6 State of the Parks report

Guide to the State of the Parks report Chapter index Individual reports for Commonwealth reserves

Guide to the State of the Parks report

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

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

- Area and locational information is derived from the Collaborative Australian Protected Areas Database and from a departmental Marine Protected Areas dataset-which includes data sourced from Geoscience Australia
- The World Conservation Union (**IUCN**) **protected area management category** is identified for each reserve, and where some of the reserve are assigned to 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. The species information for the six terrestrial national parks includes the numbers of species which are a priority for management (defined as being all threatened species plus non-threatened species for which the park contains more than 1 per cent of its population). Species numbers for marine reserves have been taken from a recently developed species inventory based on documented sightings in the reserves and adjacent areas. The marine inventory is relatively new and is being updated and refined. Species numbers for marine reserves are likely to be underestimated.
- 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, and management agreements with state agencies) are described.
- The report provides information by key result area on major issues, actions and performance results for 2007–08.

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

Chapter index

Terrestrial Reserves

Australian Na	tional Botanic Gardens	62
Case study:	Pacific Highway Bulahdelah Bypass orchid recovery project	74
Case study:	Taking a lead in responding to climate change	76
Booderee Nat	ional Park	78
Case study: Figure 5:	Reducing our carbon footprint at Booderee National Park Identified sources of carbon emissions during audit	88
Christmas Isla	nd National Park	90
Case study:	Invasive weed management program on Christmas Island	96
Case study:	Christmas Island Mine-site to Forest Rehabilitation (CIMFR)	98
Case study:	Tourism-the Park's role in future economic development of Christmas Island	99
Kakadu Natio	nal Park	101
Case study:	A living cultural landscape—the Kakadu brand	113
Case study:	Fire plots	115
Case study:	Greenhouse gas emissions	118
Norfolk Island	l National Park and Botanic Garden	119
Case study: Figure 6: Figure 7:	Green Parrot recovery on Norfolk Island Annual numbers of green parrots banded since 1985 Total number of green parrots banded during the breeding progr	125 ams
Case study:	Norfolk Island National Park infrastructure projects	127
Pulu Keeling I	National Park	129
Case study:	Second Parks Office for Cocos Islands: reaching out further	135
Case study:	Relocation program for the Cocos Island buff-banded rail	137
Ulu <u>r</u> u–Kata Tj	u <u>t</u> a National Park	139
Case study:	A new sunrise viewing facility for Ulu <u>r</u> u	150
Case study: Figure 8:	Species trends at Uluṟu-Kata Tjuṯa National Park Relationship between ambient temperature and reptile species diversity recorded at Uluṟu-Kata Tjuṯa National Park	152
Calperum and	l Taylorville Stations	155

Marine Reserves

Ashmore Reef National Nature Reserve		
Case study: Dedicated vessel now watches over Ashmore Figure 9: Ashmore Reef National Nature Reserve	169	
Cartier Island Marine Reserve	171	
Cod Grounds Commonwealth Marine Reserve	175	
Coringa-Herald National Nature Reserve	180	
Case study: Science for adaptive ecosystem-based management in tropical marine reserves	186	
Elizabeth and Middleton Reefs Marine National Nature Reserve	188	
Great Australian Bight Marine Park (Commonwealth Waters)	192	
Heard Island and McDonald Islands Marine Reserve	197	
Lihou Reef National Nature Reserve	204	
Lord Howe Island Marine Park (Commonwealth Waters)	208	
Mermaid Reef Marine National Nature Reserve	212	
Ningaloo Marine Park (Commonwealth Waters)	216	
Solitary Islands Marine Reserve (Commonwealth Waters)	221	
South-east Commonwealth Marine Reserve Network	225	
Figure 10: South-east Commonwealth Marine Reserve Network including Macquarie Island		
Apollo Commonwealth Marine Reserve	231	
Beagle Commonwealth Marine Reserve	232	
Boags Commonwealth Marine Reserve	233	
East Gippsland Commonwealth Marine Reserve	234	
Flinders Commonwealth Marine Reserve	235	
Franklin Commonwealth Marine Reserve	236	
Freycinet Commonwealth Marine Reserve	237	
Huon Commonwealth Marine Reserve 23		
Macquarie Island Commonwealth Marine Reserve	239	
Murray Commonwealth Marine Reserve 240		
Nelson Commonwealth Marine Reserve	241	

•	South Tasman Rise Commonwealth Marine Reserve	242
•	Tasman Fracture Commonwealth Marine Reserve	243
•	Zeehan Commonwealth Marine Reserve	
	Case study: Building Partnerships to effectively manage the South-east Commonwealth Marine Reserve Network	245

Australian National Botanic Gardens

www.anbg.gov.au



Special features

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

The ANBG contributes to meeting Australia's obligations under 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 the 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 diverse range of climatic and biogeographic regions—alpine to tropical, coastal to central desert	
Management plan	Second plan of management expires 9 January 2009	
Other significant management documents	Management Plan Implementation Schedule; Risk Assessment and Management Schedule; ANBG Masterplan (National Capital Authority); 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 (CPBR) between the Director of National Parks and the CSIRO; CPBR Strategic Plan	

Financial	Operating	\$9.422 million	
	Capital	\$0.473 million	
	Revenue	\$0.670 million	
Visitors	501,400 to site 96,000 to visitor centre		
Living plants	Planted in 2007–08: 4,535		
	Total number of taxa in the living collection: 6,339		
	Total number of registered plants in the living collection: 78,146		
Herbarium specimens Specimens added to database in 2007–08: 38,518		7–08: 38,518	
	Total number of specimens in collection: approximately 1.2 million		
Australian Plant Image	Added in 2007–08: 4,027		
Index	Total number of photographs in collection: 40,000		
Permits	4 commercial activity permits; 45 wedding or wedding photography licences; 100 licences to publish 509 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 programs		
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 by delivering 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 (Royal Botanic Gardens, Kew, and Harvard University) Global Biodiversity Information Facility International Organisation for Plant Information World Vascular Plant Checklist Project Species 2000 		

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 between the ANBG and CSIRO Plant Industry. It was formed in 1993 and cooperative arrangements were renewed for a further 10 years in 2000.

The Australian National Herbarium is the core of this facility, housing voucher specimens for research, environmental studies and for the ANBG living collection. Databases support 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 that is developing a national endorsed list of scientific names for Australian plants. It is a key contributor to the *Taxonomy Research and Information Network* and the *Atlas of Living Australia*.

Monitoring

The ANBG's horticultural planting is scientifically 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 to the living specimens and used in public interpretation. New collection accessions help document the occurrence and distribution of plants in Australia.

A specialised database system (the *Integrated Botanical Information System*) helps to maintain essential links between specimens in the herbarium, contemporary scientific literature, the living plants in the gardens and the photographs in *Australian Plant Image Index*.

A team of ANBG staff regularly stocktake its living plant specimens, recording plantings, locations and deaths, plus the overall health of the collection.

Future challenges

Major challenges are:

- ANBG sustainability—defining the operational and business model that will secure sufficient resources to achieve government and national priorities
- developing a new strategic plan for the ANBG, with a long term (50 year) vision, and completing a new management plan in accordance with the EPBC Act
- water management because of the continuing drought and sharp increases in unit water costs in Canberra. Funding of \$1.5 million has been allocated to upgrade water infrastructure. Access to a sustainable supply of non-potable water is fundamental to this upgrade

- integrating climate change considerations into ANBG operational management. This includes the management of water, horticultural practices, Australian plant climate change impacts and adaptation, the education role and the scope of the living collections held in Canberra
- calculating a financial, social and environmental value for the living, herbarium and photograph collections. Valuation will help to ensure the collections are adequately resourced
- maintaining the ANBG's role as a tourist attraction in the face of water restrictions. Lawn-dependent visitor attractions, such as the Friends of the ANBG's summer concerts, will require careful management
- the Centre for Plant Biodiversity Research, which will conclude its current operational and funding agreement on 31 December 2009. The role and effectiveness of the Centre will be reviewed before a new agreement is negotiated between the Director of National Parks and CSIRO
- accommodation space for the collections of the Australian National Herbarium has become critical. The current arrangements with their lack of workable space are becoming dysfunctional. A major capital funding proposal for building extension must be negotiated with both CSIRO and the Department of the Environment, Water, Heritage and the Arts (DEWHA)
- completion of the Australian Plant Census project to produce a list of flowering plant names for the whole of Australia that is endorsed by the Australian Government and the state and territory herbaria. The project coordinator is located at the Australian National Herbarium. Although the project will be ongoing, the first phase is due for completion in 2010, when all families will have been reviewed. So far 244 families representing about 58 per cent of the flowering plants have been treated
- implementing the next phase of *Australia's Virtual Herbarium*. Funding for the first phase has ended and the ANBG is working with state and territory herbaria and museums to build on the project through new national infrastructure proposals
- biodiversity information management as part of the *Atlas of Living Australia* and the *Taxonomic Research and Information Network*. Modern information technology is being engaged to improve the efficiency and productivity of taxonomy and systematics research on the Australian flora.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- · Water management and associated infrastructure
- Ex situ conservation
- · Plant records and census of living plant collection
- Introduction of GIS to living collection management

Actions

- Increase water use efficiency
- · Commence review of the scope and operations of the living collections
- Position the ANBG as a leader in ex situ conservation including seed banking
- · Accelerate census of the living collection
- · Use GIS to accurately map the living collection

Performance results 2007–08

- The ANBG put considerable effort into securing a more sustainable water supply. The Government has committed \$1.5 million to address the ANBG's water infrastructure needs as part of the National Water Security for Towns and Cities program
- Project planning and tender processes for major water infrastructure improvements have been completed and will be implemented next year
- The efficient application of water to garden beds was refined. This included the use of ornamental pools as reservoirs for recycling run-off water from the site, increased use of water-sensors to determine and refine watering regimes and increased use of mulch to reduce evaporation
- An external consultant was engaged to develop a draft framework for a comprehensive review of the ANBG living collection and its interaction with other associated ANBG collections
- Initiated a program for *ex situ* conservation of alpine plants with an emphasis on germplasm storage under controlled and cryogenic conditions. During the year 10 field trips to the Kosciuszko area were undertaken, resulting in 287 seed samples being stored
- The ANBG contributed to a review of seed banking in Australia in cooperation with State and Territory botanic gardens and the Kew Gardens *Millennium Seed Bank* project, with the aim of developing a long term national germplasm strategy

6

- An accelerated stocktake was undertaken to complete a living plant census within the year as input to a comprehensive collection review. Staffing constraints have extended the likely completion date to October 2008
- The intended first phase of the ANBG's GIS implementation has been placed on hold due to funding constraints

KRA2: Cultural heritage management

Major issues

- · Displaying the flora of Australia
- · Education related to the flora of Australia

Actions

- Display the flora of Australia in a horticultural setting
- Provide cultural interpretation and education programs about the Australian flora

Performance results 2007–08

- The ANBG displays about one-third of the plant species occurring naturally in Australia in a managed horticultural setting. Water restrictions imposed during the recent drought placed much of the collection under stress and, coupled with staff losses, resulted in some loss of plant specimens, contraction of planted areas and decline in some horticultural displays
- A project was initiated to develop and document techniques to grow attractive native annuals and Sturt's desert pea (*Clianthus formosus*) as high-impact display plants. The public will be able to view them in spring and summer. Interpretation and horticultural extension will be a major part of this project
- The cultural values of Australian native plants were promoted with exhibitions in the visitor centre and elsewhere in the ANBG: 'Caring for Land', 'Friends School Photographic Exhibition', 'Local Colour', 'Botanical Art Group Exhibition', 'Growing Home, the Street Trees of Canberra', 'A Tree in the Palm of your Hand Bonsai Exhibition' and 'Snakes Alive!'
- 13,208 students attended the ANBG Education Programs, 4,074 families and individuals attended the Snakes Alive Exhibition, totalling 17,282 participants
- Commenced development of an Australian bush food plants trail and redevelopment of the Aboriginal Plant Use Walk
- Distributed approximately 300 copies of the education unit's poster on the floral emblems of Australia to schools and educators on demand

6

KRA4: Visitor management and reserve use

Major issues

- · Visitor management
- Visitor safety

Actions

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

Performance results 2007–08

- Results from two major visitor surveys, conducted in conjunction with the Botanic Gardens of Australia and New Zealand and the National Capital Attractions Association, are being analysed for incorporation into the ANBG strategic planning process
- Implementation of a marketing strategy developed last year has been constrained by available resources
- Development commenced of a new policy on snake management within the public areas of the ANBG in response to the eastern brown snake survey

KRA5: Stakeholders and partnerships

Major issues

- Ongoing support for the Centre for Plant Biodiversity Research (CPBR)
- Servicing DEWHA's need for technical advice on native plants
- Supporting and participating in botanical forums: the Council of Heads of Australasian Herbaria, Council of Heads of Australian Botanic Gardens, Global Biodiversity Information Facility, Taxonomy Research and Information Network, Atlas of Living Australia and Taxonomic Databases Working Group
- The need to develop memoranda of understanding with non-government organisations associated with the ANBG
- Working with, and supporting, the Friends of the ANBG
- Supporting the Australian Cultivar Registration Authority (ACRA), the Australian Network for Plant Conservation (ANPC) and Greening Australia

Actions

- Continue to participate in the joint ANBG–CSIRO Centre for Plant Biodiversity Research
- Undertake and promote services that ANBG and CPBR can provide to DEWHA in the form of technical and expert advice

- Continue the Australian National Herbarium's leadership role in the Council of Heads of Australasian Herbaria
- Continue the ANBG's participation and strategic leadership in the Council of Heads of Australian Botanic Gardens
- Continue strategic partnerships and cooperative data management with the Taxonomic Databases Working Group and the managers of the *Global Biodiversity Information Facility, Taxonomy Research and Information Network, and Atlas of Living Australia*
- Formalise the strong relationship with non-government organisations located on site via memoranda of understandings
- Continue the partnership between the ANBG and the Friends of the ANBG
- Continue hosting on the ANBG website the Greening Australia Community Seedbank, the Australian Cultivar Registration Authority and the Australian Network for Plant Conservation

Performance results 2007–08

- The ANBG maintained its strong ties with CSIRO Plant Industry in jointly managing the Centre for Plant Biodiversity Research and the Australian National Herbarium
- The incorporation of the Atherton Annexe of the Australian National Herbarium into the new Australian Tropical Herbarium in Cairns resulted in new partnerships in its joint management with James Cook University and the Queensland Government Environmental Protection Agency. The Herbarium was opened on 4 March 2008
- The Australian National Herbarium continued to play a coordinating role on behalf of DEWHA for projects undertaken by the Council of Heads of Australasian Herbaria. These included developing weed profiles, endangered species profiles and the Australian Plant Census. The staff also updated profiles for threatened vegetation systems
- Took a leadership role within the Council of Heads of Australian Botanic Gardens by coordinating a climate change workshop. This resulted in a draft national climate change adaptation strategy and action plan for botanic gardens
- Ran a workshop on the role of botanic gardens in climate change education
- Continued membership of technical working groups under the Global Biodiversity
 Information Facility and Taxonomic Databases Working Group
- The CPBR continued its close association with the new *Taxonomy Research and Information Network*, housing its core staff and also participating in projects such as systematic and diversity studies of the weed Lantana and biodiversity information management

- The CPBR and *National Plant Image Index* assisted the new *Atlas of Living Australia* project through providing information technology advice, harvesting data, contributing images and initiating a demonstration on-line species information project featuring mangrove communities
- The ANBG participated in a national workshop on information standards for species profiles for on-line floras, faunas and species fact sheets. This will allow integration and sharing of information across institutions and collaboration in projects such as the *Atlas of Living Australia*
- At year's end, of the four non-government organisations on site only Greening Australia had a formal memorandum of understanding with ANBG
- 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; and supported the ANBG's annual summer concerts in January 2008
- A new initiative between the Friends and the ANBG saw the establishment of the Botanical Resource Centre, a facility for the general public to identify plants using computer tools, microscopes and specimens. The Centre was opened by Her Excellency Mrs Marlena Jeffery on 15 May 2008
- The Australian Cultivar Registration Authority (ACRA), based at the ANBG, documents the nomenclature of cultivated plants. In October 2007, the International Society for Horticultural Science Commission approved the reappointment of ACRA as the official International Registration Authority for Australian plant genera for a further four years. ANBG initiated a strategic planning workshop for ACRA
- The Australian Network for Plant Conservation, based at the ANBG, continued to serve its network of members and provide workshops in plant conservation techniques throughout the country. During the year it produced four editions of its newsletter and ran three workshops
- 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 ground space and irrigation for seedling production

KRA6: Business management

Major issues

- Long term sustainability for the operation of the ANBG
- Budget management
- Staff management
- Risk management

Actions

- Major review of the functions and priorities
- · Ensure business continuity and service delivery
- Manage staff resources efficiently
- Continue ongoing risk assessment

Performance results 2007–08

- An internal review commenced early in the year was discontinued. There was a need for a more comprehensive strategic analysis of the ANBG's role and directions in changing circumstances
- Increases in the costs of water, electricity and maintenance placed considerable strain on the ANBG as savings in other areas are required to cover basic maintenance and running costs
- Increasing costs are affecting the standard of delivery of existing services and the ability to ensure business continuity
- Maintained and improved staff consultation, involvement and capacity building formally (through training, the occupational health and safety committee, staff planning days) and informally (through opportunities for higher duties, informal consultation)
- Damage to buildings and nursery polyhouses from the February 2007 hail-storm continued to affect the Gardens—as insurance claims were not settled within the current year.

KRA7: Biodiversity knowledge management

Major issues

- Curation of the Australian National Herbarium
- Nationally consistent Australian plant names
- Taxonomic botanical research
- Improving access to botanical databases and information management
- Improving access to plant photographs and other images
- Dissemination of botanical information via the web
- Development of species profiles
- Responding to Climate change
- · Developing national collaborative projects

Actions

- Maintain and curate the Australian National Herbarium collections. Make botanical data, information and expertise available to the national and international botanical communities
- Develop and maintain the *Australian Plant Name Index* and the *Australian Plant Census* to define and list all the flowering plants in Australia
- Integrate departmental plant and animal name databases to allow a more consistent management and delivery of biological data
- Undertake taxonomic and systematic research, and publish and disseminate research findings
- Develop and maintain scientific databases of Australian plant information
- Enhance the extensive collection of photos and illustrations of plants and further develop access to the collection using innovative technology
- Promote and provide information about Australian native plants via the internet
- Develop innovative ways to collate data from a range of sources to be presented as 'species profiles'
- Position the ANBG as a leader in the dissemination of information on climate change issues in botanic gardens
- Drive national collaborative biodiversity information management projects

Performance results 2007–08

- Databased 38,518 herbarium specimens and curated approximately 6,000 herbarium specimens, for accession to the *Australia's Virtual Herbarium* project
- Produced and maintained an agreed list of scientific names for Australia's flowering plants through management of the *Australian Plant Name Index* and the national collaborative *Australian Plant Census* project. The project was partially funded through the Natural Heritage Trust and endorsed by Australian Government, State and Territory herbaria
- Consultants and contractors were engaged to redevelop the *Australian Faunal Directory*-managed by the Australian Biological Resources Study for compatibility with the *Australian Plant Name Index*
- Researchers completed scientific papers or publications resulting from research undertaken at the Australian National Herbarium. Areas of study include Australian Orchidaceae, Rutaceae, Myrtaceae, Malvaceae, Santalaceae and the bryophytes
- Research was undertaken to understand ecological function, structure and the small-scale dynamics of grassland communities in south-eastern Australia, using grasslands in the West Wyalong district as model systems. The research particularly focused on understanding the importance of plant community diversity in reducing vulnerability to invasive plant species

- After an extended vacancy, the appointment of a senior systematist to lead the Systematics and Evolution program of the CPBR has injected new vigour into the systematics and taxonomy research programs
- 'Born-digital' images now contribute significantly to the *Australian Plant Image Index* which was previously based on 35 millimetre slides; 4,615 additional images were made available via the web
- Continued to develop the ANBG/CPBR website as the premier online resource for information about Australian plants. The website of about 43,000 pages, provides access to extensive botanical databases. It recorded an average of 41,000 hits each day
- A new configuration of the photographic data allows web search engines to directly deliver images from the database. As a result, about 5,300 named plant photos are accessed each day
- The ANBG and CPBR were involved with developing species profiles for both weeds and threatened species to be delivered via the web. A further initiative to collate such profiles by harvesting a range of data sources is being developed through involvement with the *Atlas of Living Australia* and the *Taxonomy Research and Information Network*
- The ANBG coordinated a national education forum on climate change for botanic gardens throughout the country
- The ANBG and CPBR participated in national and international biodiversity information management and technical infrastructure projects including the *Atlas of Living Australia*, the *Taxonomy Research and Information Network*, the *Australian Plant Census*, the *Australia's Virtual Herbarium* and the *Global Biodiversity Information Facility*

Pacific Highway Bulahdelah Bypass orchid recovery project



Corybas dowlingii, one of the three orchids that are the subject of the Bulahdelah Orchid Recovery Project

In partnership with the NSW Roads and Traffic Authority, the Centre for Plant Biodiversity Research is investigating the biology of three threatened species of orchid, which are affected by the proposed Pacific Highway Upgrade at Bulahdelah in NSW.

Two of the species, *Cryptostylis hunteriana* (leafless tongue orchid) and *Rhizanthella slateri* (eastern Australian underground orchid), are listed under the Commonwealth

Environment Protection and Biodiversity Conservation Act 1999 and *Corybas dowlingii* (red lanterns) is listed under the NSW *Threatened Species Conservation Act 1995*. All occur within, and adjacent to, the proposed highway upgrade site on the lower slopes of Alum Mountain.

The project involves both field and laboratory research on the species to:

- improve our understanding of the requirements for the long-term survival and population sustainability of each species
- provide a basis for and recommendations on the translocation of each species in compliance with the EPBC Act
- support future scientific research on the conservation of these and related species.

All orchids depend on mycorrhizal (symbiotic root-dwelling) fungi for seed germination and maintenance of plants in the wild. The two nationally threatened species being investigated also rely on a range of host plants for their survival. Such complex relationships mean the project is focusing on more than just the orchids themselves.

The field research component of the project involves the location, hand pollination and collection of seeds of the three threatened orchid species at the Bulahdelah site; the isolation, identification and establishment of the nature of the mycorrhizal fungal relationships with each orchid species, and the identity of potential higher plant host species. This information will help identify possible alternative sites on Alum Mountain suitable for translocation of those plants directly affected by the road construction.



Rhizanthella slateri – eastern Australian underground orchid

Already 15 visits have been made to the site to gather data on the life cycle and ecology of each species and to collect samples for research. Further fieldwork will involve translocating some individuals identified within the road footprint, and the identification and assessment of other sites suitable for translocation or re-introduction of laboratory propagated orchids.

Research in the laboratory will involve the isolation, culture and identification

(through DNA sequencing and analysis) of the mycorrhizal fungi associated with the orchids; artificial propagation of the orchids from seed in association with the appropriate mycorrhizal fungus; and, where appropriate, propagation of seedlings of potential host tree and shrub species. As they develop, orchid seedlings will be matched with their associated mycorrhizal fungus and host plant species as units, for re-introduction into appropriate off-road sites at Bulahdelah. Translocated and re-introduced orchids will be monitored by our partners for a period of ten years to assess the results.

The nature of the species and the time constraints involved make this a challenging and ground-breaking project. Its results will be highly significant in understanding the interactions and complexities of these and similar species and in providing answers to crucial questions to support future conservation management.

Taking a lead in responding to climate change



Soil sensors have been installed at the Australian National Botanic Gardens to accurately determine the water needs of the living collection

The Australian National Botanic Gardens (ANBG) is taking action nationally, regionally and locally in response to the challenges of climate change. This includes:

- leading national coordination of education and of *ex situ* plant conservation to support conservation in the wild
- developing an alpine seed collection and research program
- redesigning on-site water management to reduce consumption.

As climate change places greater pressures on the natural ranges and survival of wild populations of plants, Australia's botanic gardens are among the first in the world to take a national approach to supporting plant conservation. The ANBG has facilitated the development of a national climate change adaptation strategy that capitalises on three key strengths of botanic gardens.

The first of these is education. Receiving about 13 million visitors annually, Australia's botanic gardens are places where people, plants and biodiversity come together. As a first step to putting together a national approach to raising community awareness, the ANBG facilitated development of shared key messages around climate change and biodiversity, to be delivered in botanic gardens across the country.

Second, botanic gardens provide a safety net for plant conservation. Seed banks and other living collections offer a living store of genetic diversity. These collections are valuable to a range of taxonomic, species and ecological research and as an insurance policy supporting plant conservation in reserves.

Third, botanic gardens are places of immense knowledge about how to grow and propagate plants. This knowledge underpins efforts to reintroduce species and restore ecosystems. It supports climate change research and provides botanic information towards the management of our reserves.

One of the areas where the ANBG is applying its expertise is in research and conservation of alpine plants. Recognised as one of the 11 Australian centres of plant diversity, the alpine region has been identified among the most vulnerable to climate change. The ANBG has completed its third year of seed collection from critically vulnerable alpine areas, and is laying the groundwork for a collecting and germination research program.

The work will support broader alpine vegetation research, conservation of alpine species and species recovery, where little is currently known. Understanding the effects of a changing climate through germination studies will help develop management strategies to ensure survival and adaptation in the wild.

A changing local climate is also inspiring best-practice water management strategies in the ANBG. To make the most of every drop, the ANBG introduced new soil moisture sensors to be used in conjunction with the computer controlled irrigation system that was commissioned in 2006. The sensors help staff understand how quickly the soil is getting wet and how deep the water goes. Staff members are monitoring water use more effectively and ensuring each area is watered at just the right level and the right time to meet plant needs.

Other water-saving initiatives already in place in the gardens include recycling water in the pond systems and nursery, minimising watering on lawns, and collecting water from buildings for the Growing Friends nursery.

The ANBG's achievements this year form a strong foundation for future work that will make a difference in response to climate change.

Booderee National Park

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



Special features

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

Booderee National Park is of great

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

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

Location	Latitude 35° 09' South, Longitude 150°39' East	
Area	6,379 hectares (including a marine area of 875 hectares)	
Proclamation date	4 March 1992	
IUCN category	Category II overall (botanic gardens Category IV)	
Biogeographic context	Interim Biogeographic Regionalisation for Australia region: Sydney Basin	
Management plan	First plan expires 3 April 2009	

Other significant management documents	Management Plan Implementation Schedule; Risk Assessment And Management Schedule; fire and pest management strategies; Memorandum of Understanding with NSW Rural Fire Service; draft Memorandum of Understanding with the Department of Defence; Botanic Gardens' Collections Policy; Joint Training Strategy with the Wreck Bay Aboriginal Community Council and Wreck Bay Enterprises Ltd; Cultural Heritage Strategy in preparation		
Financial	Operating	\$6.909 million	
	Capital	\$0.814 million	
	Revenue	\$1.231 million	
	Paid to traditional owners	\$0.493 million	
Visitors	400,000 (estimated)		
Permits	21 commercial tour operators, 9 research, 3 wedding celebrants		

International conventions and agreements		
Wetlands (Ramsar) Convention	Nomination in preparation	
Migratory Species (Bonn) Convention	27 of 105 listed Australian species	
China–Australia Migratory Birds Agreement	20 of 81 listed species	
Japan–Australia Migratory Birds Agreement	23 of 77 listed species	
Korea–Australia Migratory Birds Agreement	15 of 59 listed species	

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

Listed flora	Species	1 vulnerable: magenta lilly-pilly (Syzygium paniculatum)
	Recovery	1 in preparation: magenta lilly-pilly (<i>Syzygium</i>
	pians	paniculatum) ^(w)
Heritage	On Commonwealth Heritage List (part of several listings)	

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

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

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

Board of management

The Booderee National Park Board of Management has 12 members, including seven representatives nominated by the Wreck Bay Aboriginal Community Council. The board oversees preparation and implementation of the park's management plan. The current plan expires in 2009 and the board will commence preparation of a draft management plan in early 2008–09.

Monitoring

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

Threatened and listed species monitoring continued with a focus on birds including the eastern bristlebird (*Dasyornis brachypterus*), sooty oystercatcher (*Haemotopus fuliginosus*) and little penguin (*Eudyptula minor*). A number of research projects commenced through the partnership between the Australian National University and the park funded by an ARC Linkage Grant, including two full time PhD students. The first study commenced in March 2007 on amphibians in the park and the data will provide a valuable baseline for examining possible climate change impacts. Another commenced in 2008 examining aspects of the ecology of the eastern chestnut mouse (*Pseudomys gracilicaudatus*), a rare species recently discovered in the Park, its habitat requirements and its relationship to fire and other mammal species.

Wildlife monitoring also continued to focus on the effectiveness of regular fox baiting and long-term impacts of the 2003 Windermere and 2007 Cave Beach fires, particularly on long-nosed bandicoots (*Perameles nasuta*) and eastern bristlebirds.

In November 2007 a study commenced to examine the combined effects of fire, bitou bush, and wallaby grazing on native plant regeneration. This study compares the response of native vegetation in plots that have been fenced-off from wallabies, with unfenced plots in a bitou infested area that has been treated with herbicide and subsequently burnt. Early results suggest that wallabies have a major suppressive effect on the number of plant species and the abundance of individual plant species.

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

Future challenges

Major challenges are:

- continuing to improve control measures for key threats on Bowen Island, and for bitou bush and foxes throughout the park
- addressing the park's isolation from adjacent natural areas due to development pressures in the region
- progressing the cultural centre
- identifying ways of replacing critical ageing assets (notably the visitor information centre)
- implementing the cultural heritage strategy's recommendations
- implementing the training strategy
- progressing service level agreements and contracting opportunities with the community to an agreed timetable
- identifying impacts and possible actions to address climate change.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

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

Actions

- Manage the feral animal control program with emphasis on regional fox control, control of bait-shy individual foxes, and introduction of alternative fox control methods
- Coordinate a meeting for Jervis Bay Region landholders to discuss fox control
- Develop safer integrated management techniques (aerial spraying and fire) for bitou control. Refine integrated control measures (fire, spraying, rehabilitation) and monitor ecological impacts of these control measures
- Control the spread of kikuyu grass (*Pennisetum clandestinum*) on Bowen Island, and increase community involvement
- Continue to implement an ecologically appropriate and safe fire management program and upgrade training and monitoring to cope with larger, more intense fires
- Continue to consult with agencies on the regional value of the park, the importance of maintaining habitat corridors and links with other natural areas, and possible impacts of development
- Work with researchers to better understand potential impacts of climate change on the park

Performance results 2007–08

- The exceptional natural recovery after the intense wildfires of 2003–04 continued. Biodiversity monitoring continues to indicate a healthy environment with indicator species stable or increasing. However, for the third year running, the threatened green and golden bell frog was not recorded in the park
- Coordinated a fox control meeting for Jervis Bay Region stakeholders
 on 6 February 2008
- High numbers of key indicator species (long-nosed bandicoot and eastern bristlebird) suggest that fox baiting is succeeding. Initial research suggests that optimum recovery of indicator species may be achieved if fox control is carried out soon after a wildfire
- Maintained native plantings and re-established penguin nesting habitat on Bowen Island
- Trained five new crew leaders and updated fire training standards with a new fire officer

KRA2: Cultural heritage management

Major issues

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

Actions

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

Performance results 2007–08

- Conducted cultural interpretation sessions as part of the spring, summer and autumn school holiday activities programs
- Maintained the cultural heritage GIS held by the Wreck Bay Aboriginal community
- Began construction of new signage, and walking trails at Booderee Botanic Gardens
- · Finalised a draft cultural heritage strategy
- Continued the Junior Ranger program at Jervis Bay School
- Developed a Memorandum of Understanding (MoU) with the Jervis Bay School to formalise the Junior Ranger Program

KRA3: Joint management

Major issues

- Meeting the obligations of the lease agreement
- Progressing contracting arrangements between the park and Wreck Bay Aboriginal community to an agreed timetable
- Implementing the management plan

Actions

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

Performance results 2007–08

- Reviewed ongoing service level agreements for road and fire trail maintenance and entry station services
- · Reviewed the service level agreement for cleaning park and staff facilities
- Wreck Bay Enterprises Ltd contractors undertook \$512,000 of capital works in the park, including road and walking track upgrades, construction of shelters, and a major upgrade of Murray's Boat Ramp and parking facilities
- · Upgraded and refined the management plan implementation database
- Three Koori staff have been acting in management/supervisory positions
- A community member won a placement in the Canberra office's Indigenous Policy and Coordination Section for 6 months as part of the Indigenous Secondment Program
- Annual management plan implementation schedule was not reported to the Board of Management as it has not met this year
- Preliminary work commenced on the new management plan process

KRA4: Visitor management and reserve use

Major issues

6

- Increasing visitors' awareness of the park's natural and cultural values
- Providing infrastructure to facilitate appropriate and safe use of the park, while protecting conservation values
- · Deteriorating condition of the visitor centre
- Maintaining visitor numbers and revenue base in an increasingly competitive domestic tourism market

Actions

- Include conservation and cultural themes in interpretation programs
- Maintain campgrounds and public facilities and infrastructure to a high standard
- Monitor visitor numbers and experiences

- Continue to educate visitors about recreational fishing catch limits and marine zone restrictions and to enforce legislation where appropriate
- Renovate the visitor centre and plan for its replacement
- Manage risk through the park risk watch list and ParkSafe

Performance results 2007–08

- Delivered 122 school holiday interpretation sessions, focussing on Aboriginal cultural values and conservation themes, with 3,401 attendees. A further 50 interpretation sessions were delivered to primary schools, high schools and special interest groups, with 1,289 attendees in total
- The Park won a Keep Australia Beautiful, Environmental Protection Award for Murray's Beach
- A series of short trip and day trip itineraries were produced for the park and posted on its website to assist visitors plan trips in advance
- Jervis Bay Territory declared plastic bag free, with the support of all governmental agencies and local shop owners/managers. Booderee National Park organised and supplied the alternative shopping bags
- Booderee National Park website upgraded and re-launched in June 2008
- Completed repairs to visitor infrastructure damaged by the Cave Beach fire of October 2007 and the storm in June 2007
- Upgraded visitor facilities including the Green Patch and Bristol Point amenities blocks and Bristol Point water mains; Booderee Botanic Gardens walking trails and bridges, visitor information signs, and roads and management trails. Installed water and electricity saving devices in all public amenities. Completed work on two new public shelters
- Recorded generally high levels of compliance with marine zoning scheme and catch limits but there continues to be a problem with a small number of fishers taking commercial quantities of squid. Successful prosecution actions were completed for detected and repeated breaches of recreational fishing bag limits
- Continued to monitor visitor numbers and purchased enhanced visitor data analysis software and hardware to improve understanding of visitor trends and issues
- Completed some minor refurbishment of the visitor centre. Concept design and business case development are under way for eventual replacement or major refurbishment, with capacity to include a cultural centre
- Completed job safety analysis on a range of higher risk functions

6

KRA5: Stakeholders and partnerships

Major issues

- Continuing the cooperative arrangements between the park, the NSW National Parks and Wildlife Service, the Jervis Bay Marine Park and the Department of Defence
- · Building strong cooperative arrangements with universities
- · Monitoring of recovery of biodiversity after fire

Actions

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

Performance results 2007–08

- Continued cooperative arrangements with adjacent agencies, including NSW National Parks and Wildlife Service, Jervis Bay Marine Park, NSW Fisheries and Department of Defence. Booderee continued to lead regional fox management
- Issued 17 research permits in postgraduate conservation fields in accordance with the management plan. Cooperative undergraduate and postgraduate programs operated with the University of Wollongong, the University of Canberra and the Australian National University
- Completed negotiations between the park and the Department of Defence on a Memorandum of Understanding covering day-to-day operations and relationships between the parties, for consideration by the Board of Management
- Commenced Community Development Employment Projects at Booderee Botanic Gardens, involving Wreck Bay youth, and supported Vincentia High School's students at risk program through work experience
- Supported youth at risk programs with the NSW Police Force
- Conducted 21 Parkcare activities, including post-fire rehabilitation, weed removal, marine surveys and rehabilitating little penguin nesting habitat
- Continued membership of, and involvement with, regional tourism organisations
- Participated in an accreditation process through the Caravan and Camping Industry Association NSW Gumnut Awards for commitment to environmental sustainability and socially responsible management. The park received a bronze award in 2007–08, and is working towards gold

KRA6: Business management

Major issues

- Ensuring that, in accordance with Investors in People policy, staff have all the necessary skills to do their jobs
- Trends in revenue
- Implementing the management plan
- Managing the budget to accommodate increased salary and contracting costs

Actions

- · Increased emphasis on training identified in personal development plans
- Work to the annual implementation plan and report the results
- · Continue to monitor the park's revenue trend
- · Identify budget savings and efficiencies wherever possible

Performance results 2007–08

- Offered training in line with personal development plans, with emphasis on contract and project management, fire preparedness/fighting and supervisory and management skills
- Revenue figures maintained in excess of \$1 million
- Continued vigilance in the collection of entry and camping fees, with particular emphasis on increased compliance at the entry station
- Reviewed and updated the annual implementation plan as necessary
- Reviewed the performance framework and measures. The park is taking part in a trial of best practice performance management systems with the University of Queensland
- Formed a Carbon Footprint working group, implemented power and water conservation measures and engaged a consultant to undertake the park's first Carbon Emissions Audit (see case study on page 88)

Reducing our carbon footprint at Booderee National Park



Solar panels have been installed in the park for electricity generation

In 2007 a group of motivated and ecologically committed Booderee staff banded together in an attempt to *Think Globally but Act Locally*.

The stated objective was to take action to minimise the carbon footprint of both Booderee National Park and the Jervis Bay Territory by identifying and adopting a range of power and water conservation measures and developing ecologically sustainable waste reduction practices.

A Carbon Footprint Working Group was formed to workshop ideas, undertake research and identify some achievable and measurable short and long-term actions. A communications strategy was also formulated to publicise these initiatives to other staff, and to the public through the website and on information boards around the park.

Some initial and immediate short-term actions were rolled out including:

- a changeover to high efficiency electric barbeques in visitor areas
- trialling of waterless urinals in visitor amenities and staff offices
- installation of water flow restrictors on all public outdoor taps
- · installation of flow restricted taps inside public amenities
- · reduction in lighting at campground amenities
- installation of hot water touchpads in campground showers to reduce water and power consumption
- closure of under-utilised amenities in the non-peak season to save power, water and cleaning costs
- · installation of timed motion-sensor lighting in key areas
- improved plumbing response times for water system leakages
- upgraded irrigation system in the Booderee Botanic Garden
- a dedicated 'switch off' program in all staff offices.

These initiatives had an immediate and dramatic impact with a 50 per cent reduction in water use and a 40 per cent reduction in electricity used within the park.

The working group then sought and gained management support to engage a consulting firm to undertake Booderee's first formal Carbon Emissions Audit.

The Audit was conducted in May 2008, calculating the volume of Carbon Dioxide Equivalent emissions throughout a defined area of activities, following the reporting scopes of the Greenhouse Gas protocols and ISO standard 14064-1.

Booderee National Park was identified as contributing 731.4 tonnes of carbon emissions for the audited period. Of this total 28 per cent was Scope 1 – Direct energy use (including use of all park vehicles), 32 per cent was scope 2 (indirect emissions from purchased electricity) and approx. 40 per cent was scope 3 (indirect emissions) mainly generated through waste collections throughout the park.



Figure 5 – Identified sources of carbon emissions during audit

Some priority areas have now been identified to further reduce carbon outputs including:

- · possible reduction of the park vehicle fleet
- more intensive turn-off campaign for lights, unnecessary hot water heaters, computers, monitors and other electrical equipment
- possible transfer of all of Jervis Bay Territory to 100 per cent Green Power
- staged rollout of sensor lighting and voltage control equipment
- intensive waste management and reduction program
- development of strategies to reduce consumables (printed paper products).

It was estimated that the cost of Carbon Offsets for Booderee National Park over the previous 12 months for all Scope 1, 2 and 3 emissions would be approximately \$15,000. This was based on an indicative cost of \$20 per tonne.

Booderee's Carbon Footprint Working Group will spend the next financial year implementing as many of these recommendations as possible, including the ongoing investigations of ways to assist visitors to the park to offset their carbon emissions during their visit to Booderee.

Christmas Island National Park

www.environment.gov.au/parks/christmas



Special features

Christmas Island is home to a unique rainforest ecosystem that supports very high biodiversity, with at least 225 species of endemic animals and 25 species of endemic plants. The Island includes the last remaining nesting habitat of the endangered Abbott's booby (*Papasula abbotti*), and an extraordinary diversity and abundance of land crabs. The island is renowned for its annual crab migration, when up to 50 million red crabs (*Gecarcoidea natalis*) march to the sea to spawn.

The marine environment of Christmas Island includes coral reef systems and provides habitat for an estimated 607 fish species, including whale sharks (*Rhincodon typus*) which are found in waters around Christmas Island around November to May each year.

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	The Christmas Island Mine-site to Forest Rehabilitation (CIMFR); Invasive Ants on Christmas Island Action Plan; Management Plan Technical Audit and Risk Watch Assessment List. Weed Management Strategy 2005–2009			
Financial	Operating	\$3.468 million		
	Capital	\$0.096 million		
	Revenue	\$1.809 million		
Visitors	600 (estimated)			
Permits	6 photography, 7 research; 2 others (e.g. camping, works)			

International conventions and agreements			
Wetlands (Ramsar) Convention	The Dales and a small landlocked mangrove forest at Hosnies Spring are listed under the convention		
Migratory Species (Bonn) Convention	31 of 105 listed species		
China–Australia Migratory Birds Agreement	48 of 81 listed species		
Japan–Australia Migratory Birds Agreement	45 of 77 listed species		
Korea–Australia Migratory Birds Agreement	40 of 59 listed species		

Environment Protection and Biodiversity Conservation Act 1999			
Listed fauna	Species	2 extinct 1 critically endangered 4 endangered 7 vulnerable 63 migratory 92 marine	
	Recovery plans	10 plans being implemented: Christmas Island shrew (<i>Crocidura attenuata trichura</i>); Christmas Island pipistrelle (<i>Pipistrellus murrayi</i>); Abbott's booby (<i>Papasula abbotti</i>); Christmas Island goshawk (<i>Accipiter fasciatus natalis</i>); Christmas Island frigatebird (<i>Fregata andrewsi</i>); Christmas Island hawk-owl (<i>Ninox natalis</i>); marine turtles; whale shark (<i>Rhincodon typus</i>); Christmas Island gecko (<i>Lepidodactylus listeri</i>); pink blind snake (<i>Ramphotyphlops exocoeti</i>) 2 awaiting preparation: emerald dove (<i>Chalcophaps indica natalis</i>) and Christmas Island thrush (<i>Turdus poliocephalus erythropleurus</i>)	
Listed flora	Species	2 critically endangered 1 endangered	
	Recovery plans	 2 being partially implemented: Asplenium listeri; Tectaria devexa var. minor 1 awaiting preparation: Pneumatopteris truncata 4 species being assessed for nomination: Asystasia alba, Amaracarpus pubescens, Cycas rumphii, Pteropus natalis These species will be included in a regional recovery plan for the island 	
Heritage	On Commonwealth Heritage List (as part of a wider listing of the island's natural areas)		

Numbers of native species recorded						
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants	
3 (3)	95 (16)	9 (9)	607 (35) marine, 3 freshwater	over 2,000 (198)	213 (91)	

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

Advisory and consultative groups

The Christmas Island Crazy Ant Scientific Advisory Panel (CASAP) reformed in 2008. The purpose of the CASAP is to provide scientific and technical advice to Parks Australia to inform the Crazy Ant Management Strategy.

Parks Australia is a member of the Christmas Island Tourism Association (CITA) Executive, Destination: Christmas Island Steering Committee, Christmas Island Central Roads Authority and Christmas Island Emergency Management Committee.

Monitoring

The bi-annual Island Wide Survey aims to determine effectiveness of the crazy ant control program, determine areas for future control, and assess red crab numbers. The survey also provides an opportunity for collecting distribution information for other native and invasive species.

The distribution of Pipistrelle bats (*Pipistrellus murrayi*) is monitored as part of the recovery plan for this critically endangered species. This program is under review to determine if the apparent decline in population numbers is due to a decreased population or population movement to other foraging and roosting areas.

Other programs include monitoring the success of the forest rehabilitation program, a reptile distribution and abundance survey (conducted by park staff and researchers) and a fish fauna survey (conducted by researchers from James Cook University).

Future challenges

Major challenges are:

- reducing the impacts that yellow crazy ants (*Anoplolepis gracilipes*) have on biodiversity through integrated control strategies, while reducing impacts of control programs on non-target species. Funding of approximately \$4 million was provided in the May 2007 budget, for financial years 2007–2008 to 2010–11, to be used for investigation and/or development of alternative baits, implement aerial and ground baiting and conduct research into bio-control options
- determining the reasons for the decline in terrestrial biodiversity, particularly for reptiles and the pipistrelle bat. Implementing appropriate and feasible threat mitigation programs to reduce this decline
- continuing the implementation of the Christmas Island Mine-site to Forest Rehabilitation (CIMFR) program. The Memorandum of Understanding for the CIMFR with the Attorney-General's Department was extended to February 2010
- controlling woody weeds. Although the control effort for woody weeds has increased substantially, further resources will be necessary to bring major weed species under long-term control
- contributing to an economically and environmentally sustainable future for Christmas Island by supporting the development of appropriate tourism opportunities and infrastructure.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Developing effective integrated strategies for yellow crazy ant management
- · Continuing management of high priority weed species
- Reducing impacts on threatened species and biodiversity decline by implementing recovery and threat mitigation actions
- Reducing crab mortality from traffic
- Developing management strategies for the marine areas of the park, in collaboration with State management agencies

Actions

- Yellow crazy ants:
 - Island Wide Survey completed in 2007
 - reestablish the Crazy Ant Scientific Advisory Panel (CASAP)
 - finalise research proposal for bio-control of scale insects
- · Undertake rehabilitation works of former minesite areas
- · Control invasive weed species
- · Implement actions from recovery plans, including for the pipistrelle bat
- Prepare a Christmas Island regional recovery plan issues paper for terrestrial biodiversity
- Implement road management strategies (underpasses and bridges) for the management of red crabs during migration time
- Conduct reptile survey
- Support the Inaugural Indian Ocean Seabird Conference
- Facilitate and support research projects, including seabird research, and a fish species marine survey

6

Performance results 2007-08

- · Treated 120 hectares of yellow crazy ant super-colonies
- · Crazy ant bio-control research proposal finalised and contractor selected
- Completed earthworks and planted 22,000 trees on 25 hectares of former phosphate mine located in the park
- Treated 190 hectares of invasive woody weed species
- · Implemented actions from existing recovery plans
- The distribution and abundance of some reptile species declined
- The status of the Pipistrelle bat remains critically endangered

KRA4: Visitor management and reserve use

Major issues

- Developing island-wide approaches to the development of tourism consistent with the protection of the park values, while providing visitors with opportunities for safe and high quality nature-based experiences
- · Maintaining existing visitor infrastructure

Actions

- Continue participation on the CITA Executive
- Participate in the Christmas Island Tourism Destination Development forum
- Maintain, and where possible improve, roads, trails, viewpoints and interpretive material, including production of new interpretative materials
- Support film crews and journalists working in the park

Performance results 2007-08

- Attended CITA meetings
- Membership on the Destination: Christmas Island Steering Committee to oversee the implementation of the Tourism Destinations Development Report
- Kept clear approximately 60 kilometres of unsurfaced roads and tracks
- Produced interpretive brochures on Christmas Island species, including a new brochure on reptiles
- Assisted six film crews (Australian and international) and journalists publicising the island's biodiversity and conservation values

KRA5: Stakeholders and partnerships

Major issues

- · Progressing feral cat management with stakeholders
- Effectively engaging and collaborating with stakeholders in aspects of the management of the park

Actions

- Provide in-kind and field support for visiting scientists
- Undertake consultation and planning sessions with stakeholders and technical experts for the preparation of the Fourth Management Plan
- Deliver educational sessions for students from the Christmas Island District High School (CIDHS)
- Continue co-operative arrangements with the Shire of Christmas Island and Christmas Island Phosphates Pty Ltd for cat control, and investigate options and potential for a feral cat control program

Performance results 2007-08

- Supported visiting scientists and state government officers undertaking research projects into seabirds, crabs, and marine surveys
- Park and conservation management focused educational sessions held with students from the CIDHS
- Held meetings with stakeholders to prepare the Fourth Management Plan including the Christmas Island Tourism Association, the Shire of Christmas Island, Christmas Island Phosphates and WA Government agencies and researchers, including the Indian Ocean Seabird Conference participants
- Continued co-operative approach for cat control with the Shire of Christmas Island and Christmas Island Phosphates. Negotiations in support of a feral cat control baiting trial proposed by DEWHA (Invasive Species Unit) have made progress

KRA6: Business management

Major issues

- Delivering quality management services within a limited budget
- Insufficient funding to meet all actions set out in the Third Management Plan
- Ensuring up-to-date governance and management strategies are in place

Actions

- Maintain park management services within budget
- Begin preparation of the Fourth Management Plan
- Undertake organisational review to optimise staff structures, operations and resource allocation

- Managed operational and capital budgets within approved parameters
- Organisational review undertaken and finalised, changing staff structure, functions and levels
- Preparation of the management plan continued with stakeholder consultation and preliminary drafting

Invasive weed management program on Christmas Island



Park staff removing weed - Delonix regia (poinciana or flame tree)

The Weed Management Strategy for Christmas Island 2004–2009 lists 31 species as being priority weeds for control, as they threaten the Island's native plant and animal biodiversity, including endemic species. Approximately 46 per cent of the exotic species found on Christmas Island have been listed by various agencies as environmental, noxious, threatening, or invasive weeds.

To help address this issue, Natural

Heritage Trust funding was obtained from the Australian Government in 2005–07 to assist in controlling priority weeds. This year the Christmas Island National Park weed control program targeted 18 high priority weed species, including candlenut (*Aleurites moluccana*) and false curry tree (*Clausena excavata*).

The program required a combination of control methods, including hand pulling, foliar spraying, and cut and swab techniques. This intensive work is aimed at controlling areas previously treated for weeds, and the first-time suppression of new infestations. Revisiting areas treated in the previous year enables staff to detect and control adult and fruiting trees that were missed in 2005–07, and treat any seedlings that have since germinated. Follow-up visits have also extended into surrounding areas to detect and control new satellite weed infestations, if any exist.

A small number of new weed infestations were detected during the 2007 Island Wide Survey, which is primarily used as a means of monitoring the distribution and impacts of yellow crazy ant (*Anoplolepis gracilipes*). Areas identified during the 2007 survey as requiring intervention were treated during the 2007–08 weed control program.

190 hectares of weeds were successfully treated in 2007–08, in areas of intact rainforest and older rainforest rehabilitation fields. The plateau rainforest is the prime habitat for nesting Abbott's boobies (*Papasula abbotti*), which are listed as Endangered under the EPBC Act. Major weed infestations still exist elsewhere on the island, and the size and location of some of these infestations will make

them difficult to access, treat and control. The current weed control program aims to protect areas of high conservation value, maximising the effectiveness of current resources, while monitoring the location and spread of potential future weed threats.

The Weed Management Strategy will be reviewed in 2008–09, and will continue to focus on an island-wide approach. This allows the park to identify and control weed infestations of greatest risk to the environmental values of the island, and to determine the extent of resources necessary to effectively manage invasive plant species.

Tourism–the park's role in future economic development of Christmas Island



Whale sharks are known to frequently inhabit the waters of Christmas Island during their migration

With phosphate mining operations expected to cease by 2019 at the end of the current mine lease, development of alternate economic activities are essential for Christmas Island's future. With its unique set of environmental values, nature-based tourism is an obvious focus. Christmas Island National Park occupies 63 per cent of the island's land area, and much of the fringing coral reef surrounding the island. The park is

therefore ideally placed to play a key role in tourism development.

Parks Australia participated in the Christmas Island Destination Development Workshop in December 2007, where representatives from business, community organisations, government and individuals discussed the vision for future Christmas Island tourism. An outcome of the workshop was a draft plan, focussed on attracting low volume, high yield tourism as a basis for enhancing the industry's ongoing contribution to the Island's economy, and ensuring that the products and experiences on offer align with the brand.

The Christmas Island Tourism Association, tour operators and bird experts have developed successful tourism ventures around the Island's iconic bird life. For example, Bird Week is held during September each year and the inaugural Indian Ocean Seabird Conference was held in April this year.

The annual red crab migration attracts tourists, journalists and filmmakers from around the world to experience this unique natural phenomenon. Divers regularly visit the Island to experience the diversity of marine life in the surrounding waters, including the annual appearance of migrating whale sharks, and the island's spectacular drop-offs and clear waters.

The range of endemic flora and fauna, set in Christmas Island's unique limestone terraces and rainforest, provides the opportunity for iconic wildlife experiences.

Parks Australia's role in the conservation of the natural values of Christmas Island is critical to the development of opportunities suited to nature-loving experience seekers, the Island's target market. As well as managing the island's natural values, management of visitor infrastructure and walking trails, support for tour guide training, development of interpretation and education initiatives, and management of permit compliance activities are also important for the future of tourism on Christmas Island.

Christmas Island Mine-site to Forest Rehabilitation (CIMFR)



Field Supervisor Steve Mackell undertaking CIMFR monitoring activities.

Phosphate mining has occurred on Christmas Island since 1899, but it was not until the 1970's that the British Phosphate Commission commenced trial plantings of native and exotic species to rehabilitate abandoned mined out areas.

In 1991, the Australian National Parks and Wildlife Service (ANPWS), now Parks Australia, took on the task of mine-site rehabilitation on Christmas Island. Of particular concern to ANPWS

were the results of the Abbott's Booby Monitoring Program, undertaken from 1983 to 1989. These surveys indicated that the nesting success of this endangered bird was affected by increased wind turbulence resulting from the deforestation of adjacent mine sites. Replanting of these areas was recommended to restore native vegetation towards reducing wind turbulence around nearby nesting sites.

The Christmas Island Mine-site to Forest Rehabilitation (CIMFR) program is based on enhancing and creating habitat for the Abbott's booby and other native, threatened, and endemic species. The strategy and methodology is underpinned by reviews of rehabilitation techniques in 2000 and 2005 and a Memorandum of Understanding (MoU) between the Australian Government Attorney General's Department (AGD) and the Director of National Parks. The MoU provides for the rehabilitation of former abandoned mine-sites in Christmas Island National Park using funds from the Attorney General's Department based on the conservation levy paid each quarter by the local mining company–Christmas Island Phosphates Pty Ltd–for conservation and rehabilitation activities.

The program uses best practice rehabilitation techniques created by one of the world's leading mine-site rehabilitation bodies, the Centre for Mined Land Rehabilitation. The method involves the propagation, and sequential planting of a wide range of native rainforest seedlings into abandoned mined-out areas, after earthworks to add soil from unwanted stockpiles. Rehabilitated sites then undergo a period of maintenance (application of fertiliser and weed suppression) and monitoring of vegetation, fauna and soils. It takes approximately seven years from collecting the first seed to releasing a rehabilitated site from active maintenance. The CIMFR program has to be confident that the site is robust enough to withstand future weed invasions, the natural nutrient cycle is well established, and the vegetation community is on a successional path to becoming a well developed tropical rainforest, in both structure and floristics.



Park rehabilitation crew planting at the forest edge.

Since 1998, approximately 144 hectares have been planted by Parks Australia, with 13 hectares of new primary planting and 13 hectares of secondary plantings in 2007–08. There are currently over 100 hectares under active maintenance by the rehabilitation program. Christmas Island Mine-site to Forest Rehabilitation funding for 2007–08 was \$1.18 million, and proposed future funding for the program is \$2.05 million over the next year and a half (the current MoU ends in February 2010).

Kakadu National Park

www.environment.gov.au/parks/kakadu



Special features

Kakadu National Park is inscribed on the World Heritage List for both its natural and cultural values. 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 almost an entire major tropical river catchment (the South Alligator River catchment) and large representative examples of the wet-dry tropical ecosystems of northern Australia. Major landforms in the park include the sandstone plateau and escarpment, extensive areas of savanna woodlands, monsoon forest, riverine and riparian environments, billabongs, floodplains, mangroves and mudflats.

Location	Latitude 13°29' South, Longitude 132°26' East		
Area	1,979,767 hectares ^(a)		
Proclamation dates	5 April 1979, 28 February 1984, 12 June 1987, 22 November 1989, 24 June 1991 and 26 May 2007.		
IUCN category	Category II		
Biogeographic context	Located in the wet-dry tropics		
	Interim Biogeographic Regionalisation for Australia regions:		
	Darwin Coastal; Arnhem Plateau; Pine Creek		
Management plan	Fifth plan expires 1 January 2014		
Other significant	Shared Vision for Tourism; district fire management plans;		
management documents	Crocodile Management Strategy, feral species management plans;		
	Gunlom Mine Sites Rehabilitation Strategy		

Financial	Operating	\$20.554 million	
	Capital	\$2.141 million	
	Revenue	\$1.217 million	
	Paid to traditional owners	\$1.627 million	
Visitors	227,262 visitors (May 2007–April 2008)		
Permits	104 Film and photography (July 2007–June 2008)		
	108 Commercial tour operator permits issued (April 2007–March 2008) 31 Research; 662 Bushwalking (July 2007–June 2008)		

(a) The area of Kakadu was adjusted in 2007, taking into account more accurate survey data provided by the NT Government. This figure includes a number of old mining leases in the south of Kakadu, incorporated into the park in May 2007.

International conventions and agreements			
World Heritage Convention	Listed under cultural criteria (i) and (vi) and natural criteria (ii), (iii) and (iv), recognising the park's outstanding natural and cultural values		
Wetlands (Ramsar) Convention	1,375,940 hectares of wetlands are listed (683,000 hectares in stage 1 and components of stage 3 plus 692,940 hectares in stage 2)		
Migratory Species (Bonn) Convention	39 of 105 listed Australian species		
China–Australia Migratory Birds Agreement	51 of 81 listed species		
Japan–Australia Migratory Birds Agreement	49 of 77 listed species		
Korea–Australia Migratory Birds Agreement	41 of 59 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	
		8 endangered	
		11 vulnerable	
		108 migratory	
		114 marine	
	Recovery plans	 3 being implemented: golden bandicoot (Isoodon auratus) and golden-backed tree rat (Mesembriomys macrurus); eastern partridge pigeon (Geophaps smithii smithii), crested shrike tit (Falcunculus frontatus whitei) and northern masked owl (Tyto novaehollandiae kimberli); marine turtles 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	1 critically endangered 2 vulnerable	
	Recovery plans	1 in preparation: multi-species boronia	
Heritage	On National	Heritage List	

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

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

Board of management

The Minister for the Environment, Heritage and the Arts appoints members to the Kakadu National Park Board of Management. The board has 15 members, ten of whom are appointed as representatives of the park's traditional owners, representing the geographic spread of Aboriginal people in the region and the major language groupings. The remaining members are the Director of National Parks, the Assistant Secretary Parks Australia North, nominees with environmental and tourism expertise, and a nominee of the NT Government. Following the resignation of a nominee with environmental expertise last year, a process was commenced to engage a replacement. The current board has served three years of its five-year term.

Monitoring

Monitoring and control continued for introduced plants including *Mimosa pigra*, mission grass (*Pennisetum polystachion*), olive hymenachne (*Hymenachne amplexicaulis*), salvinia (*Salvinia molesta*) at Yellow Water and gamba grass (*Andropogon gayanus*). Of these, salvinia and mission grass continue to be major challenges for the park. In previous years, weevils have proved effective in controlling salvinia but in the last 12 months, insufficient numbers of weevils were available for collection. Two relatively new weed species were also targeted in the park: snakeweed (*Stachytarphetta*) and knobweed (*Hyptis capitata*). In Jabiru township, park staff collaborated with the Jabiru Town Development Authority and Energy Resources Australia in the Weedy Time Bomb Project, which addressed prominent weed species introduced into domestic gardens.

The main feral pest activity concerned ground level shooting of pigs and buffaloes. There were no instances of introduced invasive ants, such as big-headed ants (*Pheidole megacephala*) or ginger ants (*Solenopsis geminata*).

Studies of estuarine crocodile (*Crocodylus porosus*) populations and nesting flatback turtles (*Natator depressus*) in coastal areas of the park continued. A review of crocodile survey data gathered over 10 years has been finalised.

The second phase of the major program for monitoring broad-scale trends in Kakadu's fauna commenced in 2007. This program involves undertaking fauna surveys at 134 fireplots in the park, which were initially set up to monitor the impacts of fire on different vegetation types. This program links fauna monitoring with monitoring of fire and vegetation, and allows investigation of trends in a regional context, as comparable monitoring also takes place at Litchfield and Nitmiluk National Parks.

A major collaborative project with the Northern Territory Biodiversity Conservation Division commenced in 2008. This project involves undertaking targeted surveys of threatened species in recognised biodiversity hotspots in the park, largely in the Arnhem Land Plateau. The first survey in this 3 year project was completed in May 2008 and involved Kakadu National Park staff, NT Government staff, a neighbouring indigenous ranger group and senior traditional owners from Arnhem Land.

These programs indicate there is a significant ongoing decline in some mammal species across northern Australia, including within the park. The park is continuing to support research and monitoring to try and determine the cause(s) of these declines.

Fire management and monitoring was undertaken throughout the park, based on a strategic framework of regular data collection and inter-district meetings. The Stone Country Burning Program was again implemented, following the positive results last year in prevention of late dry season intense fires and involvement by Bininj in bushwalking/burning activities. The intention of the program is to establish an appropriate fire regime to protect sensitive biodiversity values and facilitate cultural activities on country. Substantial work was undertaken for monitoring and managing cultural heritage sites throughout the park, including visits to remote areas by traditional owners and district staff. Park staff also added to existing oral history recordings and development of a cultural heritage sites register, with the support and involvement of traditional owners.

Future challenges

Major challenges are:

- implementing the Fifth Management Plan that came into effect last year, especially those actions that support Indigenous business ventures and employment including capacity building, address caring for country challenges, support Kakadu's living cultural values and support its World Heritage values
- understanding the impacts of fire, ferals and climate change, coordinating research in these areas and adapting management accordingly
- identifying the cause of small mammal decline and taking appropriate action
- · controlling the spread of weeds and the impact of introduced animals
- rehabilitating old uranium mine sites in the southern Gunlom area (a major project over three years). Rehabilitation works include removing buildings that once supported mining activities and appropriate containment of mine tailings
- developing systems and partnerships to make the best use of resources
- developing staff through formal and informal training programs
- ensuring visitor and staff safety.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Fire management, particularly in sandstone country
- Managing weeds and feral animals
- Ranger mine site rehabilitation
- Monitoring and protection of threatened species
- Decline of small-mammal populations in the park
- · Enhancing the recording, storage and display of species data
- Improving understanding and protection of the marine environments of the Kakadu coast
- The future impact of climate change on Kakadu, particularly on freshwater wetlands

- The spread of introduced pasture grasses and subsequent increase in fire intensity
- Introduced pest species and their impacts

Actions

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

Performance results 2007-08

- Finalised the proceedings from the Landscape Change Symposium held in 2007
- Hosted the Weed Management Workshop in November 2007 and Fire Management
 Workshop in April 2008
- Undertook the first survey as part of a three-year contract with the NT Government to undertake collaborative threatened species monitoring in biodiversity hotspots
- · Continued resampling of fauna at Kakadu fire plots
- Commenced a collaborative study examining the incidence of disease in small mammal populations
- Continued bushwalking burning program in the Arnhem Land Plateau—outcomes valued by traditional owners and scientists
- Supported ongoing study on the impact of cane toads on native frog populations
- Supported PhD research on the magpie goose (*Anseranas semipalmata*) that examines critical relationships between geese and wetland food plants, seasonal dispersal patterns of geese, the impact of disease on populations and the likely ramifications of sea level rise (through GIS-based models). Discussion of these issues will have relevance to the long term conservation of magpie geese, as well as for traditional harvest

6

- Continued collaborative project with NT Government on two species of coastal dolphins, the Indo-Pacific humpback (*Sousa chinensis*) and Australian snubfin (*Orcaella heinsohni*)
- Supported a NT Government project to relocate golden bandicoots (*Isoodon auratus*) onto an offshore island

KRA2: Cultural heritage management

Major issues

- · Protection and appropriate presentation of World Heritage cultural heritage values
- Managing the park as part of a living culture for Bininj
- Supporting traditional owner participation in cultural activities and traditional practices
- Balancing the need to protect rock art and other significant Aboriginal heritage with facilitating their appreciation by visitors

Actions

- Develop strategic programs for the conservation and monitoring of Kakadu's unique cultural value in consultation with *Bininj*
- Continue rock art protection and maintenance work
- Continue cataloguing and preserving cultural heritage materials
- Continue to collect oral histories and ensure these are properly protected and archived
- Support traditional owner leadership in natural and cultural resource management activities
- Establish two-way learning strategies and programs
- Facilitate visits on country for *Bininj*, particularly in remote locations as a tool for re-establishing cultural links to country
- · Seek opportunities to transfer knowledge between generations
- Ensure that Kakadu's living cultural status is recognised in tourism strategy development and decision-making
- Review the approach to protection and interpretation of historic heritage in the park

Performance results 2007–08

• Commenced review of recorded cultural material, storage of cultural objects, and cultural heritage databases in consultation with *Bininj/Mungguy*. The review will include development of protocols to ensure that these sensitive cultural resources can be accessed appropriately and in a user-friendly format

- Established the Gun-mayali ('sharing of knowledge', Kunwingku language) Room at Headquarters for use by *Bininj* in accessing cultural materials and records
- Continued to develop a register of oral history audio and video material and action an ongoing plan to record history from identified key informants, in particular key traditional owners
- Developed a partnership agreement between the National Archives of Australia and the Director for long-term storage and protection of audio and video materials currently held in the park
- Stone materials collected from Leichardt Billabong 14 years ago were returned
- Conducted extensive consultations with staff and traditional owners in all districts about the preferred approach and priorities for cultural heritage under the Fifth Management Plan, including rock art maintenance, oral history collection and cultural activities that support the transfer of knowledge between generations and between traditional owners and staff
- Developed workplans with districts for rock art monitoring and maintenance
- Continued rock art maintenance at public visitation sites with the involvement of relevant Aboriginal people
- Completed four visits to rock art and other culturally significant sites in remote locations with traditional owners
- Commenced discussions with the Aboriginal Areas Protection Authority and Northern Land Council about a register of sites of significance and access protocols
- Commenced a review of historic (non-Aboriginal) cultural heritage sites in the park
- Assessed the heritage significance of Mudginberri Abattoir Complex and Anlarrh

KRA3: Joint management

Major issues

- Meeting the commitments outlined in the lease and the Fifth Management Plan
- Ensuring shared decision-making occurs at all levels within the park
- Monitoring and reporting on implementation of the Fifth Management Plan

Actions

- Ensure decision-making is consistent with the consultation guidelines
- Encourage increased Aboriginal engagement in work plans through recruitment and skills development programs
- Support traditional land management projects
- Support the Board of Management
- · Continue day-to-day consultations with traditional owners

Performance results 2007–08

- The board developed priorities and approved the implementation schedule for the Fifth Management Plan in January 2008
- Relevant Aboriginal staff continued certificate level studies, numeracy and literacy training. *Bininj* staff continued with workplace English language and literacy training
- Continued programs to re-engage young Aboriginal people in education and continued Junior Ranger program with Jabiru Area School
- Continued skill development and training for relevant Aboriginal staff via completion of a range of internal and external courses
- 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
- Continued supporting a Northern Land Council Kakadu Officer position under the Memorandum of Understanding with the Northern Land Council
- Held quarterly meetings of the Kakadu National Park Board of Management and special meetings to discuss commercial harvesting under the management plan and new branding of the park

KRA4: Visitor management and reserve use

Major issues

- Developing a new brand for Kakadu, which better positions the park as a major tourist destination in the Top End, nationally and internationally
- · Improving the quality and range of visitors' experiences
- Improving visitor safety
- Communicating with the tourism industry
- Implementing the Shared Vision for Tourism and strategic direction for increasing value from tourism

Actions

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

- Developed a new brand for promoting Kakadu, following intensive consultation with traditional owners and the tourism industry. It includes a new logo for the park, new uniforms for park staff, and a new Visitor Guide. These elements were formally launched at a special event in July 2008. Other aspects, such as a review of signage to be consistent with the new brand, and reviewing new concepts for the park's northern entrance, will continue over the next twelve months
- Finalised a draft tourism master plan, which seeks to address the park's target market and also scopes opportunities for an increased contribution by Indigenous businesses, for release for public comment
- Made substantial progress on a new user-friendly Kakadu website for visitors which will assist in matching visitor expectations to experiences in the park as well as conveying essential information for travellers
- Continued reviews of tour operator permit conditions and monitored the implementation of the park's tour guide accreditation program that was utilised last year
- Continued to deliver well-regarded seasonal interpretive ranger programs incorporating natural and cultural content
- Continued to provide detailed visitor information for use in tourism planning and resource allocation including improved monitoring methods and associated survey data
- Supported Aboriginal enterprise development and involvement in tourism ventures such as: the Werenbun Tourist Information, Wurrgeng Cultural Walk, Guluyambi Boat Cruise, Kakadu Culture Camp, Gunlom Kiosk, Hawk Dreaming and Murdujul Art Centre. This was achieved through the Kakadu Indigenous Tourism Development Fund plus financial support for relevant Aboriginal people to attend tourism industry events and in-kind assistance to produce collective promotional material
- Continued to upgrade visitor infrastructure throughout the park, including the replacement of the Jim Jim Creek crossing and commencement of work on the South Alligator bore for an improved water supply. The park's Incident Response Plan was also extensively reviewed.

KRA5: Stakeholders and partnerships

Major issues

- Continuing effective relationships with the tourism industry, Northern Territory (NT) Government and neighbours
- Continuing to participate in local, regional, national and international initiatives associated with Kakadu's World Heritage values
- Building relationships with educational institutions to develop 'education to work' pathways for relevant Aboriginal people

Actions

- Build a cooperative relationship with tourism stakeholders such as Tourism Top End and the NT Government
- Develop an operational relationship with park neighbours
- Take an active role in community programs
- · Establish and support links with managers of other World Heritage areas
- Implement work programs under the Tri-national Wetlands Agreement between Indonesia, Papua New Guinea and Australia
- Build a strategic alliance with the Jabiru Area School and Charles Darwin University to progress education to work programs

- Continued an ongoing constructive high-level relationship between the Australian and NT governments, with joint funding and planning to advance tourism in the park and a partnership in employment and education focusing on youth training
- Continued liaison with the NT Bushfires Council and other NT Government agencies, Jabiru Town Council and the Northern Land Council
- Contract signed with WWF Australia for the delivery of the agreed 2008–09 operational plan for the tri-national wetlands agreement between Indonesia, Papua New Guinea and Australia
- Continued the school based Junior Ranger program as part of the Year 6 curriculum at Jabiru Area School
- Supported community events celebrating Indigenous culture and community spirit
- Hosted participants in the UNESCO masters program in World Heritage management

KRA6: Business management

Major issues

- · Recognising high levels of staff expertise and performance
- Securing resources to achieve the visions and aims of the Fifth Management Plan and park lease obligations
- Complying with obligations under the *Environment Protection and Biodiversity Conservation Act 1999* and Regulations for the management of Commonwealth reserves
- · Maintaining and upgrading infrastructure

Actions

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

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

A living cultural landscape—the Kakadu brand



Kakadu staff Andrew Davies and Hank Schinkel wearing new uniforms developed as part of the Kakadu brand exercise

In 2005 the Kakadu National Park Board of Management released A Shared Vision for Tourism in Kakadu National Park. One of the priorities of the vision was to reposition Kakadu as an international tourism destination by developing a new brand that better reflected park values.

The traditional owners of Kakadu have maintained a continuity of culture and connection to the land. This living cultural landscape offers visitors the

opportunity to experience and connect with Aboriginal culture. These elements form the essence of the new brand.

Kakadu has traditionally been promoted to visitors primarily as a nature based tourism destination. Kakadu is one of only a few places in the world that has World Heritage status for both natural and cultural values. The new brand aims to promote Kakadu as an iconic destination with unique indigenous values and experiences.

One of the creative expressions of the brand is the Kakadu identity, a traditional image used to depict the Rainbow Serpent. The Rainbow Serpent is a powerful ancestor and played an important role in the conception of *Bininj/Mungguy* Aboriginal traditional owners. She is also part of the life cycle of plants and animals and the seasonal changes. This cultural design was chosen to represent the *Bininj/Mungguy* and the broader Aboriginal community and is a reminder to *Bininj/Mungguy* custodians about their obligations to care for country.

The new identity has been incorporated in the new Kakadu National Park logo. Other creative expressions of the brand will be seen through a new visitor website, park uniforms, visitor guides and applications to park interpretive material, including park notes and signage.

One of the important elements of managing a national park is ensuring that tourism is encouraged in a sustainable way that promotes the involvement of the traditional owners. The *Bininj/Mungguy* traditional owners have said that tourism should not be the 'boss of country'. They want visitors who respect their culture and country, stay in the park longer and take time to learn the right stories.

The new Kakadu brand aims to attract visitors who want personal experiences and engagement with the local Aboriginal people. Consultation and collaboration with Tourism Australia identified that the primary target markets for Kakadu are the domestic and international 'experience seekers'. These visitors will stay in the park longer, giving them an opportunity to appreciate *Bininj* traditional culture.

By focusing on this target market the new brand will attract people who want to experience Indigenous tourism, which will help create more *Bininj* jobs and strengthen regional tourism. These visitors will emotionally connect to Kakadu and leave the park knowing they have had an experience of a lifetime, having been enriched by a contemporary and traditional Aboriginal culture and gained an appreciation and respect for country.

As part of the brand strategy, Kakadu will continue to develop culturally appropriate and environmentally sustainable experiences that provide insights into contemporary and traditional Aboriginal culture, and the World Heritage values of Kakadu's cultural and natural heritage.

Monitoring fire regimes in Kakadu National Park



Recording and checking cypress pine. Late season wildfires have killed many of these fire-sensitive trees

Since its inception as a national park in 1979, a number of major fire research and monitoring programs have been undertaken in Kakadu. These long-running programs have provided important ecological insights concerning the responses of eucalypt-dominated savanna systems to imposed fire regimes. Early practices did not always meet the information requirements of conservation managers. In particular, they comprised a relatively narrow set of parameters (e.g. annual early, annual late season fires) applied to a small set of eucalypt-dominated vegetation types.

In 1994 conservation managers from Kakadu, Litchfield and Nitmiluk National Parks established a long-term

applied fire research and monitoring program, designed specifically to meet their conservation requirements. The program has a number of elements:

- · maintaining annual fire history mapping of the parks
- monitoring of permanent plots in order to assess changes in status and condition of habitats and particular plants and animals
- providing park managers with measures to quantify success in meeting conservation objectives.

Monitoring program

The three parks fire monitoring program comprises two complementary components: satellite-based mapping of fire events and on-ground assessment of change in biota at a large series of permanent plots. Fire mapping is undertaken at least three times each year to monitor the progression of the fire management program.

220 permanent monitoring plots have been established across the three parks to monitor biotic change. Plots were selected to span the full range of flammable vegetation types, management zones and ambient fire regimes. Many plots were positioned deliberately at sites likely to most efficiently reveal environmental dynamics such as in patches of fire-sensitive vegetation like sandstone heaths. Detailed floristic and vegetation structural data were collected at the start of the program, and subsequently every five years. Plots are visited at least once annually to record fire incidence and severity. Monitoring of fauna is also undertaken but less intensively due to its greater complexity. Data for the three parks is accessible on a common database.

Major results

Now in its fifteenth year, the program is providing invaluable information. Perhaps most importantly for practical purposes, this research and monitoring supports and informs fire management programs in each park. Knowing where fires are on a daily basis across the three parks clearly has major advantages. Training of staff in the application of fire management information products and tools, and knowing that these are of an international 'best practice' standard, is clearly also beneficial. There is robust evidence that significant challenges remain in delivering ecologically sustainable fire management on all three parks.

In relation to Kakadu, the three parks monitoring program has provided the following major observations:

- decreasing fire extent—between 1995 and 2004, an average of 41.7 per cent of Kakadu was burnt annually, down 4.1 per cent from the figure for the period 1980 to 1994
- *increasing fire heterogeneity*—a recent study of fire-induced heterogeneity (a measure of fire patchiness) found that Kakadu's fire management program has progressively improved heterogeneity in each successive five-year period
- *assessing fire severity*—based on 719 fires recorded from 178 monitoring plots in Kakadu and Nitmiluk over the period 1995–2004, 80 per cent of early dry season fires were found to have very low severity whereas 70 per cent of fires later in the dry season were typically much more severe
- savanna vegetation response to fire—recent analyses indicate that fire frequency is significantly correlated with declines of small tree stems, tall shrubs and tree species richness. More severe fires are associated with declines of large tree stems, tree and groundcover species richness and population structures of individual plant species
- fire-sensitive communities and species—severe fires have impacted significantly on populations of cypress pine (Callitris intratropica) and the exposed margins of sandstone rainforests
- fire frequency and fauna—recent analysis indicates that high fire frequency observed at many plots is associated with significantly reduced numbers of small native mammal species

• *detecting population change*—analysis of plot data indicates that the program provides a statistically robust means for monitoring common savanna plant populations but not for populations of rare plants or of mobile fauna. Instead, targeted monitoring programs are required for these species.

In summary, while major progress has been made in managing fire in Kakadu since its inception as a national park, fire frequencies need to be further reduced, particularly severe ones.

Challenges

Maintaining the impetus for improved fire management is no easy task. Fire-sensitive plant communities are increasingly at risk, such as the sandstone heaths of the Arnhem Plateau, which have recently been nominated as an Endangered Community under the EPBC Act. Indications show that populations of small native mammals and other relatively sedentary fauna are also highly vulnerable to contemporary fire regimes.

The Kakadu region is recognised internationally as a biodiversity hotspot and sustainable fire management is critical. Monitoring is a key component of any adaptive management program and results demonstrate the utility of a well-designed, robust system. The three parks monitoring program has been formally accepted as one of a small number of nationally significant long-term ecological monitoring 'sites'. The data collected by the three parks program and the insights it has derived are internationally significant, as shown by the publication of results in international scientific literature.

Australia has yet to establish a nationally funded, strategic long-term ecologically-focused monitoring system. The challenge is to improve and sufficiently resource Australia's monitoring programs to meet our national and international ecological monitoring responsibilities.

Fire and carbon in the northern savanna



By implementing strategic prescribed burning programs early in the dry season, the extent of greenhouse gas emissions can be reduced

One of the benefits of the on-going fire research and monitoring program at Kakadu and neighbouring Litchfield and Nitmiluk National Parks has been an assessment of the greenhouse impact of the extensive fires that occur during each dry season in the Top End.

Currently, these fires make a significant contribution to Australia's national greenhouse gas emissions inventory (between 2–3 per cent annually, depending on the severity of the northern fire season). Research

undertaken in western Arnhem Land over the past ten years, complemented by data from the three parks monitoring program (see page 115), demonstrates that greenhouse gas emissions from savanna burning can be substantially reduced with better fire management.

By implementing strategic prescribed burning programs early in the dry season the extent of late dry season wildfires is reduced and with it, greenhouse gas emissions. In fact, emissions from typically less severe early dry season fires are approximately half those from later in the year. Importantly, the use of early dry season burning is totally compatible with both traditional Indigenous fire management, as practised in western Arnhem Land, and biodiversity conservation requirements.

Over the first ten years of the three parks monitoring program, there has been no net change in carbon stocks contained in above and below-ground living tree and shrub biomass (25.7 tons of carbon per hectare) in these eucalyptdominated woodlands and open-forest savannas. This period has coincided with the wettest, hence most favourable period for growth, on record.

However, closer analysis of the effects of fire regime indicates that fires, especially severe fires, have a small but significant effect on growth increment. A comparison was undertaken of the fire regime of Kakadu, of the first ten years after declaration (when relatively severe late dry season fires were more prevalent) with the current regime (now mostly early dry season fires). Results suggest that, if the current regime is maintained over the next five decades, then Kakadu's savannas will sequester (i.e. function as a carbon sink) an additional 2.5 tons of carbon per hectare. With 1.5 million hectares of this vegetation type, this would equate to about 280,000 tonnes of CO, per year.

Should fire frequency be reduced even further in line with biodiversity conservation requirements, then the carbon sequestration capacity of living vegetation in Kakadu's savannas could be even greater.

Norfolk Island National Park and Botanic Garden

www.environment.gov.au/parks/norfolk



Special features

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

Of the 15 species and subspecies of birds once found only on Norfolk Island, seven are known to remain and an additional two species have not been sighted for some time and may be extinct. The park

provides important habitat for native bird fauna and assisted wild breeding programs 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 human-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	Current plan expires on 12 February 2018
Other significant management documents	Norfolk Island Public Reserves Act 1997 (NI); Norfolk Island Plan; Phillip Island Rehabilitation Strategy; Native Forest Rehabilitation Strategy; Weed Control Strategy for the Preservation and Protection of the Endangered Plants of Norfolk Island; Management Plan Implementation Schedule; Risk Assessment and Management Schedule

Financial	Operating	\$0.971 million	
	Capital	\$0.607 million	
	Revenue	\$0.007 million	
Visitors	25,000 (estimated)		
Permits	11 commercial tour operators (10 for Mount Pitt, 1 for Phillip Island)		

International conventions and agreements		
Migratory Species (Bonn) Convention	17 of 105 listed Australian species	
China–Australia Migratory Birds Agreement	24 of 81 listed species	
Japan–Australia Migratory Birds Agreement	29 of 76 listed species	
Korea–Australia Migratory Birds Agreement	22 of 59 listed species	

Environment Protection and Biodiversity Conservation Act 1999			
Listed fauna	Species	5 extinct	
		2 endangered	
		6 vulnerable	
		37 migratory	
		57 marine	
	Recovery plans	1 being implemented: green parrot (<i>Cyanoramphus novaezelandiae cookii</i>)	
		2 awaiting preparation: golden whistler (<i>Pachycephala pectoralis xanthoprocta</i>); scarlet robin (<i>Petroica multicolor multicolor</i>). These species will be included in a multi-species recovery plan for the island expected to be completed in 2008–09	
		1 exempted: Norfolk Island boobook owl (<i>Ninox</i> novaeseelandiae undulata)	
Listed flora	Species in	15 critically endangered	
	listing process	16 endangered	
		15 vulnerable	
	Recovery	These species will be included in a multi-species	
	plans	recovery plan for the island expected to be finalised in 2008-09	
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 numbers of species that are a management priority

Advisory committee

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

Monitoring

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

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

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

Rat populations are being monitored as part of a trial of alternative control methods. The monitoring program 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 program, mostly on Phillip Island.

A park bird monitoring program is scheduled for introduction by the end of 2008.

Future challenges

Major challenges are:

- raising community awareness of invasive species' potential impacts, including those of rats, cats and feral fowl
- finding more efficient and practical ways to meet the requirements of endangered species programs including through the multi-species recovery plan
- achieving a sustainable balance between conserving threatened species and supporting tourism in the park, through enhanced visitor infrastructure
- managing remnant endemic and important native species in the park's forestry zone.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- · Managing fauna and flora pest species
- · Managing endangered species
- · Building an adequate knowledge base upon which to base management decisions

Actions

- Implement strategic weed control
- · Implement identified recovery actions for endangered species
- Continue vertebrate pest species programs
- · Document existing knowledge and build the park's knowledge base

Performance results 2007–08

- Completed weed control and replanting in 8 of the 19 coups identified in the rehabilitation strategy for the park's forestry zone. Under the 10-year strategy coups are treated on a two-yearly cycle, focusing on priority weed control to increase habitat opportunities for native species
- Banded 13 green parrot chicks and two owl chicks fledged in the wild breeding program
- Initiated rehabilitation of 23 weed-infested hectares through weed removal and replanting with native species
- Trapped 19 wild cats under the feral cat control program and desexed 64 cats in desexing clinics
- Continued the trial of an alternative rat control methodology and commenced upgrade of rat stations to modern bait/trap boxes
- Expanded the spatial information system's capacity and upgraded staff skills to enable more accurate and effective data recording
- Continued preparation of the multi-species recovery plan, expected to be completed in 2008–09
- Continued to review and update databases and knowledge bases for the herbarium, moss collection, butterfly collection, slide collection and historic photography collection
- · Reviewed the Phillip Island rehabilitation strategy

6

KRA4: Visitor management and reserve use

Major issues

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

Actions

- Seal surface of Duncombe Bay Road to all weather seal
- · Review current access tracks, focus on maintaining high visitation areas
- · Investigate safety risks, and take appropriate action

Performance results 2007–08

- Duncombe Bay Road was substantially upgraded and sealed in partnership with the Norfolk Island Government
- Completed stage 7 of the botanic garden boardwalk upgrade
- · Constructed amenities block at Palm Glen
- Replaced park entrance signs
- Resurfaced sections of upper Palm Glen Track
- Continued trialling a range of surfaces to improve walking conditions on steep tracks
- · Completed a safety survey of all visitor infrastructure and addressed urgent items

KRA5: Stakeholders and partnerships

Major issues

 Working effectively with the Norfolk Island Government and Administration, local tourism operators, environmentalists, concerned citizens and professional and amateur researchers

Actions

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

Performance results 2007–08

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

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 2007–08

· Managed operational and capital budgets within allowed parameters

Green parrot recovery on Norfolk Island



Juvenile green parrots in one of the nesting sites at Norfolk Island National Park

The Norfolk Island green parrot, *Cyanoramphus novaezelandiae cookii*, is one of the rarest and most endangered bird species in Australia. It is only found on Norfolk Island where it is largely restricted to forest habitat, most of which is found within Norfolk Island National Park.

Studies conducted in the 1980's revealed that there were less than 30 green parrots remaining on Norfolk Island and urgent action was required to save the species from extinction.

A captive breeding aviary was established in the Park in 1983. Advice was sought from specialists at Taronga Park Zoo and from breeders of a rare and related species in New Zealand, to guide the management of the aviaries. The captive breeding program conducted over 20 years was relatively unsuccessful, with only a few young parrots being released into the wild during the program.

Conservation efforts were also directed to an assisted wild breeding program. Wild nest sites were constructed within the park, ensuring that they were made waterproof and resistant to rat and cat invasion. This has greatly assisted the breeding numbers and resulted in a marked increase in the green parrot population.

Total population size is primarily limited by the availability of predator-free breeding habitat and nesting sites and, ultimately, by habitat loss and the small area of remaining suitable habitat. Predator control programs are continuously operated throughout the park for the control of rats and feral cats, including rat baiting, traps and a community cat desexing program. Additionally, native trees are being planted throughout the National Park to ultimately increase the area of suitable green parrot habitat.

The numbers of green parrots continue to expand in direct relation to the control of invasive species. Visitors to the Island now report sightings of wild green parrots on a regular basis. Further expansion of green parrot numbers may be possible as additional protected nesting sites are established.

Phillip Island, located six kilometres to the south of Norfolk Island, is free of cats and rats and is viewed as possible area in which a new colony of green parrots could be established in the future.

An extended period of dry weather on Norfolk Island over the past decade saw a general downward trend in green parrot chick numbers. However, the recent rains have seen the numbers begin to expand again and we are optimistic for the future of this magnificent bird.

Current wild population is estimated to be 200 individuals including 14–20 active breeding pairs.



Figure 6: Annual numbers of green parrots banded since 1985



Figure 7: Total number of green parrots banded during the breeding programs

Norfolk Island National Park infrastructure projects



One of the kerbs installed on Duncombe Bay Road during the upgrade of this popular access route.

Two significant capital works projects were undertaken during the year at Norfolk Island National Park—an upgrade to Duncombe Bay Road and the installation of visitor amenities at Palm Glen.

Duncombe Bay Road provides access to the north of the park, leading to the popular Captain Cook Monument, and a lookout providing unobstructed views of the Island's northern shores. The park has been actively maintaining

and upgrading Duncombe Bay Road since the Park was first declared in 1986.

The road was initially a narrow unstable track with loose stones and areas of soft clay, making it impassable during rain. It was subsequently widened and graded to be more accessible to visitors. However, as the road lies across the fall of a catchment area, much of the water runoff during rain events was naturally directed onto the road surface. This made it difficult to maintain and continued to cause some road closures.

Stage one of the current upgrade commenced in 2006–7, involving an upgrade of drainage and bank stabilisation for the area. The road was also realigned to improve access. October 2007 saw the commencement of stage two, with kerbing, profiling and sealing of the road surface undertaken. These works were part funded by the Norfolk Island government.

These works were originally due for completion in late November 2007, but after 8–10 years of drought on Norfolk Island, the work has been subject to unscheduled delays as a result of intense rainfall events. The road has been constructed to a high standard, providing significant improvements to the quality of access to this area. The upgrade of Duncombe Bay Road is due to be completed in August 2008.

Palm Glen is also a popular access point into the Park, consisting of a prime lookout area, a track designed for the ambulant disabled, and a forest loop walk that appeals to many of the elderly visitors to the Park. In response to information provided in local visitor surveys, and by tour operators, toilet facilities were constructed this year to improve the area's amenity.



The new amenities are constructed to match the traditional Norfolk Island building style, using locally sourced Norfolk Island pine

The building was designed to fit with local traditional building styles. Most of the structure and exterior cladding is made of timber, milled from Norfolk Island pines that died from drought stress on the Island. The amenities are located a few metres from the car park and are designed to comfortably facilitate wheelchair access. The surrounding site has been sensitively landscaped and planted with native species.

The area is serviced by a gravelled road

and is located approximately 2 kilometres from the nearest mains electricity. To reduce our carbon footprint, the facility has been designed to utilise solar panels for lighting and power for pumping water from the rainwater tank.

These works complete the current suite of tourism infrastructure upgrades planned for the park and significantly improve the experience of visitors to Norfolk Island.
Pulu Keeling National Park

www.environment.gov.au/parks/cocos



Special features

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

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

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

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

Location	Latitude 11°50' South, Longitude 96°49' East		
Area	2,602 hectares (including marine area extending 1.5 kilometres around North Keeling Island)		
Proclamation date	12 December 1995		
IUCN category	Category II overall comprising:		
	Terrestrial Zone Category la (122 hect	ares)	
	Marine Zone Category II (2,480 hectares)		
Biogeographic context	Isolated atoll in the Indian Ocean formed atop an old volcanic seamount		
Management plan	Second plan expires 27 April 2011		
Other significant management documents	Visitor access, boating, diving and fishing strategies; Management Plan Implementation Schedule; Risk Assessment and Management Schedule		
Financial	Operating	\$0.673 million	
	Capital	\$0.046 million	
	Revenue	\$0.017 million	

Visitors	102 visitors signed in at the Home Island Office	
	52 visitors to Pulu Keeling National Park	
Permits	3 commercial tour operators (1 each for diving, surfing and terrestrial	
	tours); 46 marine access entry permits	

International conventions and agreements		
Wetlands (Ramsar)	Entire park listed	
Convention	10 of 105 listed Australian species	
China–Australia Migratory Birds Agreement	15 of 81 listed species	
Japan–Australia Migratory Birds Agreement	15 of 77 listed species	
Korea–Australia Migratory Birds Agreement	8 of 59 listed species	

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

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

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

Management arrangements/Management committee

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

Monitoring

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

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

A consultant team funded under the Envirofund program continued work with the local community on a proposal for restoration of habitat for the buff-banded rail. The proposal includes establishing a second viable population within the Cocos (Keeling) Islands group.

The first stage of the Recovery Plan was carried out in March 2008. The primary tasks were to trial capture methods for birds (for relocation to islands on the southern atoll) and to conduct preliminary radio tracking of individual birds to gain data on their movements and home range (see case study on page 137).

Systematic monitoring of marine turtles is maintained at the park. Breeding activities are documented when staff members undertake regular overnight trips. This monitoring program has been performed over the last eight years.

A systematic monitoring program for introduced yellow crazy ants (*Anoplolepis gracilipes*) has been initiated. The program follows the methodology employed at Christmas Island National Park.

Future challenges

Major challenges are:

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

6

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Regular access to the park to perform routine tasks
- Managing visitor entry to the park
- Preventing illegal wildlife harvesting
- · Monitoring red-footed boobies, coral reef health and exotic species

Actions

- Maintain a workable arrangement with the service provider of the vessel for access to the park
- Continue the ongoing community education and relations, and interpretation program
- Maintain surveillance, boat patrols and education
- Assist the community to prepare an application for a legal harvest of red-footed boobies
- Regularly survey bird numbers

Performance results 2007-08

- · Established an office on Home Island to focus on community educational activities
- Gained sufficient access to the park to undertake seabird monitoring and routine duties, due to the availability of vessels as needed
- Installed remote surveillance equipment and technology to provide more effective detection of illegal park entry and poaching
- Carried out educational activities with the local school and the general community to encourage environmentally responsible behaviour and to develop greater appreciation of the Park's biodiversity values
- Continued working with the larger community and other law enforcement agencies to detect incidents involving protected species

KRA2: Cultural heritage management

Major issues

- Managing visitor access to the SMS *Emden* shipwreck as it is becoming a popular diving site
- Managing visitors to Malay gravesites

Actions

• Ensure access to sites is managed appropriately

Performance results 2007-08

- · Effectively managed cultural heritage sites
- Conducted guided tours of the grave sites and the *Emden* memorial site on the beach
- Cleaned grave sites
- Information on culturally significant sites was provided to the communities through the educational activities

KRA4: Visitor management and reserve use

Major issues

• Managing the risks of introduction of exotic species by park visitors

Actions

- · Implement quarantine procedures
- Prevent introduction of exotic species

Performance results 2007-08

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

KRA5: Stakeholders and partnerships

Major issues

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

Actions

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

Performance results 2007-08

- To raise Parks Australia's profile, a Home Island office was established and staffed two days a week-this is in addition to the existing office on West Island
- · Maintained regular meetings and communication with stakeholders

KRA6: Business management

Major issues

Isolation restricts training opportunities

Actions

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

Performance results 2007-08

- · Managed operational and capital budgets within approved parameters
- Provided staff with local training in law-enforcement and compliance management and Geographic Information System (GIS) application
- A ranger continued a lands, parks and wildlife correspondence course

Second Parks Office for Cocos Islands: reaching out further



Ismail MacRae (Acting Manager) and Haji Wahin Bynie OAM (Senior member of the Muslim Community at Home Island) at the official opening of the Home Island Office

If greater positive returns are received through exposing financial investments to a bigger market, the establishment of a second office at Home Island should yield similar outcomes in the long term—by providing community education, encouraging responsible use of the Park and greater appreciation of the Park's values.

Of the two inhabited islands within the Cocos (Keeling) Islands group, Home Island supports 80 per cent of

the permanent residents, with the remainder residing on West Island. As many transient workers and tourists frequently travel to Home Island, the new park office is exposed to the largest possible share of the population.

Community education and fostering community relations have been integral parts of Parks Australia's core business. The new Home Island office is equipped to support these ongoing and evolving efforts. Various activities targeting audiences from differing age groups, cultural and language backgrounds and literacy levels, have been performed since Parks Australia became established on the island some 20 years ago.

Having an office on Home Island presents more opportunities for Parks Australia staff to expand and build on the current community education efforts. An opportunity to develop the second office was realised when the new Community Resource Centre was completed on Home Island in 2007. After relevant approvals were obtained, the office was formally opened in September 2007. Centrally located with neighbouring organisations providing essential services, the centre attracts considerable interest from visitors and local residents. Almost a year since its opening, the office is now staffed 2 days a week. The key achievements of the Home Island office are:

- · over 100 people have visited the office
- more than 200 native plant seedlings provided to community groups and the Shire
- staff established a collection of native plant species and trees at the Centre's garden
- four educational slideshows presented to the community
- regularly changing wildlife information and multi-media displays are presented
- displays of cultural and natural history photos and information
- a central meeting place for relevant groups, such as the Pulu Keeling National Park Consultative Management Committee
- a central place for community members to obtain permits for Park access and to talk to Parks staff members about issues facing the National Park.

The next challenge for Parks Australia Staff is to develop and deliver further information, presentations, and activities to capture local interest and to assist in educating the community of the outstanding biodiversity values of the Park.

Relocation program for the Cocos Island buff-banded rail



A Cocos Island buff-banded rail adult with leg band

Parks Australia staff at the Cocos (Keeling) Islands have taken the first steps towards the recovery of the endemic Cocos buff-banded rail, *Gallirallus philippensis andrewsi*. This semi-flightless bird was formerly distributed across the entire Cocos (Keeling) Islands group. However, buff-banded rails became extinct from the southern atoll as recently as the 1980s or 1990s, probably as a result of habitat destruction and degradation, predation by introduced rats and cats, competition with feral chickens and human hunting pressure.

The sub-species is now restricted to Pulu Keeling National Park. The

population appears to be relatively stable, with survey estimates suggesting around 750-1100 birds living on the island. The isolated nature of this single population over such a small area leaves the species vulnerable to random genetic and demographic factors (such as inbreeding and genetic drift) and catastrophic events (predator introduction, tropical cyclones and tsunamis). Consequently, the Cocos buff-banded rail is classified as Endangered under the *Environment Protection and Biodiversity Conservation Act, 1999*.

The only option to decrease the risk of extinction of the Cocos buff-banded rail is to establish a second population on the southern atoll of the island group. This is the primary objective of the *National Recovery Plan for the Buff-banded Rail* (*Cocos (Keeling) Islands) Gallirallus philippensis andrewsi*, which was adopted by the Australian Government in 2006.

In March 2008, a team of seven scientists from Canberra and Darwin, and three Parks Australia staff, captured 29 adult rails and two nestlings. Radio transmitters were attached to ten of the adults. This information was used to determine preliminary estimates of the home range of buff-banded rails. A month after fitting the radio transmitters, staff returned to Pulu Keeling and found that the tiny devices were still working successfully.

Blood samples were taken from each captured bird, and DNA samples have been successfully extracted. These samples are currently being analysed by geneticists at the Australian National University in Canberra. The results from this analysis will be used to determine how individuals from various parts of the Pulu Keeling are related. Ideally, the birds to be translocated will represent an optimal level of genetic variability to reduce risk of genetic deficiencies in the relocated population, such as inbreeding.



Dr Chris Boland (Ranger) radio tracking buff-banded rails at Pulu Keeling National Park

Direction Island on the south atoll is considered to be the best candidate for the relocation program. As it is uninhabited, but easily accessed, Parks Australia staff will be able to easily monitor the condition of the relocated population. The island will first need to be cleared of feral jungle fowl and rats. Native trees also need to be planted on the island to ensure the rails have every chance of surviving. Restoration of native vegetation on sections of the island is in progress.

The proposal involves translocation in two stages, with 20 birds being moved to Direction Island initially. If that

translocation attempt is successful, an additional 20 birds will be relocated to the island after a further two to three weeks. The proposed monitoring program for the rails will comprehensively assess the success of the translocation in the immediate, mid and long term future.

Ulu<u>r</u>u–Kata Tju<u>t</u>a National Park

www.environment.gov.au/parks/uluru



Special features

Uluru–Kata Tjura National Park is inscribed on the World Heritage List for both the cultural and natural values of its landscape. The park supports Traditional Owners to maintain their living culture and contains landscapes of exceptional scenic beauty. It also protects the iconic rock outcrops of Uluru and Kata Tjura and outstanding examples of arid zone flora and fauna.

Ulu<u>r</u>u–Kata Tju<u>t</u>a National Park is a place of great spiritual and cultural importance

to A<u>n</u>angu (western desert Aboriginal) men and women. For countless generations this ancient landscape has been influenced by the activities of A<u>n</u>angu 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 A<u>n</u>angu and Parks Australia.

Location	Latitude 25°15' South, Longitude 130°43' East		
Area	132,566 hectares		
Proclamation dates	24 May 1977, 28 October 1985		
IUCN category	Category II		
Biogeographic context	Interim Biogeographic Regionalisation for Australia region: Great Sandy Desert		
Management plan	Fourth plan officially expired 28 June 2007. In March 2007 the Board of Management requested the Director continue to manage the park in accordance with the Fourth Management Plan until the fifth plan is finalised and approved.		
Other significant management documents	Lease between the Ulu <u>r</u> u–Kata Tju <u>t</u> a Aboriginal Land Trust and the Director of National Parks; Visitor Infrastructure Master Plan; Ulu <u>r</u> u Climb Health and Safety Report; Cultural Heritage Action Plan; Women's Cultural Heritage Plan.		
Financial	Operating	\$12.034 million	
	Capital	\$11.207 million	
	Revenue	\$7.414 million	
	Paid to traditional owners	\$1.951 million	

An estimated 312,246 paying visitors (16 years and above) based on park tickets sold
207 film/photography; 99 tour operators; 4 research
Visitor survey conducted in June 2008. Results from survey to be available in 2008-09.

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
11 of 105 listed Australian species
13 of 81 listed species
13 of 77 listed species
12 of 59 listed species
Convention on Biological Diversity; Listed as a biosphere reserve under the UNESCO Man and the Biosphere Program

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	6 extinct
		5 endangered
		9 vulnerable
		17 migratory
		36 marine (birds)
	Recovery plans ^(a)	3 being implemented: mala or rufous hare wallaby (<i>Lagorchestes hirsutus</i>); tjaku <u>r</u> a or great desert skink (<i>Egernia kintorei</i>); itjariitjari or southern marsupial mole (<i>Notorcytes typhlops</i>)
		2 in preparation: murjta or mulgara (<i>Dasycercus cristicauda</i>); waru or black-flanked rock-wallaby (<i>Petrogale lateralis</i>)
Listed flora	None	
Heritage	On National Heritage List and Commonwealth Heritage List	

(a) Less than last year as the golden bandicoot (*Isoodon auratus*) and Alice Springs mouse (*Pseudomys fieldi*) have only been recorded from bones found in owl pellets in the early 1980's. These species now have very restricted ranges and do not occur in the vicinity of Ulu<u>r</u>u.

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Amphibians	Plants
21 (14)	170 (2)	73 (3)	None	4 (1)	over 400

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

Board of Management

The current board was appointed by the then Minister for the Environment and Heritage in October 2003 for a period of five years. The structure of the Uluru–Kata Tjura Board of Management ensures an *Anangu* majority of 8:4. A new board is to be appointed by October 2008. The board oversees management of the park and preparation of the Management Plan. Through joint management of the park, *Anangu* and *Piranpa* (non-Aboriginal people) work together to manage the park's cultural and natural heritage.

Monitoring

The eleventh annual survey of the tjakara or great desert skink (*Egernia kintorei*) took place in March 2008. Although an increased number of burrows were counted this year, there was a marked decrease in breeding burrows, leading to concerns that predation is substantially affecting population growth rates.

No mulgara (*Dasycercus cristicauda*) were detected during the ninth annual murtja or mulgara survey in November 2007. However, during the great desert skink survey of March 2008, evidence of mulgara including breeding burrows was widespread, alleviating concerns about the status of the population.

The fourth survey of the captive breeding population of mala or rufous hare wallaby (*Lagorchestes hirsutus*) took place in April 2008. During the survey 25 new animals were tagged from a total of 52 animals captured. This is probably due to the introduction of pre-feeding in the survey methodology.

Activity surveys for introduced predators have begun in the park, in conjunction with a fox-specific baiting trial. *Anangu* tracking skills are used during this survey which is used to produce in an index of predator abundance and activity levels.

Future challenges

Major challenges are:

- monitoring and controlling vertebrate pests in the park including camels, foxes and cats. The impact of feral animals on native fauna species is widespread and the impact of camels on waterholes and native flora is increasing. Feral animal control methods are being used in the park and on a broader regional level
- managing the impact of visitors on cultural sites around Uluru. In addition to maintenance, improvements will be undertaken on the existing Uluru base walk, including new site viewing platforms. The changes will reduce erosion and increase visitor appreciation and satisfaction with public cultural sites
- completing the second stage of the new visitor viewing facility which will provide visitors with an experience of Uluru's living cultural landscape, Aboriginal run activities and new walking tracks. (See case study on page 150.)

- managing visitor safety in the harsh environment, and in particular, those who choose to climb Ulu<u>r</u>u
- working with the NT Government on finding alternative arrangements for the delivery of essential services (power and water) to the community and the possible role of the new Shire government
- retaining and developing staff in a remote area, and increasing A<u>n</u>angu engagement in park management. The park is committed to providing employment opportunities and support to A<u>n</u>angu interested in working for the park.

Report on performance by key result areas

Major issues

- Controlling the spread of introduced buffel grass (Cenchrus ciliaris)
- Monitoring the potential impacts of sleeper weeds and new invasive species
- Reducing the impacts of vertebrate (fox, cat, camel, rabbit, feral dogs) and invertebrate pests
- Minimising the damage caused by camels, particularly to waterholes
- Understanding and managing the impacts of fire
- Monitoring the status of threatened species and managing threatening processes
- · Reintroducing locally extinct species
- · Controlling erosion and repairing existing damage

Actions

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

Performance results 2007–08

- Three Cultural Heritage and Scientific Consultative Committee meetings held to provide advice on natural and cultural heritage issues
- · Cleared approximately 20 hectares of buffel grass
- Mapped and assessed 21 quandong (*Santalum acuminatum*) trees growing in the park (a significant traditional bush food)
- Conducted monthly vertebrate pest monitoring for cats, foxes, dogs and camels in the borefields area of the park. Pest numbers are low due to the low average annual rainfall this year
- Continued the rabbit monitoring and fumigation program, which indicated that numbers have decreased
- · Commenced the fox baiting trial using fox-specific delivery stations
- Responded to one wildfire caused by lightning strike
- Draft Fire and Vegetation Management Strategy completed
- Conducted mulgara, great desert skink and mala surveys (See case study on page 152)
- Assessed the condition of waterholes in the park and surrounding areas in partnership with the Central Land Council, Parks and Wildlife Service NT and Greening Australia
- Conducted sampling for invertebrates and water quality testing at Ulu<u>r</u>u waterholes
- Completed five environmental impact assessments
- Completed the building of the park nursery and propagated key flora species for revegetation plantings of old walking tracks

KRA2: Cultural heritage management

Major issues

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

Actions

- Continue to implement the Cultural Heritage Action Plan (2002) and Women's Cultural Heritage Plan (2005)
- Continue the rock art conservation, oral history and repatriation programs
- Identify, catalogue and conserve cultural, historical and archaeological sites and objects
- Maintain the Cultural Sites Management System database as an information repository, planning and reporting tool

- Maintain the Ara Irititja (Stories from the Past) database, promote community access, and continue data entry. Ara Irititja is a multimedia database and associated project that enables Anangu to access archival material (film, photographs, sound recordings, documents, artefacts)
- Support staff and A<u>n</u>angu participation in the annual women's law and culture meeting
- Support and promote the use of traditional knowledge and skills in all areas of park management and especially in fire management

Performance results 2007-08

- Completed oral history recordings with a senior traditional owner, and commenced further recordings of significant elders' stories
- · Conducted rock art inspections throughout the year
- A specialist conservator made conservation assessments of all public sites and produced site management plans
- Consulted with traditional owners on designing and building a new viewing platform and walking path for the Wave Cave, to prevent visitor impact on the site
- Added scanned images of Uluru from the Mountford Collection to the Cultural Sites Management System and Ara Irititja databases, classified into public, restricted men's and restricted women's material
- Scientific and Cultural Heritage Consultative Committee discussed opportunities, practicalities and requirements of an archaeological survey and research program for the park
- Maintained the Cultural Site Management System database
- Maintained the Ara Irititja database. Anangu regularly accessed this popular database throughout the year. Staff worked with senior Anangu to enter information and stories about individual photographs and films in the database
- Trained A<u>n</u>angu and other staff on Ara Irititja database, and upgraded the database's functionality
- Provided logistical support for *Anangu* attending women's law and culture meetings
- Made 11 trips to adjacent Aboriginal lands for natural and cultural resource management and cross-cultural activities
- · Removed graffiti from three public rock art sites
- Realigned the North East walking track at the base of Uluru to protect cultural sites

Major issues

- Managing the park in accordance with the lease obligations and joint management principles
- Providing opportunities for Indigenous economic development in the park
- Maintaining relationships and partnerships with relevant Anangu organisations
- Ensuring traditional owners are appropriately consulted in park projects and park management activities
- Supporting Anangu employment, education and training
- Supporting ongoing transfer of traditional knowledge between generations of *Anangu*

Actions

- · Maintain productive working relationships with joint management partners
- Work with the Central Land Council to ensure effective traditional owner consultation in the development of the fifth management plan and other significant park projects
- Support Anangu enterprise development at the new visitor facility
- Develop an A<u>n</u>angu Employment, Education and Training Strategy and continue to provide opportunities for A<u>n</u>angu to develop park management skills and experience
- Continue to improve and develop the Junior Ranger Program

Performance results 2007-08

- Held four regular and one special meeting of the Board of Management, and 11 Board Consultative Committee meetings
- Joint Management Partnership Team—the Central Land Council Joint Management Officer, the Mutitjulu Community Liaison, the Board of Management Secretary and the Park Manager—met regularly to support the joint management of the park
- Continued to support the employment of the Community Liaison Officer and the Central Land Council Joint Management Officer
- The park and the Central Land Council consulted traditional owners on development of the fifth management plan and other significant projects
- Continued to support the agreement between the Mu<u>t</u>itjulu Community and the park in employing A<u>n</u>angu in the park
- Drafted the A<u>n</u>angu Intergenerational Employment Strategy. This Strategy aims to provide support and opportunities for A<u>n</u>angu to engage in park activities and gain employment in park management

- Sponsored the Mutitjulu Council Chair and an Anangu staff member to attend a two day workshop in Darwin on Indigenous Business Development. It is hoped that helping community members to access information and support will provide the community with economic development ideas which could include more Anangu business in the park
- Provided opportunities for workplace orientation and experience to Nyangatjatjara College students
- Undertook 21 Junior Ranger activities with Mutitjulu and Yulara primary schools

Major issues

- Contracting for construction of the new visitor facility
- Reviewing the park ticket system
- Managing the demands of international and Australian film crews and professional photographers
- Improving interpretation and visitor information
- Managing ageing infrastructure
- Maintaining a high level of visitor safety in the park
- Managing the Uluru climb to reduce the risks to the health and safety of visitors, and to respect cultural traditions

Actions

- Continue media briefings (using the DVD media package and electronic communications)
- Implement as appropriate the recommendations of the ticketing system review
- Implement as appropriate the health and safety recommendations from the Ulu<u>r</u>u climb review
- Develop new interpretive signs around Uluru and the Cultural Centre
- Continue work on realigning the Ulu<u>r</u>u north-eastern base walking track and upgrading the Valley of the Winds walking track
- Maintain visitor infrastructure
- Plan and manage new developments
- Continue tour operator workshops and orientation programs
- Progress the proposed online tour guide training program

Performance results 2007-08

- Undertook 6 rescues of visitors from Ulu<u>r</u>u and responded to a total of 39 emergency situations occurring in the park
- Held seven media briefings and assessed 242 media applications for filming or photography in the park
- Initiated the implementation of recommendations made in the ticket review
- Commenced planning and design of the interpretive panels at the culture centre
- Implemented key recommendations of the Uluru climb health and safety review
- Maintained the park's rock rescue, emergency response, first aid and fire suppression capabilities
- Completed four kilometres of new walking track on north east side of Uluru to improve visitor safety and satisfaction
- Completed stage one of the new visitor facility. Stage two is to be commenced in June 2008
- Installed new interpretive signs and track markers at the Uluru base walk, the cultural centre and Liru walk
- Delivered 150 presentations to visitors at the Cultural Centre
- Conducted four VIP visits including visits from The Nature Conservancy, NT Tourism Advisory Board, Chair of the Parks Australia Audit Committee, and Japanese Government Officials
- Installed a weather station near the base of the Ulu<u>r</u>u climb to obtain more accurate weather information
- Conducted two tour operator workshops
- Commenced consultations with traditional owners on the content for the Online Tour Guide training course
- Prepared tender documentation for the construction of new toilets for the Valley of the Winds and the new visitor facility
- Worked with our regional partners on the Red Centre National Landscape and Red Centre Way
- Held regular park orientation sessions for Ayers Rock Resort staff

KRA5: Stakeholders and partnerships

Major issues

- Providing opportunities for new Indigenous business enterprises
- Maintaining an effective working relationship with the Mutitjulu community
- Maintain ongoing partnership with the tourism industry
- · Maintaining good relationships with other key stakeholders

Actions

- Hold meetings of the Board Consultative Committees
- Participate in the Yulara Advisory Committee
- · Communicate clearly with all parties about park developments
- Meet regularly with the Mutitjulu community and Ayers Rock Resort representatives
- Continue supporting volunteer and community groups in protecting park values

Performance results 2007–08

- Park Manager attended regular meetings of the Yulara Advisory Committee
- Held quarterly meetings of the Tourism Consultative Committee, the Film and Photography Consultative Committee and the Cultural Heritage and Scientific Consultative Committee
- Continued ongoing contact between park management, the Joint Management Partnership Team, traditional owners and relevant stakeholders during design and implementation of core programs such as fire and pest management
- Attended Mutitjulu community council meetings
- Engaged 93 A<u>n</u>angu through the two Memoranda of Understanding on day labour programs with the Mu<u>t</u>itjulu community
- Supported teams from Conservation Volunteers Australia working in the park

KRA6: Business management

Major issues

6

- Completing and implementing the organisational review to ensure the most effective and efficient staffing structure
- Preparing the new management plan
- Providing suitable housing for park staff
- Rising fuel prices for diesel power generation and vehicle fleet
- · Maintaining park infrastructure and road networks
- Providing essential services to the Mutitjulu community
- Developing lease agreements for business enterprises at the Cultural Centre
- Improving corporate governance procedures
- Reduced revenue due to a shortfall in expected visitor numbers
- Staff training and development
- Maintaining staff health and safety at work

Actions

- Implement the organisational review
- Ensure that the park Housing, Training and Occupational Health and Safety (OHS) committees are functional and meet regularly
- Prepare papers on key issues and draft the new management plan
- Continue to implement the staff training plan and update the training calendar
- Develop new Deeds of Standing Offer
- Undertake an energy audit of park housing and implement energy efficiencies
- Continue to implement safe working procedures, including job safety analyses and standard operating procedures

Performance results 2007–08

- Continued developing the new management plan with the Board of Management
- · Implemented the organisational review recommendations
- · Implemented a new staff orientation package
- Supported 60 training events, ranging from informal information sessions to accredited training for park staff, *Anangu* and Mutitjulu community
- One A<u>n</u>angu trainee completed Certificate II in Conservation and Land Management
- Six staff members received assistance under the Department's Study Support Scheme
- The OHS Committee held three meetings and the Training Committee met twice
- The Housing Committee held regular meetings as required
- All staff completed the Department's online OHS Safetrac training course
- Maintained the ranger register to fast track recruitment actions
- Planned a solar power augmentation project for Park Headquarters and the Cultural Centre to reduce fuel costs and greenhouse gas emissions
- Initiated discussions with the Ayers Rock Resort on park housing requirements

A new sunrise viewing facility for Uluru



Peter Cullen, Assistant Manager-Operations, updates stakeholders on the progress of the project, and explains the future development of viewing platforms and facilities for the site

Finding the best vantage point for viewing Uluru is one of the most popular activities undertaken by visitors to Uluru-Kata Tjura National Park. Many visitors flock to the park's viewing areas to experience a sunrise or sunset over Uluru and capture the World Heritage listed landscape of the park.

As visitor numbers have increased over time, the impact on the park's viewing areas has also increased. This has been particularly highlighted

at the existing Sunrise Viewing Areas, where each morning there can be up to 1200 visitors, with approximately 110 cars, 30 buses and several motorcycles gathered. This area was not originally designed to cater for such numbers. As demand for the sunrise viewing area increased, there has been a proportional reduction in the overall safety and satisfaction of visitors.

The park's Fourth Management Plan and a recent traffic and parking study recognised the shortcomings of the existing Sunrise Viewing Area and highlighting the need for a new viewing facility.

The key concerns identified with the existing Sunrise Viewing Area include:

- inappropriate presentation of the living cultural landscape of the park, as taking photographs of some of the northern features of Ulu<u>r</u>u is not permitted
- increased visitor numbers causing uncomfortable crowding and detracting from the peaceful experience expected by visitors
- a risk to visitor safety, as visitors tend to be preoccupied with the dawn experience and do not observe the vehicles moving around them
- regrowth of vegetation impedes visitors' views
- the areas are too close to Uluru to take in the whole of the monolith
- the areas are considered to be single use and not multifunctional.

These issues created the impetus for the development of the new viewing facility. The consultation process for the development began in 2006, with traditional owners and the tourism industry meeting to identify and discuss an appropriate location.

The construction of the new road, parking area and other associated works, commenced in November 2007, with the first stage of the development being opened in June 2008.

During the initial construction phase, eleven kilometres of new bitumen roads were built, and 250,000 square metres of concrete paving have been laid to create coach and car parking areas. Existing roads have been realigned, and six kilometres of waterline have been incorporated into the road construction —enabling the delivery of water to the site.

The next stage of the development involves the construction of the walking tracks, elevated viewing platforms and other visitor infrastructure, including toilet facilities.

Once completed, Ulu<u>r</u>u-Kata Tju<u>t</u>a National Park will have a world class visitor facility providing visitors with a safe and uninterrupted view and a memorable experience of Ulu<u>r</u>u and the living cultural landscape. The facility has been designed to provide opportunities for local Indigenous businesses to develop.

Species trends at Ulu<u>r</u>u-Kata Tju<u>t</u>a National Park

Discoveries from 23 years of fauna surveys



A sand-plain gecko (Diplodactylus stenodactylus). One of the common reptiles recorded during the Ulu<u>r</u>u-Kata Tju<u>t</u>a fauna surveys.

Fifteen fauna surveys have been undertaken at Uluru-Kata Tjuta National Park since joint management began in 1985. They are conducted by rangers and consultants under the guidance of the park's Traditional Owners. Surveys occur at eight permanent sites representative of the broad range of the park's vegetation habitats. While few new residents have been added to the park's species lists since the early fauna surveys, subsequent surveys have enabled the

monitoring of the abundance and distribution of fauna in the park over time. Regular surveys also demonstrate how environmental factors such as fire and rainfall impact upon populations and help to evaluate the effectiveness of land management programs.

Bird diversity depends upon rainfall

Birds in the park can be broadly categorised into three groups-sedentary species including crested bellbirds (*Oreoica gutturalis*), black-faced woodswallows (*Artamus cinereus*) and spiny-cheeked honeyeaters (*Acanthagenys rufogularis*); nomadic species including budgerigars (*Melopsittacus undulatus*) and zebra finches (*Taeniopygia guttata*); and migratory and waterbird species such as cormorants (*Phalacrocorax* spp.) and herons. The abundance and diversity of each of these groups varies according to environmental conditions.

The overall diversity and abundance of birds in the park is highly dependent upon rainfall. In wet years, the number of species recorded increases from approximately 65 to over 80. This is driven both by the abundance of resources and the appearance in the park of migratory and waterbirds, taking advantage of the exceptional conditions.

Woodlands, dominated by mulga (*Acacia aneura*), blue mallee (*Eucalyptus oxymitra*) and sandhill wattle (*Acacia ammobia*), are extremely important for the suite of sedentary birds whose distribution and abundance is dependent on the health of those woodland habitats. Accordingly, bird populations found in these woodlands are heavily affected by fire, extremely dry conditions and the presence of high densities of predators, particularly foxes and feral cats.

Nomadic species are the most variable group in terms of distribution and abundance. These birds favour open environments, especially those undergoing successional stages driven by recent fire or rain events. They depend on a mosaic of these conditions within the park. The park's approach to fire planning has a strong focus on creating a patchwork of areas with differing vegetation maturity, establishing a range of successional vegetation classes for nomadic species to utilise.

Reptiles rule the desert

Uluru-Kata Tjuta National Park has a much celebrated abundance and diversity of reptile species. The reptile assemblages of the park's sand dune systems are amongst the richest in the world. This suite of predominantly spinifex-dwelling species appears to remain relatively stable in the face of a highly dynamic arid environment with few trends in abundance or distribution obvious from survey results.

For example, there is no clear impact of fire on the park's reptile fauna. The earliest fauna surveys (1985–1990) suggested that the majority of reptile species avoided burnt and early successional stage spinifex habitats. However, later surveys found that reptiles utilised ecotones, burnt areas and mature spinifex habitats equally.

Survey results also suggest that reptile diversity within the park is largely unrelated to rainfall. When comparing the number of reptile species detected in the park in successive fauna surveys, with the rainfall recorded in the six





months preceding each survey, there is no clear positive relationship between the two variables.

Most likely, the abundance and distribution of the park's reptile communities is determined by the relative availability of termite prey in the sand dune systems. The suite of reptiles detected during each fauna survey is also related to ambient temperature, as more species are detected in surveys during warmer weather.

Small mammals at home in the spinifex



A hairy-footed dunnart (Sminthopsis hirtipes) is tagged with a felt-tipped pen before being released to avoid duplication during the survey.

The park's small-mammal fauna is largely associated with spinifexdominated habitats or refugial habitats at the monoliths of Uluru and Kata Tjura. It comprises a range of rodents, macropods and dasyurids (carnivorous marsupials).

Rainfall is a reliable determinant of rodent distribution and abundance across the park, with all species showing population increases and expansion following high rainfall years, particularly the sandy inland mouse (*Pseudomys hermannsburgensis*). While this situation is somewhat mimicked by the dasyurids such as the desert dunnart (*Sminthopsis youngsonii*), the relationship between

high rainfall and population numbers is not as reliable or pronounced and they appear to remain at more stable levels.

The surveys also demonstrate that fire strongly influences the distribution of small-mammal communities across the park, with several species showing consistent and distinct habitat preferences. For example, the wongai ningaui (*Ningaui ridei*) and the desert mouse (*Pseudomys desertor*) prefer mature spinifex, while the hairy-footed dunnart (*Sminthopsis hirtipes*) and the spinifex hopping-mouse (*Notomys alexis*) prefer spinifex that is in the early-mid successional stages. The relative abundance and distribution of these species across the park varies in accordance with the amount of preferred habitat available.

Of the larger mammals, the euro (*Macropus robustus*) population at Ulu<u>r</u>u has been gradually decreasing throughout the span of the survey program. Potential threats to euro numbers in the survey area include increased human visitation, associated with a growing tourism industry, and the impact of introduced predators, particularly foxes and wild dogs. Further work is needed to confirm the reasons behind the decline.

Calperum and Taylorville Stations

www.environment.gov.au/parks/biosphere/riverland



Special features

Calperum and Taylorville Stations are adjoining pastoral leases in the Riverland area of South Australia, approximately 250km east of Adelaide, near the Victorian border.

Calperum and Taylorville are important locally, nationally and internationally because of their intact mallee vegetation, the presence of several threatened bird species, and their wetlands and related species. The properties form critical habitat for the endangered black-eared

miner (*Manorina melanotis*). They are also important for the conservation of the nationally vulnerable malleefowl (*Leipoa ocellata*) and the regionally vulnerable bush stone-curlew (*Burhinus grallarius*).

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

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

Other significant management documents	Management contract with Austland Services Pty Ltd; Biosphere Reserves Seville Strategy and statutory framework	
Financial	Operating * \$0.685 million	
	Capital	\$0.088 million
	Revenue	\$0.562 million
Visitors	2060 bed-nights in camping grounds, dormitories and other accommodation	

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

International conventions and agreements		
Wetlands (Ramsar) Convention	Part of Calperum included in Riverland Ramsar site	
Migratory Species (Bonn) Convention	8 of 105 listed Australian species	
China–Australia Migratory Birds Agreement	10 of 81 listed species	
Japan–Australia Migratory Birds Agreement	13 of 77 listed species	
Korea–Australia Migratory Birds Agreement	7 of 59 listed species	
Other international agreements	Major component of the Riverland Biosphere Reserve under the UNESCO Man and the Biosphere Program	

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

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

10

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 was funded through the Natural Heritage Trust. Austland Services provides additional support for management activities and community-based programs. During the year a review was conducted of management delivered under the contract and a tender process was completed to select a manager for the properties from 1 July 2008. Austland services was the successful tenderer.

Monitoring

Significant monitoring programs track the physical and biological attributes of both properties. Annual biological surveys in 2007–08 included pitfall trapping of small vertebrates, vegetation photopoints, monitoring malleefowl mound activity, black-eared miners, stone-curlews, waterbirds, fish, possums, frogs, nestboxes and aquatic vegetation assessments. New collaborative studies were initiated to assess and track the impacts of the 2006 Bookmark Bushfires. Feral animal monitoring focused on foxes, goats, pigs and rabbits.

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

Future challenges

Major challenges are:

- supporting and promoting the development of sustainable economic activities based on the natural resources of the region, particularly eco-tourism
- developing an appropriate management regime for Calperum Station's wetlands that can respond to changing conditions
- protecting the critical threatened species habitat provided by mature mallee on Taylorville and Calperum from fire and other potential threats
- developing cross-tenure approaches to managing the broader landscape for shared goals.

KRA1: Natural heritage management

Major issues

- · Rehabilitating and conserving native vegetation and endemic fauna
- Controlling feral animals and weeds
- Conserving fauna
- Managing the floodplain
- Managing fire

Actions

- Rationalise watering points
- Maintain captive colonies of the Murray River snail (Notopala sublineata hanleyi)
- Investigate and monitor saline groundwater
- Review fire management strategies and infrastructure, respond to fires, hazard reduction burning
- Restore and revegetate wetlands
- Implement feral animal control programs
- · Monitor native animal populations
- Contribute to recovery programs for threatened birds

Performance results 2007-08

- Waterpoints identified as non-essential during the regional fire planning process were decommissioned, while essential storages were monitored and maintained or upgraded to prevent water loss
- Captive Murray River snail populations were maintained. A study was initiated to test the ability of populations of the Murray River snail to survive, reproduce and disperse in the wild, when given varying levels of protection from factors such as predation
- The network of floodplain test-wells established under the GridWell project was expanded. Regular monitoring of all wells was continued
- A Bureau of Rural Sciences project to map groundwater salinity in the Calperum floodplain using airborne electromagnetic survey techniques was begun
- Input was submitted to the South Australian Country Fire Service who completed and released for public comment the Bookmark Mallee Draft Fire Plan (the Fire Plan takes a cross-tenure approach to fire management in the region)
- Implementation of several key actions described in the Bookmark Mallee Draft Fire Plan continued during its preparation. These included the installation of dedicated fire-fighting water storage on Taylorville Station, fuel reduction burning on Calperum Station, fire-track/fire-break maintenance and upgrading and planning for the installation of enhanced signage in Mallee areas

- Calperum's 4WD fire-fighting vehicle was upgraded
- Existing revegetation projects, including the Revegetation Gardens research project, were continued. Rationalisation and revegetation of floodplain camping areas continued. A new pilot project was initiated to revegetate a dune crest joining mallee woodland and floodplain ecosystems. Re-establishment of such connections is especially important for the regent parrot (listed as Vulnerable under South Australian legislation)
- A detailed review of vegetation condition and weed status across the properties was commenced, using skilled volunteer labour. Studies of three areas of Calperum with contrasting natural vegetation and management histories were completed
- Regular feral animal control programs continued. Over 3,000 fox baits were laid and monitored, 25 km of rabbit control trail established, and a cull of feral goats was organised in collaboration with neighbouring Gluepot Reserve
- A comprehensive biological monitoring program was maintained and enhanced by the addition of new photopoints and small-vertebrate monitoring sites. The program covered 183 separate sites, and was supplemented by monitoring of rainfall, groundwater and surface water at a further 77 sites
- In addition to ongoing participation in established recovery plans for threatened birds, such as the black-eared miner and malleefowl, Calperum/Taylorville took part in a research program to develop and apply enhanced bird monitoring procedures. This was led by the SA government's regional Threatened Species Ecologist for Mallee Birds. A separate SA government research program into the distribution of the bush stone-curlew, which is listed as rare under South Australian legislation, was also supported

KRA2: Cultural heritage management

Major issues

• Protecting and conserving Indigenous and non-Indigenous heritage

Actions

• Protect, conserve and encourage awareness and recognition of heritage

Performance results 2007–08

- Continued to monitor, protect and revegetate identified Indigenous heritage sites
- Wide community consultation was undertaken to develop a proposal for a training program for Indigenous youth, using *caring for country and re-connecting with cultural heritage* as a central theme of project activities. Significant resourcing for the project has been secured, with its launch planned for 2008-09
- Continued to protect and maintain iconic structures that recall the early pastoral industry, including the Yubalia outstation ruins, the Cooper's Camp fisherman's hut and various items of pastoral-era infrastructure

6

KRA4: Visitor management and reserve use

Major issues

- Providing quality visitor services that are compatible with conservation objectives, visitor safety and management requirements
- · Communicating the values of Calperum and Taylorville
- · Conducting relevant research to support management objectives
- Conducting commercial activities that achieve ecologically sustainable use of natural resources and provide financial benefits that support the protection and/or rehabilitation of natural and cultural assets, and as models for the region

Actions

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

Performance results 2007–08

- Continued redevelopment and enhancement of floodplain camping areas and the development of a Mallee interpretive garden
- · Developed new and additional signage incorporating interpretive materials
- Established a program of occasional 'tag-along' tours to provide the general public with safe access through the remote Mallee woodland areas of Calperum Station
- Continued to support the development of sustainable ecotourism in the region through engagement with Riverland Ecotourism Association, the Riverland Tourism Association and the Riverland Biosphere. A key activity was supporting and encouraging the development of the broader region as a destination under the National Landscapes program
- A total of 2060 bed-nights of accommodation was provided to volunteers, students and visitors to Calperum Station
- Conducted educational programs for pre-primary, primary, secondary and tertiary students, using Calperum Station and the McCormick Centre as key activity sites

- In close collaboration with Renmark High School, developed curriculum materials to allow field trips to Calperum Station and the McCormick Centre to be included in teaching of Year 8 and 9 Science and Society and Environment courses. Teacher professional development days were also staged to support these activities
- Established a Vocation Education and Training (VET) program for senior secondary students, with four students studying for Certificate 1 and 2 units in Conservation and Land Management under the guidance of Calperum Station staff
- Two fulltime trainees completed Certificate 2 courses in Conservation and Land Management, and a further two trainees were recruited
- Hosted an undergraduate Wildlife Conservation student from the University of Hertfordshire (UK) for a one year study/work experience placement
- Hosted three groups of North American tertiary students under the International Student Volunteer program
- Hosted numerous field trips and camps for TAFE SA (Technical and Further Education), university and non-government study tour groups, studying biology, ecology and environmental management. Sessions were held on floodplain management; communities' capacity to understand and respond to environmental issues involving the river; conduct of biological surveys; collecting and classifying native plants; and the aims and methods of community-based management of Calperum and Taylorville Stations
- Hosted and/or supported activities for compatible programs run by other organisations, including CSIRO's 'Lab on Legs' and Double Helix Science Club, Waterwatch, Community Stream Sampling, Oz Green's My RiveR Murray project and the GrowSmart Careers in Science
- In conjunction with TAFE SA, ran numerous accredited training courses for volunteers and the community on natural resource management, including plant and animal identification, biological survey techniques, native seed collection and plant propagation
- Calperum Station and the McCormick Centre were involved in education and training events that catered for over 1,800 participants in total. They involved approximately 2,100 person-days of capacity-building activity
- Updated software and hardware components of the properties' Geographic Information System (GIS)
- Two PhD students continued research programs on Calperum Station
- None of Calperum Station's allocation of irrigation water was used during the year

KRA5: Stakeholders and partnerships

Major issues

- Promoting the UNESCO Man and the Biosphere Program
- Involving the community in land management
- Supporting and recognising 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 Program
- Promote, support and oversee extensive volunteer involvement
- Develop a system for consistently recording volunteer hours
- · Participate in the Riverland Biosphere Community Committee

Performance results 2007–08

- Continued to promote Calperum and the McCormick Centre as places available for research and monitoring, education, skill-sharing and public recreation.
 Encouraged volunteers to recognise these objectives at all suitable opportunities
- Continued providing various forms of support and encouragement to existing and potential volunteers. Maintained appropriate insurance for volunteers. Made sure that they were aware of, and observed, occupational health and safety procedures
- The McCormick Centre developed as a focal point for meetings and the dissemination of information on issues relevant to the Man and the Biosphere Program. This included dissemination of material produced by SA government agencies and the Murray Darling Basin Commission
- Continued regular participation in management of the Riverland Biosphere through its Community Committee. Following the 2007 Annual General Meeting, one staff member was elected as Committee Chair, and a Calperum volunteer was elected Secretary
- Maintained a database to record and analyse volunteer contributions to management of the properties
- Continued to develop the Paddock Adoption Scheme under which community members take direct responsibility for the day-to-day management of parts of the Stations
- Initiated collaborations with metropolitan Adelaide Rotary clubs to promote Calperum and Taylorville as a major focus for activity under Rotary's 'Preserve Planet Earth' program. An early result of this collaboration was the establishment of a partnership with Rotary and LeFevre High School to involve disengaged students in the program

KRA6: Business management

Major issues

- Property maintenance
- Business management
- · Environmentally sustainable management

Actions

- Maintain infrastructure
- · Manage professionally and accountably

Performance results 2007-08

- Continued producing quantities of seed for revegetation and occasional commercial sale
- Maintained existing buildings, fencing, tracks and other infrastructure. A significant fence repair program was undertaken on Taylorville Station in the aftermath of the Bookmark Bushfires
- Developed an outstation on Taylorville Station to support enhanced field work and to act as a forward fire-fighting facility
- Renovated woolshed annex to provide additional secure equipment storage capacity
- Completed partial renovation of Calperum Station's plant nursery
- Undertook regular infrastructure and equipment maintenance and enhancement programs, including improvements to visitor infrastructure
- Upgraded computing and communications infrastructure
- Complied with applicable legislation
- Maintained a recycling program

6

Ashmore Reef National Nature Reserve

www.environment.gov.au/coasts/mpa/ashmore



Special features

Ashmore Reef National Nature Reserve, located approximately 830 kilometres north-west of Darwin, is renowned for its high biological diversity and unique marine ecosystems. The reserve contains a variety of marine habitats, including a coral reef system, lagoons, abundant seagrass beds and extensive tidal sand flats, as well as vegetated sand islands.

Ashmore Reef is home to a variety of fish, coral, mollusc and other invertebrate species. Seventeen species of sea snakes

have been recorded at Ashmore Reef, which is the highest known diversity and density of sea snakes in the world. The reserve is also an important breeding and feeding habitat for a number of threatened species, including dugong (*Dugong dugon*), green turtles (*Chelonia mydas*), loggerhead turtles (*Caretta caretta*) and hawksbill turtles (*Eretmochelys imbricata*).

The reserve's three sand islands have a combined area of 112 hectares and support some of the most important seabird rookeries on the Northwest Shelf. The reserve is an important staging point for migratory wetland birds, especially waders. More than 93 species of seabirds have been recorded at Ashmore Reef, of which 45 are listed in international agreements for the conservation of birds and their habitats.

Location	Latitude 12°15' South, Longitude 123°05' East		
Area	58,337 hectares		
Proclamation date	28 July 1983		
IUCN category	Category la: 54,991 hectares		
	Category II: 3,346 hectares		
Biogeographic context	IMCRA 4.0 provincial bioregion: Timor Province		
Management plan	Second plan expires 25 June 2009		
Other significant	Australian Government Memorandum of Understanding with Indonesia;		
management documents	Standard Operating Procedures (included in an operations manual)		
	for Australian Customs Service officers operating at the Reserve.		
Financial	Operating	\$49,730*	
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	Capital Not applicable		
	Revenue	Not applicable	
Visitors/Users	 124 Indonesian vessels, 16 recreational vessels (yachts, catamarans)^(a) 3 commercial tour permits (bird watching); 1 scientific permit (bird) 		
Permits/Approvals			

- * In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.
- (a) Figures are taken from the records of vessels boarded at Ashmore, as at 8 May 2008. These records continue to be updated and reflect only vessels observed and identified by Customs officers while present in the Reserve.

International conventions and agreements			
Wetlands (Ramsar) Convention	The entire reserve is listed		
Migratory Species (Bonn) Convention	28 of 105 Australian listed species		
China–Australia Migratory Birds Agreement	44 of 81 listed species		
Japan–Australia Migratory Birds Agreement	45 of 77 listed species		
Korea–Australia Migratory Birds Agreement	35 of 59 listed species		
Other agreements	Under a Memorandum of Understanding with Indonesia, traditional Indonesian fishers are allowed access to an area that includes the reserve		

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

Numbers of native species recorded ^(a)					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
1	93	19	810	1,371	44

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The reserve is managed by the Marine Division of the Department of the Environment, Water, Heritage and the Arts, under delegation from the Director of National Parks. On-site management and surveillance is provided through formal arrangements with a number of other government agencies.

The Australian Customs Service (Customs) carried out on-site management of the reserve and has maintained a permanent enforcement presence since April 2008. Coastwatch provided regular surveillance flights over Ashmore and Departmental staff visited the reserve in December 2007 and May 2008 to implement and assess reserve management activities.

Monitoring

Sea snake monitoring by Charles Darwin University indicates a decline in sea snake populations at Ashmore Reef. A three-part research program to investigate this more closely began with a survey in November 2005. The survey found very low numbers of sea snake species, including by comparison with other nearby reefs (Cartier and Hibernia). A follow-up survey in March 2007 (to take seasonal variation into account) confirmed this trend. The final survey of the research program was conducted in May 2008—the results are expected in 2008-09.

A rat identification program was established in June 2008 following a possible rat sighting on West Island in April 2008. Records of rats on West Island date back to 1949. Following an intensive eradication program during the 1980's, the island was thought to be free of rats in 1990. Results of the rat identification program are expected in July 2008. An eradication program will be developed and implemented in 2008-09 if results indicate that rats have returned to the island.

Future challenges

Major challenges are:

- managing potential introduced species
- · continuing to support and enhance the compliance and enforcement capacity
- managing for the potential impact of climate change, including coral bleaching events and loss of niche habitats and associated species. Coral health and species abundance will continue to be monitored at Ashmore, with the aims of better understanding the impacts of climate change and developing appropriate management responses.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

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

Actions

- Enforce access and fishing restrictions
- Cooperate with other Australian Government agencies to improve management of the MoU Box fishery with Indonesia
- Encourage and facilitate reef research and monitoring
- Manage threats identified in the Marine and Terrestrial Introduced Species Prevention and Management Strategy (2004)
- · Monitor and remove weeds and marine debris from the reserve
- Implement quarantine, bilge and ballast water protocols

- The 35 metre Australian Customs Vessel, *Ashmore Guardian*, was successfully deployed to Ashmore Reef in April 2008. This specially modified vessel accommodates up to 10 Customs and other government officers. It provides a near permanent compliance and management presence at Ashmore Reef (see case study on page 169)
- Customs officers enforced access and fishing restrictions. Officers boarded 124 fishing vessels in the area and advised crews of restrictions. Suspected illegal activities were investigated and warnings issued
- Sea snake research was conducted which indicated lower numbers compared to earlier surveys
- · Collection and analysis of marine debris continued

KRA4: Visitor management and park use

Major issues

· Damage to the reef from anchoring vessels

Actions

- Maintain moorings
- Monitor visitation

Performance results 2007–08

- · Three new moorings for Customs use were installed at Ashmore Reef
- · Customs officers monitored visitors' use of moorings
- Information about appropriate moorings use was distributed via a brochure and published on the web site

KRA5: Stakeholders and partnerships

Major issues

- Illegal foreign fishing
- Effective working and liaison arrangements with the management service provider–Customs

Actions

- Collaborate with Australian Government agencies involved in revising and implementing an integrated management approach for Indonesian fishing in the MoU Box
- Manage the relationship with Customs

- Consulted with the Department of Agriculture, Fisheries and Forestry to address
 overfishing issues in the MoU Box on a regional and cooperative basis
- · Held regular meetings and consultations with Customs
- Provided warden training for Customs officers
- The Australian Government established a permanent Customs enforcement vessel
- Organised and participated in a workshop to improve adaptive management for coral reef reserves. The workshop included remote coral reef marine reserve managers, key researchers and monitoring providers. Linkages between research and monitoring of remote coral reefs natural heritage were identified. Relationships between participants were improved and participants' understanding of adaptive management processes and challenges was enhanced

Dedicated vessel now watches over Ashmore



Indonesian fishers moored at Ashmore Reef

Ashmore Reef is a jewel in the northwest of Australia's marine waters. The area was declared as the Ashmore Reef National Nature Reserve in 1983 to protect its outstanding and representative marine ecosystem. Ashmore provides homes for many types of sea snakes, sea birds, dugongs, turtles, coral, fish, sea stars, sea urchins and sea cucumbers.

Ashmore lies within a broader area known as the MoU Box which is

managed under an agreement with Indonesia, and allows traditional Indonesian fishermen to fish for some species in areas outside the reserve. Many Indonesian fishers stop at Ashmore for shelter, to get water from the well on West Island, or visit the grave sites of Indonesian fishers buried on West Island.

Indonesian Fishermen are allowed to use moorings in West Island Lagoon at Ashmore. These fishermen may catch finfish for immediate consumption only in the open area of the lagoon. However, it is known that illegal fishing for turtle, shark fin, sea cucumber (otherwise known as trepang), trochus and giant clam shells has occurred in the area. The Australian Government has recognised that the absence of a compliance presence in the Reserve, even for a short time, can result in a significant decline in target species populations, particularly trochus and trepang.

The Australian Customs Service (Customs) has provided a compliance and enforcement presence at Ashmore Reef for many years, using its Bay Class patrol vessels. In recent years, these vessels have been in high demand, responding to incidents across Australia's entire exclusive economic zone (EEZ). As a result it was clear to the Australian Government that a dedicated vessel was required to protect the unique environment at Ashmore Reef.



Australian Customs Vessel Ashmore Guardian

In April 2008 the *Ashmore Guardian*, a 35m long specially modified commercial fleet support ship, was accepted into service by Customs. The Guardian is capable of carrying up to ten Customs and other government officers, and enables Customs to conduct operations on a near-continuous basis at the Ashmore Reef National Nature Reserve.

Customs officers aboard the *Ashmore Guardian* undertake day to day compliance and enforcement activities in the Reserve, as well as reserve management tasks on behalf of the Department of the Environment, Water, Heritage and the Arts (DEWHA). This includes visiting all vessels that arrive at Ashmore. Visitors receive information about the values and rules of the Reserve and provide valuable data on their catch, home port and destination.

Customs officers also assist with surveys of the seabirds and their chicks on the islands, and collecting marine debris. More targeted activities such as weed eradication, marine science surveys and bird surveys are supported by departmental reserve managers and scientists, as well as Customs officers.



Figure 9: Ashmore Reef National Nature Reserve

Cartier Island Marine Reserve

www.environment.gov.au/coasts/mpa/cartier



Special features

Cartier Island Marine Reserve is located in the Indian Ocean, approximately 790 kilometres north-west of Darwin and approximately 45 kilometres south-east from Ashmore Reef. The reserve contains a variety of marine habitats including a coral reef system, a sand island and extensive tidal sand flats.

Cartier Island Marine Reserve is home to a variety of fish, coral, sponge, echinoderm, mollusc and other invertebrate species. Its varied habitats

provide for an unusually high diversity and density of sea snakes, some of which are endemic to the region. The reserve supports populations of feeding, breeding and nesting sea turtles and may also support dugongs (*Dugong dugon*).

Location	Latitude 12°32' South, Longitude 123°33' East		
Area	17,238 hectares		
Proclamation date	7 June 2000		
IUCN category	Category la		
Biogeographic context	IMCRA 4.0 provincial bioregion: Timor	Province	
Management plan	Current plan expires 25 June 2009		
Other significant management documents	Australian Government Memorandum of Understanding with Indonesia; Standard Operating Procedures (included in an operations manual) for Customs officers operating at the Reserve.		
Financial	Operating	Nil*	
	Capital	Not applicable	
	Revenue Not applicable		
Visitors/Users	1 Indonesian vessel boarded		
Permits/Approvals	None		

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements			
Migratory Species (Bonn) Convention	n) 1 of 105 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	8 marine		
	Recovery	1 implemented: marine turtles		
	plans			
Listed flora	None			

Numbers of native species recorded ^(a)					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
1	Unknown	17	810	1371	0

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The reserve is managed by the Marine Division of the Department of the Environment, Water, Heritage and the Arts, under delegation from the Director of National Parks. On-site management and surveillance is provided through formal arrangements with a number of other government agencies.

Cartier Island and Ashmore Reef are managed together being approximately 45 kilometres apart. The Australian Customs Service (Customs) has a permanently stationed enforcement vessel at Ashmore Reef that assisted with on-site management activities. Compliance and enforcement activities were also supported by Coastwatch, which provided regular surveillance flights over the Cartier Island Marine Reserve.

Monitoring

Monitoring to date has shown that the major threats to the reserve are from illegal foreign fishing and climatic disturbances such as cyclones and coral bleaching.

The last major marine survey was carried out in September 2005. The survey found that species targeted by Indonesian fishers, including trepang and trochus shell, were still in recovery from previous exploitation. The next survey is scheduled in 2008.

Future challenges

Major challenges are:

- · continuing to support and enhance compliance and enforcement activity
- managing for the potential impacts of climate change.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Illegal access
- Overfishing

Actions

- · Enforce access and fishing restrictions
- Liaise with the Department of Agriculture, Fisheries and Forestry and Indonesian officials to improve management of the MoU Box fishery
- Encourage and facilitate reef research and monitoring

Performance results 2007–08

- The 35 metre Australian Customs Vessel, *Ashmore Guardian*, was successfully deployed to Ashmore Reef in April 2008. This specially modified vessel strengthened the protection of Cartier reserve by assisting with compliance and enforcement measures and on-site management
- 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
- Continued to collect and analyse marine debris

KRA5: Stakeholders and partnerships

Major issues

- Illegal foreign fishing
- Effective working and liaison arrangements with the management service provider–Customs

Actions

- Collaborate with Australian Government agencies involved in revising and implementing an integrated management approach for Indonesian fishing in the MoU Box
- Manage the relationship with Customs

6

- Consulted with the Department of Agriculture, Fisheries and Forestry to address overfishing issues in the MoU Box on a regional and cooperative basis
- Organised and participated in a workshop to improve adaptive management for coral reef reserves. The workshop included remote coral reef marine reserve managers, key researchers and monitoring providers. Linkages between research and monitoring of remote coral reefs natural heritage were identified. Relationships between participants were improved and participants' understanding of adaptive management processes and challenges was enhanced
- Held regular meetings and consultation with Customs
- Provided warden training for Customs officers
- Worked closely with Customs to acquire and establish a permanent enforcement vessel at Ashmore Reef, which also provides enforcement coverage for Cartier reserve

Cod Grounds Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/cod-grounds



Special features

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

The east coast population of the grey nurse shark is listed as critically endangered under the *Environment Protection and Biodiversity Act 1999* and is at high risk of extinction due to its low

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

The *Recovery Plan for the Grey Nurse Shark* recommends that the Cod Grounds be declared a Sanctuary Zone as it provides critical feeding and reproduction habitat for grey nurse sharks. Under the reserve management arrangements all fishing is prohibited in the reserve.

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

Location	Latitude 31°40′52″ South, Longitude 152°54′37″ East. The reserve comprises a 1,000 metre radius from this point	
Area	314 hectares	
Proclamation date	10 May 2007	
IUCN category	Category la	
Biogeographic context	IMCRA 4.0 provincial bioregion: Central Eastern Shelf Transition	
Management plan	Interim management arrangements are in place until a Cod Grounds Management Plan is developed	

Other significant management documents	Annual Business Agreement between the Australian and New South Wales Governments (NSW Department of Primary Industries)	
Financial	Operating	\$103,233*#
	Capital	Not applicable
	Revenue	Not applicable
Visitors	241	
Permits	1 commercial dive operator, 2 research	

- * In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.
- # A further \$564,368 was spent in 2007-08 on a structural adjustment process for affected commercial fishing businesses under the *Australian Policy on Marine Protected Areas and Displaced Fishing*.

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

Management arrangements

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

The reserve is managed by the Marine Division of the Department of the Environment, Water, Heritage and the Arts, under delegation from the Director of National Parks. The New South Wales Department of Primary Industries (NSW DPI) undertook compliance and enforcement activities in the reserve under an Annual Business Agreement between the Australian and New South Wales governments.

Interim management arrangements will remain in force until the management plan for the reserve is approved. Development of the plan includes two periods of public consultation to enable stakeholders to have the opportunity to comment on the plan. The first period of public consultation was completed in late 2007.

Monitoring

Grey nurse shark numbers are being monitored at the Cod Grounds as part of a broader study into the distribution and population of the species along the east coast of Australia. The commercial dive operator submits reports for each dive undertaken in the reserve with a tally of grey nurse sharks sighted on each dive. Numbers vary from zero to over 80 sharks sighted on any one dive.

Swath mapping and habitat classification of the reserve was undertaken by the NSW Department of Environment and Climate Change. Preliminary results show that the Cod Grounds reef is part of a series of reefs extending from the south, with the Cod Grounds having the shallowest reef with steeper slopes. Four distinct substrate types were identified: sand, unconsolidated sand and cobble, unconsolidated sand and boulder, and rocky reef.

The Port Macquarie Underwater Research Group undertook dives to monitor and photograph species at the Cod Grounds, with the aim of identifying the major species occurring in the reserve.

Future challenges

Major challenges are:

- managing public access to the reserve
- educating the public on the values of the reserve and why these management arrangements have been implemented
- developing and implementing an effective compliance and enforcement strategy
- developing the Cod Grounds Commonwealth Marine Reserve Management Plan.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Monitoring habitats and populations of the grey nurse shark
- Obtaining baseline information on the habitats of the reserve

Actions

- · Implement interim management arrangements
- Undertake habitat mapping and classification
- Retrieve and replace data loggers

Performance results 2007–08

- Swath mapping and habitat classification project completed
- Replaced grey nurse shark listening station and temperature data loggers
- Regular grey nurse shark counts undertaken

KRA4: Visitor management and reserve use

Major issues

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

Actions

- Enforce fishing prohibition
- Issue approvals for user access and research
- · Implement interim management arrangements
- Undertake regular compliance and monitoring patrols
- · Distribute brochures and information on the reserve

- NSW Department of Primary Industries conducted 36 surface patrols
- Information and advice given to fishers operating close to and within the reserve
- · Warnings issued to nine fishers found in breach of management arrangements
- · Signs installed at local boat ramps informing users of management arrangements
- Reports received from approved commercial dive tour operator on activities undertaken

KRA5: Stakeholders and partnerships

Major issues

- Ensuring ongoing engagement with the community, key groups and government agencies
- Establishing complementary management arrangements with NSW State Government and Australian Government agencies
- Developing the Cod Grounds Commonwealth Marine Reserve Management Plan
- Informing the community about Interim Management Arrangements, e.g. total fishing ban

Actions

- Development of Annual Business Agreement with the NSW State government to undertake compliance activities within the reserve
- Consult with key stakeholders and industry bodies
- · Initiate development of management plan
- Provide community information on Interim Management Arrangements

- Annual Business Agreement entered into with NSW Department of Primary Industries to undertake vessel patrols within the reserve
- Consulted with stakeholders and general community about the development of the management plan for the reserve
- Liaised with local dive operator, researchers and NSW State agencies on the status of reserve values

Coringa–Herald National Nature Reserve

www.environment.gov.au/coasts/mpa/coringa



Special features

Coringa–Herald National Nature Reserve has six islets and cays of which 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 significant 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.

The Coringa Islets were named after the *Coringa Packet*, a sailing ship wrecked off Chilcott Islet in 1945. The remains of the *Coringa Packet* have been declared an historic shipwreck.

Location	Latitude 16°59' South, Longitude 149°45' East 885,249 hectares		
Area			
Proclamation date	16 August 1982		
IUCN category	Category la IMCRA 4.0 provincial bioregion: Northeast Province Second plan expires 4 September 2008 Operating \$202,756*		
Biogeographic context			
Management plan			
Financial			
	Capital	Not applicable	
	Revenue Not applicable There were three research and monitoring trips to the Reserve Permits: 1 commercial tour, 1 research		
Visitors/Users			
Permits/Approvals			

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

Entire reserve is listed
8 of 105 listed Australian species
14 of 81 listed species
15 of 77 listed species
8 of 59 listed species

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

Numbers of native species recorded ^(a)					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
30	27	5	over 342	over 1,000	16

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The reserve is managed by the Marine Division of the Department of the Environment, Water, Heritage and the Arts, under delegation from the Director of National Parks. On-site management and surveillance is provided through formal arrangements with a number of other government agencies.

The Bureau of Meteorology provides weather forecasting services and storage facilities for an emergency helicopter fuel cache to cover possible emergency evacuation from the reserve. Coastwatch provide aerial surveillance of the reserve. Customs provided compliance and enforcement, and vessel support, for research and monitoring activities in the reserve.

Monitoring

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

A biological control program was postponed during the year to allow monitoring of vegetation, invertebrates and insect pests, such as scale insects and hawkmoth. Monitoring evidence indicates that the introduced control species have become established and further release is therefore not necessary. To date biological control programs have proved successful in minimising damage to the *Pisonia* forest from insect defoliation.

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

Subsurface sea temperature loggers were installed and exchanged as part of a large ongoing temperature monitoring program. The remote sensing pilot project was successful and is planned to continue. The project trialled the use of satellite imagery to map and classify habitats, produce and ground-truth bathymetric maps, and detect changes in terrestrial and marine habitats over time. Satellite images have been acquired and processed for Northeast Herald Cay.

Future challenges

Major challenges are:

- maintaining the health of the *Pisonia* forest ecosystem including controlling pest insects
- understanding and managing the impacts of climate change, including coral bleaching events and loss of niche habitats and associated species
- ensuring the health and safety of personnel. This continues to be effectively
 addressed by doing a rigorous safety analysis before each trip, including
 comprehensive contingency and communication plans and risk control measures.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Possible illegal fishing
- Measuring reef health—includes coral bleaching
- Impacts of pest insects and climate change on the Pisonia forest ecosystem

Actions

- Enforce fishing restrictions
- Continue the strategic reef monitoring program
- · Implement an insect pest monitoring and management program
- · Acquire satellite images to use for long-term remote monitoring

- Detected no measurable permanent deforestation of *Pisonia* by insect pests. Departmental staff and a consulting botanist and entomologist visited the reserve to monitor defoliation and forest health. Insects beneficial to the control of scale insects and hawkmoth were released
- James Cook University and C&R Consulting undertook coral reef health assessments, reporting a slow recovery and continued low percentage of live coral cover. However, this appears to be typical of oceanic reefs similar to those in the reserve
- The Australian Institute of Marine Science installed and exchanged data loggers, which record sea temperatures
- · Erected new signs and collected and removed marine debris
- Using satellite imagery CSIRO Land and Water produced vastly improved bathymetric maps, and terrestrial and marine ecosystem maps, which enhance capacity to detect and track ecosystem changes, and improve efficiency of field surveys

KRA4: Visitor management and park use

Major issues

Introduction of pest species by visitors to the reserve

Actions

- Distribute the information brochure
- · Maintain website
- · Erect information signs on the cays and islets in the reserve

Performance results 2007–08

- Distributed reserve information brochure to key stakeholders including researchers and commercial tour operators. The brochure details effective quarantine measures to be undertaken by visitors to the reserve and why these practices are so important
- Signs with information on the reserve have been erected on all cays and islets within the reserve

KRA5: Stakeholders and partnerships

Major issues

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

Actions

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

- Liaised with Coastwatch, the Bureau of Meteorology, Department of Defence, Department of Transport and Regional Services, relevant researchers and tour operators
- Met with partners to discuss key issues and conducted presentations on marine protected area operations and management prescriptions
- Distributed the reserve information brochure to key stakeholders. The brochure is also available on the Department's website
- Organised and participated in a workshop to improve adaptive management for coral reef reserves. The workshop included remote coral reef marine reserve managers, key researchers and monitoring providers. Linkages between research and monitoring of remote coral reefs natural heritage were identified. Relationships between participants were improved and participants' understanding of adaptive management processes and challenges was enhanced

KRA6: Business management

Major issues

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

Actions

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

Performance results 2007–08

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

Science for adaptive ecosystem-based management in tropical marine reserves



Pisonia heavily defoliated by hawkmoths

Tropical marine reserves are among the longest standing reserves in the Commonwealth marine reserves estate. These reserves boast high biological diversity, important feeding and nesting habitats for birds and sea turtles, and cultural heritage sites. Potentially significant threats to the natural and cultural values of the reserves include direct impacts from recreational activities and indirect impacts from climate change. Included

in these threats are coral bleaching from heat stress and persistence of introduced species in terrestrial forests. Understanding and improving the resilience of natural systems to cope with these stresses are the key benefits of research and monitoring efforts in the Commonwealth marine reserves.

In May 2008, a workshop on 'Science for adaptive management of remote coral reef marine reserves' was held in Brisbane, attended by over 30 scientists and reserve managers. The workshop addressed key management issues, scientific knowledge and methodologies for improving the application of scientific information in adaptive management of remote coral reef reserves. Key outcomes from the workshop included identification of information gaps and inter-linkages among research fields; recommendations for improving monitoring programs to support adaptive management; and a better understanding of the relationships between science and management.

Some recommendations from the workshop will be implemented immediately. For example, field surveys will, where possible, be more thoroughly geo-referenced to improve accuracy of habitat maps and monitoring based on satellite imagery. Remote sensing technologies are now being used as high resolution, broad-scale and cost-effective alternatives to traditional monitoring methods. Innovative and cost-effective monitoring strategies, like using satellite imagery, will become even more important in the future for understanding and managing habitats for resilience to the impacts of climate change in highly vulnerable areas. Another set of recommendations from the workshop focused on effective monitoring and response to pest incursions. A pest insect control program has been in place at North East Herald Cay in the Coral Sea since 2001. The release of predatory beetles to reduce outbreaks of a scale insect has been initially successful in reducing scale-related damage to important and vulnerable forest habitat. There are, however, other pests that defoliate forest trees and the effect of the beetle on native species is unknown. Ongoing research is needed to understand the cause of insect outbreaks that damage important nesting seabird habitat and to effectively mitigate the effects of these pest species.

Elizabeth and Middleton Reefs Marine National Nature Reserve

www.environment.gov.au/coasts/mpa/elizabeth



Special features

Elizabeth and Middleton Reefs Marine National Nature Reserve is located some 160 kilometres north of Lord Howe Island, in a transition area between tropical and temperate climates. Both reefs rise independently from deep oceanic water and are the southern-most open-ocean platform reefs in the world.

Isolation and exposure to convergent tropical and temperate ocean currents and climates has given the reefs a distinct and diverse assemblage of marine

species including a number of endemic species. Many species are near the northern or southern limit of their distribution.

The reserve 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 also has high numbers of Galapagos reef sharks (*Carcharhinus galapagensis*), which suggests the reefs are an important nursery area for this species. Apart from Lord Howe Island, the shark has not been recorded in any other Australian reef system.

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

The reserve has a rich maritime history with over thirty vessels being wrecked on the reefs over the past 200 years. The most prominent of these is the *Runic*, a 13,500 tonne meat freighter that ran aground on Middleton Reef in 1961. Although it is rapidly breaking up, the wreck remains visible for several miles.

Location	Latitude 29°42' South, Longitude 159°05' East	
Area	187,726 hectares	
Proclamation date	23 December 1987	
IUCN category	Category la overall comprising:	
	Sanctuary Zone - Category la (143,146 hectares)	
	Habitat Protection Zone - Category II (44,580 hectares)	

Biogeographic context	IMCRA 4.0 provincial bioregion: Lord Howe Province		
Management plan	Second plan expires 22 March 2013		
Financial	Operating \$9,703*		
	Capital	Not applicable	
	Revenue	Not applicable	
Visitors	Not recorded, numbers low		
Permits	12 recreational, 1 commercial tour		

In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire reserve is listed
Migratory Species (Bonn) Convention	2 of 105 listed Australian species
China-Australia Migratory Birds Agreement	3 of 81 listed species
Japan–Australia Migratory Birds Agreement	6 of 77 listed species
Korea-Australia Migratory Birds Agreement	3 of 59 species

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 vulnerable
		8 migratory
		13 marine
	Recovery plans	1 being implemented: marine turtles
Listed flora	None	

Numbers of native species recorded ^(a)					
Mammals	Birds	Reptiles	Fish	Invertebrates	Flora
2	10	2	407	586	19

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The reserve is managed by the Marine Division of the Department of the Environment, Water, Heritage and the Arts, under delegation from the Director of National Parks. On-site management and surveillance is provided through formal arrangements with a number of other government agencies.

Coastwatch made regular surveillance flights and a departmental officer accompanied a Customs compliance patrol to the reefs in November 2007.

Monitoring

The reef systems at Elizabeth and Middleton Reefs have been surveyed regularly since 1987, with the last comprehensive survey in 2006 and a rapid survey in February 2007. In 2008 the data loggers installed in 2006 were replaced and the condition of the reefs was assessed visually. The data loggers record water temperature to help assess the effects of temperature on the reefs.

The reserve is generally in good health with little bleaching and very little evidence of crown-of-thorns starfish (*Acanthaster planci*) activity. The number of black cod appears to be stable and high numbers of Galapagos sharks (*Carcharhinus galapagensis*) were observed during recent surveys.

A yacht ran aground on Elizabeth Reef in August 2007 and, due to the inaccessible location, could not be salvaged. The lone occupant was rescued by the navy. Although the yacht has not caused significant damage to the reef system, monitoring of the wreck will continue.

Future challenges

Major challenges are:

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

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

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

Actions

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

Performance results 2007–08

- · Research projects on black cod and Galapagos shark genetics were completed
- Replaced temperature data loggers installed in 2006

KRA2: Cultural heritage management

Major issues

· Possible interference with shipwrecks

190

Actions

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

Performance results 2007–08

Coastwatch flights and the November 2007 patrol detected no interference with shipwrecks

KRA4: Visitor management and reserve use

Major issues

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

Actions

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

Performance results 2007–08

- Coastwatch flights detected no illegal fishing
- The November 2007 patrol detected no illegal activity and no pollution
- · Responded to the grounding of a yacht on Elizabeth Reef
- · Issued permits for visitor access and recreational fishing

KRA5: Stakeholders and partnerships

Major issues

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

Actions

• Ensure relationships with partners are productive

- Liaised with Coastwatch, scientists, tour operators and the Lord Howe Island community
- Science for Managing Remote Coral Reef Marine Protected Areas Workshop successfully held in May 2008

Great Australian Bight Marine Park (Commonwealth Waters)

www.environment.gov.au/coasts/mpa/gab



Special features

The Great Australian Bight (GAB) Marine Park (Commonwealth Waters) protects marine mammal habitat and the ecological communities and sediments of the seabed in Commonwealth waters adjacent to the South Australian GAB Marine Park (State Waters). 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 park is adjacent to 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 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 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 values.

Location	Latitude 31°43' South, Longitude 130°23' East	
Area	1,937,162 hectares	
Proclamation date	22 April 1998	
IUCN category	Category VI overall comprising:	
	Marine Mammal Protection Zone Category VI (385,380 hectares)	
	Benthic Protection Zone Category VI (1,608,463 hectares)	
	(Overlap of these two zones = 56,681 hectares)	
Biogeographic context	IMCRA 4.0 provincial bioregions: Great Australian Bight Shelf and Southern Province	

Management plan	Second plan expires 16 May 2012		
Other significant management documents	Service level agreement and subsidiary annual business agreements between the Australian and South Australian governments		
Financial	Operating	\$172,500*	
	Capital	Not applicable	
	Revenue	Not applicable	
Visitors	None recorded		
Permits	30 commercial fishing, 1 research		

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements		
Migratory Species (Bonn) Convention	28 of 105 listed species	
China-Australia Migratory Birds Agreement	2 of 81 species	
Japan–Australia Migratory Birds Agreement	3 of 77 species	
Korea-Australia Migratory Birds Agreement	2 of 59 species	
Agreement on the Conservation of Albatrosses and Petrels	15 of 26 species	

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

Numbers of native species recorded ^(a)					
Mammals	Birds	Reptiles	Fish	Invertebrates	
38	29	1	185	over 800 ^(b)	

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

(b) Ward, T.M., Sorokin, S.J., Rogers, P.J., McLeay, L.J. and Turner, D.J. (December 2003). Benthic Protection Zone of the Great Australian Bight Marine Park: 3. Pilot Study for Performance Assessment (Volume 1), South Australian Research and Development Institute (Aquatic Sciences), Final Report to National Parks and Wildlife South Australia and the Commonwealth Department for Environment and Heritage.

Management arrangements

The Australian Government and the South Australian Government manage the Great Australian Bight Marine Park through a joint GAB Marine Park Steering Committee. The GAB 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 and the Commonwealth Department of the Environment, Water, Heritage and the Arts under joint management arrangements with South Australia.

Monitoring

A study of the seabed communities of the Benthic Protection Zone conducted in October 2006 looked for species that inhabit the seabed and those that live below the surface. The available results from the below-surface survey indicate there are 240 species from eleven phyla present; less than half of which can be identified to species level. The data collected from this, and an earlier 2002 survey, will contribute to a 20-year performance assessment program for the Zone.

Southern right whale numbers have been monitored in the Great Australian Bight annually since 1991. This year the Australian Government contributed to the development of a whale data base that will be used to assist ongoing research by making identification of individual whales more efficient.

Ongoing studies are being conducted into the foraging range and behaviour of the Australian sea-lion, its interactions with commercial fishing vessels, and how the risks of injury resulting from those interactions can be minimised.

Future challenges

Major challenges are:

- consolidating past and ongoing research into a program to assess the marine park's performance
- increasing the effectiveness of compliance strategies, including improving the fishing industry's compliance reporting
- producing a Benthic Protection Zone brochure, using 2002 and 2006 studies of benthos (seabed communities)
- implementing the GAB Marine Park (Commonwealth Waters) Management Plan.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Lack of baseline information on seabed surface and below seabed surface species and their biology
- Lack of information on the distribution and abundance of Australian sea-lions and the effects of human interactions with Australian sea-lion populations

Actions

· Continue to establish initial baseline data

Performance results 2007-08 (in cooperation with the South Australian Government)

- A partial report has been completed on the second round of ongoing baseline studies of sea bed communities
- Developed a data base to assist in the continued population studies on regional southern right whales
- Continued research into Australian sea-lion foraging behaviour and interactions
 with fishing vessels

KRA4: Visitor management and park use

Major issues

- Establishing effective deterrents to control illegal fishing
- Encouraging community participation in GAB Marine 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 to support the Yalata Community's participation in GAB Marine Park
 management activities

Performance results 2007–08 (in cooperation with the South Australian Government)

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

6

KRA5: Stakeholders and partnerships

Major issues

Maintain productive relationships with partners

Actions

- · Negotiate and implement the Annual Business Agreement with South Australia
- Develop compliance monitoring arrangements with the Australian Fisheries
 Management Authority
- · Keep stakeholders informed of, and involved in, management activities

Performance results 2007-08 (in cooperation with the South Australian Government)

- Renewed the Annual Business Agreement covering research, operations, visitor management, education, and compliance and enforcement
- Continued to raise compliance issues with the Australian Fisheries Management
 Authority and industry sectors
- Liaised with stakeholders from all sectors through the GAB Marine Park Steering and Consultative committees

KRA6: Business management

Major issues

Community understanding and appreciation of the park's values

Actions

- Write and implement a Communications Plan
- Disseminate the GAB Marine Park (Commonwealth Waters) Management Plan
 and interpretive material

Performance results 2007-08 (in cooperation with South Australian Government)

- · Communications Plan developed and commenced implementation
- · Informed the media about park activities
- Progressed a Benthic Protection Zone brochure
- Made the GAB Marine Park Management Plan and information on park values and uses available to the public, including via the websites of both Departments

Heard Island and McDonald Islands Marine Reserve

www.heardisland.aq



Special features

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

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

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

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

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

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

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

Location	Latitude 53°05' South, Longitude 73°30' East		
Area	6,465,845 hectares		
Proclamation date	16 October 2002		
IUCN category	Category la		
Biogeographic context	Subantarctic area IMCRA 4.0 provincial bioregion: Kerguelen Province		
Management plan	First plan expires 10 August 2012		
Other significant management documents	Australia's Antarctic Science Programme: Science Strategy 2004–05 to 2008–09		
Financial	Operating	\$63,000 ^(a)	
	Capital	Not applicable	
	Revenue	Not applicable	
Visitors	1 ^(b)		
Permits	2 ^(c)		

- (a) No science or management expedition was conducted in 2007–08. 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. Assessment of benthic samples from the HIMI conservation zone was undertaken as part of a broader Fisheries Research and Development Corporation grant, involving two full-time Australian Antarctic Division staff members. Those costs are not reported here.
- (b) No government research or tourist expeditions visited Heard Island during 2007–08. One Australian Antarctic Division officer visited Heard Island briefly. Details of the voyage are classified.
- (c) Details of surveillance voyages in the HIMI region are classified and, while reported in permit numbers, are not included in reported visitor numbers. Fishing vessels may have passed through the marine areas of the reserve and are not required to hold a permit to do so.

International conventions and agreements			
World Heritage Convention	Listed under natural criteria (i) and (ii), recognising its outstanding natural values		
Wetlands (Ramsar) Convention	The entire Heard Island and McDonald Islands Territory is to be nominated for Ramsar listing		
Migratory Species (Bonn) Convention	12 of 105 listed Australian species		
China-Australia Migratory Birds Agreement	1 of 81 listed species		
Japan–Australia Migratory Birds Agreement	4 of 76 listed species		
Korea-Australia Migratory Birds Agreement	1 of 59 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

Listed fauna	Species ^(a)	1 endangered
		10 vulnerable
		14 migratory
		51 marine
	Recovery	1 being implemented: albatross (Diomeda spp. and
	plans	Thalassarche spp.) and giant petrels (Macronectes spp.)
Listed flora	None	
Heritage	On National Heritage List	

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

Numbers of native species recorded					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
7 ^(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 (<12 nautical miles)

(d) Refers only to terrestrial and freshwater invertebrates

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

Management arrangements

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

Monitoring

The Australian Antarctic Division only mounts expeditions to the region every few years, due to the significant costs involved and also the time required for research results to be analysed and considered in planning for subsequent visits. One Australian Antarctic Division officer visited the island briefly in early 2008 and, although there was insufficient time to undertake detailed monitoring, several useful tasks were achieved. These included:

• a small-scale survey for new or introduced plant species

- photo-documentation of the Atlas Cove Australian National Antarctic Research Expeditions (ANARE) station heritage site
- · consideration of potential sites for automatic camera equipment
- collection of up-to-date images for use in presenting the values of the reserve.

During 2007–08 there was no research expedition to Heard Island or McDonald Islands. Acknowledging the practical and financial difficulties associated with visiting the reserve to conduct on-site monitoring, the Australian Antarctic Division has developed a project to investigate the use of geographic information system (GIS) techniques to evaluate environmental change from remotely-sensed data, such as satellite imagery. The project will run during 2008–09.

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

Future challenges

The management situation for the reserve has not varied substantially since 2006–07. Major challenges are:

- · maintaining thorough quarantine processes for all visits
- capitalising on Australian Antarctic program visits and partnerships with other operators in the region to undertake management actions and conduct research and monitoring
- sustaining the funding required to complete the Heard Island and McDonald Islands conservation zone assessment
- revising the Territory's Environment Protection and Management Ordinance.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

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

Actions

- · Evaluate possible alien species
- Perform quarantine risk assessment and inspection of vessels, as appropriate
- Undertake research and monitoring that facilitate performance assessment and reporting
Performance results 2007–08

- There were no research or commercial visits to the Heard Island and McDonald Islands Territory during 2007–08
- Consistent with the commitment in the management plan to develop further environmental indicators, automatically updated details of average monthly temperature and pressure were made available via the Heard Island website
- An Australian Antarctic Division officer participated in a surveillance voyage to the Heard Island region and observed a high level of compliance with the requirements of the management plan. A small-scale survey for new or introduced plant species was undertaken, together with photo-documentation of the Atlas Cove ANARE station heritage site and a survey of potential sites for automatic camera equipment
- Developed a project that will take place in 2008–09, to investigate the use of geographic information system (GIS) techniques to evaluate environmental change from remotely-sensed data, such as satellite imagery
- Commenced a report on the status of one alien vascular plant species *Poa annua* and one new vascular plant species *Leptinella plumosa*, to inform future decisions about the need and options for management action to control these species. The report is expected to be finalised in 2008–09
- Obtained satellite images of portions of Heard Island. This extends a record of information that will help to detect environmental change as techniques to analyse such remotely sensed data are developed

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 located there

- There were no research, commercial, or private visits to the Heard Island and McDonald Islands Territory during 2007–08
- Further registration of Heard Island artefacts in the Antarctic artefacts catalogue

KRA4: Visitor management and reserve use

Major issues

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

Actions

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

Performance results 2007–08

- There were no research, commercial or private visits during 2007-08
- Maintained and updated the website, which was well used with more than 150,000 visits
- Collected a range of up-to-date images in the vicinity of Atlas Cove for use in presenting the values of the reserve
- Contributed information about values and visitor requirements for the new version of the "Southern Ocean Cruising Handbook", widely used for Southern Ocean yachting

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

- Continued Australian Antarctic Division involvement in government initiatives to address illegal, unreported and unregulated fishing
- Consulted with relevant government agencies and the fishing industry as a routine part of the Australian Antarctic Division's role in management of the Heard Island and McDonald Islands fishery
- Consulted with Antarctic and sub-Antarctic commercial tour operators. There are two expressions of interest in visiting Heard Island and McDonald Islands in 2010
- Signed a Memorandum of Understanding with the Australian Maritime Safety Authority covering Search and Rescue (SAR) arrangements for the Heard Island and McDonald Islands region

KRA6: Business management

Major issues

· Ensuring compliance with and enforcement of reserve management requirements

Actions

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

- Maintained relationships with regional fisheries surveillance agencies, including providing training and information to fisheries surveillance personnel on reserve management requirements
- Consulted with relevant government agencies and the fishing industry as a routine part of the Australian Antarctic Division's role in management of the Heard Island and McDonald Islands fishery
- One unauthorised foreign yacht visit was identified, and follow-up actions are in progress
- An Australian Antarctic Division officer participated in a surveillance voyage to the Heard Island and McDonald Islands region and observed a very high level of compliance with quarantine and other requirements
- Prepared drafting instructions for the amendment of the Territory's Environment Protection and Management Ordinance 1987 to repeal provisions made redundant by Commonwealth reserve provisions of the *Environment Protection and Biodiversity Conservation Act 1999*

Lihou Reef National Nature Reserve

www.environment.gov.au/coasts/mpa/lihou



Special features

Lihou Reef National Nature Reserve and its associated sandy coral cays and islets comprise the largest reef structure in the Coral Sea. The reef habitats support benthic (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) use 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 la	
Biogeographic context	IMCRA 4.0 provincial bioregion: Northeast Province	
Management plan	Second plan expires 4 September 2008	
Financial	Operating	Nil*
	Capital	Not applicable
	Revenue	Not applicable
Visitors/Users	The Reserve was visited by the Bureau of Meteorology and recreational yachts during the 2007–08 period	
Permits/Approvals	Permits: 1 commercial tour, 1 research	

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
Wetlands (Ramsar) Convention	Entire reserve is listed
Migratory Species (Bonn) Convention)	6 of 105 Australian listed species
China-Australia Migratory Birds Agreement	13 of 81 listed species
Japan–Australia Migratory Birds Agreement	15 of 77 listed species
Korea–Australia Migratory Birds Agreement	9 of 59 species

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

Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
30	24	5	over 342	over 1,000	7

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The reserve is managed by the Marine Division of the Department of the Environment, Water, Heritage and the Arts, under delegation from the Director of National Parks. On-site management and surveillance is provided through formal arrangements with a number of other government agencies.

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

Monitoring

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

The Australian Institute of Marine Science has installed data loggers to monitor seawater temperature for the Department. Data loggers are replaced around every two years by the Bureau of Meteorology, with the next exchange due in July 2008.

CSIRO Land and Water has facilitated an order of satellite images to provide updated habitat and bathymetric maps for further validation during the next field survey.

Future challenges

Major challenges are:

- logistics, costs and occupational health and safety issues associated with managing such an isolated reserve
- monitoring the impact of and recovery from coral bleaching
- increased potential for illegal activities with the increase in human usage of the Coral Sea.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Possible illegal fishing
- Measuring reef health—includes coral bleaching
- The reserve's isolation means ongoing, on-ground, monitoring remains logistically difficult

Actions

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

Performance results 2007–08

- · Coastwatch surveillance flights detected no illegal fishing
- The Bureau of Meteorology and the Australian Institute of Marine Science facilitated the exchange of sea temperature data loggers to determine trends in temperature over time
- Satellite images have been ordered to support upcoming field surveys, to establish accurate habitat maps for tracking change over time, and to update bathymetric maps

KRA4: Visitor management and park use

Major issues

· Introduction of pest species by visitors to the reserve

Actions

- · Distribute the information brochure
- Maintain website information

Performance results 2007–08

• Distributed reserve information brochure to key stakeholders including researchers and tour operators. The brochure details effective quarantine measures to be undertaken by visitors to the reserve and the importance of these practices

KRA5: Stakeholders and partnerships

Major issues

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

Actions

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

Performance results 2007–08

- Liaised with Coastwatch, the Bureau of Meteorology and the Department of Transport and Regional Services
- Met with partners to discuss issues and gave presentations on marine protected area operations and management prescriptions
- · Distributed the reserve information brochure to stakeholders
- Organised and participated in a workshop to improve adaptive management for coral reef reserves. The workshop included remote coral reef marine reserve managers, key researchers and monitoring providers. Linkages between research and monitoring of remote coral reefs natural heritage were identified, relationships between participants were improved and participants' understanding of adaptive management processes and challenges was enhanced

KRA6: Business management

Major issues

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

Actions

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

Performance results 2007–08

• 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)

www.environment.gov.au/coasts/mpa/lordhowe



Special features

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

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

Location	Latitude 31°47' South, Longitude 159°09' East	
Area	300,287 hectares	
Proclamation date	21 June 2000	
IUCN category	Category IV overall comprising:	
	Category la: 96,166 hectares	
	Category IV: 204,121 hectares	
Biogeographic context	IMCRA 4.0 provincial bioregion: Lord Howe Province	
Management plan	Current plan expires 24 September 2009	
Other significant	Service Level Agreement and subsidiary Annual Business Agreement	
management documents	between Australian and New South Wales Governments	
Financial	Operating	\$52,233*
	Capital	Not applicable
	Revenue	Not applicable
Visitors/Users	Not known	
Permits/Approvals	9 commercial permits	

* In addition, \$729,524 was spent across the 25 marine Reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities

International conventions and agreements		
China-Australia Migratory Birds Agreement	1 of 81 listed species	
Japan–Australia Migratory Birds Agreement	4 of 77 species	
Korea-Australia Migratory Birds Agreement	4 of 59 species	

Environment Protection and Biodiversity Conservation Act 1999

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

Numbers of species recorded^(a)

Mammals	Birds	Reptiles	Fish	Plants
unknown	11	unknown	42	unknown

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined.

Management arrangements

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

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

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

Monitoring

Data on the fish catch taken by charter fishing vessels operating under permit in the Lord Howe Island Commonwealth Marine Protected Areas continue to be logged and collated. With the commissioning of the new patrol boat *Tursiops* in early 2008, it is anticipated that there will be an increased compliance effort.

Future challenges

Major challenges are:

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

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

· Ensure compliance with the management plan

Actions

- · Enforce fishing restrictions
- · Train and authorise enforcement staff

Performance results 2007–08

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

KRA5: Stakeholders and partnerships

Major issues

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

Actions

Take an active role on the advisory and steering committees

Performance results 2007–08

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

KRA6: Business management

Major issues

• Maintain assistance from the New South Wales Marine Parks Authority

Actions

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

Performance results 2007–08

• Successfully negotiated and implemented the annual business agreement for 2007–08

Mermaid Reef Marine National Nature Reserve

www.environment.gov.au/coasts/mpa/mermaid

Special features



Mermaid Reef is the most north-easterly of three shelf-edge reefs in the Rowley Shoals, located approximately 300 kilometres north-west of Broome, Western Australia. No land is exposed above the high water mark at Mermaid Reef, which places it under Australian Government jurisdiction.

Clerke Reef and Imperieuse Reef, the two southerly reefs of the Rowley Shoals, have permanent land above the high water mark. Together these two reefs 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 perfect geological examples of shelfedge reefs in Australian waters. Each reef includes spectacular and unusual underwater topography and life forms that have attracted divers from around the world.

Many coral and fish species that inhabit the shoals are at the limit of their distribution. 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	21 March 1991		
IUCN category	Category la		
Biogeographic context	IMCRA 4.0 provincial bioregion: North	west Transition	
Management plan	First plan expired 16 May 2007, new plan under development		
Other significant management documents	Service level agreements and Memorandum of Understanding with Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management (now Department of Environment and Conservation); Commercial Tour Operators Manual		
Financial	Operating	\$132,200*	
	Capital	Not applicable	
	Revenue	Not applicable	

Visitors/Users	300–400
Permits/Approvals	6 commercial tour operators, 3 scientific research

In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities

International conventions and agreements		
Migratory Species (Bonn) Convention	17 of 105 Australian listed species	
China-Australia Migratory Birds Agreement	13 of 81 listed species	
Japan–Australia Migratory Birds Agreement	11 of 77 listed species	
Korea-Australia Migratory Birds Agreement	11 of 59 listed species	

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

Numbers of native species recorded ^(a)					
Mammals	Birds	Reptiles	Fish	Invertebrates	Plants
13	19	18	over 390	over 633	No land plants

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The Mermaid Reef Marine National Nature Reserve is managed under service level agreements between the Director of National Parks, the Western Australian Department of Environment and Conservation and the Western Australian Department of Fisheries. These agencies implement management actions on behalf of the Director of National Parks. Coastwatch provides regular aerial surveillance of the reserve. Departmental staff visited the reserve in November 2007 to implement and assess reserve management activities.

The first management plan expired on 16 May 2007. A new draft plan is expected to be released for public comment in 2008. Until the new plan takes effect, the reserve is being managed in a manner consistent with its IUCN Category Ia, Strict Nature Reserve, classification.

Monitoring

Monitoring to date has shown that the major threats to Mermaid Reef are from climatic disturbances, such as cyclones and coral bleaching, and human impacts, such as anchoring and pollution. Fishing has also been identified as a potential pressure on Mermaid Reef. Regular aerial surveillance is conducted to monitor for such activities.

The Western Australian Department of Environment and Conservation conducted a marine biodiversity survey in December 2007, examining the benthic assemblages, including hard and soft corals, algae species, and commercially important species such as holothurians, *Trochus* and giant clams. The survey also gathered baseline biological information on reef shark habitat use and migration. When finalised, the results from the survey will be used to directly inform Mermaid Reef management.

Future challenges

Major challenges are:

- reviewing the need for isolated danger markers in the entrance to the Mermaid Reef lagoon
- improving visitors understanding of the reserve's conservation values and management requirements
- managing for the potential impacts of climate change.

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 fishing

Actions

- Maintain moorings
- Maintain surveillance
- Encourage and facilitate reef research and monitoring
- · Assess the need for specific moorings for dive sites

- Installed four moorings in the Mermaid Reef lagoon
- · Reduced the size of the anchorage area
- Coastwatch reported no illegal fishing incursions

KRA4: Visitor management and park use

Major issues

- · Need for visitors to understand and comply with reserve values and uses
- · Need for improved reporting by commercial users

Actions

- Progress work related to visitor access to the reserve
- · Finalise tour operators' manual and reporting forms
- Progress the development of a new management plan

Performance results 2007–08

- Undertook a review of passenger number limitations
- Released a tour operators' manual and new reporting forms for comment by Mermaid Reef commercial tour operators

KRA5: Stakeholders and partnerships

Major issues

- New management plan to take effect in 2008–09
- Effective management of the reserve by the management service providers (Western Australian Department of Environment and Conservation and Western Australian Department of Fisheries)
- · Industry stewardship of the reserve to support management

Actions

- Hold Rowley Shoals Steering Committee meeting
- · Progress the development of a new management plan

- Implemented annual business agreements with Western Australian partner agencies
- Participated in a workshop that included Rowley Shoals commercial tourism approval holders and the Rowley Shoals Marine Park managers. Released the Commercial Tour Operators Manual for Mermaid Reserve
- Progressed draft management plan (to be released for public comment in 2008–09)
- Organised and participated in a workshop to improve adaptive management for coral reef reserves. The workshop included remote coral reef marine reserve managers, key researchers and monitoring providers. Linkages between research and monitoring of remote coral reefs natural heritage were identified, relationships between participants were improved and participants' understanding of adaptive management processes and challenges was enhanced

Ningaloo Marine Park (Commonwealth Waters)

www.environment.gov.au/coasts/mpa/ningaloo



Special features

The Ningaloo Reef is a tropical reef system projecting out from an arid part of the continental land mass of Western Australia. In places it is as close as 20 metres from the coastline. These characteristics make Ningaloo unique among the tropical reefs off the northern coast of Australia.

Ningaloo Marine Park (Commonwealth Waters) 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.

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 reef is 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. Ningaloo Marine Park is one of the few places around the world where whale sharks regularly occur. They aggregate in the park around March/April each year and feed on plankton, small fish or squid until June/July.

Location	Latitude 21°51' South, Longitude 113°52' East
Area	243,513 hectares
Proclamation dates	7 May 1987, 21 July 1992, 14 August 2003
IUCN category	Category II
Biogeographic context	IMCRA 4.0 provincial bioregions: Northwest Province, Central Western Transition, Central Western Shelf and Northwest Shelf Province
Management plan	Second plan expires 2 July 2009
Other significant management documents	Service level agreement and Memorandum of Understanding with the Western Australian Department of Fisheries and Western Australian Department of Conservation and Land Management (now Department of Environment and Conservation); annual business agreements for management plan implementation

Financial	Operating	\$169,750*	
	Capital	Not applicable	
	Revenue	Not applicable	
Visitors/Users	Not available		
Permits/Approvals	13 commercial tour , 2 scientific research		

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities

International conventions and agreements			
Migratory Species (Bonn) Convention	3 of 105 listed Australian species		
China-Australia Migratory Birds Agreement	4 of 81 listed species		
Japan–Australia Migratory Birds Agreement	4 of 77 listed species		
Korea-Australia Migratory Birds Agreement	1 of 59 listed species		

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	1 endangered
		9 migratory
		19 marine
	Recovery	Great white shark (Carcharodon carcharias)
	plans	Recovery Plan for Marine Turtles in Australia
		Whale Shark (Rhincodon typus) Recovery Plan (2005-2010)
Listed flora	None	
Heritage	On Common	wealth Heritage List

Numbers of native species recorded(a)				
Mammals	Birds	Reptiles	Fish	Plants
unknown	22	unknown	54	0

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The Western Australian Department of Environment and Conservation and Western Australian Department of Fisheries conduct on-site management of the Marine Park under service level agreements between the Western Australian agencies and the Director of National Parks.

Monitoring

The Australian Institute of Marine Science, in a consortium with Australian and United States research organisations, extended a project begun in 2004–05. It uses 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.

Future challenges

Major challenges are:

- · ensuring compliance with park management prescriptions
- · mapping habitats adequately
- maintaining consistency between the Australian and state government planning processes
- managing for the potential impacts of climate change.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- · Limited information about the Commonwealth waters of the park
- Lack of information on the distribution, migration, behaviour and abundance of key species including whale sharks
- Lack of information on the effects of human and commercial interactions on the park's key attributes
- Potential listing of Ningaloo Marine Park on the National Heritage and World Heritage lists

Actions

- · Continue whale shark monitoring in both Commonwealth and state waters
- Engage in the National Heritage and World Heritage listing processes

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

KRA4: Visitor management and park use

Major issues

- · Reports of commercial fishers entering Commonwealth waters and fishing illegally
- · Effective management of commercial tours
- Communication and enforcement of the Regulations under the EPBC Act

Actions

- · Monitor illegal entry to Commonwealth waters via Coastwatch surveillance
- Ensure commercial tour operators comply with permits and conditions
- Undertake compliance operations to ensure adherence with the Regulations under the EPBC Act, and to increase awareness of those Regulations

Performance results 2007–08

- Continued engagement with State partners (WA Department of Environment and Conservation and WA Department of Fisheries) with regard to roles and cooperative arrangements for compliance and enforcement activities
- Issued permits for commercial tour operators
- Western Australian partner agencies patrolled the reserve regularly as part of their standard surveillance operations
- · Coastwatch conducted aerial surveillance
- Targeted compliance operation conducted 16-20 March 2008, 18 vessels were approached. All were informed of the Regulations under the EPBC Act

KRA5: Stakeholders and partnerships

Major issues

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

Actions

- Develop and implement a work plan under the annual business agreement to manage the Ningaloo Marine Park
- · Keep stakeholders informed of and involved in management activities
- Develop and distribute an information flyer to inform recreational fishers of the Regulations under the EPBC Act
- Provided fisheries staff with warden training for compliance purposes (in accordance with the EPBC Act)

Performance results 2007–08

- · Workplans were negotiated and implemented under service level agreements
- · Productive working arrangements maintained with state agencies

KRA6: Business management

Major issues

· Need to effectively manage contracts with service providers

Actions

- · Negotiate and implement annual business agreements
- · Manage contracts with service providers

- Annual business agreement negotiated and implemented with WA Department of Environment and Conservation covering compliance and enforcement, management intervention and visitor infrastructure, research and monitoring, public participation, and education
- Annual business agreement negotiated and implemented with WA Department of Fisheries covering education, compliance and enforcement, visitor management, and training

Solitary Islands Marine Reserve (Commonwealth Waters)

www.environment.gov.au/coasts/mpa/solitary



Special features

The Solitary Islands Marine Reserve (Commonwealth Waters) (SIMR) and the adjacent Solitary Islands Marine Park (State Waters) are located in a mixing zone between tropical and temperate environments. Many species in the reserve are at, or close to, the northern or southern extent of their geographic range.

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

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

Location	Latitude 29°48' South, Longitude 153°22' East		
Area	15,233 hectares		
Proclamation date	3 March 1993		
IUCN category	Category VI overall comprising:		
	Category la 79 hectares		
	Category IV 3,746 hectares		
	Category VI 11,408 hectares		
Biogeographic context	IMCRA 4.0 provincial bioregion: Central Eastern Shelf Transition		
Management plan	The SIMR Management Plan 2001 expired 3 April 2008. Interim		
	management arrangements currently in place.		
Other significant	Service Level Agreement and subsidiary Annual Business Agreement		
management documents	between Australian and New South Wales Governments		
Financial	Operating	\$93,300*	
	Capital	Not applicable	
	Revenue	Not applicable	
Visitors	Not known		

Permits (issued under Management Plan)	6 commercial fishing, 6 commercial tour operator, 2 recreational diving
Approvals (issued under	64 commercial fishing, 6 commercial tour operator
Interim Management	
Arrangements)	

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements			
Migratory Species (Bonn) Convention	12 of 105 listed species		
China-Australia Migratory Birds Agreement	9 of 81 listed species		
Japan–Australia Migratory Birds Agreement	12 of 77 listed species		
Korea- Australia Migratory Birds Agreement	5 of 59 listed species		

Environment Protection and Biodiversity Conservation Act 1999

Listed fauna	Species	4 endangered 7 vulnerable 24 migratory 38 marine
	Recovery plans	2 being implemented: marine turtles; grey nurse shark (Carcharias taurus)
Listed flora	None	

Numbers of native species recorded ^(a)				
Mammals	Birds	Reptiles	Fish	Invertebrates
25	37	6	Unknown	90

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

The New South Wales Marine Parks Authority conducts on-site day-to-day management of the reserve for the Commonwealth under an Annual Business Agreement (ABA).

The Solitary Islands Marine Park Steering Committee comprises agency representatives of State and Commonwealth governments. It oversees management and planning arrangements. The Solitary Islands Marine Park Advisory Committee enables stakeholders to contribute to planning for both the adjacent State Park and the Commonwealth reserve. The Department of the Environment, Heritage, Water and the Arts is represented on both Committees.

The SIMR Management Plan 2001 expired on 3 April 2008 and is currently being

reviewed. Interim management arrangements, to allow activities permitted under the expired SIMR Management Plan 2001 to continue, are now in force.

Monitoring

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

Baited underwater video research was conducted to identify fish biodiversity patterns in deep reef habitats and to explore the representation of fish assemblages.

An assessment of benthic (seabed) assemblages is being conducted.

The New South Wales Marine Parks Authority continued to remove and monitor debris at Pimpernel Rock.

Future challenges

Major challenges are:

- reviewing the SIMR Management Plan 2001, including zoning
- consulting with stakeholders and the New South Wales Marine Parks Authority on future management arrangements.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

· Potential illegal activities threatening conservation values

Actions

- Enforce fishing restrictions
- Monitor anchor sites at Pimpernel Rock

Performance results 2007–08 (in cooperation with New South Wales Government)

- New South Wales Marine Parks Authority provided surface support to Coastwatch surveillance and conducted surface patrols as required
- Targeted operations were conducted in response to intelligence received particularly for the Pimpernel Rock Sanctuary Zone

KRA4: Visitor management and park use

Major issues

• Managing impacts from visitor activities in the Sanctuary Zone

- Managing impacts from commercial fishing under permit in the Habitat Protection Zone
- Implementing an Approvals regime in response to the expiry of the SIMR Management Plan 2001 and communicating new requirements to reserve users

Actions

- · Conduct surface patrols and manage commercial fishing permits
- · Communicate marine protected areas values and provide information to users
- Communicate with user groups to discuss the expiry of the Management Plan and implementation of the Approvals regime

Performance results 2007–08 (in cooperation with New South Wales Government)

- New South Wales Marine Parks Authority provided surveillance support through regular surface patrols
- 64 commercial fishing approvals and 6 commercial tourism approvals issued indicating a high response rate from users
- Updated and reprinted a joint Zoning Summary and User Guide for State and Commonwealth Waters
- Installed interpretive signs and advisory material

KRA5: Stakeholders and partnerships

Major issues

• Ongoing engagement with community and Government representatives

Actions

6

- Develop an Annual Business Agreement with the NSW Marine Parks Authority to provide management, communication, compliance and research services in the reserve
- Participate in Solitary Islands Marine Park Advisory Committee and Solitary Islands Marine Park Steering Committee meetings
- Conduct community consultation and stakeholder meetings as part of the SIMR
 Management Plan 2001 Review

Performance results 2007–08 (in cooperation with New South Wales Government)

- Annual Business Agreement signed
- Management, communication, compliance and research activities conducted
- Participated in Advisory and Steering Committee meetings
- Gave presentations and met with all identified stakeholder groups at various locations and times

South-east Commonwealth Marine Reserve Network

www.environment.gov.au/coasts/mpa/southeast

Special features

On 28 June 2007 the South-east Commonwealth Marine Reserve Network (Reserve Network) was declared under the *Environment Protection and Biodiversity Conservation Act 1999*. The reserves came into effect on 3 September 2007.

The Reserve Network is the first temperate, deep sea marine reserve network in the world. This large network, covering 388,517 square kilometers, includes 14 reserves that are representative examples of the diverse seafloor features and associated habitats found in the South-east Marine Region. The South-east Marine Region stretches from the far south coast of New South Wales, around Tasmania and Victoria and west to Kangaroo Island off South Australia, and includes Macquarie Island.

The Reserve Network includes significant underwater features such as underwater canyons, seamounts, and diverse marine life associated with them, some of which are new to science and found nowhere else in the world. It provides habitat and feeding grounds for a variety of birds and sea life including large iconic species such as great white sharks, southern bluefin tuna and migrating whales. The deeper parts of the Reserve Network are home to a diverse range of fish and other creatures such as crabs, coral, sea urchins and sponges.



Figure 10: South-east Commonwealth Marine Reserve Network including Macquarie Island

6

Management plan	The current Macquarie Island management plan expires 25 September 2008. Macquarie Island Commonwealth Marine Reserve will be incorporated into the South-east Commonwealth Marine Reserve Network. The South-east Commonwealth Marine Reserve Network management plan is currently being developed.		
Other significant	Annual business agreements between	n Australian and Victorian	
management documents	governments.		
	Annual business agreements betweer	h Australian and South Australian	
	governments.		
	Annual business agreements between Australian government and Tasmania Police.		
	Memorandum of Understanding between Department of the Environment,		
	Water, Heritage and the Arts and Australian Fisheries Management Authority.		
	Service level agreement and subsidiary annual business agreements		
	between the Australian and Tasmanian governments		
Financial	Operating	\$449,344*	
	Capital	Not applicable	
	Revenue	Not applicable	
Approvals	361 Commercial Fishing and Tourism		
Permits	1 Scientific		

* In addition, \$729,524 was spent across the 25 marine reserves managed by the Marine Division of the Department on behalf of the Director of National Parks. The expenditure covered professional services, permits and performance assessment systems, training, communications, workshops and conference attendance, surveillance and enforcement activities.

International conventions and agreements	
World Heritage Convention	Macquarie Island and waters within a 12 nautical mile radius were listed as a World Heritage Area in 1997
Migratory Species (Bonn) Convention	25 of 105 listed species
China-Australia Migratory Birds Agreement	4 of 81 listed species
Japan-Australia Migratory Birds Agreement	5 of 77 listed species
Korea-Australia Migratory Birds Agreement	3 of 59 listed species
Other agreements	Agreement on the Conservation of Albatrosses and Petrels; International Convention for the Regulation of Whaling; International Convention on the Conservation of Antarctic Marine Living Resources

Environment Protection and Biodiversity Conservation Act 1999		
Listed fauna	Species	21 endangered
		44 vulnerable
		30 migratory
		72 marine
	Recovery	11 being implemented: albatross (Diomeda spp. and
	plans	Thalassarche spp.) and giant petrels (Macronectes spp.);
		marine turtles; 10 seabird species; southern right whale
		(Eubalaena australis); blue whale, (Balaenoplera musculus) fin
		whale (Balaenoplera physalus) and set whale (Balaenoplera
		borealis); white shark (Carcharodon carcharias); grey hurse
		shark (Carcharias taurus); humpback whale (Megaptera
		novaengilae); orange-bellied parrot (Neophema chrysogaster);
		4 handfish species; and sub-Antarctic fur seal (Arctocephalus
		tropicalis) and southern fur seal (Mirounga leonine)
Listed flora	None	
Heritage	Macquarie Is	land Commonwealth Marine Reserve on National Heritage List

Numbers of species recorded ^(a)				
Mammals	Birds	Reptiles	Fish	Plants
At least 44	At least 61	At least 4	At least 158	Not known

(a) Species numbers have been taken from a recently developed species inventory based on documented sightings in the reserve and adjacent areas. The inventory is still new and is continuing to be updated and refined. It is likely to currently underestimate species numbers.

Management arrangements

Annual business agreements and memorandums of understanding have been developed between Victorian, Tasmanian and South Australian government agencies and the Australian Government to actively promote and monitor compliance with the rules of the Reserve Network and to enforce the rules when breaches are detected. Information sharing arrangements have been established with the Australian Fisheries Management Authority to also aid in compliance and enforcement.

Interim management arrangements have been implemented, to manage the Reserve Network until a management plan is in operation.

A management plan for the Reserve Network, which will also cover the management of Macquarie Island Commonwealth Marine Reserve, is currently being developed. The draft management plan is expected to be released for public consultation in late 2008 or early 2009.

A first round of public consultation on the proposal to develop a management plan for the Reserve Network was held between 19 January and 28 February 2008. A range of submissions were received from individuals, businesses, conservation organisations, recreational associations, industry groups and government agencies. 6

Monitoring

Relatively little is known about the plants and animals of the deepwater habitats of the South-east Region. The Department is developing a research and monitoring strategy to identify the main knowledge gaps for the South-east Region and address them as efficiently as possible.

In the meantime, the Director of National Parks will continue to undertake and approve research projects where the aims of those projects clearly address management needs for the Reserve Network. To this end, two major projects were initiated during 2007-2008 to research aspects of the South-east Region's ecology.

Future challenges

Major challenges are:

- finalising the South-east Commonwealth Marine Reserve Network
 management plan
- understanding the full extent of the social, economic and environmental values associated with the Reserve Network
- ongoing liaison with key stakeholders and other community interest groups in relation to reserve and network management
- maintenance of constructive partnership arrangements with relevant state and Australian Government agencies
- development and implementation of a reserve/network awareness program for key stakeholder groups and the community generally
- encouraging compliant use of the Reserve Network and active involvement in day to day management across all sectors
- establishing a research and monitoring program for each reserve.

Report on performance by key result areas

KRA1: Natural heritage management

Major issues

- Limited information on the ecological communities and processes within the Reserve Network
- Degradation of island feeding and breeding areas within state jurisdiction (Macquarie Island)

Actions

• Fund research and monitoring projects across the South-east Commonwealth Marine Reserve Network to assist in informing management

- Develop an integrated research and monitoring strategy for the Reserve Network
- Work with the Tasmanian government on protection and further understanding of species, habitats and marine systems

Performance results 2007–08

- Two research projects were undertaken with an emphasis on obtaining baseline biological information for several of the reserves. These projects are ongoing with the results expected late in 2008:
 - Biological baseline survey in South-east Marine Protected Areas—Tasmanian Aquaculture and Fisheries Institute (TAFI)
 - Deep sea biological survey in the South-east Commonwealth Marine Reserve Network—CSIRO
- An inventory of scientific literature relevant to the South-east Network was completed
- Work commenced on developing a research and monitoring strategy for the Reserve Network
- No surveillance was conducted at Macquarie Island Commonwealth Marine Reserve due to a reliance on informal service provision arrangements and higher Coastwatch priorities elsewhere
- Continued working with the Tasmanian Department of Tourism, Parks, Heritage
 and the Arts under a service level agreement covering the management of the
 Macquarie Island Commonwealth Marine Reserve. It includes marine debris survey
 and collection, determining the foraging patterns of southern and northern giant
 petrels and their ecological interactions with fisheries, and monitoring and
 collecting seabird population baseline data

KRA4: Visitor management and park use

Major issues

- Implementation of the Reserve Network interim management arrangements for ongoing reserve use
- Lack of existing Australian Government compliance and enforcement capacity for the South-east Region
- Monitoring and detection of illegal activities
- Lack of knowledge of Reserve Network management arrangements within industry and the community
- Potential non-compliance with Reserve Network management arrangements by some recreational and commercial fishing operators

Actions

• Develop strategies to assist in monitoring and detecting illegal activities including entering into information sharing arrangements with relevant parties

• Develop educational material, including posters, brochures and DVDs, to raise community awareness and understanding of the Reserve Network values and the applicable management arrangements

Performance results 2007–08

- Implemented interim management arrangements to make provision for ongoing use of the Reserve Network consistent with the zoning of the individual reserves, pending the development of the Reserve Network management plan
- Arrangements entered into with relevant state government agencies and Commonwealth agencies to establish a compliance and enforcement capacity in the South-east Region
- Information sharing arrangements in place with Australian Fisheries Management Authority for the provision of compliance and monitoring data
- Educational products (including bulletins, Reserve Network User Guides, posters, brochures and a DVD) developed and distributed to stakeholders and throughout the community

KRA5: Stakeholders and partnerships

Major issues

- Ensuring ongoing and constructive engagement with the community, key interest groups and government agencies
- Establishing complementary management arrangements with state government agencies and Australian Government agencies, where required

Actions

- Develop formal partnerships with state and Australian Government agencies to establish an active compliance and enforcement capacity for the South-east Region
- Consult with key stakeholders and industry bodies on management arrangements
 and planning

- Annual business agreements entered into with Victorian, Tasmanian and South Australian government departments to undertake vessel patrols and air surveillance activities within the reserves
- Continued consultation with the South East Region Fishing Industry Working Group—particularly funding a liaison officer and consultation with relevant South-east fishing industry sector representatives
- Consulted with stakeholders and general community on development of the Reserve Network management plan
- Continued the service level agreement with the Tasmanian government on the cooperative management of marine protected areas, including Macquarie Island Commonwealth Marine Reserve

Apollo Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/apollo



Special features

Apollo Reserve is located off Apollo Bay on Victoria's west coast. It lies in the shallow waters of the continental shelf at depths of 80 to 120 metres. Apollo Reserve includes 1,184 square kilometres of Commonwealth ocean territory. It complements the Victorian State Government Marine Protected Area network.

Apollo Reserve contains representative samples of the Bass Strait Province Bioregions that extend from South

Australia to the west of Tasmania. The area includes the Otway Depression, an undersea valley that joins the Bass Basin to the open ocean. This valley was an outlet channel from the old Bass Lake and mainland river systems during the last ice age. The shelf is a high-energy environment, exposed to large swell waves propagating from the south-west and strong tidal flows. These rough seas are home to such species as fur seals and school sharks.

Location	Latitude 39°16' South, Longitude 143°35' East
Area	118,360 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: Bass Strait Province

Beagle Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/beagle



Special features

Covering 2,928 square kilometres of ocean, Beagle Reserve is situated entirely within the shallow Bass Strait. It lies mostly between depths of 50 to 70 metres with its north-western edge abutting Victorian waters to the south east of Wilson's Promontory.

Beagle Reserve is representative of an area of shallow continental shelf ecosystems that extends around south eastern Australia to the east of Tasmania. It covers an area of the sea

floor that is thought to have formed a land bridge with Tasmania as recently as 10,000 years ago during the last Ice Age.

Beagle Reserve encompasses the fauna of central Bass Strait which is expected to be especially rich based on studies of several sea floor dwelling animal groups. Its boundary encloses the Tasmanian Kent Group Marine Reserve and the Hogan and Curtis Island groups. Its ecosystems are similar to those documented for the deeper sections of the Kent Group Marine Reserve, especially those based around habitats of rocky reefs. They support beds of encrusting, erect and branching sponges, and sediment composed of shell grit with patches of variously large sponges and sparse sponge-habitats.

The deep rocky reefs of Beagle Reserve support a rich array of life, and the area provides homes and feeding grounds for seabirds, little penguins and Australian fur seals. The reserve is located near the Hunter group of islands, which is an important breeding area for the fairy prion, shy albatross, silver gull, short tailed shearwater, black faced cormorant, Australian gannet, common diving petrel and little penguins.

Location	Latitude 39°21' South, Longitude 146°58' East
Area	292,758 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: South-east transition

Boags Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/boags



Special features

Boags Reserve covers 537 square kilometres of ocean and is situated off the north western tip of Tasmania, north of Three Hummock Island. The reserve is wholly contained within western Bass Strait with a depth range mostly between 50-80 metres.

Boags Reserve represents an area of shallow continental shelf ecosystems that extends through central Bass Strait. It encompasses the fauna of central Bass Strait, which is expected to be especially

rich based on studies of several sea floor dwelling animal groups.

Boags Reserve contains a rich array of life, particularly bottom dwelling animals, as is common for the central Bass Strait area. It is also a foraging area for a variety of seabirds, including the fairy prion, shy albatross, silver gull, short tailed shearwater, black faced cormorant, Australian gannet, common diving petrel and little penguins. It lies adjacent to an important breeding area in Tasmania's north-west, particularly the Hunter group of islands.

Location	Latitude 40°14' South, Longitude 144°59' East
Area	53,748 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: Bass Strait Province

East Gippsland Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/east-gippsland



Special features

East Gippsland Reserve is located in Commonwealth waters off Mallacoota near the NSW/Victoria border. The reserve covers 4,137 square kilometres of Commonwealth waters. It contains representative samples of an extensive network of canyons, continental slope and escarpment in depths from 600 metres to deeper than 4,000 metres.

East Gippsland Reserve has impressive geomorphic features such as rocky-substrate habitat, submarine

canyons, escarpments and a knoll which juts out from the base of the continental slope.

The reserve includes both warm and temperate waters and supports free-floating aquatic plants or microscopic plant (i.e. phytoplankton) communities. Complex seasonality in oceanographic patterns influences biodiversity and local productivity. There are summertime incursions of the warm East Australian Current and a wintertime cascade of cold water from Bass Strait that sinks along the upper slope and forms a temperature front. This cold front helps nutrients come to the surface and in turn this supports a diverse phytoplankton community and other sea life. The area may also support foraging activities for wandering albatross.

Location	Latitude 38°04' South, Longitude 150°20' East
Area	413,664 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: Southeast Transition

Flinders Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/flinders



Special features

Flinders Reserve comprises an area of 27,043 square kilometres. It is named after the adjacent Flinders Island in the Furneaux group of islands to the north-east of Tasmania. The reserve covers a depth range from about 40 metres on the shallow continental shelf to abyssal depths of approximately 3,000 metres at the edge of the Exclusive Economic Zone.

Flinders Reserve spans continental shelf, slope and deeper water ecosystems of the major biological zone that extends

around south-eastern Australia to the east of Tasmania. Key features of this area are the continental shelf, and a long portion of steep continental slope escarpment incised by a series of submarine canyons. Sea bottom dwelling habitats include sheer rocky walls and large rocky outcrops that support a rich diversity of small seabed animals, such as lace corals and sponges. These and the large expanses of sandy and muddy sediments are habitats for a wide variety of fishes and invertebrates.

Biodiversity is influenced by summertime incursions of the warm East Australian Current and associated large scale, anti-clockwise, small whirlpools. Another prominent feature is a large off-shore seamount believed to be too deep to have been fished. Seamounts are generally considered to be important centres of deep ocean biodiversity.

The shallower part of Flinders Reserve includes habitat important to the white fronted tern, Australian gannet, black faced cormorant, common diving petrel, fairy prion, little penguin, shy albatross, silver gull, crested tern, short tailed shearwater and white faced storm petrel. Importantly, it includes the habitat of a suite of continental shelf and slope shark species, including school shark and—between 400 and 600 metre depths—gulper sharks (Harrison's dogfish and southern dogfish). Among the range of fishes, sponges and deep water corals of this reserve can also be found the giant crab, weighing up to 15 kilograms and one of the largest crabs in the world.

Location	Latitude 40°00' South, Longitude 151°17' East
Area	2,704,306 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category la overall comprising:
	Sanctuary Zone Category la (2,581,195 hectares)
	Multiple use zone Category VI (123,111 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: Tasmanian Province, Southeast Transition

Franklin Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/franklin



Special features

Covering 671 square kilometres of ocean, Franklin Reserve is situated off the north western tip of Tasmania, south of King Island. The reserve covers an area of continental shelf waters in a depth range of 50–150 metres.

Franklin Reserve represents an area of shallow continental shelf ecosystems. It incorporates two major biological zones: the Franklin Zone, which runs down the west coast of Tasmania (from which the reserve takes its name) and

the biological zone that extends from South Australia and Western Victoria.

This reserve provides a feeding ground for a variety of seabirds, including the fairy prion, shy albatross, silver gull, short tailed shearwater, black faced cormorant, common diving petrel and, in particular, the Australian gannet that breeds at the nearby Black Pyramid Rock—one of only eight breeding sites in Australia.

Location	Latitude 40°46' South, Longitude 144°16' East
Area	67,077 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: Western Bass Strait Transition and Tasmanian Transition
Freycinet Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/freycinet



Special features

Freycinet Reserve comprises a total area of 57,942 square kilometres. This reserve is named after the adjacent Freycinet National Park on the east coast of Tasmania. It covers a depth range from about 40 metres on the continental shelf to abyssal depths of approximately 3,000 metres at the edge of the Exclusive Economic Zone.

Freycinet Reserve spans the continental shelf, slope and deeper water ecosystems of the major biological zone that extends

around south-eastern Australia to the east of Tasmania. Key features of this area are the continental shelf and a long portion of steep continental slope escarpment that joins to a large off-shore saddle.

Other prominent features include large off-shore seamounts, which are believed to be too deep to have been fished. Seamounts are generally considered to be important centres of deep ocean biodiversity. They host a wide range of habitats at different depths and orientations to currents. The large seamounts to the east of Tasmania are believed to be individually important, providing habitat to species that may be unique to each seamount and to a range of more widely occurring species.

The shallower part of the Freycinet Reserve includes habitat important to the white fronted tern, Australian gannet, black faced cormorant, common diving petrel, fairy prion, little penguin, shy albatross, silver gull, crested tern, short tailed shearwater, and white faced storm petrel.

Additionally, the reserve includes the habitat of a group of continental shelf and slope shark species, including school shark and, between 400 and 600 metres, gulper sharks (including Harrison's dogfish and southern dogfish).

Location	Latitude 42°12' South, Longitude 151°07' East
Area	5,794,248 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category la overall comprising:
	Sanctuary Zone Category la (5,679,269 hectares)
	Recreational Use Zone Category II (32,330 hectares)
	Multiple Use Zone Category VI (82,649 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: Tasmania Province, Southeast Transition, Tasmanian IMCRA Province

Huon Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/huon



Special features

Huon Reserve covers about 9,991 square kilometres of ocean to the south of Tasmania. It covers a broad depth range from the inner continental shelf at about 70 metres, to the abyss at over 3,000 metres. The majority of the reserve's area is in deep water.

The Tasman Seamounts Marine Reserve, that was proclaimed in 1999 and covers a small part of this area, has been revoked and wholly incorporated into the Huon Reserve.

Huon Reserve spans the continental shelf, continental slope and deeper water ecosystems of a primary biological zone to the south of Tasmania. Close to the shore seabirds and school sharks can be found, while further into the open ocean the seabed is made up of deep plains, which are broken up by submerged mountains. A diverse range of fish, coral, squid, crabs and other animals make these seamounts their home.

The reserve's most remarkable feature is a cluster of cone-shaped submerged seamounts. The natural values of these seamounts include a rich seabed fauna characterised by high numbers of endemic species and the presence of large, erect seabed animals, including habitat-forming corals and sponges. Some of these are extremely long-lived – hundreds and possibly thousands of years old—making them some of the longest-lived animals on earth. The seamounts of Huon Reserve provide an important connection between seamounts of the Indian Ocean and the Tasman Sea.

Huon Reserve includes an area of continental shelf and slope known to be important foraging habitat for the Australian gannet, shy albatross and silver gull from adjacent nesting areas. Based on the distribution of larvae, this area is also known to provide spawning or nursery areas for important commercial fishes including the ocean perch and blue warehou. Other offshore geological features include terraces, rotated continental blocks, saddles, pinnacles and canyons, which are believed to provide habitat for unique fauna.

Location	Latitude 44°19' South, Longitude 147°40' East
Area	999,074 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI overall comprising:
	Benthic Sanctuary Category la (38,897 hectares)
	Multiple Use Zone Category VI (960,177 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: Tasmanian IMCRA Province, Tasmania Province

Macquarie Island Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/macquarie



Special features

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

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

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

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

Location	Latitude 55°54' South, Longitude 161°38' East
Area	16,189,466 hectares
Proclamation date	27 October 1999
IUCN category	Category IV overall comprising:
	Highly Protected Zone Category la (5,713,710 hectares)
	Habitat Species Zone Category IV (10,475,756 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: Macquarie Island Province

Murray Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/murray



Special features

Murray Reserve stretches south of the River Murray mouth off the South Australian coast, for a distance of more than 400 kilometres. It runs from the inshore State waters to the edge of Australia's Exclusive Economic Zone. Murray Reserve includes an extensive system of canyons. It covers a total area of 25,803 square kilometres.

The reserve protects samples of the key features of the region, including

continental shelf and slope, abyssal plain and canyons. It includes areas of Australian sea lion and New Zealand fur seal habitat, a residence area for school shark and, at depths of 400 to 600 metres, habitat for the gulper shark (southern dogfish).

The reserve spans an extensive area across the Lacapede shelf, continental slope and deeper water ecosystems, that extends from South Australia to the west of Tasmania. It contains one of the most spectacular geological formations on the Australian continental block, the Murray Canyons. The canyons are situated south of Kangaroo Island, off the South Australian coast. They stretch for more than 150 kilometres. Deeper than America's Grand Canyon and more than twice the height of Mt Kosciuszko, the Murray Canyons descend to 4600 metres below sea level.

The marine life that inhabits the Murray Canyons is supported by nutrient-rich sediments that have been deposited over thousands of years by the Murray River. Occasional seasonal upwelling occurs in this area, where nutrient rich deeper waters are brought to the surface. This upwelling stimulates the food chain by encouraging the growth of phytoplankton, which in turn become food for larger predators, resulting in a profusion of life in these areas.

Location	Latitude 37°26' South, Longitude 137°12' East
Area	2,580,312 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category la overall comprising:
	Multiple Use Zone Category VI (590,687 hectares)
	Special Purpose Zone Category VI (714,709 hectares)
	Sanctuary Zone Category la (1,274,916 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: Spencer Gulf IMCRA Province, Southern Province, West Tasmania Transition

Nelson Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/nelson



Special features

Nelson Reserve takes in 6,123 square kilometres of ocean in deep water (below 3,000 metres depth) off the far south-east corner of South Australia.

Nelson Reserve spans the deep water ecosystems extending from South Australia to the west of Tasmania. It encloses geological features including plateaus, knolls, canyons and the abyssal plain (a large area of extremely flat or gently sloping ocean floor just offshore from a continent). The knoll features a rocky substrate above the abyssal plain.

Scientists believe these areas are home to unique fauna, but little is known about what lives on the seabed of this reserve. The reserve is known to be an important area for a number of whale species including the southern right, sperm, minke, killer, pilot and blue.

Location	Latitude 39°18' South, Longitude 139°52' East
Area	612,311 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: West Tasmania Transition

South Tasman Rise Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/south-tasman-rise



Special features

The South Tasman Rise Reserve covers 27,704 square kilometres of deep ocean to the south-east of Tasmania. It includes a section of the mid-continental slope of the South Tasman Rise, at depths of 1,200 to 3,000 metres. Its southern edge follows the boundary of the Australian Exclusive Economic Zone, 200 nautical miles from land.

The South Tasman Rise Reserve spans the mid-continental slope and deeper water ecosystems to the south of

Tasmania. It encloses a submerged ridge of continental rock that stands as the last remnant of the link between Australia and Antarctica.

Deformed by the massive rifting process when the Australian continental block moved north, the south Tasman rise supports unique environments for marine life and is an area of significant scientific interest.

The reserve contains several seamounts, some of which have flat summits, which indicates a period of exposure above the surface at some time.

Location	Latitude 46°17' South, Longitude 149°04' East
Area	2,770,437 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI
Biogeographic context	IMCRA 4.0 provincial bioregion: Tasmania Transition

Tasman Fracture Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/tasman-fracture



Special features

At over 42,500 square kilometres, the Tasman Fracture Reserve extends south west of Tasmania from the continental shelf to the Exclusive Economic Zone boundary, 200 nautical miles from land. The Tasman Fracture Reserve complements the Port Davey/ Bathurst Harbour Marine Protected Area, which was recently declared by the Tasmanian Government.

The Tasman Fracture Reserve spans the continental shelf, continental slope and deeper water ecosystems to the south

of Tasmania. It is scored by steep canyons and encloses other geological features, which are believed to be characterised by unique fauna. These features include steep escarpments and troughs, saddles, canyons, basins and part of a plateau that is over 400 kilometres long and rises up to three kilometres above the seafloor.

The northern most section of the reserve includes a drowned river valley. The natural values of this reserve include important habitat for the fairy prion, little penguin, common diving petrel, short-tailed shearwater, silver gull, school shark and blue warehou.

Due to its location, extending south of the sub-tropical convergence zone and into the sub-Antarctic front, the fauna of this reserve includes sub-Antarctic fishes and seabed invertebrates in at least the continental shelf and continental slope areas. Biodiversity in this Commonwealth Marine Reserve is also influenced by the Zeehan Current, which is the most easterly extent of flow from the Indian Ocean around southern Australia.

Location	Latitude 44°49' South, Longitude 144°49' East
Area	4,250,056 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI overall comprising:
	Sanctuary Zone Category 1a (69,212 hectares)
	Multiple Use Zone Category VI (2,049,572 hectares)
	Special Purpose Zone Category VI (2,131,272 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: Tasmania Province, West Tasmania Province, Tasmanian IMCRA Province

Zeehan Commonwealth Marine Reserve

www.environment.gov.au/coasts/mpa/southeast/zeehan



Special features

Zeehan Reserve covers an area of 19,897 square kilometres to the west and south west of King Island in the Commonwealth waters around north west Tasmania. It covers a broad depth range from the shallow continental shelf of approximately 50 metres to the abyssal plain that is over 3,000 metres deep.

Zeehan Reserve spans the continental shelf, continental slope and deeper water ecosystems of the major biological zone

that extends from South Australia to the west of Tasmania. A significant feature of the reserve is a series of four submarine canyons that incise the continental slope, extending from the shelf edge to the abyssal plains. Biodiversity and productivity on the outer shelf and upper slope in this reserve are influenced by the Zeehan Current and its interactions with the canyons.

Zeehan Reserve includes a variety of seabed habitats including rocky limestone banks. These support rich animal communities, made up of large sponges and other permanently attached or fixed invertebrates on the continental shelf. There are also extensive 'thickets' of low invertebrate animals—mostly lace corals and sponges on the continental slope. These communities are exceptionally diverse and include species new to science. The rocky limestone banks provide important seabed habitats for a variety of commercial fish species, including Australia's giant crab. Concentrations of larval blue warehou and ocean perch indicate the role of the area as a nursery ground.

Zeehan Reserve is also a foraging area for a variety of seabirds, including the fairy prion, shy albatross, silver gull and short-tail shearwater.

Location	Latitude 41°10' South, Longitude 142°18' East
Area	1,989,697 hectares
Proclamation date	28 June 2007 (effective 3 September 2007)
IUCN category	Category VI overall comprising:
	Multiple Use Zone Category VI (93,298 hectares)
	Special Purpose Zone Category VI (1,896,399 hectares)
Biogeographic context	IMCRA 4.0 provincial bioregion: West Tasmania Transition, Western Bass Strait IMCRA Transition, Tasmania Transition

Building Partnerships to effectively manage the South-east Commonwealth Marine Reserve Network



DEWHA and partner agencies at the compliance workshop, April 2008

Australia's South-east Commonwealth Marine Reserve Network (the Reserve Network) is the first temperate, deep-sea network of marine reserves in the world. When proclaimed in 2007, the Reserve Network nearly doubled the number of Commonwealth Marine Protected Areas (MPA's) and added over 226,000 square kilometres to the Commonwealth MPA estate.

The sheer size and scale of the diverse values of the Reserve Network introduced an array of new challenges to the MPA management team, particularly how to achieve compliance with the rules of the Reserve Network.

To meet these challenges the Department of the Environment, Water, Heritage and the Arts (DEWHA) has developed partnerships with key stakeholders within the region to undertake a program of vessel patrols and surveillance flights, share compliance data and intelligence and respond to any incidents within the reserves.

Active partnerships have now been formalised with: the South Australian Department of Primary Industries and Resources (PIRSA), the Victorian Department of Primary Industries, Tasmania Police, the Australian Customs Service, the Australian Fisheries Management Authority and the South East Region Fishing Industry Working Group.

These partnerships will also assist the effective management of the Reserve Network by reducing the duplication of functions between agencies, ensuring the effective use of public resources, minimising the regulatory impacts of reserve management on the fishing industry where possible and improving cross-jurisdictional cooperation.

An additional and critical element of these arrangements is to build operational capacity across agencies through the delivery of training, the purchase and upgrade of equipment and the effective sharing of experience and information.

In order to consolidate the compliance arrangements for the Reserve Network representatives from DEWHA and all partner agencies came together in Canberra in April 2008 to discuss compliance and enforcement issues. This valuable exchange of information will ensure that the Australian Government's compliance program in the Reserve Network is delivered in the most efficient and effective way possible. By successfully building and utilising these partnerships the Australian Government is demonstrating its commitment to protecting the Reserve Network through actively promoting compliance with its rules and enforcing those rules where breaches occur.



PIRSA Fisheries patrol vessel - the Southern Ranger