Management and Research Issues at Ashmore Reef National Nature Reserve

Field Trip to Ashmore Reef 23 May to 15 June 2000

Final Report to Environment Australia

By

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BIOMARINE  INTERNATIONAL

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Scott Whiting, Biomarine International, June 2000

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Cover Photo: The ACV Wauri at the anchorage at Ashmore Reef

Preface

The purpose of this consultancy was to provide advice to Environment Australia on management and scientific research issues at Ashmore Reef National Nature Reserve, eastern Indian Ocean.

Major tasks involved :

- Providing familiarity training to Customs Officers
- Developing a framework for environmental monitoring
- Developing management procedures for Customs Officers
- Assisting with compliance and enforcement measures in the Reserve
- Undertaking management and research tasks
- Developing management and research protocols to be applied to Ashmore Reef
- Setting up data sheets for use by Customs staff to record observations while at Ashmore Reef
- Setting a database for use by Customs staff to record observations while at Ashmore Reef

To meet this end, this report and been divided into two sections: 1) Management Issues including those that need to be addressed by EA and also those activities that need to be performed by Customs staff at Ashmore Reef and 2) Research Issues including a report on the suitability of the *ACV Wauri* to facilitate scientific personnel.

A summary of the daily activities during the field period is presented in a diary format in Appendix 1.

Important to the Reader

The following symbols have been used to indicate an important point for consideration by the respective agencies:

Australian Customs Service - Customs Officers stationed at Ashmore Reef **(ACS ☛)**

Environment Australia - Marine Protected Areas Section **(EA ☛)**

Further information regarding any aspect of this report can be obtained from Scott Whiting at the above address.

Glossary of Acronyms

ACS	Australian Customs Service
ACS (NMU)	Australian Customs Service (National Marine Unit)
ACV	Australian Customs Vessel
AFMA	Australian Fisheries Management Authority
CSIRO	
EA	Environment Australia
EEZ	Exclusive Economic Zone
DIMA	Department of Immigration and Multicultural Affairs
Fisheries WA	Fisheries Western Australia
GIS	Geographic Information System
MOU	The Memorandum of Understanding between the governments of Australia and Indonesia, relating to traditional fishing inside the Australian EEZ
MPA	Marine Protected Area
NRSMPA	National Representative System of Marine Protected Areas
NT Fisheries	Northern Territory Fisheries
NTU	Northern Territory University
RAN	Royal Australian Navy
SIEV	Suspected Illegal Entry Vessel
SUNC	Suspected Unlawful Non-Citizen

Contents

Summary

Resources Produced During this Consultancy

1) Final Report - Distributed to EA (paper copies and one electronic) and "*ACV Wauri*" (paper copy).

2) Display Book of Coloured Brochures on the Marine Environment (left on-board "The *ACV Wauri*") (Plate 1.1).

3) Display Book of data sheets to be used by Customs at Ashmore Reef (left on-board the "The *ACV Wauri*") (Plate 1.1). This included the following data sheets:

- General Observations
- Sea Turtle Track Counts
- Sea Turtle Nesting for Individuals
- Dugong Sightings
- Animal Mortality
- Whale and Dolphin (EA)

4) Three Databases, including:

- General Observations
- Sea Turtle Track Counts
- Dugong Sightings

5) Bound book of photocopied journal articles relevant to Ashmore Reef (paper copy to EA and to the "*ACV Wauri*").

6) Copies of photographs sent to EA, Canberra

A Summary EA Activities to be Performed by Customs Officer at Ashmore Reef

The following is a brief description of activities to be performed at Ashmore Reef by Customs Officers on behalf of Environment Australia. Detailed information and methodology is provided in the following document.

Boarding Vessels - Board all traditional fishing vessels that enter Ashmore Reef.
Yachts and recreational vessels - Send a copy of Customs boarding report to or a summary to EA
SIEV's - Unattended SIEV's must be kept afloat and anchored until disposal. No boat should reach the shore of the islands.
Anchoring - All small vessels should be encouraged to anchor on the moorings
Moorings - regularly check that the floats are still present on the moorings.
Channel Markers - Once per week check that the Channel markers are in position. Servicing of these markers using snorkel may be required.
Islands - Officers should patrol the beaches of each island once per fortnight.
West Island - West Island should be visited every few days especially when numerous boats are anchored in the lagoon..

Observations and Data Collection -all observations should be recorded on the appropriate data sheets provided.

General Wildlife and Management Issues - record interesting observations on wildlife of other management problems. (eg pollution, coral bleaching, illegal activity)

Turtle Nesting - Tracks should be counted and recorded for each island every fortnight.

Dugongs - all dugongs sightings should be recorded on the data sheet provided.

Marine Debris including Fishing Debris - record the location and extent of marine debris on the general observation data sheet.

Animal Mortality - All beach washed animals should be recorded on the mortality data sheet provided.

Whales and Dolphins - sightings should be recorded on the data sheet provided.

Important - recording data

1) Write detailed notes about observations.
2) Photograph everything to support your observations. Make the photos to the notes.
3) Databases need to be updated regularly from the data sheets.

Disposal of Rubbish from the *ACV Wauri* - All rubbish except food scapes should be returned to the mainland with the change over vessel.

Minimise Environmental Impacts of *ACV Wauri* - All activities should have a minimal impact on the wildlife and marine environment. This includes reducing light, noise and chemical pollution from the *ACV Wauri*.

Marine Debris on islands - should be removed and carried to the mainland.

Tenders - Should be driven at conservative speeds to avoid collisions with wildlife.

Assist With Ongoing Research and Management Activities as Required - Customs Officers may be required to perform research and management tasks as required by EA. (eg. Collecting specimens, repairing of water pump, covering the well etc.)

End of Trip Report to EA - An end of trip report must be completed by the crew and sent to EA. This can include a summary sheet and details of specific issues.

Provide support for visiting scientists - Customs will be required to provide accommodation and provide meals and research space for visiting scientists several times per year. This may require assisting with their research program such as driving boats and helping on deck. ‘

Scientists will require:

- use of tender vessels (dinghy to be driven by scientists)
- tenders that facilitate SCUBA diving
- deck space for equipment
- help with research activities
- space and power to run a compressor
- space to store flammable formalin/preserving alcohol
- use of phones and fax

Special arrangements may need to be made for scientists that have special requirements.

Chapter 1.

Introduction

Ashmore Reef is a shelf-edge reef located 800 km west of Darwin, 600 km north of Broome and 140 km south of Roti Island, Indonesia. The maximum dimensions of the reef are 30 km in length and 15 km in width. Three islands, West, Middle and East, are aligned lengthways along the reef.

Ashmore Reef is a biologically and ecologically diverse marine system. It supports many species of corals and reef fish some of which are endemic to the region. It is considered the most diverse region for sea snakes in the world, with over 13 species associated with the reef. It supports large productive seagrass pastures which feed high densities of endangered green sea turtles and a small population of dugongs. The endangered loggerhead and hawksbill turtles are also found on the reef. Over 90 species of birds have been recorded on the reef and islands, over half of which are found on international agreements. These islands form the largest breeding sites in the region for numerous species of sea birds. Reviews of this information can be found in the Cartier Island Marine Park Proposal (Environment Australia 2000).

The history of Ashmore Reef is complex. Europeans discovered the reef in 1811 and since then it has had various forms of human visitation including mining, research and management. Indonesian visitation extends back centuries and in the past century has been linked to over harvest of the marine resources of the reef. In 1974, through a Memorandum of Understanding (MOU) between the Australian and Indonesian Governments, the traditional Indonesian fishing practices were recognised. This MOU defined access and fishing restrictions of the MOU including Ashmore Reef. In June of this year, Cartier Island, 60km south-east of Ashmore Reef, was declared a marine reserve and therefore will have fishing and collecting restrictions. Controlling this illegal activity forms the largest part of management activities at Ashmore Reef.

As the management agency for Ashmore reef, Environment Australia has obligations to protect and conserve the habitat, ecosystems, fauna and flora and natural values of the Marine Reserve under many national and international laws, legislation, agreements and conventions (see Environment Australia 2000). In the past, Environment Australia has contracted a private vessel and crew to manage the natural resources of the reef. In April 2000, Australian Customs took over the role of carrying out the duties of Environment Australia at Ashmore Reef.

This report is based on defining management and research issues for Ashmore Reef with emphasis the role of the Australian Customs Service performing EA duties at Ashmore Reef.

Chapter 2

Management Issues

The following section deals with some of the management issues at Ashmore Reef. The activities described below are suggestions to be incorporated into the "MOU between the Australian Customs Service (ACS) and Environment Australia (EA) for the Ashmore Reef National Nature Reserve.

2.1 Traditional and Illegal Fishing and Collecting

The main management issue for EA at Ashmore Reef is the enforcement of a no-take fishing and collecting zone inside the 50m depth contour.

2.1.1 Period of Service for Enforcement Vessel at Ashmore Reef

Background - Prior to 2000, EA contracted a private vessel and crew to be stationed at Ashmore Reef to conduct EA activities and to deter illegal fishing. The contracted term was approximately 9 to 10 months each year between April and December. This period of service was established to avoid cyclones between December and January and to reduce the cost of keeping a vessel at Ashmore Reef for twelve months of the year. During the contract period, the duties of the crew included boarding and monitoring traditional fishing boats. However, when the contract vessel returned to Darwin for several months each year, Coastwatch, AFMA representatives and the Royal Australian Navy frequently observed illegal activity within the nature reserve. This included: 1) illegal fishing and collecting, resulting in the removal of resident fish, trepang and trochus resources, 2) the harvesting of the *Argusia* bushes on West Island 3) harvest of adult sea turtles 4) harvest of bird eggs and 5) fires places on the island. Other disruptive activity included damage to the water pump and well.

(EA/ACS ☛) Suggested Solution - The presence of an enforcement vessel is the major deterrent to illegal fishing and collecting. An ACV must be stationed at Ashmore Reef for 365 days per year to effectively control illegal fishing and collecting. An absence of the Customs vessel for several weeks could result in the depletion of the natural resources of the reef through illegal harvest.

The annual servicing of the *ACV Wauri* will mean that a "bay class" ACV may need to replace the *ACV Wauri* at Ashmore Reef during this period. The ACV's currently operate in this region during the cyclone season so this should not be a restriction.

2.1.2 Boarding of Fishing Vessels

Datasheets

Background - In the past, the Warden at Ashmore Reef used a standard boarding from Environment Australia when boarding a vessel at Ashmore Reef. When AFMA representatives boarded vessels at Ashmore Reef they used their own forms which they also

used for boarding's throughout the MOU. At this stage, it appears that AFMA representatives will be stationed continuously on the Customs Vessel the *ACV Wauri* at Ashmore Reef.

Problem - EA and AFMA two different forms when boarding vessels at Ashmore Reef. The AFMA data sheets are entered onto two different databases depending on whether they are sent to Darwin or Broome at the end of a patrol. Although all data collected by the AFMA representatives is sent to AFMA, there is no single data base for these boarding's. Boarding personnel can come from any of 6 agencies (EA, AFMA, Fisheries WA, NT Fisheries, RAN and ASC). A standard datasheet and database is essential for a holistic approach to the management of the natural resources. The similarity of the EA and AFMA datasheets are shown in Appendix 2.

(EA ☛) Activity - *Short term changes* - EA should negotiate with AFMA for permission to use the AFMA boarding datasheet and database. This means that all agencies will record uniform data when at Ashmore Reef. Additional questions required by EA could be added to the data sheet if necessary.

This has the following advantages for EA in the short-term.

1) EA and AFMA boarding forms are similar and therefore will suit the requirements of EA at Ashmore Reef.

2) when AFMA representatives are stationed at Ashmore Reef they will not have to fill in two different forms, but simply make a photocopy. This reduces the chances of the EA form not being completed by another agency.

Requirements for this proposal to be successful include:

1) Negotiations need to occur between EA and AFMA representatives

2) all boarding sheets related to the Ashmore Reef area are photocopied and sent to the Marine Protected Area Section of EA in Canberra when the Fisheries Officer returns to port.

3) All agencies can gain access the data.

(EA ☛) *Long term changes* - All agencies need to work together to produce an efficient data recording, storage and retrieval system. All boarding data should be appended to the master database that is held by one agencies and copies then sent back to the participating agencies.

The new database should be developed is such a way that facilities the needs of all agencies. At Ashmore Reef this would include EA and AFMA. Communication between AFMA and EA should be improved to allow a better exchange of information. It is understood that AFMA are currently developing a generic database. EA should establish communications with AFMA to negotiate the use of this databse.

<u>AFMA representatives aboard the *ACV Wauri*</u>

Background - It is unknown how long AFMA representatives will be stationed on board the *ACV Wauri*. It will take a minimum of several months for ACS Officers to be trained in legislation, boarding procedures and language skills to a level whereby they can efficiently conduct boarding's of fishing vessels.

(EA ☛) Activity - EA should encourage the use of AFMA representatives aboard the *ACV Wauri* at least until the end of the year 2000. Especially since permanent crews have still not be contracted.

Boardings by the ACS Officers

Background - There will be periods when AFMA representatives are not aboard the *ACV Wauri*. During these periods ACS Officers will be required to board all fishing vessels.

(ACS ☛) Activity - Board all traditional fishing vessels that enter Ashmore Reef. Play taped message (provided by EA) to crew. Warn Indonesian crew about breaching Australian laws while in Australian waters. Complete EA boarding reports on each vessel. Advise crew on limits of access to Ashmore Reef. Stamp Indonesian documents with the EA stamp to show subsequent officers that they have been provided with information. Send copies of data sheets back to EA in Canberra. File original data sheets on board the *ACV Wauri*.

In the future, a standard database that is used by all agencies is preferred.

2.1.3 Prosecution

Background - Prosecution inside the Ashmore Reef National Nature Reserve can be complicated as some offences can be prosecuted under EA or AFMA legislation. Also, the prosecuting agency will be held responsible for the costs incurred for the prosecution. The Customs Officers are new to the tasking at Ashmore Reef and will require a thorough briefing or course on the procedure and consequences of prosecuting an offence inside the reserve.

(EA/ AFMA ☛) EA will need to provide a thorough briefing to Customs Officers on the procedure for prosecution of illegal fishing. This must include the consequences of their actions and the once the offenders are taken to mainland Australia. EA must be prepared for the costs involved with prosecution under EA legislation.

2.1.4 Education for Traditional Fishers

Background - Education is a major component to reducing illegal fishing in the MOU. This will be more important with the declaration of Cartier Island as a Marine Protected Area.

Coloured Information Maps

Background - Currently there are no maps or information sheets aboard the *ACV Wauri* regarding access areas at the Ashmore Reef National Nature Reserve.

Activity - EA need to provide the ACS Officers with more resources to enable the education of traditional fisher in regard to the laws of Australia.

Background - With the declaration of Cartier Island Marine Protected Area, the education of fishers in the region will be a priority. AFMA have produced a coloured waterproof map of the fishing boundaries in north-western Australia (Appendix 3). These are well received and well regarded by the Indonesian fishers. A similar format could be used by EA to educate the fishers with regard to the rules of Ashmore Reef and Cartier Islands. A joint EA/AFMA production should be possible.

Activity - Produce a coloured pictorial map to define the rules and regulations of both Ashmore and Cartier Marine Protected Areas. Pictorial details of the restricted areas to Ashmore Reef and West Island should also be defined. Any text should be in both English and Indonesian.

Audio Tape of Rules of the Area

Background - The EA audio tape describing the rules and regulations of Ashmore Reef and the MOU is 13 minutes in length. This is too long to hold the interest and attention of the fishers.

(EA ☛) Activity - This tape needs to be short and be specific. EA need to re-record this tape.

(EA ☛) Activity - A text version (summary) of this tape in Indonesian needs to be available to give to the Indonesian fishers. This could be incorporated into a map (described above).

(EA ☛) Activity - A test version of this tape in English needs to be aboard the *ACV Wauri* so that ACS Officers know exactly what information is on the tape.

2.2Visitors

2.2.1 Yachts and Recreational Vessels

Background - Yachts commonly use Ashmore Reef as a stopover anchorage. The numbers of yachts per month and per year should be monitored by EA to assess such things as potential anchor damage and human pressure on West Island.

(ACS ☛) Activity - ACS Officers should record the number of yachts that are anchored in the lagoon, by nationality. This should be reported in their end of trip report.

2.2.2 Education of Visitors (Yachts and Indonesian Fishers)

Background - Education is the main management tool in Marine Protected Areas and good educational resources can solve many management issues.

(EA ☛) Activity - EA need to send photocopies of maps of the access areas of Ashmore Reef as well as copies of the coloured brochure "Ashmore Reef National Nature Reserve".

(EA ☛) Activity - A one page list of rules and restrictions should be produced in English and Indonesian. This should be included in the coloured map described above. Information should include:

- Access restrictions to lagoon and islands
- Fishing rules
- Collecting bans
- Anchoring rules
- Information on pump

2.3 Disposal of SIEV's

Background - Suspected Illegal Entry Vessel's (SIEV's) were a regular occurrence at Ashmore Reef in 1999. These vessels were often anchored in the Ashmore Reef lagoon and in

the entrance to the lagoon. They usually carrying several 208L drums of diesel fuel and their bilges are usually contaminated with oil. SIEV's create a possible pollution problem for Ashmore Reef when they enter and are held in the lagoon because they often pump bilge water filled with oil and fuel or they leak fuel. They are also prone to sinking. All items and garbage on board the vessel present a quarantine issue. Usually the the Suspected Unlawful Non-Citizen (SUNC's) are transported to mainland Australia using RAN vessels of ACV's and the SIEV's remain at Ashmore Reef for a period of several weeks . The RAN patrol boats are then required to sink the vessels in a designated area (12° 11'S/122° 45' E).

(ACS ☛) Activity - If possible the SIEV's should not be brought into the lagoon but kept in the entrance to the lagoon and should be held for as short a period as possible.

Problem - Often SIEV's are left at Ashmore Reef for disposal after SUNC's have been transported to mainland Australia. The disposal of the remaining fuel held on board creates a problem. Plate 1.2 shows approximately 200L of diesel fuel aboard a SIEV in May 2000.

(ACS EA ☛) Activity - Ideally, all extra fuel and oil should be pumped from these vessels into drums and taken back to mainland Australia for recycling or proper disposal. This will have to be organised with ACS and the RAN. Small amounts of fuel can be used to burn the SIEV's before disposal.

Problem - The final disposal of the vessel is difficult. In the past vessels have been destroyed by the Royal Australian Navy "Fremantle Class" patrol boats or ACV's

(DIMA/ ACS ☛) Activity - The RAN should be responsible for the destruction of the SIEV's. They have the ability to tow the vessels out to the dumping area in all conditions and they have the weapons suitable for their destruction.

Important Points

- All vessels to be disposed of in the designated dumping area (12° 11'S/122° 45' E)
- All rubbish on board the vessel must be burnt before the vessel is destroyed by the 50 calibre cannon. This ensures that the rubbish including plastics do not float to the surface and create a hazard to wildlife after the vessel sinks. Also it is an offence to dispose of plastics into the sea.
- Excess fuel (not required for burning) is removed from the vessel and returned to the mainland
- Checks are made to ensure that the vessels has sunk and that it is not neutrally buoyant just below the surface and a hazard to shipping
- Any remaining debris items on the surface of the water are picked up.

2.4 Pests from Foreign Vessels

Background - Boats carry a host of marine and terrestrial pests. Because traditional foreign fishing vessels have been visiting Ashmore Reef for hundreds of years, little can be done to reduce the threat of marine pests. However, terrestrial pests such as exotic seeds and weeds, cockroaches and rats are always a threat to the islands.

(ACS ☛) Activity - All foreign vessels should be stopped from reaching the shore of any island at Ashmore Reef. Unattended SIEV's in the lagoon should be monitored by ACS Officers to stop the vessel sinking or breaking anchor and washing ashore.

2.5 Anchor Damage

Background - Anchoring vessels can cause severe anchor damage to coral reefs. Although Ashmore Reef is in a remote location it receives regular boat traffic to the entrance of the lagoon and also inside the western lagoon.

2.5.1 Large Vessels

Background - The "Fremantle Class" RAN patrol boats and the "Bay Class" ACV's are frequent visitors to Ashmore Reef for various reasons. They carry large anchors and heavy chain and usually anchor at the entrance to the western lagoon. This is very important because of the regular traffic of RAN vessels and ACV's to Ashmore Reef.

(EA ☛) Activity - EA need to define an area of sand at the entrance to the lagoon which can be a designated anchorage for these vessels to reduce coral damage from repeated anchoring. This area needs to be well communicated to all vessels.

2.5.2 Small Vessels

Background - Smaller vessels such as Traditional Type II sailing vessels frequently anchor in the western lagoon at Ashmore Reef to avoid bad weather and obtain fresh water. In addition, at certain times of the year, numerous sailing yachts anchor at Ashmore Reef.

(ACS ☛) Activity - Customs Officers should encourage smaller craft to anchor on the moorings provided by EA.

(EA ☛) Activity - EA should make sure that moorings are in good condition and are suitable for the vessels in the area.

(EA ☛) Activity - EA should outline the use of moorings on any education brochure.

2.6 Main Mooring - *ACV Wauri*

Background - The *ACV Wauri* is anchored on the existing mooring that was used by the contract vessel in previous years.

(EA ☛) Activity - The details of the block and chain should be kept of file by EA and copies sent to Customs in Canberra and to the *ACV Wauri* at Ashmore Reef. Details should include: a description of the block and chain, their dimensions and their capacities, the period since deployment and a schedule of maintenance. An example of a data sheet is included in the Appendix 4. The officer in charge of the vessel will require this information to assess safe anchorage in bad weather.

2.7 Additional Moorings

Background - Eleven concrete moorings were dropped at the entrance to the lagoon in early 1999. In November 1999, two of these moorings were left at the entrance, while 9 were

carried with lift-bags to locations inside the lagoon, east of the main EA anchorage. In May 2000, I could only find the floats of 4 mooring buoys inside the lagoon and none at the entrance. I have listed the latitude and longitude of these remaining floats in Appendix 5. The missing floats may have been stolen, but it is likely that the ropes holding the float to the chain was too thin and chaffing caused the loss of floats.

In general, the moorings were of poor quality.

(EA ☛) Activity - EA need to seek professional advice on these moorings before any more money is spent.

Problem - Full details of these mooring, including specifications and latitude and longitude are not kept on file by EA. Specification details of the blocks and chains are required for assessing what size vessel and in what sea conditions a vessel can safely attach to the mooring. The floats may get stolen, and thus the moorings will need to be easy to find with a GPS.

(EA ☛) Activity- EA need to keep a comprehensive file with full details of each mooring. Details should include: latitude and longitude, a description of the block and chain, the capacities of each block and chain, a description of the floats attached, the period since deployment and a schedule of maintenance. The same data sheet could be used as for the main mooring (Appendix 4).

Problem - The surface end of the mooring chains do not have attachment points to allow vessels to attach easily. At present, a float is attached to the chain but there is no means of attaching a vessel. This means that the traditional Indonesian vessels will not use the moorings.

(EA ☛) Activity: The mooring chains need to be made user friendly to allow for the attachment of vessels. One method involves attaching a 5m of rope (25mm diam.) to the end of the chain using thimbles and D-shackles. A spliced eye will be needed in the end of the rope for attachment to the vessel (see Appendix 6). Ideally a float with a stainless steel rod should be between the chain and rope (see Appendix 6).

Problem - The chains are too thin to provide a safe moorings, especially with corrosion already noticeable on the chain.

(EA ☛) Activity - Larger diameter chain is required for a safe mooring. The chains may have to be replaced by the end of the year 2000.

Problem - The length of chain is too short for some of the moorings with some chains pulling the floats under at high tide.

(EA ☛) Activity - The length of the chain on each mooring will need checking and the chain lengthened in some cases. Professional advice should be sought.

Problem - The current floats are too small to hold the chain, especially when they become covered with barnacles and algae.

(EA ☛) Activity - Larger floats are required for the moorings. These should be in a light colour to allow easier anchoring at night. The word for "mooring" should be written on the floats in Indonesian.

Problem - Corrosion of mooring chain and attachment point on mooring block.

(EA ☛) Activity - The chain and attachment point should be regularly checked for corrosion. Once the attachment point of the mooring is corroded, the becomes useless. Other mooring designs should be considered in the future (see Appendix 7 an 8). These have the advantage of multiply uses as the chains can be replaced easily. The Manta Rays (Appendix 8) have the advantage of no heavy chain damage around the mooring site.

Problem - Biological growth on the chain and floats causes them to sink and disappear.

(EA ☛) Activity - Customs Officers could routinely clean the floats, but the chains would need to be cleaned by SCUBA divers.

Problem - Theft of the surface floats could occur if a vessel is not stationed at Ashmore Reef.

(EA ☛) Activity - If sub-surface floats were attached to the chain it would allow a snorkeller to reattach the floats to the chain without cost and effort involved in sending a commercial diver to Ashmore Reef.

Problem - Liability for moorings is a issue for the provider of the moorings. Usually a proper survey is required by a certified officer each year.

(EA ☛) Activity - EA need to have a maintenance schedule for moorings and check details in relation to liability.

2.8 Channel Markers

Background - A correctly marked channel will allow the safe passage of vessels through the lagoon to the anchorage. This will improve the efficiency of ACS crew change-overs and increase the response time for boardings and patrols. The existing channel markers are inadequate for navigational markers especially with different ACS crews using the lagoon during rough weather and low light conditions. Also the *ACV Wauri* will need to leave the lagoon regularly to refuel and to patrol the new Cartier Marine Park.

The positions of the Channel Markers as of June 9, 2000 are listed in Appendix 9a and 9b. Several of these markers had to be re-installed because of poor installation (Plate 3.3).

(ACS ☛) Activity - The channel should be mapped with a GPS and bommies that present navigational hazards should be marked with standard navigational marks.

Background - The present channel markers are almost impossible to see in low light conditions in the morning and afternoon. Most of the floats do not have spars with navigational shapes.

(EA/

ACS ☛) Activity - Navigation markers should be standard and if possible have visual and radar reflectors on the top. All markers should have spars with cones or cans on the top (to represent starboard and port). These shapes should be viewable in a 360° plane. The markers will need a heavy anchor set in a position that will do minimal damage to the reef. To reduce chain damage to the coral, a wire rope could be attached to the anchor and held above the substrate by a sub-surface float. A rope from the marker could attach to the wire rope with a snap clip (see Appendix 9c.). This would allow for the rope to be changed easily using snorkel equipment.
Eight pairs of standard starboard and port channel markers should be purchased to mark the channel into the lagoon at Ashmore Reef.

Background - The channel markers will need regular maintenance such as the removal of the biological fouling from the ropes and floats and the replacement of ropes because of chaffing.

(ACS ☛) Activity - Customs Officers should have the qualifications and codes of practice in place to check and generally maintain these markers. The would require using snorkelling equipment in 0-4 metres of water at low tide.

2.9 Use of Tender Vessels - Boat Speeds

Background - Boat collision with large animals are common in areas where both occur. Sea turtles, dugongs and sea snakes are the animals that are most vulnerable to boat strike at Ashmore Reef. Turtles, dugongs and sea snakes are vulnerable when surfacing for air, while sea turtles and dugongs may be hit by the outboard motor when resting on the substrate in shallow water. The 640 and the "Kazi" are both powerful boats and have the potential to collide with these animals when they travelling at fast speeds.

(ACS ☛) Activity - Drivers of the tenders should be always aware of the potential danger of hitting animals. Drivers should reduce speed in areas that have high densities of animals or where weather and sea conditions are not conducive for observing animals.

2.10 West Island

2.10.1 Visitor Access

Background - West Island has more human presence than any of the other islands. Visitors to Ashmore Reef are allowed access to the eastern beach of West Island and to the water pump and well.

(ACS ☛) Activity - Visitors should be restricted to the eastern beach of West Island.

(EA ☛) Activity - Photocopies of maps showing the areas of restricted access to West Island should be distributed to visitors. EA need to provide these maps to the *ACV Wauri*.

2.10.2 Helicopter Landing Site

Background - Helicopters have been used to evacuate people from Ashmore Reef in emergencies in the past. With the *ACV Wauri* stationed at Ashmore Reef it has been suggested

that crew could be changed over by landing helicopters on West Island. There are several drawbacks for using this change over method:
1) The *ACV Wauri* will need to be resupplied with food and fuel and this could only be achieved by using a vessel.
2) Disturbance to Wildlife - West Island does not have the large number of nesting birds like Middle and East Island. However, several species of birds do nest on West Island and these include: eastern reef herons *(Ardea sarca*), crested terns (*Sterna bergii*), wedge-tailed shearwaters (*Puffinus pacificus*), red-tailed tropic birds (*Phaethon rubricauda*) and white-tailed tropic birds (*Phaethon lepturus)*. On Michaelmas Cay, Qld, sooty terns and common noddies took flight when seaplanes landed within 400m of the colony (Hicks, King and Chaloupka 1987). In the southern Great Barrier Reef, nesting birds lifted off their nests before the sounds of aircraft could be heard by humans (O'Neil Pers. Comm. in WBM Oceanics Australia and Gorden Claridge 1997).

Navigational hazards include the low *Argusia* bushes which ring the island and a steel pole approximately 15m in height at position (12° 14.47'S/ 122° 58.04' E).

Intertidal areas have been suggested for helicopter landing sites when the tide is out. However, the helicopters used by two companies in Darwin have wheels and not skids and thus would not be suited to landing on soft sand.

(EA ☛) Landing Site if required - A landing site behind the water pump and north of the coconut tree would be a suitable site for landing a helicopter (Appendix 10 and Plate 2.1). It is away from the usual nesting site for crested terns on the southern side of the island and clear of the wedge-tailed shearwater burrows on the north-western side of the island. It is also close to the eastern beach for loading equipment and supplies. Visitor access is allowed to the water so the landing area in this location that will keep all the human activity together. The landing site should not include a constructed pad but left in a natural condition. Frequent landing of helicopters should be avoided on all islands at Ashmore Reef because of the negative impact on the birds. The use of helicopters for the change-over of ACS crew would be impractical because of the requirements large orders of fuel and food.

(ACS ☛) Activity - Customs Officers may be required to check the safety of designated area before each landing.

(EA ☛) Recommendation - Helicopters should not land on West Island until the effect of such activity on bird nesting is scientifically investigated.

2.10.3 Water Pump

Background - Traditional Indonesian fishers are allowed access to West Island for the purpose of obtaining fresh water. To reduce the health risk of an open well, a hand water pump was installed several years ago on the eastern side of the island to extract water from the fresh water lens via a spear. This pump has had a variety of breakdowns over the years which have required either maintenance or full replacement of the pump by the EA representatives at Ashmore Reef. In the past when the pump has been out of service, further damage results to the pump and spear or to the well, so it is in EA's best interest to keep the pump operating.

(EA ☛) Activity - If traditional fishers are allowed continued access to freshwater on the island, EA should ensure that they have spare parts or a replacement pump in their possession. Once a suitable model has been sourced from a distributor, EA should buy 3-4 pumps to ensure that water is available on the island via the spear and not the well.

(ACS ☛) Activity - Customs Officers will be required to check that the water pump is working and to repair or replace the pump when required.

2.10.4 The Well

Background - After the installation of the water pump and spear on West Island, the original well in the middle of the island was covered in with rocks and sand. This ensured that the hole was not a hazard to wildlife and that water quality was not a health issue and a hazard to humans. In the summer of 1998, a group of SUNC's were dropped off on West Island without any water. They could not extract water via the water pump and consequently dug up the well. This has remained uncovered for over one year. This is a hazard for wildlife because it acts as a trap, and once an animal has fallen in the well, it cannot escape. In November 1999 I viewed several species of birds dead in the well. In May 2000, I recorded a dead eastern reef heron in the bottom of the well.

(EA ☛) Activity - EA needs to make a decision on how to cover the well. This could involve filling in the well with sand or locking a steel door over the well. A wooden cover is not acceptable because it will be removed for firewood by the Indonesian fishers.

(ACS ☛) Activity - Customs Officers will be required to act on this decision and either fill in the well or construct a cover with supplied material.

2.10.5 Exotic Plants

Background - The exotic plants (*Cenchrus brownii* - burr grass -Plate 3.1 and *Cenchrus ciliaris* - Buffel grass - Plate 3.2) are conspicuous on the eastern side of West Island. The Spinifex on the northern side of the island is also spreading.

(EA /ACS ☛) Activity - EA will need to decide of the most appropriate form of weed control. For the *Cenchrus sp*. The flower heads should be removed and placed in bags and then the whole plant should be chipped out. The seed heads could be burnt on a sand bank at low tide. An environmental friendly chemical should be used if chipping out the weeds does not work.

(EA/ ACS ☛) Activity - The spread of Spinifex should be monitored using stakes secured in the ground at the perimeter of the area.

2.10.6 Collection of Firewood

Background - The collection of firewood is prohibited on the islands. However, evidence indicates that firewood has been recently harvested from the *Argusia* bushed on West Island during the summer of 1998/99 and 1999/00. The collection of driftwood is also prohibited.

(ACS ☛) **Activity** - Customs Officers should be aware that branches of *Argusia* bushes have been removed from the island in recent months. ACS officers should report any evidence that indicates tree damage from this practice. Stop this practise if observed.

2.10.7 Beached Type III of intertidal flats

Background - A type III vessel broke from its mooring in the summer of 1999/2000. It is partly burnt and is now located on the intertidal flats in front of the eastern beach of West Island.

(ACS ☛) Activity - Customs Officers should allow traditional Indonesian fishers to removed the wooden structure of the vessel for firewood.

2.11 East and Middle Island

Visitatation to Islands with Nesting Birds

Background - East and Middle Island are the main bird nesting islands at Ashmore Reef, both supporting thousands of nesting birds per year (Plates 1.3 and 1.4). Human presence has a huge effect on nesting birds. People walking through sea bird colonies causes disturbance by trampling of nests and burrows, regurgitation of food by adults, disruption to feeding, stress, adults disserting the nest resulting in opportunistic predation be other birds and the exposure of eggs and chicks to the elements (WBM Oceanics Australia and Gorden Claridge 1997). Continued disturbance may lead to shifts in colony distribution.

(ACS ☛) Activity - Visits to East and Middle Island should be kept to a fortnightly basis to check for nesting turtles and marine debris (Plate 2.2). Personnel should only walk around the beaches of these islands and not through to interior. All personnel requiring access to the interior of these islands should request permission from EA.

(ACS ☛) Activity - Access to these islands by visitors should be by permit only.

(EA ☛) Activity - Activity by researchers and EA staff to the interior of these islands should be under controlled and only occur to fulfil specific research or management goals.

2.12 Collecting

Background - All visitors to Ashmore Reef are prohibited from collecting and removing items within the reserve boundaries. This includes shells and driftwood on the islands.

(ACS ☛) Activity - All visitors should be informed of the rules of the Nature Reserve. They should be informed that collection of animal and plant material, dead or alive is prohibited. These rules apply to ACS Officers and any official visitors to the reef. Items can only be removed under a permit from EA.

2.13 Communication between Agencies

Background - The deployment of the *ACV Wauri* at Ashmore Reef is the result of a combination of needs from several agencies in the region. The success of this deployment with

regard to the objectives of each agency will depend on good communication links and data flow between the agencies.

(EA ☛)Activity - EA should establish good links with Australian Customs, DIMA, AFMA, Fisheries WA and NT Fisheries. Links between Fisheries WA and NT Fisheries are required because these agencies represent AFMA at Ashmore Reef.

(EA ☛) Activity - EA may need to request all taskings through Australian Customs head office and not directly through the Officers on the *ACV Wauri*. This will require an efficient chain of communications.

(EA ☛) Activity - EA, as the management agency for Ashmore Reef, should contact the Customs Officers by phone on board the *ACV Wauri* once per week. This will provide Customs Officers with the opportunity to ask questions and sort out problems. This will also refine the post-trip patrol report to EA.

2.14 Marine Debris

Background - persistent anthropogenic debris is a global problem for the marine environment.

(ACS ☛) Activity - ACS officers should clean the beaches during their fortnightly patrols of the islands. The debris should be bagged and returned to the mainland. See section 3.1.6 for more information. Fishing nets should be collected where possibly (Plate 3.4).

2.15 Customs Officers Aboard the *ACV Wauri*

2.15.1 EA Familiarity Training

Background - Conducting EA duties at Ashmore Reef is a new role for Customs Officers. Proper education by EA is essential of ACS Officers is essential for EA

At the moment EA have provided little training to ACS Officers in regard to the rules and regulation of the reserve and legislation for prosecution of illegal activities.

(EA ☛) Activity - EA should ensure that Customs Officers are fully informed about all aspects of their role at Ashmore Reef. This includes providing written and oral information relating to historical, cultural, environmental and management issues in the Nature Reserve. This field trip to Ashmore Reef by Scott Whiting in May-June 2000 was successful because it provided training for the ACS Officers and allowed many of the management issues for Ashmore Reef to be identified. This and other types of familiarity training should continue for the next few months, especially when permanent crews have yet to be established.

2.15.2 Resource Materials

Background - Available resource materials are essential for Customs Officers to become familiar with the historical, cultural, and environmental significance of Ashmore Reef. EA has a good range of reference materials aboard the *ACV Wauri.* A full list of materials that are currently held on board the *ACV Wauri* are listed in Appendix 11. Scott Whiting provided a

display folder containing coloured brochures and general information on many most aspects of the marine environment.

(ACS ☛) Activity - The reference material provided by EA needs to be stored in an accessible area aboard the *ACV Wauri* (such as the lounge area). This will ensure that the material is used by ACS Officers.

(EA ☛) Activity - EA should purchase some reference materials for the *ACV Wauri*.. EA should update this list whenever new material are bought for the vessel at Ashmore Reef.

Other resources suggested for the *ACV Wauri* are listed in Appendix 11.

2.15.3 Personal education

Background - To be efficient in conducting EA work at Ashmore Reef all Customs Officers have a personal responsibility to become familiar with all aspects of the management of Ashmore Reef, take an interest in Marine Park Management objectives and in the marine environment in general.

(ACS ☛) Activity - All ACS Officers aboard the *ACV Wauri* stationed at Ashmore Reef should read the Plan of Management for Ashmore Reef (ANPWS 1989), look through the display book of coloured brochures, look through the bound copy of journal articles and look through reference books, all of which are provided.
When not sure about something, either, look it up in a reference book or call EA.

2.15.4 Permanent Customs Personel on the ACV Wauri at Ashmore Reef.

Background - The *ACV Wauri* stationed at Ashmore Reef serves the functions of several government agencies. This requires a crew that have experience and an interest in issues at Ashmore Reef. The EA duties at Ashmore Reef requires active persons that have a genuine interest in the marine environment and in Marine Park management.

(EA ☛) Activity - EA should request that a representative is present during the selection process when Customs are selecting a crew to be stationed on the *ACV Wauri.*

2.15.5 Recreational Fishing By Customs Officers

Background - Fishing is restricted to a subsistence level at Ashmore Reef.

(ACS ☛) Activity - Traditional subsistence fishing for fin fish is allowed in the western lagoon of Ashmore Reef (ANPWS 1989).

Some fishing guidelines are recommended:

- Subsidence fishing only. Only catch what you will eat. No frozen fish to be brought back to the mainland.
- Customs Officers should only fish outside the reef edge. Refrain from fishing inside the reef edge and for sedentary species. Sedentary species can be fished out easily.
- Do not fish at the anchorage which has resident fish under the vessel.
- Return all undersized and unwanted fish carefully and quickly to the water
- Avoid fishing in areas where fish are gathering to spawn

- To avoid the attracting sharks to the anchorage, do not dispose of fish scraps at the anchorage after cleaning the fish.
- The collection of shell fish is prohibited.

2.15.6 Reef Walking

Background - Reef walking is an educational experience and should be encouraged for ACS Officers to learn more about their environment.

Recommendations - Some guidelines to reef walking are as follows:

- Do not step on live coral
- Do not touch fauna and flora that you cannot recognise. Many species are dangerous and sometimes fatal.
- Always return objects their original locations
- No collecting is permitted

2.15.7 Snorkelling

Background - Snorkelling is an educational experience and provides a recreational activity.

Recommendations - Some guidelines are as follows:

- Avoid touching the reef with your body or fins.
- Do not disturb the sediment
- Do not touch the animals as some may be dangerous
- Always swim with a buddy
- Where a wetsuit to avoid coral cuts and to provide some buoyancy
- Treat any coral cuts immediately after your return
- Let somebody know where you have gone and when you will return
- If possible have somebody on the surface keep watch

2.16 The *ACV Wauri* at Ashmore Reef

The *ACV Wauri* will be stationed at Ashmore Reef for 12 months of the year. Therefore the *ACV Wauri* must have a minimal impact on the environment and wildlife at Ashmore Reef.

2.16.1 Disposal of Rubbish from the "Wauri"

Background - Personnel aboard the *ACV Wauri* will number between 4 and 10. During this time a considerable amount of domestic litter will be produced. I

(ACS ☛) Activity - I have listed two options to deal with the rubbish staring with the most preferred option which is for Customs to return the rubbish back to port. In both cases, all decomposable items such as food scraps can be disposed of into the sea. Where possible food scraps could be held in a container on board and disposed of outside the lagoon every few days.

Disposal of non-biodegradable material

Option 1. Return rubbish to port. This is the most preferred option.

All material including paper and plastic are taken back to port by the changeover vessel. All containers can be rinsed using the salt water system before storage. A compactor could be used to reduced the bulkiness of litter items and keep the size of the total rubbish to manageable levels. In the simplest form a compactor could include a can compactor. Large and more advanced designs could facilitate the compaction of all products except glass. The removal of all of rubbish by the support vessel should be considered as the most preferred option. At present, the "Bay" class Customs Vessels return rubbish to shore when on normal duties and the deployment of the *ACV Wauri* at Ashmore Reef will not be any different.

Option 2. Burn combustible rubbish on West Island.

The second option is to burn combustible items on West Island. In the past a 208L steel drum was used as an incinerator to burn all items. The non-combustible items were then disposed of at sea in deep water. Problems with this system included: damage to nearby *Argusia* bushes, rubbish spread around on beach, the decrease in aesthetic appeal of West Island and the chance of rubbish entering the marine environment. In the future, if rubbish is to be burnt on West Island , an enclosed incinerator that burns the rubbish at high temperatures could be used.

** Packaging around grocery items could be reduced before leaving port to reduce waste disposal at Ashmore Reef.

2.16.2 Chemicals Pollution

Background: An ACV will be anchored at Ashmore Reef, between 10 and 12 months of the year. Ashmore Reef is a National Nature Reserve and thus chemical pollution of any type must approach zero.

Many everyday chemicals that are used for cleaning decks and in the laundry, galley and bathroom are hazardous to fauna and flora in the marine environment. This effect is multiplied because the *ACV Wauri* will be stationed in the same location all year round.

Petrochemicals

Background - Petrochemicals are well known contaminants of the marine environment.

(ACS ☛) Activity

1) All petrochemicals such as oils and fuels should not escape into the marine environment. Waste oil products including oily bilge water must be returned to port and disposed of properly. Customs Officers have a good record of storing oil based compounds in a waste 200L drum for return to the mainland.

Cleaning Agents

Background - Other chemicals such as deck cleaners, kitchen and laundry detergents and bathroom products should be biodegradable. Even the use of biodegradable chemicals should not be excessive.

(ACS ☛) Activity - A list of toxic chemicals that should be avoided when purchasing products is listed below (Logan 1997):

Alcohol	Hydrofluoric acid
Ammonia	Lye (Sodium hydroxide)
Bleach (Chlorine Bleach or Sodium hypochlorite)	naphthalene
	PDCB's (paradichlorobenzenes)
Butyl cellosolve	Perchloroethylene
Cresol (related to Phenols)	Petroleum distillates (Hydrocarbons)
Dye	Phenol (Carbolic acid)
Ethanol	Phosphoric acid
Formaldehyde	Propellents (propane, butane, CFC's)
Glycols	Sulfuric acid
Hydrochloric acid	TCE (Trichloroethylene)

Anti-fouling

Background - Anti-fouling paints that contain Tribtyltin (TBT) are toxic to the marine environment. Customs vessels do not use anti-fouling paints that contain this substance. Other anti-fouling paints can also be toxic (ANZECC 1996).

(ACS ☛) Activity - The vessel at Ashmore Reef should use the most environmental friendly anti-fouling on the market.

2.16.3 Noise Pollution from the ACV Wauri

Background - Noise pollution is a problem for many marine fauna. It can disrupt their normal behaviour and cause them to avoid important areas.

(ACS ☛) Activity - If the Wauri is stationed at Ashmore Reef for the next few years then sound proofing may be required to insulate the noise from the generator.

2.16.4 Light Pollution from the ACV Wauri

Background - The Wauri has high wattage floodlights positioned forward and aft that may pose a problem for the wildlife at Ashmore Reef. During the field trip to Ashmore Reef (May/June) common noddies were attracted to the floodlights at night. Some were disorientated and flew into the lights while others flew into other structures on the vessel. These floodlights severely disturbed the natural behaviour of these birds.

Sea turtle hatchlings navigate from the beach using the lightest horizons. Excessive lights from vessels is known to attract hatchlings. Hatchlings that are attracted to the *ACV Wauri* will have a lower chance of survival than if they made their way directly off the reef edge.

(ACS ☛) Activity - the floodlights on the Wauri should be switched off unless required for night watches or specific activities. If lights are required on a continuous basis then modification could be made to reduce the disturbance on the wildlife. These modifications could include lower wattage lights or the use of covers or filters to reduce the spread of light.

2.17 Office Facilities Required for EA work on board the *ACV Wauri*

Background - The *ACV Wauri* has Pentium desktop computer in the bridge and a combination facsimile, printer and copy machine. The quality of the printer is adequate but it is very slow and would not be suitable for printing multiply pages. The photocopying capabilities from this unit are poor and inadequate for copying datasheets etc..

(EA ☛) Facilities required on *ACV Wauri* -

Desk-top computer (with CD burner or zip drive)

An extra computer station would allow EA duties to be entered into database, photographs processed and information stored and backed up.

Laser printer (Brother 1040 $599)

A small laser printer would increase the efficiency and quality of paper work aboard.

Flatbed Photocopier

This would allow copying of datasheets, allow crew to copy information from books and pamphlets and help with the processing of SUNC's

Digital camera

A digital camera would allow important photos to be Email directly to EA. More importantly photos can be stored on the computer and backed up onto a CD.

Small waterproof camera (Cannon or Minolta).

To conduct EA duties ACS Officers need a waterproof camera that can be carried at all times in the boat and during island surveys.

** the laser printer, copier and fax machine could be combined into the one unit.

2.18 Crew Change-Overs

Background - At present the crew change overs are being rushed and are achieved in less than three hours. This is primarily because the shuttle vessel has other duties or taskings. At present it is too rushed to complete a thorough exchange of information.

(EA/ ACS ☛) Activity - A change over period of 6 to 12 hours would be allow for the exchange of all EA and ACS information and the resupply of food and fuel.

Chapter 3

Scientific Research

Environment Australia should continue to encourage scientific research at Ashmore Reef. The regular changeover trips to Ashmore Reef by the "bay class" ACV's should facilitate more research opportunities for scientists throughout the year.

3.1 Routine Scientific Data Collection by Customs Officers

3.1.1 Datasheets and Databases

Background - Scientific information is crucial to the management of Ashmore Reef National Nature Reserve. Observations need to be detailed, accurate and include photos where possible. All datasheets to be used at Ashmore Reef are currently stored inside a labelled Display Book aboard the *ACV Wauri*. Three databases have been compiled and are located on the *ACV Wauri* computer.

Data Sheets include:

- Boarding Data Sheet
- General Observations
- Turtle Nesting Track Counts
- Nesting Turtle Data Sheet
- Dugong Data Sheet
- Mortality Data Sheet
- Whale Sighting Data Sheet

Databases include:

- General Observations
- Turtle Nesting Track Counts
- Dugong Sighting

Other databases for sea turtles and dugongs are held by ScottWhiting.

(ACS ☛) Activity - It is the responsibility of the crew of the *ACV Wauri* to record all observations on the appropriate datasheets and to regularly update the 3 databases. Some datasheets do not have databases (eg Whale sighting sheet) and these should be forwarded to EA when complete. The computer aboard the *ACV Wauri* should hold the master copy of all databases. Updates of the database should be sent to Phil Domaschenz at EA and Scott Whiting where necessary.

3.1.2 General Observations - Wildlife and Management Issues

Background - Documenting opportunistic observations of wildlife and management issues is essential for the effective management of Ashmore Reef.

(ACS ☛) Activity - Record all interesting observations of wildlife of other management problems on the datasheet provided (Appendix 12). This can include: interesting wildlife sightings, excessive marine debris on beaches, fishing nets, oil pollution from SIEV's, coral bleaching, removal of firewood from island. These forms should be sent to EA. All records should be entered onto the database provided (Appendix 13). All datasheets should be kept together. At the end of each patrol, a copy of the datasheets and a print-out of the database entries could be sent to EA with the end of trip report.

3.1.3 Sea Turtles

Background - All sea turtle species are endangered or critically endangered worldwide. EA has obligations for sea turtle research and management under the Marine Turtle Recovery Plan. The research by NTU in the past 6 years has provided EA with the basis for detailed long-term on-going monitoring of both the foraging and nesting populations. At present, Ashmore Reef has the most established sea turtle research program of any Commonwealth Marine Protected Area in Australia. This should be encouraged

In-water Sightings

Background - It is estimated that over 10,000 turtles forage on the intertidal flats at Ashmore Reef (Whiting1999). Many in-water observations of these turtles provide good scientific data (for example, observations of mating, or observations of rare species, etc).

Activity - Customs should record in-water turtle sightings on the "General Sightings" datasheet and database (Appendix 12 and 13).

Nesting Turtles

Background - Sea turtles nest at Ashmore Reef throughout the year, with peak nesting occurring in the summer months. Nesting is predominantly by green turtles, although minor some nesting by hawksbill turtles has been recorded. There is one record of a loggerhead turtle nesting on West Island. West Island supports the majority of the sea turtle nesting. See datasheets for instructions.

(ACS ☛) Activity - Customs officers will be required to patrol West, Middle and East Islands once per fortnight during a falling tide cycle. Record the date, time, the name of the island and the number of fresh and old tracks on the sheet provided (Appendix 14). All tracks counts should be entered onto the database provided (Appendix 15).

Background - On many mornings during the nesting season it will be common to see nesting turtles on the beach during daylight hours, because either, they have not finished nesting or because they are too disorientated and exhausted to find the water.

(ACS ☛) Activity - When a nesting turtle is found on West Island, record the details on the nesting sheet provided (Appendix 16). Record tag number, date, time, species, activity and name and contact of recorder. These should be sent to Scott Whiting. Where possible ACS officers should assist the turtle to the water.

Previous nesting data -collected by EA

Background - Nearly 1000 nesting turtles have been opportunistically tagged by EA officers on West Island over the past ten years. These records are kept on a Paradox database in Canberra, but the current database design has limited benefit for research. This data is wasted unless it can be transformed onto a different database and the quality of the data assessed.

Activity - The turtle records collected by EA at Ashmore Reef need to be transferred to an established sea turtle database to enable the extraction of data. This will enable the quality of the data to be assessed by an expert. This will take approximately 4 weeks work.

3.1.4 Dugongs and other marine mammals mammals

Background - Dugongs occur at Ashmore Reef, but in unknown numbers. One estimate puts the population at approximately 60 animals (Whiting, 1999). Dugongs at Ashmore Reef live in unique previously undescribed habitat. Very little is known about these animals and their habitat requirements at Ashmore Reef. Other marine mammals may be sighted infrequently.

(ACS ☛) Activity - To gain a better understanding of the population size, habitat requirements and behaviour of dugongs at Ashmore Reef, Customs officers will be required to record all observations on the data sheet provided (Appendix 17). Details will include: latitude and longitude, date, habitat description, depth of water and behaviour (Appendix 18). See datasheets for details.

Other marine mammals can be entered on the datasheet in Appendix 19.

3.1.5 Animal Mortality

Background - Mortality of animals will occur irregularly and for a variety of reasons. Animals that may found include: sea turtles, birds, sea snakes, dugongs, dolphins and whales. The carcasses may be in a varying state of decomposition. In some cases the cause of death can be determined by obvious evidence (eg a turtle on West Island may have its flippers or plastron removed which would indicate illegal harvest or a bird or marine mammal may be washed ashore entangled in discarded fishing net). Dead specimens allow a unique opportunity to obtained biological samples not usually available from free-ranging animals. Skin allow geneticists to extract DNA and thus delineate between species, sub-species and populations.

(ACS ☛) Activity - Animal mortality should be reported on the "general sighting" data sheet provided (Appendix 12) and on the detailed datasheet in Appendix 20. Make a detailed description of the animal, including size, colour, stage of decomposition. Take photographs to validate identification. A skin sample should be taken from all marine mammals and stored in $DMS0^2$ solution. Samples to be sent to EA in Canberra or to Scott Whiting.

3.1.6 Pollution

Marine Debris

Background - Persistent anthropogenic debris items are an environmental problem globally because they create a hazard to both wildlife and humans. Wildlife can die or suffer sub-lethal

injuries by through entanglement or ingestion. At Ashmore Reef, excessive marine debris creates a hazard for sea turtles, dugongs, sea snakes, birds and fish.

During this field trip a piece of net weighing over 500 kg was removed from the north-eastern reef edge. This net was taken to the mainland.

(ACS ☛) Activity - Customs Officers should collect excessive quantities of marine debris found on the beaches of the islands. If possible this should be removed and carried to the mainland. Other options include burning the debris on the SIEV's in the dumping area before they are destroyed or burning the debris of the intertidal sand flats at low tide. The second option may leave a residue on the sand after burning. All marine debris such as fishing nets and beach clean-ups should be recorded on the general observation datasheets and database (Appendix 12 and 13). A sample of net should be cut from any net found and placed in a plastic bag with a label displaying all details.

Chemical Pollution

Background - Chemical pollution is a serious and an obvious threat to the marine environment at Ashmore Reef.

(ACS ☛) Activity - Report all observations of chemical pollution at Ashmore Reef on the "General Observations" datasheets and database provided (Appendix 11 and 12).

3.2 Special Data Collection by Customs Officers

Background - The crew of the *ACV Wauri* will have time to conduct additional EA work other than that described above. Collections or observations may be required by other scientists and these can be performed by the crew of the *ACV Wauri*.

(EA ☛) Activity - EA should encourage scientists to submit proposals to EA so that Customs at Ashmore Reef to collect data on their behalf. Customs officers can then be trained to collect data on their behalf.

(ACS ☛) Activity - Customs will be required to collect other scientific information on behalf of the scientists.

3.2.1 Nesting Sea Turtles

Background - Previously the previous warden has tagged and nesting sea turtles at Ashmore Reef. For this practise to continue specific survey guidelines will have to be adhered to for the data to be of scientific use. For example every turtle should be tagged and monitored every night over at least a two week period. This is useful knowledge and would greatly benefit sea turtle research in the Indian Ocean. This consultancy fell within the non nesting season for Ashmore Reef and therefore the ACS Officers could not be trained with sea turtles research protocols. This information can be passed onto Customs Officers during a two weeks training period

(EA ☛) Activity - Customs Officers could be trained in sea turtle research protocols.

3.3 Previous Scientific Research at Ashmore Reef

Background - Research in the past has included observations by previous EA staff and specific research projects undertaken by research scientists. EA observations have mostly been recorded in Patrol Reports that are on file to EA in Canberra while details of research projects have been recorded in a mixture of reports to EA and in scientific publications. Many patrols have collected data on sea turtles and birds which would be very useful to the management of Ashmore Reef and to science in general.

(EA ☛) Activity - All previously opportunistically collected data from previous ANPWS and ANCA patrols should be reviewed and assessed by experts in the relevant fields. This is particularly important for birds, dugongs and sea turtles.

3.4 Future Research

3.4.1 Scientific Research Priorities

Scientific research should continue to be encouraged by EA at Ashmore Reef.

Future projects should fit into the following categories:

- Continuation of ongoing long-term projects
- Flora and fauna baseline surveys
- Monitoring of those species that may be under threat within the region or internationally
- Projects that are part of regional or international approaches to conservation problems

(EA ☛) If EA are serious about future management of Ashmore Reef funds should be made available each year for scientific research. Scientific research is essential for monitoring habitat, fauna and flora and ultimately provide the basis of management. This could be set-up into a research fund that is applied for on a competitive basis.

At present EA spends no money to support scientific research at Ashmore Reef. This is in complete contrast to other management agencies in other areas such as the Great Barrier Reef Marine Park Authority and State Agencies. The level of research and the quality of the reports will be greatly enhanced with financial support from EA. This will be a major boost to the management of the reserve.

3.5 Facilitation of scientists aboard the *ACV Wauri*

Throughout the year scientists will visit Ashmore Reef to conduct research and will need to be based aboard the *ACV Wauri.* The requirements of these scientist will need to be facilitated. Scientists should be given some notes on what they should expect on the *ACV Wauri*.

(EA ☛) EA could provide, those scientists intending to go to Ashmore Reef, with an information sheet about the facilities aboard the *ACV Wauri*.

3.5.1 The ACV Wauri

The *ACV Wauri* has three sleeping cabins that sleep a total of 8 persons. The recreation/TV room has bunks for four persons thus giving the a 12 person capacity. At this stage *the ACV Wauri* will carry five Customs Officers one AFMA representative which leaves 6 beds available. However, because of space limitations and catering supplies, a scientific party consisting of four persons is suggested as the maximum.
The ACV Wauri has :

- plenty of deck space forward and aft.
- a davit for transferring equipment between vessels.
- 240 volt power to run all equipment required for research purposes.
- no dedicated freezer for biological samples. Therefore other arrangements should be made if frozen specimens are required.
- Pentium Computer
- Facsimile machine
- Email Facilities
- Satellite Phone

** flammable liquids such as formalin and preserving alcohol will be stored on the aft deck.

3.5.2 Tenders

The Wauri has three tenders: 1) Pursuit 640 - 6.4m purpose built centre console sea going tender with two 90 hp outboard engines (Plate 2.3), 2) Kazi - a 5.2 m aluminium vessel with forward controls and two 50 hp outboard engines Plate 2.4), 3) Snipe - 3.6 m dinghy with 15 hp outboard engine (Plate 2.5).

All vessels will be available for use by scientist, although they will only be allowed to drive the small dinghy. It is suggested that the Snipe is upgraded to a 4m vessel with 25-30hp engine.

3.5.3 SCUBA Diving

Customs or EA do not have a SCUBA diving code of practice. All diving will be conducted using the diving codes of practice from the agencies of the divers on board the *ACV Wauri*. When scientists from different agencies are diving together, then the diving code of practise from the most qualified diver should be used.

(EA ☛) EA should investigate developing or adopting a Diving Code of Practise.

Chapter 4

Information Management

4.1 Reporting by Customs Officers

Background - The recording and reporting of observations will be one of the main roles for Customs personnel at Ashmore Reef. All observations should be recorded in detail with supporting photographs if necessary.

(ACS ☛) Activity - All EA activities should be recorded in a diary.

(ACS ☛) Activity - The crew should submit a report to EA at the end of each change over-period. The report should include a summary sheet on the cover (sample attached) and a description of the major activities conducted by ACS for EA. Details of important events should be described. A copy of sightings from the General Observation database can be attached to the report.

(ACS ☛) Activity - Extra copies of print photos should always be made. After photographs are developed, each photo should have the following recorded on the back: Date, Location, description of photo, Name and Contact of photographer. Photographs should then be sent to match up with the respective trip report. A detailed photograph log book should be kept to help match photographs with observations after development.

4.2 GIS for Ashmore Reef

Background - A good GIS at Ashmore Reef would facilitate the collation of data from scientific projects (past, present and future). This requires a good base map of Ashmore Reef delineating the reef, the islands and the two lagoons. Habitats within the reef system can be obtained from satellite images, but all habitats must be ground truthed before using this information. With a good GIS established, scientists could add the locations of sampling sites, rare species, and interesting habitat. This will not only help in describing the biological diversity of the reef but help in monitoring changes in species composition or abundances over time, including the monitoring of dramatic events such as cyclones or coral bleaching. This type of information system will increase the management continuity of the Ashmore Reef Nature Reserve during periods of staff change over within EA.

In 2000, NTU produced a habitat map of Ashmore Reef for EA. However, this was not ground truthed and therefore the habitat categories are unknown. In 1999, CSIRO produced a GIS map with habitat categories for Ashmore from a satellite image which they ground thruthed in 1998. This map would help the management and scientific data collection at Ashmore Reef.

(EA ☛) Activity - EA need to establish a GIS database for scientific and management use. EA need to negotiate with CSIRO for the use of this image to aid the management of Ashmore Reef.

4.3 Plan of Management

Background - Many scientific and management activities have been conducted since the last Ashmore Reef Plan of Management. However, most of this information is unpublished.

(EA ☛) Activity -The next Plan of Management for Ashmore Reef would benefit from a collation of all scientific information not yet published. A symposium with all those who have conducted scientific or management projects at Ashmore Reef could facilitate such collation of information. For such a symposium to be effective, EA need to ensure that the Plan of Management is not written before this information is presented.

Chapter 5

Conclusion

The success of the new role of the Australian Customs Services at Ashmore Reef is totally dependent on the development of an efficient communications network between all government agencies that are involved in the area

To ensure that EA's requirements are met at Ashmore Reef, EA need to provide thorough training and education of ACS officers in all aspects of their duties.

The future management of Ashmore Reef will require that most issues discussed in this document are addressed.

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