MARINE MANAGMENT SUPPORT
NINGALOO

LONG TERM MONITORING SITE LOCATIONS IN NINGALOO MARINE PARK

Data Report: MMS/NIN/NMP-37/2001

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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February 2001

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This report may be cited as:

Grubba T (2001). Long term monitoring site locations in Ningaloo Marine Park. Data Report MMS/NIN/NMP-37/2000. (Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St., Fremantle, Western Australia, 6160). Unpublished report.

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Tim 2 Jennie 6 Ray (3)

Days

Ray

GDA'94

1 — (1) Need to check (confirm) transfer of 1999 sites to AGD'84

5 day — (2) Set up a Arcview Project with upto date zones, images, maps, coastline and monitoring site points

Rect Aerial Photo. DOLA to do.

2 days. — (3) Review sections 5-8 which Tim will write.

2 day. — (4) Conduct trials on site re-location in Freo.

1 day Data Survey

ACKNOWLEDGMENTS

Direction

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Manager, Marine Conservation Branch (MCB), CALM - Dr. Chris Simpson

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Funding / Resources

This project was partially funded by *Coasts and Clean Seas* an initiative of the Natural Heritage Trust. Significant resources including personnel, equipment and logistic support were provided CALM Exmouth district and MCB.

SUMMARY

This report presents a summary of the long term monitoring sites ("transect" and "non-transect") established between 1998 and 1999 as part of the *Ningaloo Marine Park Monitoring Program* (NMPMP). The data report also clarifies standard procedures in recording long term monitoring site positions.

1 INTRODUCTION

1.1 GENERAL

1.2 BACKGROUND

1.3 ISSUES

1.4 AIMS

- To standardise the coordinates of long term monitoring sites established as part of the NMPMP between 1998 and 1999.
- To standardise the site coordinates of long term monitoring sites established in Coral Bay in 1989
- To clarify the procedures used to record long term monitoring site positions.

2 NMPMP LONG TERM MONITORING SITES ESTABLISHED IN MAY 1998

2.1 SITE COORDINATES RECORDED IN 1998

A total of 21 permanent transect sites were established along the back-reef approximately every 15-20 km of coastline. At each site three permanent 50 meter long transects were set in a line, one after another with the transect start and end points separated by a 10 m space. The transects were permanently set up using star pickets (at the start of each transect and at the end of transect three). The position of the start of each transect was recorded using a differential GPS (datum WGS AGD 84) which provides an accuracy of better than three meters.

The 1998 site coordinates were overlaid over a satellite image of Ningaloo using GIS software (ArcView) in order to verify the site coordinates. It was noted that a number of the plotted sites were shifted (xxx meters) from their expected location. This was determined by referring to mud maps that recorded the site positions in relation to distinctive underwater features. The shift suggested that there were possible datum issues involved. The site coordinates were initially recorded using a DGPS using the datum WGS 84. However it was determined that the DGPS must have been set to the datum AGD 84. There were also a number of booking errors. This suggested that their was a possible datum shift. The check their positioning. It was noted that the location of sites was approximately xxx meters away from their expected position using distinctive land

The sites are listed in table xx in chrological order that they were established in order to determine whether there was a pattern of datum changes. For example the DGPS unit may have been switched. It was noted in the post field program report that the batteries on the Scout Master GPS unit may have gone flat and the datum would have reverted back to the default (US datum). However it appears that this problem was corrected before the DGPS was used.

As part of this process the site coordinates were converted to from latitude and longitude (degrees, minutes and seconds to decimal degrees. This conversion was due to the fact that Arcview only accepts decimals degrees.

2.2 FINAL SITE COORDINATES

3 NMPMP LONG TERM MONITORING SITES ESTABLISHED IN AUGUST 1999

3.1 SITE COORDINATES RECORDED IN 1999

3.1.1 "Transect" sites

3.1.2 "Non-transect" sites

3.2 FINAL SITE COORDINATES

3.2.1 "Transect" sites

3.2.2 "Non-transect" sites

4 CORAL BAY LONG TERM MONITORING SITES ESTABLISHED AFTER CORAL MORTALITY FROM A CORAL MASS SPAWNING EVENT IN 1989

4.1 SITE COORDINATES RECORDED IN 1989

4.2 SITE COORDINATES RECORDED IN 1994

4.3 SITE COORDINATES RECORDED IN 2000

4.4 FINAL SITE COORDINATES

5 RECORDING LONG TERM MONITORING SITE COORDINATES

5.1 GLOBAL POSTIONING SYSTEMS (GPS)

5.1.1 GPS or DGPS

It is essential that when site coordinates are recorded that are done so to. In the past this level of accuracy has been achieved using a Differential Global Positioning system. The disadvantages of using the Differential demodulator is it's bulk and the cost (~$20/hour). The current status (as of 09/03/01) of the DGPS unit is that it is in-operatable due to a malfunction with the unit's power system. The unit would need to be fixed and possibly replaced.

In XXXX the US Government switched off its scrambling of GPS systems which thus means that the standard GPS unit has an accuracy of xxx meters but is more typically xxx meters. This increase in accurracy is good, but a full assessment of the level of accurracy required to re-locate a star picket needs to be addressed. It is proposed that a field trial of the protocols detailed in this report are conducted in Perth prior to any field work.

5.1.2 Datum

The Australia government have adopted a new standardised datum known as xxxxx. All departments are now required to transfer all existing data to this datum and all new data is to be collected using this datum. As of 09/03/01 the Marine Conservation Branch has not moved over to the new datum. Therefore it was proposed that. It is important to note that the current GPS units (Garmin 12) do not have the capability to operate using datum xxxxxx. However the datum WGS 84 can be substituted for the datum xxxx. The error between these two datum is xxxxx. MCB will need to purchase two new GPS units and this should have the capabilities to operate in the datum xxxx.

5.1.3 Position format

Typically MCB has recorded site coordinates in the field using the format degrees, minutes and seconds. This is a standard format as marine charts use the same format. However GIS software require site coordinates to be in the format decimal degrees. Therefore all site coordinates needed to be transferred to decimal degrees. This calculation can be carried out easily in Excel spread sheet but can be a possible source error (calculation). It is essential that when recording coordinates in decimal degrees to record the reading to five decimal places. The following table provides an estimate of the distance for each decimal places

23.12345

xxx meters

One decimal place	
Second decimal place	
Third decimal place	
Fourth decimal place	
Fith	

It is extremely useful to become familiar with this distances when re-locating a specific site. This will also facilitate linking the GPS to a PC laptop running GIS software in real time.

5.2 OTHER DESCRIPTIONS

5.2.1 "Mud maps"

5.2.2 Aerial photographs

5.3 PLOTTING LONG TERM MONITORING COORDINATES IN GIS SOFTWARE (ARCVIEW)

6 RE-LOCATING LONG TERM MONITORING SITES

6.1 GLOBAL POSITIONING SYSTEMS (GPS)

7 FUTURE DEVELOPMENTS

7.1 DATUM CHANGE

8 REFERENCES

APPENDIX 1: ORIGINAL COORDINATES OF 'TRANSECT' LONG-TERM MONITORING SITES ESTABLISHED IN 1998

The following site coordinates were originally recorded as being in datum WGS 84.

Site No.	Site name	Transect	Latitude	Longitude
N5	Tantabiddi	1	21° 53.646	113° 57.146
		2	21° 53.671	113° 57.121
		3	21° 53.691	113° 57.100
		3 end	21° 53.710	113° 57.079
N19	Bundegi Sanctuary	1	21° 51.409	114° 09.982
		2	21° 51.429	114° 09.959
		3	21° 51.453	114° 09.942
		3 end	21° 51.472	114° 09.923
N1	Bundegi	1	21° 49.699	114° 10.718
		2	21° 49.725	114° 10.698
		3	21° 49.75	114° 10.682
		4	21° 49.776	114° 10.678
N2	Mildura Wreck	1	21° 47.098	114° 10.011
		2	21° 47.089	114° 09.984
		3	21° 47.063	114° 09.960
		3 end	21° 47.045	114° 09.936
N3	Vlamingh Head	1	21° 48.279	114° 06.763
		2	21° 48.251	114° 06.738
		3	21° 48.234	114° 06.715
		3 end	21° 48.218	114° 06.695
N6	Ned's Camp	1	21° 58.466	113° 55.291
		2	21° 58.494	113° 55.281
		3	21° 58.527	113° 55.273
		3 end	21° 58.553	113° 55.265
N7	Turquoise Bay	1	22° 06.570	113° 52.655
		2	22° 06.602	113° 52.650
		3	22° 06.633	113° 52.638
		3 end	22° 06.657	113° 52.631
N8	Osprey Bay	1	22° 14.708	113° 49.744
		2	22° 14.735	113° 49.729
		3	22° 14.764	113° 49.711
		3 end	22° 14.786	113° 49.701
N21	Yardie Creek	1	22° 18.909	113° 47.783
		2	22° 18.929	113° 47.779
		3	22° 18.961	113° 47.770
		3 end	22° 18.987	113° 47.761
N20	Jurabi Point	1	21° 51.412	113° 59.951
		2	21° 51.383	113° 59.944
		3	21° 51.356	113° 59.933
		3 end	21° 51.334	113° 59.916
N9	Bunderra	1	22° 23.491	113° 44.804
		2	22° 23.521	113° 44.801
		3	22° 23.550	113° 44.800
		3 end	22° 23.576	113° 44.797
N10	Lefroy Bay	1	22° 30.29	113° 41.913
		2	22° 30.322	113° 41.909
		3	22° 30.346	113° 41.894
		3 end	22° 30.377	113° 41.899
N25	Point Billy	1	22° 33.106	113° 39.407
		2	22° 33.138	113° 39.412

		3	22° 33.160	113° 39.416
		3 end	22° 33.192	113° 39.388
N11	Point Cloates	1	22° 41.358	113° 38.634
		2	22° 41.389	113° 38.632
		3	22° 41.418	113° 38.629
		3 end	22° 41.448	113° 38.629
N12	Dugong Sanctuary	1	22° 51.839	113° 45.521
		2	22° 51.870	113° 45.518
		3	22° 51.901	113° 45.515
		3 end	22° 51.924	113° 45.511
N14	Coral Bay	1	23° 08.881	113° 44.965
		2	23° 08.911	113° 44.971
		3	23° 08.945	113° 44.982
		3 end	23° 08.960	113° 44.980
N13	Bruboodijoo Pt.	1	22° 56.728	113° 46.645
		2	22° 56.763	113° 46.645
		3	22° 56.796	113° 46.643
		3 end	22° 56.821	113° 46.640
N22	North Coral Bay	1	23° 05.942	113° 44.397
		2	23° 05.978	113° 44.390
		3	23° 05.990	113° 44.394
		3 end	23° 06.034	113° 44.390
N24	Pelican Point	1	23° 20.023	113° 46.671
		2	23° 20.055	113° 46.668
		3	23° 20.085	113° 46.670
		3 end	23° 20.109	113° 46.672
N17	Cape Farquhar	1	23° 37.410	113° 36.887
		2	23° 37.434	113° 36.867
		3	23° 37.458	113° 36.859
		3 end	23° 37.481	113° 36.830
N18	Gnaraloo	1	23° 45.750	113° 32.500
		2	23° 45.776	113° 32.484
		3	23° 45.806	113° 32.471
		3 end	23° 45.831	113° 32.462

APPENDIX 2: FINAL COORDINATES OF 'TRANSECT' LONG-TERM MONITORING SITES ESTABLISHED IN 1998

The site coordinates converted to the datum AGD 84 in the format decimal degrees.

Site No.	Site name	Transect	Latitude	Longitude
N5	Tantabiddi	1	-21.894100	113.952433
		2	-21.894517	113.952017
		3	-21.894850	113.951667
		3 end	-21.895167	113.951317
N19	Bundegi Sanctuary	1	-21.856817	114.166367
		2	-21.857150	114.165983
		3	-21.857550	114.165700
		3 end	-21.857867	114.165383
N1	Bundegi	1	-21.828317	114.178633
		2	-21.828750	114.178300
		3	-21.829167	114.178033
		4	-21.829600	114.177967
N2	Mildura Wreck	1	-21.784967	114.166850
		2	-21.784817	114.166400
		3	-21.784383	114.166000
		3 end	-21.784083	114.165600
N3	Vlamingh Head	1	-21.804650	114.112717
		2	-21.804183	114.112300
		3	-21.803900	114.111917
		3 end	-21.803633	114.111583
N6	Ned's Camp	1	-21.974433	113.921517
		2	-21.974900	113.921350
		3	-21.975450	113.921217
		3 end	-21.975883	113.921083
N7	Turquoise Bay	1	-22.109500	113.877583
		2	-22.110033	113.877500
		3	-22.110550	113.877300
		3 end	-22.110950	113.877183
N8	Osprey Bay	1	-22.245133	113.829067
		2	-22.245583	113.828817
		3	-22.246067	113.828517
		3 end	-22.246433	113.828350
N21	Yardie Creek	1	-22.315150	113.796383
		2	-22.315483	113.796317
		3	-22.316017	113.796167
		3 end	-22.316450	113.796017
N20	Jurabi Point	1	-21.856867	113.999183
		2	-21.856383	113.999067
		3	-21.855933	113.998883
		3 end	-21.855567	113.998600
N9	Bunderra	1	-22.391517	113.746733
		2	-22.392017	113.746683
		3	-22.392500	113.746667
		3 end	-22.392933	113.746617
N10	Lefroy Bay	1	-22.504833	113.698550
		2	-22.505367	113.698483
		3	-22.505767	113.698233
		3 end	-22.506283	113.698317
N25	Point Billy	1	-22.551767	113.656783
		2	-22.552300	113.656867

		3	-22.552667	113.656933
		3 end	-22.553200	113.656467
N11	Point Cloates	1	-22.689300	113.643900
		2	-22.689817	113.643867
		3	-22.690300	113.643817
		3 end	-22.690800	113.643817
N12	Dugong Sanctuary	1	-22.863983	113.758683
		2	-22.864500	113.758633
		3	-22.865017	113.758583
		3 end	-22.865400	113.758517
N14	Coral Bay	1	-23.148017	113.749417
		2	-23.148517	113.749517
		3	-23.149083	113.749700
		3 end	-23.149333	113.749667
N13	Bruboodijoo Pt.	1	-22.945467	113.777417
		2	-22.946050	113.777417
		3	-22.946600	113.777383
		3 end	-22.947017	113.777333
N22	North Coral Bay	1	-23.099033	113.739950
		2	-23.099633	113.739833
		3	-23.099833	113.739900
		3 end	-23.100567	113.739833
N24	Pelican Point	1	-23.333717	113.777850
		2	-23.334250	113.777800
		3	-23.334750	113.777833
		3 end	-23.335150	113.777867
N17	Cape Farquhar	1	-23.623500	113.614783
		2	-23.623900	113.614450
		3	-23.624300	113.614317
		3 end	-23.624683	113.613833
N18	Gnaraloo	1	-23.762500	113.541667
		2	-23.762933	113.541400
		3	-23.763433	113.541183
		3 end	-23.763850	113.541033

APPENDIX 3: ORIGINAL COORDINATES OF 'TRANSECT' LONG-TERM MONITORING SITES ESTABLISHED IN 1999

APPENDIX 4: ORIGINAL COORDINATES OF 'NON-TRANSECT' LONG-TERM MONITORING SITES ESTABLISHED IN 1999

APPENDIX 5: FINAL COORDINATES OF 'TRANSECT' LONG-TERM MONITORING SITES ESTABLISHED IN 1999

APPENDIX 6: FINAL COORDINATES OF 'NON-TRANSECT' LONG-TERM MONITORING SITES ESTABLISHED IN 1999

APPENDIX 7: ORIGINAL COORDINATES OF LONG-TERM MONITORING SITES ESTABLISHED IN 1988

APPENDIX 8: RE-DETERMINED (1994) COORDINATES OF LONG-TERM MONITORING SITES ESTABLISHED IN 1988

APPENDIX 9: RE-DETERMINED (2000) COORDINATES OF LONG-TERM MONITORING SITES ESTABLISHED IN 1988

APPENDIX 10: FINAL COORDINATES OF LONG-TERM MONITORING SITES ESTABLISHED IN 1988