

A changing climate for the seabirds and shorebirds of the Great Barrier Reef

Summary

The *Great Barrier Reef Outlook Report 2009* identifies seabirds as being highly vulnerable to the potential consequences of climate change. Under the *Great Barrier Reef Climate Change Action Plan 2007-2012*, the Great Barrier Reef Marine Park Authority (GBRMPA) is supporting research to determine the extent and the temporal and spatial patterns of observed bird declines at key breeding sites on the Great Barrier Reef. This information will help define the knowledge gaps and information required to guide appropriate management strategies aimed at improving seabird and shorebird resilience to a changing climate.



Background

The Great Barrier Reef World Heritage Area is of international importance to seabirds and shorebirds. It provides breeding and roosting habitat, feeding grounds and migratory pathways to at least 23 seabird species and 32 shorebird species. Large populations of these species are monitored in accordance with the Great Barrier Reef Coastal Bird Monitoring Strategy. The data is stored in the Coastal Bird Atlas database, which is managed by the Queensland Department of Environment and Natural Resource Management (DERM). The Atlas database currently contains over 60,000 records. This database is now being queried to investigate long-term spatial and temporal patterns in breeding seabird populations on the Great Barrier Reef. This information will help inform appropriate management strategies to improve seabird and shorebird resilience under a changing climate.

Seabird declines

Initial analysis of Atlas data for some key breeding sites on the Great Barrier Reef (Michaelmas Cay, Heron Island, the Swain reefs and Raine Island), revealed significant population declines for some very common seabird species. Wider analysis of the Atlas and other related databases is now underway to determine whether the observed declines extend throughout the World Heritage Area.

Table 1: Key questions for further analysis of the Coastal Bird Atlas database. Some questions require other existing datasets to be linked to the Coastal Bird Atlas.

Research area	Key questions
Seabird island habitat – nesting and roosting	<p>What is the abundance and the temporal and spatial distribution of birds in the Great Barrier Reef World Heritage Area?</p> <p>What are the natural environmental processes affecting bird populations in the Great Barrier Reef World Heritage Area?</p>
Seabird foraging and dispersal patterns	<p>What are the local and regional climate change impacts and other human activities affecting bird populations in the Great Barrier Reef World Heritage Area?</p>
Shorebird roosting and feeding habitats	<p>What are the critical research and monitoring priorities that will address management needs in the face of climate change, to conserve bird populations in the Great Barrier Reef World Heritage Area?</p>

Project name: Seabird atlas

Project code: 2.2C.412.7.09

Outcome: B1 & B2

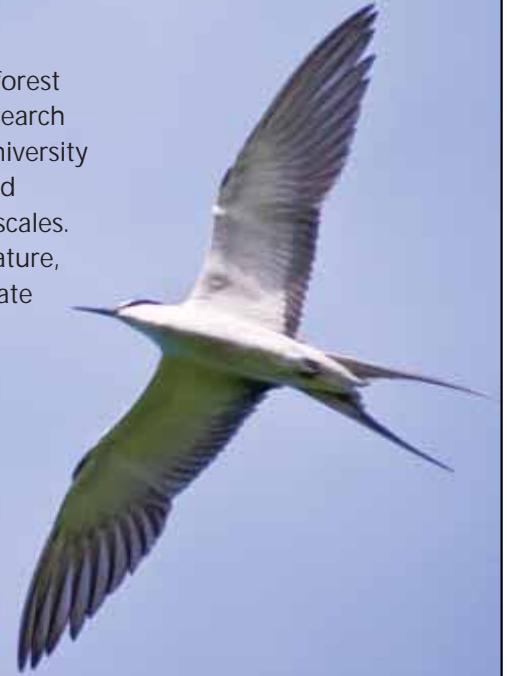
Year: 2009–2010

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Tracking climatic influences on seabirds of the Great Barrier Reef

The Great Barrier Reef Marine Park Authority, in partnership with the Reef and Rainforest Research Centre and the Australian Government's Marine and Tropical Sciences Research Facility, is supporting seabird research projects at James Cook University and the University of Queensland. This research is specifically looking into the linkages between seabird foraging and reproductive success and oceanographic variation at different spatial scales. Satellite tracking tags and GPS data loggers are being deployed along with temperature, depth and activity recorders on several seabird species. This data will be used to relate patterns of resource use and foraging behaviour with physical oceanography.

These data, when combined with satellite and hydrodynamic information on oceanographic variability, enable better predictions of how seabirds will respond to projected increases in sea-surface temperature and other ENSO associated phenomena. The research is also assessing the flexibility of behavioural and developmental factors in several seabird species in response to fluctuating resource availability. Combined, these two project components are helping to determine the likely range of oceanographic and climatic conditions within which seabird reproduction on the Great Barrier Reef will remain viable.



Research priorities

In July 2008, a workshop was held to discuss possibilities for further analysis of the Coastal Bird Atlas database and related datasets. The workshop was organised by GBRMPA and attended by members of the GBRMPA, DERM, researchers, consultants and community groups with a history of interest in coastal birds. During the workshop a list of key further data analysis questions was established. The three key research areas and four overarching research questions are shown in Table 1. These questions will provide the basis for any further analysis and interpretation of the database.

Investigation of these key research areas and questions will guide further steps towards determining, understanding and predicting the status and trend of seabird populations in the World Heritage Area. This information will help researchers and managers to forecast the impacts of climate change and other human related pressures on seabird and shorebird species and their habitat areas.

Recent progress

The final report for the Phase 1 analysis of the Coastal Bird Atlas data has been completed. The data has now

been more clearly defined and key sites that are relevant to understanding the distribution of seabird breeding activity on the Reef have been highlighted. A number of regions were defined and particular species were shown to prefer certain regions for breeding and experienced differing long-term breeding patterns.

The Redtailed Tropicbird, Lesser Frigatebird, Common Noddy, Roseate Tern and Black-naped Tern showed a significant decline in breeding numbers between 1982 and 2001. Results for the Bridled Tern, Crested Tern, Masked Booby and Sooty Tern were either inconclusive, showed no change, or exhibited a significant increase in breeding activity during the same period.

Future directions

Phase 2 of this project will focus on identifying the reasons for any observed temporal patterns in breeding effort by defining the links between the size of breeding populations and the environment.

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