Coastal Bird Monitoring Strategy
for the
Great Barrier Reef World Heritage Area

Malcolm Turner

May 2002

Australian Government
Great Barrier Reef
Marine Park Authority

Queensland Government
Environmental Protection Agency

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Introduction

The coastal bird monitoring strategy for the Great Barrier Reef World Heritage Area (GBRWHA) outlines the value of coastal bird monitoring and sets out the minimum monitoring required. It is intended to assist managers to plan and program, as well as assist staff monitoring the birds to conduct their responsibilities.

For a quick summary see Table 6 Summary of Minimum Level of Monitoring Required.

Management of coastal birds in the GBRWHA is primarily the responsibility of the Environmental Protection Agency (EPA) and the Great Barrier Reef Marine Park Authority (GBRMPA). Monitoring is part of the Day-to-Day Management (DDM) Program for the GBRWHA.

The Great Barrier Reef/Coral Sea Seabird Workshop in June 1999 in Cairns endorsed the priorities in this monitoring strategy to ensure monitoring of coastal birds in the GBRWHA is effective and efficient.

Definitions

Monitoring in the Great Barrier Reef DDM Program is defined as:
"A structured program of data collection and analysis over a period of time designed to measure and report changes in the condition and status of natural values and to evaluate the effectiveness of management" *(Strategy Group minutes for meeting 25 February 1999)*

Research is a structured study looking at causes and effects.

Coastal birds for this strategy include birds with populations totally dependent on the sea, which breed in the GBRWHA or migrate seasonally to the area. They include:

- Seabirds such as petrels, shearwaters, pelicans, bobbies, frigatebirds, tropicbirds, cormorants, gulls and terns
- Breeding shorebirds
- Coastal raptors
- Coastal herons
- Significant migrating shorebirds.

Aims, objectives and the value of monitoring

Outcome of coastal bird management

To conserve coastal bird populations in the GBRWHA, whilst maintaining sustainable multiple use.

Aim of monitoring coastal birds

To detect, interpret and report changes to the temporal and spatial distribution and abundance of coastal birds to guide management actions and determine effectiveness of management.

Aim of monitoring strategy

To provide a context to and identify the minimum requirements for monitoring coastal birds breeding, feeding and roosting in the GBRWHA and identify the information required to ensure management of coastal birds is effective.

Objectives of monitoring strategy

- Identify an effective program for monitoring coastal bird populations breeding in the GBRWHA that minimises the costs to the DDM Program
- Assist programming of DDM activities
- Assist the EPA and the GBRMPA in setting priorities for funding
- Identify priorities for coastal bird research to be conducted by other organisations that will assist the DDM Program.

Why monitor coastal birds

- Coastal birds are a significant part of the marine and island ecosystems
- Monitoring coastal birds is necessary to determine the success of government actions in meeting treaty and legislative obligations to manage coastal birds
- Coastal birds are good indicators of the health of the environment as they are amongst the highest order predators in the food chain
- Coastal birds are relatively easy to monitor compared to other indicator animals due to their visibility and concentration at breeding and roosting sites
- Considerable biological information is available for coastal birds so it is possible to interpret monitoring data
- Coastal birds are high profile animals and visible to visitors
- Coastal birds are the subject of several international agreements.

Legislative and international obligations

The Australian and Queensland Governments are required to protect the values of the GBRWHA in general, and birds and threatened species specifically under a variety of legislation and international treaties. These include:

Legislation:
- *Nature Conservation Act 1992 (Qld)*
- *Great Barrier Reef Marine Park Act 1975 (Commonwealth)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*.

International Conventions and Agreements:
- World Heritage Convention
- Convention of Biological Diversity
- China Australia Migratory Bird Agreement (CAMBA)
- Japan Australia Migratory Bird Agreement (JAMBA)
- Ramsar (Wetland) Convention
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Since the 1980s EPA and GBRMPA have worked together to encourage and support coastal bird management. Workshops in 1995, 1996, 1997, and 1999 coordinated with Environment Australia helped develop national approaches to seabird monitoring and research.

Value of coastal birds in the Great Barrier Reef World Heritage Area

Seabirds
- 22 species of seabird nest on the Great Barrier Reef islands
- 55 islands are significant breeding islands
- 1.4 to 1.7 million seabirds breed in the Great Barrier Reef
- Over two million seabirds non-breeding migrant seabirds use the GBRWHA.

Shorebirds
For a site to be listed under the Ramsar Convention the area must support greater than 20 000 shorebirds or more than one per cent of a population.
- Shoalwater Bay and Bowling Green Bay are listed Ramsar Sites
- Other sites have been identified as meeting the shorebird criteria but have not been added to the Convention yet.

Threatened species

EPA places a high priority on threatened species listed under the Queensland *Nature Conservation Act 1992* (NCA). GBRMPA is also concerned about assessing and maintaining Great Barrier Reef coastal bird biodiversity and World Heritage values including threatened species. Species in the World Heritage Area listed under regulations of the NCA Act are:

- Herald Petrel — Endangered
- Red-tailed Tropicbird — Vulnerable
- Little Tern — Endangered
- Sooty Oystercatcher (northern spp) — Rare
- Beach Stone-curlew — Vulnerable

Garnett ST and Crawley GM *The Action Plan for Australian Birds* (2000) classified bird status nationally. Classified birds breeding or visiting beyond vagrant status in the GBRWHA are:

- Herald Petrel — Critically endangered
- Masked Booby — Vulnerable
- Red-tailed Tropicbird — Near threatened
- Little Tern — Least Concern
- Beach Stone-curlew — Least Concern
- Sooty Oystercatcher (northern spp) — Least Concern

The International Union for the Conservation of Nature classifies fauna by their threatened species status. Listed internationally is:

- Roseate Tern

Threatening processes

Tropical coastal birds are suffering a global and Pacific-wide decline. This primarily appears due to disturbance to their breeding sites and impacts on their food sources. Threatening process are those processes that are known to, or suspected of, impacting on the coastal birds. They may cause the direct death of birds, cause secondary mortality, for example through starvation, or cause long-term decline to populations by lowering reproductive success. Anthropogenic threatening process for coastal birds include:

- Disturbance to nesting, roosting and feeding sites by humans on foot, boat or vehicle
- Feral animals, for example rats and foxes
- Habitat loss, for example to coastal development
- Weeds taking over habitat
- Increased predation by silver gulls, for example on the Swains Reefs, Yeppoon
- By-catch of birds, for example by long line fishery
- Depletion of fish stocks which are prey items
- Climate change, for example changing food distribution or availability
- Water quality decreases and pollution, which deplete food availability

Natural impacts on coastal birds include:

- Adverse weather
- Parasites and disease (these can be introduced by humans)
- Variations in food availability
- Habitat loss, for example island erosion.

Issues identified by monitoring coastal birds

In the GBRWHA monitoring by the DDM Program has identified several significant coastal bird issues including:

- Discovery in 2002 that Roseate Terns breeding in Japan and China migrate to the Swains Reefs (perhaps the entire East Asian breeding population)
- An 80 per cent decline in breeding populations of Black Noddy in the Capricorn and Bunker Groups
- A 50 per cent decline in Sooty Tern and Common Noddy breeding populations on Michalmas Cay
- A 30 per cent decline in the breeding numbers of Brown Boobies in the Swains Reefs
- A change in predatory behaviour of Silver Gulls in the Swains Reefs, with a subsequent threat to the breeding success of other seabirds
- The loss of breeding populations of ground nesting terns on Green, Heron and North West islands
- A significant decrease in the population of breeding Caspian Terns near Yeppoon, probably due to an increase in the Silver Gull population
- The loss of a pelican breeding population from Pelican Island in the Whitsundays
- The precarious status of mainland populations of Little Tern and Beach Stone-curlews, due to increasing visitation to beaches.

Work by other observers has identified other coastal bird issues including:

- The decimation of Wedge-tailed Shearwaters on North Stradbroke Island (outside GBRWHA) but showing the threat of foxes to inshore island breeding birds
- The recent discovery of small breeding populations of Little Terns at obscure sites in south-east and central Queensland.

Management actions taken using monitoring data

Monitoring coastal bird populations has enabled GBRWHA management agencies to make informed decisions. Examples of DDM coastal bird monitoring data that has assisted management include:

- Monthly monitoring at Michaelmas Cay has enabled the assessment and adjustment of management actions aimed at minimising visitor impacts on grounding nesting terns
- Monitoring data at Lady Musgrave Island has enabled planners undertaking site planning to accommodate the needs of both nesting seabirds and island campers
- Accurate locations of seabirds and shorebirds enabled planners for the Whitsundays to reduce proposals for large closures to protect birds to the minimal areas required
- Monitoring data assisted separation of breeding birds and visitors at Lady Elliot Island
- Monitoring data on seabirds on Sandbank Number 8 has lead to management agencies applying conditions on a permit for a tourist operation to the site
- Published reports of monitoring in the Swains Reefs forms the basis for management of visitation to the Swains, including closures of islands
- Pelican monitoring data at Akens Island precluded the granting of a permit for oyster farming
- Nomination of Shoalwater Bay as a Ramsar site.

Coordination of coastal bird monitoring

The role of management agencies

Since the 1980s EPA and GBRMPA have worked together to encourage coastal bird management. Workshops in 1995, 1996, 1997, and 1999 coordinated with Environment Australia helped develop national approaches to seabird monitoring and research.

EPA has supported coastal bird monitoring by setting up a central database (Coastal bird Atlas) to collate and store coastal bird data. EPA has employed specialist coastal bird biologists in the past (till 1991) to undertake seabird monitoring and study. EPA is responsible for coastal bird monitoring throughout Queensland and provides resources for management of the Atlas. GBRMPA has supported coastal bird monitoring and management work. It developed and published 'Guidelines for the Visitation to Seabird Islands'.

The DDM Program undertakes a range of management actions, including monitoring, for GBRMPA and EPA. The Strategy Group for DDM decides what monitoring is possible within the DDM Program. Marine Parks staff within the DDM Program conduct most monitoring of coastal birds, with support from EPA and GBRMPA and sometimes with the assistance of other organisations. Much of the monitoring occurs on multi-tasked patrols, with few patrols dedicated to coastal bird monitoring alone.

Research into coastal birds has been conducted by EPA, universities, the CRC Reef Research Centre and specialists contracted by both GBRMPA and EPA. Critical management focused information requirements for coastal bird research need to be identified by GBRMPA and EPA. External funding is essential for this research, but the DDM Program may provide in-kind support if the research has a management outcome.

Queensland Coastal Bird Atlas

EPA is responsible for collating and managing coastal bird data. EPA set up a seabird bird database (Seabird Atlas) based in Brisbane. In the early 1990s EPA (with GBRMPA support) employed a consultant to compile all the available seabird census data into a single database (Seabird Atlas). The Seabird Atlas database contained information collected prior to about 1995.

The Seabird Atlas was upgraded and updated in 2001 incorporating additional data from Marine Park monitoring officers in Townsville, Rockhampton and Cairns. Coastal bird data is also held by a number of researchers from both within EPA and external to the service. While it does remain as a stand-alone database, it is attached to the WildNet system. It has been relaunched as the Queensland Coastal Bird Atlas. EPA officers managing the Atlas are refining the collation, storage, reporting and distribution of coastal bird data.

A policy has been drafted for sharing coastal bird monitoring data between the EPA, GBRMPA and the Biodiversity Group of Environment Australia who are responsible for the management of the Coral Sea Territory.

Monitoring methodology

Measures for monitoring

Monitoring can measure:

- Population size/index - especially the size of the breeding population
- Breeding success - is a more useful measure but much more expensive to determine
- Spatial and temporal variation in distribution
- Population demographics derived from mark/recapture, modelling etc, for example age classes
- Threatening processes - those known or suspected to have negative impacts on the populations, for example disturbance levels, habitat shrinkage.

Key sites

Priorities for the selection of monitoring sites should focus on:

- The most significant and representative populations
- Significant breeding and roosting sites known to be under threat
- Significant regional sites
- Control sites with little disturbance to compare with impacted sites.

Minimum monitoring priorities

Identification of the minimum level of monitoring required for coastal birds in the GBRWHA should be based on a risk assessment approach that looks at values and risks to values. A structured assessment of priorities must consider:

- **Indicator species:** Systematic monitoring of the breeding population size of key *indicator* species at a limited number of important breeding sites - during the breeding season (usually once per year, or twice in Far Northern and Swains colonies).

- **Threatened species:** Monitoring of *threatened* species with particular attention given to identifying threatening processes.

- **Threatened sites and threatening processes:** Monitoring where threatening processes or priority management issues have been identified (where possible this should be tied to additional research aimed at reducing the impacts of threatening processes).

- **Management actions:** Monitoring effectiveness of management actions should entail before and after monitoring and/or comparisons with control sites. It applies to both small-scale specific DDM actions such as fencing and to large-scale management actions such as the Whitsundays management planning exercise.

Additional observations

A structured program which minimises the amount of monitoring required does not preclude additional observations of coastal bird numbers at breeding or roosting sites, and observations of feeding birds made as part of patrol reporting.

Some recording of coastal bird data is undertaken by field staff on patrol in addition to structured monitoring programs. These observations could be made more structured and systematic.

Data recording methods and sheets

Minimum standard monitoring techniques have been developed with the data sheets for the Coastal Bird Atlas. Staff have been trained to observe and fill out the data recording sheet. These techniques include how to determine breeding effort by counting nesting effort. Breeding effort is the best measure for comparing sites and years when only a limited number of counts can be made at each site.

The localities and conditions where coastal birds occur are highly variable and the following considerations are important:

- Specific techniques for counting vary with the site and species
- Techniques for identifying and assessing threatening processes are determined on a case-by-case basis
- Monitoring techniques are integrated with conservation plans, management plans and threat abatement plans
- Techniques are subject to tests of statistical validity.

Table 1 Monitoring indicator species at key sites

Whilst it may be desirable to monitor all coastal bird species the minimum requirement is to monitor a selection of species that reflect a range of feeding and breeding strategies. These are the indicator species. Selection of these species was also influenced by the historic data available on some species.

Key sites for monitoring indicator species were selected with the following criteria:

- Significance of the size of the population breeding (or roosting) at the site
- Ease of access and counting
- History of monitoring at the site (it is preferable to continue existing monitoring)
- Covering a geographical spread of sites from north to south in the GBRWHA.

	Islands	**Islands**	**Islands**	**Islands**
Indicator species	**Cairns/Far Northern District**	**Hinchinbrook District**	**Whitsundays District**	**Gladstone District**
Black Noddy	Quoin Island		Bushy Islet (roost)	North West, Masthead, Heron Island
Wedge-tailed Shearwater	Rocky Islet Raine Island			North West, Masthead, Heron Island
Brown Booby	Sandbank No 8 Raine Island			Swains Reefs
Roseate Tern	Wallace Islet	Brook Island		All Cap/Bunkers
Least Frigatebird	Quoin Island			Bell Cay (Swains Reefs)
Sooty Tern	Michaelmas Cay Stapleton Island			
Masked Booby	Raine Island Moulter Cay			Swains Reefs
Pelican	Combe Island Pelican Island			Akens Island

Table 2 Key breeding sites identified as important regionally

The Great Barrier Reef has a large geographic spread. To monitor coastal birds in the GBRWHA it is important to monitor key sites throughout the area. The most significant coastal bird islands in each region have been based on the numbers of species and numbers of breeding birds on each island. (In 'Guidelines for Managing Visitation to Seabird Breeding Islands' WBM Oceanics Australia).

Cairns and Far Northern District	**Hinchinbrook District**	**Whitsundays District**	**Gladstone District**
Raine Island		Eshelby Island	Lady Elliot Island
Michaelmas Cay	Cape Bowling Green Spit	Bushy Islet (roost)	North West Island
Moulter Cay	Brook Island		Swains Reefs
Quoin Island			Fairfax and Hoskyn Islands
Sandbank No 8			
Wallace Islet			

Table 3 Monitoring and information needs for threatened species

Many information needs cannot be met as part of the monitoring strategy and must be met by other resources. The monitoring strategy can address the following monitoring needs.

Birds	Monitoring needs	Locations	Information needs
Herald Petrel	Monitoring of breeding population	Raine Island	Determine population size and if it still breeds
Masked Booby	Monitoring breeding population size	Raine Island, Moulter Cay and Swains Reefs	Population status
Red-tailed Tropicbird	Monitoring of the breeding population at Raine Island and Lady Elliot Island	Raine Island Lady Elliot Island	Understanding of nest site fidelity and the relationship with Coral Sea populations. Also significance and variable breeding success of Lady Elliott Island breeding populations.
Little Tern	Monitoring of size and location of known breeding populations in selected areas. (Little terns can move nesting locations)	**C/FN:** Ingram, Lowrie, South Barnards **Hinchinbook:** Cape Bowling Green Spit Dunk Island spit Coastal sites north of Townsville **Gladstone:** Sandy Point at Corio Bay Barrubra Island	The size and location of the Queensland breeding population, and information on the breeding success at various sites subject to different disturbance conditions. Need to acquire an understanding of the interaction with northern hemisphere and southern Australian breeding populations
Roseate Tern	Monitoring breeding populations and success	All Cap/bunkers, Brook Islands, Wallace Islet	Impacts of disturbance on breeding.
Beach Stone-curlew	Monitoring of breeding success and effects of disturbance. Targeted at known breeding pairs at selected sites	Whitsundays, Brook Islands, Shoalwater Bay, Beaches north of Townsville	Understanding of diet, predation levels, importance of island breeding sites compared to mainland sites, dispersal patterns, breeding success and effects of human disturbance.
Sooty Oystercatcher	Monitoring of population size and breeding success at selected sites	Important sites to be determined includes: North Brook and Whitsundays	Understanding of diet, predation levels, importance of island breeding sites compared to mainland sites, dispersal patterns, breeding success and effects of human disturbance.

Additional identification of key sites for monitoring is required for Little Terns, Sooty Oystercatchers and Beach Stone-curlews.

Table 4 Monitoring and research for management issues

Specific monitoring projects are often required to monitor management actions or assess management issues. More general long term monitoring can assist. This table provides a summary of information required to support coastal bird management.

Information required	Location of issue	When to monitor	How to monitor
Cause of decline of Michaelmas Cay breeding seabird species especially Sooty Tern and Common Noddy	Michaelmas Cay and a control site (e.g. Stapleton Island)	Monthly	An applied research project will drive this program. Monitoring of populations and disturbance is required.
Critical approach distances by people on foot and in boats for breeding success. Degree of species assimilation to human presence	Visited islands and control sites. Especially in Whitsundays	Breeding seasons	Research project. Support required.
Effectiveness of management actions including habituation	Site of action and a series of control sites (e.g. Michaelmas Cay, Cap/ Bunkers and Whitsundays)	Breeding seasons when action taken	Where possible monitoring breeding success or population size should occur before management action and certainly after
Impacts of disturbance by visitors to Roseate Terns (and other breeding seabirds)	Cap/Bunkers threatened and control sites	Annually at breeding times	Monitor population and visitation levels. Support required.
Location of critical feeding areas for tropical seabirds on the Great Barrier Reef (e.g. Brown Booby and unknown diets)	Swains Reefs Cap/Bunkers and Far North	Year round especially in breeding season	Research project. Support required.
Requirements for protection and recovery of threatened species - Little Tern, Beach Stone-curlew, Sooty Oystercatcher	State wide	Year round	Research project. Support required.
Genetic population structure for species of special concern and units of management to inform monitoring and management programs (e.g. Roseate Terns, Brown Boobies)	Great Barrier Reef and Coral Sea	Breeding season	Collect and analyse samples from nesting sites. Research project. Support required.
Changes in area of coral cays (e.g. Michaelmas Cay)	Reef wide	Every few years	Monitoring program beyond DDM. Support required.

Table 5 Summary of reasons for monitoring particular sites

There may be more than one reason for monitoring particular locations. A minimum number of sites have been selected that meet the different monitoring needs.

Island	Monitoring indicator species	Monitoring key sites	Monitoring threatened species	Monitoring management issues
Cairns and Far Northern				
Raine	X	X	X	
Stapleton	X			X
Moulter	X	X	X	
Quoin	X	X		
Sandbank Number 8	X	X		
Wallace	X			
Rocky	X			
Michaelmas	X	X		X
Pelican	X			
Ingram			X	
Lowrie			X	
Barnards			X	
Hinchinbrook				
Dunk Island Spit	X		X	
Brook Islands	X	X	X	
Cape Bowling Green		X	X	X
Beaches north of Townsville			X	
Whitsundays				
Bushy	X	X		
Eshelby		X		
Whitsundays Islands and mainland			X	X
Gladstone				
Swain Reefs	X	X	X	
North West	X	X	X	
Heron	X		X	
Masthead	X		X	
Fairfax and Hoskyn Island		X	X	
Lady Musgrave			X	X
Other Cap/ Bunker Islands			X	
Lady Elliott		X	X	
Akens Island	X			
Shoalwater Bay beaches			X	
Sandy Point Corio			X	

Bay				
Barrubra Island			X	

Table 6 Summary of minimum level of monitoring required

Key **When**: S= once/summer W= once/winter
Species: all = all species breeding on island, BB = Brown Booby, BN = Black Noddy, BSC = Beach Stone-curlew, HP = Herald Petrel, LF = Least Frigatebird, LT = Little Tern, MB = Masked Booby, P = Pelican, RtTb = Red-tailed Tropicbird, RosT = Roseate Tern, SO= Sooty Oystercatcher, ST = Sooty Tern, WtS = Wedge-tailed Shearwater

Island or mainland site	When to monitor	What to monitor- minimum required.	Monitoring management issues
Cairns & Far Northern District			
Raine	S/W	all, especially RtTb, HP, MB, BB, WtS	
Stapleton	S/W	all especially ST	Michaelmas Cay control site
Moulter	S/W	all, especially MB	
Quoin	S/W	all, especially LF, BN	
Sandbank Number 8	S/W	all, especially BB	
Wallace Islet	S/W	all, especially RosT	
Rocky Islet	S	WtS	
Michaelmas Cay	monthly	all especially ST	Fewer birds at tourism site, management actions
Pelican	S/W	P	
Ingram Island	S	LT	
Lowrie Island	S	LT	
Barnards Island	S	LT	
Hinchinbrook District			
Dunk Island Spit	S	LT	Effects of disturbance
Brook Islands	S	all esp LT, BSC, RosT, SO	
Cape Bowling Green spit	monthly in S	all, especially LT, BSC	Effects of disturbance
Beaches north of Townsville	monthly in S	BSC, LT	Effects of disturbance
Whitsunday District			
Bushy	S/W	all esp. BN	
Eshelby	S	all	
Whitsundays Islands & mainland	S	BSC, LT, SO	Effects of disturbance, management action
Gladstone District			
Swains Reefs	S/W	all, especially MB, BB, LF	
North West	S	all, especially BN, WtS	
Heron	S	BN, WtS	
Masthead	S	BN, RT, WtS	
Fairfax & Hoskyn	S	all, especially RosT	
Lady Musgrave	S	RosT	Management effectiveness
Other Cap/ Bunker	S	RosT	Effects of disturbance RosT

Lady Elliott	S	all, especially RtTb, RosT	
Akens	S/W	P	
Shoalwater Bay	S	BSC	
Sandy Point	S	LT	
Barrubra Island	S	LT	

Implementing the Strategy

This strategy outlines the minimum requirements for monitoring key coastal bird species at key sites within the GBRWHA.

Coordination and implementation of monitoring

EPA and GBRMPA are the prime agencies responsible for coastal birds and the health of the ecosystem in the GBRWHA and therefore have responsibility for coastal bird monitoring. Coordination of coastal bird monitoring is provided through an informal working group of EPA and GBRMPA officers. This group tries to ensure the strategy for coastal bird monitoring is implemented, with the DDM Coordination Unit providing support.

Management of the Coastal Bird Atlas by EPA staff will ensure data is consistently collected and stored in a database, that reporting meets agency requirements and that data is available for analysis.

Each year the DDM Program will attempt to undertake the minimum monitoring required for indicator species, threatened species and threatening processes as outlined by this strategy. Table 6 is the key guide for Marine Park managers to determine their monitoring program. Implementation of the monitoring strategy will be primarily through the annual business planning process that ensures resources of staff and boats are programmed. This is facilitated by the DDM Coordination Unit. GBRMPA and EPA will encourage academic and volunteer programs to assist with monitoring.

Reporting

An annual summary of coastal bird monitoring will be produced for the GBRWHA by EPA staff managing the Coastal Bird Atlas. As a minimum it will include population estimates of all key sites and species as identified in Table 6. EPA staff currently undertaking the monitoring will annually report on specific monitoring projects. Every five years a major collation and presentation of the monitoring program will be undertaken as part of the State of the GBRWHA report.

Research

Research will be undertaken by appropriate researchers and funded outside the DDM budget. GBRMPA and EPA should continue to encourage academic institutions and volunteers to participate. DDM may support projects related to the research priorities listed here if their expenses are covered by GBRMPA, EPA or external funds, and if the use of staff and boats does not compromise other management priorities.

Updating the strategy

Appraisal of the monitoring program will be undertaken each year by the Coastal Bird Working Group. The appraisal will take place in February, prior to the budgeting cycle. Each region or district will present a list of the monitoring achieved and a summary of significant results. After review by the group the monitoring strategy will be revised.

Appendix 1 The 1999 Seabird Workshop

The Great Barrier Reef/Coral Sea Seabird Workshop met in June 1999 and endorsed the priorities in this strategy. The participants for the Cairns workshop are listed below:

Tony Stokes, Great Barrier Reef Marine Park Authority (GBRMPA) - organiser
Barry Baker, Environment Australia
Brad Congdon, James Cook University (Cairns campus)
John Cornelius, EPA DDM Cairns
Dennis Devine, EPA DDM Cairns
Kirstin Dobbs, GBRMPA
Pam Dyer, University of the Sunshine Coast
Darren Grover, James Cook University Townsville
Emma Gyuris, James Cook University (CRC Reef)
Mark Hallam, Environment Australia
Eddie Hegerl, Australian Marine Conservation Society
John Hicks, EPA DDM Townsville
Kees Hulsman, Griffith University
David James, Australasian Seabird Group/Birds Australia
Col Limpus, EPA, Brisbane
David Milton, CSIRO Marine Research
Frazer Muir, EPA DDM Cairns
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