MARINE MANAGMENT SUPPORT
NINGALOO

RE-SURVEY OF HIGH HUMAN USAGE LONG TERM MONITORING SITES IN NINGALOO MARINE PARK IN DECEMBER 2000.

Field Program Report: MMS/NIN/NMP-28/2000

A collaborative project between the Marine Conservation Branch
and Exmouth District Office of CALM

Part funded by *Coasts and Clean Seas*

an initiative of the Natural Heritage Trust

Natural Heritage Trust
Helping Communities Helping Australia

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

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Funding / Resources

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1 INTRODUCTION

1.1 GENERAL

This field program report presents information on the December 2000 field survey of the Ningaloo Marine Park Monitoring Program (NMPMP). The main aim of the NMPMP is determine the health of the key benthic habitats of the Ningaloo Marine Park and the proposed southern extension. The locality and boundaries of Ningaloo Marine Park and surrounds are shown in Figure 1.

Three previous field surveys have been conducted by CALM as part of the NMPMP

- May 1998 (Cary *et al*. 1999)
- August 1999 (Cary *et al*. 2000)
- May 2000 (Cary and Grubba 2000)

In August 1999 thirty-one long term monitoring sites were established in areas of high human usage in lagoonal, back reef and shoreline areas (nine transect sites and 22 non-transect sites).

This survey will involve the re-survey of approximately eight of these long term monitoring sites located in areas of high human usage located in the northern region of Ningaloo Marine Park (Figure 2).

The field survey will be coordinated by the Exmouth District of CALM (contact Doug Myers) in collaboration with Marine Conservation Branch (MCB) of CALM (Project Supervisor: Jennie Cary). Tim Grubba (MCB) coordinated the field trip preparation with Exmouth District.

Carolyn Williams will be Field Team Leader and will coordinate all activities in the field. Carolyn Williams and Adam Meyer will supervise all diving activities in the field, and will both be designated Dive Supervisors. Other CALM staff will include Arvid Hogstrom from 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. They must 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 of 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; (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 aim of the Ningaloo Marine Park Monitoring Program (NMPMP) is to assess the 'health' of major benthic habitats of the marine park and its southern extension. Long term monitoring sites established during 1999 will provide baseline data from which the impacts from human activities can be monitored and managed to ensure that all activities are ecologically sustainable. This report describes one of a number of field surveys that will be conducted as part of the NMPMP. 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. This field survey will re-survey long-term 'non-transect' monitoring sites established in August 1999 in areas of high human usage in the northern region of the NMP. At each site semi-quantitative biological information to assess the 'health' of coral communities will be collected using visual surveillance, supported by video footage, within re-locatable areas ('non-transect' sites) (see 2.2).

1.3 AIMS

- re-survey approximately ten monitoring sites in areas of high human usage established in the northern region of the Ningaloo Marine Park in 1999.

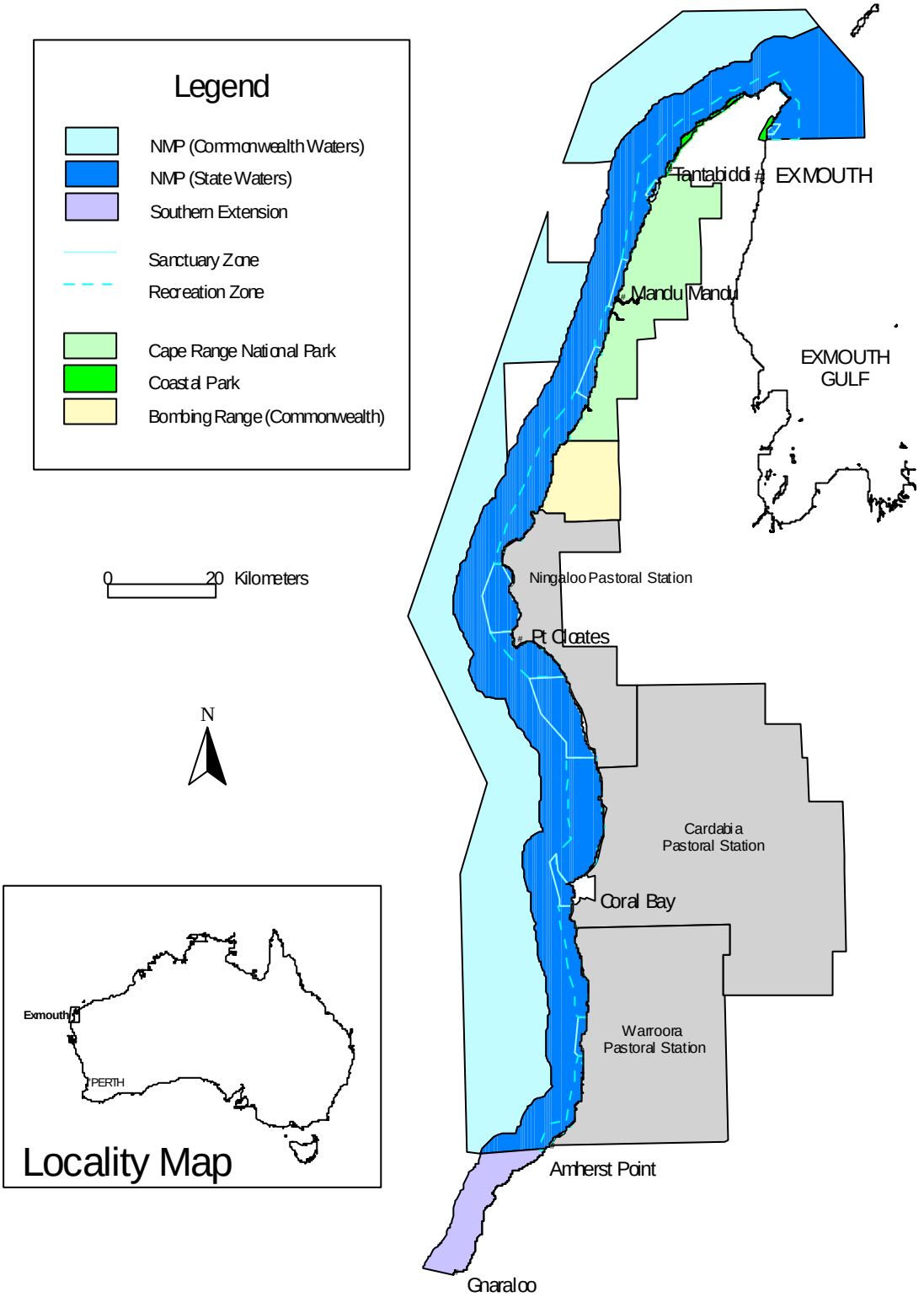

Legend
NMP (Commonwealth Waters)
NMP (State Waters)
Southern Extension
Sanctuary Zone
Recreation Zone
Cape Range National Park
Coastal Park
Bombing Range (Commonwealth)
0 20 Kilometers
N
Locality Map
Exmouth
PERTH
Tantabiddi
EXMOUTH
Mandu Mandu
EXMOUTH GULF
Ningaloo Pastoral Station
Pt Cloates
Cardabia Pastoral Station
Coral Bay
Warroora Pastoral Station
Amherst Point
Gnaraloo

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

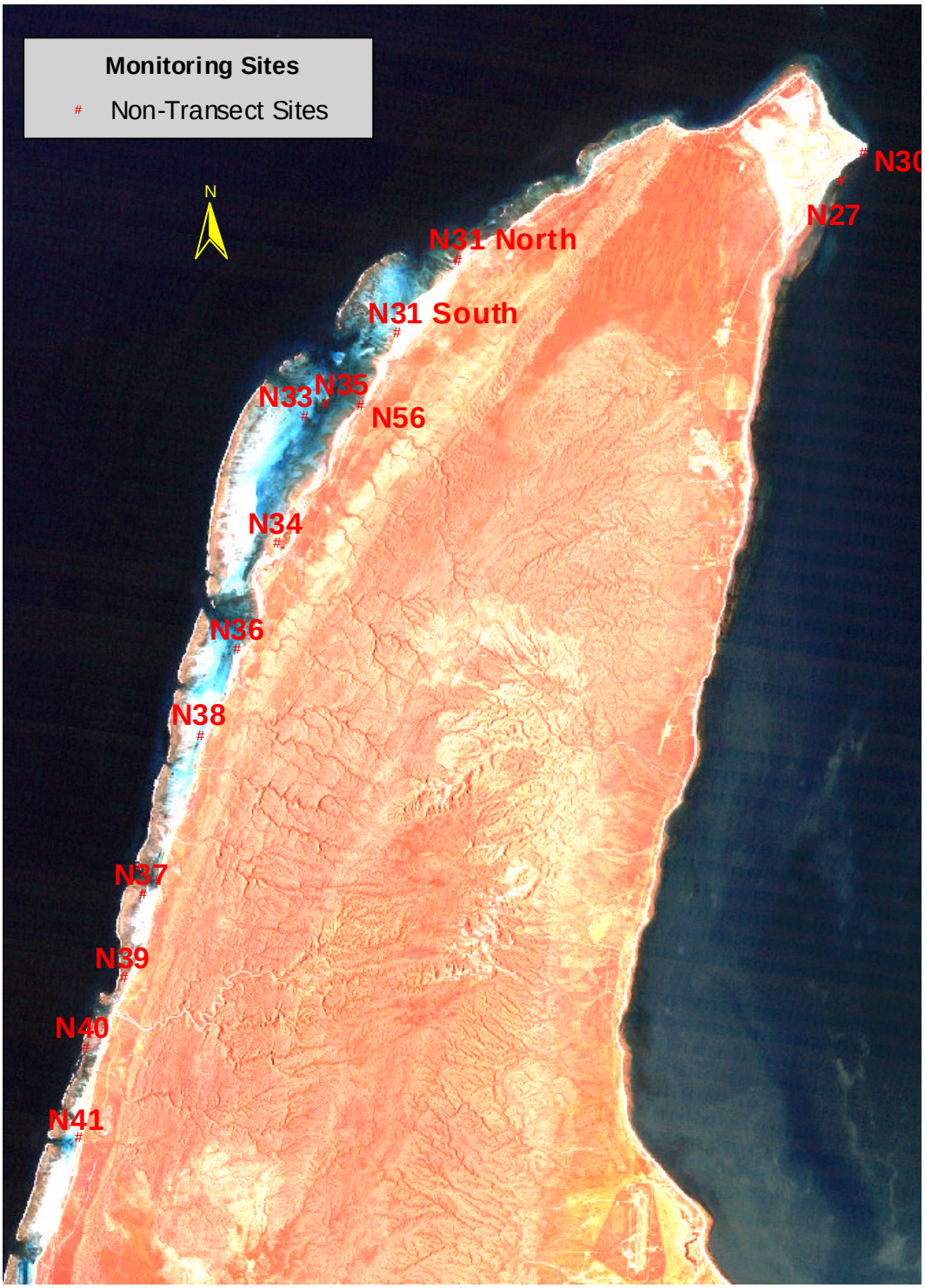


Figure 2. Location map of 'non-transect' monitoring sites established in Ningaloo Marine Park in August 1999

2 STUDY AREA, METHODS AND EQUIPMENT

2.1 STUDY AREA

The Ningaloo Reef, is a fringing-barrier coral reef enclosing a shallow lagoon that extends for about 280 kilometres along the west coast of Australia between latitudes 21º 47' - 24º S (Figure 1). The width of the lagoon ranges from 0.5 to 6 kilometres (average 2.5 kilometres) and has a mean depth at AHD of about 2 metres (Hearn *et al*., 1986). In 1987 the Ningaloo Marine Park (State waters) was gazetted (Figure 1).

The December 2000 field survey will re-survey approximately ten 'non-transect' (compliance) long term monitoring sites located in high human usage areas in the northern region of the Ningaloo Marine Park (north of Yardie Creek). Figure 2 displays all 'non-transect' sites located in the northern section of the NMP.

2.2 METHODS

At each non-transect site the site location and size will be determined by referring to the data sheets ('non-transect' site data sheet) completed in 1999 (Appendix IV). In most cases DGPS coordinates of each corner of each site were recorded, but in some cases only one site coordinate was recorded along with a description of the site.

At each site digital video footage will be taken of damage to benthic communities from human activities (eg anchor or diver damage), and any observed litter. In addition the following observations are recorded onto the habitat sheets and 'non-transect' data sheets (Appendix I):

- habitat description, including dominant species, etc;
- type and extent of impacts from human activities on benthic communities;
- type of litter and number of items;
- presence and abundance of targeted species eg
  - crayfish;
  - oysters;
  - fish;
- coral predators eg *Drupella* (the number of feeding scars, low density (5 feeding scars) and medium/high density (6 feeding scars)).

The data from the data sheets will be entered electronically onto standard data files. All written data is to be transferred to the computer files during the field survey, and preferably on the day of collection.

2.2.1 Field Procedures

This procedure has been approved by the Departmental Diving Officer (Alan Byrne)

The following outlines the field procedures to be used when re-surveying 'non-transect' monitoring sites. The procedures are based on two-three people. Sites easily accessible from the shore will not require a boat and can be carried out by two people whereas sites requiring a boat will require three people. The roles of each member include:

- *BOAT OPERATOR*: operates the boat
- *OBSERVER 1*: operates the video camera
- *OBSERVER 2*: records data

1. Locate the position of the site using GPS coordinates (WGS84) and by referring to the 'non-transect' data sheet
2. Identify the coverage of the site using GPS coordinates or the description on the 'non-transect' data sheet. It can be useful to temporally mark the corners of the site using weighted marker buoys.
3. The two observers (on SCUBA/snorkel/foot) move through the entire site, ensuring that the whole area is covered (visually).
4. One person has the role of video camera operator and the second is a data recorder (Appendix II)
5. The camera operator films the general area, filming any visible impacts (eg. broken coral, litter, etc.) and anything else of significance.
6. The data recorder follows the video operator and records general observations such as dominant species, general health and any visible impacts etc. This data recorder will also draw mud-maps of the position of the site and impacts in relation to prominent features to assist in future re-location (Appendix I)

7. If time is available re-record the GPS coordinates of the four corners (marker buoys) of the site using the datum AGD84 and the coordinates in decimal degrees (Appendix III).
8. Once the site has been re-surveyed any marker buoys should be removed before moving on to the next site.

2.2.2 Contingency for adverse conditions

In the event of adverse weather, sea or road (track) conditions the Field Team Leader in consultation with the boat skipper may choose to re-evaluate the day's field program and change the schedule if necessary. This would primarily involve the abandonment of a site at which conditions are unsuitable and the replacement of the site with a site that is sheltered from the wind and/or offers better sea conditions for underwater work, and/or is accessible by road.

2.3 EQUIPMENT

2.3.1 Video systems

Primary equipment (except TV/video unit) will be supplied by MCB. The back-up unit will be kept at MCB but is also available.

Primary

- Canon MV1 digital video camera with battery packs (4) and chargers (1)
- Amphibico underwater video housing
- Pelican case
- Housing O-ring kit and silicone grease
- Cleaning kit
- Instruction manuals
- Digital video tapes (4)
- Leads, remote control, spares
- TV/video unit

Backup

- Canon MV1 digital video camera
- Amphibico underwater video housing
- Housing O-ring kit and silicone grease
- Cleaning kit
- Instruction manuals
- Leads, remote control, spares

2.3.2 Safety

CALM Exmouth Office will supply all safety equipment.

- Comprehensive diving first aid kit
- Emergency response flowsheet
- Emergency contact flow chart
- Patient information log
- Accident log sheets
- Oxy-viva units (1)
- Spare oxygen D cylinder and regulator
- 3 wet weather jackets
- Sunscreen
- Spare sunglasses
- Vinegar and flask hot water

2.3.3 Information

- Reference books for the identification of corals, fish, birds, marine mammals and marine fauna
- Habitat data sheets
- Non-transect monitoring site data sheets
- 1 field notebooks
- 1 box of pencils
- 1 stationary box
- equipment log book

2.3.4 Diving

CALM Exmouth Office will supply diving equipment.

- Personal dive gear
- 2 scuba tanks
- 2 BCD's
- 2 regulators with alternate airsource and gauges
- 2 dive computers
- 2 compasses
- 1 boat dive flags
- 1 personal dive flag
- dive spare parts and repair kits
- underwater slate and pencil
- Scuba log book

2.3.5 Vessels and vehicles

CALM Exmouth Office will supply vessels and vehicles

- CALM Exmouth Region boat (Quintrex- Aluminium with 40hp outboard or 3.7 m Quicksliver inflatable with 15 hp outboard)
- Bags, repair kit, ropes, oars and lines, and fuel tanks
- CALM Exmouth vehicle
- Vehicles to have full tool kit, battery jumper leads, tyre inflator coupled to scuba cylinder valve

2.3.6 Position fixing and communications

CALM Exmouth Office will supply position fixing and communications equipment.

- 1 hand held GPS unit
- 1 CALM hand-held radio and charger
- CALM vehicle equipped with CALM VHF

2.3.7 Additional equipment

CALM Exmouth Office will supply all additional equipment.

- 4 x pre cut marker buoys
- 4 x 8lb weights
- Comprehensive mechanical tool kit
- Comprehensive electrical repair kit
- 10 AA batteries (for GPS unit)

3 FIELD PROGRAMME

3.1 FIELD ITINERARY

Table 1. Field itinerary for the period 5 December to 28 December 2000.

Date	day	Site number location	Activity
5/12/00	Tue	N37 Turquoise Bay	• Fieldwork
5/12/00	Tue	N38 Lakeside	• Fieldwork
5/12/00	Tue	N36 Mesa	• Fieldwork
5/12/00	Tue	N34 Mangrove Walk	• Fieldwork
6/12/00	We	N56 Tantabiddi Ramp	• Fieldwork
6/12/00	We	N31 Jurabi-South	• Fieldwork
7/12/00	Th	N30 Naval Jetty-South	• Fieldwork
7/12/00	Th	N27 Bundegi – Human Usage	• Fieldwork
28/12/0	Th	N33 Tantabiddi-Snorkel	• Fieldwork
28/12/0	Th	N35 Tantabiddi – GBB	• Fieldwork

3.2 EQUIPMENT SUPPLIERS AND RELEVANT CONTACTS

The following list gives contact details of the suppliers of major items of equipment.

Ansett air freight: Ph 13 2767
CALM, Exmouth: Ph. (08) 99 491676 (fax) (08) 99 491580
CALM, MCB: Ph (08) 9432 5100 (fax) (08) 9430 5408
Exmouth automotive and marine Alan Waddingham; (08) 99492795
Underwater video system: Sea Optics, David Hill, Ph. 08 3626161

4 SAFETY

Safety issues relating to:
- field work are the responsibility of the Field Team Leader, Carolyn Williams
- diving are the responsibility of the Diving Supervisor, Carolyn Williams
- boating and navigation are the responsibility of the boat skipper

4.1 EMERGENCY CONTACTS

Contact with the field team should be made through the Exmouth District Office of CALM.

General
CALM, Exmouth: Ph.(08) 9 949 1676 and (08) 9 949 2113, Fax (08) 9 949 1580
CALM, Marine Conservation Branch, Fremantle: Ph (08) 9 432 5100; Fax (08) 9 430 5408
Fisheries Department, Exmouth: Ph (08) 9 949 2755
Exmouth Dive Centre: Coral Bay Ph (08) 9 942 5824; Exmouth Ph (08) 9 949 1201
Exmouth Hospital/Ambulance: Ph.(08) 9 949 1011, fax (08) 9 949 1017
Exmouth Police: Ph. (08) 9 949 2444
Fremantle Hyperbaric/Diving Service: (08) 9 431 2233 or (08) 9 431 3333
Royal Flying Doctor Service: Admin., Ph (08) 9 414 1200
Coral Bay Volunteer Rescue Group: Ph. (08) 9 942 5933 , Call Sign: VMR679, Channel 90 (UHF,VHF)
Exmouth Sea Rescue Group: Ph. (08) 9 949 2382, Call Sign: VMR682, Channel 90 (UHF, VHF)

Radio
CALM VHF Radio: Monitored at Exmouth office, use channel 11 (north of Yardie Creek) and channel 17 (south of Yardie Creek)
Marine VHF: A hand held unit will be carried on vessels

5 BUDGET

Table 2. Budget reconciliation for December 2000 field work

Budget Item			CALM (MCB)	CALM (Exmouth)	Total costs ($)
Travel					
Vehicles	CALM Exmouth vehicle - $0.45/km for 300 km		-	135.00	135.00
Tire repair etc			-		
		Sub-total	**-**	**135.00**	**135.00**
Staff					
Carolyn Williams	5 days @ $250.72		-	1253.60	1253.60
Arvid Hogstrom	3 days @ $243.88			731.64	731.64
Adam Meyer	2 days @ $197.72			395.44	395.44
Tim Grubba	5 days @ $237.23		1186.15		1186.15
Jennie Cary	2 days @ $308.23		616.46		616.46
		Sub-total	**1802.61**	**2380.68**	**4183.29**
Equipment					
CALM Exmouth vessel	2 days @ $100		-	200.00	200.00
Handheld GPS unit	4 days @ $5.00		-	20.00	20.00
3 x SCUBA sets	3 days @ $100		-	300.00	300.00
4 x SCUBA cylinders	3 days @ $20		-	60.00	60.00
1 x Underwater digital videos	5 days @ $50		250.00		250.00
		Sub-total	**250.00**	**580.00**	**830.00**
Consumables					
Fuel and oil			-		
Air fills	5 @ $5		-	25.00	25.00
Digital video tapes	4 x DVM-E60 @ $14.75		59.00		59.00
Digital video backup tapes	4 x DVM-E60 @ $14.75		59.00		59.00
Freight costs	Perth – Exmouth and Exmouth - Perth				
Other consumables	Gloves/pencils/chalk/erasers/batteries…etc		-	20.00	20.00
		Sub-total	**118.00**	**45.00**	**163.00**
		Total	**2170.61**	**3005.68**	**5176.29**

6 PUBLICITY/EDUCATION

6.1 PUBLIC RELATIONS OPPORTUNITIES

Nothing is planned for this field survey

6.2 EDUCATION OPPORTUNITIES

Nothing is planned for this field survey

7 REFERENCES

Cary J L, Grubba T L and Myers J (1999). Ningaloo Marine Park Monitoring Program: Benthic Monitoring sites established in 1998. Data Report MMSP/PI/NMP-18/98. (Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry Street, Fremantle, Western Australia, 6160). Unpublished report.

Cary J L, Grubba T L, Mahendran M & Radford B (2000). Ningaloo Marine Park Monitoring Program: Benthic monitoring sites established in 1999. Data Report: MMS/PI/NMP_21/2000 (Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St., Fremantle, Western Australia, 6160). Unpublished report.

Cary J L and Grubba T L (2000). Survey of the monitoring sites established in 1989 after coral mortality in Bills Bay from the coral mass spawning event of March 1989. Field Program Report MMS/NMP-24/2000 (Marine Conservation Branch,

Department of Conservation and Land Management, 47 Henry Street, Fremantle, Western Australia, 6160). Unpublished report.

APPENDIX I: BLANK DATA RECORDING SHEETS

HABITAT DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		November 2000
Site No.	N	**Site Name**		**Date**		**Recorder**	
Vessel		**Time**		**Weather**			
Sea		**Water depth (m)**		**Water visibility (m)**			
GPS Latitude		**GPS Longitude**		**Differential**			
° ’ S		° ’ E		**Yes**	☐	**No**	☐
Site location							

Habitat Description

Dominant Species

Seagrass	
Macro-algae	
Coral	
Fish	
Invertebrates	

Other Features

Impact or Activity

Video reference	NMPMP/bvt/ /#	**Aerial reference**	/WA /RUN /
Slide reference		**Print reference**	

NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		November 2000
Site No.	N	**Site Name**		**Date**		**Observer**	

Co-ordinates of Boundary Markers			**Observed Impacts**
	DGPS Latitude	**DGPS Longitude**	
1	° ’ S	° ’ E	
2	° ’ S	° ’ E	
3	° ’ S	° ’ E	
4	° ’ S	° ’ E	
5	° ’ S	° ’ E	
6	° ’ S	° ’ E	

Video operator		**Tape no.**	NMPMP/bvt/ /#	**Main Human Activity**	
Time coding for all video footage at site:		**From:**	0:00:00:00	**To:**	0:00:00:00

Notes:

APPENDIX II: UNDERWATER VIDEO SYSTEM

PREPARATION OF UNDERWATER HOUSING AND DIGITAL VIDEO UNIT

Where possible, store and prepare the equipment at room temperature to prevent condensation on the lenses of the digital video camera and housing. Carry out these preparations in a dry, dust and spray-free environment.

The following is to be used as a general guide only. Users should refer to the relevant instruction manual for full details on settings, care and use.

HOUSING

Check the inside of the housing for any dust or other particulate matter, and clean out using a lens cloth and blower brush if necessary. Check the inside of the lens and clean using blower brush, lens tissues and lens cleaning fluid if necessary. Remove the O-ring from the housing, clean it with lens tissues and check for any cracks or scratches. If there is any damage to the O-ring, discard and replace with a new one. Apply a small amount of silicone grease (2-3 mm) between thumb and index finger and run the O-ring through several times to spread this evenly. **Ensure that you do not use too much grease as this could cause the seal to leak!** Remember that the grease is there to keep the O-ring supple and not to actually form a seal. Clean out the O-ring groove with a cotton bud, and carefully replace the clean and greased O-ring back into the groove without twisting it. Ensure that there is no particulate matter sticking to the O-ring. The housing is now ready for the digital video camera to be inserted.

CAMERA SETUP

Set the OPERATE switch to CAMERA
Set the STANDBY LEVER (front right) to MOVIE
Press MENU button
Use the small joy stick controller, on the left hand side of the camera, to move around the menu
Set movie mode to PRO SCAN
Set the PROGRAM SELECT switch to AUTO ("A" inside a square)

POST-DIVE PROCEDURE

After every dive immerse the housing in fresh water for about 10-15 minutes. Occasionally operate the external controls to ensure they are well rinsed. Wipe the housing with a clean, dry towel and leave in a clean, dry, airy and salt-free environment to dry completely. Wipe carefully around the rear seal of the housing before opening so that no water gets onto the video camera. Open the housing and remove the camera. **Do not open the housing where salt spray is present.** Rewind the tape using the either the controls on the back of the video camera or the remote commander. Connect the video camera to the TV monitor (refer to video camera instruction manual) and view the footage. Transcribe the system time code information onto the main 'non-transect' data sheet (Appendix I). Label the tape clearly (using a permanent marker pen) with the designated tape number, the site number and the date of recording as described below.

TAPE NUMBERING

The videotapes should be consecutively numbered according to the following coding system:

Project acronym (NMPMP)/Sampling method (bvt - benthic video transect)/Date (03.08.99)/Tape number (#1 onwards).

Thus, the first tape might be labelled as: **NMPMP/bvt/03.08.99/#1**

If the tape contains footage spanning more than one day the tape number should indicate this (eg. **NMPMP/bvt/07-08.08.99/#1).**

A total of two sites should be recorded on each 60-minute digital tape. Before commencing filming at another site, ensure that the tape is wound forward to the end of the footage recorded at the previous site. This will ensure that no data is recorded over accidentally. Once a tape is complete the red copy protect switch on the tape should be switched on to prevent any loss of site data. The tapes should be stored in a waterproof container and duplicated at the end of the field trip.

APPENDIX III: OPERATING THE GARMIN GPS 12XL UNIT

It is ESSENTIAL that prior to using the Garmin GPS unit that the operator checks what datum the GPS unit is set to read and how the position is displayed. Currently (as of April 2000) CALM uses the datum AGD 84 and the coordinates (latitude and longitude) are displayed in decimal degrees (to a minimum of five decimal places). The text below outlines the procedures that must be followed in order to operate the Garmin GPS, including checking and altering GPS settings (eg. datum and display).

It is also important to note that during site relocation it is essential to check what datum the coordinates were originally recorded in. Always ensure that the datum set on the GPS matches that of the datum is the same as the position you area trying to find. When using a nautical chart in conjunction with the GPS always check what datum the chart is in.

In cases where coordinates are recorded using a different datum or different format then it is ESSENTIAL that the datum and display used are noted on the appropriate data sheet.

It is also good idea prior to using a GPS unit to calibrate it using a local Department of Land Administration (DOLA) benchmark. An information sheet on each DOLA benchmark can be obtained from DOLA. This process will identify any major discrepancies in the reading obtained by the GPS unit. Any major discrepancies should be investigated and any minor discrepancies should be noted on all data sheets.

TURNING THE UNIT ON

- Press and briefly hold [⏻] to turn the unit on

WHEN THE UNIT IS FIRST TURNED ON

- Display [*WELCOME PAGE*]
- Display [*WARMING UP PAGE (DATABASE INFORMATION)*]

ACQUIRING SATELLITES

- Display [ACQUIRING SATELLITE)
- The unit is searching for satellites
- Ensure that the GPS unit has a clear view of the sky (ie. Not indoors)
- When the GPS has locked onto satellites it will display the position
- If the GPS can't acquire satellites then it will beep and display the message [MESSAGE PRESS PAGE]
- Press the button [**PAGE**]
- Display [NEED TO SELECT INIT METHOD]
- Press the button [**PAGE**]

INITIALISING THE GPS UNIT

- Display [CHOOSE INIT METHOD]
- Three options provided
- Press button [▲ ▼] to highlight one of the three choices.
- If you are unsure if the GPS if the unit has been initialised highlight [1 SELECT COUNTRY FROM LIST]
- If you are sure that the GPS can been initialised highlight [3 NO RE-INIT (CONTINUE ACQUIRING)]
- To select a highlighted choice press button [**ENTER**]
- If you chose [1 SELECT COUNTRY FROM LIST] then scroll through the country list by pressing [▲ ▼] to highlight [AUS-WESTERN]

- Select the highlighted choice by pressing [**ENTER**]
- The GPS will display [ACQUIRING SATELLITE]

SET UP MENU

- To locate the Set up Menu press [**PAGE**] to scroll through the various screen to reach the screen [MAIN MENU]
- Press button [▲ ▼] to highlight [SET UP MENU]
- Select the highlighted choice by pressing [**ENTER**]
- The GPS will display the [SET UP MENU]

SELECTING/CHECKING THE DATUM

- Go to the page [SET UP MENU]
- Press button [▲ ▼] to highlight [NAVIGATION]
- Select the highlighted choice by pressing [**ENTER**]
- The GPS will display the [NAV SET UP]
- If the [MAP DATUM] displays [AGD 84] then press [**PAGE**] or [**QUIT**] to move back to previous pages
- If [Map Datum] displays some other Datum then
- Press button [▲ ▼] to highlight [MAP DATUM]
- Press [ENTER] to select
- Press [▲ ▼] to highlight the Datum AGD84
- Press [**Enter**] to select

SELECTING/CHECKING THE POSITION FORMAT

- Go to the page [SET UP MENU]
- Press button [▲ ▼] to highlight [NAVIGATION]
- Select the highlighted choice by pressing [**ENTER**]
- The GPS will display the [NAV SET UP]
- If the [POSITION FRMT] displays [hddd.ddddd°] then press [**PAGE**] or [**QUIT**] to move back to previous pages
- If [POSITION FRMT] displays some other format then
- Press button [▲ ▼] to highlight [POSITION FRMT]
- Press [**ENTER**] to select
- Press [▲ ▼] to highlight the format hddd.ddddd°
- Press [**Enter**] to select

TURNING THE UNIT OFF

- Press and hold down [⏻]

APPENDIX IV: DATASHEETS FOR 'NON-TRANSECT' SITES TO BE RE-SURVEYED

NON-TRANSECT MONITORING SITE DATA SHEET

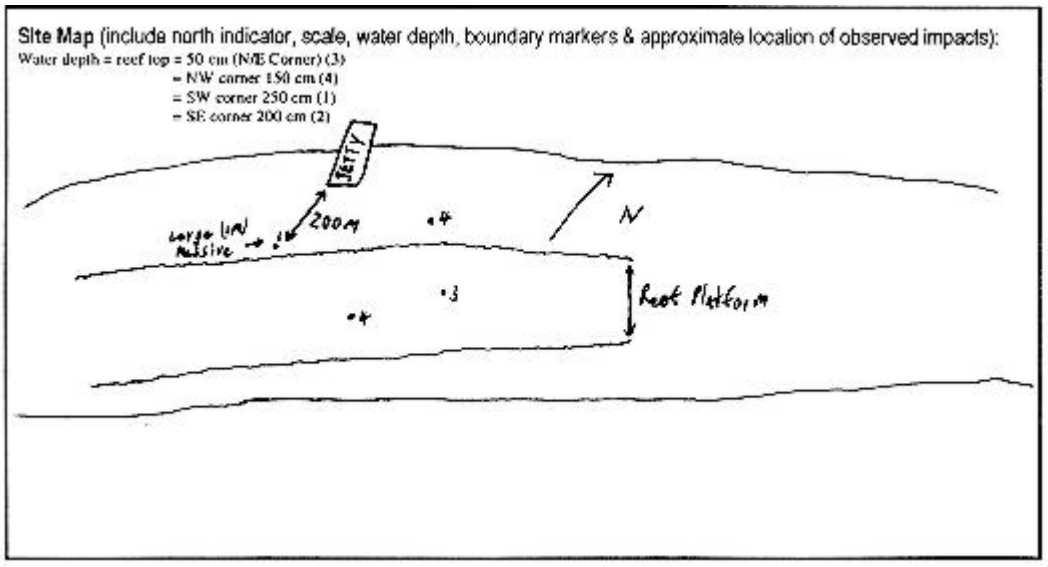
Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	N27	**Site Name**	Bundegi- human usage	**Date**	4-08-99	**Observer**	Cary

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	

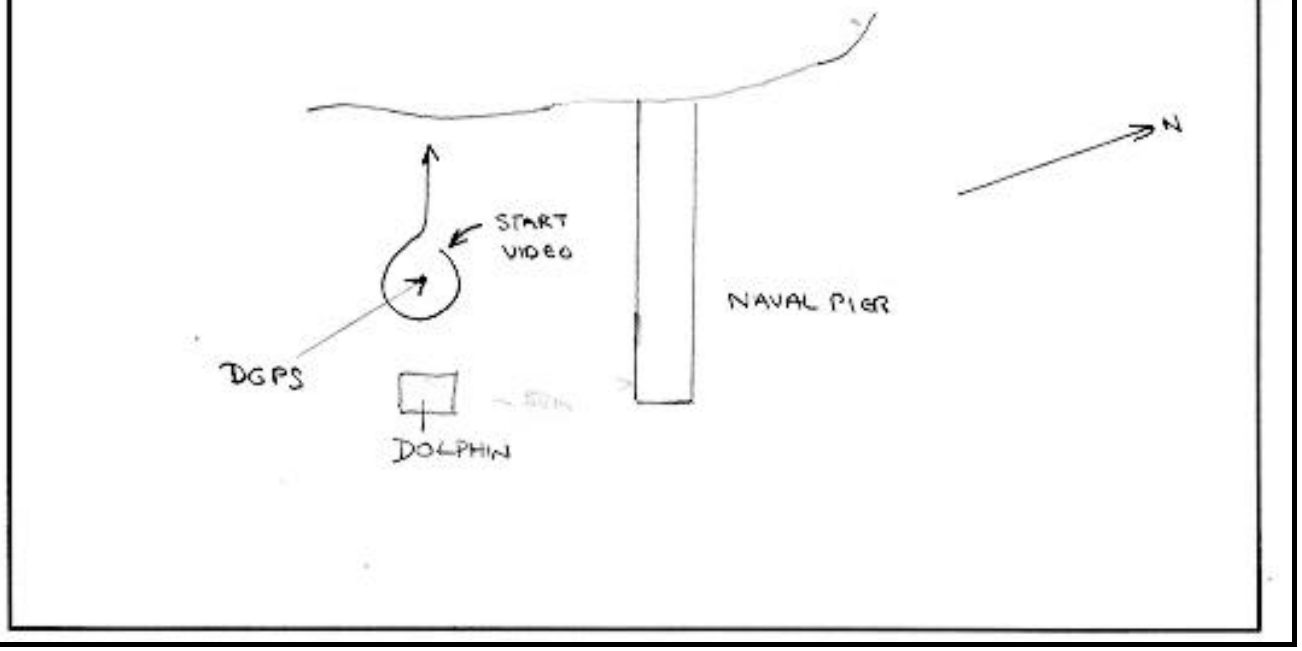
NON-TRANSECT MONITORING SITE DATA SHEET

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**	

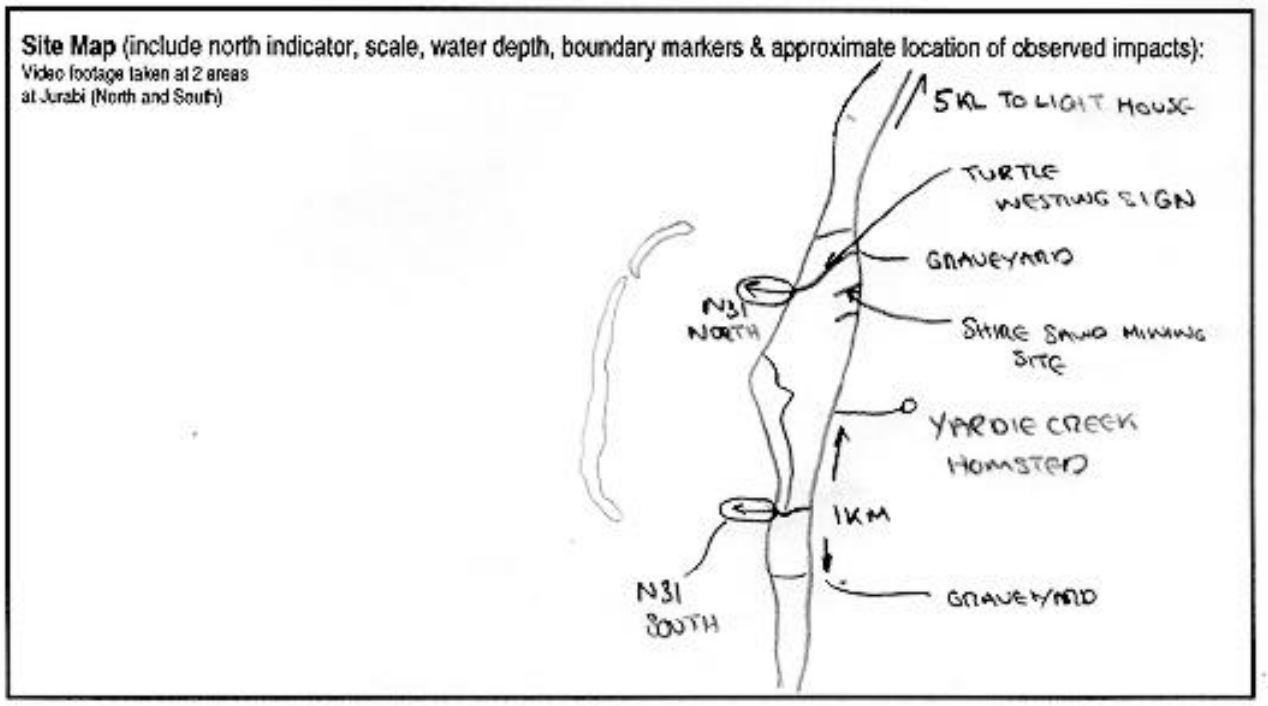
NON-TRANSECT MONITORING SITE DATA SHEET

Project	NINGALOO MARINE PARK MONITORING PROGRAM				**Field Survey**		AUGUST 1999
Site No.	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	

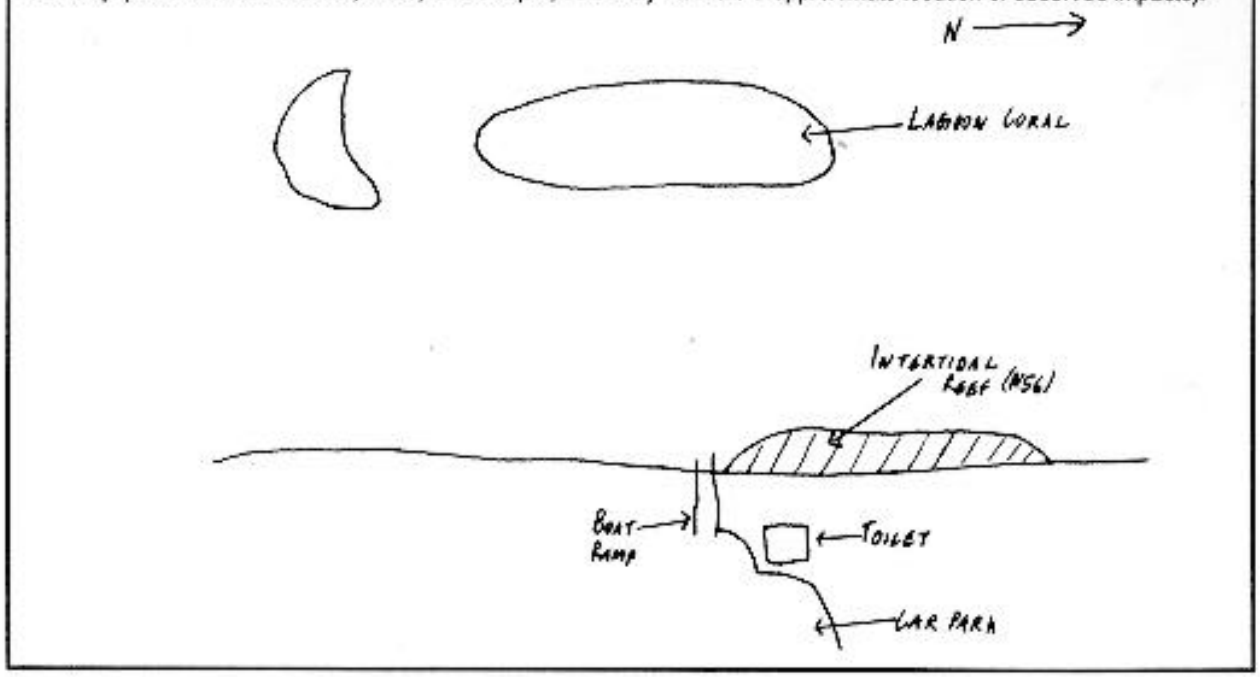
NON-TRANSECT MONITORING SITE DATA SHEET

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 gastropods

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**	

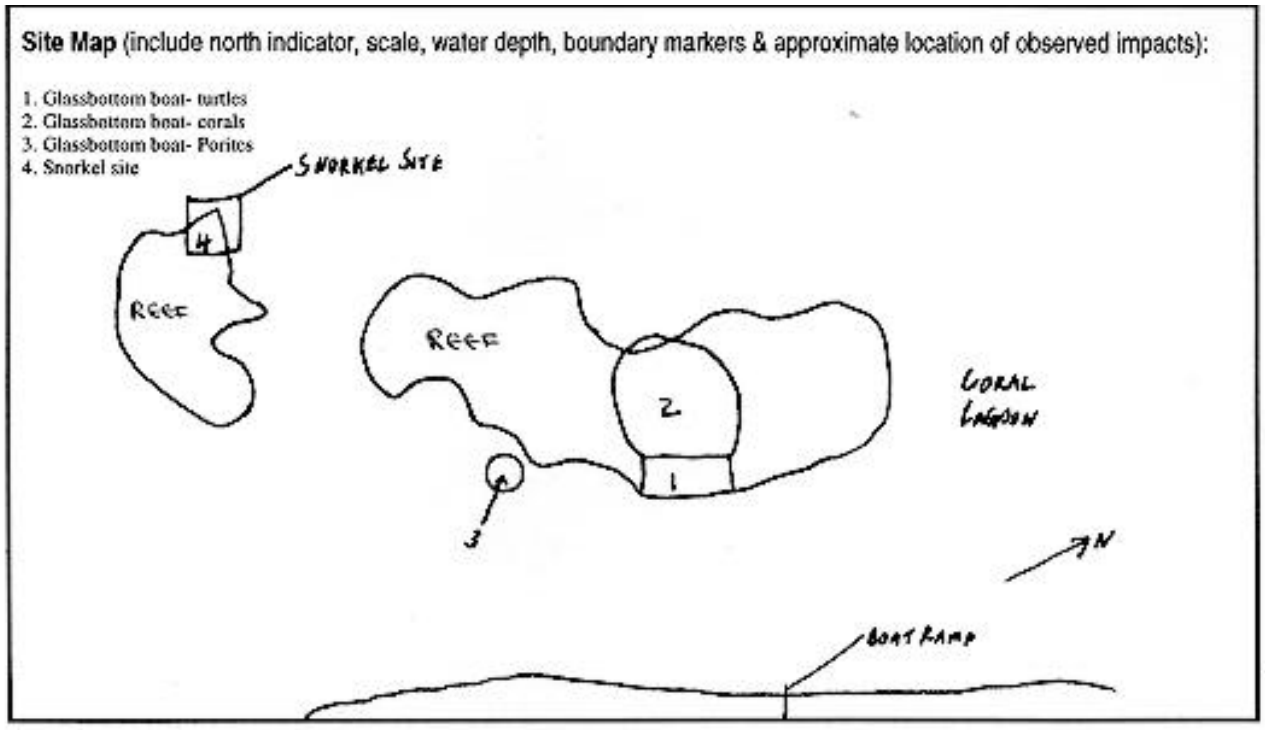
NON-TRANSECT MONITORING SITE DATA SHEET

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

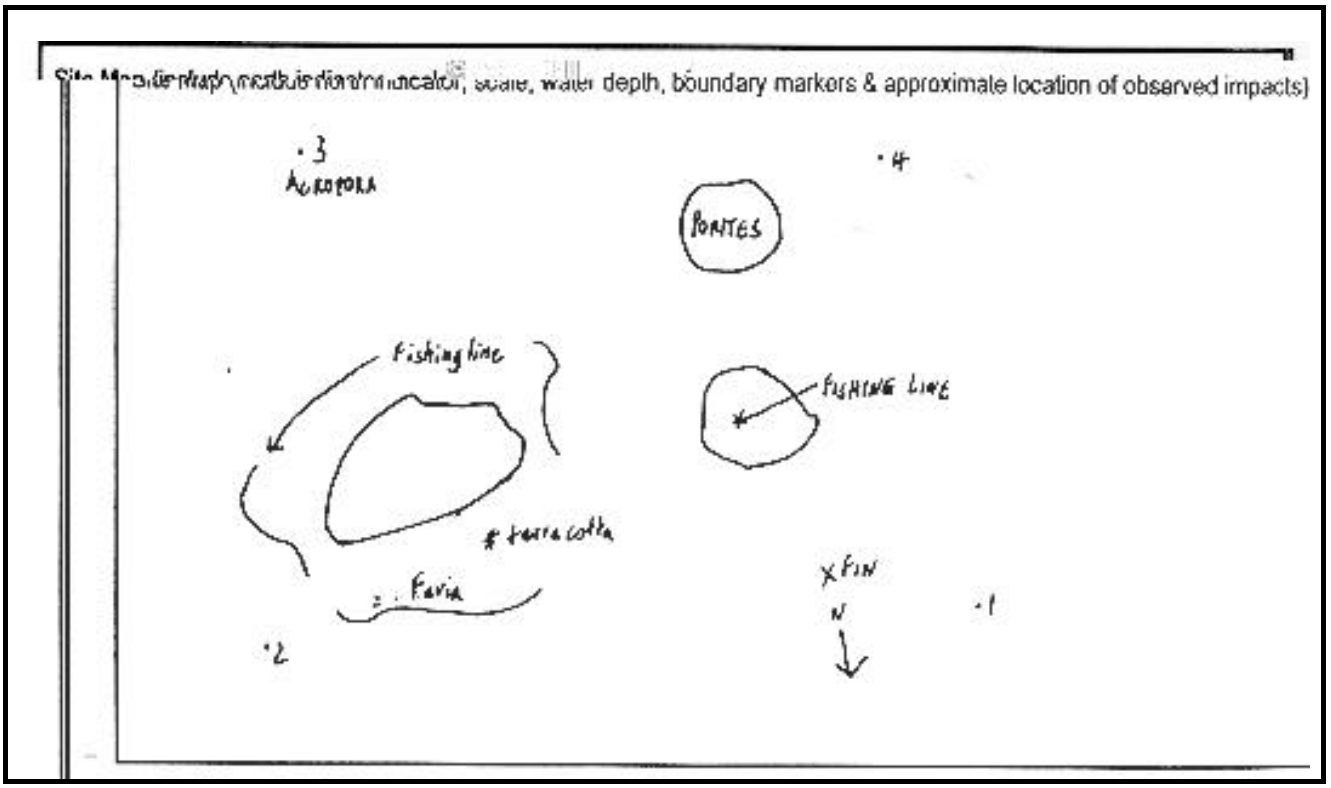
Slide reference		**Print reference**	

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**	

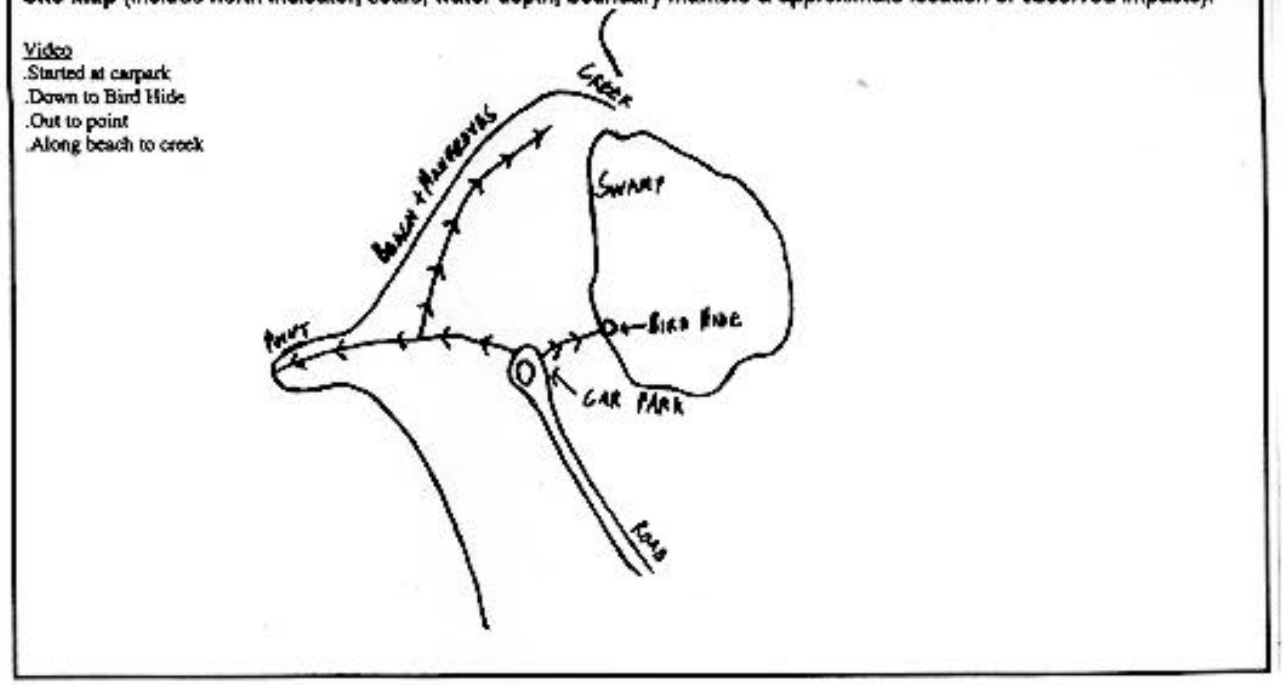
NON-TRANSECT MONITORING SITE DATA SHEET

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 Grey one
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

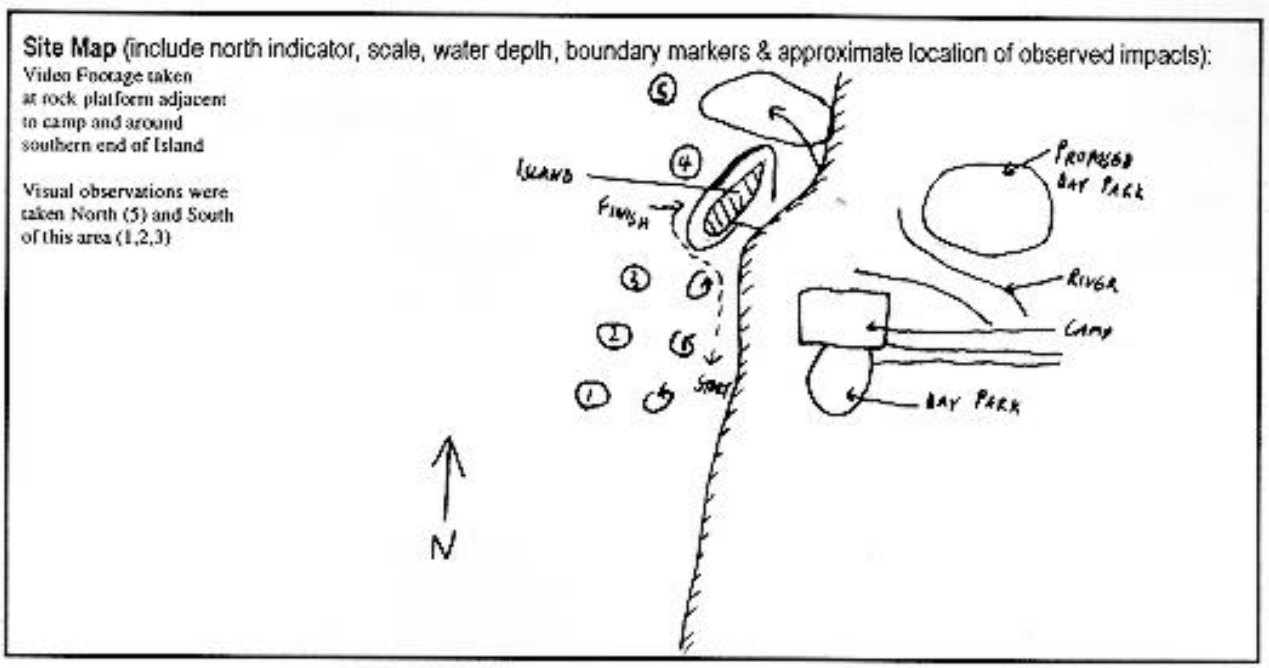
	Co-ordinates of Boundary Markers		Observed Impacts
	DGPS Latitude	DGPS Longitude	
1	22° 00.299' S	113° 55.555' E	4 x Fishing line around island
2	° ' S	° ' E	
3	° ' S	° ' E	
4	° ' S	° ' E	
5	° ' S	° ' E	
6	° ' S	° ' E	

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**	

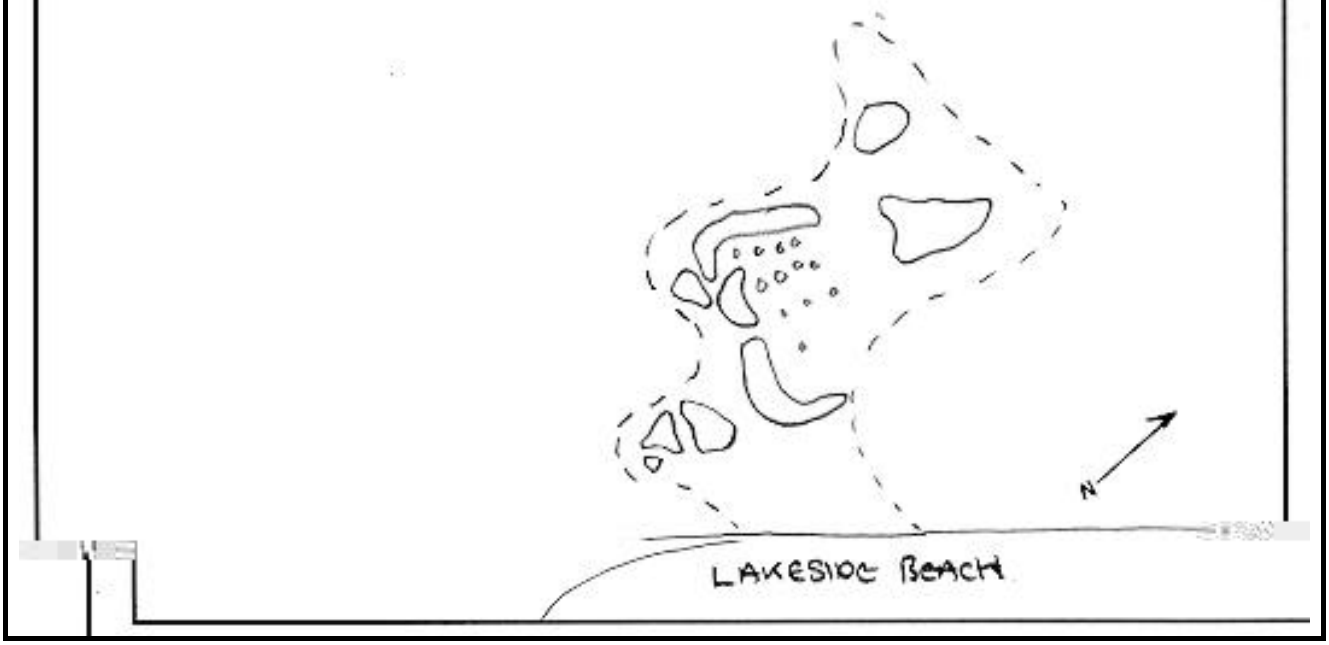
NON-TRANSECT MONITORING SITE DATA SHEET

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**	

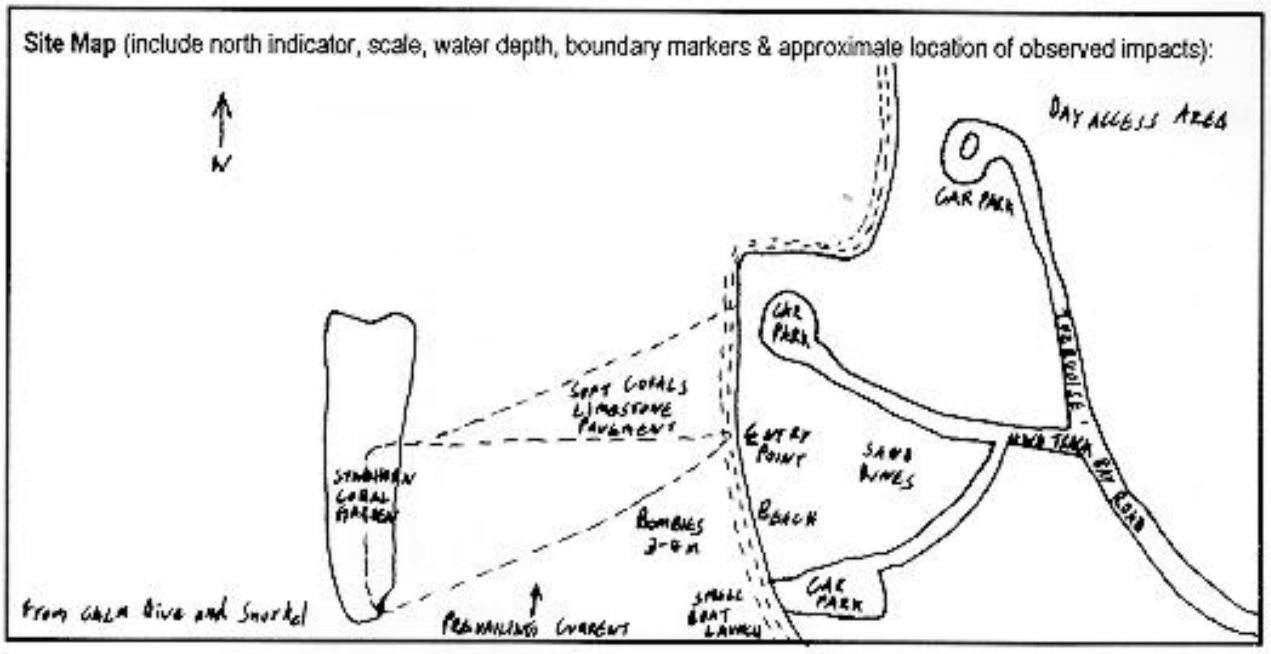
NON-TRANSECT MONITORING SITE DATA SHEET

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**	

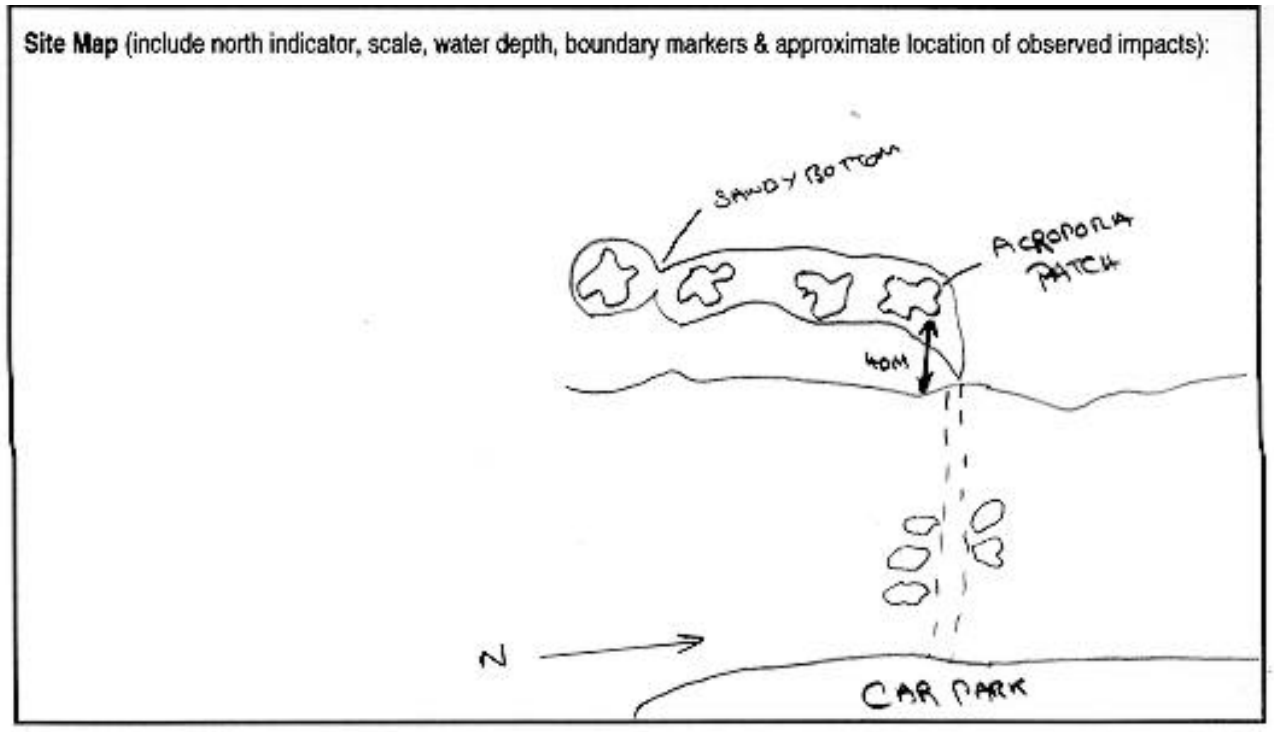
NON-TRANSECT MONITORING SITE DATA SHEET

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

	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 Iymma (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**	

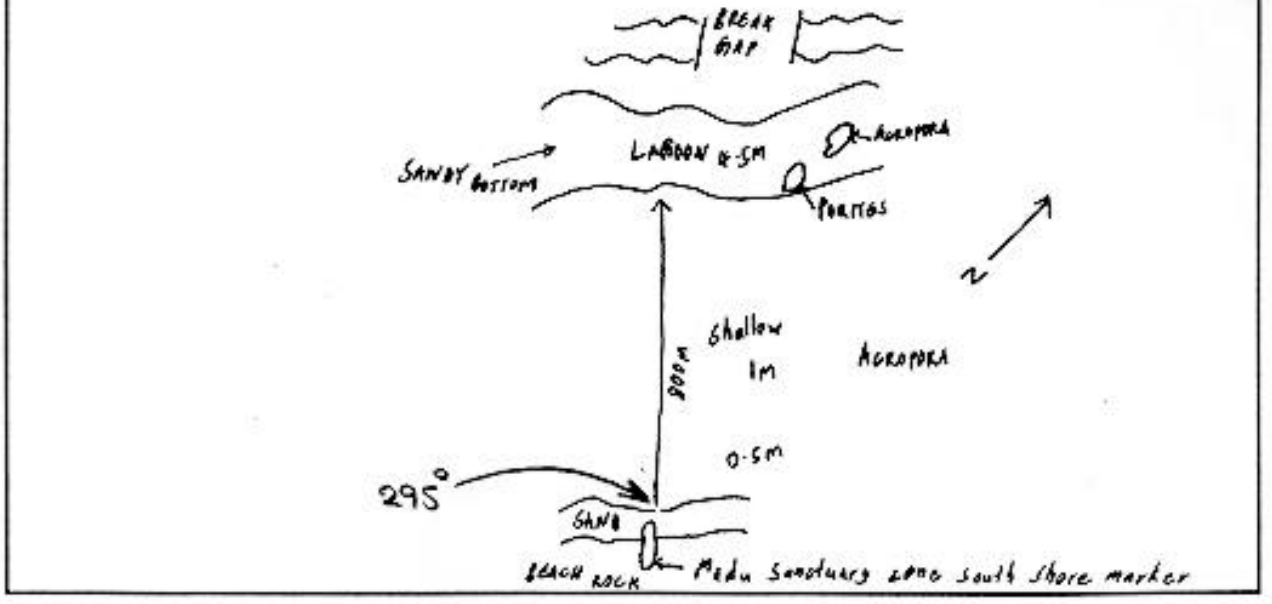
NON-TRANSECT MONITORING SITE DATA SHEET

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**	

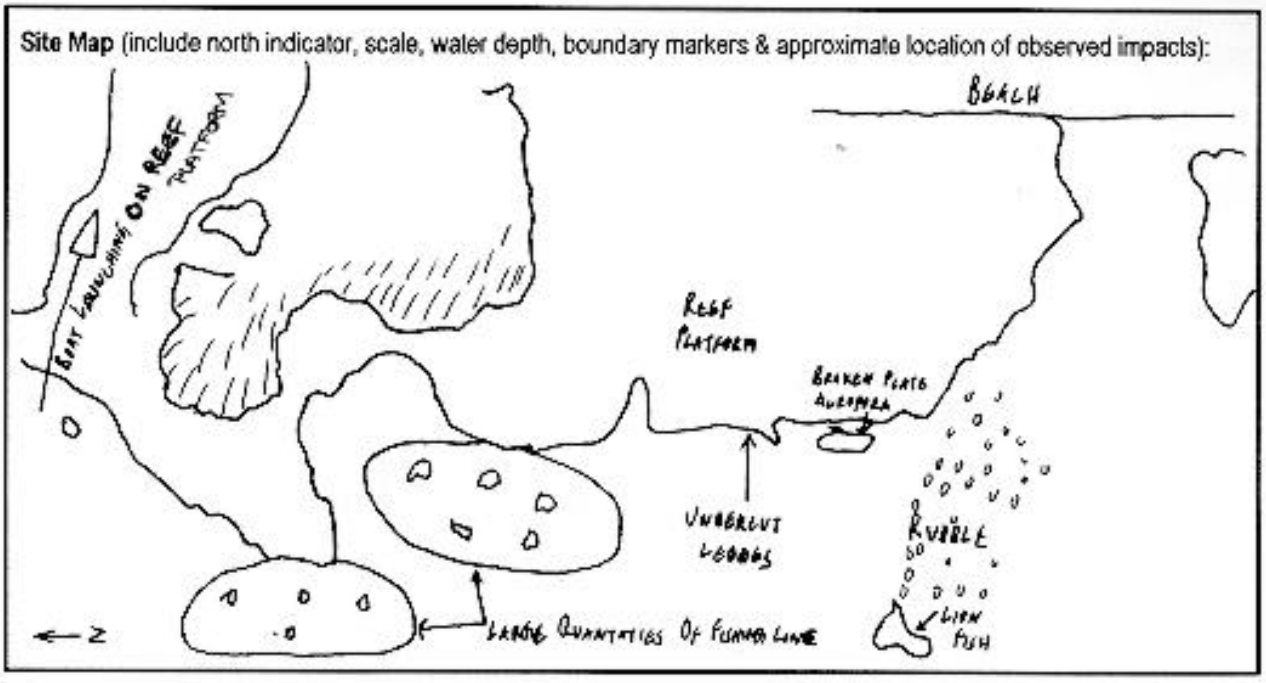
NON-TRANSECT MONITORING SITE DATA SHEET

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**	

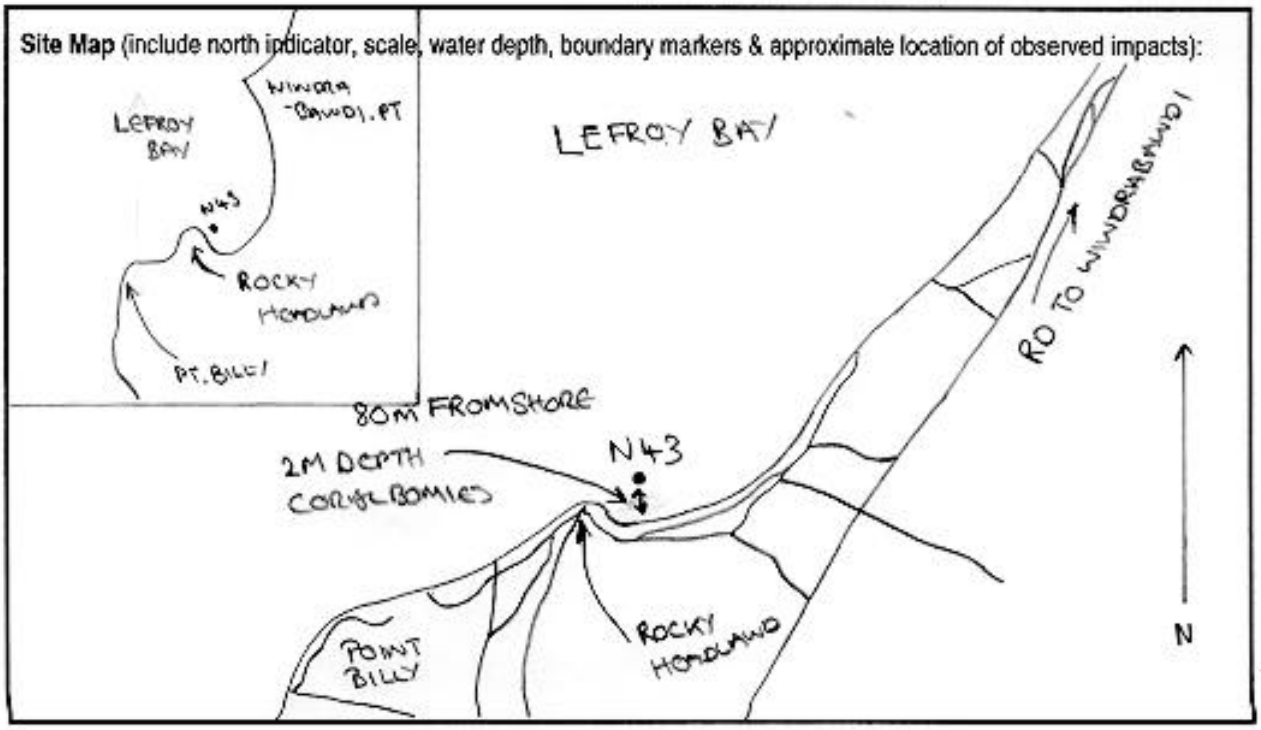
NON-TRANSECT MONITORING SITE DATA SHEET

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**	

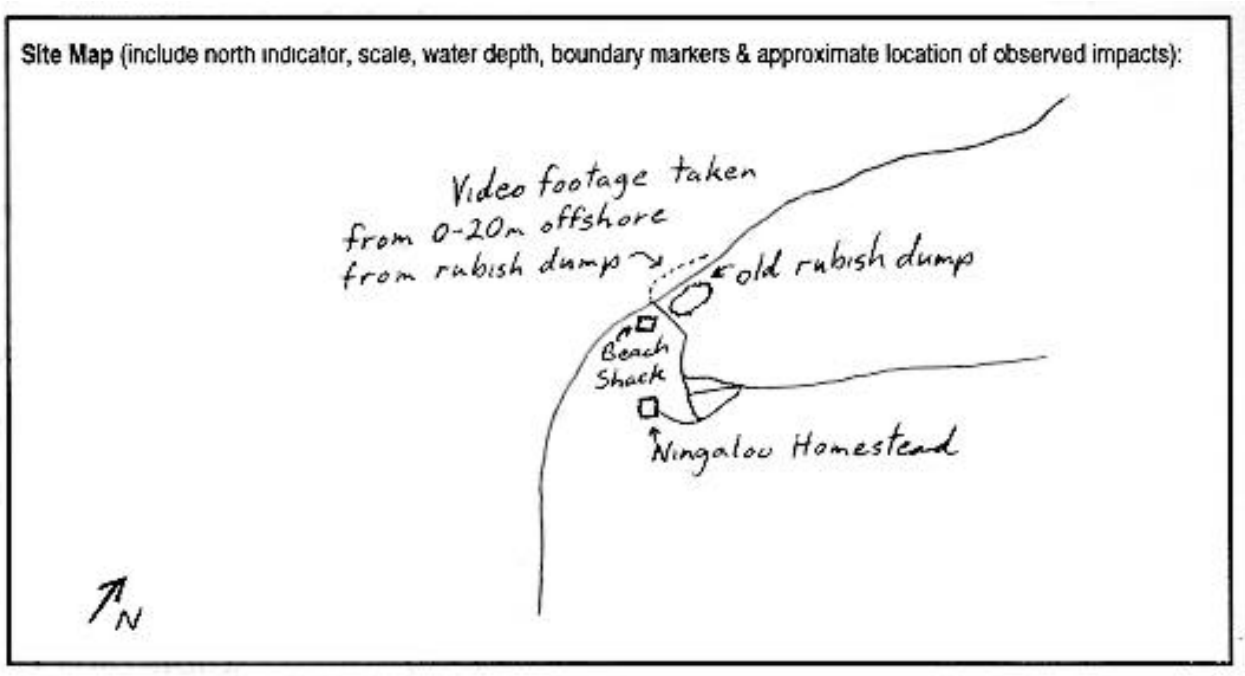
NON-TRANSECT MONITORING SITE DATA SHEET

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**	