

Report on a Crown of Thorns Survey conducted on reefs off
Mackay, 14-22 November, 1987

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and

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Executive Summary

Five reefs off the coast of Mackay were surveyed between the 14th and the 22nd of November, 1987. Reefs were McIntyre, Gable, 20-351(a) and the Chauvel reefs (nominally "Big" and "Little"). All reefs were surveyed using the mantle tow technique. Percentage cover of Live hard coral and Dead Standing hard coral skeleton was recorded over an area of approximately 10m wide and 200m long (ie that area covered by a two minute tow). No Crown of Thorns starfish were recorded on any of the reefs.

Background

The Australian Survey Office was conducting marine surveys on reefs off the Queensland coast and the Great Barrier Reef Marine Park ^{Authority} was invited to utilize this ship time for any worthwhile purpose.

It was decided to use this period to conduct surveys for the starfish Acanthaster planci as the starfish is reported in large numbers from Creelin Reef in the Mackay district (pers comm P. McGinnity). It was felt that if further starfish populations could be identified in this area, weight would be lent to the hypothesis of southward migration of starfish populations.

Aims

1. To determine the presence or absence of the Crown of Thorns starfish (Acanthaster planci) on reefs surveyed off the coast of Mackay and to estimate the percentage cover of live and dead standing coral on the perimeter of the reefs surveyed.
2. To trial the establishing of a Permanent Monitoring site on a reef.

Methods

Two minute manta tows were conducted around the perimeter of each reef surveyed. Attributes recorded were:

Percentage cover of Live scleractinia

Percentage cover of Dead standing scleractinia

Number of A. planci

Number of feeding scars (that could be attributable to A. planci)

Miscellaneous observations were made including the percentage of sand/rubble and the presence of high percentages of soft coral covered by the tow path.

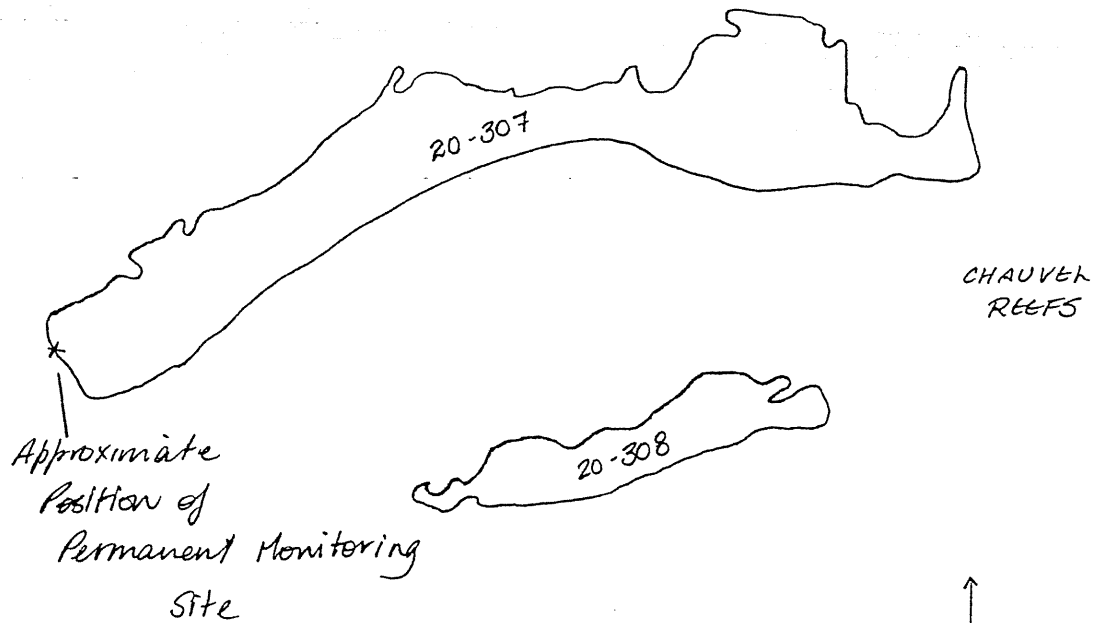
Two of the three observers were experienced at estimating coral cover using the menta tow technique while the third had no previous experience.

A procedure to standardize estimates of live and dead coral between observers was undertaken on McIntyre Reef. Six (6) buoys were laid in a line, 200m apart on the back slope of the reef, simulating five two-minute menta tows across the reef slope. Two observers were then towed simultaneously over the area and their estimates recorded separately. Each observer was towed over the site a minimum of four times and tow paths were kept consistent within the area. The replicate areas were towed at random to avoid observers remembering previous results. Consultation between observers took place and in this way scores were standardized.

A permanent monitoring site was laid at the south west end of (Big) Chauvel reef (Figure 1). Star pickets and besser bricks were used to mark each of the five x 20m transects, randomly selected within a 200 segment of reef. Star pickets were used to mark the ends of the fixed line transects and besser bricks were laid at 4m intervals to mark the position of placement of the tape. The central reinforcement of each brick was positioned to coincide with the line and placement of the tape. Transects were placed between the 0m and 4m depth contours and did not overlap. Physiognomic structural attributes (as per Methods from The Crown of Thorns Study) were recorded for each transect and the entire exercise was timed.

FIGURE 1

Permanent Monitoring site on (Big) Chauvel Reef.



CHAUVEL
REEFS



Results

No A. glanci were recorded on any of the reefs surveyed. Feeding scars were observed but when investigated were found to be indistinguishable from those made by the gastropod Drupella and those left by the brittle star (Crinoidea).

Estimates of coral cover are attached as appendix 1. It is suggested that this data be analyzed in the same manner as similar data collected by the AIMS is analyzed.

The permanent monitoring site took a total of five hours, 30 minutes to establish with three people working on the task. This includes the time taken to collect and load equipment into the inflatable boat and breaks between dives to change cylinders. A breakdown of timing is as follows:

0800 - 0930 : collect equipment and load into inflatable
- two trips to the site were necessary to have all equipment at the site necessary to lay three transects

0945 - 1100 : Placing of first two transects on slope including recording of physiognomic structural attributes (PSA).

1100 - 1150 : Return to vessel to change cylinders and load more equipment.

1150 - 1330 : Placing of remaining three transects and recording of PSA.

Learning curves and observer variability

The estimates of live coral cover for the three observers over the experimental area is shown in figures 1-3 as a learning curve for the four or five consecutive tows over the same area. Table 1 gives the variability for each tow path for each observer.

Table 1 Observer variability for five consecutive tow paths

Observer	Tow	Observer	Tow	Observer	Tow	Observer	Tow
1	35	10	35	10	35	10	35
	35	10	35	10	35	10	35
	35	10	35	10	35	10	35
	42	8	42	8	42	8	42
	38	7	38	7	38	7	38
2	55	3	55	3	55	3	55
	45	5	45	5	45	5	45
	35	10	35	10	35	10	35
	40	8	40	8	40	8	40
	39	7	39	7	39	7	39
3	55	3	55	3	55	3	55
	48	2	48	2	48	2	48
	68	3	68	3	68	3	68
	32	15	32	15	32	15	32
	38	7	38	7	38	7	38
4	65	5	65	5	65	5	65
	68	3	68	3	68	3	68
	75	0	75	0	75	0	75
	75	0	75	0	75	0	75
	55	3	55	3	55	3	55
5	55	3	55	3	55	3	55
	55	3	55	3	55	3	55
	40	8	40	8	40	8	40
	70	0	70	0	70	0	70
	60	5	60	5	60	5	60

4. The variability in the estimates of live coral cover for each tow path is shown in Table 1.

Figure 2.

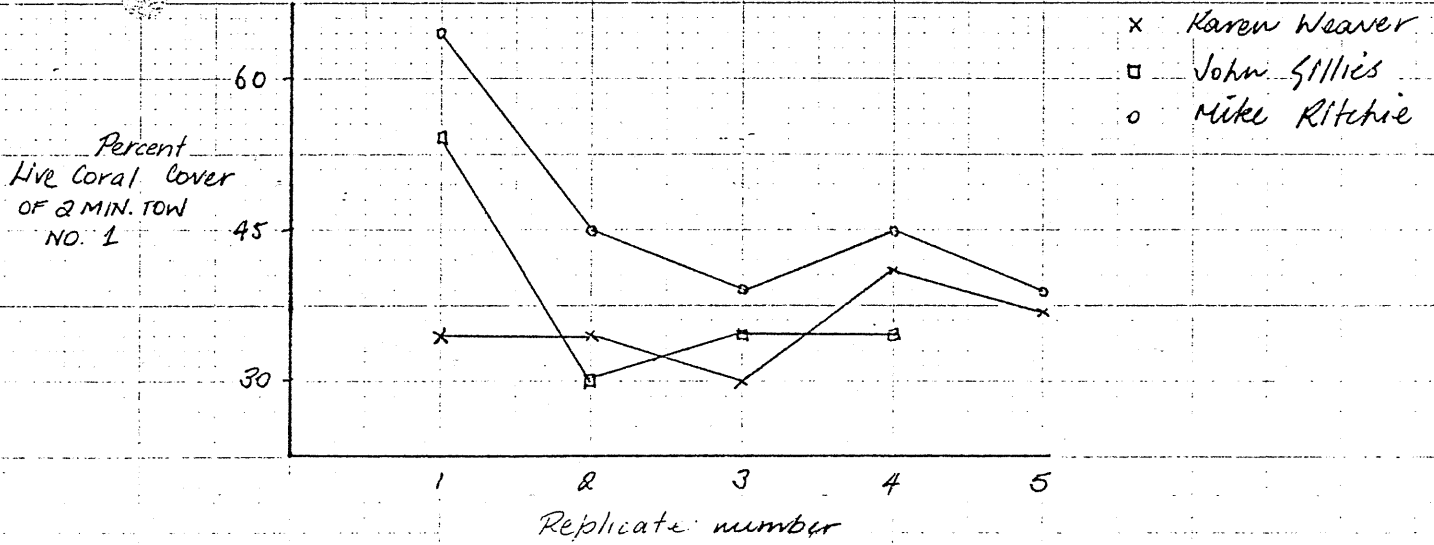


FIGURE 3

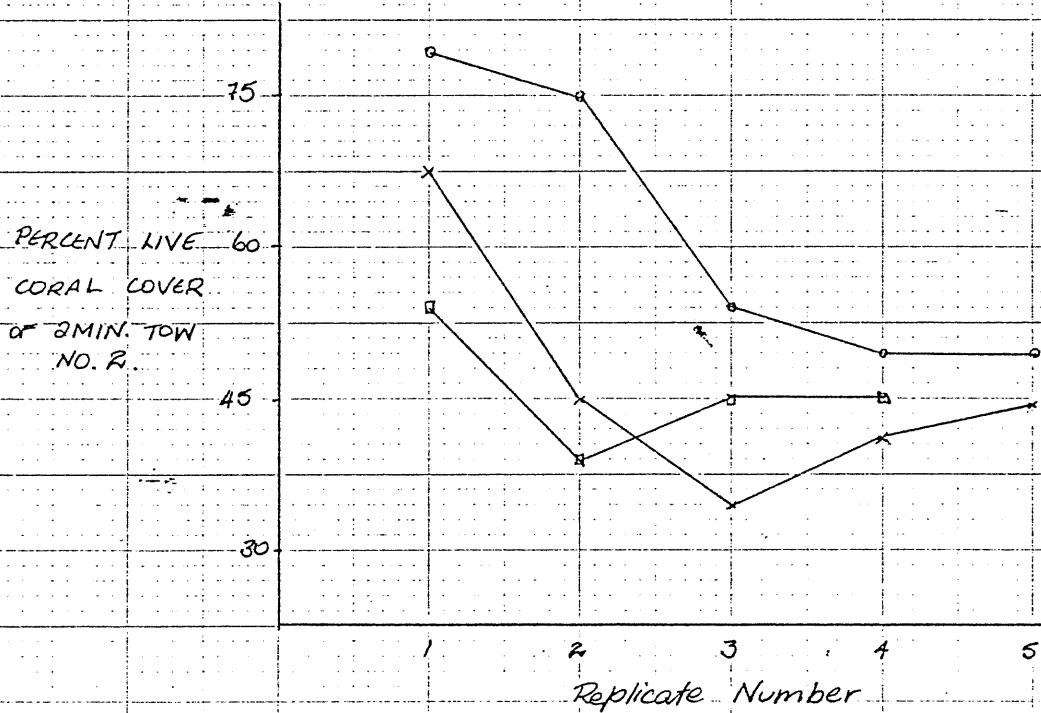


Figure 4

PERCENT LIVE CORAL COVER OF 2 MIN. TOW NO. 3

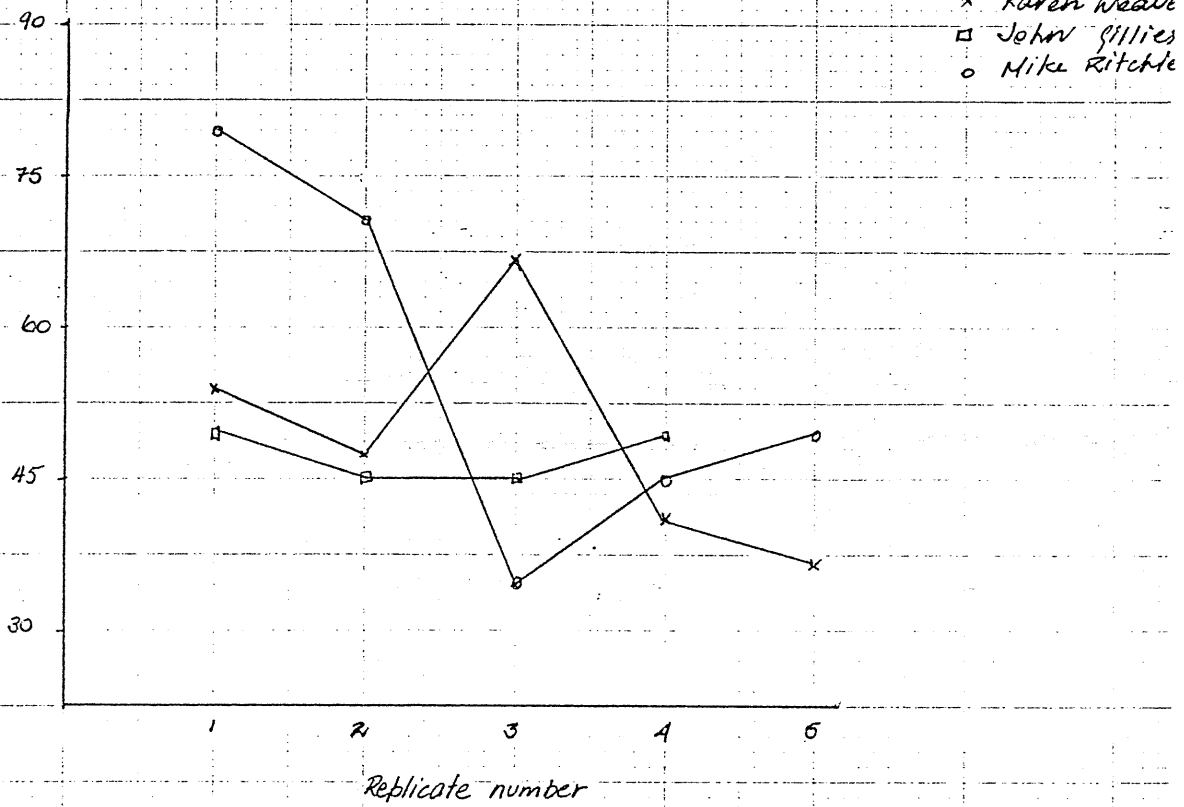


FIGURE 5

PERCENT LIVE CORAL COVER OF 2 MIN TOW NO. 4

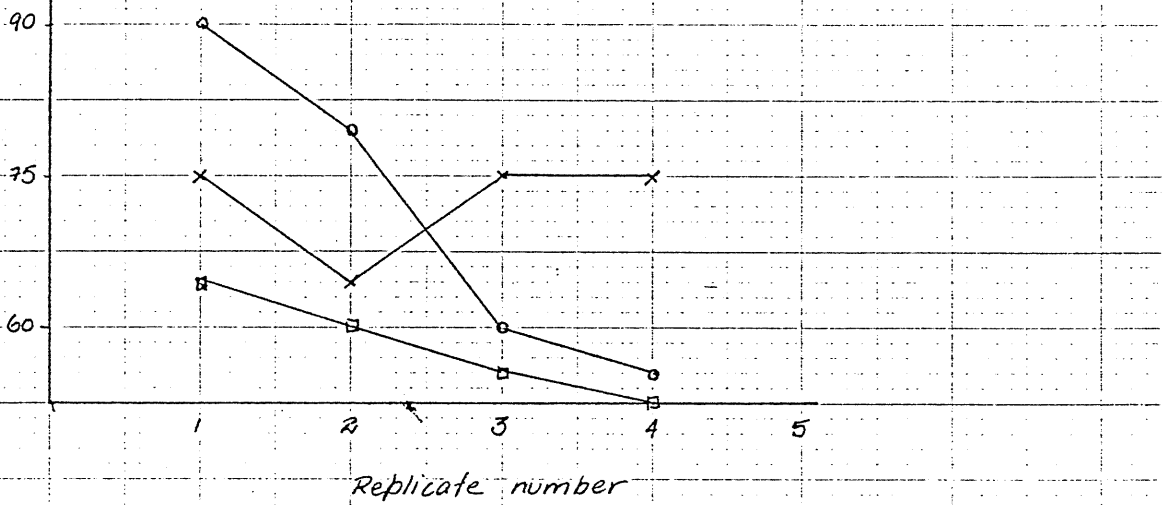
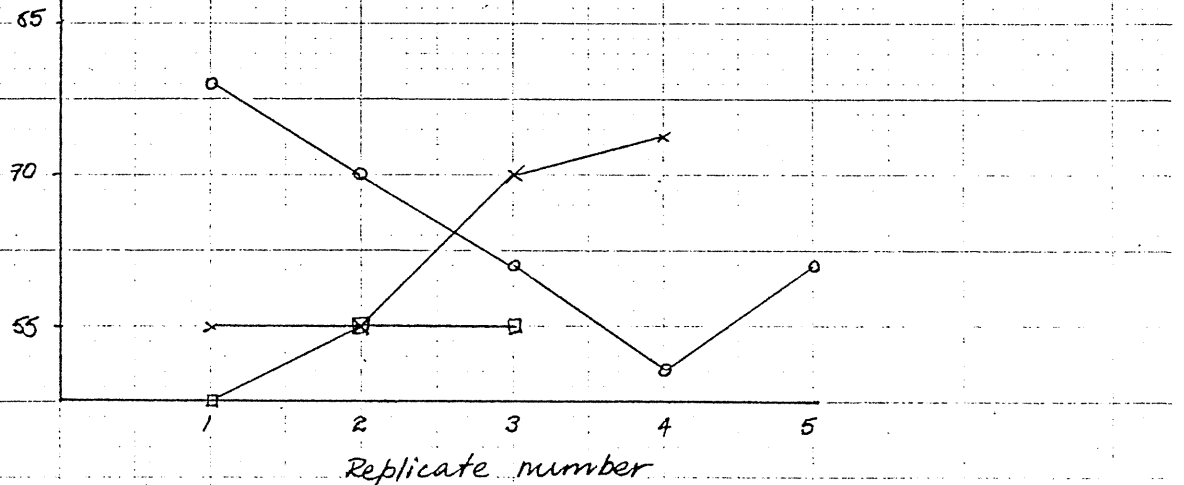


FIGURE 6

PERCENT LIVE CORAL COVER OF 2 MIN TOW NO. 5



Discussion

The survey indicates that A. plani is not present in large population numbers as reported for Credlin Reef just to the north. There is little indication of crown of thorns starfish damage and while it is possible that outbreaks or new populations could occur in this region in the future, there is no indication of this at present.

A permanent monitoring site takes 5 and 1/2 hours to establish with three people working consistently over that time. Each transect takes approximately 30 minutes x 3 people (1 1/2 person hours) and collecting and loading of equipment for 5 transects approximately 2 hours x 3 people (6 person hours).

To successfully monitor any one reef, it has been proposed that at least two sites on the weather side of a reef (preferably three or more) and an equal number on the lee of the reef be established. Given that a total of six sites were to be laid on a reef, six days in the field would be required (and more to cater for poor weather). This study has shown that present methods of fixing line transects are inadequate and time consuming. It was found that even with markers every four metres there was a large degree of error in fixing the position of the tape and consequently the estimates of coral cover. Furthermore, estimates of growth and longevity, based on positive identification of individual colonies over time would be seriously biased by the real inability to fix the tape position. It is suggested that a peg (similar to an 2" tent peg) be fixed every metre and that it have a specially designed fixed ring attached to it in which the tape can be placed at each survey. Extra pegs should be stationed in areas where topography is irregular to fix the tape position.

This method would also reduce the need for cumbersome starpickets and picket drivers which are difficult to use underwater. A single mallet would suffice. The only problem which is currently obvious with this method is difficulty in finding pegs and relocating the site. Subsurface buoys would help to solve this problem. Dr Tony Ayling uses a similar method at his Cape Tribulation site and may be able to provide useful logistical insights.

Figures 1-5 indicate that the inexperienced observer consistently overestimated the coral cover as estimated by experienced observers. However, the figures show that the learning curve rapidly approaches that of experienced observers after consultation.

Table 1 shows also that internal variability in experienced observers is greater than for experienced observers. While the variance in estimates of coral cover is confounded by the fact that the observer is learning, it nonetheless points to the fact that inexperienced observers cannot be relied on to accurately gauge coral cover without training.

This study therefore points strongly toward the need for training and retraining of observers. This could be achieved by towing observers simultaneously over different habitats with consultation after each tow until the estimates of each are comparable. Similar variations may exist for estimates of crown of thorns numbers and observers should undertake similar training procedures to reach consistency prior to recording data.

Appendix 1 Field notes and raw data for the following
reefs:

McIntyre

Bable

20 351

(Big) Chauvel

(Little) Chauvel