Moran
	05/84	0	M	front	manta tow	
	09/84	79	M	back	manta tow	

Reef	Date	Crown-of-Thorns	Live Coral Cover	Reef Zone	Methods	Author <sup>2</sup>
Knife Reef	06/71	467	L	whole	spot check	Pearson GBRMPA
	07/84	45	M	back	scuba	
Helix Reef	06/71	441	L	whole	spot check	Pearson GBRMPA GBRMPA Moran GBRMPA
	06/83	50	M	back	scuba	
	06/83	2	M	front	scuba	
	05/84	72	-	whole	tow	
	01/85	59	M	front	snorkel	
Grub Reef	08/70	40+	L	back	swim	Endean Pearson Pearson Moran GBRMPA
	11/70	506	M	whole	spot check	
	05/71	341	M	whole	spot check	
	05/84	0	-	whole	manta tow	
	02/85	17	M	back	scuba	
Chicken Reef	06/71	119	M	whole	spot check	Pearson
Centipede Reef	08/70	0	H	back	swim	Endean Pearson Endean Pearson GBRMPA Moran
	12/70	76	H	whole	spot check	
	01/71	12	M	front	swim	
	06/71	85	M	whole	spot check	
	10/76	0	-	whole	scuba	
	09/84	0	-	back	tow	
Wheeler Reef	12/70	2	H	whole	spot check	Pearson Pearson GBRMPA GBRMPA Moran GBRMPA GBRMPA
	06/71	0	H	whole	spot check	
	07/72	0	-	back	scuba	
	05/82	1	H	back	scuba	
	05/83	2	-	whole	tow	
	03/84	50	H	back	scuba	
	02/85	30	H	back	scuba	
	Davies Reef	-/70	0	M	back	
12/70		38	M	whole	spot check	
06/71		235	M	whole	spot check	
04/72		44	L	back	scuba	
10/83		1	-	whole	tow	
Keeper Reef	01/70	6	M	whole	scuba	Laxton Pearson
	05/71	52	M	whole	spot check	
John Brewer Reef	-/69	(many)	L	front	spot check	Brown Endean & Stablum Endean & Stablum Endean & Stablum Endean & Stablum Endean & Stablum Laxton Moran <i>et al.</i> (1985)
	1/70	36	D	front	scuba	
	1/70	-	S	flat	scuba	
	7/70	(common)	M	front	scuba	
	8/70	2	M	front	scuba	
	1/70	16	M	front	scuba	
	7/70	(many)	L	front	scuba	
	+/82	(outbreak)	L	front	manta tow	

Reef	Date	Crown-of-Thorns	Live Coral Cover	Reef Zone	Methods	Author <sup>2</sup>
Lodestone Reef	-/69	(many)	L	front	spot check	Brown
	10/70	194	M	front	quadrat	Endean & Stablum
	11/70	1.58 x 10m <sup>2</sup>	M	whole	photo quadrats	Laxton
	07/70	(many)	M	whole	spot check	Pearson
	11/70	100 <sup>+</sup>	L	whole	spot check	Pearson
	3/83	(outbreak)	M	whole	manta tow	Moran <u>et al.</u>

## Notes to Table ...

1. Representative description of average cover of Live Coral.

Percent cover of live coral	Corresponding description
Less than 10 percent	Low (L)
From 10 to 50 percent	Moderate (M)
Greater than 50 percent	High (H)

These categories were chosen to provide a comparative description of previous records with the present work.

2. Authors

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GBRMPA	Great Barrier Reef Marine Park Authority database.
Laxton	Laxton, J.H. (1974).
Pearson	Pearson, R.G. (1971).
Moran	Hegerl, E. (1984).
Moran <u>et al</u>	Moran, P.J., R.H. Bradbury and R.E. Reichelt (1985).

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