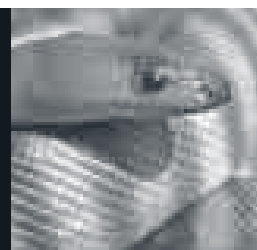


## 6 State of the Parks report



[Guide to the State of the Parks report](#)

[Chapter index](#)

[Individual reports for Commonwealth reserves](#)

## Guide to the State of the Parks report

The State of the Parks report presents systematic and consistent background information on each Commonwealth reserve proclaimed under the EPBC Act and for Calperum and Taylorville Stations.

The following information is common to the reports on each place:

- **Area and locational information** derived from the Collaborative Australian Protected Areas Database is provided.
- The World Conservation Union (**IUCN**) **protected area management category** is identified for each reserve, and where parts of the reserve come under different categories this is indicated. The IUCN categories are formally assigned under the EPBC Act, and schedule 8 of the EPBC Regulations defines the Australian IUCN reserve management principles applying to each category.
- Where possible, each reserve's **biogeographic context** is described by reference to the national biogeographic regionalisations: terrestrial (Interim Biogeographic Regionalisation for Australia) or marine (Integrated Marine and Coastal Regionalisation of Australia).
- The report summarises the relevance of **international agreements** to each reserve, recognising both the international significance of the reserves and the Director's legal responsibility to take account of Australia's obligations under each agreement.
- The report summarises the occurrence in each reserve of **species listed under the EPBC Act** as threatened, migratory or marine, and the status of relevant recovery plans.
- Information on the **total number of different types of plant and animal species** recorded for each place is included, to the extent of available knowledge. For the six terrestrial national parks, Parks Australia has worked to refine understanding of the species recorded from each park and the species for which each park is significant. The species information for these six parks includes the numbers of species which are a priority for management (defined as being all threatened species plus those non-threatened species for which the park contains more than 1 per cent of its population).
- Monitoring is a key aspect of successful park management, and **major monitoring efforts** for the year are reported.
- Future planning is ongoing, and **future challenges** are reported for each area.
- **Management arrangements** (such as boards of management, committees, management agreements with state agencies) are described.
- The report provides information by **key result area** on major issues, actions and performance results for 2006–07.

Also included in this section are **case studies** that provide more detailed reporting on management of specific issues.

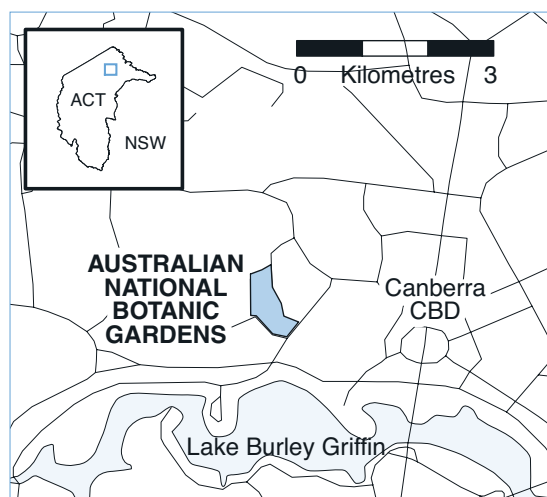
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## Australian National Botanic Gardens

<http://www.anbg.gov.au>



### Special features

The Australian National Botanic Gardens (ANBG) is a major scientific, educational and recreational resource. It was one of the first botanic gardens in the world to adopt the study and display of a nation's native species as a principal goal. Approximately one-third of the known flowering plant species that occur in Australia, and about half the known eucalypt species, are represented in its living collection. The ANBG is a national showcase in the horticultural use of Australia's native plants.

The ANBG contributes to meeting Australia's obligations under various international environment conventions to which Australia is a signatory. In particular, the Convention on Biological Diversity recognises the importance of botanic gardens in *ex situ* and *in situ* conservation, research, training, plant identification and monitoring, raising public awareness, providing access to genetic resources, and global cooperation in relation to sustainable use of plant biodiversity.

Location	Latitude 35°16' South, Longitude 149°06' East	
Area	85 hectares	
Proclamation date	17 September 1991	
IUCN category	Category IV	
Biogeographic context	Displays plants from a vast range of biogeographic regions—alpine to tropical, coastal to central desert	
Management plan	Second plan expires 9 January 2009	
Other significant management documents	Management plan implementation schedule; risk assessment and management schedule; ANBG Masterplan (National Capital Authority); Capital Works and Maintenance Plan 2002–2005; Emergency Response Procedures Manual June 2005; ANBG Fire Procedures 2006; kangaroo and wallaby management plans; ANBG Education Service Policy; ANBG Photograph Collection Policy; Agreement for the Establishment and Operation of the Centre for Plant Biodiversity Research between the Director of National Parks and the CSIRO	
Financial	Operating	\$9.169 million
	Capital	\$0.782 million
	Revenue	\$0.661 million

Visitors	509,325 to site 122,762 to visitors centre
Living plants	Planted in 2006–07: 12,478 Total number of taxa in the living collection: 6,673 Total number of registered plants in the living collection: 90,506
Herbarium specimens	Specimens added to database in 2006–07: 37,380 Total number of specimens in collection: ~1.2 million
Australian Plant Image Index	Added in 2006–07: 1,885 Total number of photographs in collection: 35,617
Permits	4 commercial activity permits; 58 wedding or wedding photography licences; 101 licences to publish 640 photographs from the collection

International conventions and agreements	
World Heritage Convention	Supports Australia's World Heritage sites through botanical research, scientific plant collections, plant identification, botanical information management and horticultural and educational programmes
Wetlands (Ramsar) Convention	Supports Australia's obligations under the Ramsar Convention through access to plant identification services and data on aquatic plants in the Australian National Herbarium, and through delivering information on Australia's aquatic plants through its website
Other agreements	Collaborates with international organisations including: <ul style="list-style-type: none"> <li>• International Association of Botanic Gardens</li> <li>• International Association of Plant Taxonomists</li> <li>• International Plant Propagators Society</li> <li>• International Union of Biological Sciences Taxonomic Databases Working Group</li> <li>• International Plant Name Index (Kew Botanic Gardens and Harvard University)</li> <li>• Global Biodiversity Information Facility</li> <li>• International Organisation for Plant Information World Vascular Plant Checklist Project</li> <li>• Species 2000</li> </ul>

Environment Protection and Biodiversity Conservation Act 1999	
Heritage	On Commonwealth Heritage List

## Centre for Plant Biodiversity Research

The Centre for Plant Biodiversity Research is a joint venture by the ANBG and CSIRO Plant Industry. It was formed in 1993 and renewed for a further 10 years in 2000.

The Australian National Herbarium is the foundation of this facility, housing voucher specimens for research and environmental studies and for plants in the ANBG with databases supporting the living, herbarium, and photograph collections. The herbarium is a major contributor to the network of Australasian herbaria, to Australia's

Virtual Herbarium—a national project involving all states and territories—and to the Australian Plant Census project to produce a national endorsed list of scientific names for Australian plants.

## Monitoring

The ANBG's scientific planting is documented through voucher specimens in the Australian National Herbarium. A team of botanists, including national and international collaborators, ensure that the correct botanical names are always applied. New collection accessions help document the occurrence and distribution of plants in Australia.

A specialised and sophisticated database system maintains essential links between specimens in the herbarium, contemporary scientific literature, the living plants in the gardens and the photographs in the Australian Plant Image Index.

A team of ANBG staff regularly assesses the ANBG's living plant specimens.

A new computerised irrigation management system installed in 2006 is being used to monitor and manage irrigation more efficiently and reduce water use.

## Future challenges

Major challenges are:

- water management in light of the continuing drought and sharp increases in unit water costs in Canberra. With further restrictions expected to come into force in 2007–08, actions will be needed to reduce nursery activities to maintenance of the 'permanent pot collection', reduce new propagation to a minimum, possibly sacrifice replaceable areas like lawns and expedite the long-term aim to establish a non-potable water source to water plants
- studying the impact of climate change. This will be a major focus for the ANBG as it seeks to understand and adapt to climate change, and to develop and communicate sound climate change messages about Australia's biodiversity and horticultural practices to visitors and clients
- placing a monetary value on the living, herbarium and photograph collections. Valuation is necessary to ensure the collections are adequately resourced
- maintaining the ANBG's role as a tourist attraction in the face of water restrictions. Visitor attractions like the Friends of the ANBG's summer concerts and guided tours will continue to be important
- continuing work on the Australian Plant Census project to produce a list of flowering plant names for the whole of Australia that is endorsed by the Australian Government and the state and territory herbaria. The project coordinator is located at the Australian National Herbarium and the project is due for completion in 2008 (see case study on page 55)
- implementing the next phase of Australia's Virtual Herbarium. Funding for the first phase ended in 2006 and the ANBG is working with state and territory herbaria and museums to build on the project through new national infrastructure proposals.



## Report on performance by key result areas

### **KRA1: Natural heritage management**

#### *Major issues*

- Water management infrastructure
- Plant records and census of living plant collection
- Introduction of GIS to living collection management

#### *Actions*

- Increase water use efficiency
- Stocktake the living collection
- Use GIS to map the living collection

#### *Performance results 2006–07*

- Increased water use compared to 2005–06 due to hot and dry weather conditions. The ANBG more than met its own target of replacing 50 per cent of net evaporation per year; however this still fell short by 21 per cent of ACTEW's target allocation of water to the ANBG
- Developed a strategy to undertake a complete living plant census in 12 months (instead of three years as previously) via deployment of nursery staff
- Implemented the first phase of the ANBG's GIS

### **KRA2: Cultural heritage management**

#### *Major issues*

- Displaying the flora of Australia
- Education

#### *Actions*

- Display the flora of Australia in a horticultural setting
- Provide cultural interpretation and education programmes relevant to the Australian flora

#### *Performance results 2006–07*

- The ANBG displays about one-third of the plant species thought to occur naturally in Australia in a managed horticultural setting. Water restrictions put much of the collection under stress and resulted in some losses
- Promoted the cultural values of Australian native plants with exhibitions in the visitor centre and elsewhere in the ANBG: 'Flora Tasmanica', 'Bare Winter', 'A Tree in the Palm of your Hand Bonsai Exhibition', 'Snakes Alive!', 'Blooming Threads' and 'Caring for Land'
- 16,897 children attended the ANBG education programmes



- Distributed approximately 500 copies of the education unit's poster on the floral emblems of Australia to schools and educators on demand

#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Visitor management
- Visitor safety

##### *Actions*

- Conduct visitor surveys
- Initiate a marketing plan
- Conduct an eastern brown snake survey

##### *Performance results 2006–07*

- Completed a major visitor survey in conjunction with the umbrella organisation Botanic Gardens of Australia and New Zealand and commenced a visitor survey with the National Capital Attractions Association
- Drafted a marketing strategy
- Completed an eastern brown snake survey. An interim snake management policy was drafted and approved

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Friends of the ANBG
- Greening Australia
- Centre for Plant Biodiversity Research
- Botanical forums: the Council of Heads of Australasian Herbaria, Council of Heads of Australian Botanic Gardens, Global Biodiversity Information Facility and Taxonomic Databases Working Group
- Commonwealth Environment Research Facilities Taxonomy Hub
- ACTEW Corporation

##### *Actions*

- Strengthen the partnership between the ANBG and the Friends of the ANBG
- Continue hosting the Greening Australia Community Seedbank on the ANBG site
- Continue to participate in the joint ANBG–CSIRO Centre for Plant Biodiversity Research
- Continue the Australian National Herbarium's leadership role in the Council of Heads of Australasian Herbaria

- Continue the Australian National Herbarium's participation in the Council of Heads of Australian Botanic Gardens, Global Biodiversity Information Facility and Taxonomic Databases Working Group
- Continue the Australian National Herbarium's participation in the Commonwealth Environment Research Facilities Taxonomy Hub in association with CSIRO biological collections and major universities
- Liaise with ACTEW Corporation which is the sole supplier of water to the ANBG and administers the ACT Government's water restrictions

#### *Performance results 2006–07*

- The Friends of the ANBG ran the annual students' photographic competition and the autumn and spring plant sales; published quarterly newsletters; provided volunteer guided walks each day; opened the Friends Cascade, a new water feature; opened the Friends Shelter, the first project of the Friends' Public Fund; and supported the ANBG's annual summer concerts in January–February 2007
- Continued the close collaboration between the ANBG seedstore and Greening Australia including joint field collecting, seed storage and management. The ANBG also provides Greening Australia with space for seedling production
- Continued ANBG staff's management, research and technical support roles in the Centre for Plant Biodiversity Research and the Australian National Herbarium
- The Council of Heads of Australasian Herbaria's Australia's Virtual Herbarium project tendered for and won a government contract to prepare weed profiles for the Department's Species Profile and Threats Database.
- Continued membership of technical working groups under the Global Biodiversity Information Facility and Taxonomic Databases Working Group
- Undertook a project to database and manage digital images of historical specimens from the Royal Botanic Gardens, Kew's herbarium collection. The project is funded by the Global Biodiversity Information Facility
- Ran a workshop on life science identifiers for Australian herbaria and participated in a workshop on database standards, both under the auspices of the Taxonomic Databases Working Group
- Took a leadership role within the Council of Heads of Australian Botanic Gardens in developing a national climate change adaptation response for botanic gardens
- Received support through the Commonwealth Environment Research Facilities' Taxonomy Hub project and began recruitment to key positions
- Maintained a positive working relationship with ACTEW which administers the ACT Government's water restrictions. The ANBG received a water use exemption to maintain the living collection

**KRA6: Business management***Major issues*

- Budget management
- Staff management
- Risk management

*Actions*

- Ensure business continuity and service delivery
- Manage staff resources efficiently
- Continue ongoing risk assessment

*Performance results 2006–07*

- Significant increases in the unit cost of water have reduced the ANBG's ability to deliver on other key functions
- Attempting to ensure business continuity and delivery of existing services with declining resources is impacting on staff dedicated to the high standards of a national botanic garden
- The effects of an ageing workforce are starting to be felt, especially among horticultural staff managing the living collection
- Maintained and improved staff consultation, involvement and capacity building formally (through training, the occupational health and safety committee, staff planning days) and informally (through opportunities for higher duties, informal consultation)
- Damage to buildings and nursery polyhouses from the February 2007 hail-storm and failure of the herbarium building's air-conditioning system in summer highlighted the importance of risk monitoring through riskwatch lists, and identifying appropriate action. Drought is the most significant ongoing direct risk to the living collection

**KRA7: Biodiversity knowledge management***Major issues*

- Australian National Herbarium
- Australian plant names
- Taxonomic botanical research
- Botanical database and information management
- Australian Plant Image Index
- The ANBG website, incorporating the Centre for Plant Biodiversity Research and the Friends of the ANBG
- Climate change

### Actions

- Maintain and curate the Australian National Herbarium collections and make botanical data, information and expertise available to the national and international botanical community
- Develop and maintain the Australian Plant Name Index and the Australian Plant Census to define and list all the flowering plants in Australia
- Undertake taxonomic and systematic research, and publish and disseminate research findings
- Develop and maintain scientific databases of Australian plant information
- Enhance the extensive collection of photos and illustrations of plants and further develop access to the collection using innovative technology
- Promote and provide information about Australian native plants via the internet
- Position the ANBG as a leader in *ex situ* responses to climate change

### Performance results 2006–07

- Curated and databased 37,380 specimens which contributed to the Australia's Virtual Herbarium project
- Continued management of the Australian Plant Name Index and the collaborative Australian Plant Census project to produce an agreed list of scientific names for Australia's flowering plants. The project is funded through the Natural Heritage Trust and endorsed by Australian Government, state and territory herbaria
- Researchers completed scientific papers or publications resulting from research undertaken at the Australian National Herbarium. Areas of study include Australian Orchidaceae, Asteraceae, Myrtaceae, Malvaceae, Santalaceae and the bryophytes
- Born-digital images started to contribute significantly to the Australian Plant Image Index which was previously based on 35 millimetre slides; 2,315 additional images were made available via the web
- Continued to develop the website as the premier online resource for information about Australian plants. The website recorded an average of 45,000 hits each day, an increase of 10,000 per day from 2005–06
- Developed a botanic gardens climate change website
- Initiated a seed collecting project in the vulnerable alpine areas

## Making Australian plants count



*Terminalia bursarina* – This tree, widespread across northern Australia, has been known by different names by different authors. It has been treated as a distinct species (especially by botanists in the NT) or included within the related species *T. canescens* (especially by Queensland botanists). Recommended nomenclature through the Australian Plant Census is to treat both taxa as distinct species

Compiling a list of all naturally occurring and naturalised Australian plants is a major undertaking only attempted twice before.

For a plant census to be truly useful, it must include all names, including synonyms, and provide information on the taxonomic concept of the plant to which each name or names are applied. In the past, different botanists and state herbaria used different concepts when applying names to their flora, with plants apparently 'changing names across borders'. The need for a unified Australian Plant Census became more urgent as the Australian Government tried to align new legislative schedules with state government legislation.

In 2004 the Council of Heads of Australasian Herbaria, including representatives of all the state, territory and Australian Government herbaria, agreed to produce this much needed list with funding from the Natural Heritage Trust. The aim is a 'consensus census' which presents the majority view, in some cases a compromise between conflicting scientific opinions, on the current state of Australia's taxonomic plant

knowledge.

The census project is coordinated by the Australian National Herbarium and builds on the foundation of the Australian Plant Name Index which is managed by the herbarium on behalf of the Australian botanical community. The index lists every published use of every plant name for the Australian flora, including introduced naturalised species. The census tells users which of those names are currently recognised and which are regarded as synonyms, along with basic state-level distribution. Decisions are made with extensive input from botanists in all major Australian herbaria, making the census a truly national, collaborative project.

The process so far has involved working through the flowering plants family by

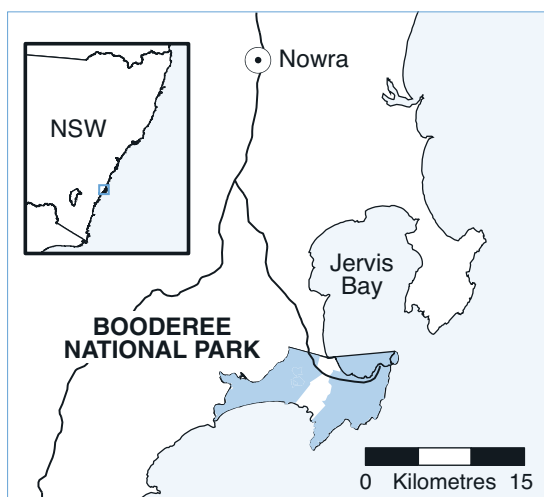
family. The list is refined by consensus with a working group of botanists in each herbarium. By mid-2007, 205 families had been treated covering about 50 per cent of Australia's flowering plants. Some large groups such as the Proteaceae, Chenopodiaceae and Mimosaceae have been completed but many major groups remain to be tackled, including the Poaceae, Myrtaceae and Asteraceae.

Unlike previous plant lists the census is a dynamic database, constantly updated as new information is published. In that sense it will never be 'finished' but the first pass at a consensus census for all Australian flowering plants is expected by late 2008. In the meantime, the census is accessible to scientists and the public for those families treated so far.

See the results so far at <http://www.anbg.gov.au/chah/apc/index.html>.

## Booderee National Park

<http://www.environment.gov.au/parks/booderee>



### Special features

Booderee National Park protects most of the southern peninsula of Jervis Bay, the Bherwerre Peninsula, Bowen Island, and the waters and seabed in the southern part of the bay. The park includes the Booderee Botanic Gardens, formerly an annex of the ANBG. Staff work cooperatively with the adjoining NSW Jervis Bay National Park to protect much of the biodiversity of the Jervis Bay region.

Booderee National Park is of great significance to its traditional owners, the Wreck Bay Aboriginal community, who are increasingly involved through a unique and evolving joint management model in running and servicing the park. More than 100 prehistoric Aboriginal sites have been recorded on the Bherwerre Peninsula.

Jervis Bay is one of the major biogeographic nodes in Australia and contains a variety of relatively undisturbed marine and terrestrial habitats. The marine environment is one of the most diverse recorded in temperate Australia, with tropical and temperate species represented. The park is renowned for its exceptional water clarity, due to small intact catchments, and exceptionally white sands. The park has one of the largest seagrass meadows on the NSW coast. Vegetation communities include relic rainforest, littoral rainforest, forest, woodland, wet and dry heath, salt marsh and coastal wetlands, and coastal scrub and grassland communities. The park is rich in flora and fauna.

Location	Latitude 35° 09' South, Longitude 150°39' East
Area	6,379 hectares (including a marine area of 875 hectares)
Proclamation date	4 March 1992
IUCN category	Category II overall (botanic gardens Category IV)
Biogeographic context	Interim Biogeographic Regionalisation for Australia region: Sydney Basin
Management plan	First plan expires 3 April 2009
Other significant management documents	Management Plan Implementation Schedule; Risk Assessment and Management Schedule; fire and pest management strategies; Memorandum of Understanding with NSW Rural Fire Service; draft Memorandum of Understanding with the Department of Defence; Botanic Gardens' Collections Policy; Joint Training Strategy with the Wreck Bay Aboriginal Community Council and Wreck Bay Enterprises Ltd; Cultural Heritage Strategy in preparation

Financial	Operating	\$6.124 million
	Capital	\$1.023 million
	Revenue	\$1.137 million
	Paid to traditional owners	\$0.490 million
Visitors	400,000 (estimated)	
Permits	19 commercial tour operators, 9 research, 2 wedding celebrants	

International conventions and agreements	
Wetlands (Ramsar) Convention	Nomination in preparation
Migratory Species (Bonn) Convention	23 of 98 listed Australian species
China–Australia Migratory Birds Agreement	20 of 81 listed species
Japan–Australia Migratory Birds Agreement	22 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 critically endangered 4 endangered 11 vulnerable 36 migratory 72 marine East coast whale migration refuge area
	Recovery plans	5 implemented: humpback whale ( <i>Megaptera novaeangliae</i> ); southern right whale ( <i>Eubalaena australis</i> ); albatross ( <i>Diomedea</i> spp. and <i>Thalassarche</i> spp.) and giant petrels ( <i>Macronectes</i> spp.); marine turtles; grey nurse shark ( <i>Carcharias taurus</i> )  5 in preparation: grey-headed flying-fox ( <i>Pteropus poliocephalus</i> ); Gould's petrel ( <i>Pterodroma leucoptera</i> ); eastern bristlebird ( <i>Dasyornis brachypterus</i> ); green and golden bell frog ( <i>Litoria aurea</i> ); giant burrowing frog ( <i>Heleioporus australiacus</i> )
Listed flora	Species	1 vulnerable
	Recovery plans	1 in preparation: magenta lilly-pilly ( <i>Syzygium paniculatum</i> ) <sup>a</sup>
Heritage	On Commonwealth Heritage List (part of several listings)	

(a) Recovery plan currently being drafted following collation of distribution data.

Numbers of native species recorded					
Mammals	Birds	Reptiles	Amphibians	Fish	Plants
26 (4)	200 (9)	17 (3)	14 (2)	308 (1)	625 (1)

Figures in brackets are the number of species that are a management priority



## Board of management

The Booderee National Park Board of Management has 12 members, including seven representatives nominated by the Wreck Bay Aboriginal Community Council. The board oversees preparation and implementation of the park's management plan. The current plan expires in 2009 and the board will commence preparation in 2007–08 for the second management plan.

## Monitoring

Species are being systematically monitored in collaboration with the Australian National University Centre for Resource and Environmental Science. This five-year study seeks to document the role of fire in determining species distribution and abundance. The results are expected to be published over the next two to three years.

Threatened and listed species monitoring continued with a focus on birds including the eastern bristlebird (*Dasyornis brachypterus*), sooty oystercatcher (*Haematopus fuliginosus*) and little penguin (*Eudyptula minor*), and amphibians including the green and golden bell frog (*Litoria aurea*) and the giant burrowing frog (*Heleioporus australiacus*). A full time PhD student began a study on amphibians in the park in March 2007 and the data will provide a valuable baseline for examining climate change impacts.

Wildlife monitoring also continued to focus on the effectiveness of regular fox baiting and long-term impacts of the 2003 Windermere fires, particularly on long-nosed bandicoots (*Perameles nasuta*) and eastern bristlebirds.

A new aerial survey technique for the highly invasive ecological weed bitou bush (*Chrysanthemoides monilifera*) was trialled and the results indicate some decrease in density of the main infestation behind Bherwerre Beach, and some increase in the number and density of satellite infestations (see case study on page 66). Bitou remains the major environmental risk to the park. New integrated management approaches involving ultra low volume aerial spraying followed by high intensity fire were partially successful, with a sprayed large block successfully burnt. Monitoring sites were established in the block before treatment, so that the ecological consequences of treatments can be determined.

Effort was increased to monitor compliance with the park's marine zoning scheme and catch limits, and the effectiveness of brochures and face-to-face education.

## Future challenges

Major challenges are:

- continuing to improve control measures for key threats particularly introduced kikuyu grass (*Pennisetum clandestinum*) on Bowen Island, bitou bush and foxes throughout the park



- addressing the park's isolation from adjacent natural areas due to development pressures in the region
- progressing the cultural centre
- identifying ways of replacing critical ageing assets (notably the visitor information centre)
- completing the cultural heritage strategy with the Wreck Bay Aboriginal community and implementing the strategy's recommendations
- implementing the training strategy
- progressing service level agreements and contracting opportunities with the community to an agreed timetable
- identifying impacts and possible actions to address climate change.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- 13 known introduced terrestrial vertebrate pest species in the park, of which foxes are the greatest threat
- Bitou bush is the most significant weed in Booderee
- Protection of seabird nesting habitat (little penguin, three species of shearwater, sooty oystercatcher) from kikuyu grass and other weeds
- Fire-prone vegetation communities require active management in an increasingly risky climate
- The role of climate change and its impacts on the park
- Rapid residential development in surrounding areas isolating the park from adjacent natural areas, possibly threatening a range of species

#### Actions

- Manage the feral animal control programme with emphasis on regional fox control, control of resilient individual foxes and introduction of alternative fox control methods
- Develop safer integrated management techniques (aerial spraying and fire) for bitou control. Refine integrated control measures (fire, spraying, rehabilitation) and monitor ecological impacts of these control measures
- Control the spread of kikuyu on Bowen Island, and increase community involvement
- Continue to implement an ecologically appropriate and safe fire management programme and upgrade training and monitoring to cope with larger, more intense fires

- Continue to consult with agencies on the regional value of the park, the importance of maintaining habitat corridors and links with other natural areas, and possible impacts of development
- Work with researchers to better understand potential impacts of climate change on the park

#### *Performance results 2006–07*

- The exceptional natural recovery after the intense wildfires of 2003–04 continued. Biodiversity monitoring continues to indicate a healthy environment with indicator species stable or increasing. However, for the second year running, the threatened green and golden bell frog was not recorded in the park
- High numbers of key indicator species (long-nosed bandicoot and eastern bristlebird) suggest that fox baiting is succeeding. Initial research suggests that optimum recovery of indicator species may be achieved if fox control is carried out soon after a wildfire
- Focused on maintaining native plantings and re-establishing penguin nesting habitat on Bowen Island
- Trained five new crew leaders and updated fire training standards with a new fire officer

### **KRA2: Cultural heritage management**

#### *Major issues*

- Maintaining the cultural values of the park
- Addressing aspects of cultural heritage management through a cultural heritage strategy
- Developing and delivering a well-accepted cultural heritage education programme in partnership with the Wreck Bay Aboriginal Community Council

#### *Actions*

- Maintain the register of cultural sites on GIS and database, determine protection measures, and examine the merits of a more sophisticated GIS
- Offer school holiday summer, spring and autumn interpretation programmes with an increased focus on cultural interpretation
- Develop Koori cultural themes to promote understanding of Aboriginal plant use
- Continue planning for a staged approach to a new visitor/cultural centre by progressing concept design and business case development
- Develop a cultural heritage strategy for the park
- Continue the Junior Ranger programme with an integrated approach to education about natural and cultural park values



### *Performance results 2006–07*

- Conducted a cultural interpretation holiday programme during the spring, summer and autumn school holidays, involving 159 sessions and 4,459 attendees
- Maintained the cultural heritage GIS held by the Wreck Bay Aboriginal community
- Began construction of new signage, and walking trails at Booderee Botanic Gardens
- Commenced a cultural heritage consultancy
- Continued the Junior Ranger programme at Jervis Bay School (see case study on page 68 )

### **KRA3: Joint management**

#### *Major issues*

- Lease is successfully administered and conditions met
- Contracting arrangements between the park and Wreck Bay Aboriginal community are progressed to an agreed timetable
- Management plan is fully implemented

#### *Actions*

- Continue to negotiate service level agreements for provision of agreed park services under the terms of the services contract between the Wreck Bay Aboriginal community and the Director
- Implement an integrated training strategy agreed by the Wreck Bay Aboriginal community, the park and Wreck Bay Enterprises Ltd
- Prepare an annual management plan implementation schedule and report progress to the board of management

### *Performance results 2006–07*

- Supported ongoing service level agreements for road and fire trail maintenance and entry station services
- Finalised and implemented a service level agreement for cleaning park and staff facilities
- Wreck Bay Enterprises Ltd contractors undertook capital works in the park
- Park and Wreck Bay boards of management endorsed the integrated training strategy agreed by the park, the community and Wreck Bay Enterprises Ltd. The strategy is consistent with park lease obligations, and a substantial amount of training was conducted
- Upgraded and refined the management plan implementation database
- Received a World Wildlife Fund Australia award for the most outstanding Commonwealth protected area for the decade 1992–2002

- A community member advanced through the training programme to a management level position

#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Increasing visitors' awareness of the park's natural and cultural values
- Provision of infrastructure to facilitate appropriate and safe use of the park while protecting conservation values
- Poor condition of the visitor centre due to its age

##### *Actions*

- Include conservation and cultural themes in interpretation programmes
- Maintain campgrounds and public facilities and infrastructure to a high standard
- Educate visitors about fish catch limits and the zoning plan and enforce legislation where appropriate
- Monitor visitor numbers and experiences
- Renovate the visitor centre and plan for its replacement
- Manage risk through a risk watch list and ParkSafe

##### *Performance results 2006–07*

- Delivered interpretation programmes focusing on Aboriginal cultural values and conservation themes in the park and at schools, and during school holidays
- Completed repairs to visitor infrastructure damaged by the Windermere fire of Christmas 2003. Finalised repairs and insurance payments in November 2006
- Upgraded visitor facilities including the Green Patch nature trail, Booderee Botanic Gardens walking trails, visitor information signs, and roads and management trails. Began work on two new public shelters
- Recorded generally high levels of compliance with marine zoning scheme and catch limits (there are few repeat offenders) but there is a serious problem with a small number of fishers taking commercial quantities of squid. Commenced prosecution actions for repeat offenders
- Enhanced visitor data analysis software and hardware
- Carried out two visitor satisfaction surveys, with 96 per cent of those surveyed in January 2007 responding as 'satisfied to completely satisfied' and 93 per cent in the June 2007 survey
- Completed some minor refurbishment of the visitor centre. Concept design and business case development are under way for eventual replacement or major refurbishment, with capacity to include a cultural centre
- Completed job safety analyses on a range of higher risk functions



## **KRA5: Stakeholders and partnerships**

### *Major issues*

- Cooperative arrangements between the park, the NSW National Parks and Wildlife Service, the Jervis Bay Marine Park and the Department of Defence
- Strong cooperative arrangements with universities
- Fire recovery monitoring

### *Actions*

- Continue integrated management programmes in key areas
- Support research in conservation areas identified in the park management plan
- Support cooperative undergraduate and postgraduate programmes
- Refocus monitoring programmes to deal with wildfire
- Support community involvement (through Parkcare, Conservation Volunteers Australia, Community Development Employment Projects)

### *Performance results 2006–07*

- Continued cooperative arrangements with adjacent agencies, including NSW National Parks and Wildlife Service, Jervis Bay Marine Park, NSW Fisheries and Department of Defence. Booderee continued to lead regional fox management
- Issued nine research permits in postgraduate conservation fields in accordance with the management plan. Cooperative undergraduate and postgraduate programmes operated with the University of Wollongong, the University of Canberra and the Australian National University
- Completed negotiations between the park and the Department of Defence on a Memorandum of Understanding covering day-to-day operations and relationships between the parties, for consideration by the board of management
- Commenced Community Development Employment Projects at Booderee Botanic Gardens involving Wreck Bay youth, and supported Vincentia High School's students at risk programme through work experience
- Supported youth at risk programmes with the NSW Police Force
- Conducted 18 Parkcare activities, including post-fire rehabilitation, weed removal and rehabilitating little penguin nesting habitat
- Supported three externally funded Conservation Volunteers Australia activities on Bowen Island
- Continued membership of and involvement with regional tourism organisations
- Participated in an accreditation process through the Caravan and Camping Industry Association NSW Gumnut Awards for commitment to environmental sustainability and socially responsible management. The park received a bronze award, and is working toward silver

**KRA6: Business management***Major issues*

- In accordance with Investors in People policy, staff have all the necessary skills to do their jobs
- Revenue review
- Management plan implementation
- Managing the budget to allow for rising salaries

*Actions*

- Increase emphasis on training identified in personal development plans
- Implement the approved pricing restructure for camping and entry fees
- Work to the annual implementation plan and report the results

*Performance results 2006–07*

- Offered training in line with personal development plans, with emphasis on contract and project management, fire preparedness/fighting and supervisory and management skills
- Implemented the restructured camping and entry fees with a 24.5 per cent increase in revenue
- Supported the pricing restructure implementation by increased vigilance in collecting entry and camping fees, including checking the car park and campgrounds, and randomly closing the bypass entry lane provided for local traffic
- Reviewed and updated the annual implementation plan as necessary
- Reviewed the performance framework and measures. The park is taking part in a trial of best practice performance management systems with the University of Queensland



## Bitou battleground

The highly invasive bitou bush (*Chrysanthemoides monilifera* ssp. *rotundata*) has been present in Booderee National Park for over 30 years, after being introduced to the NSW south coast in 1969 for dune stabilisation. Bitou is listed as one of the top 20 weeds of national significance and is recognised in Booderee as the key threatening process affecting many ecological communities. The traditional owners, the Wreck Bay Aboriginal community, are very concerned about this threat.

A feature of the weed is its edible bright black fruit which is spread widely by birds, producing satellite infestations which are difficult to detect and treat on the ground.

With almost 1,500 hectares of bitou bush in the park, management of the weed is no small task. Eradication efforts began in Booderee in the early 1970s focusing on manual removal. Control then switched to ground spraying until techniques for selective poisoning using ultra-low-volume aerial spraying of the herbicide Roundup were developed at Booderee in the 1990s. That technique has since been used to attack the main infestation spreading from the Bherwerre dune systems, supported by ground spraying of satellite infestations.

Aerial surveys in 2004 and again this year have allowed staff to quantify the area and density of the infestation and to assess how effective control operations have been over the intervening three years. The surveys involved flying parallel transects in a helicopter while two observers assessed the presence and density of bitou at set intervals and recorded the results via a global positioning system. These results are used to map the infestation in the park's GIS. The accompanying map shows areas of the park where bitou density has increased, decreased and remained unchanged during the past three years.

Overall, the distribution of bitou changed very little between surveys, with a slight increase of 4 per cent. However, the extent of different classes of bitou infestation changed quite dramatically. The heaviest infestation class (more than 50 per cent coverage), concentrated in a broad band through the middle of the western half of the park, declined by 69 per cent. This is where the most long-term environmental damage is being done and where control efforts have been concentrated. In contrast, the low density class (0–10 per cent coverage) increased by 73 per cent, largely representing formerly high density areas becoming low density following spraying.

In the highest density areas a technique called spray-burn-spray is used to improve the level of control. This control technique was pioneered on the NSW south coast and involves spraying an infestation, and then burning the canes



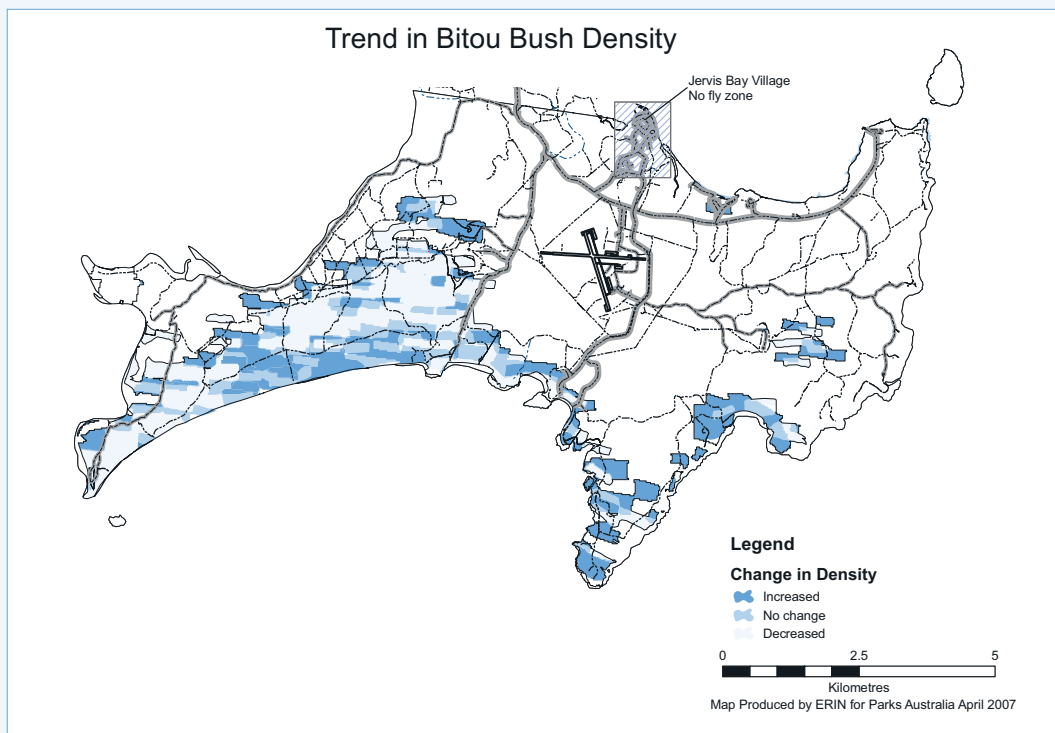


once they have sufficiently dried. This burning stimulates a mass germination of bitou seed stored in the soil which is then sprayed again, effectively draining the soil of seed which can otherwise remain viable for up to eight years. Preliminary results suggest that not only does this treatment achieve the best control of bitou, it also results in the best recovery of native plants.

The eastern half of the park has received less attention due to the low level of bitou infestation and more inaccessible terrain; however the survey found that satellite infestations on the St Georges Peninsula and above Steamers Beach have expanded in the last three years. In June 2007 aerial spraying of those areas was conducted for the first time, and the number and extent of satellite infestations recorded in the 2007 map is expected to decrease.

Bitou bush research will continue in the park. The Australian National University is currently examining the impact of bitou on a range of terrestrial vertebrates while a future project will examine the interaction between fire, bitou regeneration, native plant regeneration and grazing by herbivores such as wallabies. While the long-term eradication of such a tenacious weed from Booderee is unlikely, the survey results suggest that a continued high level of control via aerial spraying should save much of the park from becoming an emerald green monoculture of bitou bush.

**Figure 4: Changes in bitou bush density at Booderee National Park 2004 – 2007**



## Rangers of the future



*Booderee Junior Rangers with Jervis Bay School teachers, park staff and research staff from the Australian National University's Centre for Resource and Environmental Studies*

The Booderee National Park Junior Ranger programme started in 2006 at Jervis Bay School, cementing a long established connection between the school and the park in environmental and cultural education.

The school is located in the grounds of HMAS Creswell in Jervis Bay Territory and students come from the Wreck Bay Aboriginal community,

Navy families and nearby villages. Many students have family members who work at the park or have connections with the park over many years.

The programme is based on the environment and work at Booderee, as well as the local Koori culture of Wreck Bay. Park employee and community member Julie Freeman worked with park staff and teachers to develop and deliver a regular programme of activities for students from pre-school to year 6, based around relevant syllabus areas. Students learn about the park's flora and fauna, fire management, visitor management, the botanic gardens, how to propagate plants, bush tucker and medicines, and Aboriginal tools and technology. The programme is delivered by community members, park staff and researchers, all with a wealth of knowledge to pass on to the next generation of park staff and community managers.

The 2006 programme culminated in an end-of-year performance at Jervis Bay School, celebrating the park's natural environment and Koori culture in a dance choreographed and taught by professional Koori dancers and coordinated by teaching staff and Julie. The large audience of family and friends were moved by the sight of children of all ages and different cultural backgrounds dancing together, concentrating hard on their part in the dance and obviously enjoying the occasion.

A review of the Junior Ranger programme identified many benefits, including:

- promoting joint management and interest in the park
- demonstrating and highlighting career paths in park management
- assisting in the Wreck Bay community's goal of sole management of the park

- building knowledge
- developing social and personal wellbeing
- respecting and appreciating different cultural backgrounds.

As well as continuing to work with Jervis Bay School, there is a growing demand for park-based interpretive activities from regional schools. A pilot project using formal lesson plans linked to NSW syllabus areas for years 5 and 6, based around the park, has been developed. The pilot demonstrates how the programme could be extended to deliver environmental and cultural education in the park to a wider range of students from visiting schools and to enhance the programme for Jervis Bay School students.

## Christmas Island National Park

<http://www.environment.gov.au/parks/christmas>



### Special features

Christmas Island is home to a unique rainforest ecosystem that supports very high biodiversity with at least 225 species of endemic animals, 25 species of endemic plants and many that do not occur elsewhere in Australia. It includes the last remaining nesting habitat of the endangered Abbott's booby (*Papasula abbotti*), and an extraordinary diversity and abundance of land crabs.

The island is renowned for its annual crab migration, when up to 50 million red crabs (*Gecarcoidea natalis*) march to the sea to spawn, and for the whale sharks (*Rhincodon typus*) that migrate to its inshore waters to feed.

Location	Latitude 10° 29' South, Longitude 105°38' East	
Area	8,719 hectares	
Proclamation dates	21 February 1980, 31 January 1986 and 20 December 1989	
IUCN category	Category II	
Biogeographic context	Christmas Island is the coral-encrusted, emergent summit of a basaltic, submarine mountain in the Indian Ocean. Its plants and animals are most closely linked with those of South-East Asia	
Management plan	Third plan expires 13 March 2009	
Other significant management documents	Christmas Island Rainforest Rehabilitation Programme; Invasive Ants on Christmas Island Action Plan; Management Plan Implementation Schedule; and Risk Assessment and Management Schedule	
Financial	Operating	\$3.198 million
	Capital	\$0.212 million
	Revenue	\$1.676 million
Visitors	600 (estimated)	
Permits	5 commercial tour operators; 5 photography; 6 research; 12 others (e.g. camping, works)	

International conventions and agreements	
Wetlands (Ramsar) Convention	The Dales and a small landlocked mangrove forest at Hosnie's Spring are listed under the convention
Migratory Species (Bonn) Convention	28 of 98 listed Australian species
China–Australia Migratory Birds Agreement	48 of 81 listed species
Japan–Australia Migratory Birds Agreement	45 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 extinct 1 <sup>a</sup> critically endangered 3 <sup>a</sup> endangered 9 <sup>b</sup> vulnerable 63 migratory 92 marine
	Recovery plans	10 plans being partially implemented: Christmas Island shrew ( <i>Crocidura attenuata trichura</i> ); Christmas Island pipistrelle ( <i>Pipistrellus murrayi</i> ); Abbott's booby ( <i>Papasula abbotti</i> ); Christmas Island goshawk ( <i>Accipiter fasciatus natalis</i> ); Christmas Island frigatebird ( <i>Fregata andrewsi</i> ); Christmas Island hawk-owl ( <i>Ninox natalis</i> ); marine turtles; whale shark ( <i>Rhincodon typus</i> ); Christmas Island gecko ( <i>Lepidodactylus listeri</i> ); pink blind snake ( <i>Ramphotyphlops exocoeti</i> )  2 awaiting preparation: emerald dove ( <i>Chalcophaps indica natalis</i> ); Christmas Island thrush ( <i>Turdus poliocephalus erythropleurus</i> ). These species will be included in a multi-species recovery plan for the island, preparation to begin in 2006–07
Listed flora	Species	2 critically endangered 1 <sup>c</sup> endangered
	Recovery plans	2 being partially implemented: <i>Asplenium listeri</i> , <i>Tectaria devexa</i> var. <i>minor</i> 1 awaiting preparation <i>Pneumatopteris truncata</i> 3 species being assessed for nomination: <i>Asystasis alba</i> , <i>Amaracarpus pubescens</i> , <i>Cycas rumphii</i> . These species will be included in a multi-species recovery plan for the island, preparation of which began in 2006–07
Heritage	On Commonwealth Heritage List (as part of a wider listing of the island's natural areas)	

(a) One species, *Pipistrellus murrayi*, was transferred from endangered to critically endangered in 2006

(b) Increased from 8 reported in 2005–06 due to an earlier reporting error

(c) One endangered plant species was erroneously not reported in 2005–06

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
3 (3)	95 (16)	9 (9)	575 (35) marine, 3 freshwater	>2,000 (198)	213 (91)

Figures in brackets are the number of species that are a management priority

## Advisory committee

The Christmas Island National Park Advisory Committee comprises the Director of National Parks and community representatives. The committee advises the government conservator on implementation of the management plan. It also advises the Shire of Christmas Island and the Director of National Parks on matters relevant to the park.

## Monitoring

In April 2007 a three-year biodiversity monitoring programme was completed. The programme was funded by the Department of Finance and Administration to monitor the impacts of the Christmas Island Immigration Reception and Processing Centre's construction. The programme has increased knowledge of the island's unique biodiversity and demonstrates the importance of this aspect of park management.

An ongoing monitoring programme using infrared cameras and ultrasonic bat detectors is in place for the Christmas Island pipistrelle (*Pipistrellus murrayi*) as part of the recovery plan for this critically endangered species (see case study on page 76).

## Future challenges

Major challenges are:

- containing yellow crazy ants (*Anoplolepis gracilipes*) at a manageable level. Management programmes have dramatically reduced the density of yellow crazy ant colonies that had been threatening the island's crab population. However, the ants remain widespread and will require an intensified control effort to contain them at a manageable level
- developing an alternative yellow crazy ant bait with fewer impacts on non-target species. Extra funding of \$4 million over the next four years provided in the May 2007 Budget will accelerate bait development, fund annual aerial bait application and fund research into biocontrol agents of scale insects (a major food source for crazy ants)
- containing other ants including fire ants (*Solenopsis geminata*) and big-headed ants (*Pheidole megacephala*). Many potentially invasive ant species are present on the island and are being monitored for signs of spread

- continuing the Christmas Island Rainforest Rehabilitation Programme. The original three-year Memorandum of Understanding with the Department of Transport and Regional Services concluded this year. Independent consultants reviewed the programme and a further three-year Memorandum of Understanding was signed
- controlling woody weeds. Although the control effort for woody weeds has increased substantially over the past two years sustained resources are required to bring major weed species under long-term control.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### *Major issues*

- Potential impacts of proposed new mine leases on the island
- Insufficient funding for yellow crazy ant management
- Continuing management of high priority weed species
- Adoption and funding of all relevant recovery plans
- Crab mortality from traffic

#### *Actions*

- Provide advice to the Department's Approvals and Wildlife Division on the environmental and biodiversity consequences of the proposed new mine leases
- Bait yellow crazy ants
- Prepare 22 hectares of mine site for rehabilitation
- Hand spray 28 of the most invasive weed species
- Implement as possible approved recovery plans for 12 species
- Design and test improved over-road crab crossings
- Prepare the final report on the biodiversity monitoring programme that started in December 2003
- Supply landscape plants to the immigration reception and processing centre

#### *Performance results 2006–07*

- Submitted detailed advice on environmental and biodiversity aspects of new mine lease proposals to the Approvals and Wildlife Division
- Treated 250 hectares of yellow crazy ant super-colonies
- Received ministerial approval for the 10-year yellow crazy ant strategy and received \$545,000 of Natural Heritage Trust funds for ant control
- Completed earthworks and planted 40,000 trees on 22 hectares of former phosphate mine located in the park
- Treated 110 hectares of 28 invasive woody weed species



- On average implemented 38 per cent of actions in existing recovery plans
- Completed the three-year biodiversity monitoring programme
- Met all targets in the immigration reception and processing centre plant supply contract

#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Quality of visitors' experiences
- Visitor safety
- Insufficient funding to meet all requirements

##### *Actions*

- Maintain and where possible improve roads, trails, viewpoints and interpretive material
- Produce new interpretive material and signage
- Support film crews and journalists

##### *Performance results 2006–07*

- Maintained approximately 60 kilometres of murrum or unsurfaced roads and tracks. Improved and re-marked the Winifred Beach and West White Beach tracks
- Produced seven new interpretive brochures
- Assisted several film crews (Australian and international) and journalists publicising the island's biodiversity and conservation values

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Efforts to establish Christmas Island as a globally important island biodiversity hotspot with research opportunities
- Progress of the feral cat eradication programme with the Shire of Christmas Island

##### *Actions*

- Support visiting scientists
- Maintain and service the Christmas Island National Park Advisory Committee
- Implement the Memorandum of Understanding on feral cats with the mining company and Shire of Christmas Island signed in 2003–04

##### *Performance results 2006–07*

- Supported two visiting scientists doing collaborative research projects
- The cat eradication programme remains on hold awaiting implementation of cat control legislation by the Shire of Christmas Island



#### **KRA6: Business management**

##### *Major issues*

- Delivering quality management services within a limited budget

##### *Actions*

- Maintain park management services within budget

##### *Performance results 2006–07*

- Managed operational and capital budgets with approved parameters

## Declining biodiversity on Christmas Island—the case of the pipistrelle



Christmas Island Pipistrelle – *Pipistrellus murrayi*

Christmas Island's biodiversity has been in decline for a number of years. A monitoring programme between December 2003 and April 2007 studied the impacts of the immigration reception and processing centre's construction on a number of the island's species. The programme established baseline data and monitored trends in fauna populations to determine what mitigating actions, if any, will be required to reverse declines in species or ecological processes.

The endemic Christmas Island pipistrelle (*Pipistrellus murrayi*) is just one species of concern. This tiny insectivorous bat was once widespread on the island. Since the 1990s the population has been in decline and its range has contracted. In September 2006 its status was changed from 'endangered' to 'critically endangered' and it may soon be extinct if present trends continue. The cause of the decline is not well understood but a number of factors are thought to contribute including habitat loss, climatic conditions and introduced predators. The invasive yellow crazy ant (*Anoplolepis gracilipes*) which threatens crab and other fauna populations may be implicated.

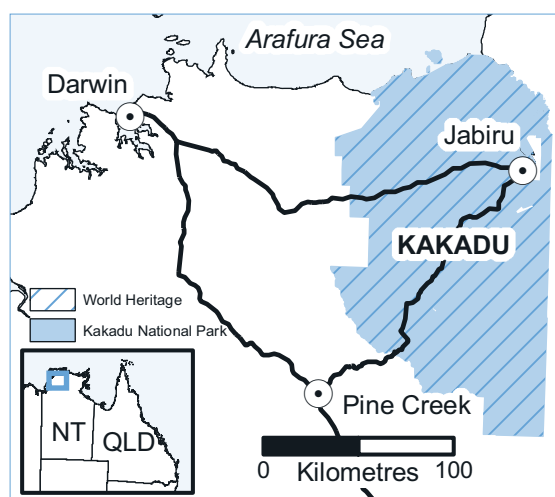
A national recovery plan for the pipistrelle is currently being implemented. Researchers from the Arthur Rylah Institute in Victoria recently completed investigations into threats to the bat and identified protecting and supplementing known maternity roosting sites as urgent recovery measures. Parks Australia staff have installed roosting boxes and placed guards around known roost sites to restrict access by predatory rats and giant centipedes. An ongoing monitoring programme using infrared cameras and ultrasonic bat detectors is in place. Discussions with the phosphate mining company are also proceeding to minimise possible impacts on roost sites.

The decline in Christmas Island's biodiversity can be expected to continue along similar lines into the future. Key threatening processes implicated in the decline are habitat degradation and invasive fauna and flora species.

In the May 2007 Budget Parks Australia received an additional \$4 million over four years to manage and control the yellow crazy ant and further reduce its impact on crab populations. The funding is a tremendous boost that will kick start a 10-year management strategy to control this invasive invertebrate, building on previous control efforts. Time will tell whether increased control of the yellow crazy ant also benefits the Christmas Island pipistrelle.

## Kakadu National Park

<http://www.environment.gov.au/parks/kakadu>



### Special features

Kakadu National Park is inscribed on the World Heritage List under natural and cultural criteria. It is one of the most ecologically and biologically diverse places in Australia.

Kakadu's traditional owners maintain strong links to their country, links that are demonstrated through their cultural practices, spiritual beliefs and traditional management and use of their country. An estimated 15,000 rock art sites and innumerable artefacts

and sites of cultural, archaeological and historic significance in the Kakadu region contribute to archaeological evidence indicating that people have lived continuously in the Kakadu region for at least 50,000 years.

The park contains an almost entire major tropical river catchment (the South Alligator River catchment) and large representative examples of the wet-dry tropical ecosystems of northern Australia. Major landforms in the park include the sandstone plateau and escarpment, extensive areas of savanna woodlands, monsoon forest, riverine and riparian environments, billabongs, floodplains, mangroves and mudflats.

Location	Latitude 13° 29' South, Longitude 132°26' East	
Area	1,980,400 hectares	
Proclamation dates	5 April 1979, 28 February 1984, 12 June 1987, 22 November 1989, 24 June 1991 and 26 May 2007	
IUCN category	Category II	
Biogeographic context	Located in the wet-dry tropics Interim Biogeographic Regionalisation for Australian regions: Darwin Coastal; Arnhem Plateau; Pine Creek	
Management plan	Fifth plan expires 1 January 2014	
Other significant management documents	Shared Vision for Tourism; district fire management plans; Crocodile Management Strategy, feral species management plans; Gunlom Mine Sites Rehabilitation Strategy	
Financial	Operating	\$17.260 million
	Capital	\$3.339 million
	Revenue	\$1.476 million
	Paid to traditional owners	\$1.499 million

Visitors	209,000 (estimated April 2005–March 2007) <sup>a</sup>
Permits	77 film/photography; 90 commercial tour operators; 20 research; 427 camping/bush walking

(a) Improved visitor count techniques devised during 2005–06 indicate a potential 23 per cent undercount in previously reported figures. Further data collection using the new techniques will assist in improving accuracy of future counts.

International conventions and agreements	
World Heritage Convention	Listed under cultural criteria (i) and (vi) and natural criteria (ii), (iii) and (iv), recognising the park's outstanding natural and cultural values
Wetlands (Ramsar) Convention	1,375,940 hectares of wetlands are listed <sup>a</sup> (683,000 hectares in stage 1 and components of stage 3 plus 692,940 hectares in stage 2)
Migratory Species (Bonn) Convention	87 of 98 listed Australian species
China–Australia Migratory Birds Agreement	52 of 81 listed species
Japan–Australia Migratory Birds Agreement	49 of 76 listed species
Other agreements	Tri-National Wetlands Memorandum of Understanding (links Kakadu, Wasur National Park in Indonesia, and Tonda Wildlife Management Area in Papua New Guinea)

(a) Stage 2 area was erroneously omitted from previous reports

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 critically endangered 8 endangered 11 vulnerable 108 migratory 114 marine
	Recovery plans	3 being implemented: golden bandicoot ( <i>Isododon auratus</i> ) and golden-backed tree rat ( <i>Mesembriomys macrurus</i> ); eastern partridge pigeon ( <i>Geophaps smithii smithii</i> ), crested shrike tit ( <i>Falcunculus frontatus whitei</i> ) and northern masked owl ( <i>Tyto novaehollandiae kimberli</i> ); marine turtles  8 in preparation: bare-rumped sheath-tail bat ( <i>Saccolaimus saccolaimus nudiclunatus</i> ); red goshawk ( <i>Erythrotriorchis radiatus</i> ); yellow chat ( <i>Epthianura crocea macgregori</i> ); Gouldian finch ( <i>Erythrura gouldiae</i> ); freshwater sawfish ( <i>Pristis microdon</i> ); speartooth shark ( <i>Glyphis sp.A</i> ); northern rivers shark ( <i>Glyphis sp.C</i> ); water mouse ( <i>Xeromys myoides</i> )
Listed flora	Species	1 critically endangered 2 vulnerable
	Recovery plans	1 in preparation: multi-species boronia
Heritage	On National Heritage List	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Amphibians	Fish	Plants
68 (19)	292 (35)	134 (32)	26 (2)	~320 <sup>a</sup> 276 marine and estuarine, 44 freshwater (60)	2,022 (14)

Figures in brackets are the number of species that are a management priority

(a) Increased from a total of 286 species reported in 2005–06 following a further marine inventory

## Board of management

The Minister for the Environment and Water Resources appoints members to the Kakadu National Park Board of Management. The board has 15 members. Ten members are appointed as representatives of the park's traditional owners, representing the geographic spread of Aboriginal people in the region and the major language groupings. The remaining members are the Director of National Parks, the Assistant Secretary Parks Australia North, nominees with environmental and tourism expertise, and a nominee of the NT Government. During the year the nominee with environmental expertise resigned and nominations for his replacement are currently being sought. The current board has served two years of its five-year term.

## Monitoring

Monitoring and control continued for introduced plants including *Mimosa pigra*, mission grass (*Pennisetum polystachion*), olive hymenachne (*Hymenachne amplexicaulis*), salvinia (*Salvinia molesta*) at Yellow Water and gamba grass (*Andropogon gayanus*); introduced invasive ants including big-headed ants (*Pheidole megacephala*) and ginger ants (*Solenopsis geminata*); and introduced terrestrial vertebrates.

Studies of estuarine crocodile (*Crocodylus porosus*) populations and nesting flatback turtles (*Natator depressus*) in coastal areas of the park continued. Following last year's compilation of information from marine turtle surveys, a review and report of crocodile survey data gathered over 10 years is being finalised.

Research into the movement of large crocodiles into upstream habitats and the impact of seasonal food source availability on magpie goose (*Anseranas semipalmata*) populations continued. Researchers completed an interim report on crocodile tracking by satellite (see case study on page 89) and finalised fieldwork for the magpie goose study.

Staff worked with NT Government agencies on genetic sampling and population counts of two inshore dolphin species, the Australian snubfin dolphin (*Orcaella heinsohni*) and the Indo-Pacific humpback dolphin (*Sousa chinensis*). This work will

help with developing management and conservation strategies in recognition of the potential sanctuary value of the park's coastal areas for these species.

Other collaborative research included ecological/epidemiological modelling of feral buffaloes in northern Australia and key baseline surveys of mangrove communities, to improve knowledge and provide baseline information to monitor the effect of climate change.

A formal description of one of a number of (endemic) Kakadu caridid shrimps was completed. The species was discovered in the plateau zone of the south arm of Magela Creek. Such work contributes to maintaining an up-to-date inventory of the park's conservation values, including endemic species of high conservation value.

Following a series of late season fires on the park's sandstone plateau, a fire management strategy was developed focusing on an appropriate fire regime for this identified high biodiversity area. A detailed vegetation map of the plateau's sandstone communities will support the strategy.

Oral history recordings and development of a cultural heritage sites register continued with the support and involvement of traditional owners.

## Future challenges

Major challenges are:

- rebranding Kakadu and positioning the park as a tourism destination within the larger region and the Top End
- protecting park values while ensuring that the experiences sought by the park's target market are developed and delivered
- understanding the impacts of fire, ferals and climate change, coordinating research in these areas and adapting management accordingly
- controlling the spread of weeds and the impact of introduced animals
- implementing the fifth management plan, most importantly actions that support Indigenous business ventures and employment including capacity building, address caring for country challenges, support Kakadu's living cultural values and support its World Heritage values
- rehabilitating old uranium mine sites in the southern Gunlom area (a major project over the next three years). Rehabilitation works include removing buildings that once supported mining activities and appropriate containment of mine tailings
- developing systems and partnerships to make the best use of resources
- developing staff through formal and informal training programmes
- ensuring visitor and staff safety.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Future impact of climate change on Kakadu, particularly the freshwater wetlands
- Fire management, particularly in sandstone country
- Managing weeds and feral animals including cane toads
- *Salvinia molesta* infesting Yellow Water
- Ranger mine site rehabilitation
- Threatened species monitoring programmes
- Decline of small-mammal populations in the park
- Marine environments of the Kakadu coast are poorly studied
- Enhancing the recording, storage and display of species data
- The spread of introduced pasture grasses and subsequent increase in fire intensity
- Introduced pest species and their impacts
- Monitoring the impact of tour operations on natural values

#### Actions

- Identify gaps in knowledge about potential climate change impacts
- Develop appropriate fire regimes for the variety of habitats within the park, particularly an escarpment fire plan
- Finalise the feral animal strategy and have it peer reviewed
- Monitor threatened species in biodiversity hot spots
- Detect and treat invasive ant infestations
- Continue to control serious pest plant species, focusing on weeds of national significance including mimosa, salvinia and olive hymenachne, as well as mission grass, gamba grass and other introduced pasture grasses
- Improve knowledge of landscape change processes
- Continue monitoring native animals affected by cane toads
- Develop programmes to monitor the impact of visitor use on Kakadu's natural values
- Improve the use of GIS technology in recording weed locations and weed data
- Appoint a knowledge management officer to improve spatial data recording, storage, display and use
- Commission and support research that will improve management of the park's natural and cultural values



### *Performance results 2006–07*

- Hosted the Landscape Change Symposium in April 2007. The symposium examined current knowledge, identified key knowledge gaps for management, key threats and management strategies for agents of landscape change
- Drafted an escarpment fire plan. A bushwalking burning programme commenced in the 2007 dry season: a staff member walked with local Aboriginal people on the Arnhem Plateau lighting early dry season fires to reduce the likelihood of destructive late dry season wildfires
- Submitted the feral animal strategy for peer review
- Signed a three-year contract with the NT Government to undertake collaborative threatened species monitoring
- Supported ongoing research and monitoring of frog calls. This is a benchmark study that will assist analysis of the cane toad impact on native frogs
- Appointed a knowledge management officer
- Continued ongoing monitoring of species affected by cane toads
- Supported research into magpie goose populations and habitat in conjunction with the NT Government and Charles Darwin University
- Continued to limit the extent and impact of salvinia through biological, mechanical and chemical means
- Applied findings from the 2004–05 landscape change study to strategic plans for fishing access and weed control, limiting boat access to upstream billabongs during the wet season
- Conducted aerial surveys for significant areas of weed infestation to support ground data. Ground and aerial data will be used to develop predictive models to direct weed control activities
- Continued invasive ant monitoring and control
- Continued to support Indigenous fire management
- Completed analysis of data collected from marine turtle nesting surveys
- Analysed data from the marine resource inventory of Kakadu's coastline
- Continued monitoring the impact of night-time tours on nocturnal wildlife
- Continued fire plot monitoring. Established a partnership with the NT Bushfires Council to analyse data



## KRA2: Cultural heritage management

### Major issues

- Supporting the continuity of traditional owners' living culture
- Protecting cultural items and sites of significance

### Actions

- Ensure that Kakadu's living cultural status is recognised in tourism strategy development and decision-making
- Establish two-way learning strategies and programmes
- Review cultural heritage management programmes
- Continue rock art protection work
- Continue cataloguing and preserving cultural heritage materials
- Continue to collect oral histories
- Seek opportunities to transfer knowledge between generations
- Support traditional owner leadership in natural and cultural resource management activities

### Performance results 2006–07

- Progressed the Shared Vision for Tourism to promote Kakadu's living cultural and natural values and guide the development of tourism in the park
- Increased staffing in the Natural and Cultural Programmes Unit
- Continued to develop a register of oral history audio and video material
- Progressed a partnership agreement between the National Archives of Australia and the Director for long-term storage and protection of audio and video materials currently held in the park
- Continued rock art maintenance at public visitation sites with the involvement of relevant Aboriginal people
- Held cultural camps at Deaf Adder Gorge incorporating fauna survey methods, rock art maintenance and oral history collection
- Facilitated visits by senior traditional owners and senior Indigenous people to key sites, such as Jim Jim and Twin Falls and Deaf Adder Gorge, to enable cultural exchange with younger Indigenous park staff with responsibility for managing those areas
- Recorded oral histories with senior Indigenous women from Kakadu's southern clan groups



### **KRA3: Joint management**

#### *Major issues*

- Meeting the commitments outlined in the lease and management plan
- Ensuring shared decision-making occurs at all levels within the park
- Finalisation of the fifth management plan

#### *Actions*

- Finalise the fifth management plan
- Ensure decision-making is consistent with the consultation guidelines
- Encourage increased Aboriginal engagement in work plans through recruitment and skills development programmes
- Support traditional land management projects
- Support the board of management
- Continue day-to-day consultations with traditional owners

#### *Performance results 2006–07*

- The Minister approved the fifth management plan and put it into effect on 1 January 2007
- Relevant Aboriginal staff continued certificate level studies, numeracy and literacy training. For example, two of four school-based apprentices completed Certificate II in Conservation and Land Management, one is continuing and one withdrew; 21 Bininj staff completed workplace English language and literacy training
- Continued programmes to re-engage young Aboriginal people in education
- Continued skill development and training for relevant Aboriginal staff via completion of a range of internal and external courses. For example, 38 Bininj staff completed 4WD operation and recovery courses and 19 completed senior first aid
- Consulted on wide-ranging park management issues with traditional owners and other relevant Aboriginal people through the Northern Land Council
- Continued day-to-day joint decision-making by relevant Aboriginal people and park staff, including field trips to discuss mine site rehabilitation and sickness country protocols
- Continued supporting a Northern Land Council Kakadu Officer position under the Memorandum of Understanding with the Northern Land Council
- Held quarterly meetings of the Kakadu National Park Board of Management

#### KRA4: Visitor management and reserve use

##### *Major issues*

- Quality and range of visitors' experiences
- Visitor safety
- Communication with the tourism industry
- The shared vision and strategic direction for increasing value from tourism

##### *Actions*

- Develop a brand strategy focusing on experiencing Kakadu's World Heritage values and develop a tourism masterplan
- Monitor the permitting system for tour operations and accreditation of tour guides
- Increase knowledge of visitor experiences and use patterns
- Regularly review safety of visitor areas
- Regularly inspect and maintain visitor facilities

##### *Performance results 2006–07*

- Kakadu Tourism Consultative Committee continued to advise the board of management on tourism related matters
- Continued to develop a Kakadu 'brand' to guide visitor experiences and promotion of the park to visitors seeking an experience in a World Heritage setting recognised for its natural and cultural values
- Continued to develop a tourism masterplan for Kakadu
- Continued reviews of tour operator permit conditions
- Online tour guide training and accreditation commenced (see case study on page 88)
- Refreshed directional signs and progressed the standardisation of interpretation materials for Kakadu
- Commenced a consultancy to develop a dedicated Kakadu website and develop concepts for the park's northern entrance on the Arnhem Highway
- Aboriginal board members participated in several tourism conferences
- Local Aboriginal people delivered seasonal interpretive ranger programmes incorporating natural and cultural content
- Provided more accurate and detailed visitor information for use in tourism

planning and resource allocation through improved monitoring methods and associated survey data

- Supported Aboriginal enterprise development and involvement in tourism ventures such as the Kakadu Culture Camp, Hawk Dreaming and Murdujul Art Centre, through the Kakadu Indigenous Tourism Development Fund plus financial support for relevant Aboriginal people to attend tourism industry events and in-kind assistance to produce collective promotional material
- The board approved one new Indigenous business proposal
- Removed crocodiles from plunge pools at visitor areas to reduce risk of interactions, installed more emergency call devices to assist search and rescue and developed a multi-agency response plan to deal with visitor injuries

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Relationships with the tourism industry, NT Government and neighbours
- Participation in local, regional, national and international initiatives associated with Kakadu's World Heritage values
- Relationships with educational institutions to develop 'education to work' pathways for relevant Aboriginal people

##### *Actions*

- Build a cooperative relationship with tourism stakeholders and the Northern Territory Government
- Develop an operational relationship with park neighbours
- Take an active role in community programmes
- Establish and support links with managers of other World Heritage areas
- Implement work programmes under the tri-national wetlands agreement between Indonesia, Papua New Guinea and Australia
- Build a strategic alliance with the Jabiru Area School and Charles Darwin University to progress education to work programmes

##### *Performance results 2006–07*

- Continued the ongoing high-level relationship between the Australian and NT governments with joint funding and planning to advance tourism in the park and a partnership in employment and education focusing on youth training
- Undertook key staff and traditional owner exchanges under the operational plan to support the tri-national wetlands agreement between Papua New Guinea, Indonesia and Australia

- Continued liaison with the NT Bushfires Council and other NT Government agencies, Jabiru Town Council and the Northern Land Council
- Built relationships with regional World Heritage neighbours through attendance at the South Pacific World Heritage forum held in Tongariro, New Zealand
- Continued the school based Junior Ranger programme which forms part of the Year 6 curriculum at Jabiru Area School
- Supported community events celebrating Indigenous culture and community spirit
- Hosted participants in the UNESCO masters programme in World Heritage management

#### **KRA6: Business management**

##### *Major issues*

- Recognition of high levels of staff expertise and performance
- Resources to achieve the visions and aims of the fifth management plan and park lease obligations
- Compliance with obligations under the *Environment Protection and Biodiversity Conservation Act 1999* and Regulations relating to the management of Commonwealth reserves
- Infrastructure maintenance and upgrade

##### *Actions*

- Implement outcomes from the organisational review of park operations
- Implement the Department's performance development scheme
- Fulfil the Department's financial management and reporting obligations
- Manage park assets and developments to relevant Australian Standards

##### *Performance results 2006–07*

- Continued ParkSafe, occupational health and safety training and incident reporting and assessment
- Implemented outcomes of the independent organisational review aimed at allocating and prioritising resources to meet the aims of the park lease and fifth management plan
- Implemented the performance development scheme for all staff focusing on key result areas and staff development
- Prioritised asset management and the work programme against risk considerations and maintenance schedules



## E-learning for tour guides



*Kakadu Knowledge for Tour Guides project team: Left to right: Ian Hutton (CDU), Meryl Triggs (Parks Australia), Joanne Ruscoe and Alicia Boyle (CDU), Natasha Smith (Parks Australia), Melanie Rickerman (Tourism NT)*

One feature that most of the places managed by Parks Australia have in common is their remoteness from the big cities.

Ensuring that the natural and cultural values of all of the places managed by Parks Australia are presented well to park visitors is an

important component of park management. This means tour guides need to be knowledgeable and well-trained. To help meet this need Parks Australia, in partnership with Charles Darwin University, has developed an entry-level online training course for tour guides, initially focused on Kakadu.

Kakadu Knowledge for Tour Guides is delivered through the university's Learnline, a flexible, online e-learning site. The course uses interactive tools—online discussions and audio and visual learning aids—as well as the direct participation of park staff and traditional Aboriginal owners. The course materials, including links to Learnline, are provided in CD ROM format but can also be in hard copy or delivered to groups face to face.

Parks Australia and Charles Darwin University received funding from the Australian Flexible Learning Framework to assist in developing the course. E-learning overcomes two key challenges faced by the nature-based tourism industry, namely the high turnover of tour guides and difficulty in accessing training from remote locations.

The entry-level training course covers the key areas of visitor safety; understanding the park's natural and cultural values and history; minimising environmental impacts; and legal compliance. Park staff, traditional owners and the tourism industry have all helped develop the course.

The Kakadu course was launched in December 2006 and it will be extended to Uluru–Kata Tjuta National Park in 2007. At Kakadu, the training will be voluntary until mid-2008 when it will become a requirement for tour guides leading tour groups in the park. At Uluru it will be a requirement by the end of 2009.

## Finding out where the crocodiles go



*Jim Jim fitted with a GPS tracking device shortly after release*

Estuarine crocodiles (*Crocodylus porosus*) are a significant and potentially dangerous feature of Top End waterways. As crocodile populations continue to reclaim areas from which they disappeared before commercial hunting ceased in the Northern Territory in 1971, the movement of large 'salties' into upstream freshwater sites used for recreation creates a major challenge for wildlife managers.

Kakadu National Park's Crocodile Management Strategy aims to protect the natural abundance of crocodiles in the park while minimising the risks they pose to people. The strategy comprises a range of measures including research and education as well as removal (including relocation) of problem animals that pose a particular risk. In 2004, the high level of crocodile risk at plunge pools associated with the escarpment led Parks Australia to close popular Twin Falls Gorge to swimming and introduce a boat shuttle service to enable safe visitor access to the base of the falls.

A major constraint to managing crocodiles in recreational areas is the lack of biological information on their movement, dispersal and colonisation of upstream sites. While some individuals are known to move long distances upstream in the wet season (particularly mid-sized adult males, which are responsible for most attacks on people) there is little hard information as to what factors trigger movements, how quickly animals travel, whether 'resident' animals as well as vagrants move, and how or when individuals removed from upstream sites are replaced.

In late 2005 a consortium of the major agencies involved in crocodile research and management in the Top End embarked on a joint project which aims to shed more light on crocodile movements into upstream areas. Parks Australia is a participant, along with the Parks and Wildlife Service NT, Wildlife Management International, Tourism NT and Charles Darwin University.

Since the project began a total of 23 crocodiles have been fitted with tracking devices that allow recordings of their position to be collected via satellite. Fifteen of the animals were tagged in Kakadu and the remainder in the Mary River to the west and the Blyth River in Arnhem Land to the east. Although the project has concentrated on tracking mature males, several smaller males and one mature female were also tagged during relocation of problem animals.



A detailed analysis of the movements of all the tracked individuals is required before any firm conclusions can be drawn from the project. Nevertheless, the preliminary findings suggest the picture is quite complex. Animals tagged and released back in the same upstream areas tended to exhibit less movement than those further downstream, suggesting a strong element of residency in the general area of capture, particularly for large 'boss' crocodiles. In contrast, animals that were relocated after tagging tended to move considerably (more than 800 kilometres and 1,500 kilometres during a single year in two cases) but not necessarily back towards the point of capture.

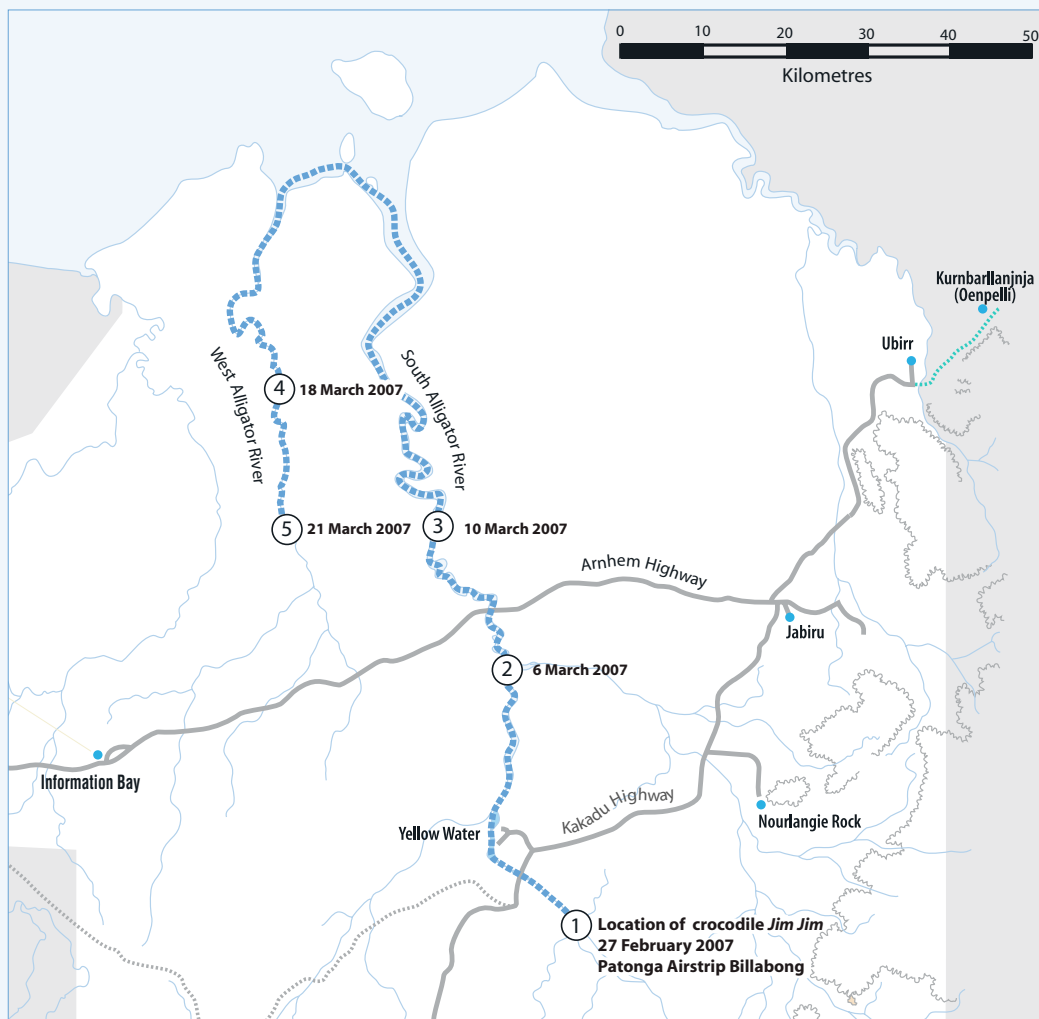
The case of a 3.8 metre mature male known as 'Jim Jim' demonstrates the complexities. For 18 months after being fitted with a tracking device in October 2005 Jim Jim rarely moved more than a few kilometres from the area where he was tagged and released, and was considered to be resident in a freshwater billabong in Kakadu. Then, at the start of March 2007, a sudden dramatic movement was recorded. In 10 days Jim Jim travelled more than 60 kilometres downstream and eight days later had left the South Alligator River system entirely and moved into the West Alligator River. On 21 March Jim Jim was more than 56 kilometres upstream, well past the tidal interface and back into fresh water. In three weeks, Jim Jim had travelled more than 170 kilometres from his usual home range, into a different river system.

Jim Jim is the first of the tracked 'resident' animals to show such dramatic movement. The precise reason is unknown but coincided with the onset of Cyclone George and record flooding. Jim Jim may have been displaced by another large crocodile brought to the area by the floods or perhaps human interference played a part.

The first stage of this collaborative project has confirmed satellite telemetry as a cost-effective technique for monitoring crocodiles in the wild and has provided important information on crocodile movements in the Top End. Detailed analysis of the results will answer some specific questions about crocodile management in recreational areas and will help maximise public safety, a fundamental element of all crocodile management programmes in northern Australia.



**Figure 5: Map showing movement of the crocodile Jim Jim — February to March 2007**



## Norfolk Island National Park and Botanic Garden

<http://www.environment.gov.au/parks/norfolk>



### Special features

Norfolk Island National Park protects most of the remaining natural vegetation of the island. The park and botanic garden are a refuge for some 40 species found only on the island, including the entire populations of 13 of the 15 critically endangered flora species.

Of the 15 species and subspecies of birds once found only on Norfolk Island, seven definitely remain (of the remaining species, two have not been

sighted for some time and may be extinct). The park provides important habitat for native bird fauna and assisted wild breeding programmes are in place for two species, the green parrot (*Cyanoramphus novaezelandiae cookii*) and the morepork or boobook owl (*Ninox novaeseelandiae undulata*).

Phillip Island, which is free of introduced predators, is an important seabird breeding area. The only terrestrial reptile species found in the Norfolk group—*Christinus guentheri* and *Pseudemoia lichenigera*—are considered extinct on Norfolk Island but still occur on Phillip Island.

Location	Latitude 29° 01' South, Longitude 167°56' East
Area	656 hectares (includes Mount Pitt section 460 hectares; Phillip Island 190 hectares; and Norfolk Island Botanic Garden 5.5 hectares)
Proclamation dates	National park 31 January 1986 (Mount Pitt section); 24 January 1996 (Phillip Island) Botanic garden 31 January 1986
IUCN category	National park Category II overall (Phillip Island Category IV) Botanic garden Category IV
Biogeographic context	Isolated small islands of volcanic origin (2 to 3 million years old) in the South Pacific Ocean. Prior to European settlement, Norfolk Island was almost entirely covered by sub-tropical rainforest
Management plan	Plans expired 28 June 2007 (new plan covering both national park and botanic garden in preparation)

Other significant management documents	Norfolk Island Public Reserves Act 1997 (NI); Norfolk Island Plan; Phillip Island Rehabilitation Strategy; Native Forest Rehabilitation Strategy; Weed Control Strategy for the Preservation and Protection of the Endangered Plants of Norfolk Island; Management Plan Implementation Schedule; Risk Assessment and Management Schedule	
Financial	Operating	\$0.965 million
	Capital	\$0.392 million
	Revenue	\$0.024 million
Visitors	25,000 (estimated)	
Permits	11 commercial tour operators (10 for Mount Pitt, 1 for Phillip Island)	

#### International conventions and agreements

Migratory Species (Bonn) Convention	18 of 98 listed Australian species
China–Australia Migratory Birds Agreement	28 of 81 listed species
Japan–Australia Migratory Birds Agreement	33 of 76 listed species

#### Environment Protection and Biodiversity Conservation Act 1999

Listed fauna	Species	5 extinct 2 endangered 6 vulnerable 37 migratory 57 marine
	Recovery plans	1 being implemented: green parrot ( <i>Cyanoramphus novaezelandiae cookii</i> )  2 plans being partially implemented: golden whistler ( <i>Pachycephala pectoralis xanthoprocta</i> ) and scarlet robin ( <i>Petroica multicolor multicolor</i> ). These species will be included in a multi-species recovery plan for the island expected to be completed in 2007  1 exempted: Norfolk Island boobook owl ( <i>Ninox novaeseelandiae undulata</i> )
Listed flora	Species in listing process	15 critically endangered 16 endangered 15 vulnerable
	Recovery plans	These species will be included in a multi-species recovery plan for the island expected to be completed in 2007
Heritage	Phillip Island is on the Commonwealth Heritage List	

#### Numbers of native species recorded

Mammals	Birds	Reptiles	Plants
0	47 (26)	2 (2)	92 (74)

Figures in brackets are the number of species that are a management priority

## Advisory committee

The Norfolk Island community provides guidance to the Director on national park and botanic garden management through the Norfolk Island National Park Advisory Committee, which meets formally twice a year, and informally each month.

## Monitoring

Monitoring of Norfolk and Phillip Islands for invasive fauna continues. Recent self introduced and human introduced species with potential to impact on listed species include the Asian house gecko (*Hemidactylus frenatus*), Asian paperwasp (*Polistes chinensis*), Argentine ant (*Linepithema humile*) purple swamphen (*Porphyrio porphyrio*) and feral fowl (*Gallus gallus*).

Recovery programmes for the Norfolk Island green parrot and morepork (boobook) owl include monitoring and recording nest sites and chicks. Identification bands on individual birds help researchers to develop an historical database.

The Weed Control Strategy for the Preservation and Protection of the Endangered Plants of Norfolk Island is regularly reviewed and monitored to ensure its effectiveness.

Rat populations are being monitored as part of a trial of alternative control methods. The monitoring programme compares traditional control (poison baits) with an alternative method (spring traps) and an untreated control area.

Park staff assist in a volunteer seabird monitoring and banding programme, mostly on Phillip Island.

## Future challenges

Major challenges are:

- raising community awareness of invasive species' potential impacts
- finding more efficient and practical ways to meet the requirements of endangered species programmes including through the multi-species recovery plan
- achieving a sustainable balance between conserving threatened species and supporting tourism in the park through enhanced visitor infrastructure (see case study on page 98)
- managing remnant endemic and important native species in the park's forestry zone.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### *Major issues*

- Fauna and flora pest species management
- Endangered species management
- Building adequate knowledge upon which to base management decisions

#### *Actions*

- Continue to implement strategic weed control
- Continue to implement identified recovery actions for endangered species
- Continue vertebrate pest species programmes
- Continue to document existing knowledge and to expand the knowledge base

#### *Performance results 2006–07*

- Completed weed control and replanting in 10 of the 19 coups identified in the rehabilitation strategy for the park's forestry zone. Under the 10-year strategy coups are treated on a two-yearly cycle focusing on priority weed control to increase habitat opportunities for native and endemic species
- Banded 26 green parrot chicks and two owl chicks fledged in the wild breeding programme
- Initiated rehabilitation of 35 weed-infested hectares through weed removal and replanting with native species
- Trapped 23 wild cats under the feral cat control programme and desexed 58 cats in desexing clinics
- Continued the trial of an alternative rat control methodology
- Further expanded the spatial information system's capacity and upgraded staff skills to enable more accurate and effective data recording
- Progressed the multi-species recovery plan expected to be completed in 2007
- Reviewed and updated databases and knowledge bases for the herbarium, moss collection, butterfly collection, slide collection and historic photography collection
- Visiting seabird specialists prepared a report on management of seabird populations. Findings were considered in drafting the new management plan



#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Closure of Duncombe Bay Road to the Captain Cook Monument after heavy rain
- Growing visitor expectations of tourism infrastructure
- Some access tracks pose safety issues and are unsuitable for disabled visitors
- Need for high quality interpretive signs and pamphlets

##### *Actions*

- Reconstruct drainage and renew surface of Duncombe Bay Road
- Strategically review current access tracks, focusing on high visitation areas
- Establish requirements and allocate resources within existing priorities

##### *Performance results 2006–07*

- Resurfaced Duncombe Bay Road and finished rebuilding drainage which will prevent the road being washed away by heavy rain, a major problem in the past
- Completed the botanic garden boardwalk upgrade stage 6
- Upgraded sections of Bridle Track and Red Road including removing dense weeds, upgrading surfaces, installing safety rails, and major clearance of invasive trackside weeds with associated rehabilitation
- Completed an interim botanic garden interpretive display
- Refreshed and replaced botanic garden signs
- Resurfaced sections of upper Palm Glen Track
- Trialled a range of surfaces to improve walking conditions on steep tracks
- Undertook one visitor survey and one vehicle road use survey
- Completed a safety survey of all visitor infrastructure and addressed urgent items

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Need to work with the Norfolk Island Government and Administration, local tourism operators, environmentalists, concerned citizens and professional and amateur researchers

##### *Actions*

- Meet regularly with tourism industry representatives
- Create avenues for information sharing and access to resources for citizens, stakeholders, and government and non-government organisations
- Educate the community and stakeholders on the role of the Norfolk Island National Park Advisory Committee
- Provide educational opportunities to tourism partners

*Performance results 2006–07*

- Through networking and regular contact, maintained professional and cordial relationships with the following stakeholders and partners: other Department of the Environment and Water Resources staff; other Australian Government Departments on Norfolk Island; Norfolk Island Government and Administration; Norfolk Island tourism operators and industry groups; and environment and conservation groups
- Successfully managed a permit system for the public, stakeholders, and formal and informal partners
- Provided an informative weekly newspaper article covering topical issues with an environmental focus
- Continued to promote use of information sources such as the website and the section 266A register established under the *Environment Protection and Biodiversity Conservation Act 1999* for persons who wish to be consulted about permit applications
- Provided an on-island departmental presence primarily as a referral point for wider environmental and heritage issues

**KRA6: Business management***Major issues*

- Delivering quality management services within a limited budget

*Actions*

- Maintain park management services within budget
- Develop staff capacity to deliver financial services

*Performance results 2006–07*

- Managed operational and capital budgets within allowed parameters

## Improving visitor facilities on Norfolk Island



*Rehabilitation of Duncombe Bay Road vegetation following reconstruction of the drainage system*

Based on the results of a series of visitor surveys, Parks Australia has been steadily upgrading visitor facilities in the national park and botanic garden over the past seven years.

The most recent visitor survey was in January 2007. A total of 106 responses were received from the 749 departing visitors who were given the opportunity to complete the survey. The 50–59 age group recorded the most responses and the majority of visitors stayed on the island for seven days. Approximately 70 per cent of survey participants rated their visit as very satisfactory or higher.

Previous surveys had indicated that the Mount Pitt area of the park was a primary point of interest for visitors. The Australian Government invested more than \$3 million between 1998 and 2003 to rebuild Mount Pitt Road and improve visitor and interpretive facilities at the summit. The January 2007 survey confirmed that Mount Pitt remains the most visited feature of the park.

The Captain Cook Monument lookout and picnic area was rated the next most visited feature. During 2006–07 Parks Australia substantially rebuilt the park's section of the access road known as Duncombe Bay Road. The entire drainage system underneath the road was rebuilt and table drains were cut along the edge of the roadway. Finally, the road surface was reshaped and prepared for bitumen sealing.

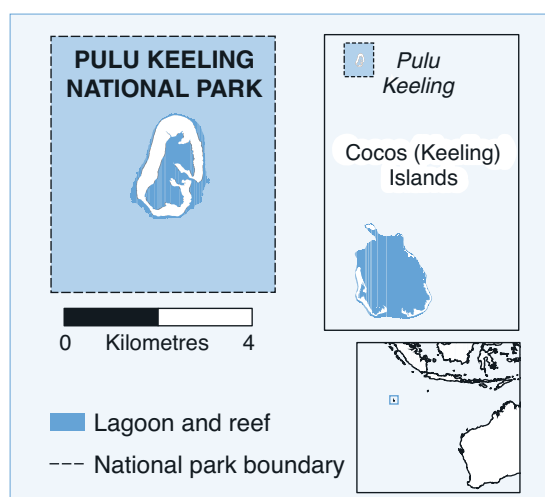
Other works during the life of the most recent national park and botanic garden management plans (2000–2007) included construction of a lookout and facilities at the Captain Cook Monument; reconstruction of the summit-to-summit track and lookout between Mount Pitt and Mount Bates; and construction of toilet facilities and boardwalks in the botanic garden. Major upgrades were also made to other tracks which visitors rated as important. Local contractors undertook much of the work, providing a significant employment boost for the island.

More improvements to visitor facilities are scheduled during the life of the next management plan. The Duncombe Bay Road surface will be bitumen-sealed to complete that project and picnic, shelter, water and toilet facilities will be installed at Palm Glen.



# Pulu Keeling National Park

<http://www.environment.gov.au/parks/cocos>



## Special features

Pulu Keeling National Park's most outstanding feature is its intact coral atoll ecosystem. With the widespread global decline of similar coral island habitats and their reefs due to human interactions, the conservation and protection of the park and its wildlife is of international importance.

The park, which makes up the whole of North Keeling Island, is an internationally significant seabird rookery. The breeding colony of the

dominant bird species—the red-footed booby (*Sula sula*)—is one of the largest in the world. The island is also the main habitat of the endangered Cocos buff-banded rail (*Gallirallus philippensis andrewsi*), found only on the Cocos (Keeling) Islands.

The critically endangered Round Island petrel (*Pterodroma arminjoniana*) has been recorded on the island but has not been sighted in recent years, despite intensive searching. Green turtles (*Chelonia mydas*) nest on the island and hawksbill turtles (*Eretmochelys imbricata*) inhabit the waters of the park; both species are listed as vulnerable.

Location	Latitude 11°50' South, Longitude 96°49' East	
Area	2,602 hectares (including marine area extending 1.5 kilometres around North Keeling Island)	
Proclamation date	12 December 1995	
IUCN category	Category II overall comprising: Terrestrial Zone Category Ia (122 hectares) Marine Zone Category II (2,480 hectares)	
Biogeographic context	Isolated atoll in the Indian Ocean formed atop an old volcanic seamount	
Management plan	Second plan expires 27 April 2011	
Other significant management documents	Visitor access, boating, diving and fishing strategies; Management Plan Implementation Schedule; Risk Assessment and Management Schedule	
Financial	Operating	\$0.742 million
	Capital	\$0.066 million
	Revenue	\$0.033 million

Visitors	102
Permits	3 commercial tour operators (1 each for diving, surfing and terrestrial tours) 14 marine access

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire park listed
Migratory Species (Bonn) Convention	8 of 98 listed Australian species
China–Australia Migratory Birds Agreement	15 of 81 listed species
Japan–Australia Migratory Birds Agreement	15 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 critically endangered 4 endangered 5 vulnerable 24 migratory 36 marine
	Recovery plans	4 being implemented: blue whale ( <i>Balaenoptera musculus</i> ); sei whale ( <i>Balaenoptera borealis</i> ); Round Island petrel ( <i>Pterodroma arminjoniana</i> ); marine turtles
Listed flora	Species	None
Heritage	North Keeling Island on Commonwealth Heritage List	

Numbers of native species recorded			
Mammals	Birds	Reptiles	Plants
5 (2)	24 (8)	6 (5)	31

Figures in brackets are the numbers of species that are a management priority

## Management committee

The Pulu Keeling National Park Community Management Committee comprises the Director of National Parks (or his nominee), three others nominated by the Director and six community representatives nominated by the Cocos (Keeling) Islands Shire Council.

## Monitoring

The red-footed booby population on North Keeling Island has been monitored since 1985. Analysis of the data in 2005 again put the number at around 30,000 breeding pairs.

With a current estimate of 1,000 individuals, the buff-banded rail population remains stable in the park and staff continue to monitor the population.

A consultant team funded under the Envirofund programme is working in partnership with the local community to prepare a proposal for restoration of habitat for the buff-banded rail. The proposal includes establishing a second viable population within the Cocos (Keeling) Islands group.

The eighth year of the sea turtle monitoring programme was completed, with 87 green turtles and 104 hawksbill turtles caught and measured. Over the eight year period a total of 1,217 turtles have been captured and released.

Annual coral reef health checks under the international Reefcheck programme include a site on North Keeling Island (see case study on page 104).

## Future challenges

Major challenges are:

- preventing the introduction of pests and diseases to the park
- containing the impact of exotic species. Island fauna is especially vulnerable to the introduction of exotic species; outbreaks of scale insects and die-back (*Phytophthora* spp.) on nearby Christmas Island and in Western Australia may pose a threat to the park
- managing for global warming, which poses a particular challenge to the future management of low-lying atolls such as North Keeling.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Regular access to the park to perform routine tasks
- Illegal entry to the park
- Illegal wildlife harvesting
- Monitoring red-footed boobies

#### Actions

- Maintain a workable arrangement with the service provider (vessel contract)
- Maintain surveillance, boat patrols and education
- Continue the ongoing community education and interpretation programme
- Assist the community to prepare an application for a legal harvest of red-footed boobies
- Survey bird numbers regularly



### *Performance results 2006–07*

- Progressed installation of remote surveillance equipment to provide more effective detection of illegal park entry and poaching
- Spent 133 staff days on patrols during the year. Patrols are believed to be effective at deterring poaching
- Carried out educational activities with the local school and the general community to encourage environmentally responsible behaviour
- Detected a number of incidents via patrols and information from the community. Five people were charged with wildlife or firearms offences
- Continued bird surveys; however inclement weather and limited availability of the ocean going vessel meant that only two surveys were possible

#### **KRA2: Cultural heritage management**

### *Major issues*

- The SMS *Emden* shipwreck is becoming a popular diving site
- Visitors to Malay grave sites

### *Actions*

- Ensure access to sites is managed appropriately

### *Performance results 2006–07*

- Effectively managed cultural heritage sites
- Conducted guided tours of the grave sites and the *Emden* memorial site on the beach
- Cleaned grave sites
- Installed a new beach sign to inform visitors of the *Emden* wreck site's historic importance

#### **KRA4: Visitor management and reserve use**

### *Major issues*

- Potential for introduction of exotic species by park visitors

### *Actions*

- Implement quarantine procedures
- Prevent introduction of exotic species

### *Performance results 2006–07*

- Inspected visitors' equipment and clothing and scrubbed footwear prior to visitors swimming ashore. No evidence was found that new species had been introduced

**KRA5: Stakeholders and partnerships***Major issues*

- Dissatisfaction with park management due to a perceived lack of obvious benefits to the community

*Actions*

- Promote the benefits of the park (including employment, tourism, local expenditure)

*Performance results 2006–07*

- Progressed the establishment of an office on Home Island, in addition to the existing office on West Island, to build Parks Australia's profile. The office would be staffed part time
- Maintained regular meetings and communication with stakeholders

**KRA6: Business management***Major issues*

- Isolation restricts training opportunities

*Actions*

- Train staff more effectively
- Make the best use of staff visits to the park within budget constraints

*Performance results 2006–07*

- Managed operational and capital budgets within approved parameters
- Provided staff with local training in 4WD operation, advanced first aid and ParkSafe
- A ranger continued a lands, parks and wildlife correspondence course



## 10 years of Reefcheck surveys on the Cocos (Keeling) Islands



*Wendy Murray surveying a reef at the Cocos (Keeling) Islands*

The Cocos (Keeling) Islands is one of the longest running Reefcheck survey sites in the world. Parks Australia commenced surveys in 1997 as part of the International Year of the Reef. The initial strategy was adapted for long-term monitoring to examine and record the health status of the surrounding coral reefs.

Reefcheck is an international organisation that is assembling the world's largest international database on coral reef status. Data are collected using Reefcheck's standardised and internationally recognised underwater visual survey

format. The format allows accurate comparison of global trends in reef status.

The good news is that surveys are finding that the coral reefs at Cocos remain healthy and stable, with minimal overall disturbance to coral communities and steady abundance of fish and invertebrates.

The Reefcheck programme on Cocos involves annual observation and collection of field data at 11 representative marine sites. Ten sites are on the South Keeling atoll and one (the Bunya coral site) is in Pulu Keeling National Park. To provide information on habitat, key indicators and level of collecting/use by the local community, the numbers of selected fish and invertebrate species are recorded. Species monitored include butterfly fish, barramundi cod, moray eels, giant clams, crown-of-thorns starfish and lobsters.

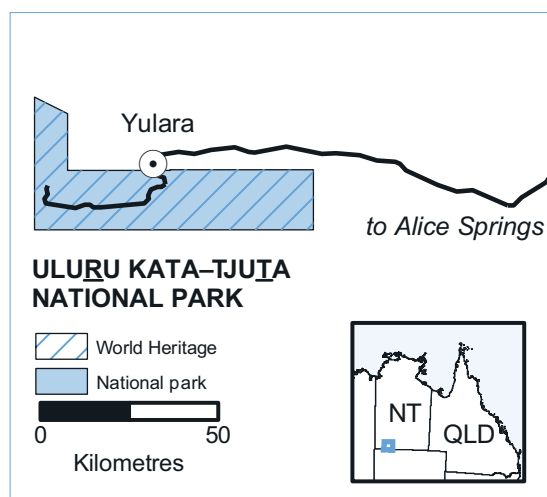
Researchers do underwater visual counts of fish and invertebrates using four permanent 20 x 5 metre belt transects at each site. Transects are surveyed at a depth of 10 metres for nine of the 11 sites and at 3 metres at two sites within the lagoon.

A data logger secured at each site measures water temperature every hour for 12 months. Monitoring water temperature assists early detection of rises which can lead to coral bleaching. On Cocos (Keeling) Islands the water temperature ranges from 24 degrees to 32 degrees but averages around 28 degrees.

This underwater survey work is contributing to international knowledge about the impacts of global warming and climate change on the health of coral reefs. The continued good health of the Cocos sites suggests they will continue to play an important part in the conservation of coral reefs globally.

## Uluru–Kata Tjuta National Park

<http://www.environment.gov.au/parks/uluru>



### Special features

Uluru–Kata Tjuta National Park is inscribed on the World Heritage List for both the cultural and natural values of its landscape. The park protects the cultural values of its *Anangu* (western desert Aboriginal) owners, the iconic rock outcrops of Uluru and Kata Tjuta, outstanding examples of arid zone flora and fauna and outstanding scenic beauty.

Uluru–Kata Tjuta National Park is a place of great spiritual and cultural

importance to *Anangu* men and women. For countless generations this ancient landscape has developed as a result of the activities of *Anangu* and their ancestors. The land management techniques that are a feature of these activities are an intrinsic part of *Tjukurpa* (traditional law and culture) and a feature of the joint management of the park by *Anangu* and Parks Australia.

Location	Latitude 25°15' South, Longitude 130°43' East	
Area	132,566 hectares	
Proclamation dates	24 May 1977, 28 October 1985	
IUCN category	Category II	
Biogeographic context	Interim Biogeographic Regionalisation for Australia region: Great Sandy Desert	
Management plan	Fourth plan officially expired 28 June 2007. Board of management resolved in March 2007 that the park would be managed in accordance with the fourth plan until the fifth plan is finalised and approved in 2008	
Other significant management documents	Lease between the Uluru–Kata Tjuta Aboriginal Land Trust and the Director of National Parks; Visitor Infrastructure Master Plan; Uluru Climb Health and Safety Report; Uluru Ticketing Report; Species Reintroduction Plan; Invasive Flora Control Plan; Invasive Fauna Control Plan; Fire Management Procedures; Cultural Heritage Action Plan; Risk Assessment and Management Schedule; Women's Cultural Heritage Plan	
Financial	Operating	\$10.244 million
	Capital	\$1.997 million
	Revenue	\$8.482 million
	Paid to traditional owners	\$2.030 million

Visitors	An estimated 341,700 paying visitors (16 years and above) based on park tickets sold
Permits	199 film/photography; 95 tour operators; 3 research
Visitor satisfaction	No visitor surveys were conducted in 2006–07. Visitor survey planned for 2007–08

#### International conventions and agreements

World Heritage Convention	Listed under cultural criteria (v) and (vi) and natural criteria (ii) and (iii), recognising the park's outstanding natural and cultural values and its significance as a cultural landscape
Migratory Species (Bonn) Convention	11 of 98 listed Australian species
China–Australia Migratory Birds Agreement	14 of 81 listed species
Japan–Australia Migratory Birds Agreement	15 of 76 listed species
Other agreements	Listed as a biosphere reserve under the UNESCO Man and the Biosphere Programme

#### Environment Protection and Biodiversity Conservation Act 1999

Listed fauna	Species	6 extinct 5 endangered 9 vulnerable 17 migratory 36 marine (birds)
	Recovery plans	5 being implemented: mala or rufous hare wallaby ( <i>Lagorchestes hirsutus</i> ); golden bandicoot ( <i>Isodon auratus</i> ); Alice Springs mouse ( <i>Pseudomys fieldi</i> ); tjakura or great desert skink ( <i>Egernia kintorei</i> ); southern marsupial mole ( <i>Notoryctes typhlops</i> )  8 in preparation: mulgara ( <i>Dasycercus cristicauda</i> ); bilby ( <i>Macrotis lagotis</i> ); red-tailed phascogale ( <i>Phascogale calura</i> ); sandhill dunnart ( <i>Sminthopsis psammophila</i> ); numbat ( <i>Myrmecobius fasciatus</i> ); black-flanked rock-wallaby ( <i>Petrogale lateralis</i> ); chuditch ( <i>Dasyurus geoffroii</i> ); central rock-rat ( <i>Zyzomys pedunculatus</i> )
Listed flora	None	
Heritage	On National Heritage List and Commonwealth Heritage List	

#### Numbers of native species recorded

Mammals	Birds	Reptiles	Fish	Amphibians	Plants
21 (14)	170 (2)	73 (3)	None	4 <sup>a</sup> (1)	>400

Figures in brackets are the numbers of species that are a management priority.

(a) Increased from 1 reported in 2005–06 report due to an earlier reporting error



## Board of management

The structure of the Uluru–Kata Tjuta Board of Management ensures an *Anangu* majority of 8:3. The current board was appointed by the Minister in October 2003 for a period of five years. The board oversees management of the park and preparation of the management plan. Through joint management of the park, *Anangu* and *Piranpa* (non-Aboriginal people) work together to manage the park's cultural and natural heritage.

## Monitoring

The fifteenth Uluru fauna survey and vegetation monitoring at eight permanent sites was conducted during late October and November 2006. Based on the survey results, the overall health of the park's fauna appears to be good. Seventy-eight bird species, 17 mammal species, 67 reptile species and two frog species were detected during the survey.

The survey found low to moderate numbers of bird species and low to moderate numbers of each bird species. Only a few nomadic species were observed and in low numbers. In contrast, a record number of reptiles were found, with 67 of the 73 species ever documented in the park recorded. The small-mammal population has increased considerably since extensive wildfires in 2002, with increasing numbers of native rodents and the highest number of small dasyurids captured for many years. Unfortunately, the most significant mammal trend was a great increase in camels at survey sites and across the park generally. There was a low level of feral predators across the park, though with reasonable rainfall and an increasing small-mammal population, numbers are likely to grow in the near future.

The tenth annual tjakura or great desert skink (*Egernia kintorei*) survey took place in February and March 2007. The survey recorded 147 active burrows, the highest number in 10 years, of which 65 were breeding burrows. The large area of spinifex burnt in the 2002 wildfires has created an open habitat structure suitable for tjakura and moderate rainfall since then has kept predator numbers low, increasing the survival rate of juveniles and sub-adults. Maintaining low predator numbers will be crucial to ensure continued population growth.

The eighth annual mulgara (*Dasyercus cristicauda*) survey in November 2006 recorded the greatest presence of mulgara (evidenced by scats, tracks, burrows, captures) since 2001. However numbers remain low (three animals were trapped over three nights), most likely as a result of the greatly reduced area of mid- to mature-age spinifex (regarded as prime mulgara habitat) following the 2002 wildfires. With the current very open habitat structure, managing feral predators will be critical and the remaining small areas of mature spinifex will need to be protected from fire for at least the next three years.

The second and third census of the recently reintroduced mala (*Lagorchestes hirsutus*) took place in October 2006 and April 2007 in the predator-proof enclosure. Capture



rates were lower in April (14 animals were trapped compared to 26 in October) mainly due to new plant growth following rainfall just before the census and escape of some animals from traps; however animals trapped in both October and April were healthy and included females with pouch young.

Rabbits (*Oryctolagus cuniculus*) are monitored using counts of active holes and warrens to measure the success of the control programme in place since 1989. The number of warrens located throughout the survey area in March 2007 represented a significant decline since 2000 and the overall population is very low, with large parts of the park rabbit free.

## Future challenges

Major challenges are:

- completing the new sunrise visitor facility. The new facility will cater for up to approximately 3,000 visitors per day and will include a viewing platform, viewing areas, walking tracks, wiltjas (shade areas), toilets, a car park, a bus park, a site for an Aboriginal enterprise, an area for concerts and 11 kilometres of roads. When completed in 2008, the new facility will provide an exciting new view and experience of Uluru and Kata Tjuta in a much safer and user friendly environment
- managing visitor safety, particularly for those who choose to climb Uluru (see case study on page 117)
- developing a long-term strategy for the provision of essential services (such as power and water) in the park. Currently, provision of services for both the park and the Mutitjulu community is stretched to capacity and is limiting future development. Negotiations with the NT Government on alternative arrangements are progressing slowly. A review of service provision would also enable a strategy to be developed to reduce the park's current environmental footprint.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Spread of introduced buffel grass (*Cenchrus ciliaris*)
- Potential impact of sleeper weeds and new invasive species
- Impacts of vertebrate (fox, cat, camel, rabbit, feral dogs) and invertebrate pests
- Understanding and managing the impacts of fire
- Monitoring the status of threatened species and managing threatening processes
- Reintroducing locally extinct species
- Controlling erosion and repairing existing damage
- Surface and groundwater management

### Actions

- Continue the buffel grass control programme
- Introduce a fox baiting programme in threatened species habitat, develop a camel management programme, maintain the rabbit control programme and undertake targeted cat control
- Continue to conduct fire planning workshops involving all stakeholders and to develop and implement annual burn plans
- Develop a fire and vegetation management strategy, fire operations manual and monitoring manual
- Monitor threatened and other significant species, and participate in research to improve understanding of these species' requirements
- Maintain the pest-free enclosure and complete infrastructure development
- Continue to develop a species reintroduction programme
- Provide native plants for amenity planting from the park's nursery
- Continue the erosion control programme
- Improve data and GIS management

### Performance results 2006–07

- Established the Cultural Heritage and Scientific Consultative Committee to provide advice on natural and cultural issues
- Cleared approximately 30 hectares of buffel grass
- Developed detailed specifications for a weed management GIS. Palm computers with GPS cards were set up to improve weed data collection
- Identified an infestation of an invasive pest, the big-headed ant (*Pheidole megacephala*) at Yulara and assisted Ayers Rock Resort personnel to treat the infestation
- Held a workshop to discuss camel management options with park staff, *Anangu*, the Central Land Council and NT Parks and Wildlife Service
- Conducted a rabbit monitoring and fumigation programme. Located 23 active warrens in the survey area, a significant decline since 2000 when 67 active warrens were recorded. Rabbit numbers in the park overall remain low
- Continued preparations to trial fox-specific bait delivery stations in July 2007
- Continued fox baiting in core threatened species habitat
- Held a fire planning workshop with park staff, the Central Land Council, traditional owners and the NT Bushfires Council to develop annual burn plans
- Developed the Fire and Vegetation Management Strategy to final draft form



- Conducted mulgara, great desert skink and mala surveys and a major fauna survey (see Monitoring on page 107)
- Worked in partnership with the Central Land Council, and Parks and Wildlife Service NT and Greening Australia to assess the condition of waterholes in the park and surrounding areas, particularly in relation to camel impacts
- Discussed with the NT Department of Natural Resources, Environment, and the Arts the establishment of a water control area and water advisory board for the region surrounding the park and Yulara
- Prepared for erosion control work at Warayuki sacred site
- Conducted site visits with an NT soil conservation officer to discuss erosion issues for the north-east and Valley of the Winds walking tracks
- Completed environmental impact assessments for the sunrise visitor facility, north-east walking track, Valley of the Winds walking track upgrade, bore facilities upgrade, spinifex harvest, Mutitjulu rubbish tip expansion, Mutitjulu street lighting and proposed Kata Tjuta toilets
- Provided detailed advice on selecting and planting local species for the Police Post and new homes in Mutitjulu
- Provided logistical support and presentations to the Central Land Council Indigenous Ranger Camp held in the park

## **KRA2: Cultural heritage management**

### *Major issues*

- Supporting the continuation of *Anangu* living culture and knowledge
- Protecting historic and *Anangu* cultural information, sites and objects

### *Actions*

- Continue to implement the Cultural Heritage Action Plan (2002) and Women's Cultural Heritage Plan (2005)
- Continue the rock art conservation, oral history and repatriation programmes
- Identify, catalogue and conserve cultural, historical and archaeological sites and objects
- Maintain the Cultural Sites Management System database as an information repository, planning and reporting tool
- Maintain the *Ara Irititja* (Stories from the Past) database, promote community access, and continue data entry. *Ara Irititja* is a multimedia database and associated project that enables *Anangu* to access archival material (film, photographs, sound recordings, documents, artefacts)
- Support staff and *Anangu* participation in the annual women's law and culture meeting

*Performance results 2006–07*

- Cleared buffel grass from the Pulari women's sacred site
- Continued to document the seasonal calendar by working with senior *Anangu* to record knowledge of changes to plants, animals and weather throughout the year
- Conducted rock art inspections throughout the year
- A specialist conservator made conservation assessments of all public sites and produced site management plans
- Continued the oral history recording project. Provided fireproof storage for oral history material
- Supported an *Anangu* delegation to the State Library of South Australia to view over 3,000 items from the Mountford Collection, collected in the 1930s, 40s and 50s. Scanned images from Uluru and began sorting them into public, restricted men's and restricted women's material for inclusion in the Cultural Sites Management System and *Ara Irititja* databases
- Supported an *Anangu* delegation to the National Museum of Australia in June 2007. Men's ceremonial items were repatriated to sacred sites at Uluru
- Conducted archaeological surveys, including test pits, as part of environmental impact assessments for the north-east walking track, Valley of the Winds walking track upgrade, erosion works at Warayuki sacred site and the Mala area (Kantju Gorge to base of climb)
- Undertook annual maintenance on the Cultural Site Management System database, trained seven more staff to use it, and produced a manual and training video
- Undertook twice-yearly maintenance on the *Ara Irititja* database. *Anangu* regularly accessed this popular database throughout the year. Staff worked with senior *Anangu* to enter information and stories on individual photographs and films in the database. A Pitjantjatjara speaking facilitator was engaged to assist
- Provided logistical support for *Anangu* attending women's law and culture meetings
- Assisted the Aboriginal Areas Protection Authority to locate and register sacred sites during three field trips to the park and surrounding area
- Made 10 trips to adjacent Aboriginal lands for natural and cultural resource management and cross-cultural activities



### KRA3: Joint management

#### Major issues

- Developing agreed understanding of joint management principles
- Providing opportunities for Indigenous economic development on park
- Employment of the Community Liaison Officer by Parks Australia
- Ensuring traditional owners are appropriately involved in park projects and park management activities
- Supporting training and increased *Anangu* employment

#### Actions

- Work with joint management partnership members to maintain productive working relationships and effective communication between agencies
- Work with the Central Land Council to ensure effective traditional owner consultation in the development of the fifth management plan and significant park projects

#### Performance results 2006–07

- Board member Barbara Tjikatu was awarded the Order of Australia for services to the Muṯitjulu community and Uluru–Kata Tjuṯa National Park
- Established a new Joint Management Partnership Team. Members are the Joint Management Officer (Central Land Council), Community Liaison Officer (Muṯitjulu community), board of management secretary and park manager. The team provided advice to the board of management on park, community and traditional owner issues quarterly. The team also worked to resolve and advise on many contentious issues regarding film and photography, the Uluru climb, the new sunrise visitor facility, public events and community issues
- Reviewed the Community Liaison Officer position and appointed a new officer
- The Central Land Council consulted traditional owners on development of the fifth management plan and other significant projects
- Held four regular and two special meetings of the board of management plus 11 meetings of board subcommittees to develop draft sections of the new management plan

#### KRA4: Visitor management and reserve use

##### *Major issues*

- Detailed planning and approvals for the new sunrise visitor facility
- Park ticket system review
- Managing demands of international and Australian film crews and professional photographers
- Pressures on ageing infrastructure to effectively manage the expected increase in visitor numbers
- The Uluru climb health and safety review identified potential health and safety issues that need to be addressed
- Improving interpretation and visitor information

##### *Actions*

- Continue media briefings using the new DVD media package and electronic communications
- Review the ticketing system
- Review health and safety issues associated with the Uluru climb
- Develop new interpretive signs around Uluru and the cultural centre
- Continue work on realigning the Uluru north-eastern base walking track and upgrading the Valley of the Winds walking track
- Continue strategic visitor infrastructure maintenance and planning and project manage new developments
- Continue tour operator workshops and orientation programmes for the tourism industry
- Progress the online tour guide training programme with all tour guides to be accredited to operate in the park by the end of 2009
- Continue and improve Junior Ranger programmes

##### *Performance results 2006–07*

- Held 59 media briefings using the new media DVD, which won the Australian Teachers of Media national award
- Completed the ticket review
- Completed the Uluru climb health and safety review
- Progressed the sunrise visitor facility. The design was completed, road alignment completed and the project fully funded. Tenders were called for the first construction phase
- Installed new interpretive signs and track markers at the Uluru base walk, cultural centre and Liru walk
- Continued the Junior Ranger programme with Mutitjulu and Yulara primary schools



- Conducted tours for the King and Queen of Sweden and the President of Finland
- Upgraded displays in the cultural centre and *Tjukurpa* tunnel
- Maintained park infrastructure under a scheduled works programme including new road signs and line marking
- Conducted one tour operator workshop
- Completed park-specific content for the online tour guide course based on the Kakadu Knowledge for Tour Guides course (see case study on page 88)

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Providing opportunities for developing new Indigenous commercial enterprises
- Maintaining an effective working relationship with the Muṯitjulu community during their period under administration
- Ongoing consultation with the tourism industry regarding the new sunrise visitor facility
- Maintaining good relationships with key stakeholders and investigating opportunities for further partnerships

##### *Actions*

- Hold meetings of formal park committees
- Participate in the Yulara Advisory Committee
- Communicate clearly with all parties about park developments and the Uluru climb
- Meet regularly with Muṯitjulu community and Ayers Rock Resort representatives
- Continue supporting volunteer and community groups in protecting park values

##### *Performance results 2006–07*

- Formalised *Anangu* membership of the Tourism Consultative Committee
- Joined the Yulara Advisory Committee
- Held quarterly meetings of the Tourism Consultative Committee, the Film and Photography Consultative Committee and the Cultural Heritage and Scientific Consultative Committee
- Continued ongoing contact between park management, the Joint Management Partnership Team, traditional owners and relevant stakeholders during design and implementation of core programmes such as fire and pest management
- Hosted nine Conservation Volunteers Australia programmes representing 4,500 hours of weed control effort
- Attended Muṯitjulu community meetings
- Engaged 91 *Anangu* through the two Memoranda of Understanding on day labour programmes with the Muṯitjulu community



**KRA6: Business management***Major issues*

- Conducting and implementing the organisational review to ensure the most effective and efficient staffing structure
- Preparation of the new management plan
- Shortage of staff housing
- Providing essential services to the Mutitjulu community
- Developing a lease agreement for business enterprises at the cultural centre
- Improving corporate governance procedures
- Failure to meet revenue targets due to a shortfall in expected visitor numbers
- Maintenance of infrastructure and provision of essential services has been undertaken on a case-by-case basis in the absence of period contracts
- Staff training and development

*Actions*

- Undertake the organisational review
- Ensure that the park housing and training committees are functional and meet regularly
- Prepare papers on key issues and help draft the new management plan
- Continue to implement the staff training plan and update the training calendar
- Develop new period contracts
- Undertake an energy audit of park housing and implement energy efficiencies
- Undertake occupational health and safety audits of administration buildings and implement safe working procedures including job safety analyses
- Commence an audit of power supply arrangements and review arrangements for providing essential services

*Performance results 2006–07*

- Began developing the new management plan with the board of management, including two special meetings to discuss specific issues
- Commissioned an independent organisational review which involved consultation with staff and stakeholders; the review is expected to be finalised by August 2007. The Organisational Review Reference Committee met as required
- Developed a new staff orientation package
- Supported 65 training events ranging from informal information sessions to accredited training



- Established major training programmes: a language and communication programme including literacy, numeracy and Pitjantjatjara language; a leadership and management programme developing managers' and supervisors' people management skills; and a health and wellbeing programme assisting staff to maintain the high level of fitness required
- Appointed two *Anangu* trainee rangers who began a Certificate II in Conservation and Land Management
- Nine staff members began independent studies including Masters degrees and Certificate III in relevant fields
- The Occupational Health and Safety Committee met every two months
- Undertook analysis of power supply issues
- Established a ranger register and visitor service officer register to speed up recruitment actions

## Who climbs Uluru and why?



Anangu ranger Nyninku Jingo leading the Mala Walk. Free ranger guided walks are provided daily to visitors as an alternative to the climb

Although climbing Uluru remains a popular activity for some park visitors, *Nguraritja* (senior traditional owners) say that visitors should not climb. They consider that climbing is disrespectful of their culture and are concerned for the safety of visitors to their country, for whom under *Tjukurpa* (traditional law) they are responsible. Parks Australia discourages visitors from climbing through education and providing alternative activities that allow visitors to appreciate the wider values of the park.

Since 2003, researchers from the Australian National University have been investigating who climbs Uluru and why via detailed visitor surveys. For the most recent (2006) survey researchers Richard Baker and Hannah Hueneke conducted 540 interviews covering 2,175 people to

provide a comprehensive dataset about climbing behaviour.

The 2006 survey found that 38 per cent of visitors interviewed chose to climb Uluru, a significant decrease since 1990 when park visitor surveys were first undertaken. Different nationalities varied widely in rates of climbing, with Japanese visitors by far the most likely to climb and those from the USA and Germany the least. There were also age and gender differences—more men climbed than women and those 18 years or under were the age group most likely to climb. Overall, 69 per cent of climbers were Australian, reflecting the fact that Australians formed two-thirds of all visitors.

Although the proportion of visitors who choose to climb has declined over the past 15 years, the total number of climbers has nonetheless increased, as visitor numbers to the park have approximately doubled over this period.

The surveys found the reasons why visitors make the climb are complex. The desire for views, challenge, a sense of personal or symbolic achievement and because children wished to climb were among the reasons cited. For those choosing not to climb, respect for Indigenous culture and heritage was generally mentioned. Almost all those surveyed were aware that traditional owners ask visitors not to climb.

The 2006 survey findings include some suggestions as to how park management can better present its message to visitors about the cultural and safety issues of the climb. Significantly, 97.8 per cent of those surveyed indicated that if the climb were closed they would still visit the park. The provision of alternative facilities such as guided walks around the base of Uluru and the new sunrise viewing facility (due for completion in 2008) will continue to be a management priority.

At the base of the climb, a message to visitors echoes the words of a respected *Anangu* elder:

*"That's a really important sacred thing that you are climbing..."*

*You shouldn't climb. It's not the real thing about this place.*

*The real thing is listening to everything. This is the thing that's right.*

*This is the proper way: no climbing."*

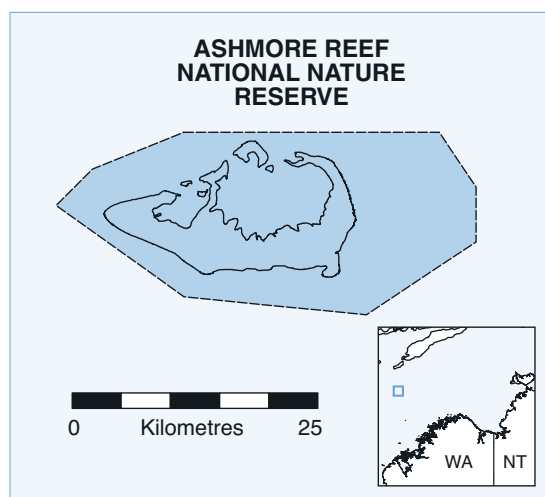
© Kunmanara, Traditional Owner



*Visitors to the park are encouraged to explore the cultural centre before they decide whether or not to climb. The centre educates visitors on the significance of Uluru in *Anangu* culture.*

## Ashmore Reef National Nature Reserve

<http://www.environment.gov.au/coasts/mpa/ashmore>



### Special features

Ashmore Reef National Nature Reserve is renowned for its high biological diversity. The reserve contains a variety of marine habitats, including extensive seagrass meadows, sandflats, reef flats and lagoons.

Ashmore Reef is home to many different species of fish, corals, molluscs and other invertebrates, and has the highest known diversity and density of sea snakes in the world, with 17 species recorded. It is also an important

breeding and feeding habitat for threatened species, including dugong (*Dugong dugon*), green turtles (*Chelonia mydas*), loggerhead turtles (*Caretta caretta*) and hawksbill turtles (*Eretmochelys imbricata*).

The reserve contains three small sand islands with a combined area of 112 hectares. The islands support some of the most important seabird rookeries on the Northwest Shelf and the reserve is an important staging point for migratory wetland birds, especially waders. At Ashmore Reef more than 78 species have been recorded, of which 43 are listed in international agreements for the conservation of birds and their habitats. Colonies of sooty terns (*Sterna fuscata*) and common noddies (*Anous stolidus*) number up to 50,000 breeding pairs.

Location	Latitude 12°15' South, Longitude 123°05' East	
Area	58,337 hectares	
Proclamation date	16 August 1983	
IUCN category	Category Ia overall comprising: Category Ia: 54,991 hectares Category II: 3,346 hectares	
Biogeographic context	IMCRA 4.0 provincial bioregion: Timor Province	
Management plan	Second plan expires 25 June 2009	
Other significant management documents	Memorandum of Understanding with Indonesia; service level agreement with the Australian Customs Service	
Financial	Operating	\$65,582*
	Capital	Not applicable
	Revenue	Not applicable

Visitors	Not known, occasional yacht visits
Permits	1 commercial tour (bird watching)

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Wetlands (Ramsar) Convention	The entire reserve is listed
Migratory Species (Bonn) Convention	26 of 98 Australian listed species
China–Australia Migratory Birds Agreement	38 of 81 listed species
Japan–Australia Migratory Birds Agreement	38 of 76 listed species
Other agreements	Under a Memorandum of Understanding with Indonesia, traditional Indonesian fishers are allowed access to an area that includes the reserve

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 endangered 2 vulnerable 46 migratory 60 marine
	Recovery plans	1 being implemented: marine turtles
Listed flora	None	
Heritage	On Commonwealth Heritage List	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
1	78	17	720	1,265	40

## Management arrangements

The Australian Customs Service carried out on-site management of the reserve and Coastwatch provided regular flights over Ashmore. Departmental staff visited the reserve in November 2006 to implement and assess reserve management activities.

## Monitoring

A survey of target marine species was carried out in November 2006 (see case study on page 124) in addition to the twice-yearly marine surveys. The 2006 survey was in response to greatly increased levels of illegal fishing in the reserve in mid-2006 when there was no on-site management for several months. The survey focused on the species targeted by Indonesian fishermen (trochus shell, trepang and clam) with results compared to the last survey in 2005. The survey found that target species

were generally still in recovery from previous exploitation and that the trochus shell population, in particular, had been reduced in 2006. The next survey is due in late 2007.

Sea snake monitoring by Charles Darwin University indicates a decline in sea snake populations at Ashmore Reef (see case study on page 125). A research programme to investigate this more closely began with a survey in November 2005. The survey found very low numbers of sea snake species, including in comparison with other nearby reefs (Cartier and Hibernia). A follow-up survey in March 2007 (to take seasonal variation into account) confirmed this trend.

## Future challenges

Major challenges are:

- improving operational arrangements and compliance and enforcement capacity. The Department is working with the Australian Customs Service to develop a stronger enforcement presence at Ashmore. This will be delivered by a dedicated enforcement vessel to be based permanently at Ashmore and staffed with Customs enforcement officers
- managing the potential impact of climate change, including coral bleaching events and loss of niche habitats and associated species. The Department will continue to monitor coral health and species abundance at Ashmore, with the aims of better understanding the impacts of climate change and developing appropriate management responses.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Illegal fishing
- Coral bleaching and species loss
- Introduction of pest species

#### Actions

- Enforce access and fishing restrictions
- Work with the Australian Customs Service to put a permanent enforcement vessel in place
- Cooperate with Indonesian officials to improve management of the MoU Box fishery
- Encourage and facilitate reef research and monitoring
- Deal with the threats identified in the Marine and Terrestrial Introduced Species Prevention and Management Strategy (2004)
- Monitor and remove weeds from the reserve
- Implement quarantine, bilge and ballast water protocols

#### *Performance results 2006–07*

- The Australian Customs Service provided on-site management at Ashmore Reef for most of the year
- Customs officers enforced access and fishing restrictions. Officers boarded fishing vessels in the area and advised crews of restrictions. Suspected illegal activities were investigated and warnings issued
- Through a joint submission with the Australian Customs Service, new funding was secured for Customs to establish a permanent enforcement vessel to strengthen the protection of Ashmore and Cartier reserves
- Researched sea snakes and invertebrate species targeted by Indonesian fishermen
- Continued to collect and analyse marine debris

#### **KRA4: Visitor management and park use**

##### *Major issues*

- Anchor damage

##### *Actions*

- Maintain moorings
- Monitor visitors

#### *Performance results 2006–07*

- Australian Customs Service officers monitored visitors' use of moorings
- Distributed information about use of the moorings via a brochure

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Illegal foreign fishing

##### *Actions*

- Revise and implement an integrated management approach for Indonesian fishing in the MoU Box

#### *Performance results 2006–07*

- Progressed the second phase of an alternative livelihood project in Indonesia using AusAID funds. The first phase provided alternative sources of income, such as seaweed farming and mariculture, for traditional fishers who currently target Australian waters. The second phase covers five new villages and is investigating further alternative income sources. This project is now being managed by AusAID



- Consulted with Indonesian officials and the Department of Agriculture, Fisheries and Forestry to address overfishing issues in the MoU Box on a regional and cooperative basis

#### **KRA6: Business management**

##### *Major issues*

- Effective working and liaison arrangements with the management service provider, the Australian Customs Service

##### *Actions*

- Manage the relationship with the Australian Customs Service

##### *Performance results 2006–07*

- Held regular meetings and consultation with Customs
- Provided warden training for Customs officers
- Worked closely with Customs to acquire and establish a permanent enforcement vessel which will also provide enforcement coverage for Cartier reserve



## Measuring the impact of illegal foreign fishing at Ashmore Reef



*A small trochus shell which is used to make mother of pearl*

Traditional Indonesian fishers have visited Ashmore Reef in the Timor Sea for hundreds of years to collect trepang (sea cucumbers), trochus shells and, to a lesser extent, giant clams.

The harvest of these benthic species (species that live on or near the ocean floor) is now prohibited in Ashmore Reef National Nature Reserve under the reserve's management plan. An agreement between Australia and Indonesia allows traditional Indonesian fishers to continue to access certain parts of the reserve to replenish

fresh water supplies, catch fin fish for immediate consumption, seek shelter and visit grave sites on the island.

In mid-2006 increased illegal Indonesian fishing was detected in the reserve. In response, the Department engaged researchers to undertake a marine survey to assess the likely impacts on the target species. The survey was conducted in October 2006 and results compared to a previous marine survey in mid-2005.

The 2005 survey indicated that there had been some recovery of the benthic species, including trochus which were becoming more abundant. However, there had not been a full recovery of all species previously fished at Ashmore Reef and certain species of high commercial value remained at low numbers.

A comparison of the data from the 2005 and 2006 surveys showed that trepang and giant clam numbers were still low, but more importantly the abundance and size of trochus had decreased. This indicates that the illegal Indonesian fishing in mid-2006 did have a detrimental effect on the recovery of trochus at Ashmore Reef and suggests that even a short period of illegal fishing can have a significant negative impact.

<b>Trochus density and size</b>	<b>2005</b>	<b>2006</b>
Estimated trochus density—individuals/hectare ( $\pm$ standard error)	37.70 ( $\pm$ 6.7)	23.75 ( $\pm$ 5.5)
Average trochus size—basal shell width in mm ( $\pm$ standard error)	75.9 ( $\pm$ 2.1)	74.0 ( $\pm$ 1.0)

In response to this illegal Indonesian fishing, the Australian Government has committed over \$30 million over the next four years to the Australian Customs Service for improved compliance and enforcement in the reserve. The funding will allow Customs to procure a vessel that will maintain a dedicated presence at Ashmore. This ongoing enforcement presence is recognised as an important part of ensuring that the unique features of the Ashmore Reef National Nature Reserve are protected.

## Declining sea snake populations at Ashmore Reef



Sea snake survey at Ashmore Reef

The reputation of Ashmore Reef as a special place for sea snakes began as early as 1926 when a British Museum of Natural History voyage noted huge numbers of sea snakes of several species. Since then 17 different sea snake species have been recorded within this fringing coral reef and lagoon habitat, more than anywhere else in the world.

Concerns about declining sea snake numbers were first raised by sea snake expert Dr Michael Guinea of Charles Darwin University, who has been researching sea snakes at Ashmore since 1995. In 2003

Michael observed a major decrease in sea snake numbers—where surveys in 2000 and earlier had encountered one every minute, the 2003 survey came up with only one every hour. Surveys in 2006 and 2007 found even fewer animals, with certain species absent altogether. At the same time other reefs in the region, such as Cartier Island and Hibernia Reef, have maintained their numbers.

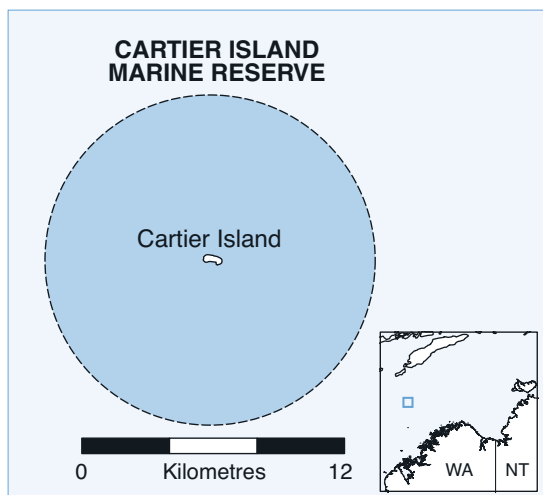
The concerns here are twofold: the significant and apparently sudden decrease in overall numbers and the absence of particular species, notably those endemic to the Ashmore region such as the enigmatic leaf-scaled sea snake (*Aipysurus foliosquama*).

Further surveys are planned and work continues to understand the dynamics of sea snake populations at Ashmore. An understanding of the possible causes of the decline is needed, and to do this a number of environmental parameters need to be assessed. A potential cause of the decline is rising sea temperatures associated with climate change. Widespread coral bleaching was observed in two marine surveys of Ashmore in 2003 and has been linked to a number of hot water events experienced during 2002–03. Those periods of elevated sea temperatures may have impacted on sea snake populations, either directly or indirectly (for example, through loss of habitat or food sources). A new project is under way to look more closely at available sea temperature information over the period of sea snake decline, using data logger records and remotely sensed data.

The sea snake story illustrates some of the challenges facing marine reserve managers. There are limited management responses to the impacts of climate change and, as with other coral reefs around the world suffering the effects of global warming, the approach at Ashmore Reef is to 'manage for resilience'. This means reducing direct impacts from human activities and so maintaining the ecosystem's resilience to natural stressors, such as increased temperatures or storms. Improved understanding of ecosystem function, combined with effective management strategies and enforcement capacity, is critical to managing for resilience.

## Cartier Island Marine Reserve

<http://www.environment.gov.au/coasts/mpa/cartier>



### Special features

Cartier Island Marine Reserve is notable for its high biodiversity values, with many fish species, corals, sponges, echinoderms, molluscs and other invertebrates. The reserve provides significant habitat for an unusually high diversity and density of sea snakes, some of which are endemic to the region. It also supports populations of feeding, breeding and nesting sea turtles, and may support dugong (*Dugong dugon*).

Location	Latitude 12°32' South, Longitude 123°33' East	
Area	17,237 hectares	
Proclamation date	21 June 2000	
IUCN category	Category Ia	
Biogeographic context	IMCRA 4.0 provincial bioregion: Timor Province	
Management plan	Current plan expires 25 June 2009	
Other significant management documents	Memorandum of Understanding with Indonesia; service level agreement with the Australian Customs Service	
Financial	Operating	\$0*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not known	
Permits	1 commercial tour (bird watching)	

\* A total of \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Migratory Species (Bonn) Convention	4 of 98 listed Australian species
China–Australia Migratory Birds Agreement	38 of 81 listed species

Japan–Australia Migratory Birds Agreement	38 of 76 listed species
Other international agreements	Under a Memorandum of Understanding with Indonesia, traditional Indonesian fishers are allowed access to an area that includes the reserve

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 endangered 1 vulnerable 4 migratory 17 marine
	Recovery plans	1 implemented: marine turtles
Listed flora	None	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
1	78	17	720	1,265	40

## Management arrangements

Cartier Island and Ashmore Reef are managed together being only 60 kilometres apart. The Australian Customs Service (based at Ashmore) carried out on-site management of the reserve and Coastwatch provided regular flights over Cartier Island. Departmental staff visited the reserve in November 2006 to implement and assess reserve management.

## Monitoring

The last major marine survey was carried out in September 2005. This was part of a twice-yearly monitoring programme for Ashmore and Cartier. The next survey is due in late 2007.

## Future challenges

A major challenge is to improve operational arrangements and the capacity for compliance and enforcement. The Department is working with the Australian Customs Service to develop a stronger enforcement presence at Ashmore and Cartier. This will be delivered by a dedicated enforcement vessel to be based permanently at Ashmore and staffed with Customs enforcement officers.

## Report on performance by key result areas

### **KRA1: Natural heritage management**

#### *Major issues*

- Illegal access

#### *Actions*

- Enforce access and fishing restrictions
- Work with the Australian Customs Service to put a permanent enforcement vessel in place
- Cooperate with Indonesian officials to improve management of the MoU Box fishery
- Encourage and facilitate reef research and monitoring

#### *Performance results 2006–07*

- The Australian Customs Service provided on-site management for most of the year
- Customs officers enforced access and fishing restrictions. Officers boarded fishing vessels in the area and advised crews of restrictions. Suspected illegal activities were investigated and warnings issued
- Through a joint submission with the Australian Customs Service, new funding was secured for Customs to establish a permanent enforcement vessel to strengthen the protection of Ashmore and Cartier reserves
- Researched sea snakes and invertebrate species targeted by Indonesian fishermen
- Continued to collect and analyse marine debris

### **KRA4: Visitor management and park use**

#### *Major issues*

- Safety is an issue due to the area's history as a Department of Defence practice area

#### *Actions*

- Enforce the closure of the reserve

#### *Performance results 2006–07*

- Coastwatch and the Australian Customs Service made regular patrols. Customs officers boarded fishing vessels in the area and advised of closure restrictions

**KRA5: Stakeholders and partnerships***Major issues*

- Illegal foreign fishing

*Actions*

- Revise and implement an integrated management approach for Indonesian fishing in the MoU Box

*Performance results 2006–07*

- Progressed the second phase of an alternative livelihood project in Indonesia using AusAID funds. The first phase provided alternative sources of income, such as seaweed farming and mariculture, for traditional fishers who currently target Australian waters. The second phase covers five new villages and is investigating further alternative income sources. This project is now being managed by AusAID
- Consulted with Indonesian officials and the Department of Agriculture, Fisheries and Forestry to address overfishing issues in the MoU Box on a regional and cooperative basis

**KRA6: Business management***Major issues*

- Effective working and liaison arrangements with the management service provider, the Australian Customs Service

*Actions*

- Manage the relationship with the Australian Customs Service

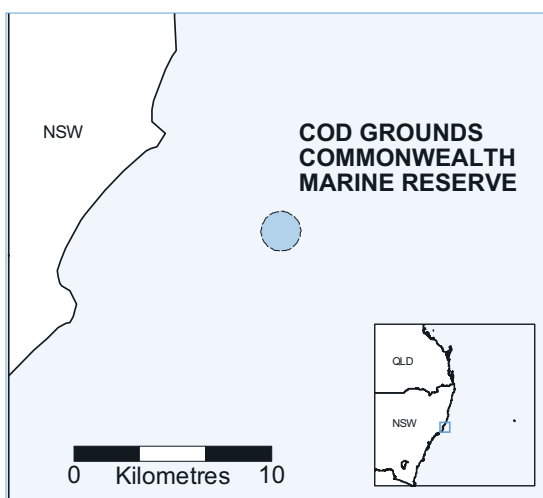
*Performance results 2006–07*

- Held regular meetings and consultation with Customs
- Provided warden training for Customs officers
- Worked closely with Customs to acquire and establish a permanent enforcement vessel which will also provide enforcement coverage for Ashmore reserve



## Cod Grounds Commonwealth Marine Reserve

<http://www.environment.gov.au/coasts/mpa/cod-grounds>



### Special features

The Cod Grounds Commonwealth Marine Reserve was declared on 10 May 2007 to protect important habitat of the critically endangered grey nurse shark (*Carcharias taurus*) making the Cod Grounds the newest Commonwealth reserve. New management arrangements applied from 28 May 2007.

The east coast population of the grey nurse shark is listed as critically endangered and is at high risk of extinction due to its low reproduction

rate and fishing-related mortality. The area known as the Cod Grounds is a series of underwater pinnacles and is a significant aggregation site for the sharks which are often observed in unusually large numbers in or near deep sandy-bottomed gutters between the pinnacles. The Cod Grounds support a large proportion of females compared to other aggregation sites surveyed off the New South Wales coast and are also habitat for preferred grey nurse shark prey species.

The grey nurse shark recovery plan recommends that the Cod Grounds be declared a sanctuary zone as it provides critical habitat for the grey nurse shark in terms of feeding and reproduction. Under the new management arrangements all fishing is prohibited in the reserve.

Declaration of the reserve follows two periods of public consultation and commitment to a structural adjustment process for commercial fishing businesses under the Australian Government's Marine Protected Areas and Displaced Fishing Policy.

Location	Latitude 31°40'52" South, Longitude 152°54'37" East. The reserve comprises a 1,000 metre radius from this point
Area	300 hectares
Proclamation date	10 May 2007
IUCN category	Category Ia
Biogeographic context	IMCRA 4.0 provincial bioregion: Central Eastern Shelf Transition



Management plan	Interim management arrangements are in place until a management plan is developed	
Other significant management documents	Service level agreement and subsidiary annual business agreement between the Australian and New South Wales governments	
Financial	Operating	\$44,588 * #
	Capital	Not applicable
	Revenue	Not applicable
Visitors	None recorded	
Permits	1 commercial dive operator	

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

# A further \$1,164,283 was spent on a structural adjustment process for affected commercial fishing businesses under the Australian Government's Marine Protected Areas and Displaced Fishing Policy.

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	A full species list has not been compiled for the Cod Grounds although the critically endangered grey nurse shark is known to occur and the vulnerable humpback whale ( <i>Megaptera novaeangliae</i> ) is likely to pass through the reserve on its annual migration
	Recovery plans	Two being implemented: grey nurse shark ( <i>Carcharias taurus</i> ); humpback whale ( <i>Megaptera novaeangliae</i> )
Listed flora	None	

## Management arrangements

The Cod Grounds Commonwealth Marine Reserve has been assigned to IUCN Category Ia, strict nature reserve, which means that the reserve will be managed primarily for scientific research and environmental monitoring.

Under the new management arrangements all forms of fishing are prohibited in the reserve and vessels entering the reserve must have all fishing gear unrigged and stowed away. Management of the reserve will ensure that the habitats, ecosystems and native species necessary for the grey nurse shark's protection are preserved in as undisturbed a state as possible. The interim management arrangements are set out in Table 9.

**Table 9: Interim management arrangements for Cod Grounds Commonwealth Marine Reserve**

Activity	Arrangement
Accessing the reserve	Visitors may access the reserve providing all fishing gear <sup>a</sup> on board the vessel is unrigged and stowed away
Commercial fishing	All forms of commercial fishing are prohibited. Commercial fishing vessels are prohibited from entering or transiting the reserve <sup>b</sup>
Recreational fishing	All forms of recreational fishing (including spearfishing) are prohibited. Any vessels entering the reserve must have all fishing gear <sup>a</sup> unrigged and stowed away while in the reserve <sup>b</sup>
Commercial scuba diving	Allowed under an approval from the Director of National Parks
Recreational scuba diving	Permitted in accordance with the New South Wales code of conduct for diving with grey nurse sharks
Scientific activities	Allowed under an approval from the Director of National Parks
Mining operations	Prohibited
Other commercial activities	Assessed on a case-by-case basis and subject to approval from the Director of National Parks

(a) Rigged fishing gear means any equipment that is designed or can reasonably be expected to attract or take fish or other aquatic animals and is attached to a line, rod or pole

(b) Prohibited by Determinations made by the Director of National Parks

New South Wales Fisheries will undertake compliance and enforcement under an annual business agreement between the Australian and New South Wales governments.

Interim management arrangements will remain in force until a management plan for the reserve is approved. Development of the plan will include two periods of public consultation in which all stakeholders will have the opportunity to have their say about the plan. The first period of public consultation is expected to begin in early 2007–08.

## Monitoring

Grey nurse shark numbers are being monitored at the Cod Grounds as part of a broader study into the distribution and population of the species along the east coast of Australia. Further monitoring priorities will be determined following a baseline survey planned for 2007–08.

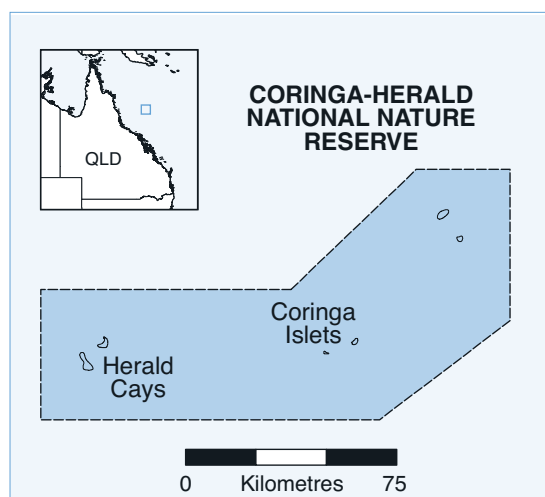
## Future challenges

Major challenges are:

- managing public access to the reserve
- educating the public on the values of the reserve and why these management arrangements have been implemented
- developing and implementing an effective compliance and enforcement strategy
- developing the management plan for the reserve.

## Coringa–Herald National Nature Reserve

<http://www.environment.gov.au/coasts/mpa/coringa>



### Special features

Of the six islets and cays of Coringa–Herald National Nature Reserve all are vegetated except one. The vegetation is mainly tropical shoreline plants of the Indo-Pacific region. However the reserve also includes the only forested cays in the Coral Sea Islands Territory. The *Pisonia grandis* forest ecosystem, which occurs on two islets in the reserve, has intrinsic conservation value. The forested islets are important habitat for species of resident birds and also

migratory seabirds that gather there from an extensive oceanic area to breed.

The terrestrial beach habitat throughout the reserve is important breeding habitat for the green turtle (*Chelonia mydas*). The reef habitats support benthic (bottom-dwelling) flora and fauna that are distinct from those of the Great Barrier Reef. Dolphins and whales occur in the area.

An historic shipwreck—the *Coringa Packet*—is located off Chilcott Islet. The Coringa Islets were named after the *Coringa Packet*, which sank in 1845.

Location	Latitude 16°59' South, Longitude 149°45' East	
Area	885,250 hectares	
Proclamation date	16 August 1982	
IUCN category	Category Ia	
Biogeographic context	IMCRA 4.0 provincial bioregion: Northeast Province	
Management plan	Second plan expires 4 September 2008	
Financial	Operating	\$212,777*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	40 visitor days recorded from commercial tours	
Permits	1 commercial tour, 1 research	

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire reserve is listed
Migratory Species (Bonn) Convention	8 of 98 listed Australian species
China–Australia Migratory Birds Agreement	14 of 81 listed species
Japan–Australia Migratory Birds Agreement	15 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 endangered 8 vulnerable 16 migratory 51 marine
	Recovery plans	2 being implemented: marine turtles; great white shark ( <i>Carcharodon carcharias</i> )
Listed flora	None	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
30	27	5	>342	>1,000	16

## Management arrangements

The Bureau of Meteorology provides weather forecasting services and storage facilities for an emergency helicopter fuel cache to cover possible emergency evacuation from the reserve. Coastwatch provide aerial surveillance of the reserve.

## Monitoring

Seabird monitoring continued with the assistance of a volunteer programme that has run continuously since 1991. The long-term and now regionally significant dataset provides valuable information about these species.

Monitoring of insect pests, such as scale insects, continued leading to more targeted releases of beneficial insects. To date this biological control programme has proved successful in minimising damage to the *Pisonia* forest from insect defoliation. Monitoring has continued since the detection of scale insect pests in 2002. Hawkmoth larvae were also identified as a serious threat to the forest and work is continuing on the best means to control this species.

Research programmes are under way to improve understanding of the *Pisonia* forest ecosystem, the terrestrial invertebrate fauna, sea turtle population dynamics and behaviour, and marine biodiversity.

Subsurface sea temperature loggers were installed and exchanged as part of a large ongoing temperature monitoring programme. A pilot project trialled the use of satellite imagery to map and classify habitats, to produce and ground-truth bathymetric maps, and to detect changes in terrestrial and marine habitats over time.

## Future challenges

Major challenges are:

- maintaining the health of the *Pisonia* forest ecosystem including controlling pest insects
- ensuring the health and safety of personnel. This continues to be effectively addressed by doing a rigorous safety analysis before each trip, including comprehensive contingency and communication plans and risk control measures.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Impact of pest insects and climate change on the *Pisonia* forest ecosystem
- Impact of coral bleaching and climate change on the marine ecosystem

#### Actions

- Implement an insect pest monitoring and management programme
- Implement coral bleaching guidelines

#### Performance results 2006–07

- Detected no measurable permanent deforestation of *Pisonia* by insect pests. Departmental staff and a consulting botanist and entomologist visited the reserve to monitor defoliation and forest health. Insects beneficial to the control of scale insects and hawkmoth were released
- James Cook University did coral reef health assessments, reporting a continued low percentage of live coral cover
- The Australian Institute of Marine Science installed and exchanged data loggers which record sea temperatures
- Erected new signs and collected and removed marine debris
- Using satellite imagery CSIRO Land and Water produced vastly improved bathymetry maps, and terrestrial and marine ecosystem maps which enhance the capacity to detect and track ecosystem changes

### KRA4: Visitor management and park use

#### Major issues

- Introduction of pest species by visitors to the reserve

#### Actions

- Distribute the information brochure

*Performance results 2006–07*

- Distributed reserve information brochure to key stakeholders. The brochure details effective quarantine measures to be undertaken by visitors to the reserve and why these practices are so important

**KRA5: Stakeholders and partnerships***Major issues*

- Lack of awareness among stakeholders of reserve management prescriptions
- Ensuring relationships with key partners remain on an effective operational basis

*Actions*

- Consult key stakeholders and partners and provide regular information on important issues
- Distribute the reserve information brochure

*Performance results 2006–07*

- Liaised with Coastwatch, the Bureau of Meteorology, Department of Defence, Department of Transport and Regional Services, relevant researchers and tour operators
- Met with partners to discuss key issues and conducted presentations on marine protected area operations and management prescriptions
- Distributed the reserve information brochure to key stakeholders. The brochure is also available on the Department's website

**KRA6: Business management***Major issues*

- Occupational health and safety risk to personnel associated with working in an isolated reserve

*Actions*

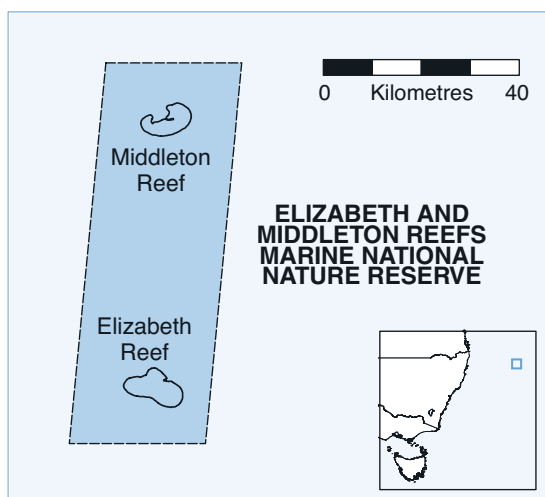
- Continue to refine and implement activity control measures as identified through the activity safety analysis

*Performance results 2006–07*

- Conducted a detailed activity safety analysis before each trip to the reserve. Successfully implemented risk control measures and contingency and communication plans developed during this process

## Elizabeth and Middleton Reefs Marine National Nature Reserve

<http://www.environment.gov.au/coasts/mpa/elizabeth>



### Special features

Elizabeth and Middleton Reefs Marine National Nature Reserve is located some 160 kilometres north of Lord Howe Island in a transition area between tropical and temperate climates. The reefs are therefore home to a unique range of marine organisms, many of which are near the northern or southern limit of their distribution. A number of species are also considered endemic to the reefs or to the south-western Pacific region.

The available information on marine plants indicates a rich and diverse algal flora. The coral communities contain unique tropical species at, or near, the southern limits of their distribution, and subtropical species that are rare or absent from tropical reefs.

The diversity of fish species is relatively low, but at least seven previously undescribed species may be endemic to the reserve. The reserve also supports two of the few known populations of the black cod (*Epinephelus daemeli*) which was once common along the New South Wales coast but is now considered rare.

The reserve is a feeding ground for green turtles (*Chelonia mydas*) and marine mammals such as bottlenose dolphins (*Tursiops truncatus*) and short-finned pilot whales (*Globicephala macrochynchus*).

Location	Latitude 29°42' South, Longitude 159°05' East	
Area	187,726 hectares	
Proclamation date	23 December 1987	
IUCN category	Category Ia	
Biogeographic context	IMCRA 4.0 provincial bioregion: Lord Howe Province	
Management plan	Second plan expires 22 March 2013	
Financial	Operating	\$29,634*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not recorded, numbers low	



Permits	11 recreational, 1 commercial tour, 1 research
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\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire reserve is listed
Migratory Species (Bonn) Convention	8 of 98 listed Australian species
China–Australia Migratory Birds Agreement	3 of 81 listed species
Japan–Australia Migratory Birds Agreement	6 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	13 vulnerable 16 migratory 15 marine
	Recovery plans	2 being implemented: great white shark ( <i>Carcharodon carcharias</i> ); marine turtles
Listed flora	None	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
6	31	2	407	558	19

## Management arrangements

Coastwatch made surveillance flights and a departmental officer accompanied a research and compliance patrol on their survey of the reefs.

## Monitoring

The reef systems at Elizabeth and Middleton Reefs have been surveyed regularly since 1987 with the last comprehensive survey in 2006 and a rapid survey in February 2007 (see case study on page 142). The 2007 survey included replacing data loggers installed in 2006, visually assessing the reefs' condition, and sampling black cod for genetic analysis. The data loggers record water temperature to help assess the effects of temperature on the reefs.

The reserve is generally in good health with little bleaching and very little evidence of crown-of-thorns starfish (*Acanthaster planci*) activity. The number of black cod appears to be stable. High numbers of Galapagos sharks (*Carcharhinus galapagensis*) were observed during the recent surveys, which suggests that the area is an important nursery for this species.

## Future challenges

Major challenges are:

- implementing biological monitoring
- monitoring for possible illegal activities in the area.

## Report on performance by key result areas

### **KRA1: Natural heritage management**

#### *Major issues*

- Monitoring reef health and populations of large vertebrates (black cod, Galapagos shark)

#### *Actions*

- Enforce fishing restrictions
- Implement management plan prescriptions
- Undertake a reef biological monitoring programme

#### *Performance results 2006–07*

- Conducted a research and compliance patrol in February 2007
- Collected black cod samples for genetic analysis; prepared a report on stock structure along the New South Wales coast and at Elizabeth and Middleton Reefs
- Continued research on Galapagos shark genetics
- Replaced temperature data loggers installed in 2006

### **KRA2: Cultural heritage management**

#### *Major issues*

- Possible interference with shipwrecks

#### *Actions*

- Enforce protection of shipwrecks
- Implement management plan prescriptions
- Inspect condition of shipwrecks

#### *Performance results 2006–07*

- Coastwatch flights and the February 2007 patrol detected no interference with shipwrecks

**KRA4: Visitor management and reserve use***Major issues*

- Managing visitor access and activities
- Keeping visitors informed of management arrangements
- Possible illegal fishing by visitors
- Pollution and marine debris

*Actions*

- Enforce fishing restrictions
- Issue permits for visitor access and recreational fishing
- Implement management plan prescriptions
- Undertake regular compliance and monitoring patrols
- Distribute brochures and information on the reserve

*Performance results 2006–07*

- Coastwatch flights detected no illegal fishing
- Detected no illegal activity and no pollution during the February 2007 patrol

**KRA5: Stakeholders and partnerships***Major issues*

- Maintaining good relationships with Coastwatch, researchers and the Lord Howe Island community

*Actions*

- Ensure relationships with partners are productive

*Performance results 2006–07*

- Liaised with Coastwatch, scientists, tour operators and the Lord Howe Island community



## Patrolling Elizabeth and Middleton Reefs



*Redfin butterfly fish (Chaetodon lunulatus) in the lagoon at Elizabeth Reef*

Along with nearby Lord Howe Island, Elizabeth and Middleton Reefs Marine National Nature Reserve is home to the world's most southerly coral reefs. A combination of warm summer currents, cold winter currents and remote location has resulted in a unique assemblage of tropical and subtropical species, including a number of endemics.

The reefs' remoteness also means they are rarely visited and so are relatively pristine. This remoteness, however, makes compliance and enforcement challenging.

Whilst it is not possible to maintain a permanent presence in the reserve, the Department ensures compliance with the reserve's management plan in a variety of ways.

The reserve has two zones, a sanctuary zone at Middleton Reef and a habitat protection zone at Elizabeth Reef. Fishing is not allowed in the sanctuary zone, although access for activities such as diving is permitted. Access to the habitat protection zone is controlled by a permitting system which allows recreational fishing under strict rules. This system ensures visitors to the reserve are registered with the Department and is a way of monitoring visitor numbers and the types of activities they undertake. Commercial fishing is not allowed in any part of the reserve.

The reserve's proximity to Lord Howe Island makes it a popular destination for island locals. The Department works cooperatively with the island community and values the stewardship role it undertakes to help protect the reserve's values.

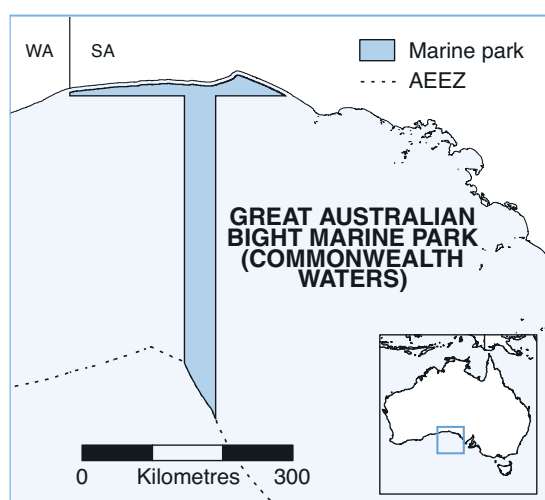
Coastwatch includes the area in its surveillance flights and has not detected any breaches of the reserve's management arrangements.

Departmental officers visit the reserve annually to conduct compliance and monitoring activities during summer, the busiest time of the year. The most recent patrol took place over six days in February 2007. As well as monitoring visitor numbers and providing an enforcement presence, officers made a rapid visual assessment of the reserve's condition and removed marine debris.

Valuable research was also conducted during the patrol by James Cook and Southern Cross universities. The researchers estimated the live coral cover was 49 per cent at Elizabeth Reef and 27 per cent at Middleton Reef which, although moderate, is expected due to the reefs' southerly location and isolation, along with past impacts of crown-of-thorns starfish. Overall, the current levels of coral cover and abundance of major fish and invertebrate species are consistent with the findings of previous surveys. These results are positive news and show that current management arrangements are working.

## Great Australian Bight Marine Park (Commonwealth Waters)

<http://www.environment.gov.au/coasts/mpa/gab>



### Special features

The Great Australian Bight Marine Park (Commonwealth Waters) protects marine mammal habitat in Commonwealth waters adjacent to the South Australian marine park. Notable species protected under the *Environment Protection and Biodiversity Conservation Act 1999* are the southern right whale (*Eubalaena australis*) listed as endangered and the Australian sea-lion (*Neophoca cinerea*) listed as vulnerable.

The marine park is next to the Head of Bight, the most important breeding place for southern right whales in Australia and one of the most important, discrete breeding locations for the species in the world. The area also offers a unique opportunity to observe the species in a pristine environment.

The marine park protects a transect of the wide continental shelf of the Great Australian Bight, which is remarkable for its high levels of invertebrate endemism and diversity. The park is also the largest representative sample of the southern continental margin of Australia in a reserve.

The marine park provides for the sustainable use of its natural resources including commercial fishing and mineral exploration while ensuring these activities do not impact on the park's special features.

Location	Latitude 31°43' South, Longitude 130°23' East
Area	1,937,162 hectares
Proclamation date	22 April 1998
IUCN category	Category VI overall comprising: Marine Mammal Protection Zone Category VI (387,500 hectares) Benthic Protection Zone Category VI (1,608,500 hectares) (Overlap of these two zones = 56,000 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregions: Great Australian Bight Shelf and Southern Province

Management plan	Second plan expires 16 May 2012	
Other significant management documents	Service level agreement and subsidiary annual business agreements between Australian and SA governments	
Financial	Operating	\$116,926*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	None recorded	
Permits	30 commercial fishing, 1 research	

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Migratory Species (Bonn) Convention)	13 of 98 listed Australian species
Agreement on the Conservation of Albatrosses and Petrels	11 of 18 listed species
China–Australia Migratory Birds Agreement	1 of 81 listed species
Japan–Australia Migratory Birds Agreement	4 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	6 endangered 17 vulnerable 31 migratory 57 marine
	Recovery plans	4 implemented: southern right whale ( <i>Eubalaena australis</i> ); great white shark ( <i>Carcharodon carcharias</i> ); marine turtles; albatross ( <i>Diomedea</i> spp. and <i>Thalassarche</i> spp.) and giant petrels ( <i>Macronectes</i> spp.) 1 in preparation: Australian sea-lion ( <i>Neophoca cinerea</i> )
Listed flora	None	

Numbers of native species recorded				
Mammals	Birds	Reptiles	Fish	Invertebrates
38	37	1	>218	>800

## Management arrangements

The Australian Government and the South Australian Government manage the Great Australian Bight Marine Park through a joint steering committee. A consultative committee with community representatives advises the steering committee on management issues.

A park manager is employed by the South Australian Department for Environment and Heritage under the joint management arrangements with South Australia.

## Monitoring

The Benthic Protection Zone was surveyed in October 2006. Data analysis will show the numbers and range of benthic (seabed) species and compare them with data from the 2002 survey. The results will contribute to a 20-year performance assessment programme for the zone.

Information from the 2002 seabed survey is being used to produce a brochure that will describe the habitats, zones and species of the Benthic Protection Zone and explain how the park protects these values. This will help to increase awareness of the benthic communities' importance and understanding of the park's role in protecting these values.

Southern right whale numbers are monitored annually. Current figures put the population using southern Australian waters at about 1,600 increasing at an average of 7–8 per cent per annum. Data collected over 16 years have provided a catalogue of 926 individual whales.

Coastline surveys of the Australian sea-lion have identified 10 breeding sites and 14 haul-out sites in the Great Australian Bight. Due to the coastline's inaccessibility the total population is not known. Australian sea-lion studies funded in 2006–07 were an ongoing satellite tracker project to study foraging range and behaviour to understand where and when these animals feed; and ongoing research into interactions with fishing vessels.

## Future challenges

Major challenges are:

- consolidating past and ongoing research into a programme to assess the marine park's performance
- increasing compliance strategies' effectiveness, including improving the fishing industry's compliance reporting
- implementing the management plan.



## Report on performance by key result areas

### **KRA1: Natural heritage management**

#### *Major issues*

- Lack of baseline information
- Lack of information on the distribution and abundance of southern right whales and Australian sea-lions
- Lack of information on the effects of human interactions with Australian sea-lion populations

#### *Actions*

- Establish initial baselines

#### *Performance results 2006–07 (in cooperation with the South Australian Government)*

- Completed the second round of ongoing baseline studies of benthos (seabed communities)
- Continued population studies on regional southern right whales and Australian sea-lions
- Continued research into Australian sea-lion foraging behaviour and interactions with fishing vessels

### **KRA4: Visitor management and park use**

#### *Major issues*

- Illegal fishing
- Community participation in park management activities

#### *Actions*

- Review surveillance plans
- Continue aerial surveillance by Coastwatch, on-ground surveillance by Yalata Land Management and sea patrols by the Department of Primary Industries and Resources, South Australia
- Investigate suspected illegal activity
- Continue the Yalata community's participation in park management activities

#### *Performance results 2006–07 (in cooperation with the South Australian Government)*

- Advertised annual closures
- Agencies undertook land, sea and aerial surveillance and operational patrols. No illegal activity was recorded
- Monitored permits for commercial fishers
- The Yalata community provided surveillance and beach clean-ups



**KRA5: Stakeholders and partnerships***Major issues*

- Maintain productive relationships with partners

*Actions*

- Negotiate and implement the annual business agreement with South Australia
- Develop compliance monitoring arrangements with the Australian Fisheries Management Authority
- Keep stakeholders informed of and involved in management activities

*Performance results 2006–07 (in cooperation with the South Australian Government)*

- Renewed the annual business agreement covering research, operations, visitor management, education, and compliance and enforcement
- Continued to raise compliance issues with the Australian Fisheries Management Authority and industry sectors
- Liaised with stakeholders from all sectors through the steering committee and consultative committee

**KRA6: Business management***Major issues*

- Community understanding and appreciation of the park's values

*Actions*

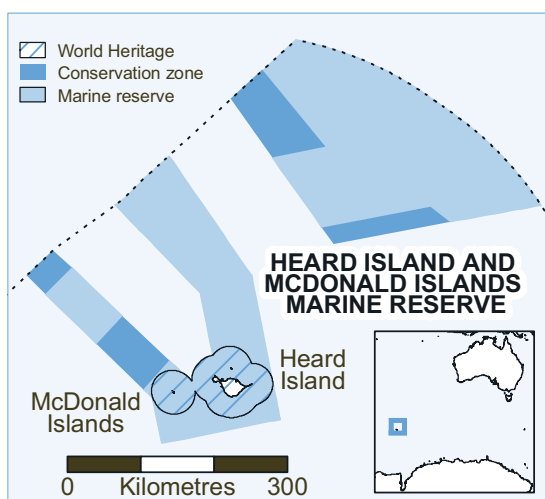
- Write and implement a communications plan
- Disseminate the management plan and interpretive material

*Performance results 2006–07 (in cooperation with the South Australian Government)*

- Progressed development of the communications plan
- Informed the media about park activities
- Progressed a Benthic Protection Zone brochure and published a southern right whale brochure
- Made the management plan and information on park values and uses available to the public, including via the Department's website

## Heard Island and McDonald Islands Marine Reserve

<http://www.heardisland.aq>



### Special features

The Heard Island and McDonald Islands Marine Reserve includes the World Heritage listed islands and 12 nautical mile territorial sea, plus an additional marine area which extends in parts to the 200 nautical mile Exclusive Economic Zone boundary.

Heard Island and McDonald Islands is the only major subantarctic island group believed to contain no species directly introduced by humans. Its terrestrial and marine ecology and oceanographic

conditions are quite distinct from other Southern Ocean islands, including Australia's Macquarie Island.

The islands and surrounding waters provide crucial breeding habitat for a range of birds and marine mammals, including several species listed as threatened and/or migratory under international conservation agreements and the *Environment Protection and Biodiversity Conservation Act 1999*. Two bird species, the Heard Island sheathbill (*Chionis minor nasicornis*) and the Heard Island cormorant (*Phalacrocorax atriceps*), are endemic to the reserve.

The terrestrial environment contains permanent glaciers, Australia's only active volcanoes, and Australia's highest mountain (Mawson Peak 2,750 metres) outside the Australian Antarctic Territory. Heard Island contains significant cultural relics and heritage sites from 19th and early 20th century sealing activities and from the first Australian Antarctic research expeditions.

The marine environment surrounding the islands features diverse and distinctive benthic habitats that support a range of slow growing and vulnerable species including corals, sponges, barnacles and echinoderms. The waters of the reserve also include prime foraging areas for a number of land-based marine predators, and provide nursery areas for fish, including commercially harvested species. Areas of highly productive nutrient rich waters in the reserve, created by the confluence of key oceanographic fronts such as the Antarctic Polar Front, are believed to provide feeding grounds for a range of cetaceans.

A conservation zone declared in October 2002 is being assessed for possible inclusion in the reserve. The assessment is considering the conservation values of the areas in question, as well as the fisheries potential of those areas and the threats to conservation values associated with fishing activities.

Location	Latitude 53°05' South, Longitude 73°30' East	
Area	6,457,815 hectares	
Proclamation date	16 October 2002	
IUCN category	Category Ia	
Biogeographic context	Subantarctic area IMCRA 4.0 provincial bioregion: Kerguelen Province	
Management plan	First plan expires 10 August 2012	
Other significant management documents	Australia's Antarctic Science Programme: Science Strategy 2004–05 to 2008–09	
Financial	Operating	\$73,000 <sup>a</sup>
	Capital	Not applicable
	Revenue	Not applicable
Visitors	None <sup>b</sup>	
Permits	None	

(a) No science or management expedition was conducted in 2006–07. This figure does not include costs associated with analysis of data collected during the 2003–04 expedition, much of which is expected to contribute directly or indirectly to the future management of the reserve and region.

(b) No government research or tourist expeditions visited Heard Island during 2006–07. Fishing vessels and surveillance vessels may have passed through the marine areas of the reserve. Details of surveillance visits are classified and are not included in reported visitor numbers.

International conventions and agreements	
World Heritage Convention	Listed under natural criteria (i) and (ii), recognising its outstanding natural values
Wetlands (Ramsar) Convention	The entire Heard Island and McDonald Islands Territory is to be nominated for Ramsar listing
Migratory Species (Bonn) Convention	12 of 98 listed Australian species
China–Australia Migratory Birds Agreement	1 of 81 listed species
Japan–Australia Migratory Birds Agreement	4 of 76 listed species
Other agreements	Convention on the Conservation of Antarctic Marine Living Resources; Agreement on the Conservation of Albatrosses and Petrels; Treaty between the Government of Australia and the Government of the French Republic on Cooperation in the Maritime Areas Adjacent to the French Southern and Antarctic Territories, Heard Island and the McDonald Islands

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species <sup>a</sup>	1 endangered 10 vulnerable 14 migratory 51 marine
	Recovery plans	1 being implemented: albatross ( <i>Diomedea</i> spp. and <i>Thalassarche</i> spp.) and giant petrels ( <i>Macronectes</i> spp.)
Listed flora	None	
Heritage	On National Heritage List	

(a) Figures include both breeding and non-breeding species, but do not include cetaceans. Only sparse records of cetaceans are currently available for the Heard Island and McDonald Islands region

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
7 <sup>a</sup>	47 <sup>b</sup>	0	34 <sup>c</sup>	169 <sup>d</sup>	262 <sup>e</sup>

(a) 3 breeding, 4 non-breeding seals

(b) 19 breeding, 28 non-breeding birds

(c) Refers to fish recorded from nearshore waters (<12nm)

(d) Refers only to terrestrial and freshwater invertebrates

(e) 12 vascular plants, 62 bryophytes, 71 lichens, 100 terrestrial algae, 17 marine macro-algae

## Management arrangements

The reserve is managed by the Australian Antarctic Division of the Department of the Environment and Water Resources, under delegation from the Director of National Parks.

## Monitoring

The Australian Antarctic Division mounts expeditions to the region only every few years; this is due to the significant costs involved and also the time required for research results to be analysed and considered in planning for subsequent visits.

During 2006–07 there was no expedition to Heard Island or McDonald Islands. A workshop was held to discuss ongoing analysis of data collected during the 2003–04 Heard Island Predator Prey Interaction and Ecosystem Study. Three scientific papers were published and over a dozen more are in preparation, providing information that will enhance understanding of how key predators based on Heard Island interact with prey, the ocean and benthic environment, and commercial fisheries. This information will improve knowledge of the reserve and may contribute to future performance assessment, including consideration of the adequacy of the reserve design.

Satellite images of portions of Heard Island were obtained, and scientists continued

to develop techniques to use such remotely sensed data to detect environmental change. In particular, thermal satellite imagery provided by the Hawai'i Institute of Geophysics and Planetology clearly indicates two hot spots near the summit of Mawson Peak on Heard Island (see case study on page 154).

The Australian Antarctic Division continued to analyse benthic samples and fishing data collected from areas within the Heard Island and McDonald Islands conservation zone. This will help further define the biodiversity and natural values of these areas and the significance of these areas to the overall Heard Island and McDonald Islands ecosystem, as required to finalise the conservation zone assessment.

### Future challenges

The management situation for the reserve has not varied substantially since 2005–06. Major challenges are:

- implementing the management plan for the reserve
- maintaining thorough quarantine processes for all visits
- capitalising on Australian Antarctic programme visits and partnerships with other operators in the region to undertake management actions and conduct research and monitoring
- completing the Heard Island and McDonald Islands conservation zone assessment
- implementing a research and monitoring strategy to facilitate performance assessment for the reserve.

### Report on performance by key result areas

#### KRA1: Natural heritage management

##### Major issues

- Preventing human introduction of alien species
- Performance assessment and reporting

##### Actions

- Evaluate possible alien species
- Perform quarantine risk assessment and inspection of vessels, as appropriate
- Undertake research and monitoring that facilitate performance assessment and reporting

##### Performance results 2006–07

- There were no research, commercial or private visits to the Heard Island and McDonald Islands Territory during 2006–07
- Obtained satellite images of portions of Heard Island, adding to a chronological

record of information that will help to detect environmental change as techniques to analyse such remotely sensed data are developed

- Continued analysis of data collected during the 2003–04 expedition
- Published three scientific papers that will enhance understanding of how key predators based on Heard Island interact with prey, the ocean and benthic environment, and commercial fisheries

#### **KRA2: Cultural heritage management**

##### *Major issues*

- Loss/degradation of cultural heritage on Heard Island
- Recording and monitoring condition of heritage sites and items at the sites

##### *Actions*

- Manage decay of heritage sites and items

##### *Performance results 2006–07*

- There were no research, commercial or private visits to the Heard Island and McDonald Islands Territory during 2006–07

#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Safe and environmentally appropriate visitor access
- Off-site presentation of the remote and isolated reserve

##### *Actions*

- Provide briefings and relevant materials to all visit organisers and visitors
- Issue permits that include conditions to provide for appropriate access and use
- Develop off-site measures for communicating the values of the reserve

##### *Performance results 2006–07*

- There were no research, commercial or private visits during 2006–07
- Maintained and updated the website which was well used, with more than 100,000 visits

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Effective management of the isolated and infrequently visited reserve requires excellent working relationships with other operators in the region
- Transparency of reserve management

### Actions

- Establish and maintain effective partnerships with relevant government agencies and other operators
- Inform the public of reserve management activities

### Performance results 2006–07

- Continued Australian Antarctic Division involvement in government initiatives to address illegal, unreported and unregulated fishing
- Consulted with relevant government agencies and the fishing industry as a routine part of the Australian Antarctic Division's role in management of the Heard Island and McDonald Islands fishery
- Gave a presentation about the reserve to the Director of the World Heritage Centre during his visit to Hobart
- Provided information about reserve and management provisions for a new edition of a regional nautical chart
- Consulted with Antarctic and subantarctic commercial tour operators. There are no current expressions of interest in visiting Heard Island and McDonald Islands
- Strengthened relationships with other subantarctic management authorities through participation in the first international forum on the subantarctic in Hobart, July 2006, and by co-authoring a paper entitled *Conservation Management at Southern Ocean Islands: Towards the Development of Best-practice Guidelines*, which was presented at the forum and published in an international peer-reviewed journal

## KRA6: Business management

### Major issues

- Ensuring compliance with and enforcement of reserve management requirements

### Actions

- Educate all visitors about reserve management requirements
- Implement the management plan

### Performance results 2006–07

- Maintained relationships with regional fisheries surveillance agencies, including providing training and information to fisheries surveillance personnel on reserve management requirements
- Consulted with relevant government agencies and the fishing industry as a routine part of the Australian Antarctic Division's role in management of the Heard Island and McDonald Islands fishery
- Published a management plan summary online and in hard copy as a first reference for potential visitors. The full management plan is also available online and in hard copy

## Watching the hot action in the subantarctic



*McDonald Islands taken in 2000 from the Akademik Shokalskiy*

Real estate in the Heard Island and McDonald Islands Marine Reserve is expanding, not because of a building boom, but as a result of powerful natural processes.

Heard Island and McDonald Island boast the only active volcanoes in Australian territory and in the subantarctic latitudes, a special situation that was recognised in the islands' inscription on the World Heritage List in 1997.

The island group and the French Îles Kerguelen 400 kilometres to the north-west are the only two surface exposures of the Kerguelen Plateau, one of the world's largest submarine plateaus. The main part of Heard Island is dominated by Big Ben, a roughly circular volcanic cone with a base diameter of around 18–20 kilometres and a height of 2,745 metres, more than 500 metres higher than Mount Kosciuszko on the Australian mainland.

Geomorphological features such as volcanic cones, craters, lava tubes, and black sand beaches clearly demonstrate the volcanic origins of the islands. Numerous eruptions and other volcanic events have been observed during research visits to Heard Island, dating back to the first Australian National Antarctic Research Expedition in 1947. Participants in the most recent Australian Antarctic programme expedition in 2003–04 witnessed plumes of steam rising from a vent near the summit of Big Ben, and the volcanic rumblings are continuing.

But if there has not been an expedition to the islands for a few years, how do we know volcanic activity is still under way? While it takes a couple of weeks and a lot of money to get to the reserve by ship, there are satellites passing over head with some regularity, and those satellites occasionally take cloud-free images that provide glimpses of what is happening on the islands when the only residents are the local seals and seabirds.

The image following illustrates the significant effect that volcanic activity during the 1990s had on McDonald Island, situated about 40 kilometres to the west of

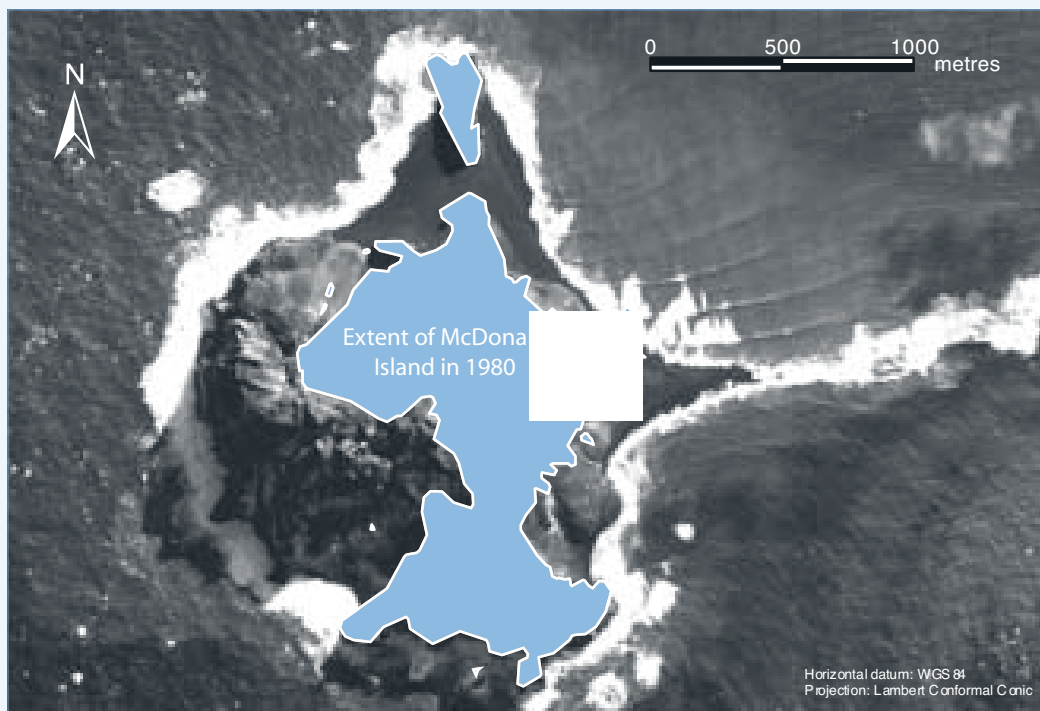


Heard Island. By comparing two visual satellite images, it can be seen that a series of slowly oozing (rather than eruptive) lava flows resulted in the island doubling in extent from around 1 square kilometre in 1980 to around 2.5 square kilometres in 2004. Also, the previously separate Flat Island is now joined to McDonald Island by a low-lying isthmus.

A thermal satellite image taken in February 2007 revealed two hot spots near the summit of Mawson Peak on Heard Island. Previous images have suggested a single summit vent, so this recent image could either indicate the presence of a new second vent or a lava flow from the main vent.

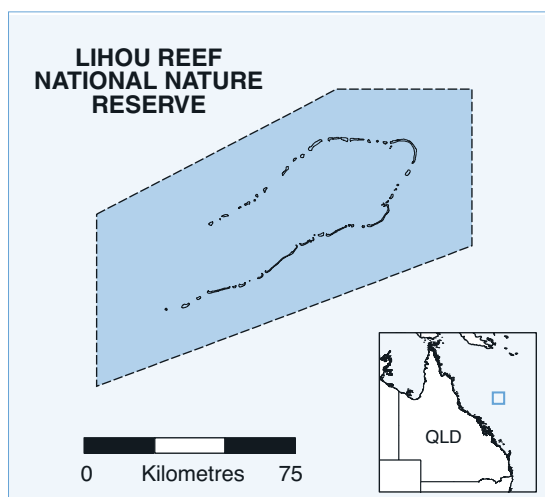
The islands may be expanding but they are still incredibly isolated, so the Australian Antarctic Division will be looking at further opportunities to use remote sensing to keep track of other key biogeographical characteristics such as vegetation cover and glacial retreat.

**Figure 6: Satellite image of McDonald Island taken in 2004 overlaid with a shaded area indicating the island's extent in 1980**



## Lihou Reef National Nature Reserve

<http://www.environment.gov.au/coasts/mpa/lihou>



### Special features

Lihou Reef National Nature Reserve and its associated sandy coral cays and islets comprise the largest reef structure in the Coral Sea. The reef habitats support benthic (seabed) flora and fauna that are distinct from those of the Great Barrier Reef. A diverse range of marine organisms has been recorded in the reserve. The green turtle (*Chelonia mydas*) breeds in the reserve and a number of cetacean species (whales and dolphins) inhabit the area.

Five islets in the reserve are vegetated, mainly by widespread tropical shoreline plants of the Indo-Pacific region. The reserve also contains extensive and regionally significant seabird colonies. The buff-banded rail (*Gallirallus philippensis*) is the only landbird species that breeds in the reserve.

Several well-documented shipwrecks, and a number of wrecks whose origins are not yet known, are located on Lihou Reef.

Location	Latitude 17°21' South, Longitude 151°44' East	
Area	843,670 hectares	
Proclamation date	16 August 1982	
IUCN category	Category Ia	
Biogeographic context	IMCRA 4.0 provincial bioregion: Northeast Province	
Management plan	Second plan expires 4 September 2008	
Other significant management documents	Management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	\$0*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	40 visitor days from commercial operators recorded	
Commercial permits	1 commercial tour, 1 research	

\* A total of \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire reserve is listed
Migratory Species (Bonn) Convention	6 of 98 listed Australian species
China–Australia Migratory Birds Agreement	12 of 81 listed species
Japan–Australia Migratory Birds Agreement	15 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 endangered 8 vulnerable 17 migratory 51 marine
	Recovery plans	2 being implemented: marine turtles; great white shark ( <i>Carcharodon carcharias</i> )
Listed flora	None	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
30	24	5	>342	>1,000	7

## Management arrangements

Coastwatch provides regular aerial surveillance of the reserve.

The Bureau of Meteorology collects and replaces data loggers during their annual visits. The bureau also provides storage for an emergency helicopter fuel cache to cover emergency evacuation from the reserve.

## Monitoring

The most recent marine survey was undertaken in October 2004 by the Australian Institute of Marine Science.

The Bureau of Meteorology visited the reserve as part of their annual weather station maintenance schedule. Bureau staff collected and replaced water temperature data loggers for the Department and the Australian Institute of Marine Science. Institute personnel exchanged two data loggers in June 2007.

## Future challenges

Major challenges are:

- logistics, costs and occupational health and safety issues associated with managing such an isolated reserve
- monitoring the impact of and recovery from coral bleaching.

## Report on performance by key result areas

### **KRA1: Natural heritage management**

#### *Major issues*

- Detection of possible illegal fishing
- Measuring reef health
- The reserve's isolation means ongoing monitoring remains logistically difficult

#### *Actions*

- Enforce fishing restrictions
- Continue the strategic reef monitoring programme
- Continue to promote and maintain partnerships with other agencies to assist with monitoring

#### *Performance results 2006–07*

- Coastwatch flights detected no illegal fishing
- The Bureau of Meteorology and the Australian Institute of Marine Science facilitated the exchange of sea temperature data loggers which measure trends in temperature over time

### **KRA4: Visitor management and park use**

#### *Major issues*

- Introduction of pest species by visitors to the reserve

#### *Actions*

- Distribute the information brochure revised last year

#### *Performance results 2006–07*

- Distributed reserve information brochure to key stakeholders. The brochure details effective quarantine measures to be undertaken by visitors to the reserve and why these practices are so important

### **KRA5: Stakeholders and partnerships**

#### *Major issues*

- Lack of awareness among stakeholders of reserve management prescriptions
- Ensuring relationships with key partners remain on an effective operational basis

#### *Actions*

- Consult key stakeholders and partners and provide regular information on important issues
- Distribute the reserve information brochure

*Performance results 2006–07*

- Liaised with Coastwatch, the Bureau of Meteorology and the Department of Transport and Regional Services
- Met with partners to discuss issues and gave presentations on marine protected area operations and management prescriptions
- Distributed the reserve information brochure to stakeholders

**KRA6: Business management**

*Major issues*

- Occupational health and safety risk to personnel from working in an isolated reserve

*Actions*

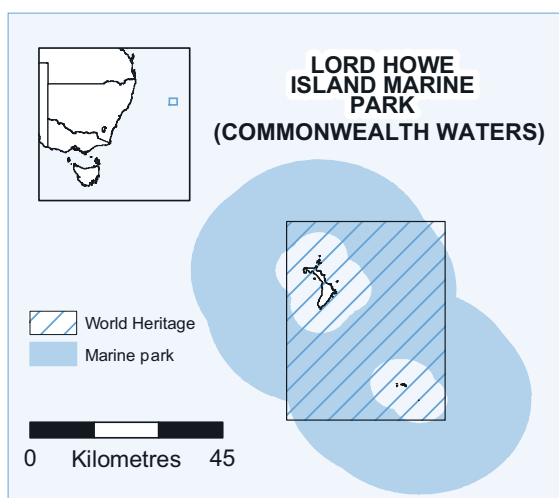
- Continue to refine and implement activity control measures identified through the activity safety analysis process

*Performance results 2006–07*

- Implemented all activity control measures identified through the activity safety analysis process for future activities within the reserve

## Lord Howe Island Marine Park (Commonwealth Waters)

<http://www.environment.gov.au/coasts/mpa/lordhowe>



### Special features

Lord Howe Island Marine Park (Commonwealth Waters) protects and conserves the complex, vulnerable and regionally unique set of deep-sea structures, benthic habitats and flora and fauna associated with the Lord Howe Island seamount system.

The marine park also ensures that the natural resources important for food, income and recreation for the Lord Howe Island community are protected and used in an ecologically sustainable manner.

Location	Latitude 31°47' South, Longitude 159°09' East	
Area	300,063 hectares	
Proclamation date	21 June 2000	
IUCN category	Category IV overall comprising: Category Ia: 96,344 hectares Category IV: 214,782 hectares	
Biogeographic context	IMCRA 4.0 provincial bioregion: Lord Howe Province	
Management plan	Current plan expires 24 September 2009	
Other significant management documents	Service level agreement and subsidiary annual business agreements between Australian and New South Wales governments	
Financial	Operating	\$20,000*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not known	
Permits	9 commercial	

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
World Heritage Convention	Listed for its outstanding natural universal values; criteria (iii) and (iv)
Migratory Species (Bonn) Convention	10 of 98 listed Australian species
Japan–Australia Migratory Birds Agreement	2 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	3 endangered 10 vulnerable 15 migratory 20 marine
	Recovery plans	2 implemented: albatross ( <i>Diomedea</i> spp. and <i>Thalassarche</i> spp.) and giant petrels ( <i>Macronectes</i> spp.); marine turtles
Listed flora	None	
Heritage	On National Heritage List	

Numbers of native species recorded			
Mammals	Birds	Fish	Invertebrates
4	11	447	536

## Management arrangements

The New South Wales Marine Parks Authority manages the Commonwealth marine park on behalf of the Department under a service level agreement.

The Lord Howe Island Steering Committee provides a forum for cooperative planning and management of the adjacent state and Commonwealth parks. The Lord Howe Island Marine Park Advisory Committee enables stakeholder groups to provide advice on the management of both parks.

The Australian Customs Service periodically conducts Coastwatch flights over the Lord Howe Island area to report on vessel activity and surface surveillance is undertaken by the New South Wales Marine Parks Authority.

## Monitoring

Data on the fish catch taken by charter fishing vessels operating under permit in the Lord Howe Island marine protected areas were analysed. During 2005, an estimated 22 tonnes of fish were caught of which approximately 75 per cent were yellowtail kingfish (*Seriola lalandi*). It is reasonable to assume that approximately half of the catch was caught in the Commonwealth reserve.

## Future challenges

Major challenges are:

- implementing a strategic monitoring programme following baseline and fish catch data collection
- monitoring the area for possible illegal activities
- undertaking a study of the kingfish population in the Lord Howe Island marine protected areas to assess the sustainability of fishing allowed under permit.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Ensure compliance with the management plan

#### Actions

- Enforce fishing restrictions
- Train and authorise enforcement staff

#### Performance results 2006–07

- Shore-based and vessel-based surveillance and observations from the public revealed no illegal fishing activity
- The Lord Howe Island Marine Park (New South Wales) manager functioned as a warden under the *Environment Protection and Biodiversity Conservation Act 1999*

### KRA5: Stakeholders and partnerships

#### Major issues

- Maintain cooperation with the community and New South Wales Marine Parks Authority
- Community support for the management plan

#### Actions

- Take an active role on the advisory committee and steering committee

#### Performance results 2006–07

- Held meetings of Lord Howe Island Advisory Committee and consulted with Lord Howe Island Steering Committee



#### **KRA6: Business management**

##### *Major issues*

- Maintain assistance from the New South Wales Marine Parks Authority

##### *Actions*

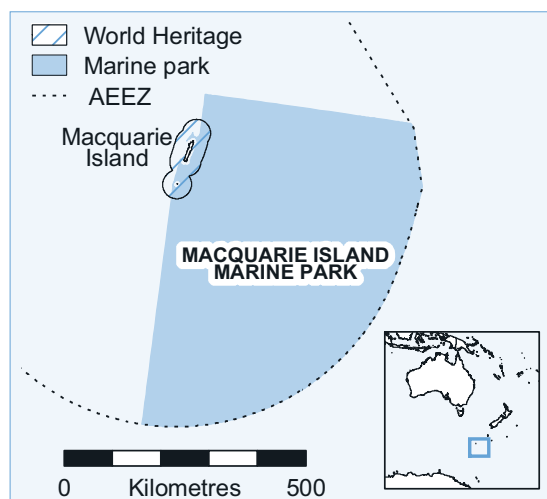
- Negotiate and implement the annual business agreement with the New South Wales Marine Parks Authority

##### *Performance results 2006–07*

- Successfully negotiated and implemented the annual business agreement for 2006–07

## Macquarie Island Marine Park

<http://www.environment.gov.au/coasts/mpa/macquarie>



### Special features

Macquarie Island Marine Park protects the unique and vulnerable marine ecosystems of the south-eastern portion of the Commonwealth waters around Macquarie Island. The marine park includes significant feeding and migratory areas for a number of threatened marine mammals and seabirds. It contains a variety of large-scale benthic (seabed) habitats, each exposed to different depths, currents, nutrient levels, wave activity and temperatures.

The Macquarie Island region has unique geological characteristics. It is the only known location where oceanic crust from a normal mid-ocean ridge has been lifted above sea level in a major oceanic basin.

In 1997 Macquarie Island and waters within a 12 nautical mile radius were inscribed on the World Heritage List.

Several species found in the region are under threat, including albatross, penguin and seal species. Macquarie Island is also listed as a critical habitat under the *Environment Protection and Biodiversity Conservation Act 1999* for the grey headed albatross (*Diomedea chrysostoma*) and wandering albatross (*Diomedea exulans*).

Location	Latitude 55°54' South, Longitude 161°38' East
Area	16,205,928 hectares
Proclamation date	27 October 1999
IUCN category	Category IV overall comprising: Category IV: 10,492,287 hectares Category Ia: 5,713,641 hectares
Biogeographic context	IMCRA 4.0 provincial bioregion: Macquarie Island Province
Management plan	Current plan expires 25 September 2008. It is envisaged that future planning for Macquarie Island Marine Park will be done in conjunction with the management plan for the South-east Commonwealth Marine Reserve Network

Other significant management documents	Service level agreement and subsidiary annual business agreements between Australian and Tasmanian governments	
Financial	Operating	\$139,363 *
	Capital	Not applicable
	Revenue	Not applicable
Visitors	A number of tourist ships transited the reserves. Most tourist ships visit Macquarie Island and anchor outside the Commonwealth marine park	
Permits	None	

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
World Heritage Convention	Macquarie Island and waters within a 12 nautical mile radius were listed as a World Heritage area in 1997
Migratory Species (Bonn) Convention	8 of 98 listed Australian species
China–Australia Migratory Birds Agreement	1 of 81 listed species
Japan–Australia Migratory Birds Agreement	3 of 76 listed species
Other agreements	Agreement on the Conservation of Albatrosses and Petrels International Convention for the Regulation of Whaling

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 endangered 9 vulnerable 4 migratory 46 marine
	Recovery plans	4 implemented: albatross ( <i>Diomedea</i> spp. and <i>Thalassarche</i> spp.) and giant petrels ( <i>Macronectes</i> spp.); southern right whale ( <i>Eubalaena australis</i> ); subantarctic fur seal ( <i>Arctocephalus tropicalis</i> ) and southern elephant seal ( <i>Mirounga leonina</i> ); 10 seabird species
Listed flora	None	
Heritage	On National Heritage List	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
18	40	0	At least 158	At least 102 benthic species	103 marine algae

## Management arrangements

The Tasmanian Government manages Macquarie Island and its surrounding waters out to three nautical miles. The Marine and Biodiversity Division of the Department of the Environment and Water Resources manages the Commonwealth marine park on behalf of the Director of National Parks.

The Department's Australian Antarctic Division manages the Australian National Antarctic Research Expedition base at Macquarie Island and its operational, logistical and scientific activities. The Department and the Tasmanian Government have a service level agreement in relation to the cooperative management of marine protected areas including Macquarie Island.

## Monitoring

Monitoring on Macquarie Island has revealed significant increases in rodent and rabbit populations. By damaging the vegetation cover and increasing erosion these feral pest species may have a major impact on marine wildlife species that forage in the marine park and breed on the island. A feral pest eradication programme is continuing to be developed by the Tasmanian Government with funding assistance from the Australian Government.

There is a paucity of population data on numerous key seabird species in the marine park. The Department funded the Tasmanian Government to undertake population monitoring as part of an ongoing seabird monitoring project. Work to date has shown the negative impact of rodents and rabbits on burrowing petrel species, some of which are listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

The aims of the seabird monitoring project are to:

- maintain long-term population monitoring of key threatened seabirds on Macquarie Island including tracking trends in population numbers, breeding effort and productivity, and response to the impacts of feral pests
- contribute to implementing the Commonwealth recovery plan and the Agreement on the Conservation of Albatrosses and Petrels.

The wildlife of Macquarie Island and the marine park are under threat from marine debris. The Department and the Tasmanian Parks and Wildlife Service have begun a marine debris survey and collection project. For the past two years, researchers and Tasmanian Parks rangers have collected, with the assistance of the Australian Antarctic Division, a large quantity of marine debris from the shoreline, recorded and monitored the rate of accumulation, and assessed the effectiveness of mitigation measures.

The aims of the marine debris surveys and collection project are to:

- remove marine debris from the Macquarie Island shoreline and reduce the threat to marine wildlife that use both state and Commonwealth marine protected areas

- record and monitor the rate of marine debris accumulation and the changes in composition of the debris
- contribute to broader assessment of marine debris sources and impacts and the effectiveness of mitigation measures.

The Department funded the Tasmanian Government to undertake a project to determine the foraging patterns of giant petrels and their ecological interactions with surrounding fisheries. The Department also funded the Bureau of Rural Sciences to undertake a risk assessment of invasion by marine pests at Macquarie Island.

## Future challenges

Major challenges are:

- monitoring possible illegal activities
- addressing the risks identified in the Bureau of Rural Sciences report on assessing risks of invasion by marine pests at Macquarie Island
- addressing the risks to native species (such as seabirds) posed by feral species (especially rodents and rabbits) on the island (a Tasmanian Government responsibility).

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Detection of possible illegal fishing
- Degradation of island feeding and breeding areas within state jurisdiction

#### Actions

- Further understanding and protection of species and habitats
- Submit taskings to Coastwatch

#### Performance results 2006–07

- No surveillance was conducted due to higher Coastwatch priorities elsewhere
- The Natural Heritage Trust financial agreement with the Tasmanian Department of Tourism, Parks, Heritage and the Arts covers the management of the marine park. It includes marine debris survey and collection, determining the foraging patterns of southern and northern giant petrels and their ecological interactions with fisheries, and monitoring and collecting seabird population baseline data. Marine debris and seabird population baseline data projects will continue in 2007–08 under the agreement



#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Need for effective working relationships with partners

##### *Actions*

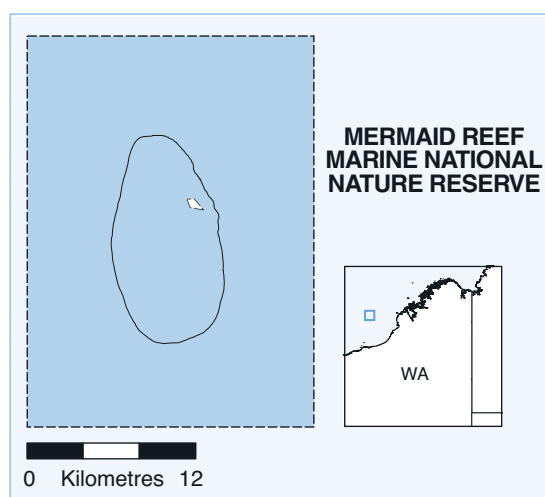
- Continue work under the service level agreement with the Tasmanian Government, focusing on the Macquarie Island marine protected area

##### *Performance results 2006–07*

- Continued the service level agreement with the Tasmanian Government in relation to the cooperative management of marine protected areas including Macquarie Island Marine Park
- Department staff met with Tasmanian Parks and Wildlife Service staff in April 2007 to discuss park management activities on Macquarie Island and strengthen ongoing cooperative arrangements

## Mermaid Reef Marine National Nature Reserve

<http://www.environment.gov.au/coasts/mpa/mermaid>



### Special features

Mermaid Reef is the most northerly of the three reefs in the Rowley Shoals. The reef is totally submerged at high tide and therefore falls under Australian Government jurisdiction.

Clerke Reef and Imperieuse Reef, the two southerly reefs, have permanent sand cays above the high water mark. Together they were incorporated into the Rowley Shoals Marine Park, declared under Western Australian legislation on 25 May 1990.

The three reefs of the Rowley Shoals are the most morphologically perfect examples of shelf-edge reefs occurring in Australian waters. Each reef includes spectacular and unusual underwater topography and life forms that have attracted international recreational divers.

Approximately 256 coral species and 688 fish species inhabit the shoals, including many species not found on near-shore coral reefs. The coral and fish communities of the Rowley Shoals are unique in their relative abundance of species.

Location	Latitude 17°06' South, Longitude 119°38' East	
Area	53,987 hectares	
Proclamation date	10 April 1991	
IUCN category	Category Ia	
Biogeographic context	IMCRA 4.0 provincial bioregion: Northwest Transition	
Management plan	First plan expired 16 May 2007, new plan under development	
Other significant management documents	1999 Memorandum of Understanding with Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management (now Department of Environment and Conservation); risk assessment report	
Financial	Operating	\$220,465 *
	Capital	Not applicable
	Revenue	Not applicable

Visitors	100–200
Permits	9 commercial tour operator, 2 scientific, 1 journalism

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Migratory Species (Bonn) Convention	12 of 98 listed Australian species
China–Australia Migratory Birds Agreement	13 of 81 listed species
Japan–Australia Migratory Birds Agreement	8 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 endangered 7 vulnerable 13 migratory 48 marine
	Recovery plans	3 being implemented: great white shark ( <i>Carcharodon carcharias</i> ); marine turtles; and humpback whale ( <i>Megaptera novaeangliae</i> )
Listed flora	None	
Heritage	On Commonwealth Heritage List (part of reserve only)	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
13	19	18	688	>592	No land plants

## Management arrangements

The Mermaid Reef Marine National Nature Reserve is managed under a service level agreement between the Director of National Parks, the Western Australian Department of Environment and Conservation and the Western Australian Department of Fisheries. These agencies cooperate in issuing permits for commercial tours of the Rowley Shoals. Coastwatch provided regular aerial surveillance of the reserve and Western Australian Fisheries provides surface patrols.

The current management plan expired on 16 May 2007. A new draft plan will be released for public comment in 2007–08. Until the new plan takes effect the reserve will be managed in a manner consistent with its IUCN Category Ia classification.

## Monitoring

Monitoring to date has shown that the major threats to Mermaid Reef are from climatic disturbances such as cyclones and coral bleaching. The coral and fish



communities have shown excellent resilience to physical disturbance from cyclones to date.

A baseline survey of undisturbed trochus shell populations at Mermaid Reef by the Western Australian Department of Fisheries in March 2006 will enable future comparisons with populations illegally fished elsewhere. An Australian Institute of Marine Science 2005 report on surveys conducted in 2003 found that shark populations at Mermaid Reef were very healthy, with up to 17 times the number of individuals at Scott Reef, located 450 kilometres to the north-east and targeted by illegal commercial shark fin fishers. Nevertheless, there is concern among reserve users that illegal shark fishers may target Mermaid Reef.

A study in September 2006 by the Western Australian Museum identified 23 coral species that had hitherto not been recorded at Mermaid Reef and a total of 43 echinoderm species, 373 mollusc species and 153 crustacean species.

Commercial fishing has also been identified as a potential pressure on Mermaid Reef. On 27 April 2007 there was a successful prosecution for commercial fishing in contravention of the *Environment Protection and Biodiversity Conservation Act 1999* (see case study on page 173).

## Future challenges

Major challenges are:

- installing moorings at Mermaid Reef (scheduled for August 2007)
- ensuring visitors understand the reserve's conservation values and management requirements.

## Report on performance by key result areas

### KRA 1: Natural heritage management

#### Major issues

- Preventing anchor damage
- Monitoring reserve health
- Monitoring and compliance issues related to illegal foreign fishing

#### Actions

- Install moorings
- Maintain surveillance

#### Performance results 2006–07

- Progressed the contract to install moorings
- Coastwatch reported no illegal foreign fishing incursions



#### **KRA4: Visitor management and park use**

##### *Major issues*

- Need for visitors to understand reserve values and uses
- Determining the appropriate scale and types of visitor use

##### *Actions*

- Progress work related to visitor access to the reserve

##### *Performance results 2006–07*

- Continued research and consultation on the appropriate vessel size, passenger limitations and issues related to seaplane access to the reserve

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- New management plan to take effect in 2007–08
- Effective management of the reserve by the management service providers (Western Australian Department of Environment and Conservation and Western Australian Department of Fisheries)
- Industry stewardship of the reserve to support management

##### *Actions*

- Hold Rowley Shoals Steering Committee meeting
- Hold management issues workshop
- Progress the draft management plan

##### *Performance results 2006–07*

- Implemented the first annual business agreement setting out joint funding arrangements with the Western Australian partner agencies
- Licensed tour operators are developing an industry stewardship strategy for the Rowley Shoals to support reserve management efforts by governments
- Received 19 submissions from stakeholders in response to the initial invitation to comment on the proposal to develop a new management plan for Mermaid Reef
- Prepared the draft management plan for public comment (to be released for comment in 2007–08)

## Worth the risk? A successful prosecution for illegally fishing at Mermaid Reef



*Commercial fishing near Mermaid Reef is monitored by Coastwatch on behalf of the Director of National Parks*

Mermaid Reef Marine National Nature Reserve, located approximately 300 kilometres to the north-west of Broome, is a unique and highly sensitive marine environment that supports a rich and diverse reef community. Clear waters, a broad range of depths and a near pristine environment support coral assemblages comparable to those found on the Great Barrier Reef.

Commercial fishing has been identified as a potential pressure on Mermaid Reef, where fish size, abundance and

community structure would be altered if commercial fishing took place. Fishing of all kinds is prohibited inside the reserve.

On 27 January 2005 a Coastwatch surveillance flight detected an Australian fishing vessel inside the boundaries of the reserve.

An investigation revealed that the vessel had illegally trawled for the commercially sold crustacean known as 'scampi'. Fishing records from the vessel showed that more than 450 kilograms of scampi were taken during the time the vessel was observed in the area, with a value of \$11,400.

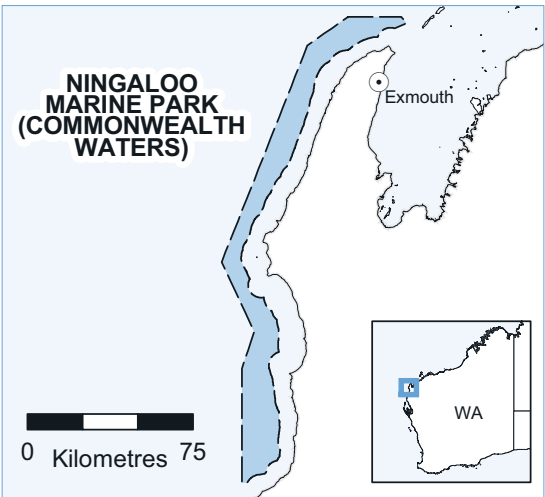
On 27 April 2007 the Federal Court of Australia ruled in favour of the Minister for the Environment and Water Resources, finding that the skipper had contravened the *Environment Protection and Biodiversity Conservation Act 1999* by conducting commercial fishing activities inside the reserve. Evidence before the court, including admissions, demonstrated that the skipper was responsible for conducting the fishing activities in contravention of the Act.

The court ordered the skipper to pay an agreed penalty of \$25,000, and awarded costs of \$27,500 to the Australian Government. This case represents the most significant penalty for a contravention of this nature issued under the Act to date.

Interagency cooperation on compliance and enforcement in Commonwealth marine reserves greatly improves the Director's ability to enforce legislation in remote and infrequently visited areas. The outcome of this case is a clear signal to other commercial fishers, and general users of marine protected areas, of the importance of complying with the legislation.

# Ningaloo Marine Park (Commonwealth Waters)

<http://www.environment.gov.au/coasts/mpa/ningaloo>



## Special features

The Ningaloo Reef is unique because, unlike the Great Barrier Reef and other reefs off the northern coast of Australia, it is not separated from the coast by a wide expanse of water. In places it is as close as 20 metres to the coastline. The park is also unique because it is a tropical reef system projecting out from an arid part of the continental land mass.

Ningaloo Marine Park is made up of state waters, extending from the

Western Australian coastline out to three nautical miles, and Commonwealth waters from the limit of the state jurisdiction out to the seaward boundary of Ningaloo Marine Park. The park protects the whole of the deep-water environment fringing the reef, including the open waters and the seabeds of the continental slope and shelf. The reef is extremely variable, with the range of coral cover and species changing within short distances. A 2004 pilot study by CSIRO of three locations in Ningaloo Marine Park found that commercially and recreationally important fish species occur in the deeper Commonwealth waters and that fish diversity was associated with habitats of greater structural complexity. It seems highly likely that other notable benthic (seabed) communities exist in Commonwealth waters.

The reef is also an important area for marine mammals, particularly whales. Green turtles (*Chelonia mydas*) are very common all along the coast, with several breeding rookeries. Of particular interest is the presence of the whale shark (*Rhincodon typus*) the world's biggest fish species.

Location	Latitude 21°51' South, Longitude 113°52' East
Area	243,559 hectares
Proclamation dates	20 May 1987, 5 August 1992, 6 April 2004
IUCN category	Category II
Biogeographic context	IMCRA 4.0 provincial bioregions: Northwest Province, Central Western Transition, Central Western Shelf and Northwest Shelf Province
Management plan	Second plan expires 2 July 2009

Other significant management documents	Service level agreement and Memorandum of Understanding with the Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management (now Department of Environment and Conservation); annual business agreements for management plan implementation	
Financial	Operating	\$271,274*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not available	
Permits	20 commercial tour, 1 scientific research	

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Migratory Species (Bonn) Convention	12 of 98 listed Australian species
China–Australia Migratory Birds Agreement	9 of 81 listed species
Japan–Australia Migratory Birds Agreement	9 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	4 endangered 12 vulnerable 17 migratory 59 marine
	Recovery plans	1 implemented: great white shark ( <i>Carcharodon carcharias</i> )
Listed flora	None	
Heritage	On Commonwealth Heritage List	

Numbers of native species recorded <sup>a</sup>				
Mammals	Birds	Reptiles	Fish	Plants
At least 55	At least 52	22	At least 590	0

(a) Species numbers have been taken from a recent review of literature which inventoried all species that have been sighted in the Commonwealth and/or state component of the marine park. The inventory is new and is being progressively updated and refined

## Management arrangements

The Western Australian Department of Environment and Conservation and Western Australian Department of Fisheries conduct on-site management of the reserve under a three-way service level agreement between the Western Australian agencies and the Director of National Parks.

## Monitoring

The Australian Institute of Marine Science, in a consortium with Australian and United States research organisations, extended a project begun in 2004–05 using satellite tracking tags to collate data on the range and behaviour of whale shark individuals from the Commonwealth and state waters of Ningaloo Marine Park.

CSIRO completed biodiversity surveys in the north of the park.

A study of commercial shipping impacts on the key values of the park was completed. The study provided useful data and made recommendations on risk management.

## Future challenges

Major challenges are:

- ensuring compliance with park management prescriptions
- mapping habitats adequately
- maintaining consistency between the Australian and state government planning processes.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Limited information about the Commonwealth waters of the park
- Lack of information on the distribution, migration, behaviour and abundance of key species including whale sharks
- Lack of information on the effects of human and commercial interactions on the park's key attributes

#### Actions

- Conduct a biodiversity survey in the Commonwealth waters of the park
- Conduct a whale shark survey in both Commonwealth and state waters
- Assess the vulnerability of key park values to commercial shipping traffic

#### Performance results 2006–07

- Prepared a biodiversity benthic survey report summarising work that was undertaken in the Ningaloo Marine Park as part of a broader CSIRO project
- Continued a study of the behaviour and migration habits of whale sharks travelling to Ningaloo Marine Park
- Completed a study of risks from commercial shipping to key biodiversity attributes of the park



**KRA4: Visitor management and park use***Major issues*

- Longlines from commercial fishing operations that are allowed in state waters but not in Commonwealth waters are reported by the commercial fishing industry to drift occasionally into the park requiring entry from commercial fishers to retrieve gear
- Reports of commercial fishers entering Commonwealth waters and fishing
- Effective management of commercial tours

*Actions*

- Monitor reports of gear loss and retrieval by commercial fishers
- Monitor illegal entry to Commonwealth waters via Coastwatch surveillance
- Ensure commercial tour operators comply with permits and conditions

*Performance results 2006–07*

- Liaised with industry and the Western Australian Department of Fisheries about reported gear loss and commercial fishing boat entry
- Continued engagement with state partners (Western Australian Department of Environment and Conservation and Western Australian Department of Fisheries) regarding roles and cooperative arrangements for compliance and enforcement activities
- Issued permits for commercial tour operators
- Western Australian partner agencies patrolled the reserve regularly as part of their standard surveillance operations
- Coastwatch conducted aerial surveillance

**KRA5: Stakeholders and partnerships***Major issues*

- Maintaining productive relationships with partners
- Negotiating complementary management regimes with partner agencies to best manage the adjoining Commonwealth and state reserves

*Actions*

- Develop and implement a work plan under the annual business agreement to manage both reserves
- Keep stakeholders informed of and involved in management activities

*Performance results 2006–07*

- The three agencies negotiated and implemented a work plan
- Productive working arrangements were maintained

#### **KRA6: Business management**

##### *Major issues*

- Need to effectively manage contracts with service providers

##### *Actions*

- Negotiate and implement an annual business agreement
- Manage contracts with service providers

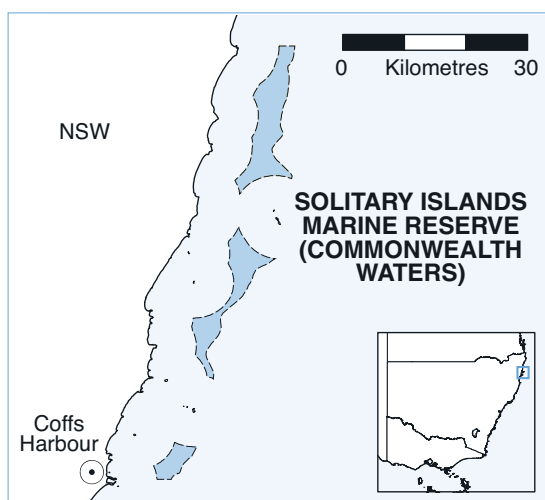
##### *Performance results 2006–07*

- The three agencies negotiated and implemented an annual business agreement covering research, visitor management, education, and compliance and enforcement



## Solitary Islands Marine Reserve (Commonwealth Waters)

<http://www.environment.gov.au/coasts/mpa/solitary>



### Special features

The Solitary Islands Marine Reserve (Commonwealth Waters) and the adjacent state reserve are located in a mixing zone between tropical and temperate environments. Many species in the reserve are at, or close to, their southern and northern geographical extents.

The reserve is home to a number of species that are listed as endangered or vulnerable under Commonwealth

legislation or international agreements. These include several dolphin species, humpback whales (*Megaptera novaengliae*), grey nurse sharks (*Carcharias taurus*), black cod (*Epinephelus daemeli*), Bleekers devil fish (*Paraplesiops bleekeri*), and numerous seabird species. An area known as Pimpernel Rock forms part of the critical habitat for the grey nurse shark which aggregates there.

Location	Latitude 29°48' South, Longitude 153°22' East	
Area	15,747 hectares	
Proclamation date	3 March 1993	
IUCN category	Category VI overall comprising: Category Ia 79 hectares Category IV 3,744 hectares Category VI 11,924 hectares	
Biogeographic context	IMCRA 4.0 provincial bioregion: Central Eastern Shelf Transition	
Management plan	Current plan expires 3 April 2008	
Other significant management documents	Service level agreement and subsidiary annual business agreements between Australian and New South Wales governments	
Financial	Operating	\$83,867*
	Capital	Not applicable
	Revenue	Not applicable

Visitors	Not known
Permits	10 commercial fishing, 10 commercial tour operator, 5 recreational diving

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Migratory Species (Bonn) Convention	14 of 98 listed Australian species
China–Australia Migratory Birds Agreement	9 of 81 listed species
Japan–Australia Migratory Birds Agreement	11 of 76 listed species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	4 endangered 4 vulnerable 24 migratory 33 marine
	Recovery plans	2 being implemented: marine turtles and grey nurse sharks ( <i>Carcharias taurus</i> )
Listed flora	None	

Numbers of native species recorded				
Mammals	Birds	Reptiles	Fish	Plants
25	42	7	20	0

## Management arrangements

The New South Wales Marine Parks Authority conducts on-site management of the reserve under a service level agreement.

The Solitary Islands Marine Park Steering Committee comprises government agency representatives and oversees management and planning arrangements. The Solitary Islands Marine Park Advisory Committee enables stakeholders to contribute to planning for the adjacent state park and the reserve. The Department is represented on both committees.

## Monitoring

The New South Wales Marine Parks Authority and CSIRO continued to monitor grey nurse shark movements between aggregation sites, including Pimpernel Rock in the reserve. The New South Wales Marine Parks Authority continued to remove and monitor debris at Pimpernel Rock.

## Future challenges

Major challenges are:

- reviewing the management plan for the reserve
- consulting with stakeholders and the New South Wales Marine Parks Authority on future management arrangements.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Detection of any illegal activity

#### Actions

- Enforce fishing restrictions

#### Performance results 2006–07

- New South Wales Marine Parks Authority provided surface support to Coastwatch surveillance and conducted surface patrols as required

### KRA4: Visitor management and park use

#### Major issues

- Managing impacts on the grey nurse shark of diving in the sanctuary zone and commercial fishing under permit in the habitat protection zone

#### Actions

- Conduct surface patrols and manage commercial fishing permits
- Communicate marine protected areas values and provide information to users

#### Performance results 2006–07

- New South Wales Marine Parks Authority provided surveillance support through regular surface patrols
- Produced a joint zoning summary and user guide for the state and Commonwealth waters (disseminated via New South Wales Marine Parks Authority)

### KRA5: Stakeholders and partnerships

#### Major issues

- Ongoing engagement with community and government representatives

#### Actions

- Participate in Solitary Islands Marine Park Advisory Committee and Solitary Islands Marine Park Steering Committee meetings

*Performance results 2006–07*

- Participated in advisory and steering committee meetings

**KRA6: Business management**

*Major issues*

- Need for continued assistance from the New South Wales Marine Parks Authority

*Actions*

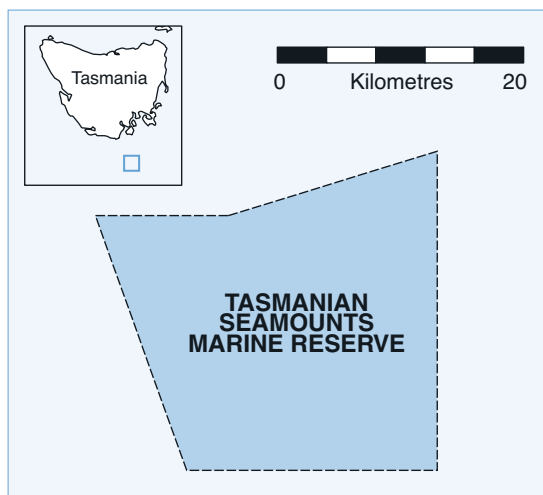
- Endorse and manage the annual business agreement with New South Wales Marine Parks Authority

*Performance results 2006–07*

- Successfully implemented the annual business agreement

## Tasmanian Seamounts Marine Reserve

<http://www.environment.gov.au/coasts/mpa/seamounts>



### Special features

The Tasmanian Seamounts Marine Reserve protects 25 of the approximately 100 seamounts that arise from water depths of between 1,000 and 2,000 metres on the continental slope off southern Tasmania. Remnants of extinct volcanoes, these seamounts are typically cone-shaped, between 200 and 500 metres high, and several kilometres across at their base.

This field of seamounts is a distinctive geological feature not known elsewhere in Australia. It supports a distinct benthic (seabed) community of animals, many of which do not occur anywhere else on earth. The primary purpose of the reserve is to protect a sample of this unique benthic community.

Research has found that 24 to 43 per cent of species in the reserve are new to science. At least eight new genera have been discovered.

Location	Latitude 44°24' South, Longitude 147°18' East	
Area	38,897 hectares	
Proclamation date	19 May 1999	
Revocation date	2 September 2007. The Tasmanian Seamounts will be incorporated into the Huon Commonwealth Marine Reserve	
IUCN category	Category Ia overall comprising: Below a depth of 500 metres is a highly protected zone (Category Ia) Upper 500 metres is a managed resource zone (Category VI)	
Biogeographic context	IMCRA 4.0 provincial bioregion: Tasmanian Province	
Management plan	First plan expires 2 September 2007. The reserve will be incorporated into the new South-east Commonwealth Marine Reserve Network and will be included in the management planning process for the network in 2007–08	
Financial	Operating	\$3,388 *
	Capital	Not applicable
	Revenue	Not applicable

Visitors	None
Permits	None

\* In addition, \$1,266,161 was spent across the 13 marine reserves managed by the Marine and Biodiversity Division of the Department on behalf of the Director of National Parks on professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Migratory Species (Bonn) Convention	12 of 98 listed Australian species
Japan–Australia Migratory Birds Agreement	1 of 76 listed species
Other agreements	Agreement on the Conservation of Albatrosses and Petrels International Convention for the Regulation of Whaling

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	7 endangered 15 vulnerable 24 migratory 21 marine
	Recovery plans	4 being implemented: albatross ( <i>Diomedea</i> spp. and <i>Thalassarche</i> spp.) and giant petrels ( <i>Macronectes</i> spp.); marine turtles; 10 seabird species; and southern right whale ( <i>Eubalaena australis</i> )
Listed flora	None	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
At least 25	At least 21	At least 1	37	242	Not fully known

## Management arrangements

Regular requests for Coastwatch aerial surveillance flights were submitted, however due to Coastwatch resource constraints, no surveillance flights of the reserve were undertaken.

## Monitoring

The Department has funded CSIRO Marine Research to conduct surveys to establish baselines in many of the proposed marine protected areas throughout the south-east region, including resurveying sites in the Tasmanian Seamounts Marine Reserve. Surveys took place in November 2006 and April 2007. Numerous specimens and deep water images were collected and are currently being analysed by CSIRO. Initial reports suggest very high biodiversity values were found within the proposed Huon

Commonwealth Marine Reserve associated with unfished seamounts. When the new South-east Commonwealth Marine Reserve network comes into effect on 3 September 2007, the Huon Commonwealth Marine Reserve will incorporate the existing Tasmanian Seamounts Marine Reserve.

## Future challenges

Major challenges are:

- to develop management arrangements for the new South-east Commonwealth Marine Reserve network with state agencies (Tasmania, Victoria and South Australia) to provide compliance and enforcement services
- to develop the network's management plan.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Improving understanding of the reserve's ecological processes

#### Actions

- Fund research in the reserve

#### Performance results 2006–07

- Results of research undertaken by CSIRO on many of the seamounts are being analysed, including species identifications and analysis of video footage

### KRA4: Visitor management and park use

#### Major issues

- Monitoring possible illegal activities

#### Actions

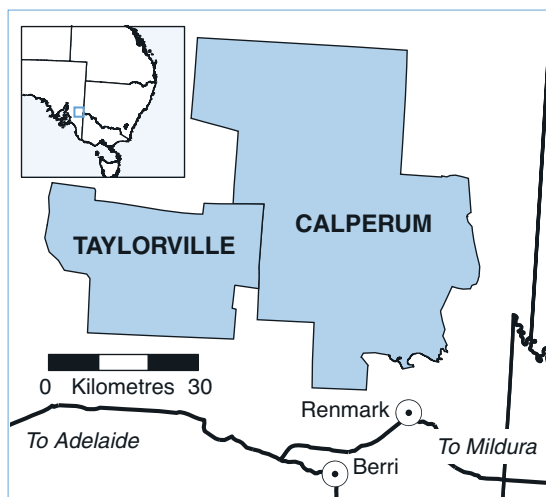
- Minimise the risk of accidental or deliberate encroachment on the reserve by trawling vessels

#### Performance results 2006–07

- Regular Coastwatch aerial surveillance was not provided due to Coastwatch resource constraints
- New arrangements with state agencies proposed following declaration of the new south-east reserve network and a more comprehensive compliance and enforcement plan should be able to more appropriately address this key result area

## Calperum and Taylorville Stations

<http://www.environment.gov.au/parks/biosphere/riverland>



### Special features

Calperum and Taylorville Stations are adjoining pastoral leases in the Riverland area of South Australia.

Calperum and Taylorville are important locally, nationally and internationally because of their wetlands and related species, their mallee vegetation, and the presence of several threatened bird species. The properties form critical habitat for the endangered black-eared miner (*Manorina melanotis*) and are also important for the conservation of the

nationally vulnerable malleefowl (*Leipoa ocellata*) and the regionally vulnerable bush stone-curlew (*Burhinus grallarius*).

The properties are key components of the Riverland (formerly Bookmark) Biosphere Reserve. While biodiversity conservation guides the management of both properties, and both actively rely on community participation in management activities, there are differences in the management objectives of the two properties. Taylorville is managed as an IUCN Category IV reserve, for habitat and species conservation. Calperum is managed for a broader, additional set of objectives, including environmentally sustainable development such as tourism.

Location	Latitude 33°49' South, Longitude 140°34' East (Calperum) Latitude 33°56' South, Longitude 140°11' East (Taylorville)
Area	331,238 hectares combined area: Calperum 238,638 hectares, Taylorville 92,600 hectares
Status	Pastoral leases in South Australia, held by the Australian Government through the Director of National Parks (Calperum acquired in 1993, Taylorville acquired in 2000)
IUCN category	Calperum: not assigned Taylorville: Category IV
Biogeographic context	Interim Biogeographic Regionalisation for Australia region: Murray–Darling Depression
Management plan	Non-statutory management plan covering both properties finalised in February 2005 (expires with current management contract in 2008)
Other significant management documents	Management contract with Austland Services Pty Ltd; Biosphere Reserves Seville Strategy and statutory framework



Financial	Operating*	\$0.507 million
	Capital	\$0.080 million
	Revenue	\$0.022 million
Visitors	150 day visitors and 1,350 bed-nights in camping grounds, dormitories and other accommodation	

\* This funding is provided by the Director of National Parks. Austland Services provides at least matching resources

International conventions and agreements	
Wetlands (Ramsar) Convention	Part of Calperum included in Riverland Ramsar site
Migratory Species (Bonn) Convention	8 of 98 listed Australian species
China–Australia Migratory Birds Agreement	10 of 81 listed species
Japan–Australia Migratory Birds Agreement	10 of 76 listed species
Other international agreements	Major component of the Riverland Biosphere Reserve under the UNESCO Man and the Biosphere Programme

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 endangered 6 vulnerable 12 migratory 45 marine (birds)
	Recovery plans	2 being implemented: malleefowl ( <i>Leipoa ocellata</i> ); black-eared miner ( <i>Manorina melanotis</i> )
Listed flora	Species	None
Heritage	On Commonwealth Heritage List	
Other	Taylorville and majority of Calperum listed as critical habitat for the black-eared miner	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Amphibians	Fish	Plants
25	188	68	10	12	>300

## Management arrangements

Calperum and Taylorville Stations are managed by Austland Services Pty Ltd (a company established by the Australian Landscape Trust) under contract to the Director of National Parks. The current management contract runs from 1 May 2003 to 30 June 2008. The contract is funded through the Natural Heritage Trust. Austland Services provides additional support for management activities and community-based programmes.

## Monitoring

Significant monitoring programmes track the physical and biological attributes of both stations. Annual biological surveys in 2006–07 included pitfall trapping of small vertebrates, vegetation photopoints, malleefowl mound activity monitoring, black-eared miners, stone-curlews, waterbirds, fish, possums, frogs, nestboxes and aquatic vegetation assessments. Feral animal monitoring focused on foxes, goats, pigs and rabbits.

Monthly rainfall data are collected from 25 rain gauges across the two stations, and a network of groundwater test wells has been developed to monitor groundwater hydrology and water salinity beneath the floodplain and wetlands of Calperum Station. Water quality in creeks and wetlands is also monitored.

## Future challenges

Major challenges are:

- identifying and implementing environmentally sustainable industries on Calperum Station
- developing an appropriate management regime for Calperum Station's wetlands that can respond to changing conditions
- protecting the critical threatened species habitat provided by mature mallee on Taylorville and Calperum from fire and other potentially threatening impacts such as bird poaching
- developing cross-tenure approaches to managing the broader landscape for shared goals.

## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Rehabilitation and conservation of native vegetation and endemic fauna
- Feral animal and weed control
- Fauna conservation and management
- Floodplain management
- Fire management

#### Actions

- Rationalise watering points
- Maintain captive colonies of the Murray River snail (*Notopala sublineata hanleyi*)
- Investigate and monitor saline groundwater
- Review fire management strategies and infrastructure
- Restore and revegetate wetlands

- Implement feral animal control programmes
- Monitor native animal populations
- Contribute to recovery programmes for threatened birds

#### *Performance results 2006–07*

- Worked closely with the regional Country Fire Service. Supported and participated in Country Fire Service training and familiarisation exercises on Calperum and supported staff to join local units
- Reviewed fire management strategies including water storage needs and supply infrastructure on Calperum which led to decommissioning several non-essential water tanks. Selected water storage infrastructure was upgraded
- Reviewed the fire-track network on Calperum and maintained and upgraded tracks as required. Added a section to the network in the west of Calperum. Identified and initiated priority actions for the Taylorville fire-track network
- A series of fires started by lightning strikes amalgamated and burnt through a large proportion of Taylorville and a small section of Calperum in December 2006. Staff helped fight the fires and contributed to briefings held for the benefit of local people and media
- Reviewed management strategies immediately following the fire. Identified and addressed priority issues. Staff and volunteers also participated in post-fire reviews by agencies including the Country Fire Service
- Participated in additional post-fire monitoring and other actions in collaboration with the SA Department for Environment and Heritage and neighbouring Gluepot Station
- Monitored the impact of environmental watering of drought stressed riparian vegetation at Double Thooke Thooke Lagoon. Planned additional environmental watering activities were scaled down due to the extreme water supply situation
- Completed a wetting and drying cycle of Lake Merreti. The planned wetting and drying of Lake Woolpolool was deferred following consultation with SA Government officers
- Continued to install test wells and monitor groundwater in wetlands and floodplains. Monitored surface water quality (salinity, temperature, pH, dissolved oxygen and turbidity)
- Continued volunteer involvement in mapping and controlling significant weeds, including post-fire weed emergence in disturbed areas and an intensive assessment of earlier revegetation activities in one section of Calperum
- Conducted photopoint monitoring and floristic surveys of partially drip-irrigated and non-irrigated sections of revegetation exclosures
- Provided tube-stock and technical advice to local groups and individuals for revegetation activities
- Facilitated collection of seed for use in a regional revegetation project
- Identified and began development of out-station infrastructure on Taylorville to support fire-fighting and research and monitoring programmes



- Survey confirmed the vigour and growth of earlier trial plantings of *Eucalyptus* and *Melaleuca* species in salinised floodplain habitat
- Planted additional shrubs and trees in highly impacted floodplain areas
- Supported a formal (Ph D) study of the effects of salinity on floodplain invertebrate communities
- Initiated an investigation of the efficacy of various artificial habitats for housing Murray River snails for recolonising waterways
- Continued and expanded native species monitoring programmes, including monitoring invertebrates, small arboreal mammals, bats, frogs, waterbirds, stone-curlews and mallee bird species. Monitored the impacts of total grazing pressure, with particular attention to floodplain areas
- Supported the black-eared miner recovery programme. A planned translocation was curtailed due to unfavourable seasonal conditions
- Participated in developing recovery plans for other mallee species of conservation concern
- Continued and enhanced feral animal control programmes for pigs, goats, foxes, cats and rabbits
- Initiated discussions on developing a regionally coordinated fox baiting programme, including a demonstration trial of alternative bait delivery systems
- Participated with government, academic and other bodies in developing a bid under the Australian Ecological Observation Network project for installing research infrastructure in the Renmark–Mildura section of the lower Murray

#### **KRA2: Cultural heritage management**

##### *Major issues*

- Protection and conservation of Indigenous and non-Indigenous heritage

##### *Actions*

- Protect, conserve and encourage recognition of heritage

##### *Performance results 2006–07*

- Continued to monitor, protect and revegetate identified Indigenous heritage sites
- Participated in running a trial Indigenous ecotourism training programme for local Indigenous youth
- Continued to protect and maintain iconic structures recalling the previous pastoral industry, including the Yubalia ruins, the Cooper's Camp fisherman's hut and various items of pastoral-era infrastructure

#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Provision of quality visitor services that are compatible with conservation objectives, visitor safety and management requirements

- Communicating the values of Calperum and Taylorville
- Conducting relevant research to support management objectives
- Conducting commercial activities that achieve ecologically sustainable use of natural resources and provide financial benefits for use in the protection and/or rehabilitation of natural and cultural assets of the properties, and as models for the region

#### *Actions*

- Manage, provide information for, monitor and review day-to-day recreational use
- Develop, maintain and promote education programmes for a range of audiences, using the resources at Calperum and Taylorville and the McCormick Centre for the Environment in Renmark (the construction of which was partly funded through the Natural Heritage Trust)
- Continue current research programmes, develop further research programmes as needed and manage research data
- Review use of the irrigated horticultural site and plant nursery
- Pursue the assessment and development of suitable ecologically sustainable industries and activities
- Review how efficiently available water resources are used

#### *Performance results 2006–07*

- Upgraded the Calperum carpark and developed the (educational) Calperum Mallee Garden, including demonstration of solar lighting and high-efficiency water-use technology
- Re-sited camping areas, installed new dry composting toilets and began to revegetate impacted areas
- Developed new and additional signage incorporating interpretive materials
- Managed visitors satisfactorily, including through developing a formal working relationship with the Riverland Ecotourism Association, facilitating ecotourism in and around Calperum, and hosting meetings and activities at the McCormick Centre and at Calperum designed to improve regional tourism
- Conducted educational programmes for pre-primary, primary, secondary and tertiary students, including a school holiday programme at the McCormick Centre. Focus areas included wetland health and water quality, sustainable design and environmentally friendly architecture
- Hosted field trips and camps for TAFE SA (technical and further education), university and non-government study tour groups studying biology, ecology and environmental management. Sessions were held on floodplain management; communities' capacity to understand and respond to environmental issues involving the river; conduct of biological surveys; collecting and classifying native plants; and the aims and methods of management of Calperum



- In conjunction with TAFE SA, ran numerous courses for volunteers and the community in aspects of natural resource management, including plant and animal identification, biological survey techniques, native seed collection and plant propagation. In partnership with TAFE SA, the Riverland Development Corporation and local schools conducted a pilot course for Indigenous youth on developing Indigenous ecotourism. A water quality testing workshop for interested community members was delivered on Calperum by the SA Murray–Darling Basin Natural Resource Management Board as part of a broader initiative under the Australian Government’s Community Stream Sampling project

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Promotion of the UNESCO Man and the Biosphere Programme
- Involvement of the community in land management
- Support and recognition of volunteers
- Fostering long-term capacity for sustainable development in the community

##### *Actions*

- Promote and disseminate information that assists in achieving the goals of the Man and the Biosphere Programme
- Promote, support and oversee extensive volunteer involvement
- Develop a system for consistently recording volunteer hours
- Participate in the Riverland Biosphere Community Committee

##### *Performance results 2006-07*

- Continued to promote Calperum and the McCormick Centre as places available for research and monitoring, education, skill-sharing and public recreation. Encouraged volunteers to recognise these objectives at all suitable opportunities
- Continued providing various forms of support and encouragement to existing and potential volunteers. Maintained appropriate insurance for volunteers, and made sure that they were aware of and observed occupational health and safety procedures
- The McCormick Centre developed as a focal point for meetings and information dissemination on issues relevant to the Man and the Biosphere Programme. Events held at the centre included the Wetlands and Waders Festival and a weekend of activities to mark the fiftieth anniversary of the 1956 flood
- Attended the 2006 Riverland Biosphere Community Committee annual general meeting, at which a staff member joined the committee. Parks Australia representatives participated in two committee meetings
- Over 180 registered individual active volunteers, and numerous volunteer

groups and organisations, donated in excess of 8,500 hours of labour during the year. Approximately 58 per cent of volunteer effort was devoted to core land management activities such as feral animal control, weed control and infrastructure maintenance. Research and monitoring absorbed 38 per cent of volunteer effort; the remainder was devoted to purely educational and skill-sharing activities (noting that many activities have an educational component)

- Maintained a database to record and analyse volunteer contributions to management of the properties
- Hosted a weekend of activities for volunteers in recognition of their efforts. This included a cruise on the River Murray, a dinner in the Calperum Woolshed and demonstrations and training in a range of biological survey techniques
- Explained to a community meeting how fire preparations helped contain the 2006 wildfires
- Began a range of activities within a broad education and skill-sharing project funded by the Australian Landscape Trust. The project includes employing natural resource management trainees, promoting and subsidising accredited training for volunteers, and developing collaborative environmental education programmes with regional schools, using Calperum and the McCormick Centre as activity sites
- Participated in a review of issues affecting the use of community monitoring data in institutional planning and decision-making being undertaken by the SA Murray–Darling Basin Natural Resource Management Board
- As part of the Paddock Adoption Scheme, sought and found new ‘paddock managers’ for the Merreti and Calperum Lakes project areas
- Obtained funding to support purchase of a stereo microscope and accessories which allow microscope images to be displayed on audio-visual equipment. The microscope is now being used to support education on aquatic macroinvertebrates and other fauna at the McCormick Centre. Other equipment purchases were facilitated by donations from SA Rotary clubs
- Supported local Green Corps projects, including training in nursery practices and a range of land management activities
- A community-based study of the life histories of two poorly known native cockroach species began under the auspices of the University of Sydney
- Assisted three research students to conduct biological research on Calperum
- Explored potential economic uses of the horticulture site. While no robust business opportunity for its further development was identified, the potential to use infrastructure to supply material for regional revegetation projects on a non-commercial basis remains. Support for small-scale trials in developing marketable native plant products by local horticulturalists is also potentially possible. Active development of initiatives was hindered by the poor outlook and uncertainty surrounding irrigation water allocations





- Contributed to publication of case studies on the management of Calperum and the McCormick Centre as an exemplar of community empowerment and volunteer engagement

#### **KRA6: Business management**

##### *Major issues*

- Property maintenance
- Business management
- Environmentally sustainable management

##### *Actions*

- Maintain infrastructure
- Manage professionally and accountably

##### *Performance results 2006–07*

- Continued producing quantities of seed for revegetation and occasional commercial sale
- Maintained the productive capacity of floriculture plantings but international market conditions remained unfavourable
- Maintained existing buildings, fencing, tracks and other infrastructure. A significant enhancement of the Oak Bore outstation has made it entirely self-sufficient for water
- Completed infrastructure enhancements including improvements to visitor infrastructure
- Produced policy statements on operations and workplace practices, and reviewed/updated employee and volunteer induction processes
- Investigated strengths and weaknesses of Calperum's horticulture site and options for its future use. This study reinforced (as a preferred option) the site's use in identification and early development of local species suitable for revegetation applications
- Investigated the development of woody perennial crops, especially the mallee sandalwood species *Santalum spicatum*, as species with potential for use in Calperum's floriculture site (as a future business opportunity)
- Followed up on safety, insurance and financial matters following the December 2006 wildfires (including assessing boundary fence damage, checking roads and tracks and clearing fallen timber). Gates and locks were replaced as required
- Complied with applicable legislation
- Maintained a recycling programme