MARINE MANAGMENT SUPPORT
PILBARA

NINGALOO MARINE PARK MONITORING PROGRAM: BENTHIC MONITORING SITES ESTABLISHED IN 1999

Data Report: MMS/PI/NMP-21/2000

A collaborative project between CALM Marine Conservation Branch,
CALM Karratha Regional Office
and CALM Exmouth District Office

Part funded by *Coasts and Clean Seas*
an initiative of the Natural Heritage Trust

Prepared by Cary J L, Grubba T L, Mahendran M & Radford B J
Marine Conservation Branch

August 2000

Marine Conservation Branch
Department of Conservation and Land Management
47 Henry St
Fremantle, Western Australia, 6160

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Helping Communities Helping Australia

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Copies of this report may be obtained from:

Marine Conservation Branch
Department of Conservation and Land Management
47 Henry St.
Fremantle, Western Australia, 6160

Ph: 94325100
Fx: 94305408

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SUMMARY

This data report presents sessile benthic coral community parameters measured at 11 ‘transect’ sites and observations at 22 ‘non-transect’ sites established in August 1999 during the second survey of the *Ningaloo Marine Park Monitoring Program* (NMPMP). The majority of sites were located in areas of high human activity. At each ‘transect’ site three re-locatable permanent monitoring transects were established. The line intercept transect (LIT) method, using video footage taken from along each transect, was used to determine the percentage cover of benthic coral community categories (eg live coral, hard coral, soft coral, dead coral, algae, and abiotic). At each ‘non-transect’ site the site was described and any visible impacts were recorded using a high quality video.

The main objective of this survey was to establish a long-term monitoring program and provide baseline quantitative benthic habitat data along re-locatable ‘transect’ sites and qualitative data of impacts at ‘non-transect’ sites to enable changes to the key conservation attributes of the Marine Park to be detected before unacceptable or irreversible impacts occur.

This project was partially funded by *Coasts and Clean Seas* an initiative of the Natural Heritage Trust.

The NMPMP was coordinated by the Marine Conservation Branch (MCB) of the Department of Conservation and Land Management (CALM) and CALM’s Pilbara Region and Exmouth District.

Companion reports associated with this project are: Cary and Daly (1999), Cary and Grubba (1998) and Cary *et al*. (1999)

1 INTRODUCTION

1.1 General

In 1998, Coasts and Clean Seas, an initiative of the Natural Heritage Trust provided $103, 050 to the Department of Conservation and Land Management (CALM) to establish a long-term monitoring program to provide information on the 'health' of benthic communities of the NMP to detect any undesirable trends so that CALM, if necessary, can take remedial action to prevent irreversible changes from occurring.

The *Ningaloo Marine Park Monitoring Program* (NMPMP) is linked to the recommendations of the *Ningaloo Marine Park Management Plan 1989-1999;*

- Monitoring of marine flora and fauna be carried out to gain an understanding of factors which influence the stability of marine communities in the Park.
- Monitoring and periodic surveys of recreational and commercial use in and adjacent to the park be carried out to determine the effect of human usage on marine communities in the Park.

This data report presents sessile benthic coral community parameters measured at nine 'transect' sites established during the second field survey of the NMPMP in August 1999 and two 'transect' sites established during the first field survey of the NMPMP in May 1998. The data report also presents observations made at 22 'non-transect' sites established during the second field survey of the NMPMP in August 1999. The locality and boundaries of Ningaloo Marine Park and surrounds are shown in Figure 1.

The August 1999 field survey was coordinated by the Marine Conservation Branch (MCB) of CALM in collaboration with the Pilbara Regional Office and the Exmouth District Office.

1.2 Background

The successful management of the marine environment is contingent upon comprehensive long-term monitoring programs that provide information on natural variability and long-term trends in key biological communities. Also to determine the status of important natural attributes at regular intervals and identify undesirable trends resulting from human activities in time for remedial management action to be implemented effectively. Monitoring programs generally comprise one or more of the following complementary objectives: (i) local scale impact and/or *compliance monitoring* that examines the effects of human activities in a localised area(s); (ii) temporally-constrained, broadscale *surveillance monitoring* to assess the impact of episodic regional physical and biological processes (eg the effect of cyclones and predators) and (iii) spatially-constrained, long-term monitoring of key biological parameters to determine the extent and cause of *natural variation* (eg seasonal and inter-annual variability) of key ecosystem attributes.

The spatial and temporal scale of on-going monitoring will determine the type of monitoring; ie. surveillance, compliance or natural variability. As the coral communities are the most dominant benthic habitat, the major focus of the field program was to monitor the coral communities. As the majority of human activities in the marine park occur within the easily accessible lagoon and back-reef reef (on the sea-ward edge of lagoon) the majority of monitoring sites were established in these areas. In this survey long-term monitoring sites were established mainly on lagoon coral communities. Quantitative biological information to assess the 'health' of the coral communities was obtained using video footage from re-locatable permanent transects. Qualitative information on visible impacts on coral communities was obtained using video footage and *in situ* observations from re-locatable sites. Long term monitoring sites were established to provide baseline ecological data from which the impacts from human activities can be monitored and managed to ensure that all activities are ecologically sustainable.

1.3 Aims

The main aim of the NMPMP is to determine the 'health' of the major benthic habitats within the Ningaloo Marine Park and the proposed southern extension.

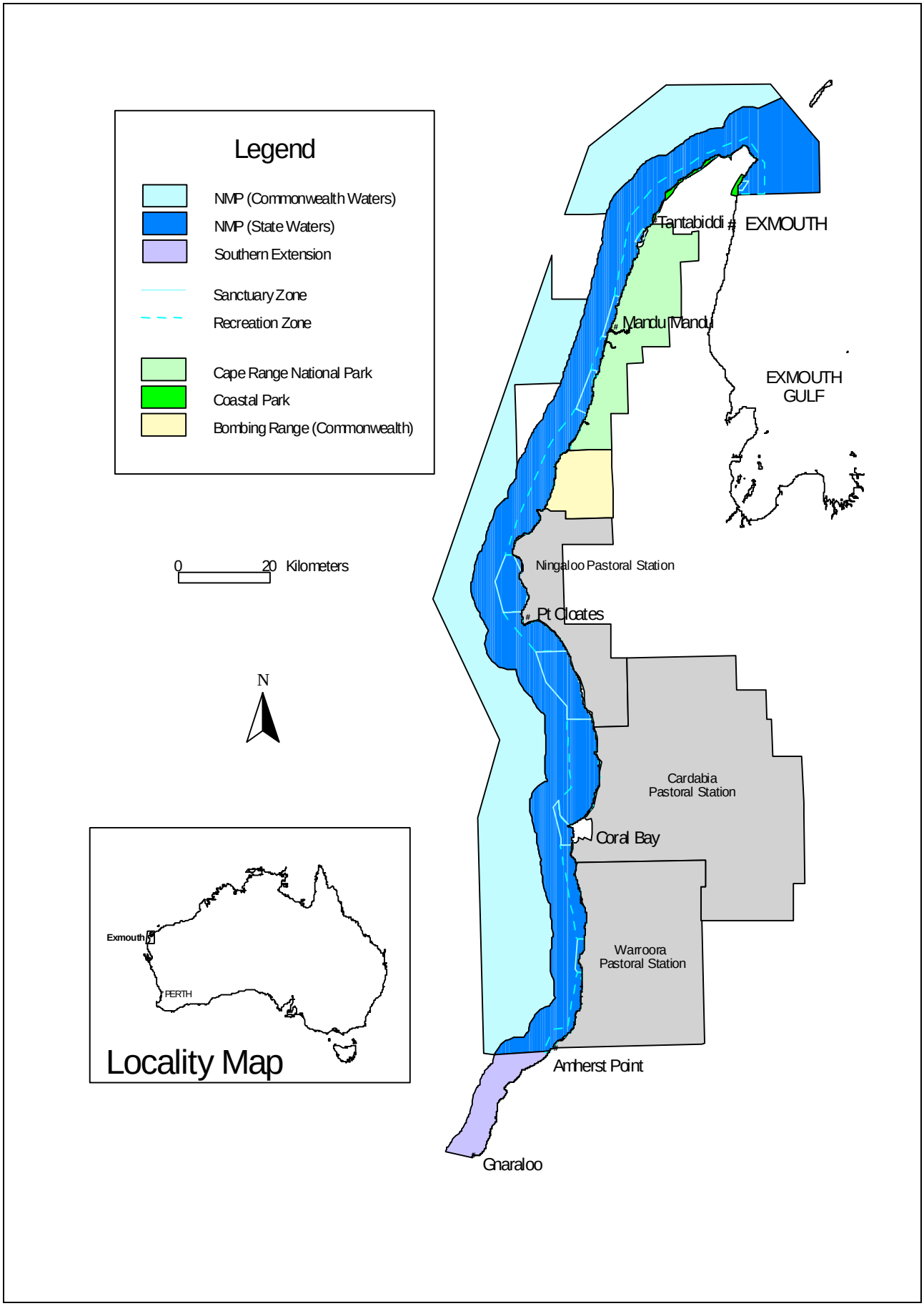

Figure 1: Location map of Ningaloo Marine Park and proposed southern extension.

2 METHODS

2.1 Site selection and establishment of site

Sites were selected to include areas of high human usage and proposed development along approximately 260km of coastline from Bundegi reef in the north (Exmouth Gulf) to Bills Bay in the south. A total of nine 'transect' sites and 22 'non-transect' sites were selected. In addition two 'transect' sites established during the first NMPMP survey in May 1998 were re-surveyed. These sites can be used for *surveillance monitoring* and *compliance monitoring*.

2.1.1 Establishment of 'transect' sites

Nine 'transect' sites were established during the second survey of the *Ningaloo Marine Park Monitoring Program* undertaken in August 1999 (Table 1 and Figure 2). To monitor the impact of broad scale human influences, such as those possible from large shore-based developments, three permanent 50m transects were established at each transect site. The transects were established mainly within the lagoon at a depth contour of approximately 2m. Where practical the transects were set in a line, one after the other, with the transect start and end points separated by a 10m space. For this configuration the distance between the start of the first transect and the end of the last transect was 50+10+50+10+50=170m. The transects were permanently set up using star pickets (at the start of each transect and at the end of transect three) with a 50m scaled (every 10cm) and weighted transect line following the contour of the seabed. The position of the start of each transect was recorded using differential GPS (datum WGS 84) which provides an accuracy of better than 3 metres. For further information on field survey methods see Cary & Daly (1999).

2.1.2 Establishment of 'non-transect' sites

Twenty-two 'non-transect' sites were established during the second survey of the *Ningaloo Marine Park Monitoring Program* undertaken in August 1999 (Table 2 and Figure 2). To monitor the impact of localised human activities (eg. campsites, boat ramps, mooring areas, dive sites) 'non-transect' sites were established in areas where the threats to the benthic community were at different spatial scales to those that can be measured by 'transect' sites. Where the threatening process was broad-scale (eg. over kilometres) then 'transect' sites were established whereas 'non-transect' sites were established where the threat was local-scale (eg. over metres). The exact size and location of the 'non-transect' site was determined by the spatial boundary of the activity. Any impacts within the area of the 'non-transect' site were recorded and video footage taken. To assist in re-location either a mud-map was drawn or DGPS readings were taken. Specific site details can be found in the companion report of Cary *et al.* (1999).

2.2 'Transect' sites

2.2.1 Re-surveyed sites

Two 'transect' sites (N1: Bundegi and N19: Bundegi Sanctuary) established during the first survey (May 1998) of the NMPMP were re-surveyed during the August 1999 survey. Site N1 was re-located however site N19 could not be found (ie star pickets re-located). To enable the site to be re-surveyed an approximate location (ie. using lat/long coordinates recorded from 1998 data sheets) was used.

2.2.2 Video sampling method

The sessile benthic composition along each transect was recorded at a set height and speed, using a high quality digital video camera in an underwater housing, resulting in a transect 50m long and approximately one metre in width being sampled. For information on sampling methodology for the collection of benthic habitat video imagery see Cary *et al*. (1998) and Cary *et al*. (1999).

In addition to using the video transect technique, site, habitat and video information for each 'transect' site were recorded onto four data sheets:

1. *Transect data sheet* - differential GPS latitude and longitudes for each of the three transects at each site.
2. *Long-term monitoring site data sheet* - a site map which includes vessel location, transect locations and other features of interest.
3. *Habitat data sheet* – habitat description including dominant species and notes any impact or activity at the site.
4. *Video data sheet* - video time codes for each transect at each site.

2.2.3 Video data analysis

Line Intercept Transect data

The mean percentage of a range of benthic categories (Table 3) was determined at each site from the video footage of three 50 m replicate transects using the line intercept transect (LIT) method (Loya 1978).

Line Intercept Transect analysed data

Basic statistical analyses were performed on the LIT data using a 'standardised' Excel workbook. The workbook was set up with formulas to calculate means and standard errors for each transect at each site and provides a summary table for the benthic categories at each site.

2.3 'Non-transect' sites

The general benthic habitat and any visible impacts of each 'non-transect' site were recorded using a high quality digital video camera in an underwater housing. In addition to using the video, qualitative information on the visible impacts and benthic community were recorded onto two data sheets:

1. *Long-term monitoring site data sheet* - a site map which includes 'non-transect' site location, observed impacts and other features of interest.
2. *Habitat data sheet* – habitat description including dominant species and notes any impacts or activities at the site.

2.4 Water depth standardisation

In order to determine whether sites were intertidal or subtidal, the average water depth for each site was standardised to the chart datum and lowest astronomical tide. The average water depth was determined at each site by averaging the water depths recorded at the beginning of each transect (Tables 1 and 2). The average water depth for each site was then standardised by subtracting the predicted tide height (for that location and time) from the average water depth (Tables 1 and 2). Predicted hourly tide height tables were available for Coral Bay and Tantabiddi. The Tantabiddi table was used for N9: Bunderra and all sites north and the Coral Bay table was used for N10: Lefroy Bay and all sites south. See Appendix 1 for the predicted hourly tide height tables provided by the Department of Transport (DOT).

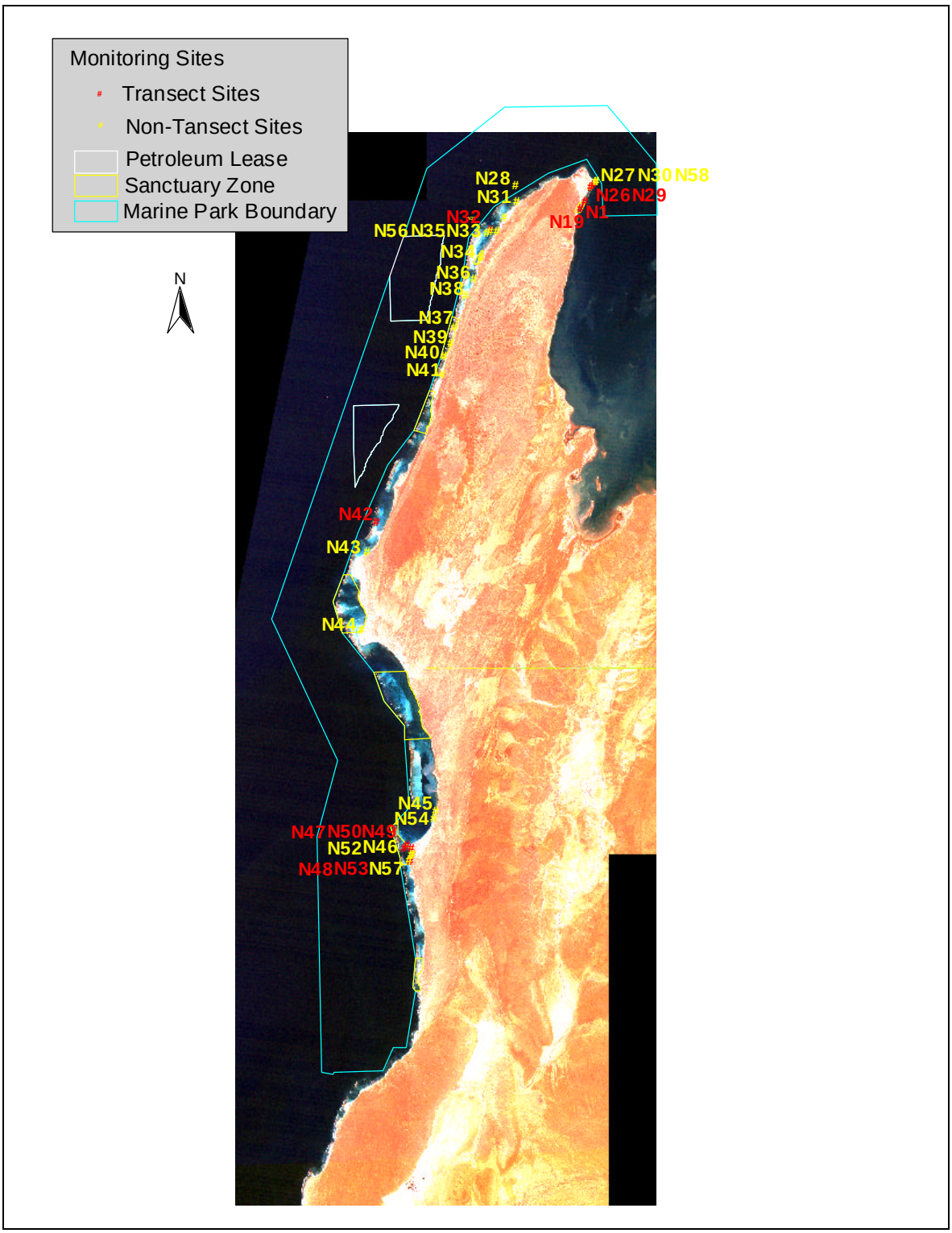

Figure 2: Location of long term monitoring 'transect' and 'non-transect' sites established in August 1999 in the Ningaloo Marine Park.

Table 1. Summary of 'transect' monitoring sites established or re-surveyed in August 1999 in the Ningaloo Marine Park

Site No	Site Name	Zone	Site Type	Site Description	Longitude and Latitude♂	Site depth (meters)♀	Site depth (meters)#
N26	Bundegi Sanctuary South	Sanctuary	Surveillance/Control	Lagoon	21° 52.222' S 114° 09.432' E	3.0	2.5
N19*	Bundegi Sanctuary (re-survey)	Sanctuary	Surveillance/Control	Back reef	21° 51.409' S 114° 09.982' E	1.7	0.2
N1*	Bundegi (re-survey)	Recreation	Surveillance/Impact	Lagoon	21° 49.699' S 114° 10.718' E	3.0	1.5
N29	Bundegi North	Recreation	Surveillance/Impact	Lagoon	21° 49.421' S 114° 11.082' E	5.0	3.4
N32	Tantabiddi Lagoon	Recreation	Surveillance/Impact	Lagoon	21° 54.511' S 113° 57.812' E	3.0	1.7
N42	Winderabandi	Recreation	Surveillance/Impact	Back reef	22° 28.890 S 113° 42.596 E	3.0	0.1
N47	Bills Bay North	Sanctuary	Surveillance/Impact	Lagoon	23° 07.463' S 113° 45.552' E	2.5	1.9
N50	Bills Bay East	Sanctuary	Surveillance/Impact	Lagoon	23° 07.793' S 113° 46.018' E	2.0	2.0
N49	Bills Bay West	Sanctuary	Surveillance/Impact	Lagoon	23° 07.805' S 113° 45.205' E	10.0	8.8
N48	Bills Bay South	Sanctuary	Surveillance/Impact	Lagoon	23° 08.476' S 113° 46.163'E	2.5	1.5
N53	Monck Head	Sanctuary	Surveillance/Impact	Lagoon	23° 09.260' S 113° 45.862'E	2.5	1.7

* sites established in May 1998 and re-surveyed in August 1999

♂ DGPS coordinates using the datum WGS 84 for the beginning of transect one

♀ average depth (meters)

average depth (meters) have been standardised to the chart datum and lowest astronomical tide

Table 2. Summary 'Non-transect' monitoring sites established in August 1999 in the Ningaloo Marine Park

Site No	Site Name	Zone	Site Type	Site Description	Longitude and Latitude♂	Site depth (meters)♀	Site depth (meters)#
N 27	Bundegi human usage	Recreation	Surveillance/Impact	Back reef	21° 49.669' S 114° 10.783' E	1.5	0.4
N30	Naval Jetty South	Recreation	Surveillance/Impact	Limestone pavement	21° 49.070' S 114° 11.381' E	2.0	1.1
N58*	Navy Pier	Defence Prohibited Area	Surveillance/Impact	Pier-sediment/ limestone pavement	21° 49.010' S 114° 11.550' E	12.0	10.7
N 28	Labyrinth	Recreation	Surveillance/Impact	Lagoon	21° 49.421' S 114° 11.082' E	13.0	13.0
N31	Jurabi North/South	Recreation	Surveillance/Impact	Limestone pavement	21° 51.361' S 114° 01.243' E	1.0	5.7
N56	Tantabiddi boat ramp	Recreation	Surveillance/Impact	Lagoon	21° 54.700' S 113° 58.748' E	1.0	0.4
N35	Tantabiddi glass bottom boat tour	Recreation	Surveillance/Impact	Lagoon	21° 54.627' S 113° 57.869' E	3.5	2.9
N33	Tantabiddi-snorkel	Recreation	Surveillance/Impact	Lagoon	21° 54.913' S 113° 57.330' E	3.0	2.3
N34	Mangrove Walk	Sanctuary	Surveillance/Impact	Mangrove	21° 57.858' S 113° 56.579' E	On land	On land
N36	Mesa Camp	Recreation	Surveillance/Impact	Limestone pavement	22° 00.299' S 113° 55.555' E	1.3	0.3
N38	Lakeside	Recreation	Surveillance/Impact	Back reef	22° 02.295' S 113° 54.585' E	5.0	1.8
N37	Turquoise Bay	Recreation	Surveillance/Impact	Back reef	22° 05.979' S 113° 53.056' E	5.0	4.3
N39	Oyster Stacks	Recreation	Surveillance/Impact	Lagoon	22° 07.884' S 113° 52.565' E	0.5	-0.3
N40	Reef Retreat	Recreation	Surveillance/Impact	Lagoon	22° 09.585' S 113° 51.878' E	3.0	1.9
N41	Pilgramunna Bay	Recreation	Surveillance/Impact	Back reef	22° 11.615' S 113° 51.315' E	3.0	2.4
N43	Lefroy Bay	Recreation	Surveillance/Impact	Back reef	22° 32.447' S 113° 41.233' E	1.5	0.5
N44	Ningaloo Beach	Sanctuary	Surveillance/Impact	Limestone pavement	22° 41.669' S 113° 40.346' E	1.5	-0.2
N45	The Lagoon	Recreation	Surveillance/Impact	Lagoon	23° 03.433' S 113° 49.272' E	1.5	0.2
N54	Oyster Bridge	Recreation	Surveillance/Impact	Back reef	23° 04.326' S 113° 48.996' E	1.5	0.2
N46	Coral Bay moorings	Sanctuary	Surveillance/Impact	Sand-coral shoreline	23° 08.482' S 113° 46.198' E	3.0	2.4
N52	Coral Bay snorkel	Sanctuary	Surveillance/Impact	Lagoon	23° 08.477' S 113° 46.042' E	3.5	2.6
N57*	Monck Head channel marker	Sanctuary	Surveillance/Impact	Lagoon	23° 09.250' S 113° 45.800' E	2.0	0.5

* sites established and surveyed in May 1998

♂ coordinates using the datum WGS 84 for the northwest corner of the survey area

♀ average depth (meters)

average depth (meters) have been standardised to the chart datum and lowest astronomical tide

Table 3: Benthic Category Codes (adapted from English *et al.* 1997)

Category	Code	Notes/Remarks
Coral Families		
Acroporidae	ACR	
Dendrophylliidae	DEN	
Faviidae	FAV	
Pocilloporidae	POC	
Milleproidae	MIL	
Oculinidae	OCU	
Agariciidae	AGA	
Mussidae	MUS	
Fungiidae	FUN	
Merulinidae	MER	
Poritidae	POR	
General Coral Structures		
Digitate	D	(Acroporidae only) no 2° branching, e.g. Acropora digitifera, A. humilis
Tabular	T	(Acroporidae only) horizontal flattened plates, e.g. Acropora hyacinthus
Branching	B	at least 2° branching, e.g. Acropora palmata, A. fromosa
Encrusting	E	Major portion attached to substratum, plate-like, e.g. Acropora palifera, A. cuneata
Foliose	F	Coral attached at one or more points, leaf-like, e.g. Turbinaria sp.
Massive	M	Solid bolder or mound, e.g. Platygyra daedalea
Sub-massive	S	Forms small columns, knobs, or wedges, e.g. Porities lichen, Acropora. Palifera
Mushroom	MR	Solitary, free-living corals of Fungia
Heliopora	HL	blue coral
Millepora	ME	fire coral
Tubipora	TU	Organ-pipe coral, Tubipora musica
Dead Coral		
Dead Coral	DC1	Recently dead/bleached, white
	DC2	Dead coral with relatively new algal growth, rusty brown
Dead Coral with Algae	DCA	Coral is standing with (older) algal growth, skeletal structure can still be observed
Upturned plates	UP	Evidence of storm damage
Broken coral	BC	Coral fragments; impact other than storm/surge
Algae		
Algal Assemblage	AA	Consist of more than one species
Coralline Algae	CA	
Halimeda	HA	
Macroalgae	MA	Weedy/fleshy browns, reds, etc.
Turf Algae	TA	
Filamentous blue-green algae	FIL	
Seagrass		
Halophila ovalis	SGH	
Other Lifeforms		
Sponges	SP	
Molluscs	MU	
Urchins	U	
Soft Coral	SC	
Other	OT	Holothurians, anenomes, giant clams, etc.
Coral Predators		
Crown of Thorns	COT	
Drupella Sp.	DRU	
Abiotic		
Rubble	R	Coral fragments
Sand	S	
Silt	SI	
Rock/Limestone Pavement	RK	

3 RESULTS

3.1 Video sampling method – data sheets

See Appendix 3 for the four data sheets completed for each 'transect' site.

3.2 Video data analysis

3.2.1 Line Intercept Transect data

See Appendix 4 for the LIT data.

3.2.2 Line Intercept Transect analysed data

See Appendix 5 for the LIT analysed data.

3.2.3 Summary of Line Intercept Transect analysed data

See figure 3 for a summary of the percentage cover of major sessile benthic categories at long term monitoring 'transect' sites. See figure 4 for a summary of the percentage cover of major coral families at long term monitoring 'transect' sites. See Appendix 6 for a summary of the LIT analysed data.

3.3 'Non-transect' – data sheets

See Appendix 7 for the two data sheets completed for each 'non-transect' site.

4 DATA MANAGEMENT

4.1 Report

Hard copies of this report will be held at three locations:

1. Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St., Fremantle Western Australia, 6010. Ph. (08) 9432 5100 Fax (08) 9430 5408.
2. Woodvale Library, Science and Information division, Ocean Reef Rd., Woodvale, Western Australia, 6026. Ph (08) 9306 1641.
3. Archives, Woodvale Library, Science and Information Division, Ocean Reef Rd., Woodvale, Western Australia, 6026. Ph. (08) 9405 5100 Fax. (08) 9306 1641.

The Marine Conservation Branch will hold digital copies of this report at the following directory pathways:

1. The Marine Conservation Branch Server" mcb on 'StreetTalk\User Data@FREM.MCB@CALM' [T:\Current_MCB_reports\MMS\mms_2100]
2. MCB Server full backup DAT tape [T:\Current_MCB_reports\MMS\mms_2100]
3. CD_ROM [mms_2100]
4. MCB homepage on the Department of Conservation and Land Management Intranet CALMweb: http://calmweb.calm.wa.gov.au/drb/ncd/mcb/rep_pdf/mms_reps/mms_2000/mmsrep00.htm#mms_2100

4.2 Digital video tapes

Original digital video tapes of the 11 NMPMP 'transect" sites and 18 'non-transect' sites will be held at:

- Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St, Fremantle Western Australia, 6010.

Digital video tape duplicates of the original digital video tapes of the 11 NMPMP 'transect" sites and 18 'non-transect' sites will be held at :

- Corporate Information Services, Department of Conservation and Land Management, 50 Hayman Road, Como Western Australia, 6152. Box HOCD08 File Number: 1999F000508

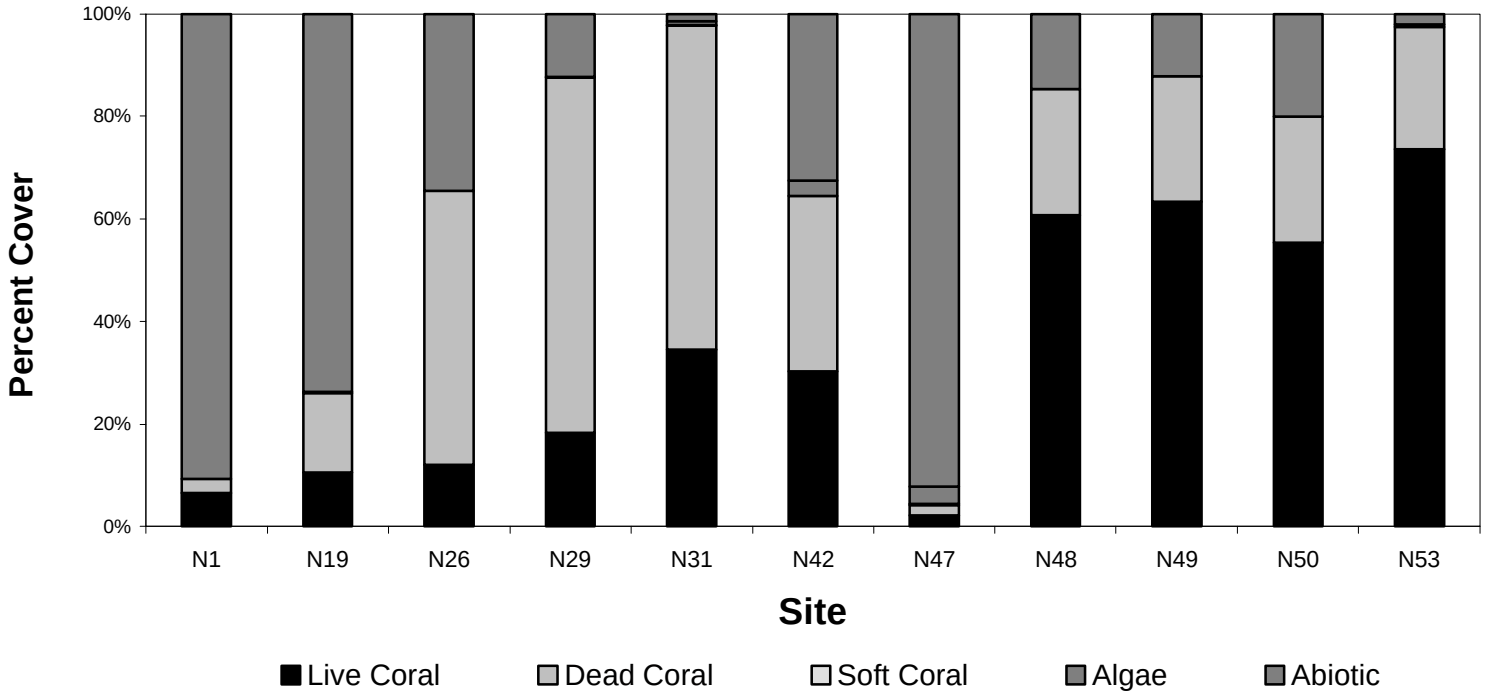

Figure 3: Percent cover of major benthic categories at long term monitoring 'transect' sites established August 1999. Sites (from left to right) run in a counter clockwise direction from near Exmouth in the north to Gnarraloo in the south (see Fig 1 and 2).

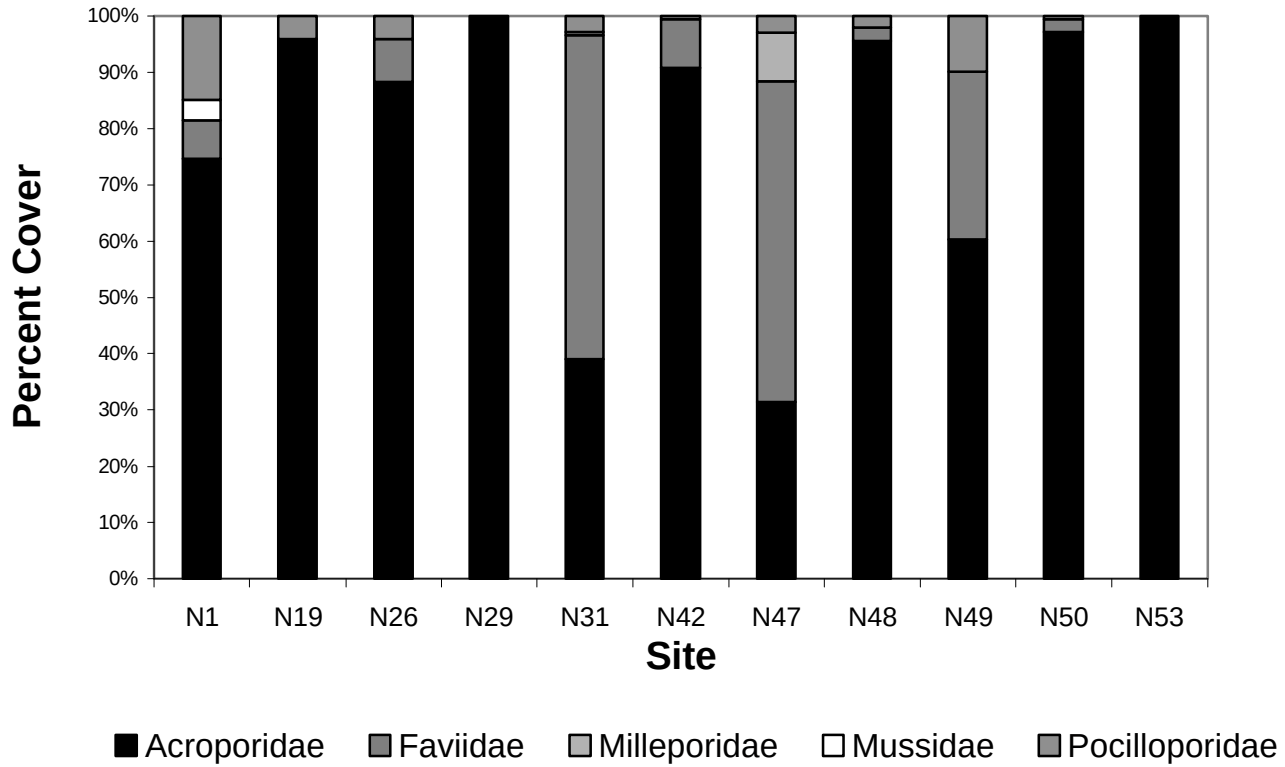

Figure 4: Percent cover of major coral family categories at long term monitoring 'transect' sites established August 1999. Sites (from left to right) run in a counter clockwise direction from near Exmouth in the north to Gnaraloo in the south (see Fig 1 and 2).

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Direction

Director, Nature Conservation Division, CALM - Keiran McNamara
Manager, Marine Conservation Branch (MCB), Nature Conservation Division, CALM - Dr. Chris Simpson
Manager, Pilbara Region, CALM - Chris Muller

CALM Regional/District collaboration

Pilbara Region - Chris Muller, Manager & George Watson, District Wildlife Officer
Exmouth District - Doug Myers, District Manager; Caroline Williams, Conservation Officer Marine & Adam Meyer, Reserves Officer Marine.

Project Supervisor - Jennie Cary MCB
Field Team Leader - Tim Daly MCB.

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This project was partially funded by $23 000 provided by *Coasts and Clean Seas* an initiative of the Natural Heritage Trust. Significant resources including scientific, technical and logistic support were provided by CALM.

APPENDIX 1: PREDICTED TIDE HEIGHTS (CM) FOR CORAL BAY AND TANTABIDDI IN AUGUST 1999

CORAL BAY

WESTERN STANDARD TIME -- PREDICTED TIDE HEIGHTS IN CMS

August 1999		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sun	1	127	127	119	102	86	73	69	74	86	104	124	140	148	142	128	106	81	59	45	43	50	67	90	111
Mon	2	126	132	127	113	96	80	69	68	74	88	107	125	138	139	132	115	94	72	55	47	50	62	83	105
Tue	3	123	133	134	125	109	91	76	67	67	75	89	106	121	129	129	120	104	84	67	56	54	63	77	99
Wed	4	117	131	137	134	122	106	88	74	67	68	75	89	103	114	119	117	108	94	79	67	61	64	75	92
Thu	5	110	126	136	138	133	120	104	87	75	68	68	74	85	95	104	108	106	98	88	77	70	70	75	87
Fri	6	102	118	130	138	139	133	121	105	89	77	69	67	76	78	85	93	97	97	93	86	80	77	79	85
Sat	7	95	109	121	132	139	140	134	123	108	93	79	69	64	64	69	75	83	89	92	91	89	85	85	85
Sun	8	90	98	108	120	131	139	141	136	126	113	97	80	67	59	56	59	66	75	85	92	95	95	93	91
Mon	9	88	90	96	105	117	129	139	145	143	133	118	99	79	63	52	47	50	60	73	87	97	102	103	99
Tue	10	93	88	85	90	99	113	128	141	149	149	138	121	99	78	65	44	40	45	59	76	94	106	111	109
Wed	11	102	91	82	78	83	93	109	126	144	153	151	140	120	95	80	48	36	35	45	63	85	104	116	118
Thu	12	113	101	86	74	71	78	88	108	129	146	154	151	137	115	87	60	42	34	37	51	73	98	119	125
Fri	13	122	113	96	70	66	64	71	88	108	130	147	153	147	129	105	76	52	38	35	43	63	88	111	126
Sat	14	131	124	109	80	70	61	61	70	87	110	131	145	147	138	118	92	66	47	39	42	55	78	103	123
Sun	15	135	132	120	102	81	64	56	60	71	91	112	130	139	138	125	104	80	58	46	44	53	71	94	115
Mon	16	131	136	129	114	94	74	61	58	62	76	94	113	128	139	135	111	91	70	55	50	54	67	87	109
Tue	17	126	135	134	123	106	86	70	61	60	67	80	97	111	119	120	112	97	80	65	57	57	66	82	102
Wed	18	119	131	134	129	116	99	81	68	62	63	71	84	96	106	110	108	99	87	74	66	63	68	83	96
Thu	19	112	124	131	131	123	110	94	79	69	63	67	75	84	93	99	101	98	90	81	73	69	71	79	91
Fri	20	105	117	125	129	126	116	105	92	80	72	69	70	75	82	87	91	92	90	86	80	77	77	81	89
Sat	21	99	109	118	123	125	122	115	104	93	82	75	71	70	72	75	80	84	86	87	85	84	83	85	88
Sun	22	94	101	109	115	120	122	120	115	106	95	85	78	70	67	67	70	74	80	85	88	90	90	90	91
Mon	23	92	95	100	106	113	119	122	122	117	109	98	85	74	65	60	60	64	71	79	87	93	96	97	95
Tue	24	93	91	92	96	103	111	119	125	126	122	112	98	83	69	58	53	54	61	71	84	94	101	103	101
Wed	25	96	90	88	89	91	101	112	123	131	132	125	113	95	76	60	49	46	51	62	77	93	104	109	105
Thu	26	101	92	88	79	80	90	101	116	129	137	136	126	109	88	67	50	42	43	52	69	88	104	114	115
Fri	27	109	97	89	73	70	75	85	104	122	136	141	137	123	102	78	59	42	39	45	60	81	102	117	122
Sat	28	118	106	99	73	63	63	71	87	108	128	141	143	134	116	91	66	47	38	40	52	73	97	117	128
Sun	29	127	116	96	76	62	55	59	70	90	113	132	142	140	126	105	79	56	42	39	47	65	90	113	130
Mon	30	135	126	111	89	64	53	50	56	72	94	117	133	138	132	115	93	69	50	42	48	66	92	107	129
Tue	31	138	135	125	104	80	59	49	47	56	74	97	117	129	130	121	103	82	62	49	48	67	78	99	122

TANTABIDDI

WESTERN STANDARD TIME -- PREDICTED TIDE HEIGHTS IN CMS

August 1999		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sun	1	139	141	133	117	96	79	71	72	84	105	129	149	157	156	143	129	92	66	47	41	46	67	94	119
Mon	2	137	145	142	129	109	88	73	68	75	89	110	132	147	152	149	130	107	80	58	46	49	62	85	111
Tue	3	132	145	146	140	124	102	82	70	67	74	91	112	130	141	149	136	117	95	73	55	54	61	79	102
Wed	4	125	141	146	146	137	119	98	80	70	68	76	92	113	124	131	131	121	106	87	73	65	64	76	95
Thu	5	118	134	146	151	146	134	116	97	81	71	69	76	89	103	113	119	118	110	96	85	78	73	77	90
Fri	6	107	124	138	148	150	145	133	116	99	83	73	70	74	82	92	101	107	107	103	95	89	84	83	89
Sat	7	99	113	127	139	147	150	145	135	120	103	88	74	68	66	73	80	89	97	101	102	99	96	96	99
Sun	8	95	103	113	125	137	146	150	148	139	125	108	89	73	63	58	61	69	80	92	101	106	107	104	100
Mon	9	97	99	100	109	121	134	146	153	153	146	131	111	89	69	55	48	51	61	77	94	107	115	116	112
Tue	10	104	99	91	93	102	119	131	147	159	159	151	135	111	85	61	45	39	44	58	80	102	118	125	123
Wed	11	116	103	90	82	84	94	110	131	151	163	164	154	134	107	77	52	37	34	45	64	91	115	130	133
Thu	12	128	115	97	80	73	76	88	109	133	154	166	165	152	129	99	67	43	32	34	49	76	106	129	140
Fri	13	139	129	110	89	71	65	70	86	110	136	157	166	162	146	120	87	57	38	32	40	62	92	120	140
Sat	14	146	140	125	102	78	63	60	68	87	114	139	158	163	154	134	105	74	50	37	38	53	80	110	134
Sun	15	147	148	137	117	92	70	56	58	73	92	118	139	152	153	141	119	91	64	46	41	56	71	99	125
Mon	16	143	150	145	130	107	83	65	57	61	75	99	121	137	144	140	126	104	78	58	48	61	66	90	116
Tue	17	135	147	148	139	121	98	77	63	59	66	83	103	120	131	133	126	111	90	71	59	66	66	94	107
Wed	18	123	141	147	143	131	112	91	74	59	64	73	88	104	116	122	121	112	96	82	69	64	63	82	100
Thu	19	110	133	142	143	136	122	105	88	75	68	70	78	90	102	109	112	109	101	90	80	74	74	83	96
Fri	20	111	124	134	138	137	129	116	101	88	78	73	75	80	88	95	100	102	100	95	88	84	83	86	95
Sat	21	105	116	125	131	134	131	124	114	102	91	82	77	76	78	82	87	91	94	96	94	92	91	93	98
Sun	22	102	108	116	122	127	130	129	124	116	105	94	84	77	72	71	74	79	85	91	93	96	99	100	100
Mon	23	101	103	107	112	119	126	129	130	127	120	109	96	83	73	65	63	66	74	84	94	102	108	108	106
Tue	24	103	100	99	101	108	116	125	132	135	133	124	111	94	77	63	55	55	61	74	89	102	112	115	114
Wed	25	108	100	93	91	95	105	117	130	139	143	139	127	109	87	67	52	47	50	62	81	100	114	122	122
Thu	26	116	104	91	83	82	90	104	121	137	147	149	142	125	102	78	55	43	41	51	72	94	114	127	130
Fri	27	125	113	95	79	72	75	87	105	126	145	154	153	140	119	91	63	44	37	42	59	84	110	129	137
Sat	28	134	122	104	82	67	64	71	86	112	135	152	157	150	130	107	77	52	38	37	50	74	103	127	141
Sun	29	140	134	115	91	69	57	57	69	91	115	142	154	155	140	122	93	69	44	38	44	64	95	122	142
Mon	30	144	145	129	105	78	58	50	54	71	97	124	144	152	148	132	109	79	54	42	43	59	84	114	138
Tue	31	152	154	142	121	93	67	51	46	55	75	102	127	142	146	137	119	96	68	51	47	58	75	103	131

APPENDIX 2: NMP 08/99 VIDEO TAPES

Tapes #	Programme	Description	Digital original	VHS copy	Digital copy
MMS/PI/NMP/BVT#1-08-99	Ningaloo Marine Park Monitoring Program	N32,N30,N1	Digital	No	Yes
MMS/PI/NMP/BVT#2-08-99	Ningaloo Marine Park Monitoring Program	N31,N36,N19	Digital	No	Yes
MMS/PI/NMP/BVT#3-08-99	Ningaloo Marine Park Monitoring Program	N38,N34,N37,N39,N35,N56	Digital	No	Yes
MMS/PI/NMP/BVT#4-08-99	Ningaloo Marine Park Monitoring Program	N33,N40,N41,N43,N44	Digital	No	Yes
MMS/PI/NMP/BVT#5-08-99	Ningaloo Marine Park Monitoring Program	N26,N42,N29	Digital	No	Yes
MMS/PI/NMP/BVT#6-08-99	Ningaloo Marine Park Monitoring Program	N47,N53,N49	Digital	No	Yes
MMS/PI/NMP/BVT#7-08-99	Ningaloo Marine Park Monitoring Program	N46,N45,N54,N52	Digital	No	Yes
MMS/PI/NMP/BVT#8-08-99	Ningaloo Marine Park Monitoring Program	N50,N48	Digital	No	Yes

APPENDIX 3: DATA SHEETS – 'TRANSECT' SITES

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N26	**Site Name**	Bundegi, Sanctuary south	**Date**	9-8-99	**Recorder**	Meyer
Time	14:50	**Video tape no.**	NMPMP/bvt/9-08-99 /#5			**Video operator**	Daly

T1	**Length (m)**	**50**	**Compass bearing (°)**	180	**Distance to T2 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	21° 52.222' S		114° 09.432' E		60cm Star/steel	0.9
Finish	° ' S		° ' E			
Notes:						

T2	**Length (m)**	**50**	**Compass bearing (°)**	180	**Distance to T3 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	21° 52.254' S		114° 09.432' E		60cm Star/steel	0.9
Finish	° ' S		° ' E			
Notes:						

T3	**Length (m)**	**50**	**Compass bearing (°)**	195	**Distance to T1 (m)**	170
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	21° 52.280' S		114° 9.434' E		60cm Star/steel	0.9
Finish	21° 52..308' S		114° 9.423' E			
Notes: A large bommie is located to the east of the transect line at the 30m mark.						

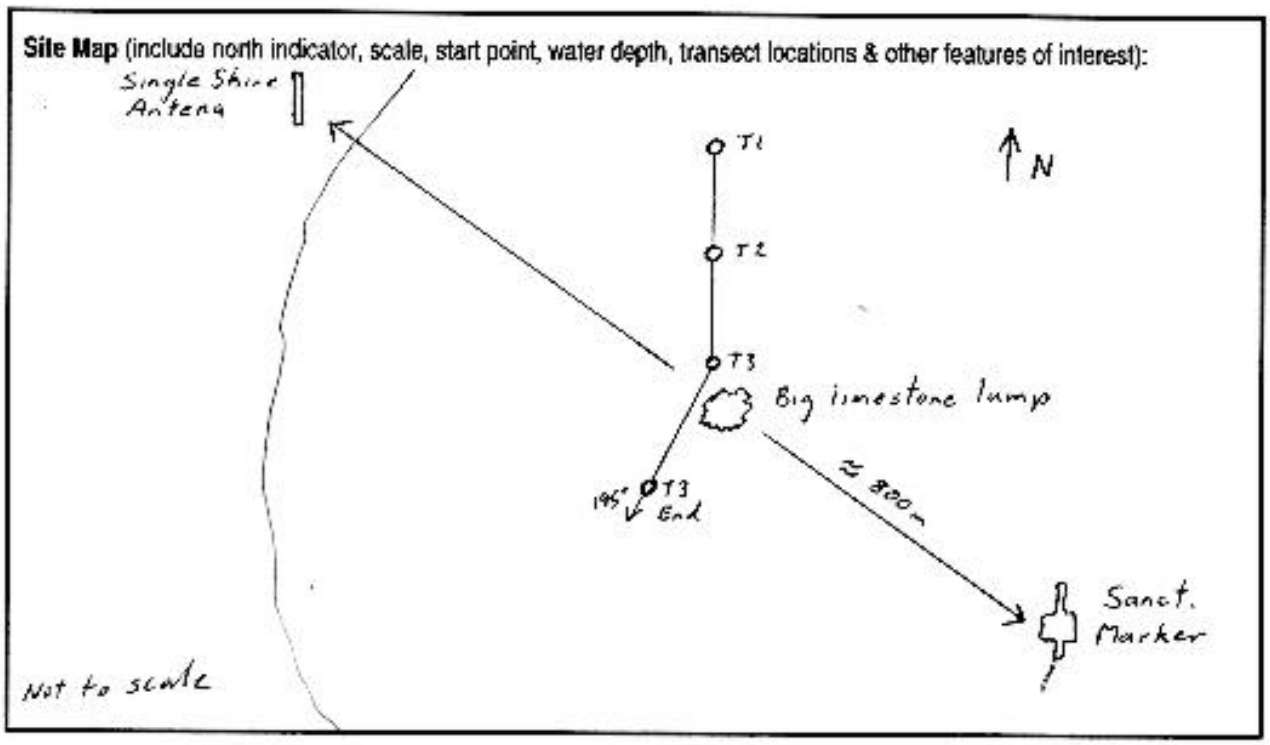
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N26	**Site Name**	Bundegi Sanctuary south	**Date**	9-8-99	**Recorder**	Mahendran

T1 Latitude start	**T1 Longitude start**	**Differential**			
21° 52.222' S	114° 09.432' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon - rubble		
Video reference	NMPMP/bvt/9-08-99 /#5	**Aerial reference**	5157/WA 2286/RUN3/840048

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N26	**Site Name**	Bundegi sanctuary south	**Date**	9-8-99	**Recorder**	Mahendran
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac		**Time**	14:50	**Weather**		
Sea			**Water depth (m)**		**Water visibility (m)**		
GPS Latitude			**GPS Longitude**		**Differential**		
21° 52.222' S			114° 9.432' E		**Yes**	☒	**No** ☐
Site location	Site is located on the southern boundary of Bundegi Sanctuary.						

Habitat Description

Lagoon – coral dominated by rubble and *Acropora* sp. (branching and tabular), with extensive cyclone damage (cyclone Vance, 1999).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Acropora* sp. (branching and tabular) and occasional Fungiidae and *Echinopora* sp.
Fish	Pomacentridae (damselfish) and Labridae (small wrasse).
Invertebrates	*Panulirus sp.* x 3 (rock lobster) and occasional Comasteridae (feather stars)

Other Features

Serrandidae x1 (Large cod - 1.8m in length).
Porites sp. (bommie – 4x3x3m)

Impact or Activity

Extensive cyclone damage (cyclone Vance, 1999). No *Drupella* sighted.

Video reference	NMPMP/ bvt /9-08-99 /#5	**Aerial reference**	5154/WA 2286/RUN3/840048
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N26	**Site Name**	Bundegi Sanctuary South	**Date**	8-9-99	**Recorder**	Daly
Start time	14:47	**Finish time**	15:40	**Depth (m)**	3.0	**Visibility (m)**	5.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Daly	**Tape no.**	NMPMP/bvt/8 /#5	**Height above substrate (cm)**	50
Time coding for all video footage at site:		**From:**	0:0:0:0	**To:**	:16:42:05

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	0:0:43:12	0:4:55:23	4.12
T2	0:5:37:12	:10:15:24	4.46
T3	0:11:15:	:16:42:05	5.27

TRANSECT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N19	**Site Name**	Bundegi (re-survey)	**Date**	6-8-99	**Recorder**	Cary
Time	15:00	**Video tape no.**	NMPMP/bvt/6-8-99 /#2		**Video operator**		Williams

T1	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T2 (m)**	
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start	21° 51.409' S	114° 9.959' E	1.5-22.0	60 cm Star steel	0.15	
Finish	° ' S	° ' E				

Notes:
Re-survey of N19 established in 1998. The star pickets could not be re-located. Transect 1 started at a 1.5m tabular coral which was the only live coral in the area.

T2	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T3 (m)**	
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start	21° 51.429' S	114° 9.959' E	11.5-2.0	60cm star steel	0.15	
Finish	° ' S	° ' E				

Notes:
The only live corals were *Montipora* sp., *Porites* sp. (branching), *Acropora* sp. (digitate) and *Pocillopora* sp. The majority of tabular and branching corals were dead.

T3	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T1 (m)**	
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start	21° 51.453' S	114° 9.942' E	1.5-2.0	60 cm Star steel	0.15	
Finish	21° 51.453' S	114° 9.923' E	1.5-2.0	60cm Star steel	0.15	

Notes:
Live corals include *Montipora* sp., *Porites* sp. (Branching), *Pocillopora* sp. and *Favites* sp.

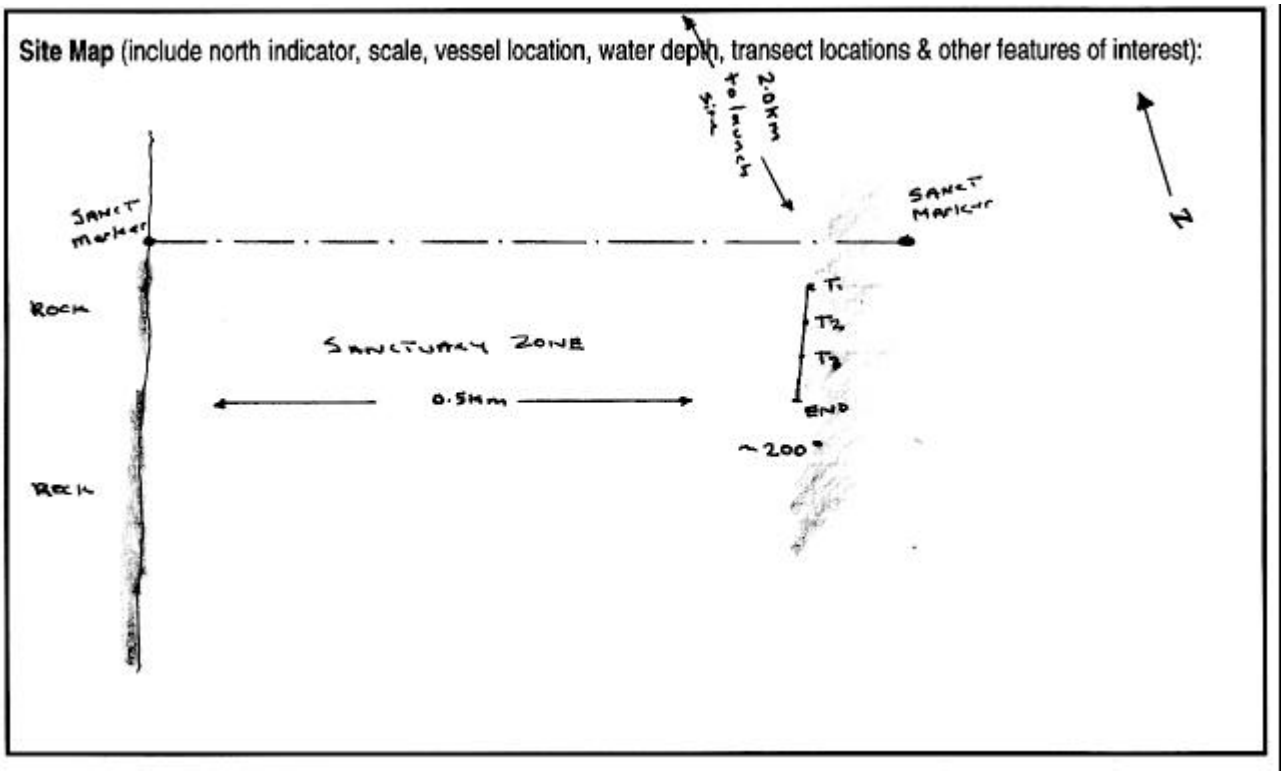
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N19	**Site Name**	Bundegi (re-survey)	**Date**	6-8-99	**Recorder**	Mahendran

T1 Latitude start	**T1 Longitude start**	**Differential**			
21° 51.409' S	114° 09.982' E	**Yes**	☒	**No**	☐

Habitat type	Back reef – coral with extensive cyclone damage.		
Video reference	NMPMP/bvt/6-8-99 /#2	**Aerial reference**	5155/WA 2286/RUN3/840048

Site Map (include north indicator, scale, vessel location, water depth, transect locations & other features of interest):



Notes:
Re-survey of N19 established in 1998.
The majority of *Acropora* sp. (tabular and branching) are dead with upturned plates and branching corals broken into small pieces.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N19	**Site Name**	Bundegi (re survey)	**Date**	6-8-99	**Recorder**	Cary
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	15:00	**Weather**	15 knots SSE		
Sea	Calm	**Water depth (m)**	3.0	**Water visibility (m)**	5.0		

GPS Latitude	**GPS Longitude**	**Differential**			
21° 51.409' S	114° 9.982' E	**Yes**	☒	**No**	☐

Site location	Site located immediately inside reef crest

Habitat Description

Back reef – coral with extensive cyclone damage (cyclone Vance, 1999).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Montipora* sp., *Porites* sp. (branching), *Favites* sp. and *Pocillopora* sp.
Fish	
Invertebrates	*Panulirus sp.* – numerous (rock lobster).

Other Features

Impact or Activity

The majority of *Acropora* sp. (tabular and branching) are dead with upturned plates and branching corals broken into small pieces probably the result of cyclone Vance (1999). Numerous small *Acropora* sp (digitate) – 10cm diameter. Prawn net found wrapped around coral. Numerous Panulirus sp. (rock lobster) sighted. No *Drupella* sighted.

Video reference	NMPMP/bvt/6-8-99 /#2	**Aerial reference**	5155/WA 2286/RUN3/840048
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N19	**Site Name**	Bundegi (re-survey)	**Date**	6-8-99	**Recorder**	Daly
Start time	14:00	**Finish time**	15:00	**Depth (m)**	0.5 – 1.8	**Visibility (m)**	4.0 – 6.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Cary/ Williams	**Tape no.**	NMPMP/bvt/6-8-99 /#2	**Height above substrate (cm)**	40.0
Time coding for all video footage at site:		**From:**	00:0:0:0	**To:**	29:40:05:

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	12:54:21:	17:51:07:	4.57
T2	18:31:18:	23:31:11:	5.00
T3	24:06:01:	28:52:02:	4.46

Notes:

12 minutes of general footage of cyclone damage.

TRANSECT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N1	**Site Name**	Bundegi (re- survey)	**Date**	4-8-99	**Recorder**	Cary
Time	15:00	**Video tape no.**	NMPMP/bvt/04-08-99 /# 1			**Video operator**	Cary

T1	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T2 (m)**	
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start 98	21° 49.699' S	114° 10.718' E		60 cm Star steel		
Finish	° ' S	° ' E		60 cm Star steel		

Notes: (eg. Description of habitat and dominant species along transect)
Re-survey of N1 established in 1998.

T2	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T3 (m)**	
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start 98	21° 49.725' S	114° 10.698' E		60 cm Star steel		
Finish	° ' S	° ' E				

Notes:
A terracotta pipe (possible discarded octopus trap) was found at the 27m mark. Within a 5m radius of the end of the transect litter sighted included drink containers x 10 and a lot of terrestrial debris (eg. spinifex) and dead Gorgonian corals were observed. *Panulirus sp.* (rock lobster) were sighted.

T3	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T1 (m)**	
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start 98	21° 49.750' S	114° 10.682' E		60 cm Star steel		
Finish98	21° 49.776' S	114° 10.678' E		60 cm Star steel		

Notes: The dominant coral was *Montipora* sp. To the west of the transect there was a large quantity of litter including:
cans >20, pvc pipe (5m X 0.12m), boat windscreen, rope at 3 sites, chain (1m X 20cm thick), timber x 2 (one 1.5 X 0.5m X 0.2m).
One *Acanthaster planci* (crown of thorn starfish) was observed near T3.

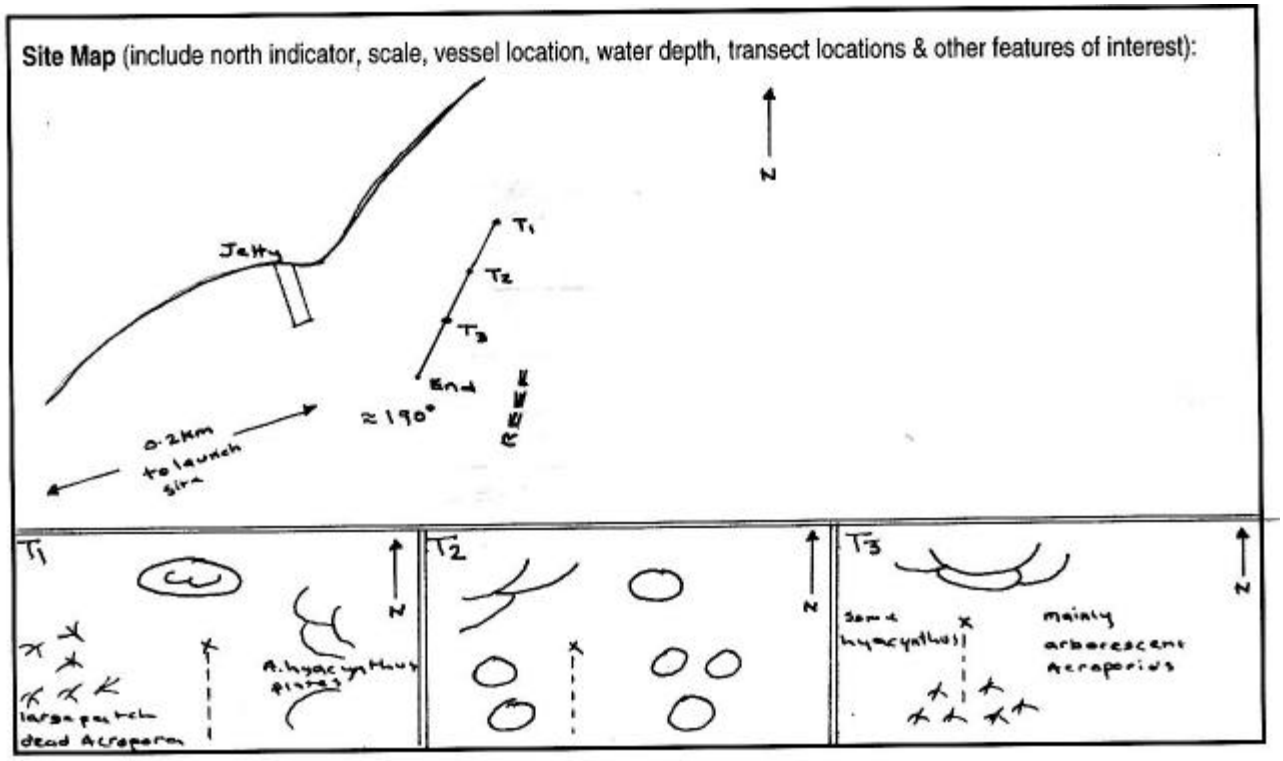
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N1	**Site Name**	Bundegi (re-survey)	**Date**	4-8-99	**Recorder**	Cary

T1 Latitude start	**T1 Longitude start**	**Differential**			
21° 49.699' S	114° 10.718' E	**Yes**	☒	**No**	☐

Habitat type	Back reef – coral dominated by *Acropora* sp. (branching) broken into small pieces. Reef has a high silt load and there is evidence of cyclone damage (cyclone Vance, 1999).		
Video reference	NMPMP/ bvt/4-8-99 /#1	**Aerial reference**	5157/WA 2286/RUN3/840048

Site Map (include north indicator, scale, vessel location, water depth, transect locations & other features of interest):



Notes:
Re-survey of N1 established in 1998. No wind and flooding tide when re- surveyed

Bearings	T3(Start)	T3(End)
Dolphin on Pier	055°	045°
End of Jetty	309°	320°
White tower	218°	217°

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N1	**Site Name**	Bundegi (re-survey)	**Date**	4-08-99	**Recorder**	Cary
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac		**Time**	15:00	**Weather**		
Sea	Calm		**Water depth (m)**	3.0	**Water visibility (m)**		10.0

GPS Latitude	GPS Longitude	Differential			
21° 49.699' S	114° 10.718' E	**Yes**	☒	**No**	☐

Site location	Site located in Exmouth Gulf, north of Exmouth.

Habitat Description

Back reef – coral dominated by *Acropora* sp. (branching) broken into small pieces. Reef has a high silt load and there is evidence of cyclone damage (cyclone Vance, 1999).

Dominant Species

Seagrass	
Macro-algae	Significant algal growth over dead coral
Coral	*Acropora* sp. (branching and digitate) and *Montipora* sp.
Fish	Platycephalidae (Flathead – up to 50cm in length), Labridae (wrasse), Pomacentridae (damselfish), and Scaridae (parrotfish)
Invertebrates	*Acanthaster planci* x 1 (crown of thorn Starfish) and feather star.

Other Features

In March 1999 cyclone Vance passed over Exmouth. The strongest winds were from the east.

Impact or Activity

A lot of litter was sighted, which could be due to cyclone Vance, as terrestrial debris, included spinifex. Litter also included: terracotta pipe (possible discarded octopus trap), cans >20; pvc pipe (5m x 0.12m), boat windscreen, rope at 3 sites, chain (1m x 20cm thick), timber x 2 (one 1.5 x 0.5m x 0.2m). One *Acanthaster planci* (crown of thorns starfish) but no feeding scars and *Panulirus sp.* (rock lobster) were sighted. No *Drupella* sighted.

Video reference	NMPMP/ bvt/4-08-99 /#1	**Aerial reference**	5157/WA 2286/RUN3/840048
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N1	**Site Name**	Bundegi	**Date**	4-8-99	**Recorder**	Cary
Start time	15:00	**Finish time**	15:30	**Depth (m)**	3.0	**Visibility (m)**	7.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.														
Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐
Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Cary	**Tape no.**	NMPMP/bvt/4- 8- 99 /#1	**Height above substrate (cm)**	40
Time coding for all video footage at site:		**From:**	:6:36:20	**To:**	:21:04:04

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	:7:38:10	:11:28:07	3.50
T2	:11:51:02	:14:57:08	3.06
T3	:17:00:00	:21:04:04	4.04

Notes:

360° scan at beginning of each transect
Footage of litter was taken at the beginning of transect 3 within a five meter radius of the star picket.
Problems with the record/pause button on the camera meant that filming had to be restarted four times.

TRANSECT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N29	**Site Name**	Bundegi North	**Date**	13-8-99	**Recorder**	George Watson
Time	12:00	**Video tape no.**	NMPMP/bvt/13-8-99 /#5		**Video operator**		Williams

T1	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T2 (m)**	60.0
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start	21° 49.421' S	114° 11.082' E	<5.0	60cm Steel star	0.8	
Finish	21° 49.455' S	114° 11.087' E	<5.0	60cm Steel star	1.6	
Notes:						

T2	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T3 (m)**	60.0
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start	21° 49.455' S	114° 11.082' E	<5.0	60cm Steel star	1.6	
Finish	21° 49.479' S	114° 11.084' E	<5.0	60cm Steel star	0.8	
Notes:						

T3	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T1 (m)**	60.0
Transect	**DGPS Lat**	**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**	
Start	21° 49.479' S	114° 11.087' E	<5.0	60cm Steel star	0.8	
Finish	21° 49.510' S	114° 11.090' E	<5.0	60cm Steel star	0.8	
Notes: There is a strong tidal flow so the site was dived during slack water.						

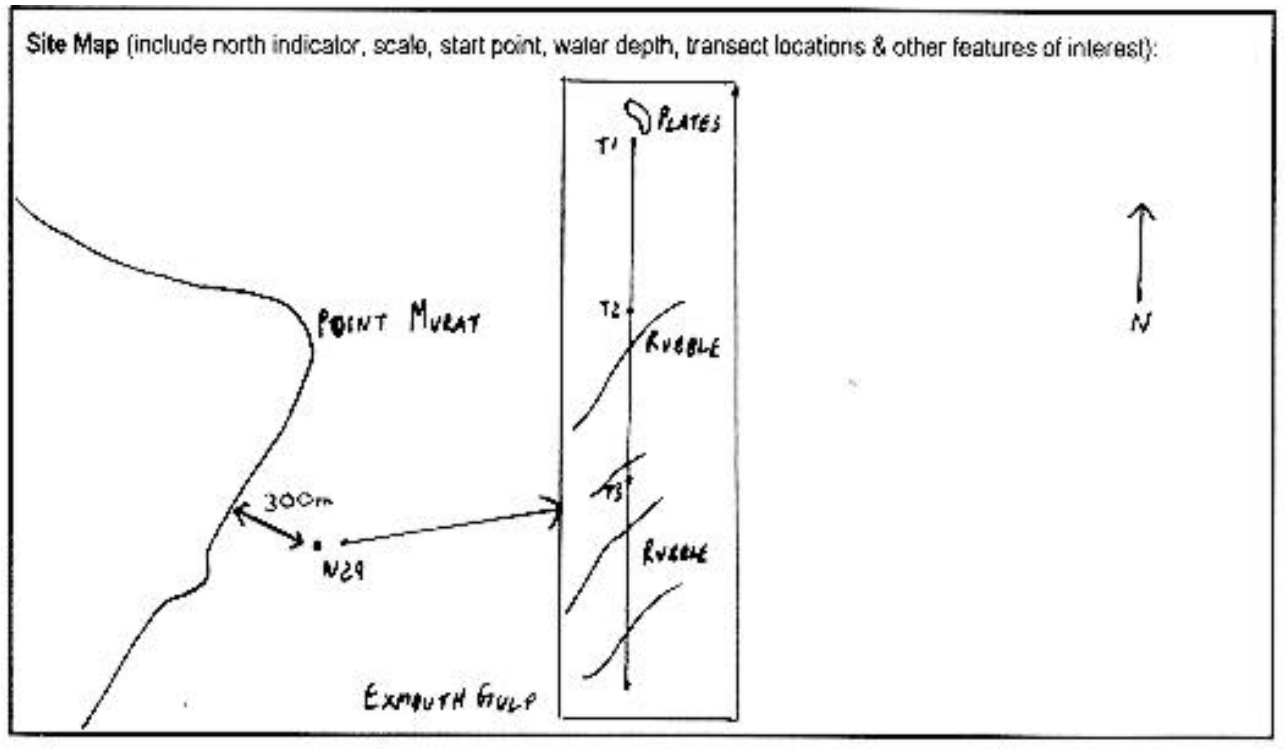
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N29	**Site Name**	Bundegi North	**Date**	13-8-99	**Recorder**	George Watson

T1 Latitude start	**T1 Longitude start**	**Differential**			
12° 49.421' S	114° 11.082' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon – coral dominated by *Acropora* sp. (branching and tabular) with cyclone damage evident (cyclone Vance, 1999).		
Video reference	NMPMP/bvt/13-8-99 /#5	**Aerial reference**	5158/WA 2286/RUN3/840048

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:
Strong tidal flow

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N29	**Site Name**	Bundegi North	**Date**	13-8-99	**Recorder**	George Watson
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	12:00	**Weather**	Fine ENE 19 knots		
Sea	Choppy	**Water depth (m)**	5.0	**Water visibility (m)**	3.0 – 4.0		

GPS Latitude	**GPS Longitude**	**Differential**			
21° 49.421' S	114° 11.082' E	**Yes**	☒	**No**	☐

Site location	Site located 300m from shore and halfway between Bundegi Jetty and the pier.

Habitat Description

Lagoon – coral dominated by *Acropora* sp. (branching and tabular) with cyclone damage evident (cyclone Vance, 1999).

Dominant Species

Seagrass	
Macro-algae	Some coralline algae and filamentous blue – green algae found on dead coral
Coral	*Acropora* sp., Fungiidae, *Pocillopora* sp.and *Millipora* sp.
Fish	Pomacentridae (damselfish), Scaridae (parrot fish) and *Synanceja horrida* (stonefish)
Invertebrates	Feather stars and nudibranchs.

Other Features

Impact or Activity

The site is known as a thoroughfare for boats using the Bundegi boat ramp or visiting the nearshore waters for fishing, anchoring, mooring, etc. During the survey poor weather conditions meant that no boats were observed using the area. Cyclone damage (cyclone Vance, 1999) evident with *Acropora* sp. (tabular and branching) upturned and broken. Large fish species are rare and no *Panulirus* sp. (rock lobster) were sighted. No *Drupella* sighted.

Video reference	NMPMP/ bvt/13-8-99 /#5	**Aerial reference**	5158/WA 2286/RUN3/840048
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N29	**Site Name**	Bundegi North	**Date**	13-8-99	**Recorder**	Mahendran
Start time	12:00	**Finish time**	14:00	**Depth (m)**	4.0	**Visibility (m)**	2.0 - 4.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Williams	**Tape no.**	NMPMP/bvt/13-08-99 /#5	**Height above substrate (cm)**	40
Time coding for all video footage at site:		**From:**	0:0:0:0	**To:**	:16:00:10

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	:0:36:19	:5:50:16	5.14
T2	:6:30:03	:10:48:10	4.18
T3	:11:12:04	:15:25:14	4.13

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N32	Site Name	Tantabiddi Lagoon	Date	3-08-99	Recorder	Daly
Time	15:00	Video tape no.	NMPMP/bvt/03-08-99 /#1		Video operator		Cary

T1	Length (m)	50	Compass bearing (°)		Distance to T2 (m)	10.0
Transect	DGPS Lat	DGPS Long	Depth (m)	Picket type	Picket ht (m)	
Start	21° 54.511' S	113° 57.812' E	3.0	60 cm Star steel	0.3	
Finish	° ' S	° ' E				

Notes: (eg. description of habitat and dominant species along transect)
Transect 1 begins near a *Porites* sp. (massive) one meter in diameter.

T2	Length (m)	50	Compass bearing (°)		Distance to T3 (m)	
Transect	DGPS Lat	DGPS Long	Depth (m)	Picket type	Picket ht (m)	
Start	21° 54.537' S	113° 57.808' E	3.0	60 cm Star steel	0.3	
Finish	° ' S	° ' E				

Notes:
Transect 2 starts on a ridge near a valley with two large colonies of *Echinopora* sp.

T3	Length (m)	50	Compass bearing (°)		Distance to T1 (m)	
Transect	DGPS Lat	DGPS Long	Depth (m)	Picket type	Picket ht (m)	
Start	21° 54.571' S	113° 57.806' E	3.0	60cm Star steel	0.3	
Finish	21° 54.599' S	113° 57.808' E				

Notes:

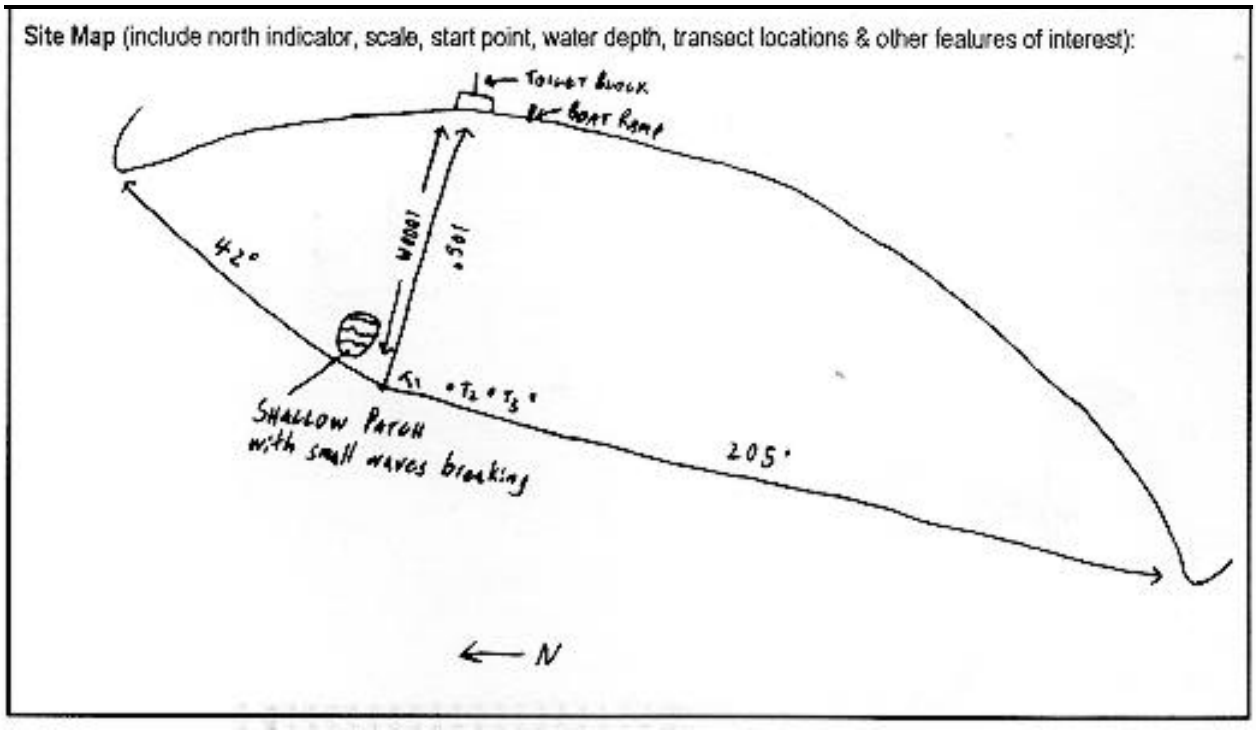
TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N32	**Site Name**	Tantabiddi Lagoon	**Date**	3-8-99	**Recorder**	Tim Daly

T1 Latitude start	**T1 Longitude start**	**Differential**			
21° 54.511' S	113° 57.812' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon – coral dominated by *Echinopora* sp.- colonies small up to large 3m in diameter, *Acropora* sp. (branching and digitate), *Porites nigrescens* (branching) and *Porites* sp. (massive). Extensive dead coral covered with macro algae.		
Video reference	NMPMP/bvt/3-08-99 /#1	**Aerial reference**	5031/WA 3405/RUN 4/940592

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:
Fairly calm day small waves breaking over shallow patch about 150m from T1.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N32	**Site Name**	Tantabiddi Lagoon	**Date**	3-08-99	**Recorder**	Cary
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	15:00	**Weather**	Slight SSE 8/10K		
Sea	CALM	**Water depth (m)**	3.0	**Water visibility (m)**	10.0		
GPS Latitude		**GPS Longitude**		**Differential**			
21° 54.511' S		113° 57. 81E		**Yes**	☒	**No**	☐
Site location	Site located 1km west south west of the boat ramp.						

Habitat Description

Lagoon – coral dominated by *Echinopora* sp.- colonies small up to large 3m in diameter, *Acropora* sp. (branching and digitate), *Porites nigrescens* (branching) and *Porites* sp. (massive). Extensive dead coral covered with macro algae.

Dominant Species

Seagrass	
Macro-algae	Dense macro algae on dead coral
Coral	*Echinopora* sp, *Acropora* sp. (branching and digitate), *Porities nigrescens* (branching), *Porites* sp. (massive)
Fish	Chaetodontidae (butterflyfish) and Labridae (wrasse),
Invertebrates	*Panulirus* sp. (rock lobster).

Other Features

Impact or Activity

Drupella in low density. No litter was sighted. *Panulirus* sp. (rock lobster) were sighted.

Video reference	NMPMP/bvt /03-08-99 /#1	**Aerial reference**	5031/WA 3405/RUN 4/940592
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N32	**Site Name**	Tantabiddi Lagoon	**Date**	3-8-99	**Recorder**	Cary
Start time	15:30	**Finish time**	16:15	**Depth (m)**	3.0	**Visibility (m)**	10.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Cary	**Tape no.**	NMPMP/bvt/3-08-99 /#1	**Height above substrate (cm)**	42
Time coding for all video footage at site:		**From:**	0:0:0:0	**To:**	:23:39:

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	:01:22:12	:6:12:10	4.50
T2	:7:14:24	:12:36:20	5.22
T3	:13:43:02	:19:18:02	5.35

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N42	**Site Name**	Winderabandi	**Date**	11-8-99	**Recorder**	George Watson
Time	12:30	**Video tape no.**	NMPMP/bvt/11-8-99 /#5		**Video operator**		Caroline Williams

T1	**Length (m)**	**50**	**Compass bearing (°)**	185	**Distance to T2 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	22° 28.89' S		113° 42.596' E	1.0 – 2.0	60cm Steel star	0.9
Finish	22° 28.923' S		113° 42.591' E		60cm Steel star	

Notes:
Dominated by *Acropora* sp. (tabular) with common *Porites* sp. and *Pocillopora* sp. and occasional Fungidae, soft corals and sand patches

T2	**Length (m)**	**50**	**Compass bearing (°)**	185	**Distance to T3 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	22° 28.923' S		113° 42.591' E	<1.0	60cm Steel star	0.9
Finish	22° 28.955' S		113° 42.586' E	<1.0	60cm Steel star	0.9

Notes:
Dominated by *Acropora* sp. and other common corals include *Porites* sp. and *Pocillopora* sp. and occasional soft corals.

T3	**Length (m)**	**50**	**Compass bearing (°)**	194	**Distance to T1 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	22° 28.955' S		113° 42.586' E	<1.0	60cm Star steel	0.9
Finish	22° 28.979' S		113° 42.579' E	<2.0	60cm Star steel	1.8

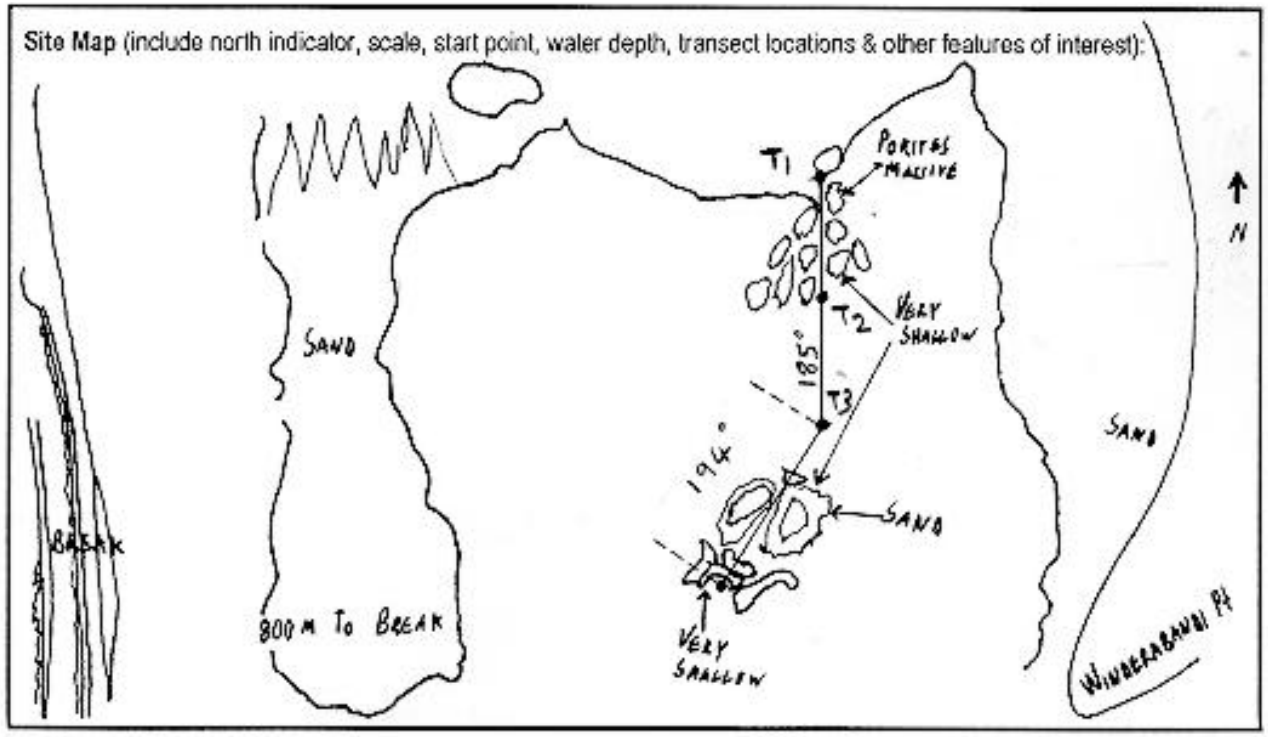
Notes:
Dominated by *Acropora* sp. and other common corals include *Porites* sp., *Pocillopora* sp., Fungidae, soft corals and some sand patches.

LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N42	**Site Name**	Winderabandi	**Date**	11-8-99	**Recorder**	Watson
T1 Latitude start		**T1 Longitude start**			**Differential**		
22° 28.89' S		113° 42.596' E			**Yes**	☒	**No** ☐

Habitat type	Back reef – coral dominated by *Acropora* sp.		
Video reference	NMPMP/bvt/9,11,13-8-99 /#5	**Aerial reference**	5003/WA 3405/RUN7/940592

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:
Transect 1 begins directly south of a *Porites* sp. (massive). The site should be surveyed during a high tide as the site is shallow.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N42	**Site Name**	Winderabandi	**Date**	11-8-99	**Recorder**	George Watson
Vessel		**Time**	12:30	**Weather**	Fine 24 SE 12 knots		
Sea	Calm	**Water depth (m)**	2.0 - 0.4	**Water visibility (m)**	20.0		

GPS Latitude	**GPS Longitude**	**Differential**			
22° 28.89' S	113° 42.596' E	**Yes**	☒	**No**	☐

Site location	Site located on the back reef 2 km north of Winderabandi Pt.

Habitat Description

Back reef – coral dominated by *Acropora* sp.

Dominant Species

Seagrass	
Macro-algae	Turban weed (rare)
Coral	*Porites* sp., *Acropora* sp., *Pocillopora* sp. and Fungidae
Fish	Pomacentridae (damselfish)
Invertebrates	Star fish and *Drupella* (low density)

Other Features

Sousa chinensis x 3 (Indo-Pacific humpbacked dolphin) sighted near the transect.

Impact or Activity

Drupella in low density. No litter was sighted. *Panulirus* sp. (rock lobster) were sighted

Video reference	NMPMP/ BVT/11-8-99 /#5	**Aerial reference**	50093/WA 3405/RUN7/940592
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N42	**Site Name**	Winderabandi	**Date**	11-8-99	**Recorder**	Watson
Start time	12:30	**Finish time**	12:46	**Depth (m)**	2.0 - 4.0	**Visibility (m)**	20.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Williams	**Tape no.**	NMPMP/bvt/11-8-99 /#5	**Height above substrate (cm)**	42
Time coding for all video footage at site:		**From:**	:00:38:00	**To:**	:14:08:13

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	:00:38:00	:04:50:05	4.12
T2	:5:04:14	:8:45:14	3.41
T3	:9:27:09	:14:08:13	4.41

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N47	**Site Name**	Bills Bay North	**Date**	16-8-99	**Recorder**	Daly/ Myer
Time	14:15	**Video tape no.**	NMPMP/bvt/16-8-99 /#6			**Video operator**	Williams

T1	**Length (m)**	**50**	**Compass bearing (°)**	180	**Distance to T2 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 7.463' S		113° 45.552' E	4m	90cm Star steel	0.25
Finish	° ' S		° ' E			

Notes:
Rubble over dead shallow bommies (1.5m) down to small sand patches on floor (at 4m)

T2	**Length (m)**	**50**	**Compass bearing (°)**	180	**Distance to T3 (m)**	60
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 7.493' S		113° 45.536' E	3.5	90cm Star steel	0.25
Finish	° ' S		° ' E			

Notes:

T3	**Length (m)**	**50**	**Compass bearing (°)**	180	**Distance to T1 (m)**	170
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 7.523' S		113° 45.538' E	3m	90cm Star steel	0.25
Finish	23° 7.549' S		113° 45.534' E	2m	150cm Star steel	0.25

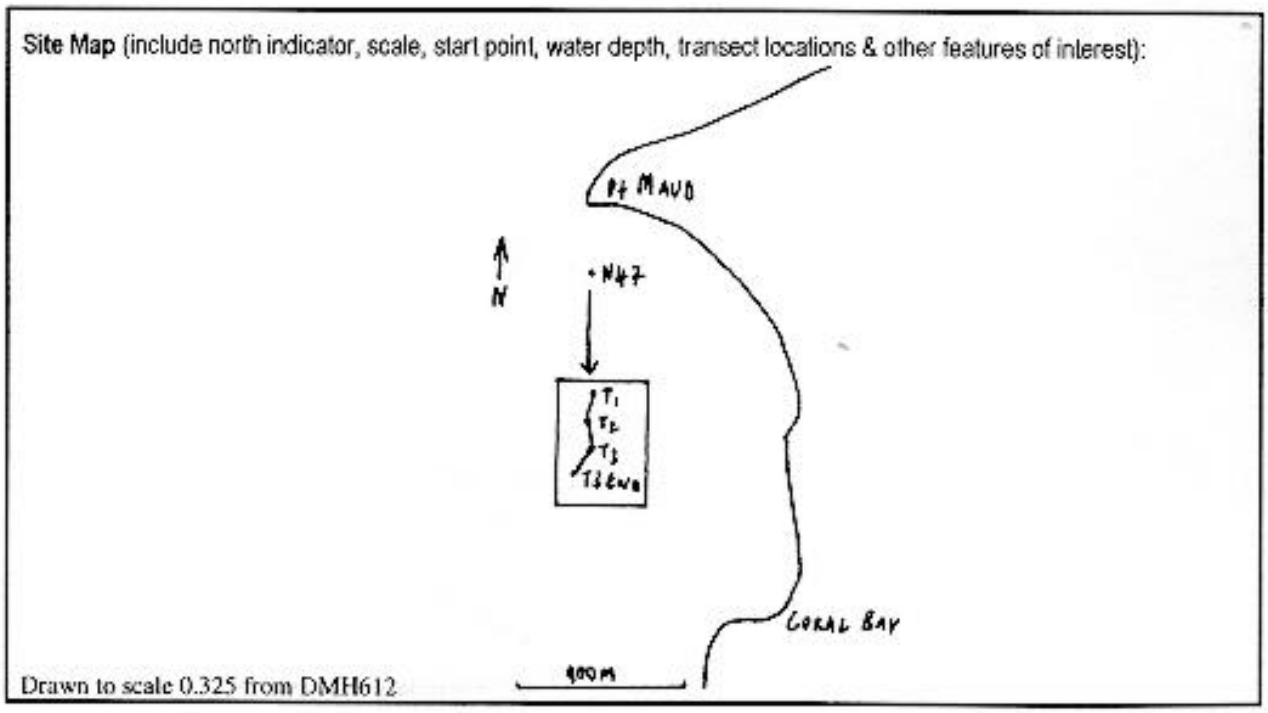
Notes:

LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N47	**Site Name**	Bills Bay North	**Date**	16-8-99	**Recorder**	Daly/ Myer

T1 Latitude start	**T1 Longitude start**	**Differential**			
23° 7.463' S	113° 45.552' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon - Coralline algae covered rubble composed mostly of upturned plates with some new corals growing on top. Habitat was once reef with small sand patches approximately 3-4m across widely spaced.		
Video reference	NMPMP/bvt /16-8-99 /#6	**Aerial reference**	DMH 612



Drawn to scale 0.325 from DMH612

Notes:
Access from Southern Bill's Bay, path across the reef is strongly discouraged by CALM rangers and locals.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N47	**Site Name**	Bills Bay North	**Date**	16-8-99	**Recorder**	Williams/ Mahendran
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	16:15	**Weather**	10-15knots W		
Sea	Flat	**Water depth (m)**	1.5- 4	**Water visibility (m)**	5		
GPS Latitude		**GPS Longitude**		**Differential**			
23° 7.463' S		113° 45.552' E		**Yes**	☒	**No**	☐
Site location	Site located 200m south of Pt. Maud in Bill's Bay.						

Habitat Description

Lagoon - Coralline algae covered rubble composed mostly of upturned plates with some new corals growing on top. Habitat was once reef with small sand patches approximately 3-4m across widely spaced.

Dominant Species

Seagrass	
Macro-algae	Very little
Coral	*Acropora* sp (digitate), Fungiids, and occasional *Turbinaria* sp, *Echinopora* sp. and *Acropora* sp. (tabular).
Fish	Mainly juveniles and females Scaridae (parrotfish), Pomacentridae (damselfish), Acanthuridae (Surgeonfish) and Chaetodontidae (butterflyfish)
Invertebrates	Urchins x 2 spp

Other Features

Site was notable in lack of other invertebrates, very few massive corals and no sponges

Impact or Activity

Rubble caused by (unknown factor) possibly cyclone (not Vance). Site very rarely visited by anyone due to shallow location in Sanctuary zone. No *Panulirus* sp. (rock lobster) sighted. No *Drupella* sighted.

Video reference	NMPMP/ bvt /16-8-99 /#6	**Aerial reference**	DMS 612
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N47	**Site Name**	Bills Bay North	**Date**	16-8-99	**Recorder**	Williams
Start time	14.15	**Finish time**	15:15	**Depth (m)**	3m	**Visibility (m)**	5m

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Williams	**Tape no.**	NMPMP/bvt/16-8-99 /#6	**Height above substrate (cm)**	50cm
Time coding for all video footage at site:		**From:**	0:0:0:0	**To:**	0:19:15:17

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	:0:43:14	:06:40:02	5.57
T2	:07:30:07	:12:44:22	5.14
T3	:13:20:03	:18:26:24	5.06

Notes:
18: 26: 24 – 18: 59: 18 = General footage
18; 59: 18 – 19 : 15: 17= Close footage of *Acropora* sp. (digitate)
Extra footage of *Acropora cerealis* (digitate)

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N50	Site Name	Bills Bay East	Date	18-8-99	Recorder	Williams
Time	9: 30	Video tape no.	NMPMP/bvt/18-8-99 /#8		Video operator		Daly

T1	Length (m)	50	Compass bearing (°)	170	Distance to T2 (m)	60.0
Transect	DGPS Lat		DGPS Long	Depth (m)	Picket type	Picket ht (m)
Start	23° 7.793' S		113° 46.018' E	3.0	90cm Star steel	
Finish	° ' S		° ' E			
Notes:						

T2	Length (m)	50	Compass bearing (°)	170	Distance to T3 (m)	170.0
Transect	DGPS Lat		DGPS Long	Depth (m)	Picket type	Picket ht (m)
Start	23° 7.819' S		113° 46.022' E	3.0	90cm Star steel	
Finish	° ' S		° ' E			
Notes:						

T3	Length (m)	50	Compass bearing (°)	170	Distance to T1 (m)	170.0
Transect	DGPS Lat		DGPS Long	Depth (m)	Picket type	Picket ht (m)
Start	23° 7.847' S		113° 46.030' E	3.0	150cm Star steel	
Finish	23° 7.873' S		113° 46.031' E			
Notes:						

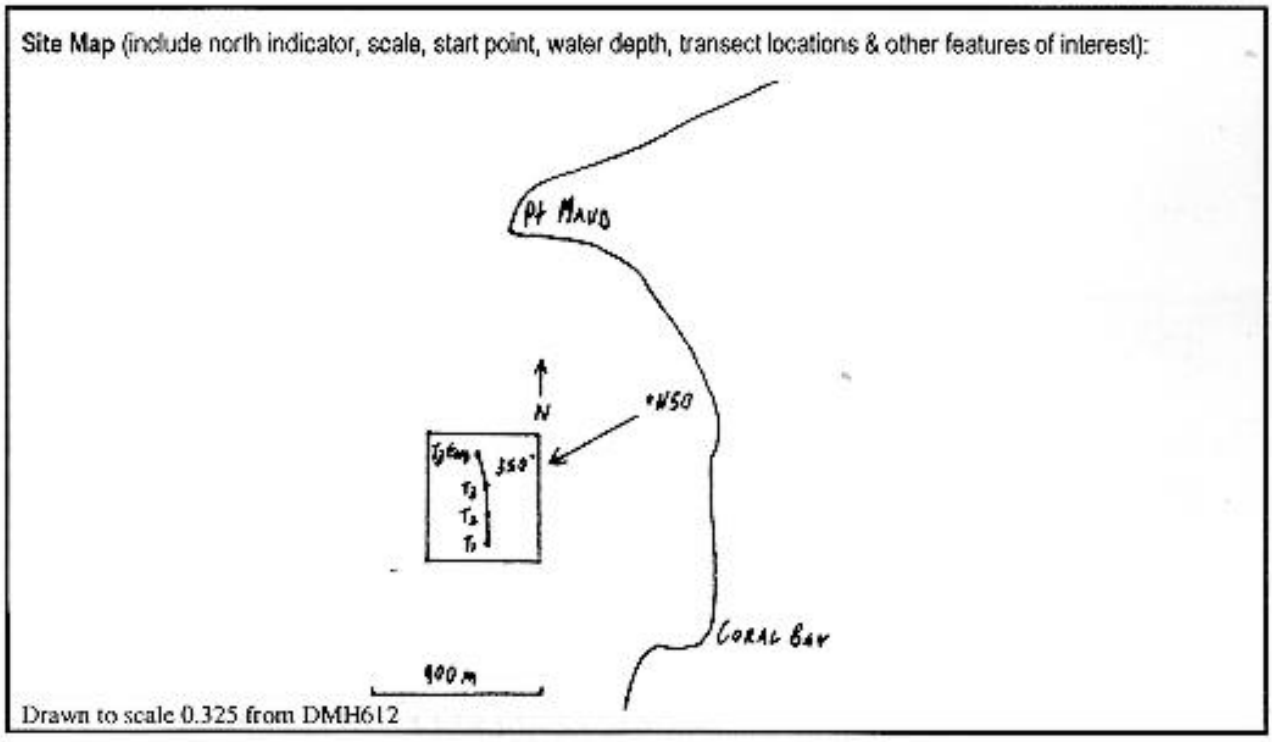
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N50	**Site Name**	Bills Bay East	**Date**	18-8-99	**Recorder**	Williams

T1 Latitude start	**T1 Longitude start**	**Differential**			
23° 7.793' S	113° 46.018' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon – coral dominated by hard coral (encrusting) covering rubble and dead corals, mainly *Acropora* sp. (plate and digitate).		
Video reference	NMPMP/ bvt/18-8-99 /#8	**Aerial reference**	DMH 612

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Drawn to scale 0.325 from DMH612

Notes:
Shallow site, requires 0.8m minimum tide for safe navigation

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N50	**Site Name**	Bills Bay East	**Date**	18-8-99	**Recorder**	Mahendran
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac		**Time**	10:00	**Weather**	SW 10knots	
Sea	Calm		**Water depth (m)**	2.0	**Water visibility (m)**	7.0	

GPS Latitude	**GPS Longitude**	**Differential**			
23° 07.793' S	113° 46.018' E	**Yes**	☒	**No**	☐

Site location	Site located in eastern Bill's Bay, approximately 800m south of Pt Maud.

Habitat Description

Lagoon – coral dominated by hard coral (encrusting) covering rubble and dead corals, mainly *Acropora* sp. (plate and digitate).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Pocillopora* sp. and low coverage of Fungidae and *Acropora* sp. (branching, digitate and tabular).
Fish	Scaridae x 2 species (parrotfish) were abundant (many females, very few males) Ostraciidae (Box fish), *Lutjanus quinquelineatus* (five lined seaperch) and occasional Chaetodontidae (butterflyfish).
Invertebrates	None observed

Other Features

The transect should be visited during high tide (0.8m)
There are shallow bommies (Navigational hazard).

Impact or Activity

The site shows significant re-growth of corals since the 1995 survey after the 1989 coral kill from coral spawning (pers com. Tim Daly). The site is a not a popular recreational site. No litter was recorded at the site. No sized recreational target fish species and no *Panulirus* sp. (rock lobster) were sighted. No *Drupella* sighted.

Video reference	NMPMP/bvt/18-8-99 /#8	**Aerial reference**	DMH 612
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N50	**Site Name**	Bills Bay East	**Date**	18-8-99	**Recorder**	Williams
Start time	10:08	**Finish time**	10:36	**Depth (m)**	2.0 - 3.0	**Visibility (m)**	7.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.												
Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐
Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Daly	**Tape no.**	NMPMP/bvt/18-8-99 /#8	**Height above substrate (cm)**	50.0
Time coding for all video footage at site:		**From:**	0:0:0:0	**To:**	0:20:14:08

Transect Time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	:0:0:0	0:07:02:24	7.2
T2	:7:02:24	:13:24:01	6.22
T3	:13:24:01	:20:14:08	6.50

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N49	**Site Name**	Bills Bay- West	**Date**	17-8-99	**Recorder**	Williams
Time	13:55	**Video tape no.**	NMPMP/bvt/17-8-99 /#6			**Video operator**	Daly

T1	**Length (m)**	**50**	**Compass bearing (°)**	150.0	**Distance to T2 (m)**	60.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 7.805' S		113° 45.205' E	10.0	90cm Star steel	
Finish	° ' S		° ' E			
Notes:						

T2	**Length (m)**	**50**	**Compass bearing (°)**	180.0	**Distance to T3 (m)**	60.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 7.834' S		113° 45.196' E	10.0	90cm Star steel	
Finish	° ' S		° ' E			
Notes:						

T3	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T1 (m)**	170.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 7.863' S		113° 45.182' E	10.0	90cm Star Steel	
Finish	23° 7.882' S		113° 45.166' E		90cm Star steel	
Notes:						

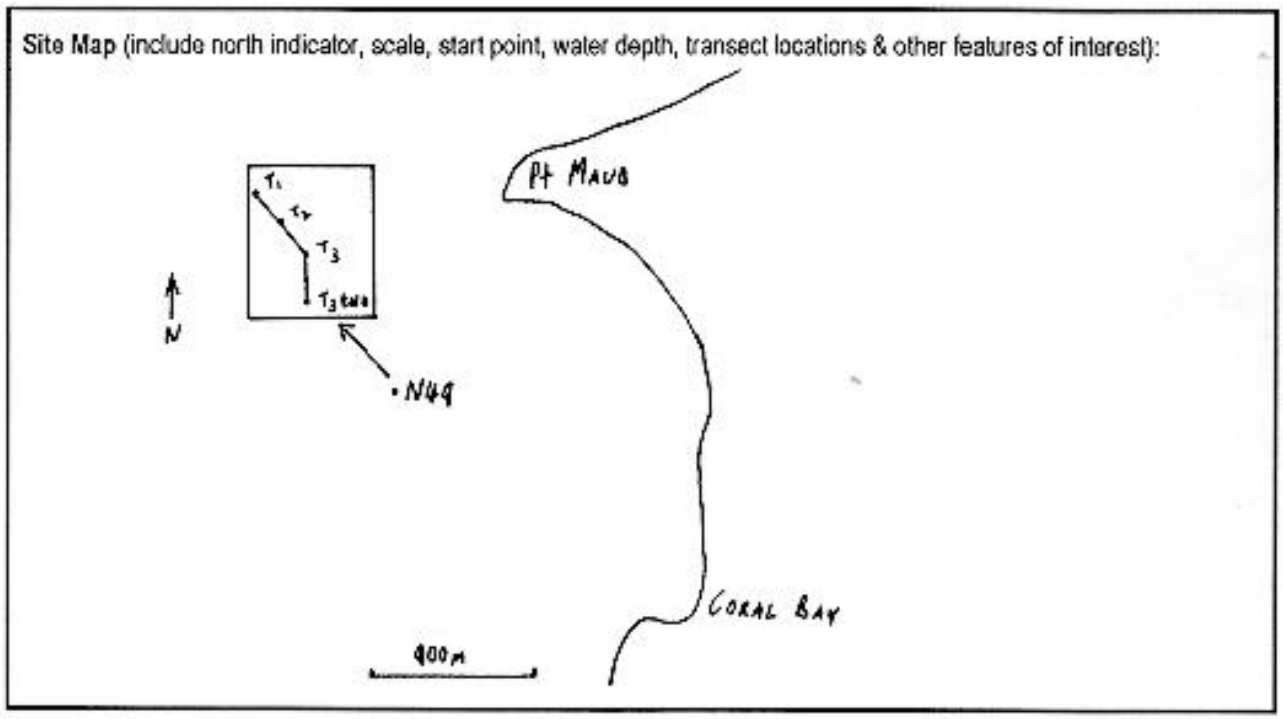
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N49	**Site Name**	Bills Bay West	**Date**	17-8-99	**Recorder**	Williams

T1 Latitude start	**T1 Longitude start**	**Differential**			
23° 7.805' S	113° 45.205' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon – coral with a high diversity and density dominated by *Acropora* sp (branching and tabular).		
Video reference	NMPMP/ bvt/17-8-99 /#6	**Aerial reference**	DMH 612

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:
Drawn to scale 0.325 from DMH612

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N49	**Site Name**	Bills Bay West	**Date**	17-8-99	**Recorder**	Williams
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	13:55	**Weather**	10-15 kts W		
Sea	Slight surge	**Water depth (m)**	10.0	**Water visibility (m)**	15.0		

GPS Latitude	**GPS Longitude**	**Differential**			
23° 7.805' S	113° 45.205' E	**Yes**	☒	**No**	☐

Site location	Site located in western Bills Bay, approximately 1km from Pt Maud

Habitat Description

Lagoon – coral with a high diversity and density dominated by *Acropora* sp (branching and tabular).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Acropora* sp. (branching and tabular), *Montipora* sp., *Pocillopora eydouxi, P.verracosa*, *Echinopora* sp.(tabular - very large common), *Favia* sp., *Favites* sp., *Stylophora pistillata*, *Galaxea* sp. and occasional Fungidae, and *Turbinaria frondens*.
Fish	Scaridae (large parrotfish) and Pomacentridae (damselfish).
Invertebrates	

Other Features

Impact or Activity

No sized target fish species and no *Panulirus* sp. (rock lobster) were sighted. No litter sighted. No *Drupella* sighted.

Video reference	NMPMP/ bvt/17-8-99 /#6	**Aerial reference**	DMH 612
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N49	**Site Name**	Bills Bay West	**Date**	17-8-99	**Recorder**	Williams
Start time	14:00	**Finish time**	16:00	**Depth (m)**	10.0	**Visibility (m)**	15.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Daly	**Tape no.**	NMPMP/bvt/17-8-99 /#6	**Height above substrate (cm)**	50.0
Time coding for all video footage at site:		**From:**	0:23:50:16	**To:**	0:36:48:00

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	0:23:50:16	0:28:21:21	4.31
T2	0:28:21:21	0:33:30:15	5.09
T3	0:33:30:15	0:36:48:00	3.18

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N48	**Site Name**	Bills Bay South	**Date**	19-8-99	**Recorder**	Williams
Time	14:40	**Video tape no.**	NMPMP/bvt/19-8-99 /#8			**Video operator**	Daly

T1	**Length (m)**	**50**	**Compass bearing (°)**	0	**Distance to T2 (m)**	60.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 8.476' S		113° 46.163' E	2.0 - 3.0	90cm Star steel	
Finish	° ' S		° ' E			
Notes: (eg. description of habitat and dominant species along transect)						

T2	**Length (m)**	**50**	**Compass bearing (°)**	0	**Distance to T3 (m)**	60.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 8.446' S		113° 46.165' E	2.0 - 3.0	90cm Star steel	
Finish	° ' S		° ' E			
Notes:						

T3	**Length (m)**	**50**	**Compass bearing (°)**	340	**Distance to T1 (m)**	170.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 8.408' S		113° 46.387' E	2.0 - 3.0	90cm Star steel	
Finish	23° 8.387' S		113° 46.160' E	2.0 - 3.0	90cm Star steel	
Notes:						

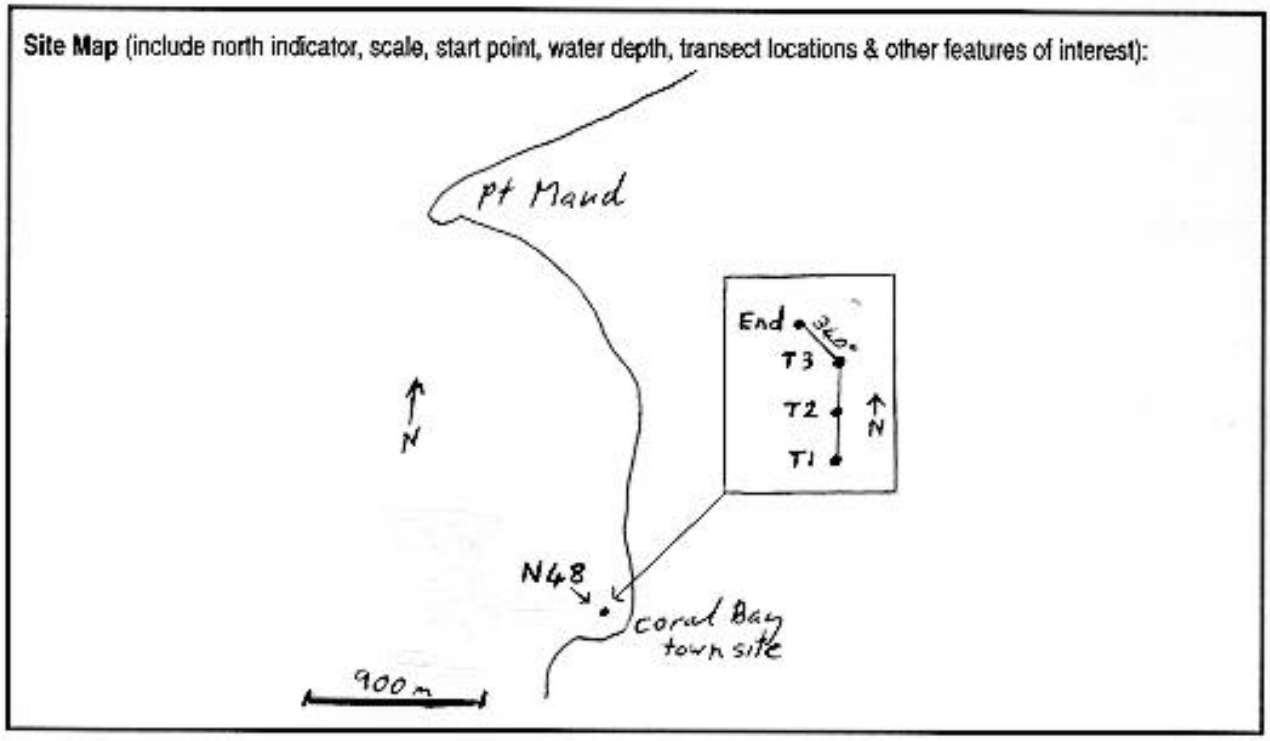
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N48	**Site Name**	Bills Bay South	**Date**	19-8-99	**Recorder**	Williams

T1 Latitude start	**T1 Longitude start**	**Differential**			
23° 8.476' S	113° 46.163' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon - coral rubble with emerging *Montipora* sp. and *Acropora* sp. (branching).		
Video reference	NMPMP/bvt/19-8-99 /#8	**Aerial reference**	DMH 612

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:
Drawn to scale 0.325 from DMH612
Star picket for the beginning of transect 1 located on south side of 2m bommie.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N48	**Site Name**	Bills Bay South	**Date**	19-8-99	**Recorder**	Williams Mahendran
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	14:40	**Weather**	19 knots SW		
Sea	Slight current	**Water depth (m)**	2.0 - 3.0	**Water visibility (m)**	8.0		

GPS Latitude	GPS Longitude	Differential			
23° 8.476' S	113° 46.163' E	**Yes**	☒	**No**	☐

Site location	Site located adjacent to the Coral Bay boat launching area, approximately 2km south of Pt. Maud.

Habitat Description

Lagoon – coral rubble with *Montipora* sp. and *Acropora* sp. (branching).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Montipora* sp., *Acropora* sp. (branching), some *Echinopora* sp., occasional Fungidae and *Pocillopora* sp.
Fish	Labridae (wrasse), Pomacentridae (damselfish), Pomacanthidae (angelfish), Chaetodontidae (butterflyfish) and *Lutjanus quinquelineatus* (five-lined seaperch)
Invertebrates	Oysters

Other Features

Impact or Activity

Litter sighted near Transect 1 included: large pipe (3m length), large drum x 1 (40 cm diameter) and beer bottle x 1. No *Panulirus* sp. (rock lobster) sighted. No *Drupella* sighted.

Video reference	NMPMP/ bvt/19-8-99 /#8	**Aerial reference**	DMH 612
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N48	**Site Name**	Bills Bay South	**Date**	19-8-99	**Recorder**	Mahendran
Start time		**Finish time**		**Depth (m)**	2.0-3.0	**Visibility (m)**	8.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Daly	**Tape no.**	NMPMP/bvt/19-8-99 /#8	**Height above substrate (cm)**	
Time coding for all video footage at site:		**From:**	0:00:00:00	**To:**	0:15:29:14

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	0:00:00:00	0:05:27:24	5.27
T2	0:05:27:24	0:10:29:17	5.02
T3	0:10:29:17	0:15:29:14	5.00

TRANSECT LOCATION DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N53	**Site Name**	Monck Head	**Date**	17-8-99	**Recorder**	Williams
Time	8:30	**Video tape no.**	NMPMP/bvt/17-8-99 /#6		**Video operator**		Williams

T1	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T2 (m)**	60.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 9.260' S		113° 45.862' E	2.5	90cm Star steel	
Finish	° ' S		° ' E			

Notes: (eg. Description of habitat and dominant species along transect)
On the edge of reef and sand patch adjacent to boating channel
Dominated by *Acropora* sp. (branching).

T2	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T3 (m)**	60.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 9.230' S		113° 45.861' E	2.0	90cm Star steel	
Finish	° ' S		° ' E			

Notes:

T3	**Length (m)**	**50**	**Compass bearing (°)**		**Distance to T1 (m)**	170.0
Transect	**DGPS Lat**		**DGPS Long**	**Depth (m)**	**Picket type**	**Picket ht (m)**
Start	23° 9.196' S		113° 45.865' E	2.5	90cm Star steel	
Finish	23° 9.170' S		113° 45.868' E			

Notes:

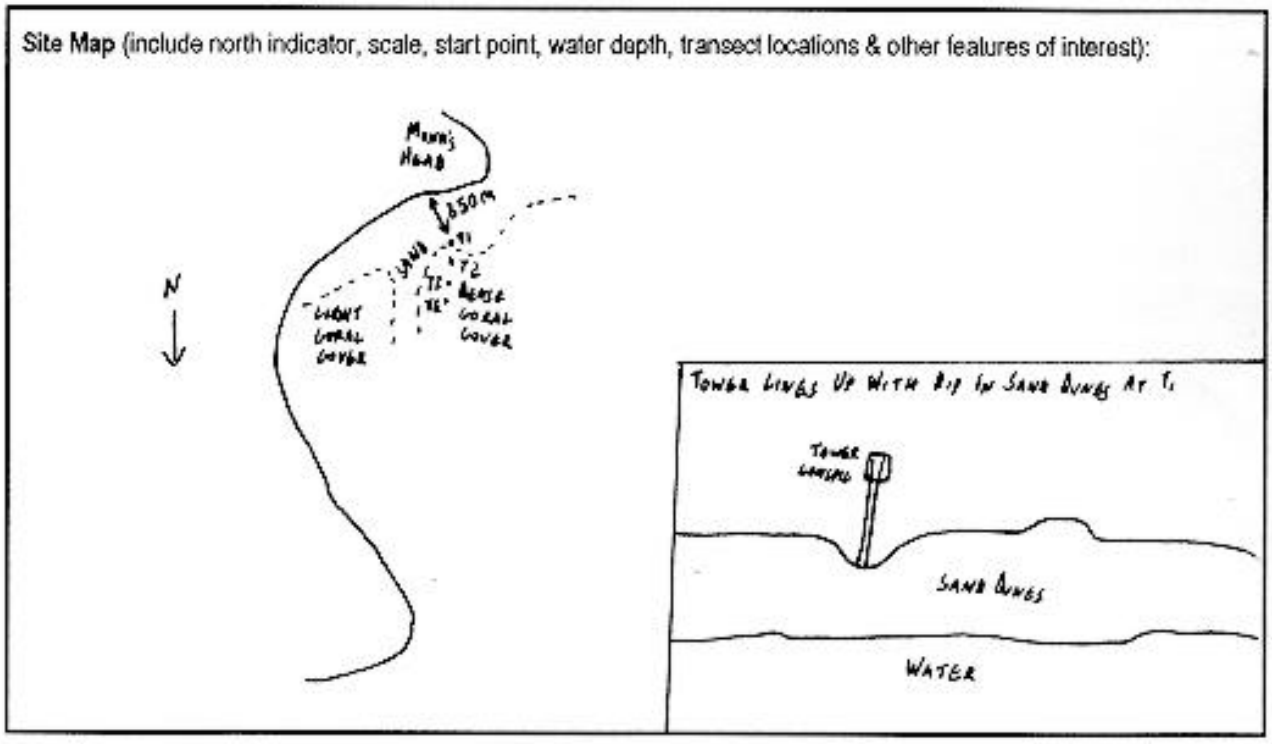
LONG-TERM MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N53	**Site Name**	Monck Head	**Date**	17-8-99	**Recorder**	Daly

T1 Latitude start	**T1 Longitude start**	**Differential**			
23° 9.170' S	113° 45.868' E	**Yes**	☒	**No**	☐

Habitat type	Lagoon – coral dominated by *Acropora* sp. (branching and tabular).		
Video reference	NMPMP/ bvt/17-08-99 /#6	**Aerial reference**	DMH 612

Site Map (include north indicator, scale, start point, water depth, transect locations & other features of interest):



Notes:
Transect 1 starts in sand on the edge of a dense coral patch.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N53	**Site Name**	Monck Head	**Date**	17-8-99	**Recorder**	Mahendran
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	8:30	**Weather**			
Sea	Calm	**Water depth (m)**	5.0	**Water visibility (m)**	15.0		
GPS Latitude		**GPS Longitude**		**Differential**			
23° 9.260' S		113° 45.862' E		**Yes**	☒	**No**	☐
Site location	Site located 350m NW of Monck Head adjacent to the boat channel.						

Habitat Description

Lagoon – coral dominated by *Acropora* sp. (branching and tabular).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Acropora* sp. (branching and tabular), *Pocillopora* sp., *Turbinaria* sp. and the occasional *Montipora* sp. and Fungidae.
Fish	Pomacentridae.
Invertebrates	*Drupella*.

Other Features

Impact or Activity

The site has been selected for a proposed boat launching site. No litter was sighted. No target fish species and Panulirus sp. (rock lobster) was sighted. *Drupella* in medium/high abundance.

Video reference	NMPMP/bvt/17-8-99 /#6	**Aerial reference**	DMH 612
Slide reference		**Print reference**	

VIDEO DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N53	**Site Name**	Monks Head	**Date**	17-8-99	**Recorder**	Williams
Start time	8:30	**Finish time**	10:30	**Depth (m)**	2.0	**Visibility (m)**	5.0

Underwater Video System	Canon MV1 digital camcorder in Amphibico housing.

Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☒	Manual	☐	Auto	☒	Manual	☐	Sports	☐	High-speed	☒	Auto	☒	Outdoor	☐

Lens system				**Filters**								**Lights**			
Wide-angle	☒	Zoom-macro	☐	None	☒	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☒

Video operator	Williams	**Tape no.**	NMPMP/bvt/17-8-99 /#6	**Height above substrate (cm)**	50
Time coding for all video footage at site:		**From:**	0:05:47:05	**To:**	0:23:50:18

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	0:06:19:04	0:11:17:01	5.58
T2	0:11:17:01	0:16:46:06	5.29
T3	0:17:33:00	0:22:59:01	5.22

Note: T1 was filmed (0:00:00:00 > 0:05:47:05) but the picket extensions with the site ID's were found to be incorrect. Star picket extensions were changed and the site re-filmed. Disregard initial footage of T1.

APPENDIX 4: LINE INTERCEPT TRANSECT DATA

N26: Bundegi Sanctuary South – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.60	R	1.20
0.60	0.81	ACRT	0.42
0.81	0.83	R	0.04
0.83	1.44	UP	1.22
1.44	6.20	R	9.52
6.20	6.35	ACRE	0.30
6.35	8.33	R	3.96
8.33	8.40	ACRB	0.14
8.40	9.82	R	2.84
9.82	9.87	ACRB	0.10
9.87	11.45	R	3.16
11.45	12.00	UP	1.10
12.00	12.40	R	0.80
12.40	12.60	UP	0.40
12.60	13.40	R	1.60
13.40	13.80	UP	0.80
13.80	19.90	R	12.20
19.90	20.95	ACRS	2.10
20.95	23.00	R	4.10
23.00	23.03	ACRB	0.06
23.03	23.05	R	0.04
23.05	23.07	ACRB	0.04
23.07	23.14	R	0.14
23.14	23.16	ACRB	0.04
23.16	24.18	R	2.04
23.18	24.26	ACRD	2.16
24.26	24.90	R	1.28
24.90	25.00	ACRS	0.20
25.00	25.80	R	1.60
25.80	26.00	ACRS	0.40
26.00	26.47	R	0.94
26.47	26.60	ACRE	0.26
27.60	27.70	R	0.20
27.70	27.77	ACRD	0.14
28.77	28.82	R	0.10
28.82	29.12	R	0.60
29.12	29.26	ACRS	0.28
29.26	29.37	R	0.22
29.37	29.42	ACRB	0.10
29.42	29.54	R	0.24
29.54	29.90	ACRS	0.72
29.90	30.13	DCA	0.46
30.13	30.17	ACRE	0.08
30.17	30.34	DCA	0.34
30.34	30.48	ACRS	0.28
30.48	30.60	DCA	0.24
30.60	30.70	ACRS	0.20
30.70	30.74	DCA	0.08
30.74	30.82	ACRE	0.16
30.82	34.67	DCA	7.70
34.67	34.82	ACRS	0.30
34.82	35.00	DCA	0.36
35.00	35.20	ACRT	0.40
35.45	35.55	DCA	0.20
35.55	35.95	ACRS	0.80
35.95	36.70	ACRS	1.50
36.70	41.20	DCA	9.00
41.20	41.27	ACRS	0.14
41.27	41.34	DCA	0.14
41.34	41.37	ACRS	0.06
41.37	41.70	DCA	0.66
41.70	42.00	UP	0.60
42.00	42.20	ACRD	0.40
42.20	44.25	DCA	4.10
44.25	45.20	ACRD	1.90
45.20	46.90	DCA	3.40
46.90	47.00	ACRS	0.20
47.00	49.00	R	4.00
49.00	50.00	UP	2.00

N26: Bundegi Sanctuary South – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	1.00	R	2.00
1.00	2.40	UP	2.80
2.40	4.70	DCA	4.60
4.70	4.86	ACRD	0.32
4.86	6.92	DCA	4.12
6.92	7.00	ACRB	0.16
7.00	7.18	DCA	0.36
7.18	7.20	ACRD	0.04
7.20	7.45	DCA	0.50
7.45	7.86	UP	0.82
7.86	7.92	ACRD	0.12
7.92	8.44	DCA	1.04
8.44	9.00	ACRS	1.12
9.00	9.30	DCA	0.60
9.30	9.40	ACRS	0.20
9.40	10.20	DCA	1.60
10.20	10.30	ACRE	0.20
10.30	10.40	ACRD	0.20
10.40	10.90	DCA	1.00
10.90	11.00	ACRE	0.20
11.00	11.70	DCA	1.40
11.70	11.80	ACRE	0.20
11.80	12.00	DCA	0.40
12.00	12.20	ACRD	0.40
12.20	13.00	DCA	1.60
13.00	13.10	ACRS	0.20
13.10	13.36	DCA	0.52
13.36	13.58	UP	0.44
13.58	13.70	DCA	0.24
13.70	14.30	UP	1.20
14.30	14.86	DCA	1.12
14.86	15.20	UP	0.68
15.20	15.90	DCA	1.40
15.90	15.95	ACRE	0.10
15.95	16.30	DCA	0.70
16.30	16.70	UP	0.80
16.70	17.38	R	1.36
17.38	17.58	ACRS	0.40
17.58	17.88	UP	0.60
17.88	18.80	R	1.84
18.80	19.00	ACRS	0.40
19.00	21.00	R	4.00
21.00	21.03	ACRD	0.06
21.03	23.30	DCA	4.54
23.30	24.00	UP	1.40
24.00	25.48	ACRE	2.96
25.48	25.70	ACRT	0.44
25.70	26.35	ACRS	1.30
26.35	26.61	POCD	0.52
26.61	27.10	DCA	0.98
27.10	27.30	ACRE	0.40
27.30	28.43	DCA	2.26
28.43	29.00	FAVF	1.14
29.00	29.25	ACRS	0.50
29.25	30.70	DCA	2.90
30.70	31.50	ACRE	1.60
31.50	32.45	DCA	1.90
32.45	32.50	FAVD	0.10
32.50	33.86	DCA	2.72
33.86	33.90	ACRE	0.08
33.90	35.00	DCA	2.20
35.00	35.25	POCD	0.50
35.25	35.50	ACRE	0.50
35.50	35.78	DCA	0.56
35.78	35.82	ACRS	0.08
35.82	36.20	DCA	0.76
36.20	36.30	ACRE	0.20
36.30	37.00	DCA	1.40
37.00	37.10	ACRD	0.20
37.10	37.86	DCA	1.52
37.86	37.90	ACRS	0.08
37.90	40.57	DCA	5.34
40.57	40.61	POCD	0.08
40.61	41.00	ACRS	0.78
41.00	41.07	DCA	0.14
41.07	41.15	ACRD	0.16
41.15	41.87	DCA	1.44
41.87	41.90	ACRE	0.06
41.90	42.00	DCA	0.20
42.00	43.14	DCA	2.28
43.14	44.20	ACRD	2.12
44.20	44.45	DCA	0.50
44.45	44.51	ACRE	0.12
44.51	44.59	DCA	0.16
44.62	45.75	DCA	2.26
45.75	46.27	UP	1.04
46.27	46.82	DCA	1.10
46.82	47.10	ACRD	0.56
47.10	47.28	DCA	0.36
47.28	47.40	ACRD	0.24
47.40	47.60	DCA	0.40
47.60	47.90	ACRE	0.60
47.90	48.18	DCA	0.56
48.18	48.27	POCD	0.18
48.27	50.00	RK	3.46

N26: Bundegi Sanctuary South – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	5.00	R	10.00
5.00	7.18	DCA	4.36
7.18	7.25	ACRE	0.14
7.25	7.35	DCA	0.20
7.35	7.44	ACRE	0.18
7.44	8.00	DCA	1.12
8.00	8.13	ACRD	0.26
8.13	8.18	DCA	0.10
8.18	8.22	ACRE	0.08
8.22	8.50	DCA	0.56
8.50	9.10	FAVF	1.20
9.10	9.40	RK	0.60
9.40	15.00	R	11.20
15.00	15.10	ACKB	0.20
15.10	15.65	R	1.10
15.65	17.00	UP	2.70
17.00	17.90	R	1.80
17.90	17.98	POCD	0.16
17.98	18.75	R	1.54
18.75	18.95	ACRE	0.40
18.95	22.30	R	6.70
22.30	22.76	RK	0.92
22.76	22.88	ACRE	0.24
22.88	28.74	DCA	11.72
28.74	28.78	ACRD	0.08
28.78	30.30	R	3.04
30.30	30.50	DCA	0.40
30.50	30.70	ACRE	0.40
30.70	31.88	DCA	2.36
31.88	31.94	FAVM	0.12
31.94	33.56	DCA	3.24
33.56	34.10	UP	1.08
34.10	39.76	DCA	11.32
39.76	39.87	ACRE	0.22
39.87	43.70	DCA	7.66
43.70	43.80	FAVM	0.20
43.80	45.57	DCA	3.54
45.57	45.61	ACRE	0.08
45.61	50.00	DCA	8.78

N19: Bundegi Sanctuary (re-survey) – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.80	R	1.60
0.80	1.10	ACRD	0.60
1.10	2.00	R	1.80
2.00	3.25	RK	2.50
3.25	3.49	R	0.48
3.49	3.62	ACRS	0.26
3.62	3.95	DCA	0.66
3.95	4.02	ACRS	0.14
4.02	4.25	R	0.46
4.25	4.35	ACRS	0.20
4.35	5.35	R	2.00
5.35	5.60	DCA	0.50
5.60	6.65	R	2.10
6.65	7.30	UP	1.30
7.30	7.85	DCA	1.10
7.85	7.90	ACRS	0.10
7.90	10.85	R	5.90
10.85	10.90	ACRS	0.10
10.90	11.45	R	1.10
11.45	11.55	ACRS	0.20
11.55	12.26	R	1.42
12.26	13.28	UP	2.04
13.28	15.24	R	3.92
15.24	16.85	DCA	3.22
16.85	17.10	S	0.50
17.10	20.30	R	6.40
20.30	20.40	ACRS	0.20
20.40	22.40	R	4.00
22.40	23.00	DCA	1.20
23.00	23.10	ACRD	0.20
23.10	23.20	DCA	0.20
23.20	23.27	ACRD	0.14
23.27	25.30	R	4.06
25.30	25.35	ACRS	0.10
25.35	26.50	R	2.30
26.50	26.70	ACRS	0.40
26.70	27.25	R	1.10
27.25	27.35	ACRS	0.20
27.35	27.85	R	1.00
27.85	27.95	ACRS	0.20
27.95	29.20	R	2.50
29.20	30.20	UP	2.00
30.20	30.30	ACRS	0.20
30.30	30.40	R	0.20
30.40	30.48	ACRD	0.16
30.48	30.65	DCA	0.34
30.65	31.00	ACRS	0.70
31.00	32.30	R	2.60
32.30	32.90	DCA	1.20
32.90	33.50	R	1.20
33.50	33.60	ACRS	0.20
33.60	37.15	R	7.10
37.15	37.55	UP	0.80
37.55	39.35	R	3.60
39.35	39.80	UP	0.90
39.80	39.90	S	0.20
39.90	40.50	UP	1.20
40.50	44.33	R	7.66
44.33	45.20	DCA	1.74
45.20	49.46	R	8.52
49.46	49.80	UP	0.68
49.80	50.00	R	0.40

N19: Bundegi Sanctuary (re-survey) – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	1.30	DCA	2.60
1.30	2.00	R	1.40
2.00	2.84	ACRS	1.68
2.84	5.00	R	4.32
5.00	5.80	UP	1.60
5.80	6.77	R	1.94
6.77	6.84	ACRE	0.14
6.84	9.23	R	4.78
9.23	9.30	ACRE	0.14
9.30	9.55	UP	0.50
9.55	10.17	ACRT	1.24
10.17	10.70	R	1.06
10.70	10.87	ACRS	0.34
10.87	11.36	R	0.98
11.36	11.41	ACRD	0.10
11.41	13.47	R	4.12
13.47	13.52	ACRD	0.10
13.52	13.66	R	0.28
13.66	16.10	UP	4.88
16.10	17.81	R	3.42
17.81	18.93	ACRE	2.24
18.93	19.18	R	0.50
19.18	19.28	POCD	0.20
19.28	20.00	R	1.44
20.00	22.00	UP	4.00
22.00	22.48	ACRT	0.96
22.48	25.35	R	5.74
25.35	25.50	ACRS	0.30
25.50	28.40	UP	5.80
28.40	28.64	ACRS	0.48
28.64	28.90	R	0.52
28.90	29.00	ACRS	0.20
29.00	29.15	R	0.30
29.15	29.23	POCD	0.16
29.23	29.77	R	1.08
29.77	33.10	UP	6.66
33.10	33.80	R	1.40
33.80	34.00	ACRS	0.40
34.00	42.10	R	16.20
42.10	42.53	ACRS	0.86
42.53	42.84	R	0.62
42.84	43.00	ACRS	0.32
43.00	46.46	R	6.92
46.46	46.62	ACRD	0.32
46.62	46.66	R	0.08
46.66	46.70	POCD	0.08
46.70	48.74	R	4.08
48.74	48.85	POCD	0.22
48.85	50.00	R	2.30

N19: Bundegi Sanctuary (re-survey) – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	0.14	ACRD	0.28
0.14	0.78	R	1.28
0.78	0.82	ACRD	0.08
0.82	1.00	R	0.36
1.00	1.09	ACRD	0.18
1.09	1.20	S	0.22
1.20	1.50	MA	0.60
1.50	3.54	R	4.08
3.54	3.60	ACRS	0.12
3.60	6.00	R	4.80
6.00	6.10	ACRS	0.20
6.10	6.48	R	0.76
6.48	6.53	POCS	0.10
6.53	9.00	R	4.94
9.00	9.20	S	0.40
9.20	10.30	R	2.20
10.30	10.43	ACRT	0.26
10.43	13.00	R	5.14
13.00	13.10	ACRD	0.20
13.10	13.60	R	1.00
13.60	13.70	ACRS	0.20
13.70	13.90	R	0.40
13.90	14.03	ACRS	0.26
14.03	14.10	R	0.14
14.10	14.20	ACRS	0.20
14.20	14.46	R	0.52
14.46	14.60	ACRS	0.28
14.60	14.75	R	0.30
14.75	14.76	ACRS	0.02
14.76	15.20	R	0.88
15.20	15.60	S	0.80
15.60	15.84	R	0.48
15.84	15.91	ACRS	0.14
15.91	16.17	R	0.52
16.17	16.30	ACRS	0.26
16.30	16.48	R	0.36
16.48	16.52	PORB	0.08
16.52	16.57	R	0.10
16.57	16.63	PORB	0.12
16.63	17.44	R	1.62
17.44	18.00	ACRS	1.12
18.00	20.70	R	5.40
20.70	20.90	ACRT	0.40
20.90	21.00	R	0.20
21.00	21.20	ACRT	0.40
21.20	21.40	R	0.40
21.40	21.60	ACRT	0.40
21.60	21.90	R	0.60
21.90	22.10	ACRT	0.40
22.10	22.80	R	1.40
22.80	23.00	ACRS	0.40
23.00	23.20	R	0.40
23.20	24.70	ACRS	3.00
24.70	25.15	R	0.90
25.15	25.20	ACRE	0.10
25.20	25.40	ACRB	0.40
25.40	26.30	R	1.80
26.30	26.45	ACRS	0.30
26.45	28.58	R	4.26
28.58	28.64	ACRS	0.12
28.64	30.00	R	2.72
30.00	30.20	ACRS	0.40
30.20	31.20	R	2.00
31.20	32.37	R	2.34
32.37	32.39	ACRB	0.04
32.39	32.90	R	1.02
32.90	33.00	ACRB	0.20
33.00	33.27	R	0.54
33.27	33.52	ACRS	0.50
33.52	33.67	R	0.30
33.67	34.00	ACRS	0.66
34.00	34.35	R	0.70
34.35	34.50	POCD	0.30
34.50	34.57	ACRT	0.14
34.57	34.87	R	0.60
34.87	35.20	ACRS	0.66
35.20	35.40	R	0.40
35.40	35.70	ACRS	0.60
35.70	36.50	R	1.60
36.50	37.27	UP	1.54
37.27	38.18	R	1.82
38.18	38.25	ACRS	0.14
38.25	44.75	R	13.00
44.75	45.50	ACRS	1.50
45.50	45.85	R	0.70
45.85	46.10	ACRT	0.50
46.10	48.73	R	5.26
48.73	49.20	ACRT	0.94
49.20	50.00	R	1.60

N1: Bundegi (re-survey) – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.94	DC2	1.88
0.94	1.00	ACRD	0.12
1.00	1.68	R	1.36
1.68	1.76	ACRB	0.16
1.76	2.00	R	0.48
2.00	3.35	ACRB	2.70
3.35	4.80	R	2.90
4.80	5.10	S	0.60
5.10	10.30	R	10.40
10.30	10.35	ACRB	0.10
10.35	24.00	R	27.30
24.00	30.73	R	13.46
30.73	30.79	ACRD	0.12
30.79	37.00	R	12.42
37.00	40.06	DC2	6.12
40.06	40.20	ACRD	0.28
40.20	41.20	R	2.00
41.20	41.80	POCD	1.20
41.80	42.50	R	1.40
42.50	43.40	R	1.80
43.40	47.20	R	7.60
47.20	47.40	ACRB	0.40
47.40	49.50	ACRD	4.20
49.50	50.00	R	1.00

N1: Bundegi (re-survey) – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	0.50	R	1.00
0.50	0.75	ACRD	0.50
0.75	4.17	R	6.84
4.17	4.31	ACRD	0.28
4.31	9.45	R	10.28
9.45	9.72	FAVD	0.54
9.72	9.90	R	0.36
9.90	10.50	POCD	1.20
10.50	15.40	R	9.80
15.40	15.70	FAVD	0.60
15.70	22.23	R	13.06
22.23	23.20	R	1.94
23.20	27.00	R	7.60
27.00	28.30	R	2.60
28.30	28.68	ACRT	0.76
28.68	30.00	R	2.64
30.00	30.10	POCD	0.20
30.10	32.70	R	5.20
32.70	32.80	FAVD	0.20
32.80	33.05	ACRD	0.50
33.05	34.00	S	1.90
34.00	34.65	R	1.30
34.65	34.80	POCD	0.30
34.80	34.90	R	0.20
34.90	35.00	ACRS	0.20
35.00	35.40	R	0.80
35.40	35.80	S	0.80
35.80	35.90	ACRD	0.20
35.90	49.70	R	27.60
49.70	49.90	ACRS	0.40
49.90	50.00	R	0.20

N1: Bundegi (re-survey) – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	1.35	R	2.70
1.35	1.70	MUSM	0.70
1.70	2.00	R	0.60
2.00	2.90	S	1.80
2.90	6.40	R	7.00
6.40	8.20	R	3.60
8.20	14.00	S	11.60
14.00	14.40	R	0.80
14.40	17.35	S	5.90
17.35	17.46	R	0.22
17.46	17.54	ACRD	0.16
17.54	18.16	R	1.24
18.16	18.18	ACRD	0.04
18.18	24.30	R	12.24
24.30	24.37	ACRS	0.14
24.37	27.40	R	6.06
27.40	27.52	ACRS	0.24
27.52	33.60	R	12.16
33.60	33.73	ACRS	0.26
33.73	33.78	R	0.10
33.78	33.82	ACRS	0.08
33.82	35.14	R	2.64
35.14	35.23	ACRS	0.18
35.23	35.56	R	0.66
35.56	35.73	ACRS	0.34
35.73	36.90	R	2.34
36.90	37.35	ACRS	0.90
39.35	39.47	R	0.24
39.47	39.48	ACRS	0.02
39.48	43.80	R	8.64
43.80	43.90	ACRS	0.20
43.90	47.30	R	6.80
47.30	47.85	ACRS	1.10
47.85	50.00	R	4.30

N29: Bundegi North – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.60	R	1.20
0.60	0.70	ACRD	0.20
0.70	0.85	R	0.30
0.85	0.95	ACRD	0.20
0.95	1.10	R	0.30
1.10	1.50	ACRD	0.80
1.50	1.60	R	0.20
1.60	1.70	ACRD	0.20
1.70	2.88	R	2.36
2.88	2.92	R	0.08
2.92	4.00	RK	2.16
4.00	5.70	R	3.40
5.70	5.80	ACRE	0.20
5.80	6.30	R	1.00
6.30	6.50	ACRE	0.40
6.50	8.00	DCA	3.00
8.00	8.20	ACRD	0.40
8.20	9.60	DCA	2.80
9.60	9.70	ACRD	0.20
9.70	10.00	DCA	0.60
10.00	10.40	ACRD	0.80
10.40	10.70	ACRT	0.60
10.70	11.40	DCA	1.40
11.40	12.50	ACRD	2.20
12.50	12.70	ACRT	0.40
12.70	13.00	DCA	0.60
13.00	13.23	ACRD	0.46
13.23	15.00	DCA	3.54
15.00	15.10	ACRE	0.20
15.10	16.00	DCA	1.80
16.00	16.80	ACRB	1.60
16.80	17.20	ACRD	0.80
17.20	17.40	ACRE	0.40
17.40	18.00	DCA	1.20
18.00	18.20	ACRB	0.40
18.20	20.30	DCA	4.20
20.30	20.85	ACRD	1.10
20.85	21.25	DCA	0.80
21.25	22.15	ACRB	1.80
22.15	23.90	DCA	3.50
23.90	24.00	ACRE	0.20
24.00	26.90	DCA	5.80
26.90	27.00	ACRB	0.20
27.00	27.90	DCA	1.80
27.90	28.00	ACRE	0.20
28.00	28.80	DCA	1.60
28.80	29.00	ACRD	0.40
29.00	30.30	DCA	2.60
30.30	30.50	ACRB	0.40
30.50	30.90	DCA	0.80
30.90	31.00	ACRB	0.20
31.00	32.55	R	3.10
32.55	32.60	ACRD	0.10
32.60	33.80	DCA	2.40
33.80	34.50	ACRD	1.40
34.50	34.90	UP	0.80
34.90	35.30	DCA	0.80
35.30	35.50	UP	0.40
35.50	35.70	ACRE	0.40
35.70	36.60	DCA	1.80
36.60	36.75	ACRD	0.30
36.75	37.60	DCA	1.70
37.60	37.90	UP	0.60
37.90	39.70	DCA	3.60
39.70	39.90	ACRD	0.40
39.90	43.30	ACRB	6.80
43.30	45.30	ACRT	4.00
45.30	46.50	DCA	2.40
46.50	46.60	ACRE	0.20
46.60	48.80	R	4.40
48.80	50.00	ACRB	2.40

N29: Bundegi North – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	0.70	ACRB	1.40
0.70	1.30	DCA	1.20
1.30	1.70	ACRB	0.80
1.70	2.00	R	0.60
2.00	2.10	ACRD	0.20
2.10	2.40	UP	0.60
2.40	2.80	DCA	0.80
2.80	3.00	ACRB	0.40
3.00	3.20	DCA	0.40
3.20	3.40	ACRD	0.40
3.40	4.80	DCA	2.80
4.80	6.00	ACRB	2.40
6.00	6.80	DCA	1.60
6.80	7.00	ACRB	0.40
7.00	7.50	DCA	1.00
7.50	8.10	ACRB	1.20
8.10	8.80	DCA	1.40
8.80	9.20	ACRB	0.80
9.20	9.40	DCA	0.40
9.40	12.30	UP	5.80
12.30	14.00	R	3.40
14.00	14.50	ACRB	1.00
14.50	17.00	DCA	5.00
17.00	17.20	ACRB	0.40
17.20	18.20	DCA	2.00
18.20	18.40	ACRB	0.40
18.40	19.20	DCA	1.60
19.20	19.30	ACRB	0.20
19.30	20.30	DCA	2.00
20.30	20.40	ACRB	0.20
20.40	21.30	DCA	1.80
21.30	21.50	ACRB	0.40
21.50	22.20	DCA	1.40
22.20	25.00	ACRB	5.60
25.00	25.40	UP	0.80
25.40	26.20	DCA	1.60
26.20	26.40	ACRB	0.40
26.40	26.70	DCA	0.60
26.70	30.00	UP	6.60
30.00	30.20	DCA	0.40
30.20	30.30	ACRD	0.20
30.30	32.00	DCA	3.40
32.00	32.20	ACRS	0.40
32.20	33.30	DCA	2.20
33.30	33.40	ACRD	0.20
33.40	39.80	DCA	12.80
39.80	40.40	UP	1.20
40.40	42.10	DCA	3.40
42.10	42.15	ACRD	0.10
42.15	42.20	DCA	0.10
42.20	42.40	ACRD	0.40
42.40	42.70	ACRS	0.60
42.70	43.00	DCA	0.60
43.00	43.40	ACRD	0.80
43.40	44.50	UP	2.20
44.50	44.80	ACRE	0.60
44.80	45.00	DCA	0.40
45.00	45.80	ACRB	1.60
45.80	47.00	DCA	2.40
47.00	47.50	ACRE	1.00
47.50	50.00	DCA	5.00

N29: Bundegi North – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	2.00	DCA	4.00
2.00	2.10	ACRS	0.20
2.10	13.00	DCA	21.80
13.00	14.00	UP	2.00
14.00	16.00	R	4.00
16.00	17.00	UP	2.00
17.00	18.50	R	3.00
18.50	19.00	UP	1.00
19.00	21.50	DCA	5.00
21.50	22.00	UP	1.00
22.00	27.00	DCA	10.00
27.00	28.00	UP	2.00
28.00	31.00	R	6.00
31.00	32.00	UP	2.00
32.00	34.50	R	5.00
34.50	35.60	UP	2.20
35.60	36.50	DCA	1.80
36.50	37.50	UP	2.00
37.50	38.60	DCA	2.20
38.60	38.80	ACRD	0.40
38.80	39.40	DCA	1.20
39.40	39.70	UP	0.60
39.70	42.60	DCA	5.80
42.60	43.40	UP	1.60
43.40	47.00	DCA	7.20
47.00	47.50	UP	1.00
47.50	48.50	DCA	2.00
48.50	48.70	CA	0.40
48.70	50.00	DCA	2.60

N32: Tantabiddi Lagoon – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.60	S	1.20
0.60	0.80	RK	0.40
0.80	1.40	AA	1.20
1.40	1.45	ACRD	0.10
1.45	1.65	AA	0.40
1.65	1.78	ACRD	0.26
1.78	1.90	CA	0.24
1.90	2.07	ACRD	0.34
2.07	2.30	AA	0.46
2.30	2.40	FAVB	0.20
2.40	2.57	FAVB	0.34
2.57	3.30	AA	1.46
3.30	3.40	FAVF	0.20
3.40	3.70	AA	0.60
3.70	4.40	FAVF	1.40
4.40	7.10	AA	5.40
7.10	7.22	FAVF	0.24
7.22	7.60	RK	0.76
7.60	8.15	ACRD	1.10
8.15	8.23	ACRD	0.16
8.23	8.32	DCA	0.18
8.32	8.40	FAVF	0.16
8.40	11.02	DCA	5.24
11.02	11.20	POCD	0.36
11.20	12.75	AA	3.10
12.75	12.85	FAVF	0.20
12.85	13.32	DAC	0.94
13.32	13.88	ACRT	1.12
13.88	14.00	FAVB	0.24
14.00	14.82	AA	1.64
14.82	14.90	ACRD	0.16
14.90	15.00	FAVD	0.20
15.00	15.28	DCA	0.56
15.28	15.30	FAVD	0.04
15.30	15.38	AA	0.16
15.38	15.40	FAVD	0.04
15.40	15.80	AA	0.80
15.80	18.55	DCA	5.50
18.55	18.57	ACRD	0.04
18.57	21.60	DCA	6.06
21.60	21.80	FAVF	0.40
21.80	23.10	DCA	2.60
23.10	23.20	FAVF	0.20
23.20	23.70	DCA	1.00
23.70	23.71	FAVD	0.02
23.71	24.30	DCA	1.18
24.30	24.32	FAVD	0.04
24.32	24.95	DCA	1.26
24.95	25.00	FAVD	0.10
25.00	25.90	DCA	1.80
25.90	26.93	CA	2.06
26.93	27.10	S	0.34
27.10	27.67	DCA	1.14
27.67	27.70	POCD	0.06
27.70	28.30	DCA	1.20
28.30	28.40	FAVD	0.20
28.40	28.50	DCA	0.20
28.50	28.55	FAVD	0.10
28.55	28.87	AA	0.64
28.87	28.90	FAVD	0.06
28.90	29.10	S	0.40
29.10	29.20	AA	0.20
29.20	29.30	ACRD	0.20
29.30	29.86	AA	1.12
29.86	29.99	ACRD	0.26
29.99	30.55	AA	1.12
30.55	30.60	ACRD	0.10
30.60	30.65	AA	0.10
30.65	30.68	ACRD	0.06
30.68	31.80	DCA	2.24
31.80	31.20	S	-1.20
31.20	32.60	DCA	2.80
32.60	33.00	ACRD	0.80
33.00	34.00	DCA	2.00
34.00	34.20	POCD	0.40
34.20	35.75	DCA	3.10
35.74	38.25	FAVD	5.02
38.25	40.16	DCA	3.82
40.16	40.18	FAVD	0.04
40.20	40.30	DCA	0.20
40.30	40.63	FAVD	0.66
40.63	40.80	DCA	0.34
40.80	41.12	ACRD	0.64
41.12	41.22	DCA	0.20
41.22	41.41	ACRD	0.38
41.41	41.47	DCA	0.12
41.47	41.72	FAVD	0.50
41.72	42.63	DCA	1.82
42.63	42.69	ACRD	0.12
42.69	43.00	DCA	0.62
43.00	43.15	FAVD	0.30
43.15	44.66	DCA	3.02
44.66	44.69	ME	0.06
44.69	45.73	DCA	2.08
45.73	45.77	CA	0.08
45.77	45.81	FAVD	0.08
45.81	46.77	DCA	1.92
46.77	47.00	ACRD	0.46
47.00	48.30	DCA	2.60
48.30	48.56	ACRD	0.52
48.56	48.80	DCA	0.48
48.80	48.90	ACRD	0.20
48.90	49.75	DCA	1.70
49.75	49.80	ACRD	0.10
49.80	49.90	DCA	0.20
49.90	49.95	POCD	0.10
49.95	50.00	DCA	0.10

N32: Tantabiddi Lagoon – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	1.14	DCA	2.28
1.14	1.16	FAVD	0.04
1.16	1.43	DCA	0.54
1.43	1.65	FAVD	0.44
1.65	5.57	DCA	7.84
5.57	5.70	ACRD	0.26
5.70	6.12	DCA	0.84
6.12	6.27	ACRD	0.30
6.27	7.06	DCA	1.58
7.06	7.13	FAVF	0.14
7.13	7.45	ACRD	0.64
7.45	8.62	DCA	2.34
8.62	9.23	FAVD	1.22
9.23	10.23	DCA	2.00
10.23	10.60	FAVD	0.74
10.60	10.90	DCA	0.60
10.90	11.20	FAVD	0.60
11.20	11.55	DCA	0.70
11.55	11.82	FAVD	0.54
11.82	11.90	RK	0.16
11.90	12.00	ACRD	0.20
12.00	12.27	FAVD	0.54
12.27	12.53	DCA	0.52
12.53	12.64	S	0.22
12.64	14.05	DCA	2.82
14.05	14.10	ACRD	0.10
14.10	14.39	DCA	0.58
14.39	14.41	ACRD	0.04
14.41	15.50	DCA	2.18
15.50	15.79	ACRT	0.58
15.79	17.20	DCA	2.82
17.20	19.30	FAVD	4.20
19.30	19.77	ACRD	0.94
19.77	25.10	DCA	10.66
25.10	27.00	FAVD	3.80
27.00	27.26	DCA	0.52
27.26	27.35	POCD	0.18
27.35	28.00	FAVD	1.30
28.00	28.10	POCD	0.20
28.10	31.50	FAVD	6.80
31.50	31.88	POCD	0.76
31.88	32.80	FAVD	1.84
32.80	33.00	ACRD	0.40
33.00	35.30	DCA	4.60
35.30	36.10	FAVD	1.60
36.10	37.40	DCA	2.60
37.40	37.60	FAVD	0.40
37.60	40.00	DCA	4.80
40.00	40.10	ACRT	0.20
40.10	40.50	DCA	0.80
40.50	40.63	ACRT	0.26
40.63	40.70	DCA	0.14
40.70	40.71	FAVD	0.02
40.71	40.90	DCA	0.38
40.90	41.00	FAVD	0.20
41.00	41.10	DCA	0.20
41.10	41.90	FAVD	1.60
41.90	43.90	DCA	4.00
43.90	44.30	ACRD	0.80
44.30	44.80	DCA	1.00
44.80	45.08	ACRD	0.56
45.08	46.40	DCA	2.64
46.40	46.56	ME	0.32
46.56	47.85	DCA	2.58
47.85	48.00	ACRD	0.30
48.00	48.30	DCA	0.60
48.30	48.40	ACRD	0.20
48.40	50.00	AA	3.20

N32: Tantabiddi Lagoon – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	0.10	ACRD	0.20
0.10	1.75	DCA	3.30
1.75	2.36	FAVD	1.22
2.36	2.41	DCA	0.10
2.41	2.77	FAVD	0.72
2.77	3.47	DCA	1.40
3.47	3.73	FAVD	0.52
3.73	4.23	ACRT	1.00
4.23	4.35	DCA	0.24
4.35	4.95	ACRT	1.20
4.95	5.17	DCA	0.44
5.17	5.33	ACRD	0.32
5.33	6.40	DCA	2.14
6.40	6.70	ACRD	0.60
6.70	7.30	DCA	1.20
7.30	7.45	ME	0.30
7.45	7.50	DCA	0.10
7.50	8.00	ACRD	1.00
8.00	8.40	DCA	0.80
8.40	8.43	ACRD	0.06
8.43	9.00	DCA	1.14
9.00	9.27	ACRD	0.54
9.27	9.90	DCA	1.26
9.90	10.00	POCD	0.20
10.00	10.40	DCA	0.80
10.40	10.50	ACRD	0.20
10.50	13.57	DCA	6.14
13.57	13.82	ACRD	0.50
13.82	14.55	FAVD	1.46
14.55	15.12	DCA	1.14
15.12	15.14	ACRD	0.04
15.14	16.57	DCA	2.86
16.57	16.92	FAVD	0.70
16.92	17.77	DCA	1.70
17.77	18.30	FAVD	1.06
18.30	25.00	DCA	13.40
25.00	26.20	FAVD	2.40
26.20	36.50	DCA	20.60
26.50	27.53	FAVD	2.06
27.53	28.25	DCA	1.44
28.25	28.35	POCD	0.20
28.35	29.70	DCA	2.70
29.70	29.90	FAVD	0.40
29.90	30.00	DCA	0.20
30.00	30.17	FAVD	0.34
30.17	30.30	DCA	0.26
30.30	30.40	FAVD	0.20
30.40	30.70	DCA	0.60
30.70	31.00	FAVD	0.60
31.00	31.25	DCA	0.50
31.25	31.50	FAVD	0.50
31.50	31.90	DCA	0.80
31.90	32.50	FAVD	1.20
32.50	32.80	DCA	0.60
32.80	33.00	FAVD	0.40
33.00	33.40	DCA	0.80
33.40	33.80	FAVD	0.80
33.80	37.13	DCA	6.66
37.13	37.40	FAVD	0.54
37.40	38.06	DCA	1.32
38.06	38.20	FAVD	0.28
38.20	38.80	DCA	1.20
38.80	39.10	FAVD	0.60
39.10	39.55	DCA	0.90
39.55	40.20	FAVD	1.30
40.20	40.30	DCA	0.20
40.30	40.50	FAVD	0.40
40.50	40.70	DCA	0.40
40.70	41.10	FAVD	0.80
41.10	41.30	DCA	0.40
41.30	41.40	POCD	0.20
41.40	42.00	DCA	1.20
42.00	42.60	FAVD	1.20
42.60	43.13	DCA	1.06
43.13	43.30	FAVD	0.34
43.30	43.60	DCA	0.60
43.60	43.78	FAVD	0.36
43.78	43.88	POCD	0.20
43.88	44.30	DCA	0.84
44.30	45.00	FAVD	1.40
45.00	46.10	DCA	2.20
46.10	46.20	ACRD	0.20
46.20	46.42	DCA	0.44
46.42	46.55	FAVD	0.26
46.55	47.00	DCA	0.90
47.00	47.30	FAVD	0.60
47.30	47.60	DCA	0.60
47.60	47.66	FAVD	0.12
47.66	47.82	DCA	0.32
47.82	47.88	FAVD	0.12
47.88	48.25	DCA	0.74
48.25	48.35	ACRD	0.20
48.35	50.00	DCA	3.30

N42: Winderabandi – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.80	S	1.60
0.80	1.65	ARCS	1.70
1.65	1.70	RK	0.10
1.70	2.00	FAVM	0.60
2.00	2.40	DCA	0.80
2.40	2.50	POCD	0.20
2.50	2.80	RK	0.60
2.80	3.10	ACRD	0.60
3.10	3.80	S	1.40
3.80	4.00	RK	0.40
4.00	4.30	S	0.60
4.30	4.50	RK	0.40
4.50	4.80	S	0.60
4.80	6.00	RK	2.40
6.00	6.07	ACRD	0.14
6.07	6.56	RK	0.98
6.56	6.63	ACRD	0.14
6.63	7.19	RK	1.12
7.19	7.38	ACRD	0.38
7.38	7.56	RK	0.36
7.56	7.80	ACRD	0.48
7.80	7.96	RK	0.32
7.96	8.40	S	0.88
8.40	8.63	ACRD	0.46
8.63	9.30	ACRS	1.34
9.30	9.36	S	0.12
9.36	11.10	ACRS	3.48
11.10	13.20	S	4.20
13.20	13.30	ACRS	0.20
13.30	13.40	S	0.20
13.40	13.64	ACRS	0.48
13.64	14.20	S	1.12
14.20	14.30	ACRS	0.20
14.30	14.40	S	0.20
14.40	14.98	ACRT	1.16
14.98	15.20	FAVM	0.44
15.20	15.35	UP	0.30
15.35	16.40	ACRT	2.10
16.40	16.60	RK	0.40
16.60	16.80	ACRD	0.40
16.80	17.10	RK	0.60
17.10	17.50	ACRS	0.80
17.50	18.13	RK	1.26
18.13	18.70	ACRT	1.14
18.70	19.00	FAVM	0.60
19.00	19.27	ACRT	0.54
19.27	20.20	RK	1.86
20.20	20.80	ACRS	1.20
20.80	21.50	RK	1.40
21.50	21.70	ACRD	0.40
21.70	21.89	RK	0.38
21.89	22.09	ACRD	0.40
22.09	22.13	ACRT	0.08
22.13	22.18	RK	0.10
22.18	22.30	FAVM	0.24
22.30	22.65	RK	0.70
22.65	22.73	FAVM	0.16
22.73	23.00	RK	0.54
23.00	23.05	ACRT	0.10
23.05	23.55	ACRS	1.00
23.55	23.63	RK	0.16
23.63	23.70	FAVS	0.14
23.70	23.80	R	0.20
23.80	24.00	RK	0.40
24.00	24.10	ACRE	0.20
24.10	24.70	RK	1.20
24.70	25.90	ACRT	2.40
25.90	26.00	RK	0.20
26.00	26.20	ACRD	0.40
26.20	26.45	RK	0.50
26.45	26.50	POCD	0.10
26.50	27.00	RK	1.00
27.00	27.20	ACRS	0.40
27.20	28.12	ACRT	1.84
28.12	29.00	RK	1.76
29.00	29.10	ACRS	0.20
29.10	29.40	RK	0.60
29.40	29.50	ACRT	0.20
29.50	29.60	RK	0.20
29.60	29.70	CA	0.20
29.70	31.20	RK	3.00
31.20	31.30	POCS	0.20
31.30	31.40	RK	0.20
31.40	31.60	ACRD	0.40
31.60	32.05	RK	0.90
32.05	32.12	ACRD	0.14
32.12	33.23	RK	2.22
33.23	33.45	ACRD	0.44
33.45	34.45	RK	2.00
34.45	34.86	ACRD	0.82
34.86	35.10	RK	0.48
35.10	35.64	ACRD	1.08
35.64	35.80	FAVM	0.32
35.80	36.00	ACRD	0.40
36.00	38.15	DCA	4.30
38.15	38.50	ACRD	0.70
38.50	39.00	RK	1.00
39.00	39.05	ACRD	0.10
39.05	39.48	RK	0.86
39.48	39.56	ACRS	0.16
39.56	41.30	RK	3.48
41.30	41.70	FAVM	0.80
41.70	42.00	RK	0.60
42.00	42.08	ACRD	0.16
42.08	42.30	RK	0.44
42.30	42.40	ACRD	0.20
42.40	42.60	RK	0.40
42.60	43.00	ACRD	0.80
43.00	43.20	ACRS	0.40
43.20	43.55	ACRD	0.70

43.55	43.65	RK	0.20
43.65	43.90	ACRD	0.50
43.90	44.50	RK	1.20
44.50	45.50	DCA	2.00
45.50	45.65	ACRT	0.30
45.65	45.70	RK	0.10
45.70	46.00	ACRS	0.60
46.00	46.32	ACRD	0.64
46.32	46.54	RK	0.44
46.54	47.00	ACRD	0.92
47.00	47.40	ACRT	0.80
47.40	47.87	ACRD	0.94
47.87	48.10	RK	0.46
48.10	48.24	ACRD	0.28
48.24	48.28	RK	0.08
48.28	48.36	CA	0.16
48.36	49.30	RK	1.88
49.30	49.40	ACRB	0.20
49.40	49.70	DCA	0.60
49.70	50.00	ACRD	0.60

N42: Winderabandi – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	1.50	S	3.00
1.50	1.60	ACRS	0.20
1.60	1.70	S	0.20
1.70	1.80	ACRS	0.20
1.80	2.00	S	0.40
2.00	3.80	CA	3.60
3.80	3.90	ACRD	0.20
3.90	5.00	RK	2.20
5.00	5.10	ACRD	0.20
5.10	5.40	RK	0.60
5.40	5.50	S	0.20
5.50	5.80	ACRD	0.60
5.80	6.90	S	2.20
6.90	7.20	ACRD	0.60
7.20	7.40	RK	0.40
7.40	7.60	ACRD	0.40
7.60	8.10	RK	1.00
8.10	8.30	ACRD	0.40
8.30	8.35	CA	0.10
8.35	8.50	ACRT	0.30
8.50	8.87	ACRD	0.74
8.87	9.00	DCA	0.26
9.00	9.20	ACRB	0.40
9.20	9.40	DCA	0.40
9.40	9.45	ACRD	0.10
9.45	9.80	DCA	0.70
9.80	9.90	CA	0.20
9.90	10.00	ACRT	0.20
10.00	10.20	ACRD	0.40
10.20	10.37	RK	0.34
10.37	10.70	ACRT	0.66
10.70	10.86	DCA	0.32
10.86	10.90	ACRD	0.08
10.90	11.28	RK	0.76
11.28	11.50	ACRD	0.44
11.50	11.62	RK	0.24
11.62	11.80	ACRD	0.36
11.80	12.20	RK	0.80
12.20	12.25	ACRS	0.10
12.25	14.12	RK	3.74
14.12	14.22	FAVM	0.20
14.22	14.50	ACRD	0.56
14.50	15.60	RK	2.20
15.60	15.70	ACRD	0.20
15.70	16.15	RK	0.90
16.15	16.40	ACRD	0.50
16.40	16.90	RK	1.00
16.90	17.30	ACRD	0.80
17.30	17.70	CA	0.80
17.70	18.00	RK	0.60
18.00	19.45	CA	2.90
19.45	19.55	ACRD	0.20
19.55	19.70	DCA	0.30
19.70	19.90	ACRS	0.40
19.90	20.34	ACRD	0.88
20.34	21.00	DCA	1.32
21.00	21.20	CA	0.40
21.20	22.40	DCA	2.40
22.40	22.60	ACRD	0.40
22.60	24.20	DCA	3.20
24.20	24.70	ACRD	1.00
24.70	25.25	RK	1.10
25.25	25.55	ACRD	0.60
25.55	26.10	RK	1.10
26.10	26.30	ACRD	0.40
26.30	27.70	DCA	2.80
27.70	27.85	ACRD	0.30
27.85	28.10	FAVS	0.50
28.10	28.40	ACRD	0.60
28.40	28.80	FAVS	0.80
28.80	29.16	ACRS	0.72
29.16	29.40	ACRD	0.48
29.40	29.50	ACRS	0.20
29.50	29.60	RK	0.20
29.60	29.90	ACRD	0.60
29.90	30.08	DCA	0.36
30.08	30.18	ACRD	0.20
30.18	30.30	RK	0.24
30.30	30.40	ACRS	0.20
30.40	32.80	RK	4.80
32.80	33.00	ACRD	0.40
33.00	33.30	RK	0.60
33.30	33.50	FAVS	0.40
33.50	33.60	RK	0.20
33.60	33.70	FAVS	0.20
33.70	36.60	DCA	5.80
36.60	37.00	ACRD	0.80
37.00	38.20	DCA	2.40
38.20	38.30	ACRD	0.20
38.30	38.60	DCA	0.60
38.60	38.80	ACRD	0.40
38.80	39.10	DCA	0.60
39.10	39.30	R	0.40
39.30	39.80	DCA	1.00
39.80	40.03	ACRD	0.46
40.03	41.00	DCA	1.94
41.00	41.60	ACRT	1.20
41.60	41.70	ACRD	0.20
41.70	42.30	RK	1.20
42.30	42.70	R	0.80
42.70	43.00	ACRT	0.60
43.00	43.15	S	0.30
43.15	44.15	ACRT	2.00
44.15	45.70	DCA	3.10
45.70	46.10	FAVS	0.80
46.10	46.20	S	0.20
46.20	46.30	ACRE	0.20
46.30	46.40	DCA	0.20
46.40	46.50	ACRS	0.20

Length 1	Length 2	Field Code	% Cover

Length 1	Length 2	Field Code	% Cover

46.50	47.80	DCA	2.60
47.80	48.00	ACRD	0.40
48.00	48.50	DCA	1.00
48.50	48.70	ACRS	0.40
48.70	49.25	DCA	1.10
49.25	49.65	ACRD	0.80
49.65	50.00	DCA	0.70

N42: Winderabandi – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	1.00	DCA	2.00
1.00	1.30	ACRD	0.60
1.30	1.85	DCA	1.10
1.85	2.00	ACRD	0.30
2.00	3.00	DCA	2.00
3.00	3.10	ACRE	0.20
3.10	3.30	ACRD	0.40
3.30	3.90	ACRS	1.20
3.90	4.40	DCA	1.00
4.40	4.50	ACRD	0.20
4.50	4.70	DCA	0.40
4.70	5.10	ACRD	0.80
5.10	5.30	DCA	0.40
5.30	5.60	ACRD	0.60
5.60	8.00	DCA	4.80
8.00	8.10	ACRT	0.20
8.10	10.30	DCA	4.40
10.30	10.40	ACRD	0.20
10.40	10.58	DCA	0.36
10.58	10.95	ACRT	0.74
10.95	11.70	DCA	1.50
11.70	11.80	ACRD	0.20
11.80	12.80	DCA	2.00
12.80	13.15	ACRE	0.70
13.15	13.55	DCA	0.80
13.55	13.70	ACRE	0.30
13.70	15.00	DCA	2.60
15.00	15.60	ACRE	1.20
15.60	16.10	DCA	1.00
16.10	16.20	ACRD	0.20
16.20	18.20	DCA	4.00
18.20	18.30	ACRE	0.20
18.30	20.00	DCA	3.40
20.00	20.10	ACRD	0.20
20.10	20.80	DCA	1.40
20.80	21.60	ACRD	1.60
21.60	21.80	DCA	0.40
21.80	22.00	FAVM	0.40
22.00	22.05	DCA	0.10
22.05	22.80	ACRD	1.50
22.80	23.40	DCA	1.20
23.40	26.40	S	6.00
26.40	26.60	ACRS	0.40
26.60	26.80	FAVM	0.40
26.80	27.00	CA	0.40
27.00	28.10	S	2.20
28.10	28.50	DCA	0.80
28.50	28.70	S	0.40
28.70	30.00	DCA	2.60
30.00	30.20	S	0.40
30.20	30.70	ACRD	1.00
30.70	31.40	DCA	1.40
31.40	31.80	S	0.80
31.80	32.00	ACRS	0.40
32.00	32.50	DCA	1.00
32.50	33.20	ACRE	1.40
33.20	33.85	S	1.30
33.85	34.10	ACRD	0.50
34.10	35.20	DCA	2.20
35.20	35.30	FAVM	0.20
35.30	35.80	DCA	1.00
35.80	35.90	FAVM	0.20
35.90	36.00	ACRD	0.20
36.00	36.20	DCA	0.40
36.20	36.40	ACRE	0.40
36.40	37.00	DCA	1.20
37.00	37.05	ACRD	0.10
37.05	38.40	DCA	2.70
38.40	38.50	ACRD	0.20
38.50	39.25	DCA	1.50
39.25	39.60	ACRD	0.70
39.60	41.10	DCA	3.00
41.10	41.20	FAVM	0.20
41.20	41.70	ACRD	1.00
41.70	42.00	DCA	0.60
42.00	42.20	ACRS	0.40
42.20	42.50	DCA	0.60
42.50	42.80	ACRD	0.60
42.80	44.20	DCA	2.80
44.20	44.26	ACRD	0.12
44.26	44.60	DCA	0.68
44.60	45.10	ACRT	1.00
45.10	45.20	UP	0.20
45.20	46.80	S	3.20
46.80	47.00	UP	0.40
47.00	47.35	ACRD	0.70
47.35	47.55	RK	0.40
47.55	47.90	ACRD	0.70
47.90	49.10	DCA	2.40
49.10	49.20	FAVM	0.20
49.20	50.00	DCA	1.60

N47: Bills Bay North – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	29.40	R	58.80
29.40	30.20	S	1.60
30.20	33.60	R	6.80
33.60	33.80	FAVM	0.40
33.80	34.00	DCA	0.40
34.00	38.70	R	9.40
38.70	38.85	ACRD	0.30
38.85	39.22	R	0.74
39.22	39.63	ACRD	0.82
39.63	40.20	R	1.14
40.20	40.30	FAVM	0.20
40.30	41.65	R	2.70
41.65	42.00	S	0.70
42.00	46.30	R	8.60
46.30	47.80	FAVM	3.00
47.80	50.00	R	4.40

N47: Bills Bay North – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	4.50	R	9.00
4.50	4.60	FAVM	0.20
4.60	7.00	R	4.80
7.00	7.50	S	1.00
7.50	8.00	R	1.00
8.00	13.00	AA	10.00
13.00	17.40	R	8.80
17.40	20.70	R	6.60
20.70	20.80	POCD	0.20
20.80	21.70	DCA	1.80
21.70	22.70	R	2.00
22.70	23.00	R	0.60
23.00	23.10	FAVM	0.20
23.10	27.20	R	8.20
27.20	28.00	S	1.60
28.00	50.00	R	44.00

N47: Bills Bay North – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	1.60	R	3.20
1.60	1.70	ME	0.20
1.70	16.90	R	30.40
16.90	17.00	ACRD	0.20
17.00	17.80	R	1.60
17.80	17.93	ACRS	0.26
17.93	25.00	R	14.14
25.00	27.00	UP	4.00
27.00	37.60	R	21.20
37.60	37.80	ME	0.40
37.80	40.40	R	5.20
40.40	40.70	ACRD	0.60
40.70	50.00	R	18.60

N50: Bills Bay East – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.60	S	1.20
0.60	0.90	ACRT	0.60
0.90	1.10	R	0.40
1.10	1.40	ACRE	0.60
1.40	1.60	S	0.40
1.60	2.20	ACRE	1.20
2.20	2.33	DCA	0.26
2.33	3.42	FAVM	2.18
3.42	4.28	DCA	1.72
4.28	4.31	ACRE	0.06
4.31	4.40	DCA	0.18
4.40	4.45	FAVM	0.10
4.45	5.00	R	1.10
5.00	5.05	ACRE	0.10
5.05	5.20	R	0.30
5.20	5.40	ACRS	0.40
5.40	5.60	R	0.40
5.60	5.70	ACRS	0.20
5.70	6.20	R	1.00
6.20	6.30	ACRS	0.20
6.30	6.50	R	0.40
6.50	6.60	FAVM	0.20
6.60	7.00	R	0.80
7.00	7.10	ACRE	0.20
7.10	7.20	R	0.20
7.20	7.25	FAVM	0.10
7.25	7.60	PORM	0.70
7.60	7.90	S	0.60
7.90	8.00	PORM	0.20
8.00	8.12	S	0.24
8.12	8.60	DCA	0.96
8.60	9.00	ACRE	0.80
9.00	9.80	R	1.60
9.80	10.00	ACRS	0.40
10.00	11.10	ACRE	2.20
11.10	11.30	ACRS	0.40
11.30	12.10	ACRE	1.60
12.10	12.30	ACRS	0.40
12.30	12.60	ACRE	0.60
12.60	12.70	ACRS	0.20
12.70	15.90	ACRE	6.40
15.90	16.10	S	0.40
16.10	19.90	ACRE	7.60
19.90	20.00	ACRS	0.20
20.00	21.00	ACRE	2.00
21.00	22.00	R	2.00
22.00	23.50	ACRS	3.00
23.50	23.60	S	0.20
23.60	28.00	ACRS	8.80
28.00	30.40	DCA	4.80
30.40	30.50	ACRE	0.20
30.50	31.40	DCA	1.80
31.40	31.70	ACRE	0.60
31.70	32.10	DCA	0.80
32.10	32.20	FAVM	0.20
32.20	32.80	DCA	1.20
32.80	32.90	FAVM	0.20
32.90	34.00	DCA	2.20
34.00	34.50	ACRS	1.00
34.50	34.80	DCA	0.60
34.80	35.00	ACRE	0.40
35.00	36.70	DCA	3.40
36.70	37.00	ACRS	0.60
37.00	38.10	DCA	2.20
38.10	38.60	ACRS	1.00
38.60	38.70	DCA	0.20
38.70	40.10	ACRS	2.80
40.10	40.40	ACRE	0.60
40.40	41.30	DCA	1.80
41.30	41.70	ACRD	0.80
41.70	42.60	S	1.80
42.60	42.80	ACRD	0.40
42.80	43.80	S	2.00
43.80	44.30	ACRS	1.00
44.30	45.30	DCA	2.00
45.30	45.40	ACRE	0.20
45.40	46.40	DCA	2.00
46.40	46.50	ACRS	0.20
46.50	47.80	DCA	2.60
47.80	47.90	FAVM	0.20
47.90	48.10	ACRE	0.40
48.10	48.80	DCA	1.40
48.80	49.00	ACRE	0.40
49.00	49.50	ACRS	1.00
49.50	50.00	DCA	1.00

N50: Bills Bay East – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	0.40	ACRE	0.80
0.40	0.55	FAVM	0.30
0.55	0.60	ACRS	0.10
0.60	1.90	ACRE	2.60
1.90	2.20	S	0.60
2.20	2.30	ACRE	0.20
2.30	2.50	S	0.40
2.50	3.72	R	2.44
3.72	3.90	ACRS	0.36
3.90	4.10	R	0.40
4.10	4.20	ACRS	0.20
4.20	4.40	R	0.40
4.40	4.70	ACRS	0.60
4.70	5.80	R	2.20
5.80	6.00	ACRE	0.40
6.00	6.10	ACRS	0.20
6.10	6.60	ACRE	1.00
6.60	6.90	S	0.60
6.90	7.00	ACRE	0.20
7.00	7.10	S	0.20
7.10	10.23	ACRE	6.26
10.23	10.24	FAVM	0.02
10.24	10.30	ACRE	0.12
10.30	10.55	R	0.50
10.55	19.90	DCA	18.70
19.90	19.98	R	0.16
19.98	20.10	ACRE	0.24
20.10	20.60	R	1.00
20.60	20.80	S	0.40
20.80	20.88	R	0.16
20.88	20.92	DCA	0.08
20.92	21.70	R	1.56
21.70	23.55	DCA	3.70
23.55	23.63	FAVM	0.16
23.63	24.00	R	0.74
24.00	27.00	DCA	6.00
27.00	28.00	R	2.00
28.00	29.80	DCA	3.60
29.80	38.10	ACRE	16.60
38.10	38.30	ACRT	0.40
38.30	38.75	ACRE	0.90
38.75	38.85	ACRT	0.20
38.85	39.00	ACRE	0.30
39.00	39.30	ACRT	0.60
39.30	39.60	ACRE	0.60
39.60	41.80	DCA	4.40
41.80	42.20	ACRE	0.80
42.20	42.90	DCA	1.40
42.90	43.00	ACRS	0.20
43.00	43.17	DCA	0.34
43.17	43.24	ACRE	0.14
43.24	43.35	DCA	0.22
43.35	43.50	ACRS	0.30
43.50	43.70	DCA	0.40
43.70	43.80	ACRT	0.20
43.80	45.00	ACRE	2.40
45.00	45.20	DCA	0.40
45.20	50.00	ACRE	9.60

N50: Bills Bay East – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	0.02	S	0.04
0.02	1.80	ACRE	3.56
1.80	2.40	S	1.20
2.40	2.60	ACRE	0.40
2.60	3.20	S	1.20
3.20	4.10	ACRE	1.80
4.10	4.20	ACRS	0.20
4.20	4.60	ACRE	0.80
4.60	4.90	ACRS	0.60
4.90	5.50	ACRE	1.20
5.50	5.60	ACRS	0.20
5.60	5.80	ACRE	0.40
5.80	5.90	ACRS	0.20
5.90	8.00	ACRE	4.20
8.00	8.10	ACRS	0.20
8.10	8.30	S	0.40
8.30	13.00	ACRE	9.40
13.00	14.20	RK	2.40
14.20	16.00	ACRE	3.60
16.00	17.50	DCA	3.00
17.50	18.60	ACRE	2.20
18.60	18.80	S	0.40
18.80	18.90	ACRD	0.20
18.90	20.02	ACRE	2.24
20.02	20.04	S	0.04
20.04	23.78	ACRE	7.48
23.78	23.86	ACRD	0.16
23.86	25.30	ACRE	2.88
25.30	27.00	S	3.40
27.00	27.20	ACRE	0.40
27.20	27.50	S	0.60
27.50	29.10	ACRE	3.20
29.10	29.70	S	1.20
29.70	30.00	ACRE	0.60
30.00	30.04	S	0.08
30.04	30.06	ACRE	0.04
30.06	32.00	S	3.88
32.00	32.70	ACRE	1.40
32.70	33.10	S	0.80
33.10	33.70	ACRE	1.20
33.70	33.80	S	0.20
33.80	33.90	ACRE	0.20
33.90	34.40	S	1.00
34.40	34.60	ACRE	0.40
34.60	34.70	S	0.20
34.70	35.00	ACRE	0.60
35.00	35.40	S	0.80
35.40	36.50	ACRE	2.20
36.50	36.60	S	0.20
36.60	37.50	ACRE	1.80
37.50	38.70	S	2.40
38.70	39.00	ACRE	0.60
39.00	39.10	S	0.20
39.10	39.60	ACRE	1.00
39.60	40.30	S	1.40
40.30	40.80	ACRE	1.00
40.80	41.00	S	0.40
41.00	41.10	ACRE	0.20
41.10	42.80	S	3.40
42.80	46.00	ACRE	6.40
46.00	46.40	S	0.80
46.40	47.00	ACRE	1.20
47.00	47.70	S	1.40
47.70	48.30	ACRE	1.20
48.30	50.00	S	3.40

N49: Bills Bay West – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.50	DCA	1.00
0.50	0.80	POCS	0.60
0.80	2.00	DCA	2.40
2.00	2.10	POCS	0.20
2.10	2.20	DCA	0.20
2.20	2.40	FAVM	0.40
2.40	2.60	ACRD	0.40
2.60	2.90	DCA	0.60
2.90	3.40	POCS	1.00
3.40	4.20	DCA	1.60
4.20	4.40	ACRE	0.40
4.40	6.00	DCA	3.20
6.00	7.70	ACRS	3.40
7.70	9.60	ACRB	3.80
9.60	9.86	ACRS	0.52
9.86	11.65	FAVD	3.58
11.65	11.90	DCA	0.50
11.90	12.40	FAVD	1.00
12.40	14.00	DCA	3.20
14.00	14.40	ACRD	0.80
14.40	14.80	DCA	0.80
14.80	15.20	ACRD	0.80
15.20	15.78	FAVD	1.16
15.78	16.80	ACRT	2.04
16.80	16.90	DCA	0.20
16.90	17.10	ACRT	0.40
17.10	18.00	DCA	1.80
18.00	18.20	ACRS	0.40
18.20	18.40	DCA	0.40
18.40	18.60	POCD	0.40
18.60	18.75	DCA	0.30
18.75	18.85	POCD	0.20
18.85	19.20	DCA	0.70
19.20	19.60	ACRS	0.80
19.60	20.70	DCA	2.20
20.70	21.00	ACRS	0.60
21.00	21.30	ACRT	0.60
21.30	22.00	POCD	1.40
22.00	22.30	ACRT	0.60
22.30	22.45	DCA	0.30
22.45	22.55	POCD	0.20
22.55	23.10	DCA	1.10
23.10	23.20	ACRD	0.20
23.20	23.50	DCA	0.60
23.50	24.10	POCD	1.20
24.10	24.40	DCA	0.60
24.40	25.30	ACRS	1.80
25.30	25.80	S	1.00
25.80	26.10	POCD	0.60
26.10	26.20	DCA	0.20
26.20	26.40	POCD	0.40
26.40	26.50	POCD	0.20
26.50	26.60	POCD	0.20
26.60	27.80	ACRS	2.40
27.80	27.95	ACRD	0.30
27.95	31.90	ACRE	7.90
31.90	33.30	FAVD	2.80
33.30	33.50	POCD	0.40
33.50	33.60	DCA	0.20
33.60	34.90	ACRE	2.60
34.90	35.10	ACRD	0.40
35.10	35.30	DCA	0.40
35.30	35.90	ACRD	1.20
35.90	36.10	ACRS	0.40
36.10	36.60	DCA	1.00
36.60	36.70	ACRS	0.20
37.70	37.90	DCA	0.40
37.90	38.18	ACRS	0.56
38.18	38.47	UP	0.58
38.47	39.30	ACRS	1.66
39.30	39.45	ACRD	0.30
39.45	39.60	FAVD	0.30
39.60	39.70	DCA	0.20
39.70	40.00	FAVD	0.60
40.00	41.50	DCA	3.00
41.50	42.50	POCD	2.00
42.50	42.60	DCA	0.20
42.60	42.80	POCD	0.40
42.80	43.00	DCA	0.40
43.00	43.10	POCD	0.20
43.10	43.70	DCA	1.20
43.70	43.80	POCD	0.20
43.80	44.20	DCA	0.80
44.20	44.30	ACRD	0.20
44.30	45.20	POCD	1.80
45.20	45.50	DCA	0.60
45.50	45.60	FAVM	0.20
45.60	45.70	POCD	0.20
45.70	46.20	DCA	1.00
46.20	46.30	ACRE	0.20
46.30	46.80	DCA	1.00
46.80	46.90	ACRD	0.20
46.90	47.30	DCA	0.80
47.30	50.00	ACRB	5.40

N49: Bills Bay West – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	0.20	ACRD	0.40
0.20	0.40	ACRT	0.40
0.40	1.15	ACRD	1.50
1.15	1.30	DCA	0.30
1.30	1.40	ACRS	0.20
1.40	1.60	DCA	0.40
1.60	2.30	ACRS	1.40
2.30	3.20	ACRT	1.80
3.20	3.40	ACRD	0.40
3.40	3.55	FAVD	0.30
3.55	3.65	ACRD	0.20
3.65	4.40	FAVS	1.50
4.40	4.60	FAVF	0.40
4.60	5.10	POCD	1.00
5.10	5.40	DCA	0.60
5.40	5.90	ACRT	1.00
5.90	7.40	ACRS	3.00
7.40	8.30	ACRT	1.80
8.30	8.55	DCA	0.50
8.55	8.70	POCS	0.30
8.70	10.00	ACRT	2.60
10.00	11.00	ACRS	2.00
11.00	12.60	UP	3.20
12.60	13.65	ACRT	2.10
13.65	14.10	DCA	0.90
14.10	14.50	ACRT	0.80
14.50	14.90	DCA	0.80
14.90	15.10	ACRT	0.40
15.10	15.70	UP	1.20
15.70	15.80	ACRT	0.20
15.80	17.00	UP	2.40
17.00	17.20	DCA	0.40
17.20	17.80	UP	1.20
17.80	18.00	DCA	0.40
18.00	21.20	UP	6.40
21.20	21.50	ACRD	0.60
21.50	21.80	DCA	0.60
21.80	22.00	ACRD	0.40
22.00	22.30	DCA	0.60
22.30	22.40	FAVF	0.20
22.40	23.20	DCA	1.60
23.20	23.30	FAVF	0.20
23.30	23.70	DCA	0.80
23.70	23.85	ACRD	0.30
23.85	24.50	ACRD	1.30
24.50	24.70	FAVF	0.40
24.70	25.70	ACRD	2.00
25.70	26.30	FAVF	1.20
26.30	26.40	ACRD	0.20
26.40	26.60	DCA	0.40
26.60	28.35	FAVF	3.50
28.35	28.90	DCA	1.10
28.90	29.15	ACRD	0.50
29.15	29.25	DCA	0.20
29.25	29.40	ACRD	0.30
29.40	31.90	DCA	5.00
31.90	32.35	ACRD	0.90
32.35	34.00	DCA	3.30
34.00	36.00	FAVF	4.00
36.00	36.60	ACRE	1.20
36.60	37.60	DCA	2.00
37.60	38.80	ACRD	2.40
38.80	39.80	DCA	2.00
39.80	39.90	POCD	0.20
39.90	40.00	DCA	0.20
40.00	40.30	ACRD	0.60
40.30	41.30	DCA	2.00
41.30	41.40	ACRD	0.20
41.40	41.60	DCA	0.40
41.60	41.80	POCD	0.40
41.80	41.95	DCA	0.30
41.95	42.12	ACRD	0.34
42.12	42.75	DCA	1.26
42.75	42.85	ACRD	0.20
42.85	43.50	DCA	1.30
43.50	43.80	ACRD	0.60
43.80	44.00	FAVS	0.40
44.00	44.20	DCA	0.40
44.20	44.40	ACRD	0.40
44.40	44.60	DCA	0.40
44.60	45.20	ACRD	1.20
45.20	46.40	DCA	2.40
46.40	46.50	FAVM	0.20
46.50	47.65	DCA	2.30
47.65	47.75	FAVF	0.20
47.75	48.30	DCA	1.10
48.30	48.40	ACRD	0.20
48.40	49.10	DCA	1.40
49.10	49.30	ACRD	0.40
49.30	49.90	DCA	1.20
49.30	50.00	FAVF	1.40

N49: Bills Bay West – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	0.80	DCA	1.60
0.80	1.10	POCD	0.60
1.10	1.20	FAVF	0.20
1.20	1.40	ACRD	0.40
1.40	1.50	FAVF	0.20
1.50	1.67	R	0.34
1.67	1.70	ACRS	0.06
1.70	2.15	R	0.90
2.15	2.23	ACRD	0.16
2.23	2.30	R	0.14
2.30	2.85	FAVF	1.10
2.85	3.10	R	0.50
3.10	3.60	ACRD	1.00
3.60	3.70	R	0.20
3.70	4.10	ACRT	0.80
4.10	5.15	R	2.10
5.15	5.70	ACRT	1.10
5.70	12.40	ACRB	13.40
12.40	13.00	ACRE	1.20
13.00	13.10	FAVM	0.20
13.10	13.22	POCS	0.24
13.22	13.40	R	0.36
13.40	13.60	FAVM	0.40
13.60	14.10	ACRD	1.00
14.10	14.30	R	0.40
14.30	14.40	FAVF	0.20
14.40	14.50	ACRD	0.20
14.50	15.00	S	1.00
15.00	16.10	ACRT	2.20
16.10	16.35	R	0.50
16.35	16.80	ACRS	0.90
16.80	16.90	R	0.20
16.90	18.00	ACRB	2.20
18.00	18.90	ACRS	1.80
18.90	19.00	FAVF	0.20
19.00	19.40	R	0.80
19.40	19.70	ACRS	0.60
19.70	20.15	FAVS	0.90
20.15	21.90	FAVF	3.50
21.90	22.05	POCD	0.30
22.05	23.20	R	2.30
23.20	23.27	ACRD	0.14
23.27	23.50	POCS	0.46
23.50	27.80	FAVS	8.60
27.80	27.90	ACRD	0.20
27.90	28.10	R	0.40
28.10	28.30	ACRD	0.40
28.30	28.70	ACRS	0.80
28.70	28.90	R	0.40
28.90	29.00	ACRD	0.20
29.00	29.17	R	0.34
29.17	29.25	ACRD	0.16
29.25	29.45	R	0.40
29.45	29.50	ACRD	0.10
29.50	29.63	R	0.26
29.63	29.90	FAVF	0.54
29.90	30.10	ACRS	0.40
30.10	30.78	FAVF	1.36
30.78	30.95	ACRS	0.34
30.95	31.05	FAVF	0.20
31.05	31.25	R	0.40
31.25	31.28	R	0.06
31.28	31.50	ACRT	0.44
31.50	32.00	FAVF	1.00
32.00	32.35	R	0.70
32.35	32.60	ACRD	0.50
32.60	32.70	R	0.20
32.70	32.90	ACRD	0.40
32.90	33.10	ACRS	0.40
33.10	33.40	R	0.60
33.40	33.70	ACRD	0.60
33.70	33.90	R	0.40
33.90	34.00	ACRD	0.20
34.00	34.15	R	0.30
34.15	34.30	POCD	0.30
34.30	34.50	R	0.40
34.50	35.25	POCD	1.50
35.25	35.90	FAVF	1.30
35.90	36.10	POCD	0.40
36.10	36.40	FAVF	0.60
36.40	37.00	POCD	1.20
37.00	38.00	FAVF	2.00
38.00	38.15	R	0.30
38.15	38.35	ACRD	0.40
38.35	38.75	R	0.80
38.75	40.20	FAVF	2.90
40.20	40.45	ACRT	0.50
40.45	40.70	ACRS	0.50
40.70	40.95	FAVS	0.50
40.95	42.18	ACRT	2.46
42.18	42.70	R	1.04
42.70	46.00	FAVS	6.60
46.00	46.85	R	1.70
46.85	46.90	ACRS	0.10
46.90	47.30	ACRS	0.80
47.30	47.85	ACRD	1.10
47.85	48.25	R	0.80
48.25	49.00	FAVS	1.50
49.00	49.30	R	0.60
49.30	49.60	ACRT	0.60
49.60	50.00	R	0.80

N48: Bills Bay South – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	1.00	R	2.00
1.00	2.00	ACRS	2.00
2.00	3.50	R	3.00
3.50	8.10	S	9.20
8.10	8.50	ACRE	0.80
8.50	8.80	R	0.60
8.80	9.00	S	0.40
9.00	9.20	ACRE	0.40
9.20	10.10	R	1.80
10.10	10.30	ACRE	0.40
10.30	10.50	R	0.40
10.50	10.60	ACRS	0.20
10.60	13.90	R	6.60
13.90	14.00	ACRE	0.20
14.00	16.70	R	5.40
16.70	17.10	ACRE	0.80
17.10	17.20	R	0.20
17.20	17.30	ACRE	0.20
17.30	17.90	R	1.20
17.90	18.20	ACRE	0.60
18.20	20.60	R	4.80
20.60	20.90	ACRE	0.60
20.90	23.15	DCA	4.50
23.15	23.30	ACRE	0.30
23.30	23.50	R	0.40
23.50	23.70	ACRE	0.40
23.70	23.95	R	0.50
23.95	24.40	ACRE	0.90
24.40	24.70	R	0.60
24.70	25.00	ACRE	0.60
25.00	26.10	R	2.20
26.10	26.20	ACRE	0.20
26.20	26.60	ACRE	0.80
26.60	27.00	R	0.80
27.00	27.20	ACRE	0.40
27.20	28.00	R	1.60
28.00	28.50	ACRS	1.00
28.50	28.60	R	0.20
28.60	28.70	ACRS	0.20
28.70	29.30	R	1.20
29.30	29.80	ACRS	1.00
29.80	31.00	R	2.40
31.00	31.50	ACRE	1.00
31.50	32.00	R	1.00
32.00	32.20	ACRE	0.40
32.20	33.10	R	1.80
33.10	33.20	ACRS	0.20
33.20	33.50	R	0.60
33.50	33.60	ACRE	0.20
33.60	33.80	R	0.40
33.80	34.00	ACRE	0.40
34.00	34.60	R	1.20
34.60	34.70	ACRE	0.20
34.70	35.90	R	2.40
35.90	36.00	ACRE	0.20
36.00	36.90	R	1.80
36.90	37.00	ACRE	0.20
37.00	37.30	R	0.60
37.30	37.70	ACRE	0.80
37.70	37.80	FAVM	0.20
37.80	38.00	R	0.40
38.00	38.10	ACRS	0.20
38.10	38.60	R	1.00
38.60	38.70	FAVM	0.20
38.70	39.10	R	0.80
39.10	39.20	ACRE	0.20
39.20	42.10	DCA	5.80
42.10	42.20	ACRE	0.20
42.20	42.50	S	0.60
42.50	42.60	ACRE	0.20
42.60	42.80	S	0.40
42.80	43.00	ACRE	0.40
43.00	43.10	S	0.20
43.10	43.15	ACRE	0.10
43.15	43.40	S	0.50
43.40	44.40	ACRS	2.00
44.40	44.80	R	0.80
44.80	45.20	ACRE	0.80
45.20	46.10	R	1.80
46.10	46.30	ACRE	0.40
46.30	47.00	R	1.40
47.00	47.50	ACRE	1.00
47.50	47.70	R	0.40
47.70	48.00	ACRF	0.60
48.00	48.40	R	0.80
48.40	48.60	ACRE	0.40
48.60	49.40	R	1.60
49.40	49.60	ACRE	0.40
49.60	50.00	R	0.80

N48: Bills Bay South – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	0.02	ACRS	0.04
0.02	1.00	R	1.96
1.00	1.50	ACRS	1.00
1.50	2.00	R	1.00
2.00	2.10	ACRE	0.20
2.10	3.40	R	2.60
3.40	3.60	ACRS	0.40
3.60	4.20	R	1.20
4.20	4.30	ACRS	0.20
4.30	4.50	R	0.40
4.50	4.70	ACRS	0.40
4.70	5.00	R	0.60
5.00	7.50	ACRE	5.00
7.50	9.00	R	3.00
9.00	9.20	ACRE	0.40
9.20	9.80	S	1.20
9.80	10.30	ACRE	1.00
10.30	11.28	DCA	1.96
11.28	11.50	ACRT	0.44
11.50	12.00	ACRD	1.00
12.00	12.75	R	1.50
12.75	12.85	ACRD	0.20
12.85	13.95	R	2.20
13.95	14.15	ACRT	0.40
14.15	14.45	R	0.60
14.45	14.65	ACRT	0.40
14.65	14.90	R	0.50
14.90	15.30	ACRE	0.80
15.30	15.80	R	1.00
15.80	16.00	ACRE	0.40
16.00	16.35	DCA	0.70
16.35	16.40	ACRE	0.10
16.40	17.30	R	1.80
17.30	18.10	S	1.60
18.10	18.30	ACRS	0.40
18.30	18.40	FAVM	0.20
18.40	18.80	S	0.80
18.80	20.15	R	2.70
20.15	20.30	ACRE	0.30
20.30	20.40	R	0.20
20.40	20.50	ACRS	0.20
20.50	20.80	S	0.60
20.80	21.00	ACRF	0.40
21.00	22.00	R	2.00
22.00	23.00	S	2.00
23.00	23.90	R	1.80
23.90	24.10	ACRE	0.40
24.10	24.40	S	0.60
24.40	24.70	ACRE	0.60
24.70	26.00	DCA	2.60
26.00	26.20	ACRF	0.40
26.20	28.30	R	4.20
28.30	28.40	FAVM	0.20
28.40	29.35	R	1.90
29.35	29.70	ACRE	0.70
29.70	30.70	R	2.00
30.70	30.82	ACRD	0.24
30.82	30.85	ACRE	0.06
30.85	31.00	S	0.30
31.00	31.35	ACRE	0.70
31.35	32.10	ACRD	1.50
32.10	32.40	R	0.60
32.40	32.70	ACRD	0.60
32.70	33.40	R	1.40
33.40	33.50	ACRE	0.20
33.50	33.80	R	0.60
33.80	34.00	ACRS	0.40
34.00	34.95	R	1.90
34.95	35.00	ACRE	0.10
35.00	36.00	R	2.00
36.00	36.80	S	1.60
36.80	37.20	PORM	0.80
37.20	37.70	S	1.00
37.70	37.80	ACRE	0.20
37.80	39.00	R	2.40
39.00	43.20	S	8.40
43.20	44.20	DCA	2.00
44.20	44.50	ACRE	0.60
44.50	45.20	R	1.40
45.20	46.00	ACRE	1.60
46.00	49.00	DCA	6.00
49.00	49.20	S	0.40
49.20	50.00	R	1.60

N48: Bills Bay South – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	3.75	DCA	7.50
3.75	3.80	FAVM	0.10
3.80	5.40	DCA	3.20
5.40	6.20	S	1.60
6.20	6.40	DCA	0.40
6.40	6.50	ACRS	0.20
6.50	8.70	DCA	4.40
8.70	9.40	S	1.40
9.40	9.60	PORM	0.40
9.60	11.20	S	3.20
11.20	13.50	DCA	4.60
13.50	15.00	S	3.00
15.00	17.00	R	4.00
17.00	17.20	ACRE	0.40
17.20	18.40	R	2.40
18.40	19.70	ACRE	2.60
19.70	20.70	S	2.00
20.70	21.40	ACRB	1.40
21.40	23.70	R	4.60
23.70	24.60	S	1.80
24.60	24.80	ACRE	0.40
24.80	25.20	S	0.80
25.20	25.90	R	1.40
25.90	26.10	ACRE	0.40
26.10	26.80	R	1.40
26.80	27.00	ACRB	0.40
27.00	28.05	S	2.10
28.05	28.10	ACRE	0.10
28.10	29.70	S	3.20
29.70	32.00	R	4.60
32.00	32.15	FAVM	0.30
32.15	36.00	DCA	7.70
36.00	37.00	ACRB	2.00
37.00	37.20	S	0.40
37.20	37.30	FAVM	0.20
37.30	39.00	RK	3.40
39.00	39.45	ACRB	0.90
39.45	39.50	ACRE	0.10
39.50	40.20	S	1.40
40.20	41.60	ACRE	2.80
41.60	42.16	S	1.12
42.16	42.30	ACRE	0.28
42.30	42.90	S	1.20
42.90	45.00	DCA	4.20
45.00	46.80	S	3.60
46.80	47.00	ACRE	0.40
47.00	47.20	S	0.40
47.20	49.00	DCA	3.60
49.00	50.00	R	2.00

N53: Monck Head – Transect 1

Length 1	Length 2	Field Code	% Cover
0.00	0.10	S	0.20
0.10	0.74	ACRD	1.28
0.74	0.85	DCA	0.22
0.85	0.90	ACRD	0.10
0.90	1.10	DCA	0.40
1.10	1.27	ACRD	0.34
1.27	1.70	ACRT	0.86
1.70	10.20	ACRB	17.00
10.20	10.40	ACRD	0.40
10.40	10.50	S	0.20
10.50	10.70	ACRD	0.40
10.70	10.80	S	0.20
10.80	11.40	ACRS	1.20
11.40	15.00	ACRB	7.20
15.00	16.50	DCA	3.00
16.50	22.30	ACRB	11.60
22.30	23.00	DCA	1.40
23.00	23.50	ACRB	1.00
23.50	24.40	S	1.80
24.40	24.86	ACRD	0.92
24.86	27.00	ACRB	4.28
27.00	27.30	ACRD	0.60
27.30	27.50	S	0.40
27.50	29.80	ACRB	4.60
29.80	31.60	ACRT	3.60
31.60	39.00	ACRB	14.80
39.00	40.40	DCA	2.80
40.40	40.70	ACRB	0.60
40.70	41.30	DCA	1.20
41.30	46.00	ACRB	9.40
46.00	46.40	DCA	0.80
46.40	46.80	ACRB	0.80
46.80	47.80	DCA	2.00
47.80	48.20	ACRB	0.80
48.20	50.00	DCA	3.60

N53: Monck Head – Transect 2

Length 1	Length 2	Field Code	% Cover
0.00	0.50	ACRB	1.00
0.50	1.00	DCA	1.00
1.00	2.20	ACRB	2.40
2.20	5.40	DCA	6.40
5.40	5.50	ACRD	0.20
5.50	6.90	DCA	2.80
6.90	7.10	ACRB	0.40
7.10	7.60	DCA	1.00
7.60	10.52	ACRB	5.84
10.52	10.84	DCA	0.64
10.84	11.70	ACRB	1.72
11.70	11.90	DCA	0.40
11.90	12.50	ACRB	1.20
12.50	12.60	DCA	0.20
12.60	17.10	ACRB	9.00
17.10	17.30	DCA	0.40
17.30	19.70	ACRB	4.80
19.70	19.90	DCA	0.40
19.90	20.60	ACRB	1.40
20.60	22.00	DCA	2.80
22.00	22.30	ACRB	0.60
22.30	22.80	DCA	1.00
22.80	23.80	ACRT	2.00
23.80	24.00	DCA	0.40
24.00	24.60	ACRT	1.20
24.60	25.00	DCA	0.80
25.00	25.10	ACRB	0.20
25.10	25.70	DCA	1.20
25.70	25.80	ACRB	0.20
25.80	26.20	DCA	0.80
26.20	26.60	ACRB	0.80
26.60	26.90	DCA	0.60
26.90	27.30	ACRB	0.80
27.30	28.00	DCA	1.40
28.00	28.60	ACRB	1.20
28.60	30.00	S	2.80
30.00	30.60	DCA	1.20
30.60	31.00	ACRB	0.80
31.00	31.20	DCA	0.40
31.20	32.10	ACRT	1.80
32.10	33.00	ACRB	1.80
33.00	33.70	DCA	1.40
33.70	34.00	ACRB	0.60
34.00	34.20	DCA	0.40
34.20	35.10	ACRT	1.80
35.10	36.70	DCA	3.20
36.70	36.80	ACRB	0.20
36.80	37.70	DCA	1.80
37.70	37.90	S	0.40
37.90	39.60	DCA	3.40
39.60	43.50	ACRT	7.80
43.50	43.85	ACRD	0.70
43.85	44.50	ACRT	1.30
44.50	48.50	ACRB	8.00
48.50	48.60	DCA	0.20
48.60	48.70	ACRT	0.20
48.70	48.80	DCA	0.20
48.80	49.10	ACRT	0.60
49.10	49.20	DCA	0.20
49.20	50.00	ACRT	1.60

N53: Monck Head – Transect 3

Length 1	Length 2	Field Code	% Cover
0.00	1.10	DCA	2.20
1.10	1.60	ACRT	1.00
1.60	2.00	AA	0.80
2.00	3.10	ACRT	2.20
3.10	4.45	ACRB	2.70
4.45	4.60	DCA	0.30
4.60	13.20	ACRB	17.20
13.20	13.40	DCA	0.40
13.40	20.60	ACRB	14.40
20.60	24.40	ACRT	7.60
24.40	24.65	ACRB	0.50
24.65	24.90	ACRT	0.50
24.90	25.40	ACRB	1.00
25.40	25.50	ACRT	0.20
25.50	26.33	ACRB	1.66
26.33	27.10	ACRT	1.54
27.10	27.50	DCA	0.80
27.50	27.80	ACRT	0.60
27.80	28.00	DCA	0.40
28.00	29.40	ACRT	2.80
29.40	29.50	DCA	0.20
29.50	29.60	ACRT	0.20
29.60	33.10	ACRB	7.00
33.10	33.20	DCA	0.20
33.20	33.40	ME	0.40
33.40	34.20	DCA	1.60
34.20	35.43	ACRB	2.46
35.43	36.40	DCA	1.94
36.40	36.80	ME	0.80
36.80	37.30	DCA	1.00
37.30	37.40	ACRD	0.20
37.40	37.90	DCA	1.00
37.90	38.13	ACRD	0.46
38.13	38.70	DCA	1.14
38.70	39.20	ACRT	1.00
39.20	39.30	DCA	0.20
39.30	40.00	ACRT	1.40
40.00	40.35	DCA	0.70
40.35	42.20	ACRB	3.70
42.20	43.10	DCA	1.80
43.10	43.60	ACRB	1.00
43.60	44.20	DCA	1.20
44.20	44.30	ACRD	0.20
44.30	44.60	DCA	0.60
44.60	45.40	ACRB	1.60
45.40	45.60	AA	0.40
45.60	46.00	ACRB	0.80
46.00	46.20	AA	0.40
46.20	47.00	ACRB	1.60
47.00	47.60	DCA	1.20
47.60	50.00	UP	4.80

APPENDIX 5: LINE INTERCEPT TRANSECT ANALYSED DATA

N26: Bundegi Sanctuary South

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Branching	0	0	0.2	0.07	0.07
Branching	0.48	0.16	0.2	0.21	0.14
Digitate	2.6	4.42	0.34	2.45	1.18
Encrusting	0.8	7.22	1.74	3.25	2.00
Sub-massive	7.18	5.06	0	4.08	2.13
Tabular	0.82	0.44	0	0.42	0.24
TOTAL	**11.88**	**17.3**	**2.28**	**10.49**	**4.39**
Faviidae					
Digitate	0	0.1	0	0.03	0.03
Foliose	0	1.14	1.2	0.78	0.39
Massive	0	0	0.32	0.11	0.11
TOTAL	**0**	**1.24**	**1.52**	**0.92**	**0.47**
Pocilloporidae					
Digitate	0	1.28	0.16	0.48	0.40
TOTAL	**0**	**1.28**	**0.16**	**0.48**	**0.40**
Dead Coral					
Standing (advanced algal growth)	26.48	56.44	55.36	46.09	9.81
Upturned plates	6.12	9.78	3.78	6.56	1.75
TOTAL	**32.6**	**66.22**	**59.14**	**52.65**	**10.23**
Abiotic					
Rubble	52.82	9.2	35.38	32.47	12.68
Rock/limestone	0	3.46	1.52	1.66	1.00
TOTAL	**52.82**	**12.66**	**36.9**	**34.13**	**11.68**

N19: Bundegi Sanctuary (re-survey)

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Branching	0	0	0.64	0.21	0.21
Digitate	1.1	0.52	0.74	0.79	0.17
Encrusting	0	2.52	0.1	0.87	0.82
Sub-massive	3.2	4.58	11.08	6.29	2.43
Tabular	0	2.2	3.44	1.88	1.01
TOTAL	**4.3**	**9.82**	**16**	**10.04**	**3.38**
Pocilloporidae					
Digitate	0	0.66	0.3	0.32	0.19
Sub-massive	0	0	0.1	0.03	0.03
Branching	0	0	0.2	0.07	0.07
TOTAL	**0**	**0.66**	**0.6**	**0.42**	**0.21**
Dead Coral					
Standing (advanced algal growth)	10.16	2.6	0	4.25	3.05
Upturned plates	8.92	23.44	1.54	11.30	6.43
TOTAL	**19.08**	**26.04**	**1.54**	**15.55**	**7.29**
Algae					
Macro algae	0	0	0.6	0.20	0.20
TOTAL	**0**	**0**	**0.6**	**0.20**	**0.20**
Abiotic					
Rubble	73.42	63.48	79.84	72.25	4.76
Rock/limestone	2.5	0	0	0.83	0.83
Sand	0.7	0	1.42	0.71	0.41
TOTAL	**76.62**	**63.48**	**81.26**	**73.79**	**5.32**

N1: Bundegi (re-survey)

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Digitate	4.72	1.48	0.2	2.13	1.35
Tabular	0	0.76	0	0.25	0.25
Branching	3.36	0	0	1.12	1.12
Sub-massive	0	0.6	3.46	1.35	1.07
TOTAL	**8.08**	**2.84**	**3.66**	**4.86**	**1.63**
Faviidae					
Digitate	0	1.34	0	0.45	0.45
TOTAL	**0**	**1.34**	**0**	**0.45**	**0.45**
Mussidae					
Massive	0	0	0.7	0.23	0.23
TOTAL	**0**	**0**	**0.7**	**0.23**	**0.23**
Pocilloporidae					
Digitate	1.2	1.7	0	0.97	0.50
TOTAL	**1.2**	**1.7**	**0**	**0.97**	**0.50**
Dead Coral					
Standing (advanced algal growth)	8	0	0	2.67	2.67
TOTAL	**8**	**0**	**0**	**2.67**	**2.67**
Abiotic					
Rubble	82.12	91.42	76.34	83.29	4.39
Sand	0.6	2.7	19.3	7.53	5.91
TOTAL	**82.72**	**94.12**	**95.64**	**90.83**	**4.08**

N29: Bundegi North – Human usage

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Branching	13.8	17.6	0	10.47	5.35
Digitate	9.96	2.3	0.4	4.22	2.92
Encrusting	2.2	1.6	0	1.27	0.66
Sub-massive	0	1	0.2	0.40	0.31
Tabular	5	0	0	1.67	1.67
TOTAL	**30.96**	**22.5**	**0.6**	**18.02**	**9.05**
Dead Coral					
Standing (advanced algal growth)	48.74	56.3	63.6	56.21	4.29
Upturned plates	1.8	17.2	17.4	12.13	5.17
TOTAL	**50.54**	**73.5**	**81**	**68.35**	**9.16**
Algae					
Coralline algae	0	0	0.4	0.13	0.13
TOTAL	**0**	**0**	**0.4**	**0.13**	**0.13**
Abiotic					
Rubble	16.34	0	18	11.45	5.74
Rock/limestone	2.16	0	0	0.72	0.72
TOTAL	**18.5**	**0**	**18**	**12.17**	**6.09**

N32: Tantabiddi Lagoon

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
AA	18.4	3.2	0	7.20	5.68
Digitate	6	4.74	3.86	4.87	0.62
Tabular	1.12	1.04	2.2	1.45	0.37
TOTAL	**25.52**	**8.98**	**6.06**	**13.52**	**6.06**
Faviidae					
Branching	0.78	0	0	0.26	0.26
Digitate	7.38	25.88	22.9	18.72	5.73
Foliose	2.8	0.14	0	0.98	0.91
TOTAL	**10.96**	**26.02**	**22.9**	**19.96**	**4.59**
Pocilloporidae					
Digitate	0.92	1.14	0.8	0.95	0.10
TOTAL	**0.92**	**1.14**	**0.8**	**0.95**	**0.10**
Milleporidae					
Encrusting	0.06	0.32	0.3	0.23	0.08
TOTAL	**0.06**	**0.32**	**0.3**	**0.23**	**0.08**
Algae					
Coralline algae	2.38	0	0	0.79	0.79
TOTAL	**2.38**	**0**	**0**	**0.79**	**0.79**
Dead Coral					
Standing (advanced algal growth)	56.26	63.16	69.94	63.12	3.95
TOTAL	**56.26**	**63.16**	**69.94**	**63.12**	**3.95**
Abiotic					
Rock/limestone	1.16	0.16	0	0.44	0.36
Sand	2.74	0.22	0	0.99	0.88
TOTAL	**3.9**	**0.38**	**0**	**1.43**	**1.24**

N42: Winderabandi

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Branching	0.2	0.4	0	0.20	0.12
Digitate	13.62	15.9	12.62	14.05	0.97
Encrusting	0.2	0.2	4.4	1.60	1.40
Sub-massive	10.46	2.62	2.4	5.16	2.65
Tabular	10.66	4.96	1.94	5.85	2.56
Sub-massive	1.7	0	0	0.57	0.57
Total	**36.84**	**24.08**	**21.36**	**27.43**	**4.77**
Faviidae					
Massive	3.16	0.2	1.6	1.65	0.85
Sub-massive	0.14	2.7	0	0.95	0.88
Total	**3.3**	**2.9**	**1.6**	**2.60**	**0.51**
Pocilloporidae					
Digitate	0.3	0	0	0.10	0.10
Sub-massive	0.2	0	0	0.07	0.07
Total	**0.5**	**0**	**0**	**0.17**	**0.17**
Dead Coral					
Standing (advanced algal growth)	7.7	33.1	61.34	34.05	15.49
Upturned plates	0.3	0	0.6	0.30	0.17
Total	**8**	**33.1**	**61.94**	**34.35**	**15.58**
Algae					
Coralline algae	0.36	8	0.4	2.92	2.54
Total	**0.36**	**8**	**0.4**	**2.92**	**2.54**
Abiotic					
Rubble	0.2	1.2	0	0.47	0.37
Rock/limestone	39.88	24.22	0.4	21.50	11.48
Sand	10.92	6.5	14.3	10.57	2.26
Total	**51**	**31.92**	**14.7**	**32.54**	**10.48**

N47: Bills Bay North

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Digitate	1.12	0	0.8	0.64	0.33
Sub-massive	0	0	0.26	0.09	0.09
TOTAL	**1.12**	**0**	**1.06**	**0.73**	**0.36**
Faviidae					
Massive	3.6	0.4	0	1.33	1.14
TOTAL	**3.6**	**0.4**	**0**	**1.33**	**1.14**
Pocilloporidae					
Digitate	0	0.2	0	0.07	0.07
TOTAL	**0**	**0.2**	**0**	**0.07**	**0.07**
Milleporidae					
Encrusting	0	0	0.6	0.20	0.20
TOTAL	**0**	**0**	**0.6**	**0.20**	**0.20**
Dead Coral					
Standing (advanced algal growth)	0.4	1.8	0	0.73	0.55
Upturned plates	0	0	4	1.33	1.33
TOTAL	**0.4**	**1.8**	**4**	**2.07**	**1.05**
Algae					
Algal assemblage	0	10	0	3.33	3.33
TOTAL	**0**	**10**	**0**	**3.33**	**3.33**
Abiotic					
Rubble	92.58	85	94.34	90.64	2.87
Sand	2.3	2.6	0	1.63	0.82
TOTAL	**94.88**	**87.6**	**94.34**	**92.27**	**2.34**

N50: Bills Bay East

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Digitate	1.2	0	0.36	0.52	0.36
Encrusting	26.16	43.16	63.8	44.37	10.88
Sub-massive	21.8	1.96	1.4	8.39	6.71
Tabular	0.6	1.4	0	0.67	0.41
TOTAL	**49.76**	**46.52**	**65.56**	**53.95**	**5.88**
Faviidae					
Massive	3.18	0.48	0	1.22	0.99
TOTAL	**3.18**	**0.48**	**0**	**1.22**	**0.99**
Pocilloporidae					
Massive	0.9	0	0	0.30	0.30
TOTAL	**0.9**	**0**	**0**	**0.30**	**0.30**
Dead Coral					
Standing (advanced algal growth)	31.12	39.24	3	24.45	10.98
TOTAL	**31.12**	**39.24**	**3**	**24.45**	**10.98**
Abiotic					
Rubble	8.2	11.56	0	6.59	3.43
Rock/limestone	0	0	2.4	0.80	0.80
Sand	6.84	2.2	29.04	12.69	8.28
TOTAL	**15.04**	**13.76**	**31.44**	**20.08**	**5.69**

N49: Bills Bay West

	CATEGORY PERCENTAGES				
	T1	**T2**	**T2**	**MEAN**	**S.E.**
Acroporidae					
Branching	9.2	0	15.6	8.27	4.53
Digitate	4.8	15.54	7.16	9.17	3.26
Encrusting	11.1	1.2	1.2	4.50	3.30
Sub-massive	12.74	6.6	6.7	8.68	2.03
Tabular	3.64	11.1	8.1	7.61	2.17
TOTAL	**41.48**	**34.44**	**38.76**	**38.23**	**2.05**
Faviidae					
Digitate	9.44	0.3	0	3.25	3.10
Foliose	0	10.3	15.3	8.53	4.50
Massive	0.6	0.2	0.6	0.47	0.13
Sub-massive	0	1.9	18.1	6.67	5.74
TOTAL	**10.04**	**12.7**	**34**	**18.91**	**7.58**
Pocilloporidae					
Digitate	10	1.6	4.3	5.30	2.48
Sub-massive	1.8	0.3	0.7	0.93	0.45
TOTAL	**11.8**	**1.9**	**5**	**6.23**	**2.92**
Dead Coral					
Standing (advanced algal growth)	35.1	36.56	1.6	24.42	11.42
TOTAL	**35.1**	**36.56**	**1.6**	**24.42**	**11.42**
Abiotic					
Rubble	0	0	19.64	6.55	6.55
Sand	1	0	1	0.67	0.33
Upturned plates	0.58	14.4	0	4.99	4.71
TOTAL	**1.58**	**14.4**	**20.64**	**12.21**	**5.61**

N48: Bills Bay South

	CATEGORY PERCENTAGES				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Branching	0	0	4.7	1.57	1.57
Digitate	0	3.54	0	1.18	1.18
Encrusting	15.1	13.36	7.48	11.98	2.31
Foliose	0.6	0.8	0	0.47	0.24
Sub-massive	6.8	3.04	0.2	3.35	1.91
Tabular	0	1.24	0	0.41	0.41
TOTAL	**22.5**	**21.98**	**12.38**	**18.95**	**3.29**
Faviidae					
Massive	0.4	0.4	0.6	0.47	0.07
TOTAL	**0.4**	**0.4**	**0.6**	**0.47**	**0.07**
Pocilloporidae					
Massive	0	0.8	0.4	0.40	0.23
TOTAL	**0**	**0.8**	**0.4**	**0.40**	**0.23**
Dead Coral					
Standing (advanced algal growth)	10.3	13.26	35.6	19.72	7.99
TOTAL	**10.3**	**13.26**	**35.6**	**19.72**	**7.99**
Abiotic					
Rubble	55.5	45.06	20.4	40.32	10.41
Rock/limestone	0	0	3.4	1.13	1.13
Sand	11.3	18.5	27.22	19.01	4.60
TOTAL	**66.8**	**63.56**	**51.02**	**60.46**	**4.81**

N53: Monck Head

	CATEGORY PERCENTAGE				
	T1	**T2**	**T3**	**MEAN**	**S.E.**
Acroporidae					
Branching	72.08	42.96	55.62	56.89	8.43
Digitate	4.04	0.9	0.86	1.93	1.05
Sub-massive	1.2	0	0	0.40	0.40
Tabular	4.46	18.3	19.04	13.93	4.74
TOTAL	**81.78**	**62.16**	**75.52**	**73.15**	**5.79**
Milleporidae					
Encrusting	0	0	1.2	0.40	0.40
TOTAL	**0**	**0**	**1.2**	**0.40**	**0.40**
Dead Coral					
Standing (advanced algal growth)	15.42	34.64	16.88	22.31	6.18
Upturned plates	0	0	4.8	1.60	1.60
TOTAL	**15.42**	**34.64**	**21.68**	**23.91**	**5.66**
Algae					
Algal assemblage	0	0	1.6	0.53	0.53
TOTAL	**0**	**0**	**1.6**	**0.53**	**0.53**
Abiotic					
Sand	2.8	3.2	0	2.00	1.01
TOTAL	**2.8**	**3.2**	**0**	**2.00**	**1.01**

APPENDIX 6: SUMMARY OF LINE INTERCEPT TRANSECT ANALYSED DATA

	Category Percentages				
	T1	**T2**	**T3**	***Mean***	**S.E.**
N26: Bundegi Sanctuary South					
Live Coral	11.88	19.82	3.96	***11.89***	4.58
Hard Coral	11.88	19.82	3.96	***11.89***	4.58
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	32.6	66.22	59.14	***52.65***	10.23
Algae	0	0	0	***0.00***	0.00
Abiotic	52.82	12.66	34.12667	***33.20***	11.60
N19: Bundegi Sanctuary (re-survey)					
Live Coral	4.3	10.48	16.6	***10.46***	3.55
Hard Coral	4.3	10.48	16.6	***10.46***	3.55
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	19.08	26.04	1.54	***15.55***	7.29
Algae	0	0	0.6	***0.20***	0.20
Abiotic	76.62	63.48	81.26	***73.79***	5.32
N1: Bundegi (re-survey)					
Live Coral	9.28	5.88	4.36	***6.51***	1.45
Hard Coral	9.28	5.88	4.36	***6.51***	1.45
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	8	0	0	***2.67***	2.67
Algae	0	0	0	***0.00***	0.00
Abiotic	82.72	94.12	95.64	***90.83***	4.08
N29: Bundegi North – Human usage					
Live Coral	30.96	22.5	0.6	***18.02***	9.05
Hard Coral	30.96	22.5	0.6	***18.02***	9.05
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	50.54	73.5	81	***68.35***	9.16
Algae	0	0	0.4	***0.13***	0.13
Abiotic	18.5	0	18	***12.17***	6.09
N32: Tantabiddi Lagoon					
Live Coral	37.46	36.46	30.06	***34.66***	2.32
Hard Coral	37.4	36.14	29.76	***34.43***	2.36
Soft Coral	0.06	0.32	0.3	***0.23***	0.08
Dead Coral	56.26	63.16	69.94	***63.12***	3.95
Algae	2.38	0	0	***0.79***	0.79
Abiotic	3.9	0.38	0	***1.43***	1.24
N42: Winderabandi					
Live Coral	40.64	26.98	22.96	***30.19***	5.35
Hard Coral	40.64	26.98	22.96	***30.19***	5.35
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	8	33.1	61.94	***34.35***	15.58
Algae	0.36	8	0.4	***2.92***	2.54
Abiotic	51	31.92	14.7	***32.54***	10.48

Appendix 7 cont.

	Category Percentages				
	T1	**T2**	**T3**	***Mean***	**S.E.**
N47: Bills Bay North					
Live Coral	4.72	0.6	1.66	***2.33***	1.24
Hard Coral	4.72	0.6	1.06	***2.13***	1.30
Soft Coral	0	0	0.6	***0.20***	0.20
Dead Coral	0.4	1.8	4	***2.07***	1.05
Algae	0	10	0	***3.33***	3.33
Abiotic	94.88	87.6	94.34	***92.27***	2.34
N50: Bills Bay East					
Live Coral	53.84	47	65.56	***55.47***	5.42
Hard Coral	53.84	47	65.56	***55.47***	5.42
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	31.12	39.24	3	***24.45***	10.98
Algae	0	0	0	***0.00***	0.00
Abiotic	15.04	13.76	31.44	***20.08***	5.69
N49: Bills Bay West					
Live Coral	63.32	49.04	77.76	***63.37***	8.29
Hard Coral	63.32	49.04	77.76	***63.37***	8.29
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	35.1	36.56	1.6	***24.42***	11.42
Algae	0	0	0	***0.00***	0.00
Abiotic	1.58	14.4	20.64	***12.21***	5.61
N48: Bills Bay South					
Live Coral	22.9	23.18	13.38	***19.82***	3.22
Hard Coral	22.9	23.18	13.38	***19.82***	3.22
Soft Coral	0	0	0	***0.00***	0.00
Dead Coral	10.3	13.26	35.6	***19.72***	7.99
Algae	0	0	0	***0.00***	0.00
Abiotic	66.8	63.56	51.02	***60.46***	4.81
N53: Monck Head					
Live Coral	81.78	62.16	76.72	***73.55***	5.88
Hard Coral	81.78	62.16	75.52	***73.15***	5.79
Soft Coral	0	0	1.2	***0.40***	0.40
Dead Coral	15.42	34.64	21.68	***23.91***	5.66
Algae	0	0	1.6	***0.53***	0.53
Abiotic	2.8	3.2	0	***2.00***	1.01

APPENDIX 7: DATA SHEETS – 'NON-TRANSECT' SITES

NON-TRANSECT MONITORING SITE DATA SHEET

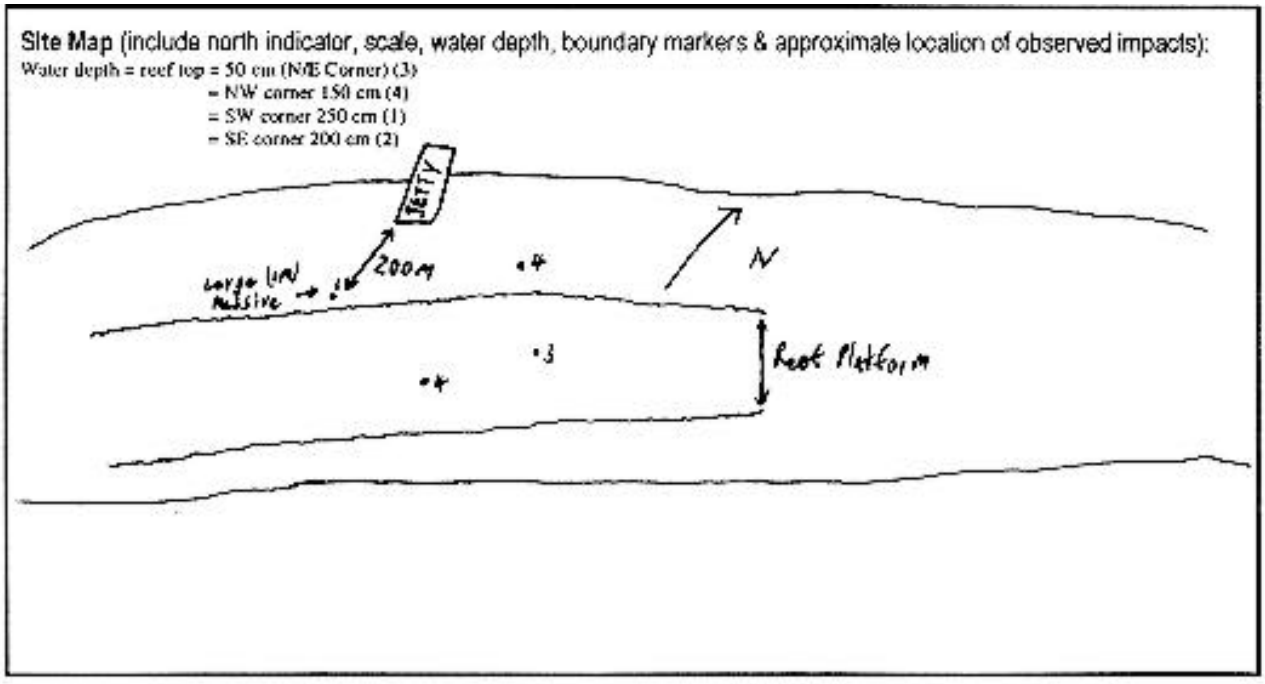
Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N27	Site Name	Bundegi- human usage	Date	4-08-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Extensive cyclone damage (cyclone Vance, 1999).
1	21° 49.669' S	114° 10.783' E	
2	21° 49.683' S	114° 10.797' E	
3	21° 49.666' S	114° 10.816' E	
4	21° 49.644' S	114° 10.809' E	
5	° ' E	° ' E	1x piece of fishing line 20m S of NW corner
6	° ' E	° ' E	

No video footage taken

Video operator		Tape no.	NMPMP/ / /#	Main Human Activity	
Time coding for all video footage at site:		From:	: : :	To:	: : :

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N27	**Site Name**	Bundegi - human usage	**Date**	4-8-99	**Recorder**	Cary
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac		**Time**	12:00	**Weather**	Fine	
Sea	Calm		**Water depth (m)**	1.0-2.0	**Water visibility (m)**	8.0	

GPS Latitude	GPS Longitude	Differential			
21° 49.669' S	114° 10.783' E	**Yes**	☒	**No**	☐

Site location	Site located on back reef 200m offshore from the Bundegi jetty.

Habitat Description

Back reef – coral dominated by Acropora sp. (branching and digitate) with large areas of dead coral. Fungidae are common and occasional *Galaxea* sp., *Favia* sp. and *Platygyra* sp.

Dominant Species

Seagrass	
Macro-algae	
Coral	*Acropora* sp. (branching and digitate).
Fish	Labridae (wrasse), Scaridae (parrotfish), Pomacentridae (damselfish) and pipefish
Invertebrates	1 large crown of thorn star fish.

Other Features

Turtle and ray seen near site

Impact or Activity

Cyclone damage (cyclone Vance, 1999) evident masks any possible impacts caused by human activities such as snorkelling. Litter included one length (30 cm) of fishing line. No targeted reef fish or *Panulirus* sp. (rock lobster) was sighted. No *Drupella* sighted.

Video reference	No video footage taken	**Aerial reference**	5158/WA 2286/RUN3/840048
Slide reference		**Print reference**	

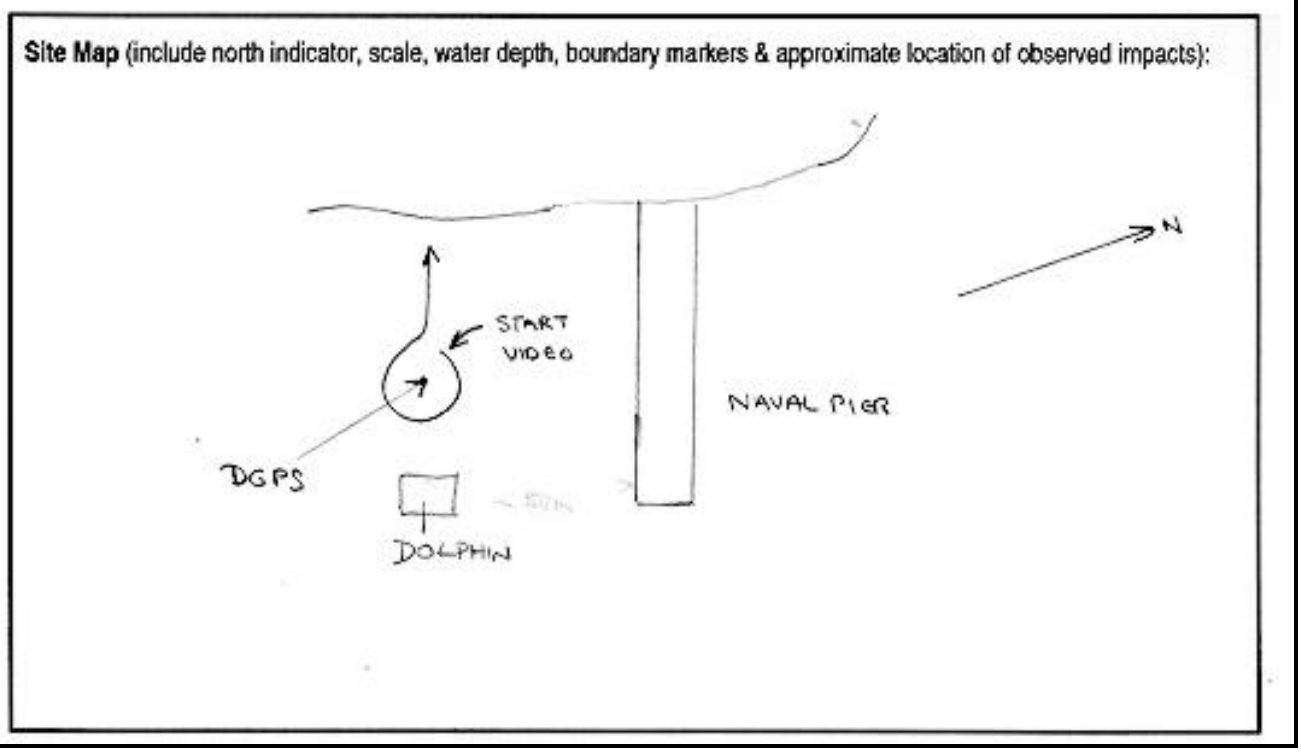
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N30	Site Name	Naval Jetty-South	Date	4-8-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	
1	21° 49.070' S	114° 11.381' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary	Tape no.	NMPMP/ bvnt /4- 8- 99 /#1	Main Human Activity	Hot water discharge from Pier and shipping
Time coding for all video footage at site:		From:	0:0:0:0	To:	:6:36:20

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: No evidence of human activity

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N30	**Site Name**	Naval Jetty-South	**Date**	4-8-99	**Recorder**	Cary
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac		**Time**	11:00	**Weather**		
Sea		**Water depth (m)**		**Water visibility (m)**			

GPS Latitude	GPS Longitude	Differential			
21° 49.070' S	114° 11.381' E	**Yes**	☒	**No**	☐

Site location	Site located just south of the Navy Pier at Pt. Murat.

Habitat Description

Lagoon - limestone pavement covered in turf algae.

Dominant Species

Seagrass	
Macro-algae	Turf algae
Coral	Dead *Acropora* sp. (tabular and branching), one small Gorgonian coral (10cm in length).
Fish	Pomacentridae (damselfish)
Invertebrates	

Other Features

Impact or Activity

There is no evidence of human activity at the site. Low fish abundance, except for Pomacentridae (damselfish) around dead coral and no *Panulirus* sp. (rock lobster). No *Drupella* sighted.

Video reference	NMPMP/ bvnt /4-8-99 /#1	**Aerial reference**	5154/WA 2286/RUN3/840048
Slide reference		**Print reference**	

NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N58	**Site Name**	Navy Pier	**Date**	11-5-98	**Observer**	Tim Grubba

Co-ordinates of Boundary Markers			**Observed Impacts**
	DGPS Latitude	**DGPS Longitude**	
1	21° 49.010' S	114° 11.550' E	Litter – debris on seabed and fishing lines/sinkers on pier pylons
2	° ' S	° ' E	Discharge of cooling water half way along the pier
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary / Grubba	**Tape no.**	NMPMP/bvt /12-5-98 /#4	**Main Human Activity**	Diving
Time coding for all video footage at site:		**From:**	:00:00:00	**To:**	:06:02:02

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):

Notes: The site was surveyed in 1998 but was not included in the 1998 data report.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N58	**Site Name**	Navy Pier	**Date**	11-5-98	**Recorder**	Cary
Vessel	Shore Dive	**Time**	7:15am	**Weather**	Slight Breeze		
Sea	Calm	**Water depth (m)**	12.0	**Water visibility (m)**	15.0		
GPS Latitude		**GPS Longitude**		**Differential**			
21° 49.010' S		114° 11.550' E		**Yes**	☒	**No**	☐
Site location	Site located at the Navy Pier at Pt. Murat.						

Habitat Description

The dive site is dominated by the pier pylons and cross braces which provide extensive habitat for a high diversity of fouling species such as sponges, soft corals, molluscs, etc. The seabed surrounding the pier is predominantly coarse sand with outcrops of limestone, colonised by small coral colonies. Scattered along the bottom are considerable amounts of litter (eg. tyres, metal grating) which provide additional settlement substrates for sponges, ascidians, corals.

Dominant Species

Seagrass	
Macro-algae	
Coral	Small colonies of Favids, *Platygyra* sp., soft corals (sea fans, gorgonians)
Fish	High diversity of fish including Serranidae (Queensland groper, coral trout), Carangidae (trevally), Lutjanidae (red emperor, north west snapper), Mullidae (goatfish), Labridae (baldchin goper), Sphyraenidae (barracuda) and Holocentridae (squirrelfishes).
Invertebrates	Sponges, ascidians, hydroids, octopus, barnacles and molluscs

Other Features

Impact or Activity

The navy pier is a popular commercial dive site, with the Australian Navy permitting local dive shops to access and dive the pier. Despite fishing being prohibited from the pier in 1986, there is still evidence of fishing activities including the presence of fishing line, and sinkers entangled on pier pylons. There is a considerable amount of litter around the pier including, tyres, pipes and grating that have originated from the pier and vessels tied to the pier. A cooling water discharge pipe is located half way along the pier. The water discharged from this pipe is salt water and is a couple of degrees warmer than the sea. The water originates from the navy power station and also contains small amounts of sewerage. There are no visible impacts from this discharge. In the past (early eighties) when the base was used by the Americans, cooling water was sometimes contaminated by oil. No *Drupella* sighted

Video reference	NMPMP/bvt /19-5-98 /#9	**Aerial reference**	5169/WA 3405/RUN16/940592
Slide reference		**Print reference**	

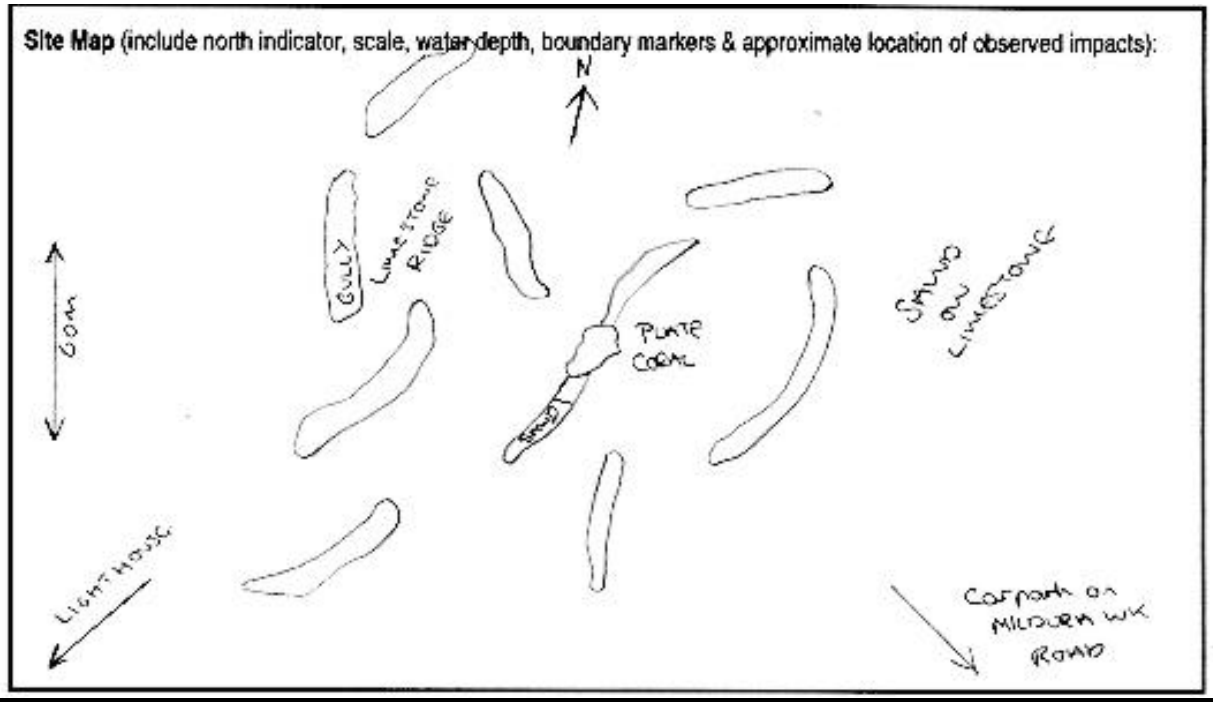
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N28	Site Name	Labyrinth	Date	26-01-2000	Observer	Adam Meyer Carolyn Williams

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	This site is accessed daily by "Coral Coast Dive", "Village Dive",
1	21° 49.421' S	114° 11.082' E	"Exmouth dive centre" and sometimes by Paul Waghon
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	No video	Tape no.		Main Human Activity	Daily dive site
Time coding for all video footage at site:		From:	:00:00:	To:	:14:56:

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: On site joined by Dave Steward skippering "Coral Coast Dive" zodiac. Without a GPS just line up first 3 towers also well know by locals.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N28	**Site Name**	Labyrinth	**Date**	26-01-2000	**Recorder**	Adam Meyer Carolyn Williams
Vessel	Trailerlable vessel		**Time**	10:50	**Weather**	SW 12-15 Kts swell	
Sea	1.5 m		**Water depth (m)**	13.0	**Water visibility (m)**	4.0	

GPS Latitude	GPS Longitude	Differential			
21° 49.421' S	114° 11.082' E	**Yes**	☐	**No**	☒

Site location	Site located in Lighthouse Bay (at the point where the three towers line up).

Habitat Description

Lagoon - limestone ridges and overhangs surrounded by flat sandy sea floor. Some hard and soft corals but mainly small sponges and invertebrates

Dominant Species

Seagrass	
Macro-algae	Very little
Coral	One *Acropora* sp. (tabular) approximately 2m diameter, hard corals (encrusting), *Pachyseris rugosa* (encrusting) and soft corals
Fish	Fish List: *Triaenodon obesus* (whitetip shark), *Taeniura lymma* (blue-spotted fantail stingray), Holocentridae (squirrel fish), Epinephelus *latifasciatus* (black tipped rock cod), *Pletropomus* sp. (coral trout), *Platax pinnatus* (hump- headed batfish), *Heniochus* sp. (banner fish), Pomacentridae (damselfish), Blackspot Tuskfish, Balistidae (triggerfish), Labridae (wrasse), Grammistidae (Dottybacks), *Lutjanus kasmira* (bluestripe seaperch), *Pterocaesion diagramma* (black-tipped fusiler), *Epinephelus multinotatus* (rankin cod), *Lethrinus fraenatus* (spangled emperor), schooling baitfish, *Kyphosus vaigiensis* (low-finned drummer).
Invertebrates	Lots of tube sponge, nudibranchs, feather star, anemone, urchins, clams, crabs, cone shell

Other Features

Resident juvenile Green Turtle.

Impact or Activity

This site is visited daily by commercial dive operators and is also a fishing site. There is a number of upturned *Acropora* sp. (tabular) but there is no significant evidence of diver or anchor damage. Litter at the site includes seven lengths of fishing line that are old and encrusted. No *Drupella* sighted.

Video reference	NMPMP / / /	**Aerial reference**	5158/WA 2286/RUN3/840048
Slide reference		**Print reference**	Chart: AUS 745

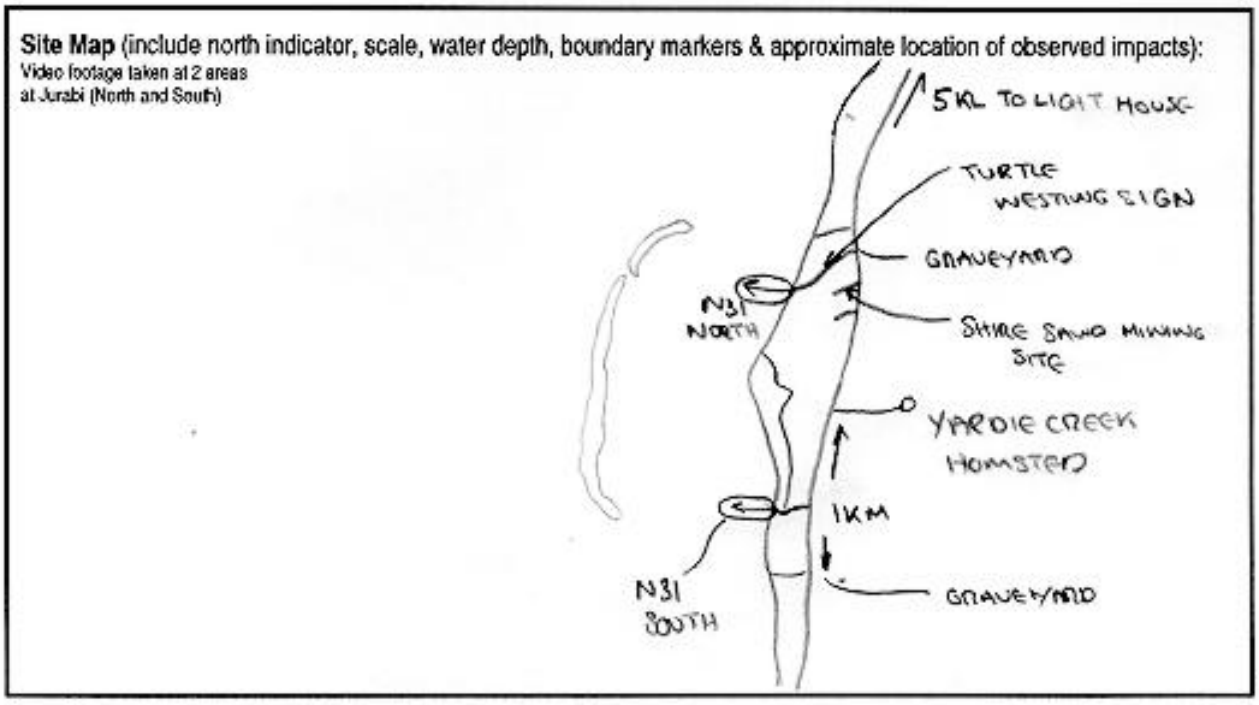
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N31	Site Name	Jurabi (north and south) – human usage	Date	5-08-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	No DGPS readings taken
1	21° 51.361' S	114° 01.243' E	Beach Fishing and picnicking observed – no impact
2	21° 53.018' S	113° 59.684' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary	Tape no.	NMPMP/bvt /5-8-99 /#2	Main Human Activity	Proposed day visit site
Time coding for all video footage at site:		From:	N31(N) 0 : 0: 0 N31(S) 5 :51: 04	To:	N31(N) 5:51:04 N31(S)13:14:11

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):
Video footage taken at 2 areas at Jurabi (North and South)



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N31	**Site Name**	Jurabi (north)– human usage	**Date**	5-8-99	**Recorder**	Cary
Vessel		**Time**	11:00	**Weather**			
Sea	Calm	**Water depth (m)**	5-8	**Water visibility (m)**			

GPS Latitude	**GPS Longitude**	**Differential**			
21° 51.361' S	114° 01.243' E	**Yes**	☒	**No**	☐

Site location	Site located 100m offshore of Jurabi beach. Access to beach via a track 1km south of Lighthouse caravan park.

Habitat Description

Limestone pavement shoreline – covered in macro algae.

Dominant Species

Seagrass	-
Macro-algae	*Halymenia* sp., *Halimeda* sp., Turf algae, *Padina* sp. and *Udotea* sp.
Coral	
Fish	Large school of *Kyphosus* sp. (buffalo bream) and *Labridae* (wrasse).
Invertebrates	Octopus, holothurians, hermit crab

Other Features

Swam from shoreline to approximately 100m offshore homogenous coverage

Impact or Activity

The site is a proposed day visit site for picnicking and fishing. There is no current evidence of human impacts. No *Drupella* sighted.

Video reference	NMPMP/ bvt/5-8-99 /#2	**Aerial reference**	5035/WA 3405/RUN4/940592
Slide reference		**Print reference**	

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N31	**Site Name**	Jarabi (south) – human usage	**Date**	5-08-99	**Recorder**	Cary
Vessel		**Time**	10:30	**Weather**	North West- 5 knots		
Sea	Calm shore waves	**Water depth (m)**	1.0	**Water visibility (m)**	3.0 - 5.0		

GPS Latitude	GPS Longitude	Differential			
21° 53.018' S	113° 59.684' E	**Yes**	☒	**No**	☐

Site location	Site located 50m offshore from Jurabi beach. Access to beach via a track 2.3km south of Lighthouse caravan park.

Habitat Description

Limestone pavement shoreline – covered in macro algae.

Dominant Species

Seagrass	
Macro-algae	*Ulva* sp., *Halimeda* sp., *Caulerpa* sp. and turf algae
Coral	
Fish	Few Labridae (wrasse).
Invertebrates	

Other Features

The site was accessed from shore to approximately 50m off shore

Impact or Activity

The site is a proposed day visit site for picnicking and fishing. There is no current evidence of human impacts. No *Drupella* sighted.

Video reference	NMPMP/ bvt/5/8/99 /#2	**Aerial reference**	5035/WA 3405/RUN4/940592
Slide reference		**Print reference**	

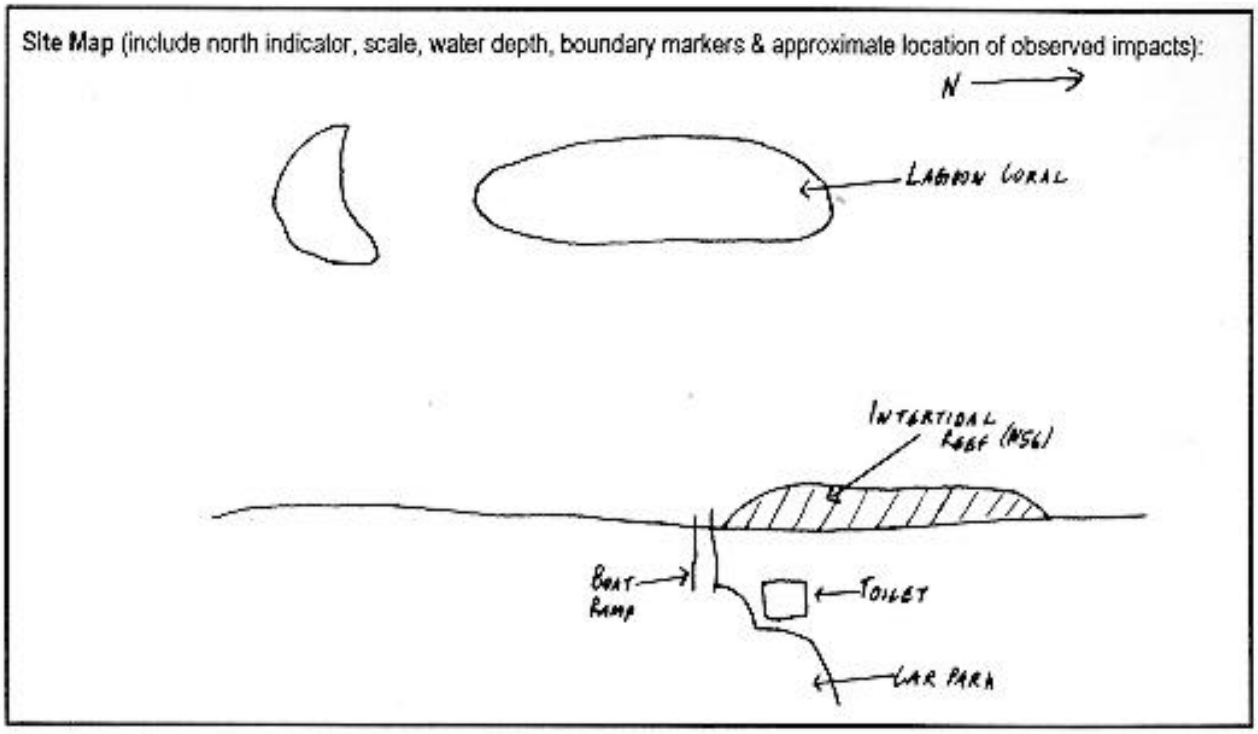
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N56	**Site Name**	Tantabiddi boat ramp	**Date**	8-8-99	**Observer**	Cary

Co-ordinates of Boundary Markers			**Observed Impacts**
	DGPS Latitude	**DGPS Longitude**	
1	21° 54.700' S	113° 58.748' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary	**Tape no.**	NMPMP/bvt/18-8-99 /#3	**Main Human Activity**	Toilet block
Time coding for all video footage at site:		**From:**	:9:00:	**To:**	:13:00:

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N56	**Site Name**	Tantabiddi boat ramp	**Date**	8-8-99	**Recorder**	Cary
Vessel		**Time**	15:00	**Weather**	Slight SE		
Sea		**Water depth (m)**		**Water visibility (m)**			

GPS Latitude	**GPS Longitude**	**Differential**			
21° 54.700' S	113° 58.748' E	**Yes**	☒	**No**	☐

Site location	Site located on an intertidal reef north of the Tantabiddi boat ramp.

Habitat Description

Intertidal reef covered in *Ulva* sp.

Dominant Species

Seagrass	
Macro-algae	*Ulva* sp. and *Padina* sp.
Coral	
Fish	
Invertebrates	Many small molluscs and gastrropods

Other Features

Impact or Activity

The large amounts of *Ulva* sp. could be natural or due to possible nutrient enrichment from toilet block. No litter sighted. No *Drupella* sighted.

Video reference	NMPMP/bvt/8-8-99 /#3	**Aerial reference**	/WA /RUN /
Slide reference		**Print reference**	

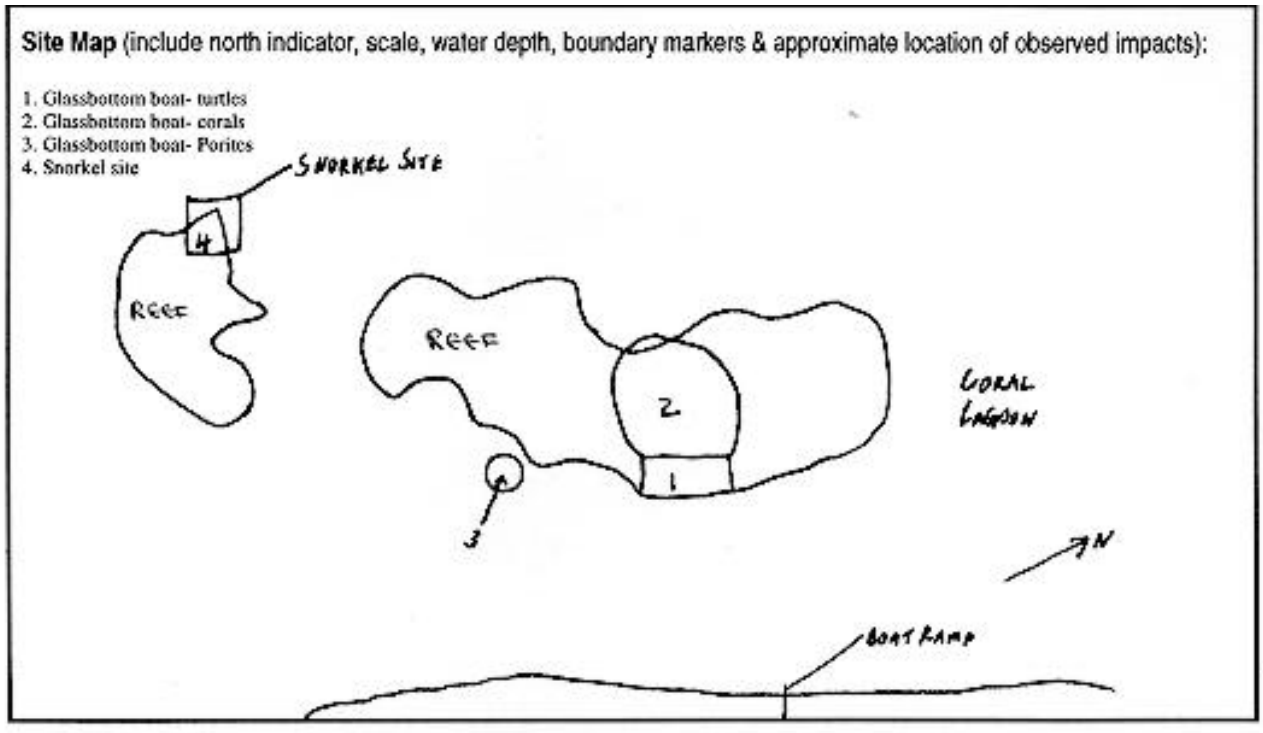
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N35	Site Name	Tantabiddi-glass bottom boat tour	Date	8-8-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Snorkelling
1	21° 54.627' S	113° 57.869' E	No DGPS coordinates taken
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary	Tape no.	NMPMP/bvt /8-8-99 /#3	Main Human Activity	Snorkel site
Time coding for all video footage at site:		From:	:00:00:	To:	:9:00:

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Glass bottom boat visits area 1, then 2, then 3 and finishes at area 4

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N35	**Site Name**	Tantabiddi-glass bottom boat tour	**Date**	8-8-99	**Recorder**	Cary
Vessel	Glass bottom boat	**Time**	13:00	**Weather**	15 knots SE		
Sea		**Water depth (m)**		**Water visibility (m)**			

GPS Latitude	GPS Longitude	Differential			
21° 54.627' S	113° 57.869' E	**Yes**	☒	**No**	☐

Site location	Site located in the lagoon area visited by the glass bottom boat tour.

Habitat Description

Lagoon - coral dominated by *Acropora* sp. (tabular and branching).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Porites* sp., *Acropora* sp. (digitate, tabular and branching), *Echinopora* sp., *Galaxea* sp., *Pocillopora* sp. and *Millepora* sp.
Fish	Ephippididae (batfish), Pomacentridae (damselfish), *Lutjanus* sp. (seaperch) and *Triaenodon obesus* (whitetip shark)
Invertebrates	

Other Features

General footage of Tantabiddi glass bottom boat activities
Many turtles
1+ 2 (See site map) *Porites* sp., *Acropora* sp. (tabular and branching), *Echinopora* sp., *Galaxea* sp., *Pocillopora* sp. and *Millepora* sp.
3 (see site map) *Porites* sp.
4 (See site map) *Porites* sp., *Millepora* sp., *Acropora* sp. (digitate and tabular).

Impact or Activity

The site is used by the glass bottom boat operator at Tantabiddi, with areas 1-3 using for coral viewing and area 4 for snorkelling. There is no evidence of impacts due to the glass bottom boat and snorkelling. The glass bottom boat operator (Richard Wain) finds litter such as fishing line and stubbies at the site and removes them. No litter sighted. No *Panulirus* sp. (rock lobster) sighted. No *Drupella* sighted.

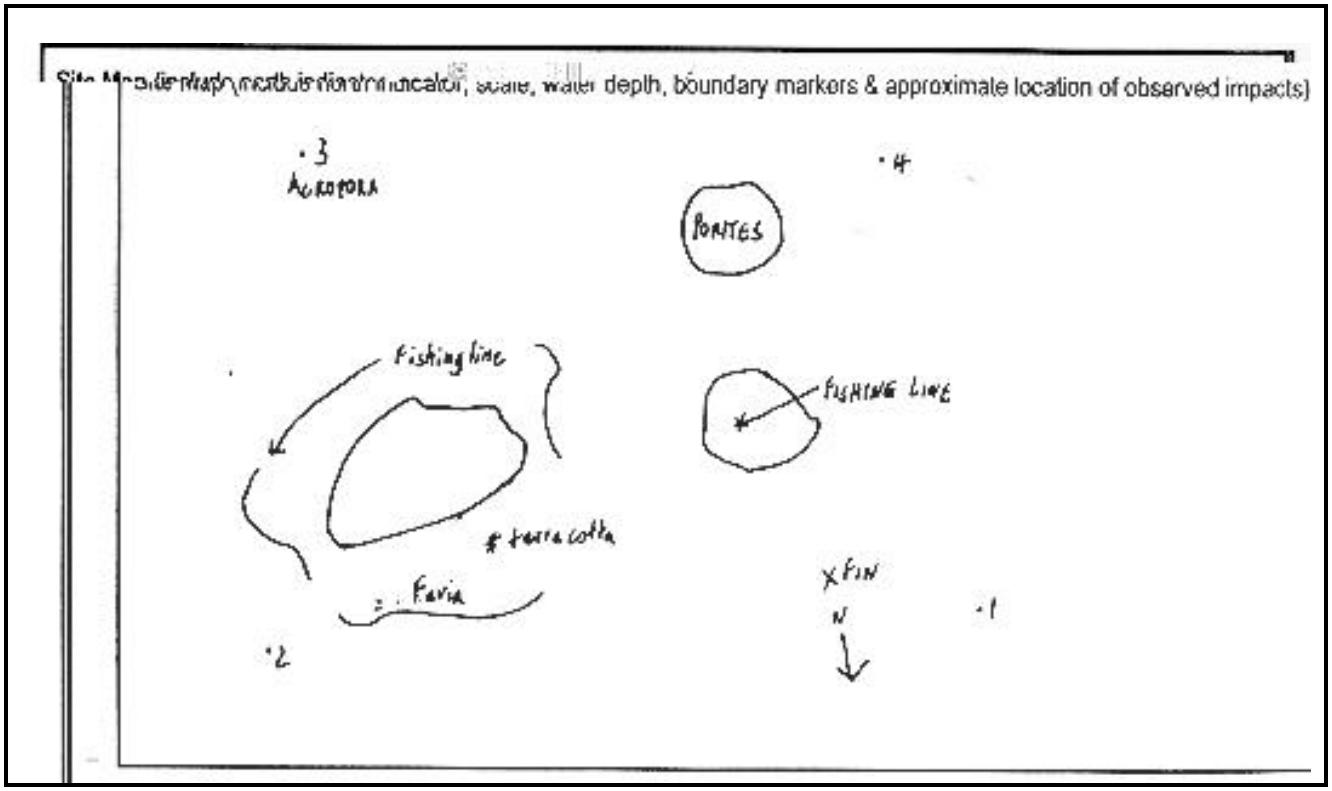
Video reference	NMPMP/ bvt/18-3-99 /#3	**Aerial reference**	5031/WA 3405/RUN4/940592
Slide reference		**Print reference**	

NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N33	Site Name	Tantabiddi-Snorkel	Date	9-8-99	Observer	Williams

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	
1	21° 54.913' S	113° 57.330' E	5 x separate pieces of fishing line- on top of *Porites* sp.
2	21° 54.922' S	113° 57.378' E	2 x pieces terracotta
3	21° 54.948' S	113° 57.363' E	
4	21° 54.936' S	113° 57.328' E	
5	° ' S	° ' E	
6	° ' S	° ' E	1 x Snorkelling fin outside area

Video operator	Williams	Tape no.	NMPMP/ bvt/9-8-99 /#4	Main Human Activity	Snorkel Fishing
Time coding for all video footage at site:		From:	:0:0:0	To:	:12:07:00



Notes: This map should be read in conjunction with N35 map. N35 glass bottom boat tour finished at snorkel site (N33)

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N33	**Site Name**	Tantabiddi-Snorkel	**Date**	9-8-99	**Recorder**	Williams
Vessel	AIMS 4.3M NAIAD CALM 3.5M Zodiac	**Time**	10:30	**Weather**	SE 8- 10 NE 10-15		
Sea	Calm	**Water depth (m)**	3.5	**Water visibility (m)**	8.0		

GPS Latitude	**GPS Longitude**	**Differential**			
21° 54.913' S	113° 57.330' E	**Yes**	☒	**No**	☐

Site location	Site located adjacent to the Tantabiddi boat ramp at the glass bottom boat snorkelling site.

Habitat Description

Lagoon – coral dominated by *Porites* sp. with white sand patches

Dominant Species

Seagrass	Few *Halophila* sp. floating past
Macro-algae	
Coral	*Porites* sp., *Millepora* sp., *Favia* sp., Mussidae, and very sparse *Acropora* sp.
Fish	Pomacentridae (damselfish), Labridae (wrasse), Scaridae (parrot fish), Mullidae (goatfish), and *Sillago* sp. (whiting),
Invertebrates	Urchins x 4 spp., few Holothurians, and *Asteroidea*

Other Features

Few juvenile Lethrinidae (north west snapper)
1 x *Triaenodon obesus* (whitetip shark) (1m)
No *Panulirus* sp. (rock lobster).
1 Cowrie shell
4- 5m diameter *Porites* sp. (massive) surrounded by *Millepora* sp.

Impact or Activity

The site is used by the glass bottom boat operator at Tantabiddi, for snorkelling. There is no evidence of impacts due to snorkelling. Litter at the site included: one fin (on the bottom outside the area), five pieces of old fishing line snagged on *Acropora* sp. and on the tip of *Porites* sp and two pieces of terracotta. No *Drupella* sighted.

Video reference	NMPMP/bvt/9-8-99 /#4	**Aerial reference**	5031/WA 3405/RUN4/940592
Slide reference		**Print reference**	

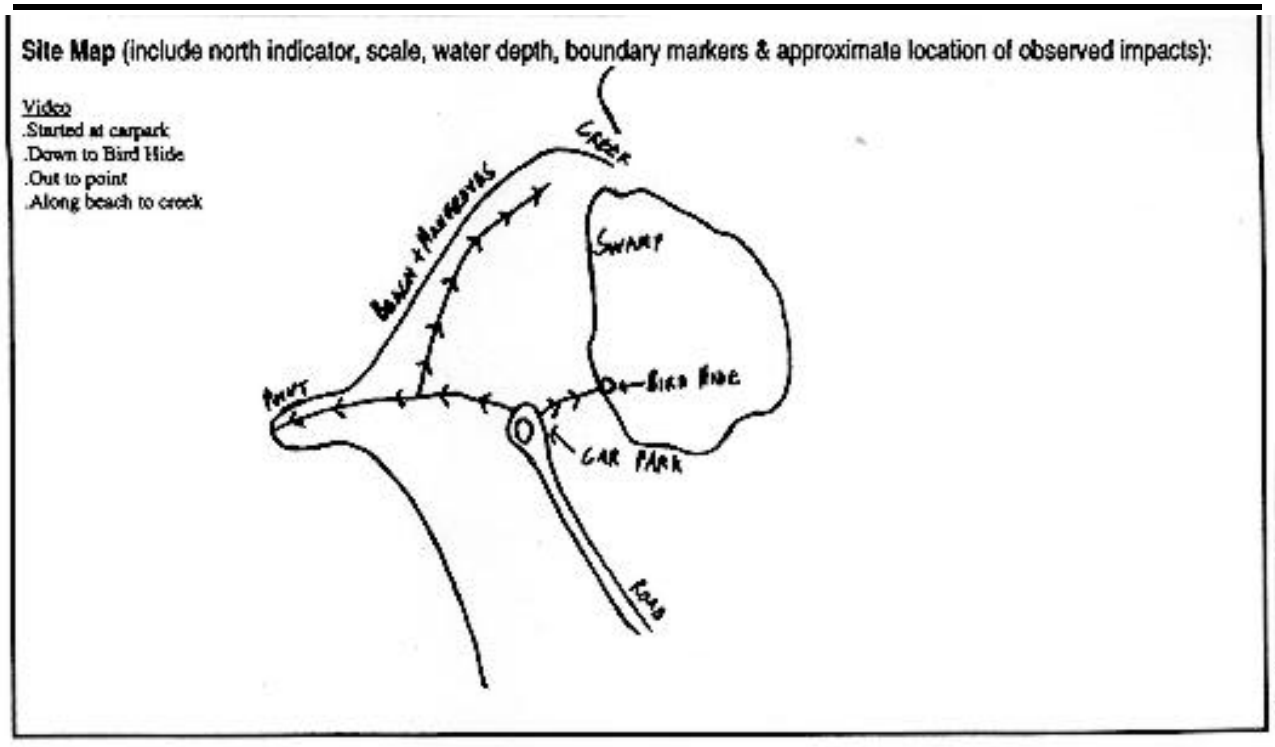
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N34	Site Name	Mangrove Walk	Date	7-8-99	Observer	Williams

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Litter along beach (three cans)
1	21° 57.858' S	113° 56.579' E	Bird watchers trampling on the mangrove
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly	Tape no.	NMPMP/bvt/7-8-99 /#3	Main Human Activity	Bird watching
Time coding for all video footage at site:		From:	:0:0:0	To:	:6:01:14

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Footage of sign, walk track and bird hide. No coordinates taken.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N34	**Site Name**	Mangrove Walk	**Date**	7-8-99	**Recorder**	Williams
Vessel		**Time**	10:30	**Weather**	Fine, sunny 25knots SE		
Sea		**Water depth (m)**		**Water visibility (m)**			

GPS Latitude	GPS Longitude	Differential			
21° 57.858' S	113° 56.579' E	**Yes**	☒	**No**	☐

Site location	Site located onshore only and included the bird hide and adjacent mangroves.

Habitat Description

Mangrove *Avicennia marina* and *Rhizophora stylson*

Dominant Species

Seagrass	
Macro-algae	
Coral	
Fish	
Invertebrates	

Other Features

Birds: Mangrove Gerygone
Eastern reef heron

Impact or Activity

The site is used as a day use area with the most popular activity being bird watching. Litter spread along the beach including: cans x 6, bottle x 1, plastic bags etc.

Video reference	NMPMP/bvt/7-8-99 /#3	**Aerial reference**	5043/WA 3405/RUN5/940592
Slide reference		**Print reference**	

NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N36	Site Name	Mesa camp	Date	5-8-99	Observer	Cary

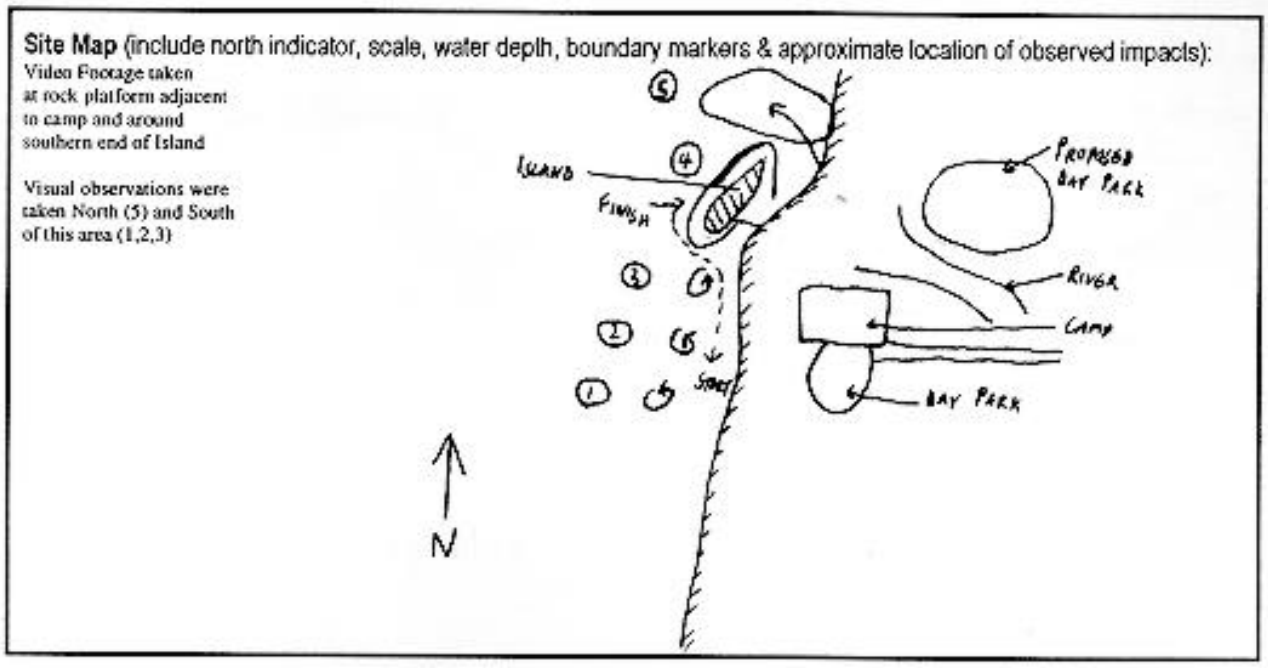
Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	
1	22° 00.299' S	113° 55.555' E	4 x Fishing line around island
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly	Tape no.	NMPMP/bvt/5-8-99 /#2	Main Human Activity	
Time coding for all video footage at site:		From:	:13:15:	To:	:15:57:08

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):

Video Footage taken at rock platform adjacent to camp and around southern end of Island

Visual observations were taken North (5) and South of this area (1,2,3)



Notes: Video footage taken adjacent to camp and around southern end of island
Visual observation were taken north (5) and south of this area (1,2,3)

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N36	**Site Name**	Mesa Camp	**Date**	5-08-99	**Recorder**	Cary
Vessel		**Time**	13:00	**Weather**	Fine		
Sea	North West	**Water depth (m)**	1.0 - 1.5	**Water visibility (m)**	10.0 - 12.0		

GPS Latitude	GPS Longitude	Differential			
22° 00.299' S	113° 55.555' E	**Yes**	☒	**No**	☐

Site location	50m offshore adjacent to camp site

Habitat Description

Limestone pavement with some massives, *Pocillopora* sp. and macro algae.

Dominant Species

Seagrass	*Halophila* sp (North of island)
Macro-algae	*Ecklonia* sp., *Halimeda* sp., *Caulerpa* sp.; *Cystophora* sp and *Udotea* sp.
Coral	Some massives (4) and *Pocillopora* sp. (1)
Fish	Balistidae (2) (triggerfish), Choerodon rubescens (5) (juvenile baldchin groper), and Gobiidae (gobies)
Invertebrates	*Conus dorensis* (juvenile cone shell), *Cypraea caputserpentis* (4) (cowries), at (5) also yellow cup like sponges

Other Features

(1)(2)(3)- mainly macro algae on rock- some *Pocillopora* sp.
Coral massives (4) found on north west of island

Impact or Activity

Litter at the site included: four pieces of fishing line/hook/sinker around Island (4). Only 10% of the oysters remain on the island. No size targeted recreational fish species or *Panulirus* sp. (rock lobster). No *Drupella* sighted.

Video reference	NMPMP/ bvt/5-8-99 /#2	**Aerial reference**	5057/WA 3405/RUN5/940592
Slide reference		**Print reference**	

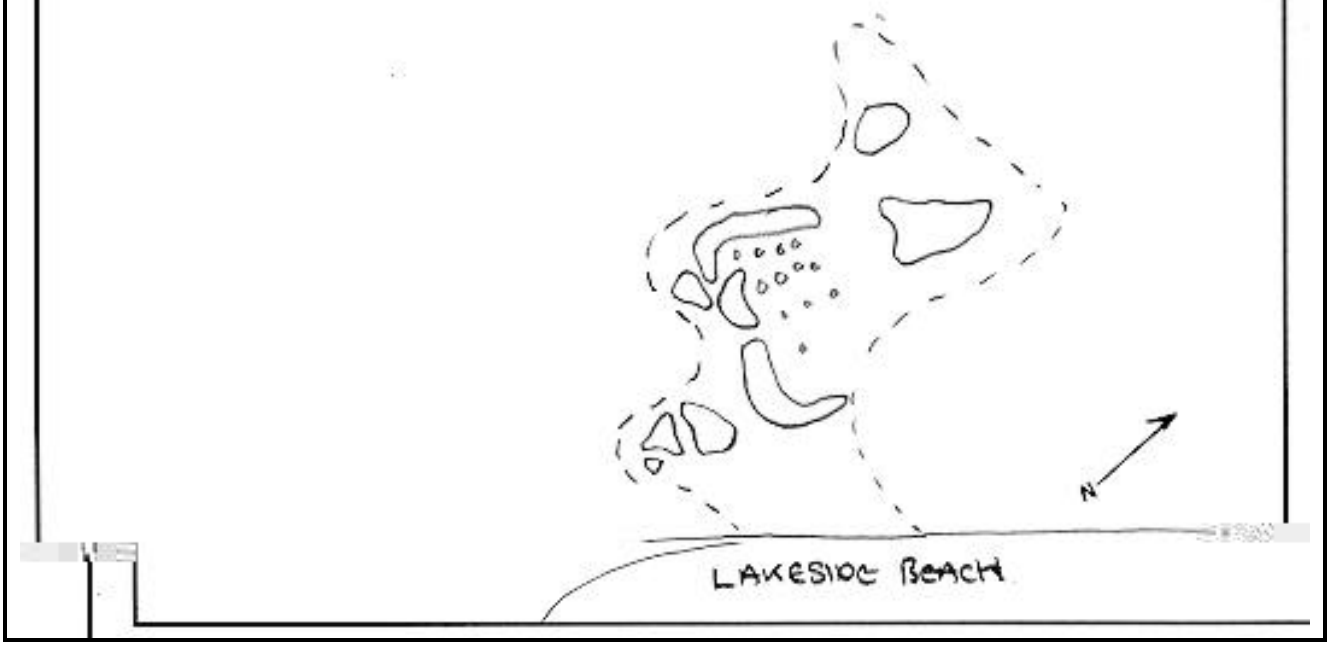
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N38	Site Name	Lakeside	Date	5-8-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Litter- fishing line found at 4 spots
1	22° 02.295' S	113° 54.585' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary/ Daly	Tape no.	NMPMP/ bvt/5-8-99 /#3	Main Human Activity	Snorkelling/ fishing
Time coding for all video footage at site:		From:	:00:00:	To:	:14:56:

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: From CALM dive and snorkel book

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N38	**Site Name**	Lakeside	**Date**	5-8-99	**Recorder**	Cary
Vessel		**Time**	16:00	**Weather**	5 knot N/W		
Sea		**Water depth (m)**	3	**Water visibility (m)**	15		

GPS Latitude	GPS Longitude	Differential			
22° 02.295' S	113° 54.585' E	**Yes**	☐	**No**	☐

Site location	Site located in the lagoon adjacent to the Lakeside access ("Lakeside bommies" in *CALM Dive and Snorkel sites in Western Australia*).

Habitat Description

Lagoon – corals include *Porites* sp. (bommies 0.5-4m), and some *Acropora* sp. (branching and tabular).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Porites* sp. x 3 spp., *Acropora* sp. (tabular and branching) and *Pocillopora* sp.
Fish	Scaridae (parrotfish), Labridae (wrasse), *Amphiprion* sp.(Anemonefish), *Epinephelus tukula* x 1(Potato cod – 90cm) and Plotosidae (catfish).
Invertebrates	*Sepioteuthis lessoniana* (squid), *Melo amphora* (baler shell), *Octopus* sp (Octopus), Holothurians (sea cucumber), Cypraeidae x 5 spp. (cowries), Anemone and *Sepia* sp. (cuttlefish)

Other Features

Chelonia mydas (green turtle),

Impact or Activity

On average 10 people per day use Lakeside between April and October. The following litter was sighted at the site: fishing line found at four spots and terrestrial debris from cyclone Vance in 1999. CALM Exmouth region clean the site annually. Evidence of impacts including damage to *Acropora* sp (branching) that could be due to anchoring and snorkelling (fin damage). No size targeted fish species or *Panulirus* sp. (rock lobster) sighted. *Drupella* were sighted at two spots on *Acropora* sp. (tabular).

Video reference	NMPMP/ bvt/5-899 /#3	**Aerial reference**	5049/WA 3405/RUN5/940592
Slide reference		**Print reference**	

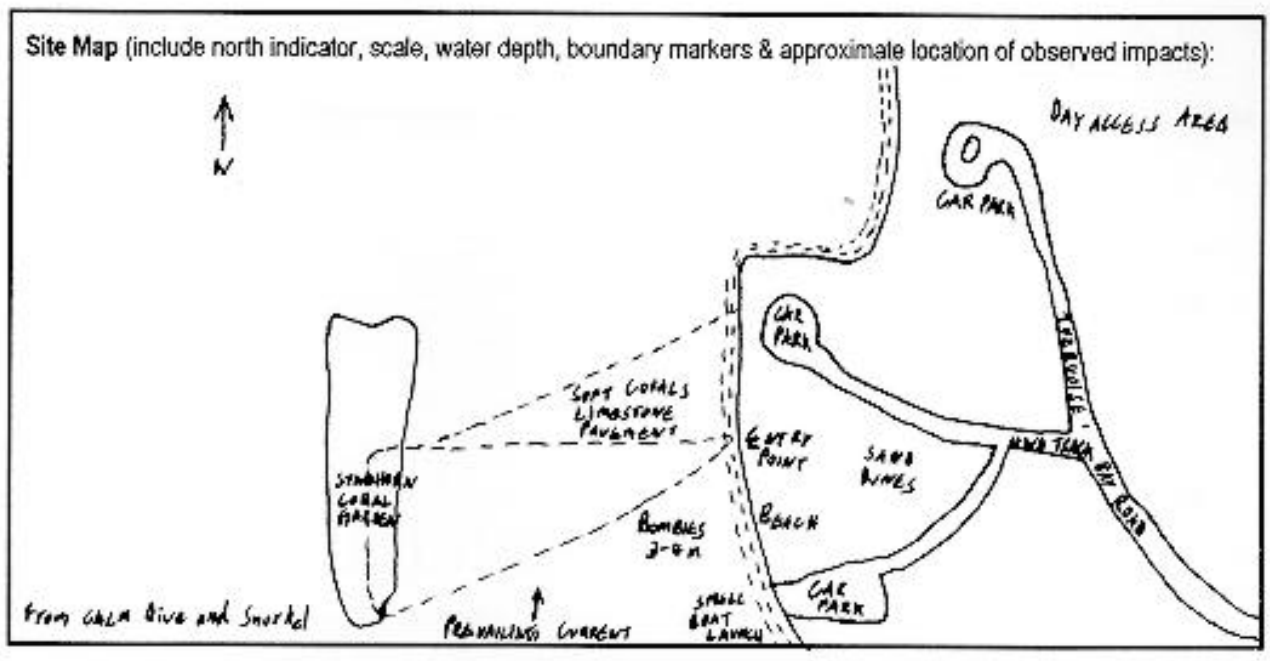
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N37	Site Name	Turquoise Bay	Date	7-8-99	Observer	Daly Williams

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Small parts of broken *Porites* sp. (difficult to determine whether impact due to cyclone or snorkelling)
1	22° 05.979' S	113° 53.056' E	Litter (1 piece of clothing found)
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly	Tape no.	NMPMP/ bvt/7-8-99 /#3	Main Human Activity	Snorkelling
Time coding for all video footage at site:		From:	:6:01:14	To:	:16:22:01

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes:.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N37	**Site Name**	Turquoise Bay	**Date**	7- 8 -99	**Recorder**	Williams
Vessel		**Time**	12:00	**Weather**	17 knots S/E		
Sea		**Water depth (m)**	5.0	**Water visibility (m)**	15.0		
GPS Latitude		**GPS Longitude**		**Differential**			
22° 05.979' S		113° 53.056' E		**Yes**	☐	**No**	☐
Site location	Site located at Turquoise Bay ("Turquoise Bay – southern drift and Turquoise Bay brain coral" in *CALM Dive and Snorkel sites in Western Australia*).						

Habitat Description

Lagoon – coral dominated by *Acropora* sp (digitate and branching) and *Sinularia* sp. (soft coral).

Dominant Species

Seagrass	Sparse *Cymodocea* sp. and *Halophila ovalis*
Macro-algae	
Coral	*Acropora* sp. (digitate and branching), *Sinularia* sp. (soft coral) and large *Porites* sp.
Fish	Lethrinidae (north west snapper), Labridae (wrasse), Scaridae (parrotfish) and Pomacentridae (damselfish).
Invertebrates	Holothurians (sea cucumbers)

Other Features

Carcharhinus limbatus (blacktip sharks).

Impact or Activity

Evidence of impacts includes small amounts of broken *Porites* sp. however it is difficult to establish whether damage is due to snorkelling or cyclone Vance, 1999. Only one piece of litter was sighted a piece of clothing. No target recreational fished species or *Panulirus* sp. (rock lobster). No *Drupella* sighted.

Video reference	MPMP/ bvt/7-8-99 /#3	**Aerial reference**	5028/WA 3405/RUN6/940592
Slide reference		**Print reference**	

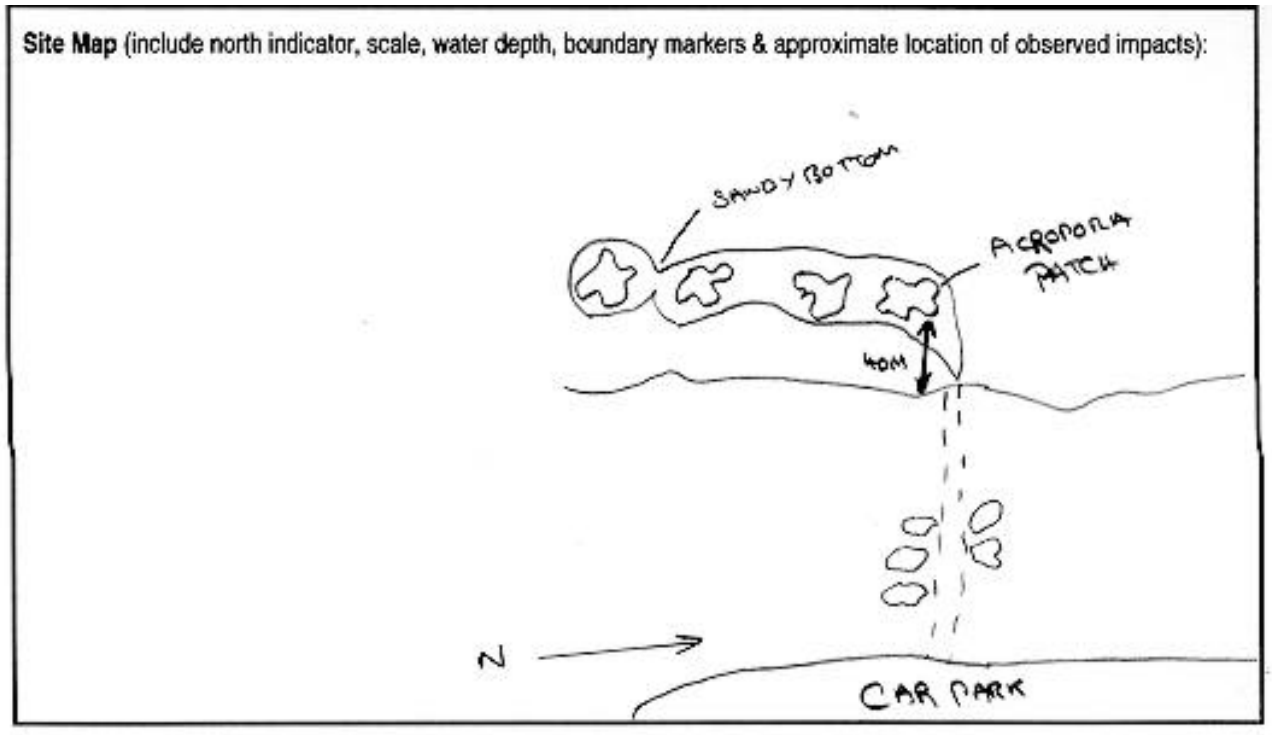
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N39	Site Name	Oyster Stacks	Date	7-8-99	Observer	Daly

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	*Drupella* in low-medium abundance
1	22° 07.884' S	113° 52.565' E	No litter
2	° ' S	° ' E	No *Panulirus* sp. (rock lobster).
3	° ' S	° ' E	Some broken corals
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly Williams	Tape no.	NMPMP/ bvt /7-8-99 /#3	Main Human Activity	Snorkelling and fishing
Time coding for all video footage at site:		From:	:16:22:02	To:	:29:09:05

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Map from CALM *Dive and Snorkel site in Western Australia*. General footage recorded for snorkel site

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N39	**Site Name**	Oyster Stacks	**Date**	7-8-99	**Recorder**	Daly
Vessel		**Time**	14:55	**Weather**	17knots S/E		
Sea		**Water depth (m)**	<1.0	**Water visibility (m)**	4.0		

GPS Latitude	GPS Longitude	Differential			
22° 07.884' S	113° 52.565' E	**Yes**	☐	**No**	☐

Site location	Site located at Oyster Stacks (four prominent 'oyster stacks) ("Oyster Stacks South and Oyster Stacks North" in *CALM Dive and Snorkel sites in Western Australia*).

Habitat Description

Lagoon – coral (shallow flat) dominated by *Acropora* Sp (tabular) and small massives.

Dominant Species

Seagrass	
Macro-algae	Unidentified green species 15-20 cm long
Coral	*Acropora* sp. (tabular and sun-massive) and small massives.
Fish	Scorpaenidae (lion fish), Plotosidae (catfish), Taeniura lymma (blue-spotted fantail ray), Labridae (small wrasse) and few Scaridae (parrotfish).
Invertebrates	*Drupella*, Holothurians (sea cucumbers), Urchins and Star fish.

Other Features

Impact or Activity

The site is mentioned as a snorkelling site in a CALM publication and is a day use site. No significant evidence of impacts due to snorkelling apart from four pieces of broken coral from *Acropora* sp. (tabular and digitate). Not litter was sighted.. No targeted recreational fish species or *Panulirus* sp. (rock lobster) sighted. One shed *Panulirus* sp. (rock lobster) carapace was sighted. *Drupella* abundance was medium to high.

Video reference	NMPMP/ bvt/7-8-99 /#3	**Aerial reference**	5028/WA 3405/RUN6/94059
Slide reference		**Print reference**	

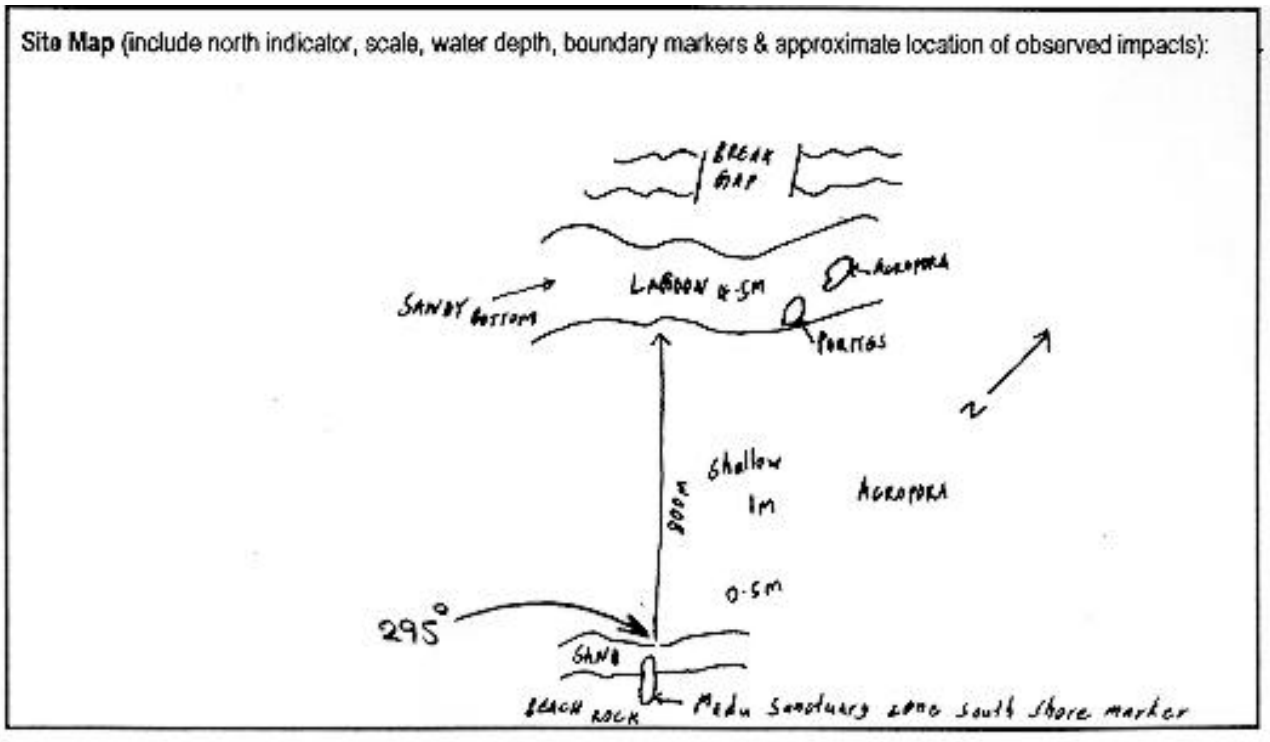
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N40	Site Name	Reef retreat	Date	10-8-99	Observer	Williams Mahendran

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	No impacts were observed out to 800m from shore.
1	22° 09.585' S	113° 51.878' E	Fishing line x2 pieces in lagoon
2	° ' S	° ' E	Broken coral from snorkelers
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Williams	Tape no.	NMPMP/ bvt/10-8-99 /#4	Main Human Activity	Snorkelling
Time coding for all video footage at site:		From:	:12:13:04	To:	:18:51:08

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: 6.5 minutes footage then flat batteries no footage of lagoon taken (spectacular)

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N40	**Site Name**	Reef Retreat	**Date**	10-8-99	**Recorder**	Williams Mahendran
Vessel		**Time**	11:40	**Weather**	SW 5-10 – W 5-10		
Sea	Calm	**Water depth (m)**	0.5 - 5.0	**Water visibility (m)**	5.0 - 10.0		

GPS Latitude	GPS Longitude	Differential			
22° 09.585' S	113° 51.878' E	**Yes**	☐	**No**	☐

Site location	Site located near the southern shore marker of the Mandu sanctuary zone.

Habitat Description

Lagoon - coral dominated by *Acropora* sp. (branching and digitate).

Dominant Species

Seagrass	*Halopila ovalis*.
Macro-algae	
Coral	*Porites* sp., *Acropora* sp., Faviidae, *Galaxea* sp. and Fungiidae.
Fish	Pomacentrids (damselfish), Chaetodontidae (butterflyfish), Labridae (wrasse) and Blenniidae (blennies).
Invertebrates	Urchins, Holothurians (sea cucumber), Starfish, few *Drupella*, *Stepnopus* sp. (banded coral shrimp).

Other Features

Triaenodon obesus x 3 (whitetip shark)
Panulirus sp. (rock lobster).

Impact or Activity

The site is used by guests of Reef Retreat for activities such as snorkelling. There is evidence of impacts from snorkelling with broken corals sighted. Litter included two pieces of fishing line. *Panulirus* sp. (rock lobster) sighted.

Video reference	NMPMP/bvt /10-8-99 /#4	**Aerial reference**	5051/WA 3405/RUN5/ 940592
Slide reference		**Print reference**	

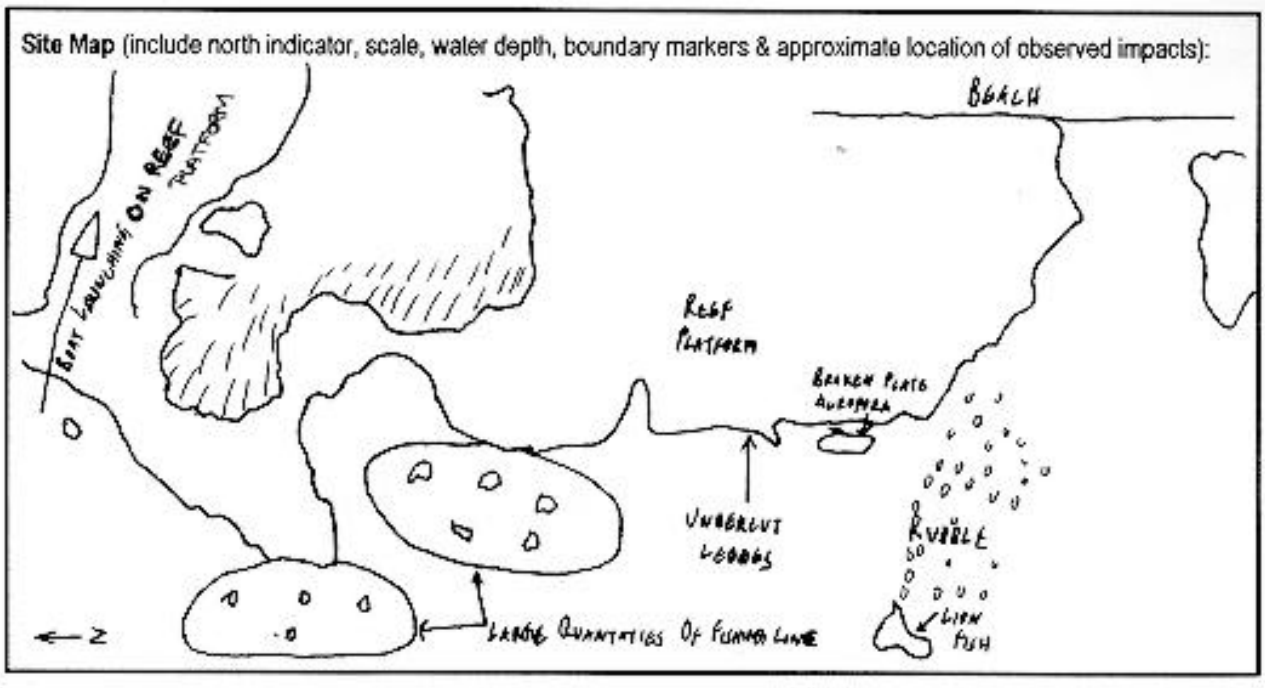
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N41	Site Name	Pilgramunna Bay	Date	10-8-99	Observer	Williams

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	
1	22° 11.615' S	113° 51.315' E	Fishing line, broken reel, broken coral from snorklers
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Watson	Tape no.	NMPMP/ bvt/10-8-99 /#4	Main Human Activity	Camping, caravanning, fishing, reef walking (boat launching)
Time coding for all video footage at site:		From:	:6:38:19	To:	:15:57:24

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N41	**Site Name**	Pilgramunna Bay	**Date**	10-8-99	**Recorder**	Williams
Vessel		**Time**	14:05	**Weather**	SE 10 knots		
Sea	Flat	**Water depth (m)**	5.0 - 2.0	**Water visibility (m)**	4.0 - 5.0		

GPS Latitude	GPS Longitude	Differential			
22° 11.615' S	113° 51.315' E	**Yes**	☐	**No**	☐

Site location	Site located off Pilgramunna campsite, 72 km from Exmouth ("Pilgramunna Ledges" in *CALM Dive and Snorkel sites in Western Australia*).

Habitat Description

Lagoon – coral (flat bottom) large *Acropora* sp (tabular) adjacent to sandy shoreline and 30m from rocky ledge and limestone rubble.

Dominant Species

Seagrass	
Macro-algae	*Padina* sp. along shore
Coral	*Porites* sp., *Acropora* sp. (tabular) and *Pocillopora* sp.
Fish	Pomacentridae (damselfish), Chaetodontidae (butterflyfish), *Plotosus lineatus* (striped catfish), *Ostracion cubicus* (yellow boxfish), Scorpaenidae (lionfish) and Muraenidae (moray eel).
Invertebrates	Orange sea stars, burrowing clams, echinoderms

Other Features

Impact or Activity

The site is mentioned as a snorkelling site in a CALM publication as a snorkel site and is also a day use and camping area. There is evidence of mechanical damage on the reef platform caused by snorkelling and reef walking. There was a high abundance of fishing line. No targeted recreational fish species or *Panulirus* sp. (rock lobster) sighted. No *Drupella* sighted.

Video reference	NMPMP/ bvt/10-8-99 /#4	**Aerial reference**	5022/WA 3405/RUN6/940
Slide reference		**Print reference**	

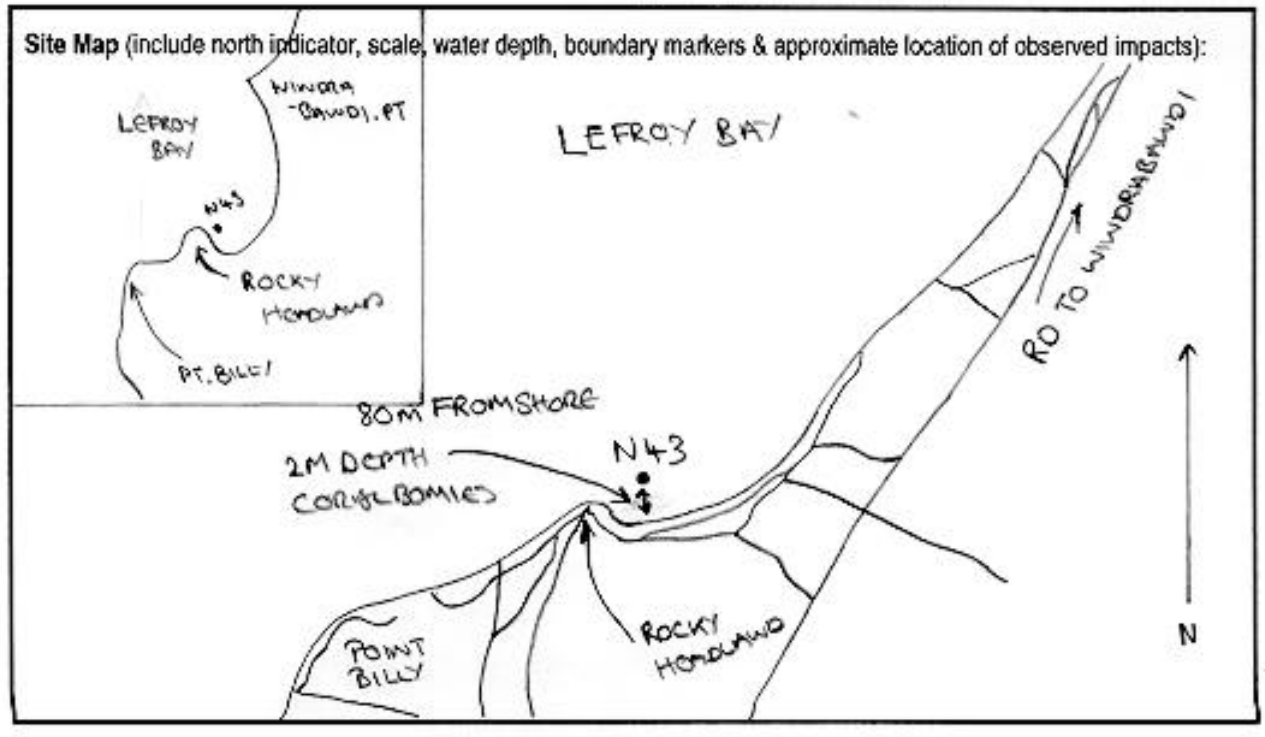
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N43	Site Name	Lefroy Bay	Date	12- 8- 99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Reef walking
1	22° 32.447' S	113° 41.233' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary	Tape no.	NMPMP/bvt/12-8-99 /#4	Main Human Activity	Reef walking
Time coding for all video footage at site:		From:	:00:0:	To:	:2:52:22

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N43	**Site Name**	Lefroy Bay	**Date**	12-8-99	**Recorder**	Cary
Vessel		**Time**	9:00	**Weather**	15- 20 knots SE		
Sea	Calm	**Water depth (m)**	2.0 (high tide)	**Water visibility (m)**	1.0		

GPS Latitude	**GPS Longitude**	**Differential**			
22° 32.447' S	113° 41.233' E	**Yes**	☐	**No**	☐

Site location	Site located 100 m east of rocky headland in Lefroy Bay

Habitat Description

Lagoon - coral

Dominant Species

Seagrass	
Macro-algae	Turf, *Ulva* sp., *Helimeda* spp., *Cylindraxis* sp. and *Caulerpa* sp.
Coral	Porites sp. x 2 spp..
Fish	
Invertebrates	

Other Features

Turtles occur at this site. Water visibility is consistently low at this site (horizontal visibility of 1m). Macro algae covers the limestone pavement between the shore line and the *Porites* sp. located 80m from the shoreline. The *Porites* sp. (massive) are up to 2m diameter.

Impact or Activity

Six people were observed reef walking during low tide the night before the site was surveyed. No *Panulirus* sp. (rock lobster) sighted. No *Drupella* sighted.

Video reference	NMPMP/bvt/12-8-99 /#4	**Aerial reference**	5120/WA 3405/RUN11/940592
Slide reference		**Print reference**	

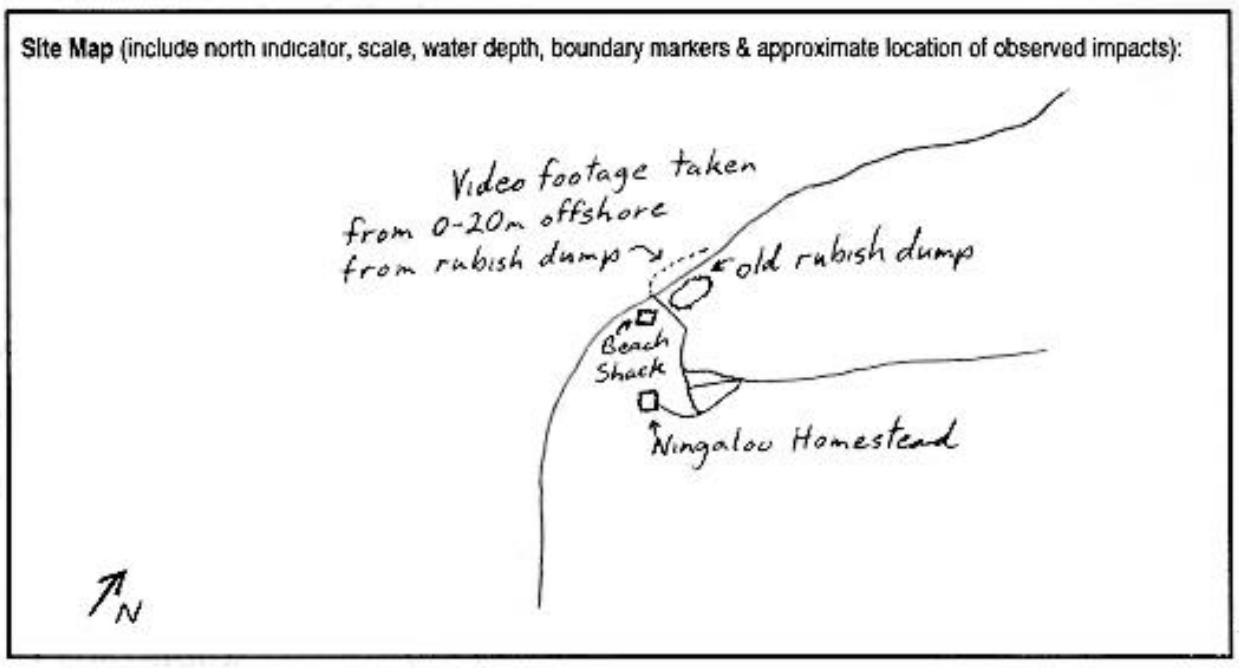
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N44	Site Name	Ningaloo Beach	Date	12-8-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Rubbish tip adjacent to beach, with old 44 gallon drums, bottles, cans, alfoil and general rubbish. Items of litter are being washed in to adjacent waters.
1	22° 41.669' S	113° 40.346' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary	Tape no.	NMPMP/ bvt/12-8-99 /#4	Main Human Activity	Proposed resort site
Time coding for all video footage at site:		From:	:2:52:22	To:	:11:42:22

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes:

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N44	**Site Name**	Ningaloo Beach	**Date**	12-8-99	**Recorder**	Cary
Vessel		**Time**	11:00	**Weather**	Strong SE		
Sea		**Water depth (m)**	1.5	**Water visibility (m)**	4.0		

GPS Latitude	**GPS Longitude**	**Differential**			
22° 41.669' S	113° 40.346' E	**Yes**	☐	**No**	☐

Site location	Site located adjacent to the beach shack located next to the Ningaloo Station Homestead.

Habitat Description

Sandy limestone pavement – shoreline with light algae cover.

Dominant Species

Seagrass	
Macro-algae	Turf and *Padina* sp.
Coral	
Fish	
Invertebrates	

Other Features

Impact or Activity

Rubbish tip adjacent to beach, with old 44 gallon drums, bottles, cans, alfoil and general rubbish. Items of litter are being washed in to adjacent waters. Site has unsuitable habitat for *Panulirus* sp. (rock lobster) and *Drupella*.

Video reference	NMPMP/bvt/12-8-99 /#4	**Aerial reference**	5132/WA3434 /RUN12/940592
Slide reference		**Print reference**	

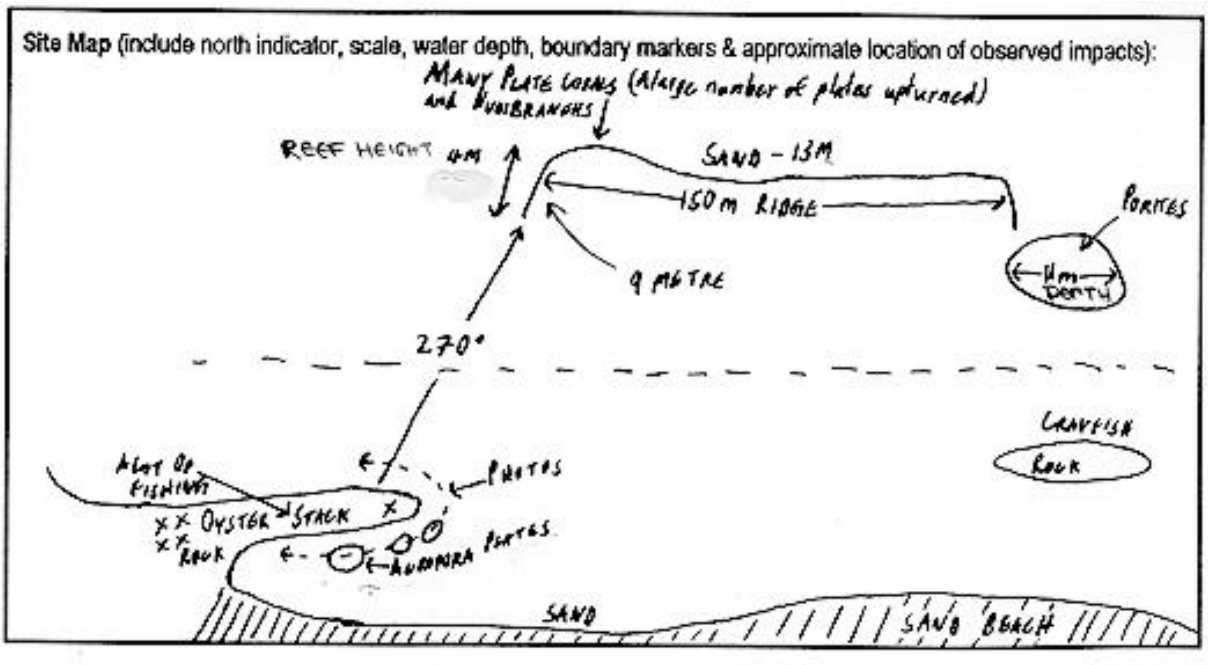
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N45	Site Name	The lagoon	Date	9-8-99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	This is a popular spot for recreation activities such as fishing, squiding, swimming and scuba diving.
1	23° 03.433' S	113° 49.272' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly	Tape no.	NMPMP/bvt/19-8-99/#7	Main Human Activity	Snorkel 4wd day trippers 4 wheel motor bike tours
Time coding for all video footage at site:		From:	0:00:00:0	To:	0:01:41:00

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Onshore footage taken on 19-8-99

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N45	**Site Name**	The lagoon	**Date**	9-8-99	**Recorder**	Cary
Vessel		**Time**	10:00	**Weather**	Slight breeze		
Sea		**Water depth (m)**		**Water visibility (m)**			

GPS Latitude	GPS Longitude	Differential			
23° 03.433' S	113° 49.272' E	**Yes**	☐	**No**	☐

Site location	Site located approximately 9.5km from Pt. Maud.

Habitat Description

Lagoon - coral reef dominated by *Acropora* sp. (digitate).

Dominant Species

Seagrass	*Halophila* sp.
Macro-algae	
Coral	*Acropora* sp. (digitate) and *Sinularia* sp. (soft coral).
Fish	
Invertebrates	*Drupella*

Other Features

Turtles are common at the site.
Area between Oyster bridge and Five mile.
The area 250m 270° from Oyster Stack is a ridge (4m height in 9-11m of water).

Impact or Activity

A popular site for fishing, squiding, swimming and scuba diving (commercial dive operators and dive schools use the area). Two locals told the story of a recreational fisher three years ago that caught bags of *Panulirus* sp. (rock lobster) at the site. If the fisher could not reach rock lobsters under plate corals then a rope was attached to the base of the plate and pulled over using a boat. No *Panulirus* sp. (rock lobster) were sighted. Litter at the site is fishing tackle with 20 coral colonies observed to have fishing line, gang hooks and squid jigs. *Drupella* abundance is medium to high, with approximately 60 individuals sighted during the survey.

Video reference	NMPMP /bvt /19-08-99 /#7	**Aerial reference**	DMH 612
Slide reference	Yes	**Print reference**	

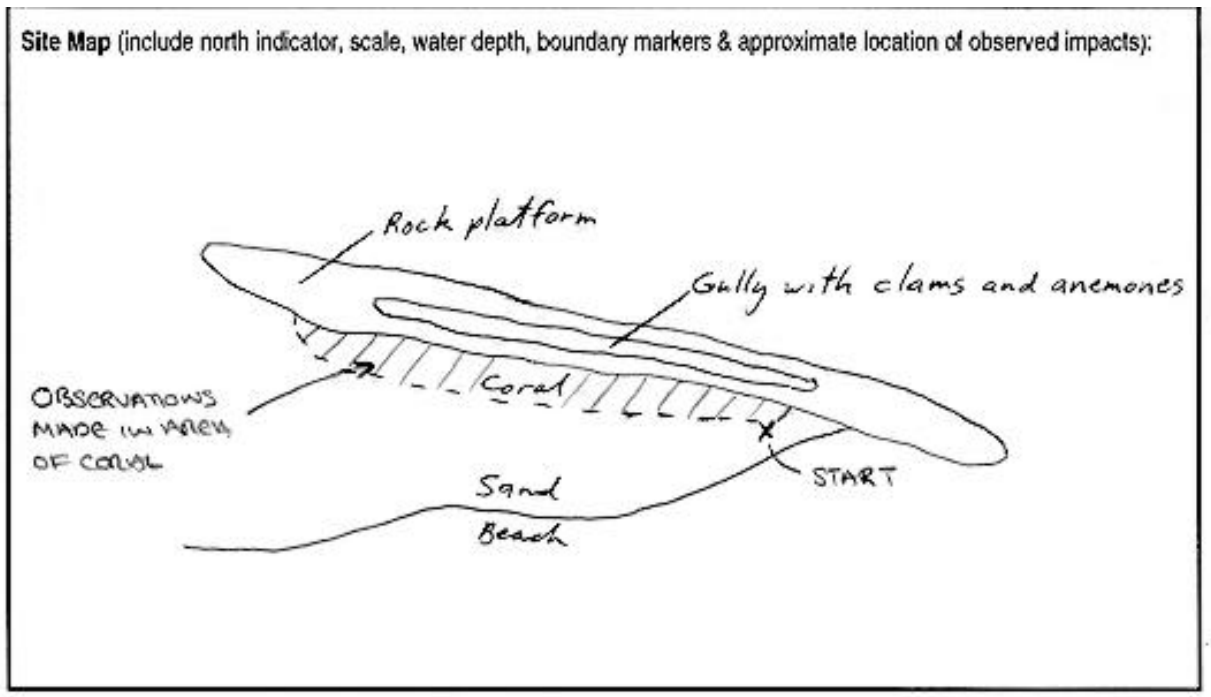
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N54	Site Name	Oyster Bridge	Date	10- 8- 99	Observer	Cary

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	
1	23° 04.326' S	113° 48.996' E	Oysters on accessible rocks have only about 5% live cover.
2	° ' S	° ' E	Oysters on inaccessible rocks have up to 90% live cover.
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly	Tape no.	NMPMP/bvt/ 18>20-8-99 /#7	Main Human Activity	Diving, fishing and oyster collection
Time coding for all video footage at site:		From:	0:01:41:00	To:	0:05:23:00

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Video footage taken on 19-8-99 (Surface footage only)

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N54	**Site Name**	Oyster bridge	**Date**	10-8-99	**Recorder**	Cary
Vessel		**Time**	9:00	**Weather**	25km SE		
Sea		**Water depth (m)**	0.5-3	**Water visibility (m)**	6		
GPS Latitude		**GPS Longitude**		**Differential**			
23° 04.326' S		113° 48.996' E		**Yes**	☐	**No**	☐
Site location	Site located 9km north of Pt Maud- following beach						

Habitat Description

Lagoon – coral with high diversity.

Dominant Species

Seagrass	*Halophila ovalis*.
Macro-algae	
Coral	*Porites* sp. (massive and branching), *Favia* sp. (massive), *Favites* sp. (massive), *Platygyra* sp. (massive), *Sinularia* sp. (soft coral), *Sarcopyton* sp. (soft coral), *Acropora* sp. (branching and digitate), *Pocillopora* sp., *Echinopora* sp. and *Goniopora* sp.
Fish	*Mugil cephalus* (sea mullet), *Fistularia* sp (flutemouth), Labridae (wrasse), Scaridae (parrotfish), Pomacentridae (damselfish and anemonefish), *Lethrinus nebulosus* (spangled emperor), and sweetlips.
Invertebrates	*Tridacna* sp. (giant clams), anemones (also on rock wall and in gully) and Cypraeidae (egg cowries)

Other Features

Impact or Activity

The site is used for snorkelling, picnicking and is visited by commercial fishing and charter boats as well as locals. The site is accessed along the beach, with four-wheel motor bikes used most commonly. The beach is clean and the only litter seen was fishing line. No *Panulirus* sp. (rock lobster) were sighted. Large *Lethrinus nebulosus* (spangled emperor) and sweetlips were sighted in large caverns. Oysters on accessible rocks have about 5% live cover, while oysters on in-accessible rocks have up to 90% live cover. No *Drupella* were sighted.

Video reference	NMPMP/bvt /10-8-99 /#7	**Aerial reference**	/WA /RUN /
Slide reference	Yes	**Print reference**	

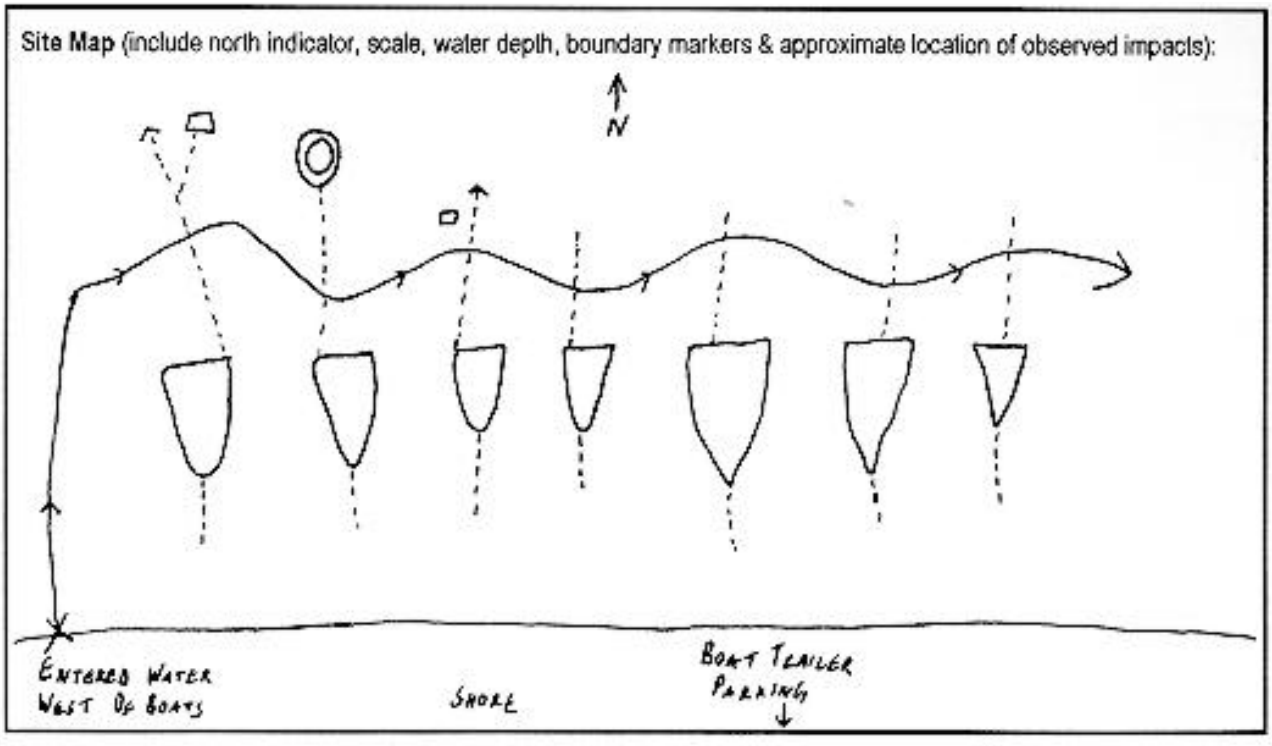
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N46	Site Name	Coral Bay Moorings	Date	18-8-99	Observer	Daly Williams

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Coral rubble swept into heaps by mooring chains
1	23° 08.482' S	113° 46.198' E	Litter : beer cans and tree branches (possibly due to cyclone)
2	° ' S	° ' E	Mooring chains secured to coral bommies
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Daly	Tape no.	NMPMP/bvt /18-9-99 /#7	Main Human Activity	Boat moorings
Time coding for all video footage at site:		From:	0:00:00:00	To:	0:20:25:00

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Snorkel only, see chart DMH 612 for location.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N46	**Site Name**	Coral Bay Moorings	**Date**	18-8-99	**Recorder**	Daly
Vessel		**Time**	16 00	**Weather**	20 km SW Fine		
Sea	Calm inshore	**Water depth (m)**	2.0 – 5.0	**Water visibility (m)**	6.0		

GPS Latitude	**GPS Longitude**	**Differential**			
23° 08.482' S	113° 46.198' E	**Yes**	☐	**No**	☐

Site location	Site located in boat moorage on shore south Bill's Bay adjacent to the Coral Bay settlement.

Habitat Description

Lagoon – coral community dominated by coral rubble and sand with some small clumps of live coral (*Acropora* sp.).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Acropora* sp., *Porites* sp. and Faviidae.
Fish	Labridae (wrasse), Pomacentridae (Damselfish) and *Lethrinus nebulosus* (spangled emperor).
Invertebrates	Holothurian (sea cucumber).

Other Features

Impact or Activity

The area is used by recreational and commercial vessels for mooring, anchoring, re-fuelling, loading and unloading, boat launch. The area is highly degraded by the use of anchors, mooring chains and vessel groundings. In some cases large *Porites* sp (massive) have been damaged by mooring chains being wrapped around them. Litter at the site includes old moorings, drink containers, 44-gallon drums and other general rubbish. There is also terrestrial debris such as tree branches, possibly due to cyclone Vance in 1999. No *Drupella* were sighted.

Video reference	NMPMP/ bvt /18-8-99 /#7	**Aerial reference**	DMH 612
Slide reference		**Print reference**	

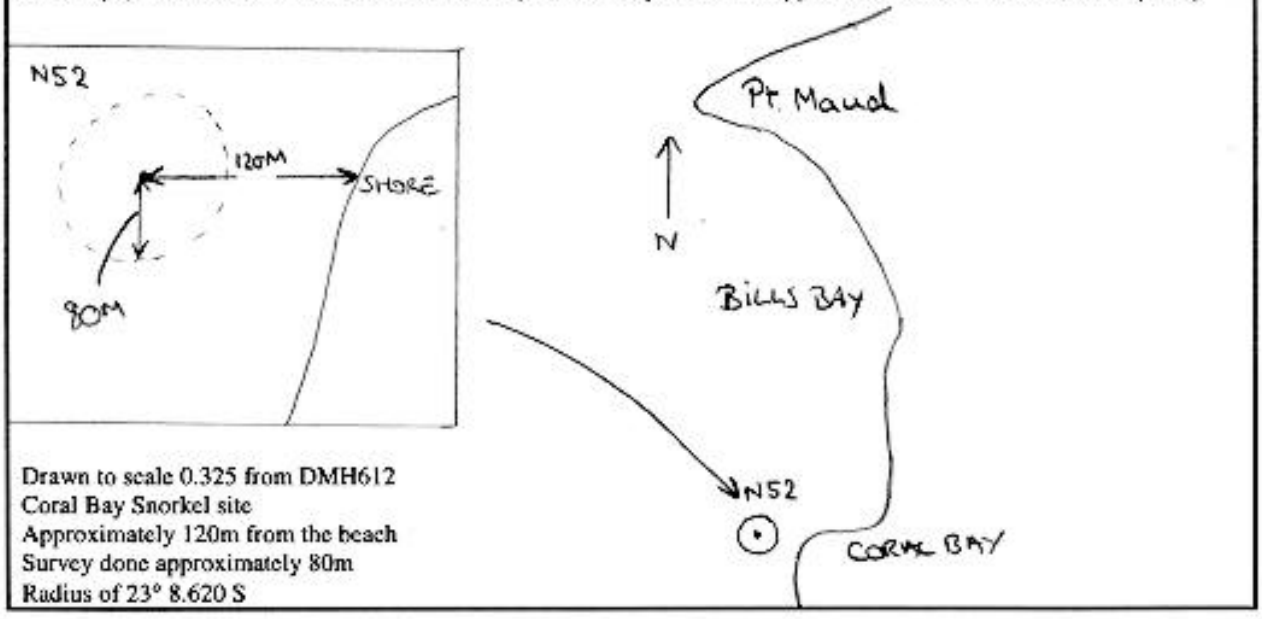
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				Field Survey		AUGUST 1999
Site No.	N52	Site Name	Coral Bay Snorkel	Date	20-8-99	Observer	Daly Mahendran

Co-ordinates of Boundary Markers			Observed Impacts
	DGPS Latitude	DGPS Longitude	Broken glass (bottles and plates), Plastic bag, Recently broken sections of plate coral (possibly snorkelers), Up turned plate corals (damage 1-2 years old), Old mooring, Some coral bleaching and *Drupella* scars sighted.
1	23° 08.477' S	113° 46.042' E	
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Mahendran Daly	Tape no.	NMPMP/bvt/18-8-99 /#8	Main Human Activity	Snorkel Snuba
Time coding for all video footage at site:		From:	0:0:0:0	To:	0:23:14:00

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Some good general footage

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N52	**Site Name**	Coral Bay Snorkel site	**Date**	20-8-99	**Recorder**	Mahendran
Vessel		**Time**	14:00	**Weather**	20 knots		
Sea	SSW Fine	**Water depth (m)**	3.0 – 4.0	**Water visibility (m)**	10.0		

GPS Latitude	**GPS Longitude**	**Differential**			
23° 08.477' S	113° 46.042' E	**Yes**	☐	**No**	☐

Site location	Site located approximately 2.3km south of Pt Maud.

Habitat Description

Lagoon – coral dominated by *Acropora* sp. and *Pocillopora* sp.

Dominant Species

Seagrass	
Macro-algae	
Coral	*Pocillopora* sp., *Montipora* sp., *Echinopora* sp., *Acropora* sp. (tabular and branching) and occasional *Favia* sp. and *Favites* sp.
Fish	Lethrinidae (north west snapper), Plotosidae (catfish), Labridae (wrasse), Pomacentridae (damselfish), *Kyphosus* sp (buff bream), Mullidae (goatfish) and *Rhinecanthis aculeatus* (white-barred triggerfish)
Invertebrates	Holothurians (sea cucumber)

Other Features

Green turtle (70cm)

Impact or Activity

The site is located very close to the Coral Bay settlement and is a popular spot for swimming and snuba. Evidence of impacts from snorkelling and boating activities including broken corals. Litter includes one plastic bag, six broken bottles and five broken plates. No *Panulirus* sp. (rock lobster) sighted. No *Drupella* sighted.

Video reference	NMPMP/bvt/20-8-99 /#7	**Aerial reference**	DMH 612
Slide reference		**Print reference**	

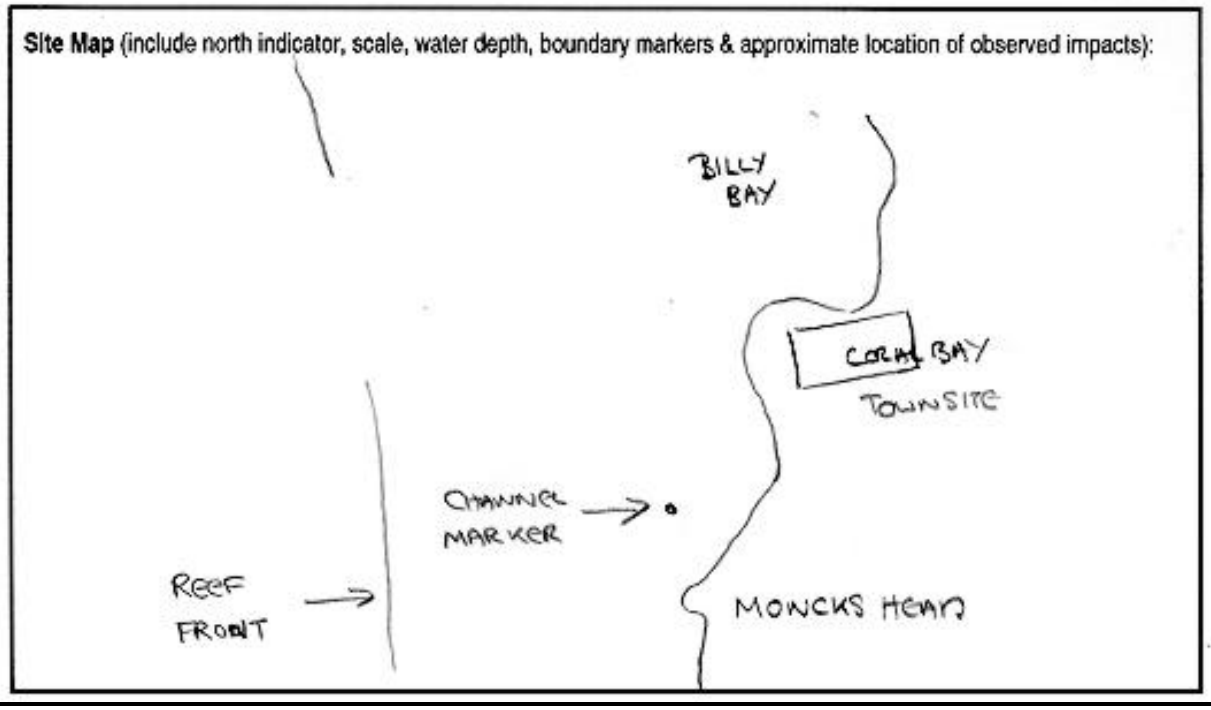
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N57	**Site Name**	Monck Head channel marker	**Date**	15-5-98	**Observer**	Cary

Co-ordinates of Boundary Markers			**Observed Impacts**
	DGPS Latitude	**DGPS Longitude**	
1	23° 09.250' S	113° 45.800' E	Coral damage by boats with deep draft
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

Video operator	Cary / Grubba	**Tape no.**	NMPMP/bvt /19-5-98 /#9	**Main Human Activity**	Boating
Time coding for all video footage at site:		**From:**	:00:00:00	**To:**	:20:40:20

Site Map (include north indicator, scale, water depth, boundary markers & approximate location of observed impacts):



Notes: Although site established in 1998 it was not included in the 1998 data report.

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N57	**Site Name**	Monck Head channel marker	**Date**	19-5-98	**Recorder**	Cary
Vessel		**Time**		**Weather**	Slight Breeze		
Sea		**Water depth (m)**	1- 3m	**Water visibility (m)**	5 m		

GPS Latitude	**GPS Longitude**	**Differential**			
23° 09.250' S	113° 45.800' E	**Yes**	☐	**No**	☐

Site location	Site located at Monck Head channel marker.

Habitat Description

Lagoon – coral dominated by *Acropora* sp. (branching).

Dominant Species

Seagrass	
Macro-algae	
Coral	*Acropora* sp. (branching)
Fish	
Invertebrates	

Other Features

Impact or Activity

Extensive coral damage caused by deep drafted boats navigating through the channel. In many cases there are distinctive v-shaped cuts through colonies of *Acropora* sp. (branching). The channel marker mooring chain as also caused localised damage around the mooring site. No *Panulirus* sp. sighted. No *Drupella* sighted.

Video reference	NMPMP/bvt /19-5-98 /#9	**Aerial reference**	5169/WA 3405/RUN16/940592
Slide reference		**Print reference**	