6 State of the Parks report

Guide to the State of the Parks report

Section index

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:

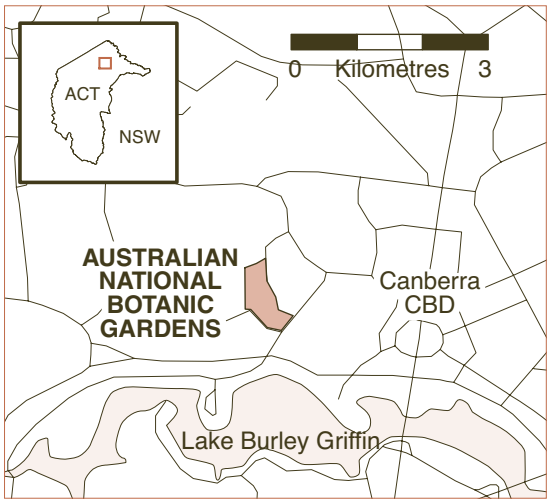
- **Area and locational information** derived from the Collaborative Australian Protected Areas Database is provided.
- The World Conservation Union **(IUCN) protected area management category** is identified for each reserve, and where parts of the reserve come under different categories this is indicated. 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 (Interim Marine and Coastal Regionalisation for 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 2005–06.

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

Section index

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 indigenous 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 indigenous 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	$8.629 million
	Capital	$0.945 million
	Revenue	$0.499 million
Visitors	464,827 recorded	
Permits	4 commercial activity permits; 46 wedding or wedding photography licences; 145 licences to publish 648 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 delivery of information on Australia's aquatic plants through its website
Other agreements	Collaborates with international organisations including: · International Association of Botanic Gardens · International Association of Plant Taxonomists · International Plant Propagators Society · International Union of Biological Sciences Taxonomic Databases Working Group · International Plant Name Index (Kew Botanic Gardens and Harvard University) · Global Biodiversity Information Facility · International Organisation for Plant Information World Vascular Plant Checklist Project

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, and the plants in the gardens.

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

Future challenges

Water resource management continues to be a major challenge for the ANBG. This is due to both the continuing drought and sharp increases in unit water costs in Canberra. A new computerised irrigation management system was purchased in 2005–06 which will be used to manage irrigation more efficiently and generate water use savings.

The impact of climate change will be a major focus for the ANBG, as it seeks to understand and adapt to the changes in local and Australian climate and to communicate sound climate change and horticultural messages to its visitors and clients.

Maintaining the ANBG's growing role as a tourist attraction will remain a key focus. Visitor attractions like the Friends of the ANBG's summer concerts and guided tours will continue to be important.

The Friends provided $38,000 to build a new visitor shelter expected to be ready for use by December 2006.

Work continued 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 ANBG and the project is due for completion in 2007.

Funding for the first phase of Australia's Virtual Herbarium ended in 2006 and the ANBG is working with state and territory herbaria and museums to build on this project through a number of new national infrastructure proposals.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Water management infrastructure

Actions

- Increase water use efficiency

Performance results 2005–06

- Met Australian Capital Territory water use reduction targets for the year
- Purchased a $180,000 irrigation management system (see case study on page 54)

KRA2: Cultural heritage management

Major issues

- Interpretation
- Education

Actions

- Provide interpretation and education programmes for all sectors of the community

Performance results 2005–06

- Hosted three major exhibitions in the visitor centre—'Art and the Bryophyte', 'Phoenix: Fire and Australian Plants' and 'Flora Tasmanica'
- Completed the ANBG's first artist in residence project with funding from the Australian Network for Art and Technology. The project is the Synapse Art and Science Residency Programme. The artist worked with the ANBG's cryptogam scientist on the exhibition 'Art and the Bryophyte'
- Continued evening spotlighting tours, the 'Twilight Forest Adventures', for school and community groups
- Hosted a popular live reptile exhibition—'Snakes Alive'
- Commenced upgrading the Rainforest Gully interpretation signage (to be completed in September 2006)

KRA4: Visitor management and reserve use

Major issues

- Visitor management in emergencies
- Visitor centre

Actions

- Implement visitor safety plan
- Upgrade facilities for the visitor centre, exhibition space and bookshop
- Initiate marketing plan

Performance results 2005–06

- Completed a major re-fit of the visitor centre in August 2005
- Engaged a marketing consultant, began stakeholder consultation and prepared a draft marketing strategy to be refined and implemented in 2006–07
- Recorded 464,827 visitors to the ANBG and 111,799 to the visitor centre
- 17,955 children attended the ANBG education programmes

KRA5: Stakeholders and partnerships

Major issues

- Friends of the ANBG
- Greening Australia
- Birrigai Outdoor School
- Centre for Plant Biodiversity Research

Actions

- Strengthen the partnership between the ANBG and the Friends of the ANBG
- Host the Greening Australia Community Seedbank on the ANBG site
- Continue the partnership with the Australian Capital Territory Government's Birrigai Outdoor School
- Continue to participate in the Centre for Plant Biodiversity Research, a joint venture between the ANBG and CSIRO Plant Industry

Performance results 2005–06

- 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; committed $20,000 to a new water feature near

the visitor centre, the 'Friends Cascade'; supported the ANBG's annual summer concerts in January–February 2006

- 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
- ANBG staff continued their management, research and technical support roles in the Centre for Plant Biodiversity Research and the Australian National Herbarium

KRA6: Business management

Major issues

- Budget management
- Staff management
- Risk management

Actions

- Ensure business continuity and delivery of services
- Continue ongoing risk assessment

Performance results 2005–06

- Increased non-government revenue by $40,000 due to increased fees for parking, venue hire and weddings. The Natural Heritage Trust continued to support Australia's Virtual Herbarium project
- Maintained staff flexibility and training through internal and external acting arrangements and casual employment
- Maintained and regularly updated the risk watch list

KRA7: Biodiversity knowledge management

Major issues

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

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 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
- Promote and provide information about Australian native plants via the internet

Performance results 2005–06

- Curated and databased specimens under 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
- The ANBG and Centre for Plant Biodiversity Research website continued to develop as the premier online resource for information about Australian plants. The website recorded about 35,000 hits each day, an increase of 8,000 per day

Water conservation at the Australian National Botanic Gardens

Weather monitoring station

The ANBG in Canberra contains the most diverse collection of cultivated native Australian plants in the country, despite major climatic limitations including low rainfall and regular winter frosts. An important feature of maintaining the health of this collection is the use of irrigation water, especially in the dry summer months.

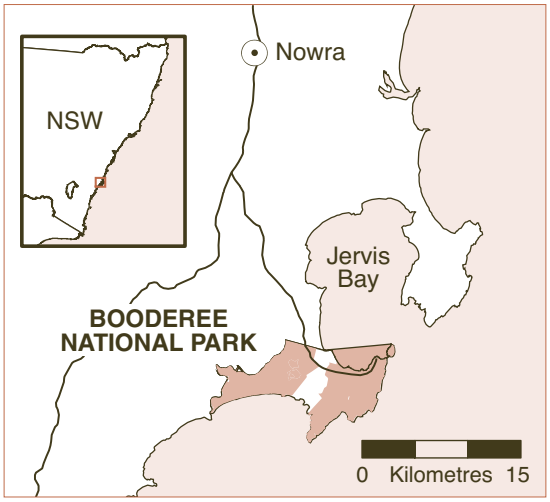
In the past three summers the ACT Government and ACT water utility (ACTEW) have used water restrictions as part of a strategy to deal with low rainfall and reduced water availability. A long-term strategy designed to reduce water use is now in place. The strategy recognises the need to adapt to the impact of climate change and Canberra's location within the Murray–Darling Basin. The ACT and Australian governments are committed to promoting and managing sustainable water use in the Murray–Darling Basin.

As a major water user, the ANBG is implementing strategies to reduce the use of water, both for sustainability and economic reasons. In 2005–06 the ANBG invested $180,000 to design and install a computerised irrigation system. The new system will help the ANBG make a permanent reduction in its irrigation water use, and reduce water costs. The cost of water in the ACT has increased significantly for 2006–07, with the ANBG water bill forecast to increase by $90,000.

The irrigation system will enable horticulturists to accurately measure and analyse the impact of micro-climatic conditions. This information, with knowledge of the various species' water requirements, will be used to determine the most effective and efficient irrigation programmes, watering when, and as, needed. For 2006–07 the ANBG's target is to reduce water use by 20 per cent. The 2005–06 target of meeting the permanent water restrictions was met.

Booderee National Park

http://www.deh.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.

The 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 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 New South Wales 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, with more than 625 native plant species recorded.

Location	Latitude 35° 09′ South, Longitude 150°39′ East
Area	7,254 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 community council and Wreck Bay Enterprises Ltd	
Financial	Operating	$6.513 million
	Capital	$1.410 million
	Revenue	$1.039 million
	Paid to traditional owners	$0.206 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 (*Megaptera novaeangliae*); southern right whale (*Eubalaena australis*); albatross (*Diomeda* spp. and *Thalassarche* spp.) and giant petrels (*Macronectes* spp.); marine turtles; grey nurse shark (*Carcharius taurus*) 5 in preparation—grey-headed flying-fox (*Pteropus poliocephalus*); Gould's petrel (*Pterodroma leucoptera*); eastern bristlebird (*Dasyornis brachypterus*); green and golden bell frog (*Litoria aurea*); giant burrowing frog (*Heleioporus australiacus*)
Listed flora	Species	1 vulnerable
	Recovery plans	1 in preparation—magenta lilly-pilly (*Syzygium paniculatum*)[a]
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)[a]	308 (1)	625 (1)

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

(a) Reduced from 15 species reported in 2004–05 due to suspected local extinction of the green and golden bell frog. Local extinction requires confirmation.

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.

Monitoring

All species were 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. There have been some unexpected early results.

Threatened and listed species monitoring continued with a focus on birds including the eastern bristlebird (*Dasyornis brachypterus*), sooty oystercatcher (*Haemotopus fuliginosus*) and little penguin (*Eudyptula minor*), and amphibians including the green and golden bell frog (*Litoria aurea*) and the giant burrowing frog (*Heleioporus australiacus*). Monitoring continues to indicate an exceptionally healthy environment, although the apparent disappearance of the green and golden bell frog is of concern, and may be a product of climate change (see case study on page 66).

An initial assessment of marine biodiversity was published. The report documents a rich marine biodiversity, with two sites off Bowen Island having the highest fish species richness so far recorded in temperate Australia.

Wildlife monitoring continued to focus on the effectiveness of regular fox baiting, particularly as it affects long-nosed bandicoots (*Perameles nasuta*) and eastern bristlebirds. Both species have increased substantially since fox baiting was started.

Monitoring and management of the highly invasive ecological weed bitou bush (*Chrysanthemoides monilifera*) indicate that, despite the commitment of considerable resources, the weed is spreading. It remains the major environmental risk to the park. New integrated management approaches involving ultra low volume aerial spraying followed by high intensity fire were hampered by the unusually dry summer and autumn, and many of the programmed burns could not safely be carried out. Current

strategies may require review with changing climate making large-scale high intensity burns impracticable.

The training database was further refined to record training received and costs incurred by Wreck Bay Enterprises Ltd members and the Wreck Bay Aboriginal community.

Management plan monitoring was updated to include monitoring management of projects identified in the Parks Australia Risk Watch List and Parksafe.

Future challenges

Major challenges for 2006–07 are to continue to improve control measures for key threats, particularly kikuyu grass (*Pennisetum clandestinum*) on Bowen Island, bitou bush and foxes throughout the park; progress the cultural centre; identify ways of replacing critical ageing assets, notably the visitor information centre; complete the cultural heritage strategy with the Wreck Bay Aboriginal community and implement its recommendations; implement the training strategy; progress service level agreements and contracting opportunities with the community to an agreed timetable; and identify 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 the fox is the greatest threat
- Bitou bush (*Chrysanthemoides monilifera*) is the most significant weed in Booderee. Need to explore more effective integrated control measures (fire, spraying, rehabilitation)
- Protection of seabird nesting habitat (little penguin, three species of shearwater, sooty oystercatcher) from kikuyu grass and other weeds
- Fire-prone vegetation communities require management in increasingly risky environment
- Need to identify the role of climate change and its impacts on the park

Actions

- Manage feral animal control programme with emphasis on regional fox control, control of resilient individuals and introduction of alternative fox control methods
- Develop safer integrated management techniques (aerial spray and fire) for bitou control

- Control the spread of kikuyu, improve integration of community group involvement
- Implement an ecologically appropriate and safe fire management programme and upgrade training and monitoring to cope with larger, more intense fires

Performance results 2005–06

- Rediscovered the white-footed dunnart (*Sminthopsis leucopus*) in the park after the species not having been recorded for 26 years. Other species have featured unusually high breeding densities (powerful owl, sea eagle), and breeding success
- Presence of key indicator species (long-nosed bandicoot and eastern bristlebird) suggests 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 bushfire. The link between fox control and fire is being explored further
- Replaced approximately three hectares of kikuyu with native species in penguin nesting habitat
- New GIS (geographic information system) officer assisted in collecting better baseline data, including distribution of flora and fauna
- Trained five new crew leaders and updated fire training standards with new fire officer

KRA2: Cultural heritage management

Major issues

- Maintaining the cultural values of the park
- The community council and the park to develop a cultural heritage strategy to drive all aspects of cultural heritage management
- The community council and the park to develop and deliver a well-accepted cultural heritage education programme

Actions

- Maintain register of cultural sites on GIS and database, determine protection measures, and examine merits of more sophisticated GIS
- Offer summer interpretation programme with increased focus on cultural interpretation
- Plan for new cultural centre by progressing a pre-design project involving environmental impact assessment and feasibility studies
- Develop a cultural heritage strategy for the park
- Establish Junior Ranger programme with cultural focus

Performance results 2005–06

- Conducted cultural interpretation holiday programme during December 2005–January 2006
- Advertised the cultural heritage strategy and received a number of written tenders. The community and park began the tender assessment process
- Commenced the Junior Ranger programme at Jervis Bay Primary School

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 agreed timetable
- Management plan is fully implemented

Actions

- 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 integrated training strategy
- Prepare annual management plan implementation schedule and report progress to the board of management

Performance results 2005–06

- Supported ongoing service level agreements for road and fire trail maintenance and entry station services
- Progressed development of a service level agreement for cleaning
- Wreck Bay Enterprises Ltd contractors undertook a variety of capital works in the park
- Park and Wreck Bay boards of management endorsed the integrated training strategy agreed by the park, community and Wreck Bay Enterprises Ltd, consistent with park lease obligations
- Upgraded and refined the management plan implementation database

KRA4: Visitor management and reserve use

Major issues

- Educating visitors to increase awareness of the conservation and cultural values of the park
- Provision of infrastructure to facilitate appropriate use of the park while protecting conservation values
- Poor condition of ageing visitor centre

Actions

- Include conservation themes in summer interpretation programme
- Maintain campgrounds and facilities
- Educate visitors in relation to fish catch limits and zoning plan and enforce legislation where appropriate
- Monitor visitor numbers and experiences
- Renovate visitor centre

Performance results 2005–06

- Delivered interpretation programmes focusing on Aboriginal cultural values and conservation themes over the Christmas 2005–06 school holidays. Schools interpretation programmes were delivered in the park and at schools
- Continued repairs to visitor infrastructure damaged by the Windermere fire of Christmas 2003. All damaged areas have now been repaired and insurance payments have been received
- Commenced a number of prosecution actions of repeat fisheries offenders
- Enhanced visitor data analysis software and hardware. Postponed visitor experiences survey to 2006 pending the availability of staff to conduct and manage the survey
- Completed some minor refurbishment of the visitor centre

KRA5: Stakeholders and partnerships

Major issues

- Cooperative arrangements between Booderee, the NSW National Parks and Wildlife Service, the Jervis Bay Marine Park and the Department of Defence are supported
- Strong cooperative arrangements with universities are extended
- 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, Australian Conservation Volunteers, Community Development Employment Projects)

Performance results 2005–06

- 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 provide the lead role in regional fox management
- Issued nine research permits in postgraduate conservation fields in accordance with the management plan. Cooperative undergraduate and postgraduate programmes operated with Wollongong and Canberra universities and the Australian National University
- Continued difficult negotiations between the park and the Department of Defence in relation to a Memorandum of Understanding covering day-to-day operations and relationships between the parties
- Commenced Community Development Employment Projects at Booderee Botanic Gardens involving Wreck Bay youth
- Conducted 18 Parkcare activities, including post fire rehabilitation, weed removal and rehabilitation of little penguin nesting habitat
- Supported three externally funded Australian Conservation Volunteers activities on Bowen Island

KRA6: Business management

Major issues

- In accordance with Investors in People policy, staff have all the necessary skills to do their jobs
- Review of revenue

Actions

- Increase emphasis on training identified in personal development plans
- Conduct business review (permits and fees)

Performance results 2005–06

- Offered training in line with personal development plans, with emphasis on contract and project management, fire preparedness/fighting and supervisory and management skills
- Trained staff, prepared new interpretive material and enhanced park administrative systems pending new fee structure being introduced on 1 July 2006

Booderee National Park joint training strategy

The park provides opportunities for employment and training for the local community

At Booderee National Park, training is an integral part of workplace and park management.

Recognising the joint management arrangements with the Wreck Bay Aboriginal Community Council, and the council's goal of eventual sole management of the park, training and development at Booderee is delivered in a coordinated and shared way to park staff, community members (whether or not currently working in the park) and Wreck Bay Enterprises Ltd staff. This is formalised under the recently developed joint training strategy.

The joint training strategy was prepared in the context of the operational and management interests of the three organisations that have a role in Booderee National Park: Parks Australia, the Wreck Bay Aboriginal Community Council and Wreck Bay Enterprises Ltd. It aims to build capacity across the three organisations by consolidating and strengthening the confidence, skills and knowledge of all participants and enabling community council members to work towards the long-term goal of sole management.

The three organisations have identified outcomes against which success will be measured, including effective implementation of the Booderee National Park Management Plan, increased Indigenous employment in all three organisations, and increased participation in training.

The strategy promotes lifelong learning, use of nationally accredited training modules for consistency and portability, competency based training, and flexible delivery.

A research and training partnership at Booderee

Darren Brown getting familiar with a diamond python at Booderee

One of Booderee National Park's major partnerships is with the Australian National University (ANU) Centre for Resource and Environmental Studies.

Under this partnership, ANU employee and Wreck Bay Aboriginal Community member Darren Brown is enrolled in a Certificate III in Conservation and Land Management through the CB Alexander Agricultural College (part of NSW Department of Agriculture). Most of Darren's training is on the job, working in the field alongside an ANU research officer on a large-scale experimental fire study and research project which will benefit the park by improving ecological and cultural knowledge of fire.

Darren is gaining practical skills in trapping, animal handling, radio tracking, animal identification, vegetation survey, data input and analysis, and data manipulation as well as broader life skills. Darren also receives training in fire operations: he is currently at crew leader level and an important member of both Booderee and Wreck Bay brigades. Darren receives support through formal and informal mentoring in the workplace.

Parks Australia is providing funding and in-kind support for three years to assist with Darren's training. The Navy at HMAS *Cresswell* is also supporting this project. The lead investigator, Professor David Lindenmayer, has a strong personal commitment to this project and contributes to the Indigenous training component from his own funds.

Darren's training is a practical step towards the Wreck Bay Aboriginal Community Council's goal of eventual sole management of the park, and a good example of the much wider social benefits of research projects in places like Booderee National Park.

Booderee National Park and climate change

*The white-footed dunnart (*Sminthopsis leucopus*) rediscovered in Booderee after 26 years*

Higher temperatures, more intense heatwaves; sea level rises and increases in cyclonic wind intensity; reduced rainfall and prolonged drought; and more frequent El Niño Southern Oscillation events—these are the most critical elements of climate change identified for Australia's east coast.

For Booderee National Park, these changes are likely to mean more intense and frequent wildfires; narrow and declining opportunities for prescribed (ecological and hazard reduction) burning; decline or loss of permanent and ephemeral water bodies; rises in sea level; changes in species distribution, abundance and localised extinction; increase in some pests; and a possible decline in marine productivity in Jervis Bay due to declining influence of the East Australia Current.

Booderee National Park communities or species potentially threatened are those not well adapted to fire (rainforests, swamp oak forest), species dependent on regular rainfall (rainforests, amphibians), those dependent on ephemeral water bodies (amphibians, turtles), species dependent on high or reliable marine productivity (penguins, pursuit diving seabirds, seals), communities subject to inundation (littoral rainforest, swamp oak forest and saltmarshes), and species close to the upper thermal limits of their range (penguins)

The longer-term impacts and cause and effect of climate change on Booderee are uncertain. Nevertheless, there have already been some relevant indicators:

- Coastal NSW experienced severe drought conditions and unusually high summer temperatures during 2004–05. On New Year's Day, temperatures rose to 47°C in Booderee, the hottest on record. Many plants were killed or severely damaged by this heatwave.
- There have been two large wildfires in the park which burnt 700 hectares in 2002–03 and 2,500 hectares in 2003–04. Weather conditions were highly conducive to another wildfire in 2005–06 but thanks to the vigilance and cooperation of staff and visitors this did not occur.
- The Byram-Keetch Drought Index remained very high after the 2005–2006 summer and reached over 130 in May 2006, the highest figure ever recorded

for the month of May. (The index is a numerical scale of 0–200 points that reflects the dryness of soils, deep forest litter, logs and vegetation. When the index for a particular area is over 100, the area is said to be in drought. Typical readings for Booderee in summer are around 120.)

- The level of Lake Windermere, the water supply for the Jervis Bay Territory, declined to an all time low leading to speculation that the self sufficiency of the territory and park for water in the next year can no longer be guaranteed.
- The green and golden bell frog (*Litoria aurea*), previously relatively common in the park and highly adapted to ephemeral water bodies, was not found in 2004–05 despite numerous surveys.
- Some marine (native) pests previously found only in tropical Australian waters began to spread through local waterways, e.g. *Caulerpa taxifolia*, an invasive alga.

Encouragingly studies in the park continue to show the amazing natural adaptive capacity of native species, especially to fire, and especially where pest predators can be controlled. Species which we are learning much more about include the endangered eastern bristlebird (*Dasyornis brachypterus*), diamond python (*Morelia spilota spilota*), long-nosed bandicoot (*Perameles nasuta*), and ring-tailed possum (*Pseudocheirus peregrinus*). The bristlebird has unexpectedly thrived after fire and continues to be found in habitats where it was not previously encountered. Large diamond pythons sought open spaces to survive the fires, then took to the trees until ground dwelling prey recovered. Some bandicoots survived, and with their incredible fecundity reacted quickly to fill the available habitats.

It seems that the interaction between fire and the most significant pest predator, the fox, has determined how these species have survived. Rare species, for example the eastern chestnut mouse (*Pseudomys gracilicaudatus*), have been found for the first time in the park, and the white-footed dunnart (*Sminthopsis leucopus*) has been rediscovered after 26 years, again possibly a result of fire and effective fox control.

Current detailed studies in the park will provide good data on distribution and abundance of species and form a sound basis for future monitoring and improved management of the park. However, the capacity of the park's species to adapt to climate change may depend on how rapidly climatic conditions change. A further pressure on the park is its increasing isolation from surrounding natural environments in New South Wales as a result of continued nearby residential and commercial developments.

Christmas Island National Park

http://www.deh.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 100 million red crabs (*Gecarcoidea natalis*) march to the sea to spawn, and for the whale sharks (*Rhincodon typus*) that migrate to its in-shore waters to feed.

6

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; biodiversity monitoring programme; management plan implementation schedule; and risk assessment and management schedule	
Financial	Operating	$2.908 million
	Capital	$0.135 million
	Revenue	$1.449 million
Visitors	600 (estimated)	
Permits	5 commercial tour operators; 5 photography, 8 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 4[a] endangered 8 vulnerable 63[b] migratory 92[c] marine
	Recovery plans	8 plans being partially implemented—Christmas Island shrew (*Crocidura attenuata trichura*); Christmas Island pipistrelle (*Pipistrellus murrayi*); Abbott's booby (*Papasula abbotti*); Christmas Island goshawk (*Accipiter fasciatus natalis*); Christmas Island frigatebird (*Fregata andrewsi*); Christmas Island hawk-owl (*Ninox natalis*); marine turtles; whale shark (*Rhincodon typus*) 2 in preparation—Christmas Island gecko (*Lepidodactylus listeri*); pink blind snake (*Ramphotyphlops exocoeti*)[d] 2 awaiting preparation—emerald dove (*Chalcophaps indica natalis*); Christmas Island thrush (*Turdus poliocephalus erythropleurus*). These species will be included in a multi-species recovery plan for the island, preparation to begin in 2006–07
Listed flora	Species[e]	2 critically endangered
	Recovery plans	2 being partially implemented (*Asplenium listeri*, *Pneumatopteris truncata*) 3 species being assessed for nomination (*Asystasis alba*, *Amaracarpus pubescens*, *Cycas rumphii*). These species will be included in a multi-species recovery plan for the island, preparation to begin in 2006–07
Heritage	On Commonwealth Heritage List (as part of a wider listing of the island's natural areas)	

(a) Reduced from 6 reported in 2004–05 due to an earlier reporting error

(b) Increased from 57 reported in 2004–05 due to refinement of species database

(c) Reduced from 96 reported in 2004–05 due to refinement of species database

(d) At the time of this report, the recovery plans were awaiting ministerial approval

(e) One vulnerable species, *Carmona retusa*, reported in 2004–05 was delisted in 2005

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 the 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 December 2003 a three-year biodiversity monitoring programme, funded by the Department of Finance and Administration, commenced to monitor the impacts of the construction of the Christmas Island Immigration Reception and Processing Centre. The programme has vastly increased knowledge of the island's unique biodiversity and emphasises how important this branch of park management is. The next challenge will be to secure the resources necessary to continue monitoring the centre into its operational phase.

Future challenges

Management programmes have dramatically reduced the density of yellow crazy ants (*Anoplolepis gracilipes*) 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.

Many other potentially dangerous invasive ants, including fire ants (*Solenopsis geminata*) and big-headed ants (*Pheidole megacephala*), are present on the island and are being monitored for signs of spread.

The Christmas Island Rainforest Rehabilitation Programme resumed operation in 2004 but lacks the resources to provide all the rehabilitation required. The question of how best to rehabilitate extensively mined landscapes with limited resources remains under investigation.

The control effort for woody weeds was substantially increased over the past year, but will require even greater resources to bring weeds under long-term control.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Advising Assessments and Wildlife Division, Department of the Environment and Heritage on proposed new mine leases
- Insufficient funding for management of yellow crazy ants
- Continuing management of 37 weed species
- Adoption and funding of all relevant recovery plans
- Crab mortality from traffic

Actions

- Advise the Assessments and Wildlife Division on environmental and biodiversity consequences of approving new leases
- Apply hand baiting to yellow crazy ants
- Submit a 10-year budget for crazy ant control
- Prepare 22 hectares of minesite for rehabilitation
- Hand spray 22 of the most invasive weed species
- Implement as possible approved recovery plans for 11 species and seek funding to implement a draft recovery plan for the Christmas Island gecko and blind snake
- Design and test improved over-road crab crossings
- Continue to implement the biodiversity monitoring programme that started in December 2003
- Implement supply of landscape plants to the immigration reception and processing centre

Performance results 2005–06

- Submitted detailed advice on all environmental and biodiversity aspects of new mine lease proposals to the Assessments and Wildlife Division
- Treated 270 hectares of yellow crazy ant supercolonies (see case study on page 75)
- 10-year crazy ant budget received in-principle ministerial approval
- Returned 40,000 tonnes of soil to a bare mine site. Of 40,000 trees to be planted on 22 hectares only 24,000 were planted on 13 hectares due to early cessation of rain. Balance to be planted next year, bringing total rehabilitated to 383 hectares
- Treated 122 hectares of 22 species of invasive woody weeds

- Achieved average implementation level of 32 per cent of actions within existing recovery plans
- Successfully tested new design of crab crossings. Design will be adopted next season
- Biodiversity monitoring programme met all targets
- Immigration reception and processing centre plant supply contract met all targets

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 interpretations material and signage
- Finalise touch-screen interpretation system in collaboration with Christmas Island Tourism Association
- Coordinate beach rubbish cleanups
- Support film crews and journalists

Performance results 2005–06

- Maintained approximately 60 kilometres of murram or unsurfaced roads and tracks. Improved and re-marked Winifred Beach track and West White Beach track
- Produced one new brochure, reprinted two existing brochures. Overseas student interns are developing a touch-screen interpretation system at the visitor centre
- Published *Native Plants of Christmas Island*
- Successfully staged an art-in-the-jungle exhibition in remote corners of the park to draw visitors
- The school and community held several beach clean-ups in conjunction with park staff
- Assisted several film crews, national and international, and journalists with a view to 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
- Progress of the feral cat eradication programme with the Shire of Christmas Island

Actions

- Establish an international research station on Christmas Island
- Support overseas student interns
- Support Japanese eco-volunteers in collaboration with Nature Watch Inc., Japan
- Support visiting scientists
- Initiate Turtle Watch project
- Continue Smith Point project
- Maintain and service the Christmas Island National Park Advisory Committee
- Implement Memorandum of Understanding on feral cats with mining company and Shire of Christmas Island signed in 2003–04

Performance results 2005–06

- Submitted business case, engaged consultant and prepared prospectus in readiness for approaches to potential investors in the international research station
- Supported 11 foreign student interns doing research projects with park staff
- Supported three volunteers doing research projects with park staff. One full-time coordinator also supported
- Supported six visiting scientists doing collaborative research projects
- Successfully launched the Turtle Watch project, now run autonomously by island volunteers
- Smith Point project continued successfully mainly by overseas volunteers in conjunction with Island Care community group
- Held two meetings of the Christmas Island National Park Advisory Committee
- Cat eradication programme on hold awaiting adoption of cat control legislation

KRA6: Business management

Major issues

- Delivering quality management services within a limited budget

Actions

- Maintain park management services within budget

Performance results 2005–06

- Financial control met all standards and directives

Controlling yellow crazy ants on Christmas Island

Crazy ants depend on scale insects for food

Yellow crazy ants (*Anoplolepis gracilipes*) arrived on Christmas Island sometime between 1915 and 1934—probably an inevitable event as the ant has spread into most tropical countries from Africa (or possibly Asia, it is not certain where it evolved). It went unnoticed on Christmas Island until the late 1990s when suddenly it began forming huge supercolonies that devastated everything in their way including an estimated 30 million red crabs (*Gecarcoidea natalis*).

Drastic action had to be taken and the worst of the infestations were aerially baited using a specially developed bait that included fipronil, a powerful insecticide. This knocked out all the supercolonies, but left many small nests scattered widely across the island. These remaining infestations are being baited manually because it is too risky to bait them from the air.

Fipronil is toxic to other carnivorous ants and also to robber crabs (*Birgus latro*), which have a unique, insect-like physiology that renders them alone among crabs highly susceptible to insecticides. This toxicity means the bait has to be precisely applied in just the right quantity to guarantee that all of it will be found and eaten only by the target ants. This is a slow, laborious and expensive manual operation when treating small ant colonies. Aerial baiting worked for the supercolonies because their density ensured that all the baits were removed by yellow crazy ants before other species could reach them.

By late 2005 it was clear that the mop-up campaign by hand-baiting was not succeeding. The crazy ants were multiplying faster than park staff could bait them. Accordingly, a more comprehensive 10 year control strategy was designed. This includes a targeted return to aerial baiting, initially with fipronil, but, as soon as they can be developed, with other chemicals. The strategy includes supporting research and trials to develop a synthetic hormone that retards the growth of the queen ants' ovaries. Such a method is being used successfully on the fire ant (*Solenopsis invicta*) in Queensland. Other recently introduced insecticides will also be tested to see if they have lower non-target impacts than fipronil.

A third component of the strategy is to support research into finding an insect predator of the scale insects that crazy ants normally depend on for food. If a biocontrol agent that substantially reduces scale insect populations can be identified and introduced then there is a very strong chance that the crazy ant could be kept at harmless levels in a benign, permanent and cost-effective manner.

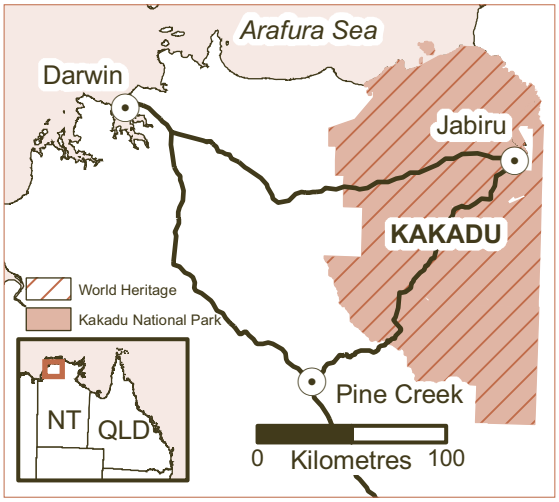
The remaining element of the control strategy is to continue targeted hand baiting of satellite colonies as resources permit.

Just why the crazy ant population suddenly exploded is a mystery. Drastic population crashes of four reptile species, two mammal species and many insect species endemic to the island may be related to the yellow crazy ant infestations, while other species show no change.

At supercolony densities the ant visibly destroys other wildlife, but to what extent it is driving rather than participating in the island's ecological changes is unclear. Climate change is likely to be involved—the island's average annual rainfall has dropped by 21 per cent in the last 30 years. Past clearing of a quarter of the island's rainforest for phosphate mining, and numerous weed and other feral pests are likely to have reduced the capacity of the island's ecosystems to cope with change.

Kakadu National Park

http://www.deh.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. The 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	In several stages: 5 April 1979, 28 February 1984, 12 June 1987, 22 November 1989 and 24 June 1991
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	Fourth plan expired 8 March 2004. Fifth plan expected to come into effect towards the end of 2006

Other significant management documents	Shared Vision for Tourism; district fire management plans; district weed control plans; crocodile management strategy	
Financial	Operating	$17.244 million
	Capital	$2.997 million
	Revenue	$1.162 million
	Paid to traditional owners	$1.111 million
Visitors	193,000 (estimated)[a]	
Permits	120 film/photography; 103 commercial tour operators; 33 research; 611 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	683,000 hectares of wetlands are listed
Migratory Species (Bonn) Convention	39 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)

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	2 critically endangered 6 endangered 10 vulnerable 68 migratory 103 marine
	Recovery plans	3 being implemented—golden bandicoot (*Isoodon auratus*) and golden-backed tree rat (*Mesembriomys macrurus*); marine turtles; eastern partridge pigeon (*Geophaps smithii smithii*), crested shrike tit (*Falcunculus (frontatus) whitei*) and northern masked owl (*Tyto novaehollandiae kimberli*) 8 in preparation—bare-rumped sheathtail bat (*Saccolaimus saccolaimus nudicluniatus*); red goshawk (*Erythrotriorchis radiatus*); yellow chat (*Epthianura crocea macgregori*); Gouldian finch (*Erythrura gouldiae*); freshwater sawfish (*Pristis microdon*); speartooth shark (*Glyphis sp.A*); northern rivers shark (*Glyphis sp.C*); water mouse(*Xeromys myoides*)
Listed flora	Species	6 vulnerable
	Recovery plans	1 in preparation (multi-species boronia)

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Amphibians	Plants
68[a] (19)	292[b] (35)	134[c] (32)	286[d] (60)	26[e] (2)	2,022[f] (14)

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

(a) Reduced from 77 species reported in 2004–05 to exclude 9 feral species

(b) Increase from 271 species reported in 2004–05 reflects refinement of species database

(c) Increase from 132 species reported in 2004–05 reflects refinement of species database

(d) Increase from 246 species reported in 2004-05 reflects inclusion of 40 freshwater species not reported previously

(e) Reduced from 27 species reported in 2004–05 to exclude 1 feral species

(f) Increase from 1,586 species reported in 2004–005 reflects refinement of species database

Board of management

The Minister for the Environment and Heritage appoints members to the Kakadu National Park Board of Management. The board comprises 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 comprise the Director of National Parks, Assistant Secretary Parks Australia North, nominees with environmental and tourism expertise, and a nominee of the Northern Territory Government. The Kakadu board has currently served one year of its five-year term.

Monitoring

Monitoring and control continued in 2005–06 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 ants including big-headed ants (*Pheidole megacephala*) and ginger ants (*Solenopsis geminata*); and introduced terrestrial vertebrate fauna.

Studies continued to research the impact of cane toads (*Bufo marinus*) on goannas, native frogs and northern quolls (*Dasyurus hallucatus*); crocodile populations; marine turtles, in particular nesting flat back turtles (*Natator depressus*) in coastal areas of the park; and the marine environments off the park's coast. This work is part of a collaborative project with the Northern Territory Government, and the Northern Land Council. Final reports on marine turtles, the impact of cane toads on goannas and on the collaborative marine biodiversity project, along with progress reports on the impacts of cane toads on northern quolls and native frogs, are currently being considered by the park.

Research commenced to map the extent of the only known population of the threatened Acacia D 19063 Graveside Gorge; satellite track the movement of large crocodiles (*Crocodylus porosus*) into upstream habitats; and monitor the impact of seasonal food source availability on magpie goose (*Anseranas semipalmata*) populations. The mapping of the threatened Acacia D 19063 Graveside Gorge has extended the known distribution of this plant but further work is required to establish the extent of its range.

Development of oral history recording and a cultural heritage sites register continued with emphasis on involving traditional owners as project officers or assistants.

New techniques were developed to improve the accuracy of visitor numbers.

Future challenges

Major challenges include developing systems and partnerships to make the best use of resources. A priority is to complete the actions set down in the management plan, including supporting Indigenous business ventures, employment and capacity building of Aboriginal people, and addressing caring for country challenges that support Kakadu's living cultural values and World Heritage values.

Other challenges include progressing the principles and ideas from *A Shared Vision for Tourism in Kakadu National Park*; developing appropriate training programmes; ensuring safety of tourists and staff; completing the fifth management plan; controlling the spread of introduced pasture grasses; addressing the threat of weeds/

non-native plants associated with developed areas; and controlling the impact of introduced non-native animal species such as cane toads.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- *Salvinia molesta* infesting Yellow Water
- An apparent decline of small mammal populations in the park
- Cane toads and their impacts on native species
- The spread of introduced pasture grasses
- Introduced pest species and their impacts
- Monitoring the status of significant species
- Monitoring the impact of tour operations on natural values
- Understanding the impact of fire
- Landscape change

Actions

- Assess species populations as part of park fauna monitoring programmes
- Continue assessing the impact of cane toads
- Detect and treat infestations of invasive ant species
- Continue control of 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
- Develop appropriate fire regimes for the variety of habitats within the park
- Study landscape change processes
- Develop programmes to monitor the impact of visitor use on Kakadu's natural values

Performance results 2005–06

- Continued research on cane toad impact on selected goanna species. Recommendations to date include maximising observations during the build-up period prior to the wet season (build-up is known to be a peak period of goanna activity and therefore the best time to maximise any sightings). Training was scheduled by the researcher to assist staff in identifying different goanna species
- Supported ongoing research into frog calls. This is a benchmark study that will assist analysis of the cane toad impact on native frogs

- Supported research into magpie goose (*Anseranas semipalmata*) populations and habit in conjunction with the NT Government and Charles Darwin University
- Made an unsuccessful effort to eradicate salvinia from Yellow Water. Efforts continue to limit the extent and impact of salvinia through biological, mechanical and chemical means
- Recorded 700–800 individuals of the threatened Acacia D 19063 Graveside Gorge *Acacia* spp. at Bilbilkimbi (Graveside Gorge). The results of this survey extended the known range of this species
- Applied findings from the 2004–05 landscape change study to strategic plans for fishing access and weed control
- Conducted an aerial survey for significant areas of weed infestation. Results will help in developing strategies to limit weed impact
- Finalised the feral animal strategy
- Continued monitoring and control programmes for big-headed ants and ginger ants. Detected and treated a big-headed ant outbreak at Cooinda
- Continued support of Indigenous fire management programmes
- Began to implement recommendations from the 2004–05 threatened plants and animals survey
- Completed analysis of data collected from marine turtle nesting surveys
- Analysed data from the marine resource inventory of Kakadu's coastline
- Supported post-graduate ecological studies investigating macropods and their place in the landscape
- Began monitoring the impact of night-time tours on nocturnal wildlife
- Concluded 10 years of 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

- Review cultural heritage management programmes
- Continue rock art protection work
- Continue cataloguing and preserving cultural heritage materials
- Continue to collect oral histories

- Seek opportunities for the transfer of knowledge between generations
- Support traditional owner leadership in the park's natural and cultural resource management activities

Performance results 2005–06

- Held an organisational review focusing on bolstering cultural heritage management
- Continued development of a register of oral history audio and video material
- Progressed a partnership agreement between National Archives of Australia and the Director of National Parks for long-term storage and protection of audio and video materials currently held in the park. The agreement is expected to be finalised before the end of 2006
- Continued rock art maintenance at public visitation sites with the involvement of relevant Aboriginal people and held two rock art protection training camps for traditional owners, one in the north and one in the south of the park
- Completed work to maintain Old Goodparla historic homestead
- Held two cultural camps at Deaf Adder Gorge incorporating aspects of fauna survey, 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
- Held an oral history camp at Mary River Station with senior Indigenous women with ties to that area of the park. This was coordinated by a female Indigenous staff member as an individual project

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

- Consult with traditional owners and the board of management and enable public comment to finalise the fifth management plan
- Implement actions to encourage increased Aboriginal engagement through recruitment and under contract, including skills development programmes

- Support traditional land management projects
- Support the board of management
- Continue day-to-day consultations with traditional owners

Performance results 2005–06

- Released the draft management plan for public comment after approval by the board and the Director of National Parks. Public comments received were summarised and were due to be considered by the board in August 2006
- Relevant Aboriginal staff continued certificate level studies and numeracy and literacy training
- Continued to employ four relevant Aboriginal people selected on merit
- Supported the New Apprenticeship Scheme and programmes seeking to re-engage young Aboriginal people in education
- Continued skill development and training for relevant Aboriginal staff
- 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 minesite rehabilitation and sickness country protocols
- Re-signed the Memorandum of Understanding with the Northern Land Council funding and supporting a Northern Land Council Kakadu Officer position
- Held quarterly meetings of 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
- Shared vision and strategic direction for increasing tourism

Actions

- Develop a branding and tourism masterplan
- Increase knowledge of visitation patterns and experiences
- Continually review safety of visitor areas
- Regularly inspect and maintain visitor facilities

Performance results 2005–06

- Commenced consultancy to develop a Kakadu 'brand' to guide visitor experiences and promotion of the park as a visitor destination
- Commenced consultancy to prepare a tourism masterplan for Kakadu
- Commenced consultancy to enhance directional signs and develop standard interpretation for Kakadu
- Established a Tourism Services Officer position
- Aboriginal board members attended tourism conferences
- Local Aboriginal people delivered seasonal interpretive ranger programmes incorporating natural and cultural content
- Improved monitoring methods and associated survey data to provide more accurate and detailed visitor information for use in tourism planning and resource allocation
- Supported Aboriginal enterprise development and involvement in tourism ventures such as the Kakadu Cultural Camp, Hawke Dreaming and Murdujul
- Board of management approved three new Indigenous business proposals

KRA5: Stakeholders and partnerships

Major issues

- Relationships with the tourism industry, Northern Territory 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
- Implement work programmes under the Tri-National Wetlands Agreement between Indonesia, Papua New Guinea and Australia
- Build a strategic alliance with Jabiru Area School and Charles Darwin University to progress education to work programmes

Performance results 2005–06

- Kakadu Tourism Consultative Committee continued to advise the board of management on tourism related matters
- Continued ongoing high-level relationship between the Australian and Northern Territory governments with joint funding and planning to advance tourism in the park and a partnership in employment and education focusing on youth training
- Finalised an 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
- Developed and implemented a Junior Ranger programme which forms part of the Year 6 curriculum at Jabiru Area School
- Supported community events highlighting Indigenous culture and community spirit

KRA6: Business management

Major issues

- Park is currently without a management plan, the fourth plan having expired in 2004. Fifth plan has been released for public comment and comments received
- Recognition of high levels of staff expertise and performance
- Need for resourcing 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

Actions

- Undertake an organisational review of park operations
- Implement a performance development scheme in accordance with Department of the Environment and Heritage policy
- Participate in the Jabiru Region Sustainability Project, in which Parks Australia, the Northern Territory Government, Energy Resources of Australia and relevant Indigenous groups are considering options for the future of the Jabiru township
- Fulfil the department's financial management and reporting obligations

Performance results 2005–06

- Introduced ParkSafe, continued occupational health and safety training and continued incident reporting and assessment
- Finalised an independent organisational review aimed at prioritising resources to meet the aims of the park lease and fifth management plan
- A staff member received an Australia Day Achievement Award recognising her emergency response to a seriously injured road accident victim
- Continued implementation and improvement of a performance development scheme for all staff focusing on key result areas and staff development
- Continued operational training for staff with emphasis on literacy and numeracy training and workplace training qualifications
- Revenues and expenses were again on budget

Weeds in Kakadu National Park

Salvinia molesta *spreads quickly and is difficult to contain*

Salvinia molesta was first discovered in Yellow Water billabong in August 2005 towards the end of the dry season.

Salvinia is a floating fern that occurs naturally in a small area of sub-tropical south-east Brazil. Without its natural enemies it grows to form floating mats that blanket the surface of water bodies, disrupting normal ecological processes, affecting diversity and restricting use of waterways. It is a major pest plant around the world. It was first recorded in Kakadu in 1983 and considerable resources have been used in attempts to control salvinia and contain its spread.

An aggressive eradication strategy was unable to remove the weed from Yellow Water before the 2005–2006 wet season commenced. The park is now combining mechanical, chemical and biological control methods. The systematic release of the weevil *Cyrtobagus salvinea*, a biological control agent, and education strategies with local tour operators and traditional owners are leading the control effort.

The salvinia infestation in Yellow Water is an example of the challenges faced in attempting to reduce the impact of invasive species. Although more than $500,000 annually is committed to invasive weed control programmes in Kakadu, successful control in sections of the park is offset by the discovery of new sites of infestation in other areas.

Major invasive weeds in Kakadu include mimosa (*Mimosa pigra*), olive hymenachne (*Hymenachne amplexicaulis*), mission grass (*Pennisetum polystachion*), gamba grass (*Andropogon gayanus*) and other introduced pasture grasses. Infestations of these alter natural fire regimes, reduce access to traditional food sources and change native fauna and flora habitat. The park is working on broader strategic approaches alongside ongoing chemical and mechanical control by park staff. Partnerships with neighbours and park user groups, pamphlets to inform visitors entering Kakadu, and inspection of livestock transporters travelling through the park are assisting the fight against the further spread of weeds.

Invasive weeds threaten not only Kakadu's natural and cultural values but its tourism industry which is built on natural diversity and living cultural values. With seed viability exceeding 20 years for some invasive species, and some 80 weed species already in the park, we are unlikely to eradicate all these species from the park.

Cyclone Monica

Ranger Dwayne Whitehurst clearing fallen trees from the Bardedjilidji walk

In late April 2006, Category 5 Cyclone Monica approached the Northern Territory from the Timor Sea. Although the intensity of the cyclone deteriorated rapidly as it moved over land, when it reached Kakadu National Park on 25 April it was still rated as a Category 2 cyclone—with wind strengths of 90–120 kilometres per hour and gusts between 125–170 kilometres per hour.

While Cyclone Monica had more dramatic impacts on communities in Arnhem Land, its path through northern sections of Kakadu National Park is marked by uprooted and snapped off canopy trees in rainforests and paperbark communities. Tree cover in woodland communities has been reduced by up to 20 per cent. Removal of the rainforest canopy layer exposed understorey species to greater sunlight and drying during the dry season. Vegetation communities will be monitored to measure how well they recover from this natural event.

In the immediate aftermath of the cyclone park staff removed fallen trees from roads and tracks, picnic sites, car parks and residential areas, and checked on the safety of residents in outstations in the park.

The preparations of the local counter disaster committee led by the Northern Territory Police Service were instrumental in ensuring there were no injuries in the park. Clean-up costs, and repairs to houses, buildings and other park infrastructure, recoverable under insurance, are expected to exceed $800,000. Park staff's preparedness significantly reduced the extent of damage to infrastructure.

The dramatic increase in leaf and branch litter has increased fire risk and careful management will be required to ensure that rainforest and other fire-sensitive communities are protected. Park staff are revisiting fire management plans, strategies on access to country and visitor interpretation strategies in light of the cyclone.

Throughout the crisis staff generally met the timeframes for the re-establishment of services as set out in the Director's Business Continuity Plan. The heavy rains that accompanied Cyclone Monica effectively extended the wet season by nearly a month, as late flood waters moved down river systems in the park. This had an impact on road and track access across the north of the park, and there were delays in reopening access to some key visitor sites, car parks and camping areas. Comprehensive and regular reports to the tourism industry throughout this period greatly assisted them in their planning and coping with the consequences of this significant event.

Rehabilitation of old uranium mining sites in Kakadu

El Sherana camp, one of the mining sites included in the rehabilitation programme

In the 1950s and 60s uranium mining was an active, dispersed and small scale industry in the upper South Alligator Valley, which is now part of Kakadu National Park. At its peak there were up to 13 uranium mining and milling operations.

In 1964 mining stopped. There was no substantial effort made at that time to rehabilitate the area properly. When the area was handed back to traditional owners and then leased to the Director of National Parks to become part of Kakadu National Park in 1991, the rehabilitation of these old mine and milling sites was made a specific lease commitment.

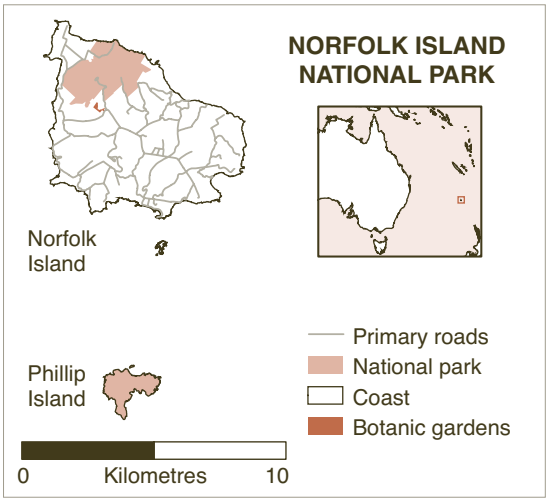
Rehabilitation plans have been developed for many of these sites, in close cooperation with the traditional owners, rehabilitation experts, the Australian Radiation Protection and Nuclear Safety Agency, the Office of the Supervising Scientist, the Northern Land Council and the Northern Territory Government.

In the 2006–07 Budget the Australian Government allocated $7.3 million over four years for a rehabilitation programme. This will rehabilitate the sites to a standard befitting a World Heritage listed national park. Plans for the first stage of the programme have been developed by experts and approved in principle by traditional owners and the Northern Land Council. Environmental assessment and detailed project planning are under way, with on-ground rehabilitation works expected to commence in the 2007 dry season. This first stage involves sites with no or only minor radiological contamination.

Planning for the long-term storage of uranium residues from other sites and the rehabilitation of areas that have significant radiological contamination has commenced. Options will be investigated in close liaison with the Australian Radiation Protection and Nuclear Safety Agency and will involve detailed environmental investigations and assessments before the second stage of the programme is finalised.

Norfolk Island National Park and Botanic Garden

http://www.deh.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 refuge for some 40 species found only on the island, including the entire populations of 13 of the 15 flora species considered to be critically endangered.

Of the 15 species and subspecies of birds once found only on Norfolk Island, only 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	First plan expires 28 June 2007	
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; and risk assessment and management schedule	
Financial	Operating	$0.948 million
	Capital	$0.108 million
	Revenue	$0.021 million
Visitors	20,000 (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	25 of 81 listed species
Japan–Australia Migratory Birds Agreement	32 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 (*Cyanoramphus novaezelandiae cookii*) 2 awaiting preparation—golden whistler (*Pachycephala pectoralis xanthoprocta*) and scarlet robin (*Petroica multicolor multicolor*). These species will be included in a multi-species recovery plan for the island, expected to be completed in late 2006 1 exempted—Norfolk Island boobook owl (*Ninox novaeseelandiae undulata*)
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 late 2006
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 introductions with potential to impact on listed species include the Asian house gecko (*Hemidactylus frenatus*), Asian paperwasp (*Polistes chinensis)*, Argentine ant (*Linepithema humile*) and purple swamphen (*Porphyrio porphyrio*).

Recovery programmes for the Norfolk Island green parrot and 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 constantly reviewed and monitored to ensure its effectiveness. A technical review by consultants was undertaken this year (see case study on page 99).

Rat populations are being monitored as part of a two-year 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 include:

- increasing community awareness of the potential impacts of invasive species
- finding more efficient and practical ways to meet the requirements of endangered species programmes including through implementation of a multi-species recovery plan
- finding a sustainable balance between managing threatened species and increasing tourism demands
- meeting increasing demand for visitor infrastructure.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Fauna and flora pest species management
- Endangered species management
- Inadequate knowledge on which to base management decisions

Actions

- Implement Norfolk Island Weed Control Strategy
- Implement identified recovery actions for endangered species
- Continue vertebrate pest species programmes
- Document and record existing knowledge

Performance results 2005–06

- Completed 12 coups identified in rehabilitation strategy
- Ten green parrot chicks banded and fledged
- Cleared and maintained approximately 43 hectares of weed-infested areas
- Expanded feral cat control programme (36 trapped) with community education and cat desexing a priority
- Continued two-year trial of alternative rat control methodology
- Expanded spatial information systems' capacity and staff skills to enable more accurate and effective recording
- Progressed development of the multi-species recovery plan, which will produce valuable knowledge on these little-known species

KRA4: Visitor management and reserve use

Major issues

- Duncombe Bay road to Cook's monument is closed after heavy rain
- Increasing infrastructure expectations from visitors
- Some access tracks are not suitable for current visitor use
- Lack of high quality interpretive signs and pamphlets

Actions

- Fund and manage drainage and surface renewal of Duncombe Bay road
- Strategically review current access tracks, focusing on high visitation areas

- Establish requirements and allocate resources within existing priorities

Performance results 2005–06

- Resurfaced Duncombe Bay road and began road drainage plan
- Completed the botanic garden boardwalk upgrade stage 5
- Installed handrails on sections of Bridle Track and resurfaced two erosion-prone corners on the track to provide safer footing for walkers
- Completed design works for botanic garden interpretive display
- Refreshed and replaced signs and installed three new park entrance signs

KRA5: Stakeholders and partnerships

Major issues

- Need to work with tourism operators, environmentalists, concerned citizens and professional and amateur researchers

Actions

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

Performance results 2005–06

- Through networking and regular contact, maintained professional and cordial relationships with the following stakeholders and partners: Department of the Environment and Heritage 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 permit system for a wide range of 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*
- Provided an on-island departmental presence primarily as a referral point for wider environmental and heritage issues

- Facilitated information and resource sharing, for example satellite imagery. The park assisted with provision of training courses to the community, including courses on use and handling of chemicals and on GPS/GIS.
- In conjunction with Volante, the Department of the Environment and Heritage information and communication technology provider, excess computers were donated to the school and Norfolk Island administration
- Held a tour operators workshop with 30 participants

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 2005–06

- Three staff completed development in finance-related tasks
- All activities completed within budget and according to Chief Executive Officer's instructions
- Operational and capital budgets within allowed parameters

Norfolk Island forest rehabilitation strategy

The sub-tropical forest of Norfolk Island is host to a range of native and endemic species

A long-term forest rehabilitation strategy in Norfolk Island National Park has been developed to maintain and increase forest health.

The 10-year strategy is a deliberate change of direction in the way that natural resource management in the park is approached. Two years into the strategy, benefits are already being realised with areas treated at the start of the strategy showing marked improvement in forest health.

The strategy separately addresses Norfolk Island (Mount Pitt), the botanic garden, and Phillip Island. The strategy will improve the overall health and integrity of forest areas and enhance the survival, protection and rehabilitation of native and endemic species.

The strategy follows the forest rehabilitation model set out in the 1997 report *Consultancy to Establish a Weed Control Strategy for the Preservation and Protection of the Endangered Plants of Norfolk Island*. It also draws on earlier flora studies, studies of fungi, mosses, lichens, insects, macropods, and reptiles, current field based analysis and the Norfolk Island Weeds Management Manual.

The Mount Pitt sector of the park has been divided into 19 'working coups' based around geographic features. Each coup is referenced to the established rat bait station network. The targets, objectives, and priorities for work in each coup are refreshed regularly and each coup's individual work plan discussed on site in detail with the chief ranger and weeding contractors.

The strategy combines:

- broad-scale weed control
- targeted weed control around specific trees or plant communities
- targeting individual weed species at certain times of the year

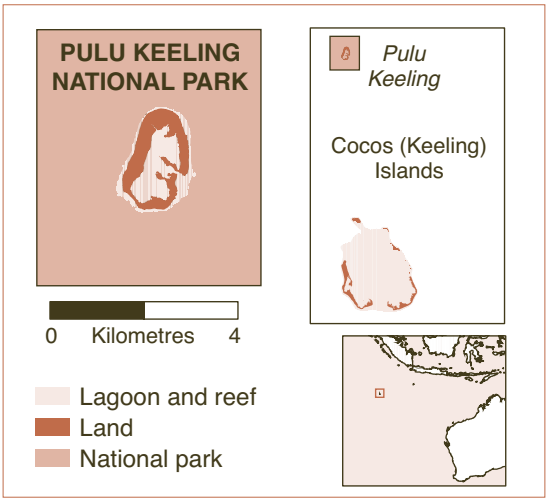
- chipping woody weeds to provide mulch and ground cover for disturbed areas
- planting to reflect natural forest regenerative processes and types and to re-establish endangered and vulnerable communities and species.

Attention is given to at least one coup every month. Each coup has its own priorities identified in the 1997 report and reviewed a month before work begins. At the end of two years, every coup in the park has received a minimum of 400 hours dedicated attention during at least one month in the preceding two-year cycle. Work is documented and regularly reviewed. The first two-year cycle of the 19 coups in the Mount Pitt sector has just been completed.

Over the 10 years of the strategy each coup will be allocated in excess of 2,000 hours work, with the higher priority communities and species receiving attention first.

Pulu Keeling National Park

http://www.deh.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 implementation schedule; and risk assessment and management schedule

Financial	Operating	$0.813 million
	Capital	$0.078 million
	Revenue	$0.072 million
Visitors	120	
Permits	3 commercial tour operators (1 each for diving, surfing and terrestrial tours) 26 marine access permits	

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 (*Balaenoptera musculus*); sei whale (*Balaenoptera borealis*); Round Island petrel (*Pterodroma arminjoniana*) and marine turtles
Listed flora	Species	None
Heritage	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 other persons 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.

Surveys of the Cocos buff-banded rail resumed in 2004 as the forest had recovered sufficiently from the effects of Cyclone Walter in April 2001 to enable the birds to be counted. The population is now estimated to be 1,000, which is an increase from the estimate of 850 birds in 1999.

The seventh year of the sea turtle monitoring programme was completed, with an additional 242 turtles caught and measured (122 green turtles and 120 hawksbill turtles). In 2006, additional Natural Heritage Trust funding enabled six nesting turtles caught in Pulu Keeling National Park to have satellite trackers attached and their movements monitored. All six turtles returned to the main foraging areas at the southern atoll, which means at least some of the turtles breeding on Cocos also spend the majority of their lives in Cocos waters. This will help to ensure the continuation of this population.

Future challenges

Major challenges are to prevent the introduction of pests and diseases to the park, and to maintain compliance and enforcement efforts to stop seabird poaching. Island fauna is especially vulnerable to the introduction of exotic species. Outbreaks of scale insects and die-back (*Phytophthera* spp.) on nearby Christmas Island and in Western Australia may pose a threat to Pulu Keeling National Park.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Illegal entry to park
- Illegal wildlife harvesting
- Monitoring red-footed boobies

Actions

- Maintain surveillance, boat patrols and education
- Survey bird numbers regularly

Performance results 2005–06

- Progressed installation of remote surveillance equipment to provide more effective detection of illegal park entry and poaching
- Spent 230 staff days on patrols during the year. Patrols are believed to be effective at deterring poaching
- Patrols detected a number of incidents. Seven people were charged with wildlife or firearms offences
- Continued bird surveys. The surveys were halved from the previous year due to difficulty visiting the park because of inclement weather conditions, limited availability of the ocean going vessel and funding constraints

KRA2: Cultural heritage management

Major issues

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

Actions

- Ensure access to sites is managed appropriately

Performance results 2005–06

- Effectively managed cultural heritage sites
- Cleaned grave sites
- Prepared new beach sign for the *Emden* wreck

KRA4: Visitor management and reserve use

Major issues

- Potential for introduction of exotic species by park visitors

Actions

- Implement quarantine procedures
- Prevent introduction of alien species

Performance results 2005–06

- 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 perceived lack of obvious benefits to the community

Actions

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

Performance results 2005–06

- Organised a Steps to Sustainable Tourism workshop to develop an action plan for the islands
- Held 10th anniversary celebrations. A documentary on the park's first 10 years was produced and shown locally

KRA6: Business management

Major issues

- Isolation restricts training opportunities
- Budget constraints restrict operations

Actions

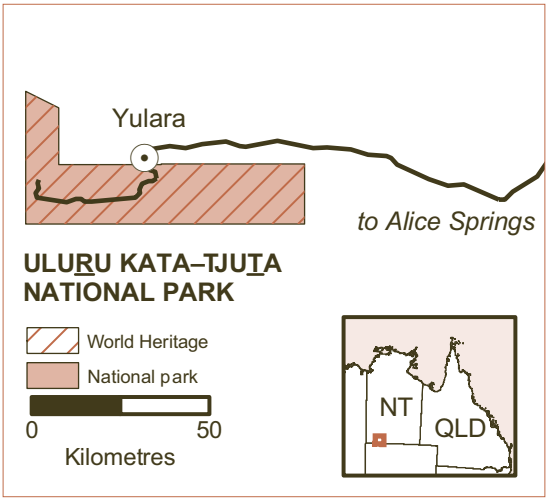
- Train staff more effectively
- Make best use of staff visits to the park within budget constraints

Performance results 2005–06

- Staff benefited from locally provided training in emergency management, marine search and rescue, and radio operations. The senior ranger is enrolled in a lands, parks and wildlife correspondence course

Uluṟu–Kata Tjuṯa National Park

http://www.deh.gov.au/parks/uluru



Special features

Uluṟu–Kata Tjuṯa 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 *Aṉangu* (western desert Aboriginal) owners, the iconic rock outcrops of Uluṟu and Kata Tjuṯa, outstanding examples of arid zone flora and fauna, and outstanding scenic beauty.

Uluṟu–Kata Tjuṯa National Park is a place of great spiritual and cultural importance to *Aṉangu* men and women. For countless generations this ancient landscape has developed as a result of the activities of *Aṉangu* 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 *Aṉangu* 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 expires 28 June 2007
Other significant management documents	Lease between the Uluṟu–Kata Tjuṯa Aboriginal Land Trust and the Director of National Parks; visitor infrastructure master plan; staff development plan; species reintroduction plan; invasive flora control plan; invasive fauna control plan; fire management procedures; cultural heritage action plan; the lease; interpretation plan; management plan implementation schedule; and risk assessment and management schedule

Financial	Operating	$9.921 million
	Capital	$5.285 million
	Revenue	$8.045 million
	Paid to traditional owners	$1.896 million
Visitors	351,968 adult paying visitors	
Permits	216 film/photography; 110 tour operators; 9 research	
Visitor satisfaction	The levels of visitor satisfaction in previous years were provided by Tourism NT. No surveys were undertaken in 2005–06. A new destination visitor survey will be implemented in 2006–07	

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	4 being implemented—mala or rufous hare wallaby (*Lagorchestes hirsutus*); golden bandicoot (*Isoodon auratus*); Alice Springs mouse (*Pseudomys fieldi*); tjakura or great desert skink (*Egernia kintorei*) 9 in preparation—mulgara (*Dasycercus cristicauda*); bilby (*Macrotis lagotis*); southern marsupial mole (*Notoryctes typhlops*); red-tailed phascogale (*Phascogale calura*); sandhill dunnart (*Sminthopsis psammophila*); numbat (*Myrmecobius fasciatus*); black-flanked rock-wallaby (*Petrogale lateralis*); chuditch (*Dasyurus geoffroii*); central rock-rat (*Zyzomys pedunculatus*)
Listed flora	None	
Heritage	On Commonwealth Heritage List	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Amphibians	Plants
21 (14)	170 (2)	73 (3)	None	1 (1)	>400

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

Board of management

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

Monitoring

Surveys for threatened species such as tjakuṟa (*Egernia kintorei*) and mulgara (*Dasycercus cristicauda*) took place.

The annual monitoring of the park's tjakuṟa population took place in March. As with the previous year, a significant increase in the size of the population was detected; the total number of active burrows rose from 67 in 2005 to 91 this year. Thirty-one of the 67 active burrows recorded last year contained juveniles. This year 52 of the 91 active burrows contained juveniles. This is the highest proportion of breeding burrows to active burrows that has been recorded since monitoring began in 1998. This improved breeding success reflected the general widespread movement of tjakuṟa into the habitat burned in 2002 combined with an apparently diminished predator load.

The seventh round of annual mulgara monitoring was undertaken during early November 2005. When mulgara monitoring began in 1999 all of the sites were on the bore field area west of the park entry station. Last year trapping was undertaken at eight sites on the bore field and two sites nearer the entry station. Due to the currently small areas of mature spinifex in the bore field area and the detection of mulgara signs in other areas in March 2005 several sites this year were chosen away from the bore field.

For the first time in four years mulgara were captured during the monitoring period. The mulgara population in the park had crashed during 2002. This is typical of the boom and bust cycles of arid Australia where occasional wet years punctuate the normally dry conditions. The mulgara population may remain at a low level until additional habitable vegetation structure develops or significant rainfall events produce greater resources, or both. The very small areas of suitable mulgara habitat

(mature spinifex) on the bore field and near the entry station need to be protected from fire for at least the next several years.

The first census of mala or rufous hare-wallaby (*Lagorchestes hirsutus*) in the park's endangered species enclosure took place in March 2006. Sixteen of the original 24 animals were captured. Females had pouch young and a number of new juveniles were spotted through binoculars. Twelve permanent survey quadrats were established inside the enclosure to monitor the impact of mala on the vegetation. Discussions are taking place regarding the possible reintroduction of burrowing bettong (*Bettongia lesueur*) into the enclosure.

Regular monitoring programmes included ongoing assessment of the condition of rock art, monitoring rock movement above the Mutitjulu art site, monitoring threatened species, and monitoring weed infestations.

Future challenges

A major challenge for 2006–07 is development of the new sunrise viewing area to cater for existing tourists and the predicted increase in tourist numbers. The current sunrise area may have over 400 visitors in the busy winter months with over 70 vehicles including buses. It is a small area and traffic control is a major concern. The new site has been identified by traditional owners and there is an ongoing consultation process with the tourism industry. Surveys were conducted and traditional owners were involved in development of the concept plans.

Another challenge is the second stage of the Kata Tjuta Valley of the Winds walking track upgrade and re-alignment of the Uluru base walk northern section to take it further away from culturally sensitive sites. These walking track projects will give a safer visitor experience and satisfy concerns expressed by the traditional owners.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Weed management, particularly buffel grass (*Cenchrus ciliaris*)
- Vertebrate pest management (foxes, cats, camels, rabbits, feral dogs)
- Fire management
- Threatened species management
- Species reintroductions
- Erosion control

Actions

- Continue the buffel grass control programme
- Introduce a fox control programme in threatened species habitat
- Continue to develop and implement annual burn plans
- Develop a fire strategy
- Undertake erosion control
- Monitor threatened species
- Establish endangered species programme
- Establish a nursery
- Improve data management

Performance results 2005–06

- Progressed the development of a fire management plan
- Developed and implemented annual burn plans
- Conducted annual monitoring of threatened species mulgara and great desert skink (*Egernia kintorei*)
- Built a 150 hectare vertebrate pest proof enclosure for mala and translocated 24 animals from the Kings Canyon enclosure
- Undertook the first population census of mala in the Uluṟu enclosure and conducted a survey to monitor impacts/changes to vegetation in the enclosure
- Removed approximately 10 hectares of buffel grass, treated 10 hectares and conducted follow up work on five hectares
- Treated new weed infestations of Mexican poppy (*Argemone mexicana*) before they became established throughout the park
- Refined the park vertebrate pest monitoring methodology
- Consulted with Voyages Pty Ltd, traditional owners and NT Parks and Wildlife Service on the development of a fox baiting programme in core threatened species habitat
- Completed environmental impact assessments for all proposed infrastructure projects
- Completed erosion control work/restoration in the Mutitjulu Waterhole area
- Staff attended regional land management workshops
- Built a plant nursery

KRA2: Cultural heritage management

Major issues

- Supporting the continuation of culture and knowledge
- Protecting cultural information, sites and objects

Actions

- Review the Cultural Heritage Management Action Plan
- Ensure that the Cultural Sites Management System is operational
- Conduct regular cultural site and rock art inspections
- Continue the oral history programme

Performance results 2005–06

- Reviewed the Cultural Heritage Management Action Plan (2002)
- Produced the Women's Cultural Heritage Action Plan (2005)
- Launched the Cultural Sites Management System and made improvements
- Produced a Cultural Sites Management Manual
- Provided training for staff and traditional owners in cultural site management and rock art conservation techniques
- Undertook regular rock art inspections and maintenance
- Continued the oral history programme, including maintenance of and access to the Ara Irititja programme, a multimedia database and an associated project that enables *Anangu* to access archival material (film, photographs, sound recordings, documents, artefacts)
- Supported staff and traditional owners' attendance at women's law and culture meetings
- Ensured that archeological survey was a component of environmental impact assessments for infrastructure developments
- Supported research into topics relevant to cultural heritage management

KRA3: Joint management

Major issues

- Outcomes of the Office of Joint Management review
- Ensuring traditional owners are appropriately involved in project design and implementation, and in the delivery of core functions
- Supporting the training and development of Indigenous staff
- Developing key indicators for joint management

Actions

- Implement recommendations of Office of Joint Management review regarding the Joint Management Partnership Team
- Work with Joint Management Partnership members in developing productive working relationships and better communication between agencies
- Put in place effective board of management secretariat
- Hold training programmes to facilitate community involvement
- Provide advice and input into the new management plan 2007–2014

Performance results 2005–06

- The Office of Joint Management was reviewed and as a result the new Joint Management Partnership Team was established in early 2006. Team members are the joint management officer (Central Land Council), community liaison officer (Mutitjulu Aboriginal), board secretary and park manager. The team met each fortnight to discuss park, community and traditional owner issues
- The Joint Management Partnership Team provided advice to the board of management on park, community and traditional owner issues quarterly
- The Joint Management Partnership Team worked to resolve and provide advice on numerous contentious issues regarding film and photography, the Uluru climb, new sunrise viewing area project, public events and community issues

KRA4: Visitor management and reserve use

Major issues

- Planning for future increase in visitor numbers
- Pressures on ageing infrastructure to effectively manage increasing visitor numbers
- Some infrastructure in need of repairs and/or replacement
- Lack of a safe sunrise viewing area for visitors

Actions

- Continue to refine traffic asset management system and pedestrian counters
- Continue upgrade of the Valley of the Winds walking track
- Continue developing interpretive signs and track markers for Uluru base walk
- Progress new sunrise viewing area
- Continue effective and strategic infrastructure planning and maintenance
- Train tour operators

Performance results 2005–06

- Progressed the new sunrise area. The site was identified and environmental impact assessment completed
- Completed toilets for the Uluṟu base walk
- Completed track reconstruction to the first lookout at the Valley of the Winds with field crew of *Aṉangu* and *Piṟanpa* (see case study on page 117)
- Upgraded cultural centre projection system in Tjukurpa Tunnel
- Undertook sign replacement and upgrade along Mala Walk and at Muṯitjulu Waterhole
- Progressed online tour guide training programme
- Installed an additional emergency call device along Kuniya Walk
- Reformatted and produced new visitor guide
- Produced media briefing DVD for visiting media
- Undertook ongoing maintenance of park infrastructure under a scheduled works programme
- Held two tour operator workshops
- Completed work on extending parking space at the sunset viewing area

KRA5: Stakeholders and partnerships

Major issues

- Developing and maintaining effective relationships with key stakeholders and partners
- Ongoing consultation with the tourism industry regarding the new sunrise viewing area
- Maintaining an effective working relationship with Muṯitjulu Community Aboriginal Corporation

Actions

- Hold regular meetings of committees, including the Uluṟu–Kata Tjuṯa Tourism Consultative Committee, the Cultural Heritage and Scientific Consultative Committee and the Film and Photography Consultative Committee
- Communicate clearly with all parties
- Meet regularly with Muṯitjulu Council and Ayers Rock Resort
- Continue supporting volunteer and community groups in the protection of park values
- Engage *Aṉangu* on park projects through the Memorandum of Understanding with the Muṯitjulu Council

Performance results 2005–06

- Established the Cultural Heritage and Scientific Consultative Committee
- Revised the commercial film and photography guidelines and streamlined the application process
- Held quarterly meetings of the Tourism Consultative Committee and the Film and Photography Consultative Committee
- Continued ongoing contact between the park management team, the Joint Management Partnership Team and traditional owners during the design and implementation of core programmes, such as fire and pest species management
- Responded within one month to requests for information
- Held regular consultation with tourism representatives on new sunrise viewing area
- Hosted nine Conservation Volunteers Australia groups representing 4,400 hours of effort towards weed work
- Organised Friends of the Park Group. Group provided 300 hours of assistance over six crews
- Green Corps project undertook 700 hours of work in many different areas such as weed eradication, track work and general natural resource management
- Attended Mutitjulu Council meetings each month
- Engaged more than 40 *Anangu* on park projects through the Memorandum of Understanding with the Mutitjulu Council

KRA6: Business management

Major issues

- Providing essential services to the Mutitjulu community is consuming an ever-increasing proportion of the park budget
- Shortage of staff housing
- Charging for power at the Mutitjulu community and for both private residences and business enterprises at the cultural centre
- Need to improve corporate governance procedures
- Failure to meet revenue targets
- No period contracts in place since 2003 for essential services
- Need to prioritise recruitment actions to take account of staff housing constraints
- Preparation of new management plan

Actions

- Introduce new arrangements to improve budget management
- Ensure that park housing committee is functional and meets on monthly basis
- Implement power charges
- Board of management to approve an entry ticket system review for 2006–07
- Develop training plan
- Engage consultant to develop new period contracts
- Establish planning team to prepare new management plan

Performance results 2005–06

- Implemented 'user pays' electricity system for park staff August 2005 and the Mutitjulu community 1 January 2006
- Implemented relevant recruitment training. Engaged training manager
- Board of management gave approval to engage consultant to review park entry ticketing system
- Engaged engineering consultant to develop new period contracts
- Received four submissions in response to an invitation for input into the new management plan

KRA7: Biodiversity knowledge management

Major issues

- Data, information and knowledge management
- Increasing research on park management issues

Actions

- Maintain herbarium specimens
- Coordinate research under park's 'permit to undertake scientific research' system

Performance results 2005–06

- Collated flora and fauna survey reports from 1987–2005
- Replaced herbarium plant specimens in poor condition
- Supported research in the park—fire and the bird assemblage in the mulga community; analysis of Uluru fauna monitoring data; home range, habitat use and thermal ecology of mulgara

- Purchased GPS/GIS (global positioning system/geographic information system) equipment and software designed to streamline data collection and management
- Prepared great desert skink monitoring data from 1998–2006 for entry into the park's GIS
- Provided GIS training to staff and developed a GPS in-house training package

Valley of the Winds walking track upgrade project

Construction of the hardened surface along the Valley of the Winds track

Trips and falls made up the second highest percentage of all safety incidents at Kata Tjuṯa from 2002 to 2006. Reconstruction of the Valley of the Winds walking track, begun in 2005, aims to reduce this figure. The last major track upgrade was carried out in 1995 and in recent years the condition of the track has deteriorated with major erosion issues.

Reconstruction from the car park to the first lookout (Karu Lookout) took place from April to December 2005, bringing this section of the track up to the desired Australian Standards Class 2 requirements.

The work included completing 144 metres of hardened surface (natural rock in concrete), removing boulders (trip hazards) from 850 metres of track, widening 500 metres of track to two metres and building a six metre long bridge.

As well as providing safe visitor access at a standard appropriate to a World Heritage property, the upgraded track protects *Tjukurpa* (traditional law and culture) and flora and fauna and improves access for emergency personnel. The upgrade addresses provisions made in the Uluṟu–Kata Tjuṯa National Park Management Plan, Valley of the Winds Walking Track Report (1996) and the Visitor Infrastructure Master Plan (2000).

Nguraritja (traditional owners) and board of management members were consulted before work began and throughout the project. The Central Land Council and other stakeholders, including the tourism industry through the Tourism Consultative Committee, were kept advised.

The project ran over 34 weeks and cost $174,000. The project created temporary jobs for 21 *Aṉangu* men from the local Muṯitjulu community. Conservation Volunteers Australia crews and Gecko's rehabilitation team from Sydney also made significant contributions to the project.

Stage 2 from Karu Lookout to Karinana Lookout is planned for 2006–07.

Uluṟu risk management and incident analysis

Analysis of the safety incidents recorded in Uluṟu–Kata Tjuṯa National Park from 2002 to 2006 shows where incidents occurred and why.

There are two major hotspots for safety incidents: the Uluṟu climb (25 per cent of incidents) and Kata Tjuṯa (a further 25 per cent).

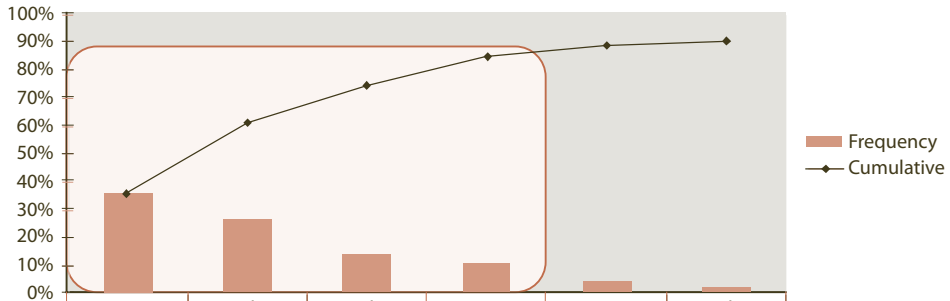
Uluṟu climb

- Uluṟu is as high as a 95 storey building (340 metres) and 97 per cent of safety incidents on the climb involved visitors (61 of 63 incidents). This is a cause of great concern to the traditional owners and park management.
- The majority of incidents on the Uluṟu climb were identified as preventable, involving people undertaking the strenuous climb with a pre-existing medical condition or becoming lost.
- Two per cent of incidents were fatal and 10 per cent required helicopter evacuation. While 41 per cent required hospitalisation or treatment at the Yulara Medical Centre, 75 per cent of victims were treated by park staff as the first, second or final treatment.
- The climb is closed under the Environment Protection and Biodiversity Conservation Regulations 2000 when specified climate thresholds are reached such as high winds, rain, and temperatures above 36°C, and when light is fading. The majority of breaches of the Regulations (88 per cent) on the Uluṟu climb involved entry onto the climb when it was closed or the climbers did not have a park entry ticket. Most illegal climbers were caught before a safety incident occurred, although each case (30) represents another potential safety incident.

Kata Tjuṯa

- There was an average of 17 safety incidents per year at Kata Tjuṯa with 95 per cent involving visitors.
- Only 8 per cent of the safety incidents at Kata Tjuṯa are recorded as being unpreventable, involving medical conditions not associated with the site.
- Four types of safety incidents—heat stress, falls, accidents with vehicles and visitors getting lost—make up 85 per cent of all visitor safety incidents at Kata Tjuṯa. These are preventable, and could potentially be eliminated (see figure 5).
- The collection and analysis of these data is helping direct park resources into the highest priority and most effective areas for improvements in visitor safety. Each safety incident is distressing to those affected, and results in a cost to the park. Better visitor education and awareness about the risks associated with the park will help reduce incidents and improve visitor experiences.

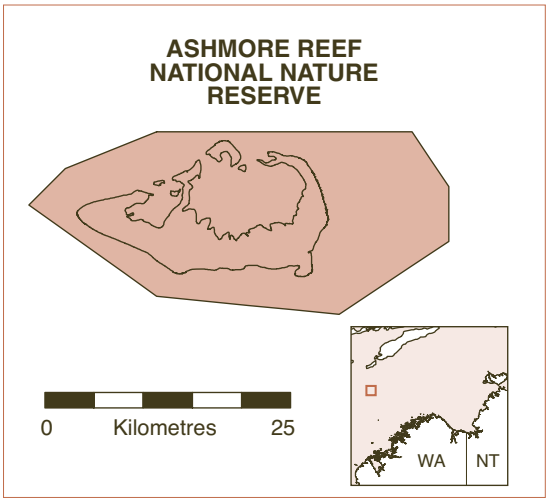
Figure 5: Preventable safety incidents for visitors to Kata Tjuṯa 2002–2006



	Heat stress	Accidents (falls)	Accidents (vehicles)	Lost	No petrol	Cyclist stranded
Frequency	36%	25%	14%	10%	3%	2%
Cumulative	36%	61%	75%	85%	88%	90%

Ashmore Reef National Nature Reserve

http://www.deh.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, 43 of which 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	Interim Marine and Coastal Regionalisation for Australia region: Oceanic Shoals
Management plan	Second plan expires 25 June 2009

Other significant management documents	Memorandum of Understanding with Indonesia; management plan implementation and performance report, incorporating risk assessment; service level agreement with the Australian Customs Service	
Financial	Operating	$552,645*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not known	
Permits	1 commercial tour permit	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

International conventions and agreements	
Wetlands (Ramsar) Convention	The entire reserve is listed
Migratory Species (Bonn) Convention	26 of the 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	Memorandum of Understanding with Indonesia

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 July 2005 and April 2006 to implement and assess reserve management.

Monitoring

A major marine survey was carried out in September 2005. This is part of a twice-yearly monitoring programme (for Ashmore and Cartier) to assess the distribution and abundance of marine invertebrates targeted by Indonesian fishers and the overall health of fish and coral communities. The survey found that target species—trepang and trochus shell—were still in recovery from previous exploitation. The survey also found significant levels of coral bleaching.

Sea snake monitoring by Charles Darwin University indicates a decline in sea snake populations at Ashmore Reef. 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 present, including in comparison with other nearby reefs (Cartier and Hibernia). A follow-up survey is planned for late 2006.

In May 2005 the Northern Territory Herbarium conducted a survey of terrestrial plant pests to guide the weed eradication programme. As a follow-up to this work, departmental staff monitored weed infestations on West Island in April 2006. *Cenchrus* and *Pennisetum* species including buffel grass (*Cenchrus ciliaris*) were found at levels consistent with the 2005 report and were then eradicated using manual control methods. Monitoring and control will continue.

Future challenges

A major challenge is to improve operational arrangements and capacity for compliance and enforcement.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Illegal fishing
- Introduction of pest species
- Decrease in compliance and enforcement coverage

Actions

- Enforce access and fishing restrictions
- Investigate options for improving compliance and enforcement capacity and addressing gaps in coverage
- Cooperate with Indonesian officials to improve management of 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)
- Remove weeds from reserve
- Implement new quarantine, bilge and ballast water protocols

Performance results 2005–06

- The Australian Customs Service provided on-site management at Ashmore Reef
- Customs officers enforced access and fishing restrictions. Fishing vessels in the area were boarded and advised of restrictions. Suspected illegal activities were investigated and warnings issued
- Undertook research on sea snakes, trepang, trochus shell, coral and fish communities. Results showed that fished species—trepang and trochus shell—were still in recovery from previous exploitation and that sea snakes and coral communities had been badly impacted by incidents of sea temperature rise. Fish communities remain healthy
- Progressed work to eradicate five potentially vigorous colonising weeds
- Customs officers implemented new quarantine protocols for vessels with significant hull fouling and/or discharging bilge and ballast water arriving in the reserve. New brochures include information for visitors about the new protocols
- Continued to collect and analyse marine debris

KRA4: Visitor management and park use

Major issues

- Anchor damage

Actions

- Maintain moorings
- Monitor visitation

Performance results 2005–06

- Inspected and maintained moorings (June 2006)
- Australian Customs Service monitored visitors' use of moorings
- Included information about use of the moorings in Ashmore brochure

KRA5: Stakeholders and partnerships

Major issues

- Illegal Indonesian fishing

Actions

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

Performance results 2005–06

- Began the second phase of an alternative livelihood project in Indonesia using AusAID funds. The first phase provided alternative sources of income for traditional fishers who currently target Australian waters. The second phase covers five new villages and is investigating further alternative income sources
- 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 management of contract with management service provider

Actions

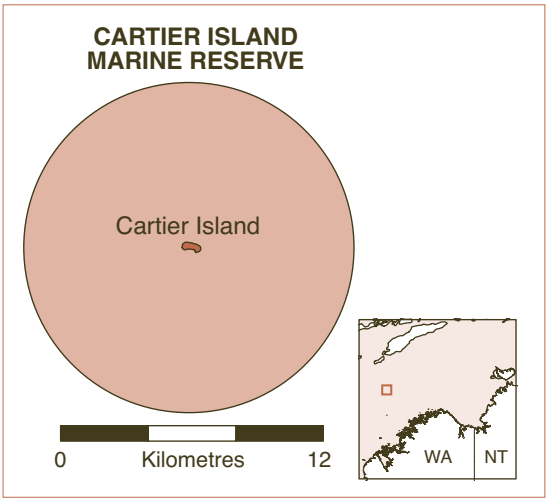
- Manage the service level agreement with the Australian Customs Service

Performance results 2005–06

- Held regular meetings and consultation with the Australian Customs Service
- Provided warden training for Customs officers

Cartier Island Marine Reserve

http://www.deh.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.

Location	Latitude 12°32′ South, Longitude 123°33′ East	
Area	17,237 hectares	
Proclamation date	21 June 2000	
IUCN category	Category Ia	
Biogeographic context	Interim Marine and Coastal Regionalisation for Australia region: Oceanic Shoals	
Management plan	Current plan expires 25 June 2009	
Other significant management documents	Memorandum of Understanding with Indonesia; and management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	$13,241*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not known	
Permits	1 commercial tour (bird watching)	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

International conventions and agreements	
Migratory Species (Bonn) Convention	4 of 98 listed Australian 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

The Australian Customs Service carried out on-site management of the reserve and Coastwatch provided regular flights over Cartier Island. Departmental staff visited the reserve in July 2005 and April 2006 to implement and assess reserve management.

Monitoring

A major marine survey was carried out in September 2005. This was part of a twice-yearly monitoring programme (for Ashmore and Cartier) to assess the distribution and abundance of marine invertebrates targeted by Indonesian fishers and the overall health of fish and coral communities. The survey found that target species—trepang and trochus shell—were still in recovery from previous exploitation.

Future challenges

A major challenge is to improve operational arrangements and capacity for compliance and enforcement.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Illegal access
- Overfishing
- Decrease in compliance and enforcement coverage

Actions

- Enforce fishing restrictions
- Investigate options for improving compliance and enforcement capacity and addressing gaps in coverage
- Cooperate with Indonesian officials to improve management of the MoU Box fishery
- Encourage and facilitate reef research and monitoring

Performance results 2005–06

- The Australian Customs Service provided on-site management at Cartier
- 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
- Undertook research on sea snakes, trepang, trochus shell, coral and fish communities. Results showed that fished species—trepang and trochus shell—were still in recovery from previous exploitation and that sea snakes and coral communities had been badly impacted by incidents of sea temperature rise. Fish communities remain healthy
- Continued to collect and analyse marine debris

KRA4: Visitor management and park use

Major issues

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

Actions

- Enforce the closure of the reserve

Performance results 2005–06

- Coastwatch and the Australian Customs Service undertook regular patrols. Vessels in the area were boarded and advised of closure restrictions

KRA5: Stakeholders and partnerships

Major issues

- Illegal Indonesian fishing

Actions

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

Performance results 2005–06

- Began the second phase of an alternative livelihood project in Indonesia using AusAID funds. The first phase provided alternative sources of income for traditional fishers who currently target Australian waters. The second phase covers five new villages and is investigating further alternative income sources
- 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 management of contract with management service provider

Actions

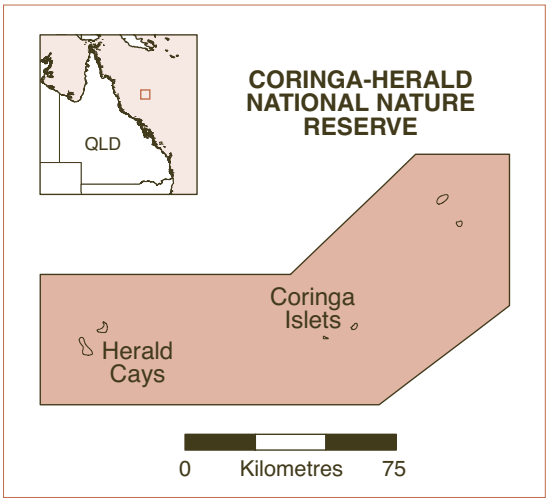
- Manage the service level agreement with the Australian Customs Service

Performance results 2005–06

- Held regular meetings and consultation with the Australian Customs Service
- Provided warden training for Customs officers

Coringa–Herald National Nature Reserve

http://www.deh.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	Tropical waters of the Coral Sea Islands Territory	
Management plan	Second plan expires 4 September 2008	
Other significant management documents	Management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	$98,692*
	Capital	Not applicable
	Revenue	Not applicable

Visitors	No visitor days recorded from commercial tours; 1 visitor day recorded by a private vessel; 17 visitor days recorded by departmental staff, volunteers and contracted researchers on 2 visits
Permits	3 commercial tour permits, 1 research permit

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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 (*Carcharodon carcharias*)
Listed flora	None	

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

Management arrangements

Coastwatch provided aerial surveillance including photographs of *Pisonia* forests to gauge defoliation by insect pest species.

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.

Monitoring

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

monitoring programme should be enhanced upon implementation of outcomes from a review of seabird monitoring programmes across the northern marine protected area estate completed in June 2006.

Monitoring of insect pests, such as scale insects, continued leading to targeted release of beneficial insects. To date this 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.

Sea turtle monitoring was not undertaken during 2005–06. It is awaiting the implementation of outcomes from the review of sea turtle monitoring programmes described above that was completed in June 2006.

Future challenges

Major conservation challenges are to maintain the health of the *Pisonia* forest ecosystem including controlling pest insects; and ensure outcomes from the current reviews into seabird and sea turtle monitoring programmes are implemented. Ensuring the occupational health and safety of personnel continues to be effectively addressed through rigorous safety analysis, including the implementation of 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 on the *Pisonia* forest ecosystem (loss of critical habitat through deforestation)
- Impact of coral bleaching on the marine ecosystem

Actions

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

Performance results 2005–06

- No sign was detected of further deforestation of *Pisonia* by insect pests. Departmental staff visited the reserve twice to monitor defoliation. Beneficial insects were released and additional pest insect species identified
- The Australian Institute of Marine Science did a brief assessment of coral reef health, with continued low percentage of live coral cover reported. On the

institute's recommendation, two more sea temperature data loggers were installed within the reserve at South-West Herald Cay and two outside the reserve at nearby Willis Islet. They provide enhanced capacity to monitor variations in sea temperature

KRA4: Visitor management and park use

Major issues

- Introduction of pest species by visitors to the reserve

Actions

- Revise information brochure

Performance results 2005–06

- Distributed the revised information brochure to key stakeholders and posted it on the Department of the Environment and Heritage website. The brochure includes details of 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
- Prepare and distribute reserve information brochure

Performance results 2005–06

- Liaised with Coastwatch, Bureau of Meteorology, Department of Defence, Department of Transport and Regional Services, relevant researchers and tour operators
- Organised meetings with partners to discuss key issues and conducted presentations on marine protected area operations and management prescriptions
- Distributed revised reserve information brochure to key stakeholders and posted it on Department of the Environment and Heritage website

KRA6: Business management

Major issues

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

Actions

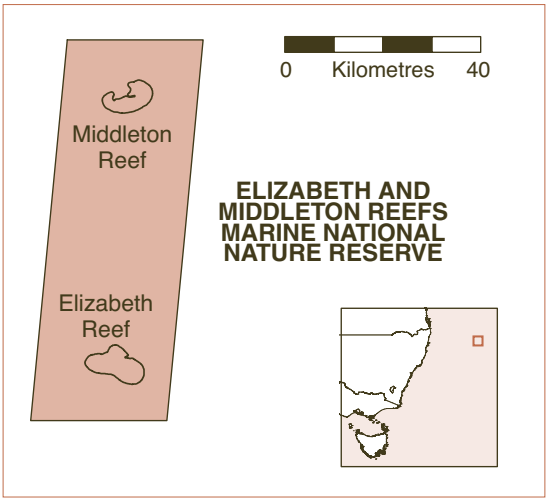
- Continue to refine and implement activity control measures as identified through the Activity Safety Analysis

Performance results 2005–06

- Conducted a detailed Activity Safety Analysis before each trip to the reserve. Risk control measures identified and contingency and communication plans developed during this process were successfully implemented

Elizabeth and Middleton Reefs Marine National Nature Reserve

http://www.deh.gov.au/coasts/mpa/elizabeth



Special features

Elizabeth and Middleton Reefs Marine National Nature Reserve is located 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 daemelii*) 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 (*Turisops truncates*) and short-finned pilot whales (*Globecephala 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	Offshore warm temperate waters in the south of the Coral Sea Islands Territory
Management plan	Second plan came into effect 23 March 2006, expires 22 March 2013

Other significant management documents	Management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	$61,842*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not recorded, numbers low	
Permits	0	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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 (*Carcharodon carcharias*); marine turtles
Listed flora	None	

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
6	31	2	407	558	1

Management arrangements

Coastwatch surveillance flights were undertaken and a departmental officer accompanied the James Cook University team on their survey of the reefs.

The second management plan for the reserve came into effect. A brochure was published highlighting what is allowed in the reserve and the conditions attached to permits to enter Elizabeth Reef.

Monitoring

The Australian Institute of Marine Science monitored reserve health at Elizabeth Reef in December 2003. The reserve was found to be generally in good health with no bleaching and very little evidence of crown of thorns starfish activity.

The number of black cod has remained stable since the last survey in 1987. High numbers of Galapagos sharks (*Carcharhinus galapagensis*) were observed during the most recent survey in 2006, which suggests that the area is an important nursery for this species.

Researchers from James Cook University surveyed Elizabeth and Middleton Reefs in February 2006. Their report is pending. Data loggers were installed to record water temperature to monitor the effects of temperature on the reefs. Black cod biopsies were collected for a genetic population assessment of the species.

Future challenges

Major challenges are implementing biological monitoring and monitoring for possible illegal activities in the area.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Possible illegal fishing
- Monitoring reef health

Actions

- Enforce fishing restrictions
- Implement management plan prescriptions
- Produce brochure including fishing restrictions
- Plan a reef biological monitoring programme

Performance results 2005–06

- Finalised the second management plan for the reserve
- Produced a brochure to accompany the plan
- Coastwatch flights detected no illegal fishing
- Researchers from James Cook University conducted a survey of Middleton and Elizabeth Reefs

- Collected black cod biopsies for genetic analysis (for comparison with mainland samples)
- Installed temperature data loggers (to record water temperature)
- Patrolled Middleton and Elizabeth Reefs in February 2006

KRA2: Cultural heritage management

Major issues

- Possible interference with shipwrecks

Actions

- Enforce protection of shipwrecks
- Implement management plan prescriptions

Performance results 2005–06

- Released management plan and brochure
- Coastwatch flights and occasional patrols detected no interference with shipwrecks
- Patrolled Middleton and Elizabeth Reefs in February 2006

KRA5: Stakeholders and partnerships

Major issues

- Need to continue good relationships with Coastwatch and researchers

Actions

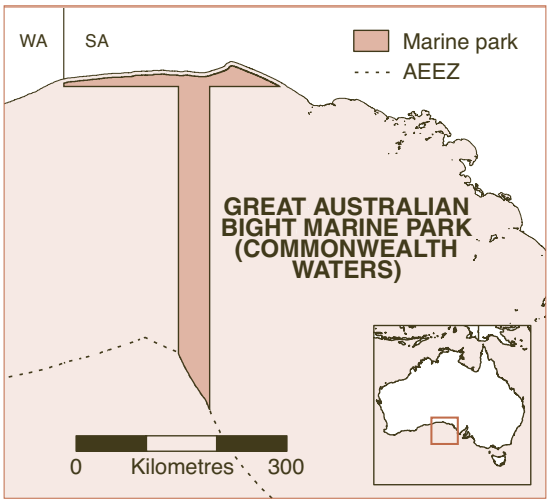
- Ensure relationships with partners are productive

Performance results 2005–06

- Liaised with Coastwatch, relevant scientists and tour operators
- Held public consultation on the draft management plan. Comments received informed the final management plan

Great Australian Bight Marine Park (Commonwealth Waters)

http://www.deh.gov.au/coasts/mpa/gab



Special features

The Great Australian Bight Marine Park (Commonwealth Waters) extends South Australia's protection of habitat for marine mammals to Commonwealth waters adjacent to the state 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 comprising: Marine Mammal Protection Zone Category VI (387,500 hectares) Benthic Protection Zone Category VI (1,608,500 hectares) (Area of overlap of these two zones = 56,000 hectares)

Biogeographic context	Interim Marine and Coastal Regionalisation for Australia regions: Eucla Bioregion (IMCRA 3.3 mesoscale regionalisation) Great Australian Bight biotone and associated continental slope (IMCRA 3.3 demersal provinces and biotones) Southern Pelagic Province (IMCRA 3.3 pelagic provinces and biotones)	
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; and management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	$97,985*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	None recorded	
Permits	30 commercial fishing	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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 (*Eubalaena australis*); great white shark (*Carcharodon carcharias*); marine turtles; albatross (*Diomeda* spp. and *Thalassarche* spp.) and giant petrels (*Macronectes* spp.) 1 in preparation—Australian sea-lion (*Neophoca cinerea*)
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.

The second management plan for the park came into effect on 17 May 2005 and covers a period of seven years.

Monitoring

A survey of the Benthic Protection Zone is planned for late 2006. This will enable comparisons of the numbers and range of benthic (seabed) species with data from the 2002 survey. It will contribute to a 20-year performance assessment programme for the zone.

Information from the 2002 seabed survey is being used to produce interpretive material 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 importance of the benthic communities and foster an understanding of the importance of the park 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 8 per cent per annum. Data collected over 15 years have provided a catalogue of identified whales numbering more than 550 individuals. Ongoing studies of the ecology and behaviour of southern right whales are being conducted at the Head of Bight.

Bight coastline surveys of the Australian sea-lion have revealed 10 breeding sites and 14 haul-out sites. Due to the inaccessibility of the coastline the total population is not known. Australian sea-lion studies funded in 2005–06 were:

- using satellite trackers to study foraging range and behaviour to understand where and when these animals feed (see case study on page 144)
- researching interactions with fishing vessels to assess the impact of vessel activity on behaviour and population.

Future challenges

Major challenges are developing a research programme to assess the marine park's performance; increasing the effectiveness of compliance strategies, including improving the fishing industry's compliance reporting; and implementing the new management plan.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Lack of baseline information
- Lack of information on distribution and abundance of southern right whales (*Eubalaena australis*) and Australian sea-lions (*Neophoca cinerea*)
- Lack of information on effects of human interactions with Australian sea-lion populations

Actions

- Establish initial baselines
- Develop a research plan to monitor the impact of known pressures on park values and their vulnerability to use e.g. the impact of marine debris and other identified risks

Performance results 2005–06 (in cooperation with South Australian Government)

- Initiated second round of 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
- Strategic research and monitoring plan for temperate marine protected areas is in final stages of preparation

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 2005–06 (in cooperation with South Australian Government)

- Advertised annual closures
- Undertook land, sea and aerial surveillance patrols. No illegal activity recorded
- Contributed to review of compliance and enforcement procedures
- Issued permits for commercial fishers
- Yalata community provided surveillance and undertook beach clean-ups

KRA5: Stakeholders and partnerships

Major issues

- Maintain productive relationships with partners

Actions

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

Performance results 2005–06 (in cooperation with South Australian Government)

- Renewed annual business agreement covering research, visitor management, education, and compliance and enforcement
- Continued to make approaches to Australian Fisheries Management Authority and industry sectors about monitoring compliance
- Liaised with stakeholders from all sectors through steering committee and consultative committee

KRA6: Business management

Major issues

- Community understanding and appreciation of park's values

Actions

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

Performance results 2005–06 (in cooperation with South Australian Government)

- Developed draft communications plan
- Informed the media about park activities
- Began work on Benthic Protection Zone interpretation brochure
- Made management plan and information on park values and uses available to general public

Satellite tracking Australian sea-lions in the Great Australian Bight

An Australian sea-lion equipped with a satellite tracker below Bunda Cliffs

The Australian sea-lion (*Neophoca cinerea*) is Australia's only endemic sea lion and exhibits unique reproductive behaviour. It breeds every 17.5 months, rather than the usual 12 months for most seal and sea lion species, and females may nurse pups for up to 18 months. The species also has an asynchronous breeding cycle, meaning that different colonies breed at different times of the year.

The Great Australian Bight Marine Park's breeding and haul-out sites, mostly along the base of cliffs on the edge of the park, comprise the majority of sea lion breeding sites on the Australian mainland. The park plays a critical role in protecting breeding and haul-out sites of Australian sea-lions in state waters, and foraging grounds in both state and Commonwealth waters of the park.

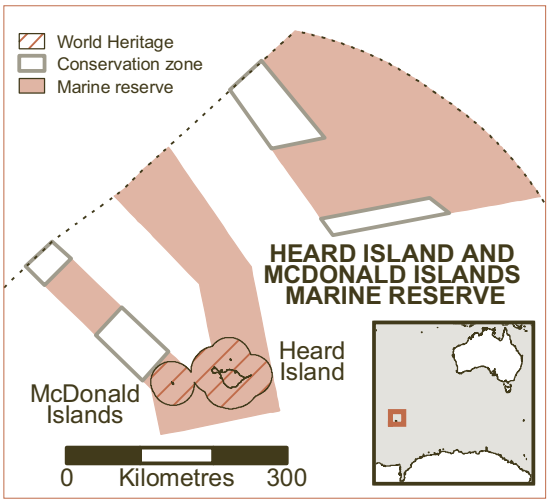
The Department of the Environment and Heritage is working cooperatively with the South Australian Department for Environment and Heritage and South Australian Research and Development Institute to study the foraging range and behaviour of the Australian sea-lion. This will help determine an acceptable level of interaction with industries such as commercial fishing that may pose a risk to sea lions. This project complements a larger scale project being undertaken by the institute to determine sea lion foraging behaviour in other areas of South Australia.

With the assistance of the State Emergency Services Vertical Rescue Unit, researchers rappelled over the 65 metre Bunda Cliffs in early 2006 to deploy satellite trackers on Australian sea-lions. The team successfully deployed five tracking devices on females in the two days available. The trackers record the positions of the animals as they forage for food on the sea floor. Data are transmitted to the satellite system each time the animals break the surface of the water. The trackers, which will fall off with the next moult, cause no harm to the sea lions. The operation was undertaken with animal ethics approval.

Preliminary results have shown the five females foraging in different areas in a south to south-west direction from the colony. The furthest distance travelled by a female has been 180 kilometres into Western Australian waters. One female has remained close to the colony.

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 other subantarctic island, 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 under the *Environment Protection and Biodiversity Conservation Act 1999* 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 Interim Marine and Coastal Regionalisation for Australia region: 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	$200,000[a]
	Capital	Not applicable
	Revenue	Not applicable
Visitors	None[b]	
Permits	None	

(a) No science or management expedition was conducted in 2005–06, which was an 'off year' for triennial visits to the reserve. 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 expeditions or tourist visits to Heard Island were undertaken during 2005–06. Fishing vessels and surveillance vessels may have passed through the marine areas of the reserve.

International conventions and agreements	
World Heritage Convention	Listed under natural criteria (i) and (ii), recognising its outstanding natural values
Wetlands (Ramsar) Convention	Ramsar information sheet prepared for proposed Heard Island and McDonald Islands wetland (comprising the Heard Island and McDonald Islands Territory). Draft information sheet circulated for public comment as part of draft management plan
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[a]	1 endangered 10 vulnerable 14 migratory 51 marine
	Recovery plans	1 being implemented—albatross (*Diomeda* spp. and *Thalassarche* spp.) and giant petrels (*Macronectes* spp.)
Listed flora	None	

(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[a]	47[b]	0	34[c]	169[d]	262[e]

(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. Figure increased from 168 in 2004–05 with the description during the year of 1 new tardigrade

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

Management arrangements

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

The first management plan for the reserve came into effect during the year.

Monitoring

The Australian Antarctic Division mounts Australian Antarctic Programme 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 2005–06 there was no expedition, but analysis of data collected during the 2003–04 expedition continued.

The division completed a comprehensive vegetation map of Heard Island, using field data obtained during expeditions from 1986–87 to 2003–04. This sound baseline will facilitate analysis of future change in vegetation as a result of climate change or other pressures. Satellite images of portions of the island were added, and scientists developed techniques to use such remotely sensed data to detect environmental change.

One new species of tardigrade (*Hypsibius herdensis*) was identified from existing collections. The vascular plant species first recorded during the 2003–04 expedition (*Leptinella plumosa*) was described. This species, together with another 'recent colonist' with restricted distribution (*Ranunculus crassipes*), will provide useful insight into colonisation processes on Heard Island.

The division completed analysis of benthic samples previously 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.

Analysis of data collected in 2003–04 provided for comparison of the foraging strategies and behaviours of king penguin (*Aptenodytes patagonicus*) populations at Heard Island and Macquarie Island. This work can enhance understanding of how the natural surroundings of animals influence their behaviours and may contribute to future assessment of the adequacy of the reserve design.

A draft Research and Monitoring Strategy for Australia's Subantarctic Marine Protected Areas was prepared. Once completed, the strategy will be implemented to provide information on ecosystem health and management of the reserve.

Future challenges

The management situation for the reserve has not varied substantially since 2004–05. Key future challenges include:

- 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
- Undertake research and monitoring that facilitate performance assessment and reporting

Performance results 2005–06

- Completed a comprehensive baseline vegetation map of Heard Island, providing an excellent reference for identification of environmental change
- Continued analysis of other data collected during the 2003–04 expedition
- Brought the subantarctic research and monitoring strategy close to completion
- Developed a Ramsar information sheet and other required supporting documentation in preparation for a future nomination of the Heard Island and McDonald Islands Territory as a Wetland of International Importance under the Ramsar Convention (an article on the wetland was on the front cover of the 2006 *Wetlands Australia* magazine)

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 2005–06

- Nothing to report (no expedition to Heard Island during 2005–06)

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/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 2005–06

- There were no research, commercial or private visits to the Heard Island and McDonald Islands Territory during 2005–06
- The Heard Island website was well used, with more than 200,000 hits
- Prepared display banners describing the reserve, for use in presenting the reserve at public and expert forums
- The Minister for the Environment and Heritage opened a public exhibition at Parliament House in Canberra that ran from August–October 2005, consisting of Heard Island photographs and interpretive panels, artworks, historical artefacts and audiovisual presentations on the Heard Island scientific expedition
- Contributed to a book that provides a comprehensive account of the natural environment and history of Heard Island—*Heard Island: Southern Ocean Sentinel*

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 2005–06

- Continued Australian Antarctic Division involvement in government initiatives to address illegal, unreported and unregulated fishing
- Updated Heard Island information in the *Southern Ocean Cruising Handbook*, on nautical maps and charts and on the Australian Fisheries Management Authority website
- Strengthened relationships with management authorities for other subantarctic islands through joint preparation of a paper entitled *Conservation Management at Southern Ocean Islands: Towards the Development of Best-practice Guidelines* for consideration at the first international forum on the subantarctic, Hobart July 2006

KRA6: Business management

Major issues

- Ensuring compliance and enforcement of reserve management requirements
- Management planning

Actions

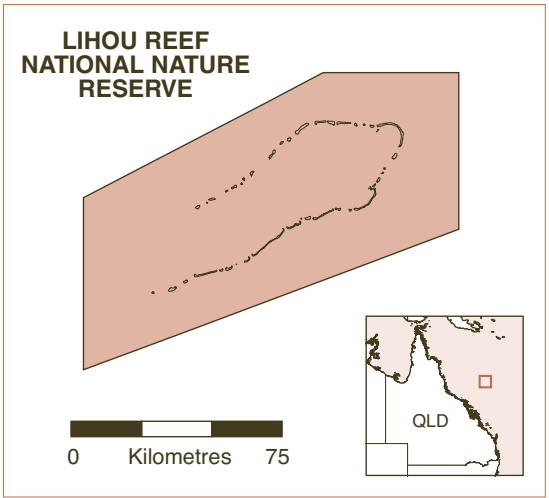
- Educate all visitors about reserve management requirements
- Implement management plan

Performance results 2005–06

- Published first management plan for the reserve in hard copy and on the internet

Lihou Reef National Nature Reserve

http://www.deh.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 (bottom-dwelling) 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	Coral Sea Islands Territory	
Management plan	Second plan expires 4 September 2008	
Other significant management documents	Management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	$13,241*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	No visitor days from commercial operators recorded; 1 visitor day by Bureau of Meteorology for weather station maintenance	
Commercial permits	3 commercial tour permits	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire reserve is listed
Migratory Species (Bonn) Convention)	6 of 98 Australian listed 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 (*Carcharodon carcharias*)
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.

A visit to undertake maintenance and research was cancelled due to logistical difficulties.

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 of the Environment and Heritage and Australian Institute of Marine Science. Institute personnel installed two more data loggers on their visit in June 2006.

Future challenges

Challenges are logistics, costs and occupational health and safety associated with managing such an isolated reserve; and 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
- Reserve's isolation means ongoing monitoring remains logistically difficult

Actions

- Enforce fishing restrictions
- Continue strategic reef monitoring programme
- Continue to promote and maintain partnerships with other agencies to provide services for monitoring activities

Performance results 2005–06

- Coastwatch flights detected no illegal fishing
- The Bureau of Meteorology collected and replaced water temperature data loggers

KRA4: Visitor management and park use

Major issues

- Introduction of pest species by visitors to the reserve

Actions

- Revise reserve information brochure

Performance results 2005–06

- Distributed revised reserve information brochure to key stakeholders and posted the brochure on the Department of the Environment and Heritage website. 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
- Prepare and distribute reserve information brochure

Performance results 2005–06

- Liaised with Coastwatch, Bureau of Meteorology, Department of Defence, Department of Territories 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 revised reserve information brochure to key stakeholders and posted the brochure on the Department of the Environment and Heritage website

KRA6: Business management

Major issues

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

Actions

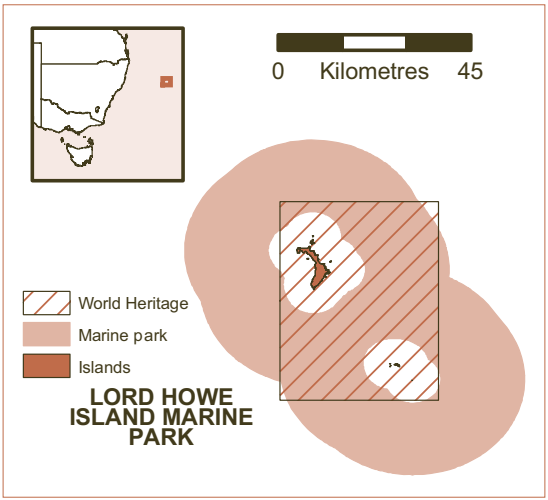
- Continue to refine and implement activity control measures as identified through the Activity Safety Analysis process

Performance results 2005–06

- 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.deh.gov.au/coasts/mpa/lordhowe



Special features

Lord Howe Island Marine Park 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.

6

Location	Latitude 31°47′ South, Longitude 159°09′ East	
Area	300,063 hectares	
Proclamation date	21 June 2000	
IUCN category	Category Ia: 96,344 hectares Category IV: 214,782 hectares	
Biogeographic context	Waters surrounding oceanic islands on seamounts; biota combine tropical and temperate taxa; east of Central Eastern Province Pelagic Biotone	
Management plan	Current plan expires 24 September 2009	
Other significant management documents	Management plan implementation schedule; risk assessment and management schedule; and service level agreement with NSW Marine Parks Authority for on-ground management	
Financial	Operating	$27,862*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not known	
Permits	9 commercial permits	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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 (*Diomeda* spp. and *Thalassarche* spp.) and giant petrels (*Macronectes* spp.); marine turtles
Listed flora	None	

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 of the Environment and Heritage 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 provides an opportunity for stakeholder groups to provide advice on the management of both parks.

The Australian Customs Service continues to conduct Coastwatch flights over the Lord Howe Island area and to report on vessel activity. New South Wales Water Police has also conducted surface patrols from the mainland.

Monitoring

Data on the fish catch taken by charter fishing vessels operating under permit in the reserve was analysed. An estimated 22.6 tonnes of fish were caught and retained (approximately half were caught in the Commonwealth reserve). This figure does not include the substantial number of fish released after capture. The most common species caught were yellowtail kingfish (*Seriola lalandi*) and trevally (*Pseudocaranx*) species followed by wahoo (*Acanthocybium solandri*), yellowfin tuna (*Thunnus albacares*), various cod (*Ephinephelus*) species, rosy jobfish (*Pristipomoides filamentosus*) and amberjack (*Seriola dumerilli*).

Future challenges

Future challenges are the implementation of a strategic monitoring programme following baseline data collection, fish catch data collection and monitoring the area for possible illegal activities.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Ensure management arrangements are adhered to

Actions

- Enforce fishing restrictions
- Train and authorise enforcement staff

Performance results 2005–06

- Coastwatch aerial surveillance was conducted regularly
- New South Wales Marine Park Authority conducted surface patrols
- Lord Howe Island New South Wales Marine Park manager functioned as warden under the *Environment Protection and Biodiversity Conservation Act 1999*

KRA5: Stakeholders and partnerships

Major issues

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

Actions

- Take an active role on advisory committee and steering committee

Performance results 2005–06

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

KRA6: Business management

Major issues

- Maintain assistance from New South Wales Marine Parks Authority

Actions

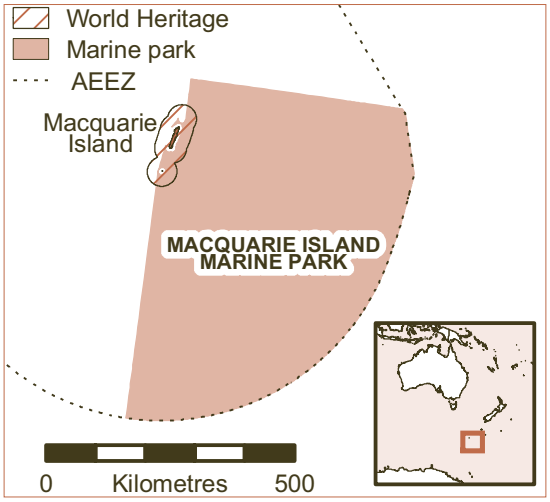
- Negotiate and implement annual business agreement with New South Wales Marine Parks Authority

Performance results 2005–06

- Successfully negotiated and implemented annual business agreement for 2005–06

Macquarie Island Marine Park

http://www.deh.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 (*D. exulans*).

Location	Latitude 55°54′ South, Longitude 161°38′ East
Area	16,205,928 hectares
Proclamation date	27 October 1999
IUCN category	Category IV: 10,492,287 hectares Category 1a: 5,713,641 hectares
Biogeographic context	Interim Marine and Coastal Regionalisation for Australia region: Macquarie Province
Management plan	Current plan expires 25 September 2008
Other significant management documents	Management plan implementation and performance report incorporating risk assessment

Financial	Operating	$89,000*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	14 tourist ships (5 operators) with a total of 1,200 passengers transited the reserve	
Permits	None	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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	International 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 (*Diomeda* spp. and *Thalassarche* spp.) and giant petrels (*Macronectes* spp.); southern right whale (*Eubalaena australis*); subantarctic fur seal (*Arctocephalus tropicalis*) and southern elephant seal (*Mirounga leonina*); and 10 seabird species
Listed flora	None	

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

Management arrangements

The Tasmanian Government manages Macquarie Island and its surrounding waters out to three nautical miles. The Director of National Parks is responsible for the management of the Commonwealth marine park.

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

Monitoring

An agreement is in place with the Australian Antarctic Division to develop a research and monitoring strategy for Commonwealth subantarctic marine protected areas. The strategy is close to completion.

Monitoring on Macquarie Island has revealed significant increases in rodent and rabbit populations. These feral pest species have a major impact on marine wildlife species that forage in the Macquarie Island Marine Park. A feral pest eradication programme is currently being developed by the Tasmanian Government with funding assistance from the Department of the Environment and Heritage.

There is a paucity of population data on numerous key seabird species in the marine park. The Department of the Environment and Heritage funded the Tasmanian Government to undertake population monitoring during 2005 and the summer of 2006. Numerous burrowing petrel species were monitored, some of which are listed under the *Environment Protection and Biodiversity Conservation Act 1999*. This project is now at the final report stage and has shown the negative impact of rodents and rabbits on burrowing petrels. The second stage of the project will be funded in 2006–07.

The wildlife of Macquarie Island and the marine park are under threat from marine debris. The Department of the Environment and Heritage and the Tasmanian Parks and Wildlife Service have initiated an ongoing marine debris survey and collection project. Over 2005 and the summer of 2006 researchers 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. Two incidents also occurred where fishing gear was entangled with, and successfully removed from, two living seals. The project will continue to be funded for 2006–07.

The Department of the Environment and Heritage funded the Tasmanian Government to undertake a project to determine the foraging patterns of the southern and northern 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

A major challenge is to implement the subantarctic research and monitoring strategy for marine protected areas, including Macquarie Island Marine Park. Further challenges are to continue to secure Coastwatch support and investigate other possibilities (fishing and tourism industry and government agencies) for monitoring possible illegal activities; to address the risks identified in the Bureau of Rural Sciences report on assessing risks of invasion by marine pests at Macquarie Island; and to address the risks to native species (such as seabirds) posed by feral species 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

- Develop plan for the feral pests eradication programme at Macquarie Island
- Further understanding and protection of species and habitats
- Develop a strategic monitoring approach for the subantarctic reserves
- Submit taskings to Coastwatch

Performance results 2005–06

- No surveillance was conducted due to higher Coastwatch priorities elsewhere
- The Tasmanian Department of Primary Industries, Water and Environment met its contractual arrangements for the development of the rabbit and rodent eradication programme on Macquarie Island
- The Natural Heritage Trust financial agreement in place for 2005–06 with the Tasmanian Department of Tourism, Parks, Heritage and the Arts covers the management of the marine park. It includes a marine debris survey and collection, determining the foraging patterns of southern and northern giant-petrels and their

ecological interactions with fisheries, and monitoring and collection of seabird population baseline data. Marine debris and seabird population baseline data projects will continue in 2006–07 under the agreement

- Funded the Bureau of Rural Sciences to undertake a risk assessment of invasion by marine pests at Macquarie Island
- The research and monitoring strategy for subantarctic reserves is close to completion

KRA5: Stakeholders and partnerships

Major issues

- Need for effective working relationships with partners

Actions

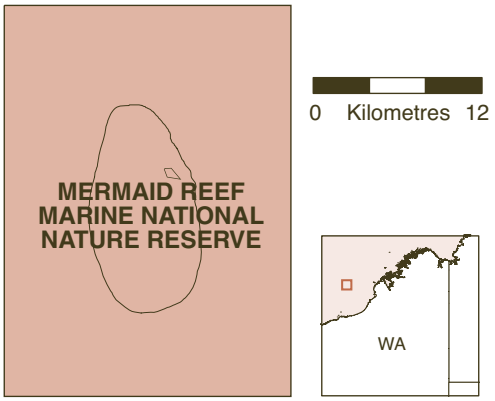
- Continue work under the service level agreement with the Tasmanian Government, focusing on Macquarie Island marine protected area

Performance results 2005–06

- Continued the service level agreement with the Tasmanian Government in relation to the cooperative management of marine protected areas including Macquarie Island Marine Park

Mermaid Reef Marine National Nature Reserve

http://www.deh.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 233 species of coral and 688 species of fish 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	Interim Marine and Coastal Regionalisation for Australia region: Oceanic Shoals
Management plan	Current plan expires 16 May 2007
Other significant management documents	1999 Memorandum of Understanding with Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management; management plan implementation and performance report, incorporating risk assessment

Financial	Operating	$79,383 *
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Approximately 127	
Permits	8 commercial tour operator permits	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

International conventions and agreements	
Migratory Species (Bonn) Convention	12 of 98 Australian listed 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 (*Carcharodon carcharias*), marine turtles and humpback whale (*Megaptera novaeangliae*)
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	>558	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 Conservation and Land Management 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.

The current management plan expires on 16 May 2007. A review of the plan is under way and a new draft plan for public comment is being prepared.

Monitoring

The Australian Institute of Marine Science has undertaken regular monitoring at Mermaid Reef for the past 10 years. The Department of the Environment and Heritage funded the institute to review this work. The review is scheduled for completion in July 2006. The review will inform the development of a strategic long-term monitoring programme, and management planning and evaluation.

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. During the last visit by the Australian Institute of Marine Science to Mermaid Reef in May 2005 a moderate bleaching event was under way, and recovery will be monitored.

Baseline monitoring of undisturbed trochus shell populations at Mermaid Reef was undertaken by the Western Australian Department of Fisheries in March 2006 to 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.

Future challenges

Major management challenges are to install moorings at Mermaid Reef; investigate anecdotal reports of illegal foreign commercial fishing targeting shark fin and determine the appropriate managerial response; incorporate the results of the current management plan review into the second management plan due in 2007; and ensure the reserve's conservation values and management arrangements are understood by visitors.

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

- Produce a draft mooring and anchoring strategy for the Rowley Shoals in cooperation with Western Australian Department of Conservation and Land Management
- Review past 10 years of monitoring effort to inform more strategic reef monitoring

Performance results 2005–06

- Continued to investigate mooring design and location
- Commenced review of monitoring work by the Australian Institute of Marine Science
- 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 appropriate scale and types of visitation

Actions

- Complete first survey of visitors to Mermaid Reef

Performance results 2005–06

- Visitor survey showed a good level of awareness of reserve rules and high levels of visitor satisfaction, based on a small sample size
- Began work with Western Australian Department of Conservation and Land Management on a joint Rowley Shoals communication strategy
- Began research and consultation on appropriate vessel size, passenger limitations and issues related to seaplane access to the reserve

KRA5: Stakeholders and partnerships

Major issues

- Management planning for new management plan to take effect in 2007
- Effective management of the reserve by the management service provider (Western Australian Department of Conservation and Land Management)
- Industry stewardship of reserve to support management

Actions

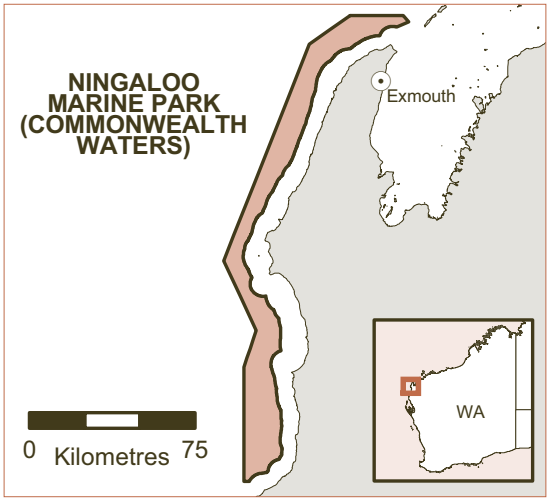
- Hold Rowley Shoals Steering Committee meeting
- Hold management issues workshop
- Produce and distribute 'Have Your Say' brochure to encourage community input to management planning

Performance results 2005–06

- Negotiated the terms of the first annual business agreement setting out joint funding arrangements with Western Australian Department of Conservation and Land Management for implementation in 2006–07
- Licensed tour operators are working to develop an industry stewardship strategy for the Rowley Shoals to support reserve management efforts by governments
- Received 19 submissions from stakeholders in response to initial invitation to comment on the proposal to develop a new management plan for Mermaid Reef
- Began drafting new management plan

Ningaloo Marine Park (Commonwealth Waters)

http://www.deh.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 pilot study (CSIRO 2004) of three locations in Ningaloo Marine Park found commercially and recreationally important fish species occurring 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	Interim Marine and Coastal Regionalisation for Australia region: Ningaloo	
Management plan	Current plan expires 2 July 2009	
Other significant management documents	Service level agreement and Memorandum of Understanding between the Department of the Environment and Heritage, Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management; annual business agreements for management plan implementation and performance reporting, incorporating risk assessment	
Financial	Operating	$178,234*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not available	
Permits	11 commercial tour permits, 2 scientific research permits	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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 (*Carcharodon carcharias*)
Listed flora	None	
Heritage	On Commonwealth Heritage List	

Numbers of native species recorded			
Mammals	Birds	Reptiles	Plants
20	34+	18+	0

Management arrangements

The Western Australian Department of Conservation and Land Management and Western Australian Department of Fisheries conduct on-ground 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, continued 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 (see case study on page 176).

CSIRO conducted further baseline biodiversity surveys in the north of the park. The results are due late in 2006.

A desktop survey 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 environmental challenges are to ensure compliance with park management prescriptions; achieve adequate habitat mapping; continue monitoring the reserve's health; investigate the feasibility of establishing sanctuary zones in Commonwealth waters; and maintain consistency between the Australian and state government planning processes. An administrative challenge for 2006–07 is to begin developing the fourth management plan to replace the current plan that will expire in 2009.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Limited baseline information about Commonwealth waters of the park, in particular information to inform the decision on the possible establishment of sanctuary zones in Commonwealth waters
- Lack of information on distribution, migration, behaviour and abundance of key species including whale sharks
- Lack of information on effects of human and commercial interactions on key attributes of the park

Actions

- Conduct baseline biodiversity surveys of the Commonwealth waters of the park; and of the whale shark in Ningaloo Marine Park
- Assess the vulnerability of key park values to commercial shipping traffic

Performance results 2005–06

- Department of the Environment and Heritage and CSIRO conducted a second survey in the north of the park to follow pilot baseline studies (CSIRO 2004) of the park's benthos
- In cooperation with Australian and United States research organisations the Department of the Environment and Heritage contracted the Australian Institute of Marine Science to conduct a whale shark tagging project to study the behaviour and migration habits of whale sharks travelling to Ningaloo Marine Park
- Conducted a desktop survey 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 2005–06

- Liaised with industry and Western Australian Department of Fisheries about reported gear loss and commercial fishing boat entry
- Contributed to review of compliance and enforcement procedures
- Issued permits for commercial tour operators
- Updated and distributed a brochure informing commercial fishers and commercial tour operators of management arrangements
- Officers of Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management patrolled the reserve regularly as part of their normal surveillance operations
- Coastwatch conducted aerial surveillance
- Department of the Environment and Heritage and Western Australian Department of Fisheries held a joint compliance and enforcement exercise

KRA5: Stakeholders and partnerships

Major issues

- Need to maintain productive relationships with partners
- Need to negotiate complementary management regimes between the Department of the Environment and Heritage, the Western Australian Department of Fisheries and the Western Australian Department of Conservation and Land Management to best manage the adjoining Commonwealth and state reserves

Actions

- Ensure that the Department of the Environment and Heritage, Western Australian Department of Fisheries and the Western Australian Department of Conservation and Land Management 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 2005–06

- The three agencies negotiated and implemented a work plan

KRA6: Business management

Major issues

- Need to effectively manage contracts with service providers

Actions

- Negotiate and implement annual business agreements with Western Australian Department of Conservation and Land Management and Western Australian Department of Fisheries
- Continue management of the Australian Institute of Marine Science whale shark tagging project
- Contract consultants to conduct risks from commercial shipping desktop survey

Performance results 2005–06

- The three agencies negotiated and implemented an annual business agreement covering research, visitor management, education, and compliance and enforcement
- Continued a research project begun in 2004 into the migration and behaviour of whale sharks in the Commonwealth waters of the park
- Desktop survey of risks from commercial shipping to the key values of the Ningaloo Marine Park (Commonwealth Waters) conducted and report accepted

Whale shark tagging research project

AIMS researchers about to tag a large whale shark

The whale shark (*Rhincodon typus*), the world's largest fish, is a migratory species whose global population status is listed as 'vulnerable' by the World Conservation Union. It is protected under the *Environment Protection and Biodiversity Conservation Act 1999*.

An Australian–United States research project is studying whale sharks as they travel through Ningaloo Marine Park to gather at Ningaloo Reef.

Individual whale sharks are tagged in Commonwealth and state waters and followed using new satellite tracking technology. Researchers aim to find out more about whale shark movements; whether they drift on ocean currents or move strategically between feeding areas, how their populations are linked across the world's tropical and warm temperate seas, and how regularly they visit Australian waters. Overall the project will identify the migratory range and behavioural habits of the species, the significance of deep water habitats, and the importance of Ningaloo Marine Park for whale sharks.

Information is logged on an individual's location, swimming depth and water temperature at one-minute intervals. The tags transmit summary data at six-hourly intervals via polar orbiting satellites fitted with receivers. Tags are expected to have an 18-month lifespan. The tagging operation is carried out under an animal ethics permit, and causes little or no reaction from the sharks.

Scientists tagged 30 animals in 2006. The tagged whale sharks range in size from four to eight metres.

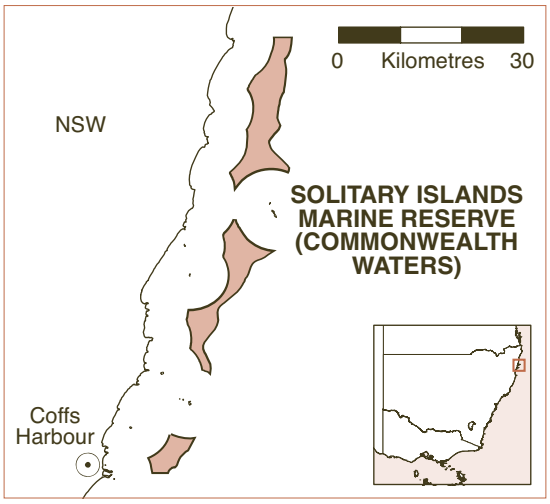
Most of the 30 animals headed on a northward track towards Indonesia, while one remained near Ningaloo and another just south of Java. One tag ceased transmitting on a beach in Indonesia where it was presumed the shark was caught by local people. The data show that the fish are quite active, diving up to one kilometre to cold depths, probably to feed in channels that may attract plankton or small schooling fish and squid.

Improved knowledge of the whale sharks' movement patterns will form the basis of better management and help the development of conservation plans for this species in Australia. The data will also help scientists assess the likely impacts on whale sharks of overseas fisheries.

This is a cooperative project between Australian organisations—the Australian Institute of Marine Science, CSIRO, the Western Australian Department of Conservation and Land Management, the Department of the Environment and Heritage and Woodside Australia—and, in the United States, the National Oceanic and Atmospheric Administration and Hubbs-SeaWorld Research Institute. The Department of the Environment and Heritage is contributing $55,000 over two years to the project.

Solitary Islands Marine Reserve (Commonwealth Waters)

http://www.deh.gov.au/coasts/mpa/solitary



Special features

The Solitary Islands Marine Reserve is 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 numerous types of dolphins, humpback whales (*Megaptera novaengliae*), grey nurse sharks (*Charcharius taurus*), black cod (*Ephinephilus daemelii*), Bleekers devil fish (*Paraplesiops bleekeri*), and numerous types of seabirds. An area known as Pimpernel Rock forms part of the critical habitat for the grey nurse shark which aggregates there.

The reserve and the adjacent state park were listed on the Register of the National Estate in 1995. Values noted on the register include outstanding marine biodiversity; mixture of communities; diversity of coral, algal and fish species; abundance of various species of anemone and clownfish (*Amphiprion latezonatus*); little penguin (*Eudyptula minor*) and muttonbird (*Puffinus*) species; and overall diversity and beauty.

Location	Latitude 29°48′ South, Longitude 153°22′ East
Area	15,746 hectares
Proclamation date	3 March 1993
IUCN category	Category VI overall: Category Ia 80 hectares Category IV 3,700 hectares Category VI 11,900 hectares
Biogeographic context	Interim Marine and Coastal Regionalisation for Australia region: Manning Shelf

Management plan	Current plan expires 3 April 2008	
Other significant management documents	Service level agreement with NSW; annual business agreements; management plan implementation and performance report, incorporating risk assessment	
Financial	Operating	$89,610*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	Not known	
Permits	12 commercial fishing permits; 11 commercial tour operator permits; 6 recreational diving permits	

* In addition, $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

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 (*Carcharias taurus*)
Listed flora	None	

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

Management arrangements

The New South Wales Marine Parks Authority conducts on-water 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 provides a forum for stakeholders to

contribute to planning for the adjacent state park and the reserve. The Department of the Environment and Heritage is represented on both committees.

Monitoring

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

A draft final report on a biophysical survey of the reserve, including the habitat surrounding Pimpernel Rock, was received. It identified 16 different benthic environments—10 sand, one gravel and the rest reef. The reef areas were predominant in the northern section of the reserve with sand prevalent in the southern and central regions.

Future challenges

Future challenges are to implement a structured biological monitoring programme and to monitor for possible illegal activities in the area.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Detection of any illegal activity

Actions

- Enforce fishing restrictions

Performance results 2005–06

- Coastwatch conducted regular aerial surveillance
- 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 of diving in sanctuary zone

Actions

- Manage dive operations via permit conditions

Performance results 2005–06

- Issued six recreational diving permits. No infringements of conditions detected

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 2005–06

- Participated in advisory and steering committee meetings

KRA6: Business management

Major issues

- Continued assistance from New South Wales Marine Parks Authority

Actions

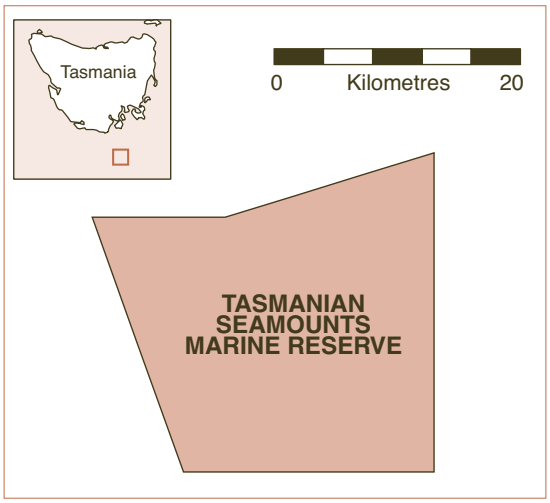
- Endorse and manage annual business agreement with New South Wales Marine Parks Authority

Performance results 2005–06

- Successfully implemented annual business agreement

Tasmanian Seamounts Marine Reserve

http://www.deh.gov.au/coasts/mpa/seamounts



Special features

The Tasmanian Seamounts Marine Reserve covers 15 of the approximately 70 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 are native to the Tasmanian seamounts and 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
IUCN category	Category Ia overall 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	Cold temperate waters offshore from the Tasmanian (Demersal) Province and the Southern Pelagic Province
Management plan	Current plan expires 25 June 2009
Other significant management documents	Management plan implementation and performance report, incorporating risk assessment

Financial	Operating	$13,500*
	Capital	Not applicable
	Revenue	Not applicable
Visitors	None	
Permits	None	

* In addition $725,407 was spent across the 12 marine reserves managed by the Marine Division on behalf of the Director of National Parks on professional services, development of permits and performance assessment systems, training wardens, communications, workshops and conference attendance.

International conventions and agreements	
Migratory Species (Bonn) Convention	12 of the 98 listed Australian species
Japan–Australia Migratory Birds Agreement	1 of the 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 (*Diomeda* spp. and *Thalassarche* spp.) and giant petrels (*Macronectes* spp.); marine turtles; 10 seabird species; and southern right whale (*Eubalaena australis*)
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

The Department of the Environment and Heritage and the Tasmanian Government have developed a service level agreement in relation to the cooperative management of marine protected areas including the Tasmanian Seamounts Marine Reserve.

Monitoring

Coastwatch provided five aerial surveillance flights of the reserve.

Future challenges

Major challenges are to finalise and implement the strategic research and monitoring plan for the Australian Government's existing and proposed temperate marine protected areas, including the Tasmanian Seamounts Marine Reserve; and to further develop and implement a compliance and enforcement plan for the reserve, including monitoring possible illegal activities particularly fishing.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Possible illegal fishing by commercial fishers
- Need to improve understanding of reserve's ecological processes

Actions

- Enforce fishing restrictions
- Develop and implement the research and monitoring plan

Performance results 2005–06

- Requested regular Coastwatch aerial surveillance. Surveillance provided occasionally, due to Coastwatch resource constraints
- No illegal fishing incidents detected
- Progressed work on the strategic research and monitoring plan for temperate marine protected areas, including the Tasmanian Seamounts Marine Reserve

KRA4: Visitor management and park use

Major issues

- Monitoring possible illegal activities, particularly fishing

Actions

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

Performance results 2005–06

- Conducted periodic surveillance

Marine protected area network reinforces Australia's global reputation

The announcement in early 2006 of a comprehensive network of marine protected areas off Australia's south-east has reinforced our national reputation as a world leader in marine environmental protection and biodiversity conservation.

The network comprises 13 marine protected areas over a total of 226,000 square kilometres—an area almost as big as the state of Victoria.

Declaration of the network will ensure protection of a stunning undersea world of deep canyons, seamounts and other geological features that support ecosystems in which up to 80 per cent of species are found nowhere else on earth.

A number of refinements to boundaries and zonings agreed during the consultation period resulted in an increase in the size of the network while reducing the impact of the network on commercial fishing.

It is expected the marine protected area network will be formally declared under the *Environment Protection and Biodiversity Conservation Act 1999* during 2006–07.

Design of the network began with the development of the South-east Regional Marine Plan. The plan was released in May 2004 and contained two candidate marine protected areas—the Murray and Zeehan. These two areas remain part of the network announced earlier this year.

The establishment of the network helps fulfil the Australian Government's commitment at the 2002 World Summit on Sustainable Development to establish a representative system of marine protected areas within its jurisdiction by 2012. The national system is designed to include samples of all Australia's marine ecosystems in protected areas and to manage those areas for the primary purpose of conserving biodiversity.

In 2005, the Australian Government announced a new approach to marine planning, bringing the programme under the *Environment Protection and Biodiversity Conservation Act 1999*. This change will see Marine Bioregional Plans developed in all Australian marine regions.

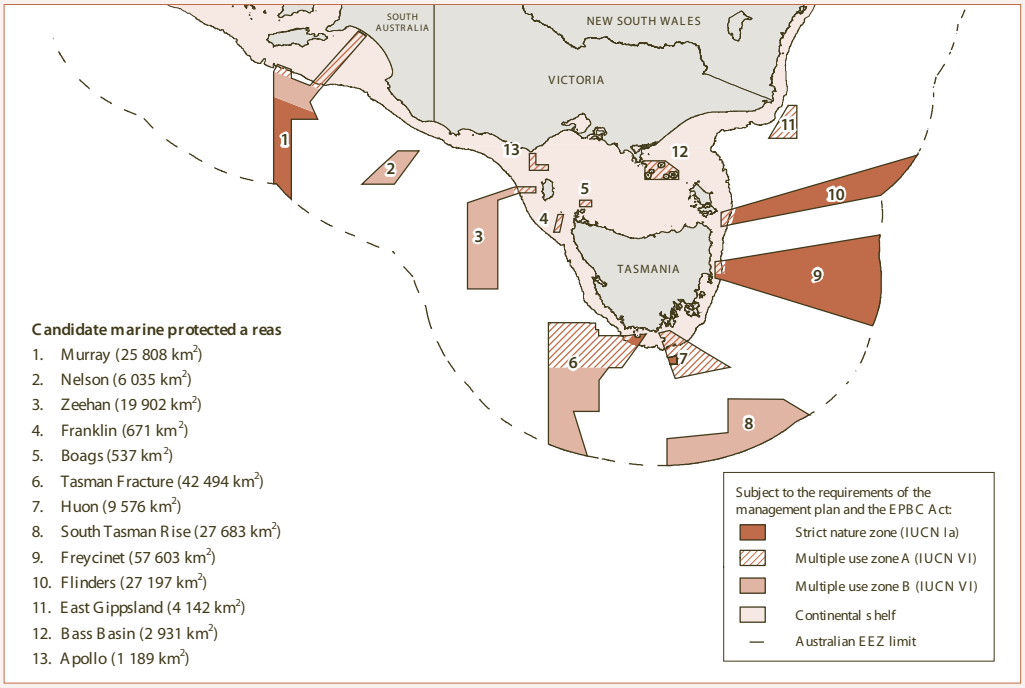
The Department of the Environment and Heritage is now developing Marine Bioregional Plans in the remaining four Australian marine regions—the South-west, North-west, North and East. Networks of marine protected areas will be developed in each of these regions as part of these Marine Bioregional Plans.

The starting point in the marine protected area development process in Australia's south-east was the scientific identification of 11 broad areas of interest based on seafloor mapping and a bioregionalisation provided by the CSIRO and Geoscience Australia.

This work revealed the location of previously unknown undersea structures such as canyons, trenches, seamounts, plateaus and terraces. Scientists mapped the upper continental shelf and the steep continental slope that plunges to the deep seas abyssal plain, which in some places is at depths of 6,000 metres below the surface.

Scientists developed guidelines to help identify the features and bioregions that needed to be included in marine protected areas in or around the broad areas of interest. Marine stakeholders contributed to the guidelines. The key objective was to establish marine protected areas with simple boundaries and consistent zoning arrangements that protect a representative sample of the key conservation features and bioregions. Where possible, overlap with prime fishing grounds and prospective areas for oil and gas development was avoided.

Figure 6: Candidate marine protected areas in the South-east Marine Region



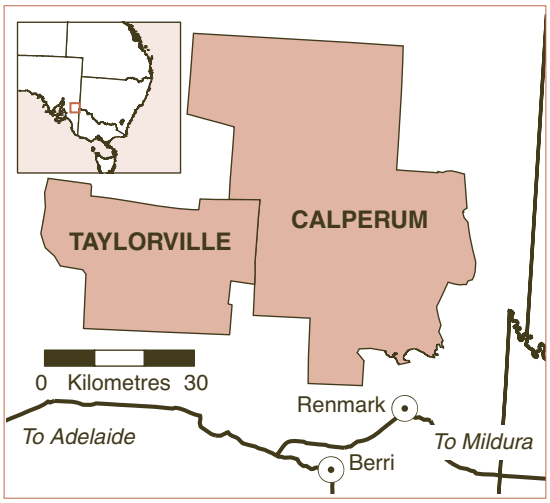
A scientific reference panel advised on the information to be used in designing the marine protected areas; and a scientific peer review panel advised the Government on the extent to which the network achieves biodiversity conservation objectives. The peer review panel identified the strengths and weaknesses in the network and concluded that it was a 'significant and important step towards a comprehensive, adequate and representative system of marine protected areas and represents a major advance in biodiversity conservation in the South-east Region.'

South-east Marine Region protected area network facts and figures

- Covers 226,000 square kilometres
- Comprises 13 marine protected areas
- Includes almost 20 per cent of the South-east Marine Region
- Brings Australia's share of the world's marine protected area estate to 30 per cent
- Protects 7.2 per cent of the continental shelf
- Protects 27 per cent of the continental slope
- Protects 17 per cent of the deep ocean plain
- Is managed primarily for biodiversity conservation
- 43 per cent is strict nature reserve—no commercial activity or extraction is allowed
- A further 36 per cent is closed to commercial fishing
- 21 per cent is multiple use—low-impact fishing methods and other activities are permitted

Calperum and Taylorville Stations

http://www.deh.gov.au/parks/biosphere/riverland



Special features

Calperum and Taylorville Stations are adjacent pastoral leases in the Riverland area of South Australia. Both properties are key components of the Riverland (formerly Bookmark) Biosphere Reserve, which has a total area of 900,000 hectares. The Riverland Biosphere Reserve forms part of the UNESCO Man and the Biosphere Programme, which comprises areas chosen as representative of the world's biodiversity.

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 key habitat for the endangered black-eared miner (*Manorina melanotis*) and are also important for the vulnerable malleefowl (*Leipoa ocellata*).

While biodiversity conservation guides the management of both properties, each has different management objectives. The development of Calperum as a model for environmentally sustainable development, including tourism, is an explicit environmental objective. In contrast, Taylorville is managed primarily for conservation of long-unburnt mallee and its dependent species.

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, owned by the Australian Government through the Director of National Parks (Calperum acquired in 1993, Taylorville acquired in 2000)
IUCN category	Calperum not applicable 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 (tied to length of management contract)	
Other significant management documents	Management contract with Austland Services Pty Ltd expires 30 June 2008 Biosphere Reserves Seville Strategy and statutory framework	
Financial	Operating*	$4.800 million
	Capital	$0.106 million
	Revenue	$0.089 million
Visitors	294 day visitors, 673 bed-nights in camping grounds, dormitories and other accommodation	

* This is funding 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 47 marine (birds)
	Recovery plans	2 being implemented—malleefowl (*Leipoa ocellata*); black-eared miner (*Manorina melanotis*)
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 an equivalent level of support for management.

Monitoring

Significant monitoring programmes track the physical and biological attributes of both stations. Annual biological surveys in 2005–06 covered vertebrate pitfalls, vegetation photopoints, malleefowl mound activity, black-eared miners, stone curlews (*Burhinus grallarius*), waterbirds, fish, possums, frogs and nestboxes. Feral animal monitoring focused on foxes.

Monthly rainfall data are collected from 25 rain gauges across the two stations, and a network of groundwater test wells is being developed to monitor groundwater quality beneath the floodplain and wetlands of Calperum Station.

Future challenges

Identifying and implementing environmentally sustainable industries on Calperum Station remains an ongoing objective. Developing an appropriate management approach for Calperum Station's wetlands that can respond to changing conditions is a major challenge. A priority is to protect areas of mature mallee on Taylorville and Calperum from fire and other potentially threatening impacts such as bird poaching. These areas provide critical habitat for threatened species.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

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

Actions

- Rationalise watering points
- Develop recovery plan for maintenance in captivity of 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 concentrating on pigs, goats, foxes and rabbits
- Monitor native animal populations
- Contribute to recovery programmes for threatened birds

Performance results 2005–06

- Reviewed water storage and supply infrastructure on Calperum Station and decommissioned several non-essential water tanks
- Maintained colonies of the Murray River snail—regarded as extinct in its natural habitat—in secure artificial habitats. One population being maintained in an artificial habitat located within a natural watercourse was observed to increase dramatically during elevated river flow levels in spring 2005 and this may have led to dispersal into the river system
- Commenced installation of test wells to monitor groundwater in wetlands and floodplains
- Completed wetting and drying cycle of Lake Woolpoolool and Lake Merreti
- Undertook environmental watering of drought stressed riparian vegetation at Double Thookle Thookle Lagoon
- Conducted photopoint monitoring and floral surveys of partially drip-irrigated revegetation exclosures
- Partnered a Green Corps project, providing training in nursery practices and procedures for producing plants for revegetation
- Reviewed fire management strategies and upgraded selected water storage infrastructure
- Reviewed the fire-track network on Calperum Station, and conducted track maintenance and upgrading as required
- Continued and enhanced feral animal control programmes for pigs, goats, foxes and rabbits
- Initiated discussions on developing a regionally coordinated fox baiting programme

- Continued volunteer involvement in mapping and controlling significant weeds
- Continued and expanded native animal population monitoring, including expanding mallee fowl monitoring grids
- Supported the black-eared miner recovery programme, including moving birds to alternative habitat
- Participated in developing recovery plans for other mallee birds and animals of conservation concern

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 2005–06

- Continued to monitor, protect and revegetate identified Indigenous heritage sites
- Conducted workshop for staff and community volunteers on identifying and protecting Indigenous heritage sites
- Initiated discussions on hosting a trial Indigenous eco-tourism training programme for local Indigenous secondary school students
- Continued to protect and maintain iconic structures recalling the previous pastoral industry

KRA4: Visitor management and reserve use

Major issues

- Provision of quality visitor services that are compatible with conservation objectives, visitor safety and management requirements
- Need to communicate the values of Calperum and Taylorville Stations
- 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 Stations and the McCormick Centre for the Environment
- 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 2005–06

- Managed visitors satisfactorily, including developing closer working relationships with local eco-tourism ventures, notably members of the Bookmark Guides group
- Educational programmes for primary and secondary school children, including a school holiday programme, were developed and delivered at the McCormick Centre for the Environment in Renmark which is partly funded through the Natural Heritage Trust
- Four Australian university research students (two PhD and two honours candidates) conducted biological research on Calperum Station
- A Masters degree student from Yale University (USA) conducted a study into the dynamics of volunteerism at Calperum Station
- A community-based study of the life histories of two poorly known bush cockroach species began under the auspices of the University of Sydney
- Explored potential economic uses of the horticulture site. No robust business opportunity for its further development was identified. Some potential to use the infrastructure to supply material for regional revegetation projects on a non-commercial basis was noted
- Re-allocated 30 megalitres of water from Calperum Station's irrigation licence to environmental watering

KRA5: Stakeholders and partnerships

Major issues

- Promotion of the 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 consistent recording of volunteer hours
- Participate in the Riverland Biosphere Community Committee

Performance results 2005-06

- The McCormick Centre for the Environment 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 ranged from a meeting of the Youth Environment Council of South Australia to a regional ABARE (Australian Bureau of Agriculture and Resource Economics) conference
- 123 registered individual volunteers, and numerous volunteer groups and organisations donated approximately10,000 hours of labour including weed and feral animal control, infrastructure maintenance and development, and wildlife monitoring. In doing so, they drove approximately 39,000 kilometres in their own vehicles
- Developed a new database to record and analyse volunteer contributions to management of the properties
- Hosted a dinner for 105 volunteers and supporters to recognise volunteer contributions
- Two volunteers passed the 1,000 hour mark for total time contributed over several years, and three volunteers passed 1,500 hours
- Parks Australia representatives participated in six biosphere committee meetings

KRA6: Business management

Major issues

- Property maintenance
- Business management
- Environmentally sustainable management

Actions

- Maintain infrastructure
- Manage professionally and accountably

Performance results 2005–06

- Continued producing quantities of seed for revegetation and for commercial sale
- Maintained the productive capacity of floriculture plantings but international market conditions remained unfavourable
- Maintained existing buildings, fencing, tracks and other infrastructure, including a significant overhaul of Calperum Station's water treatment plant and grading 330 kilometres of tracks
- Completed infrastructure enhancements including improvements to visitor accommodation and the fire track system
- Produced policy statements on operations and workplace practices, and updated employee induction processes