Western Australia's mammals:

ensuring their future

A comprehensive audit of Australia's mammals has provided a snapshot of their current status, helping the Department of Parks and Wildlife better target management of Western Australia's mammals.

by Andrew Burbidge, John Woinarski and Peter Harrison

Australia has some of the most distinct mammals in the world and 86 per cent of species that live here do not occur anywhere else. Their biology is perfectly adapted to the Australian environment but their fate changed trajectory with the arrival of European settlers. The impacts of factors such as foxes, feral cats and inappropriate fire regimes, as well as land clearing for agriculture and urban development, is well-documented, but until recently we did not have a complete and current overview of the status of all Australian mammals.

The action plan for Australian mammals 2012 is the first review undertaken of all Australian mammals. The audit was carried out in 2012, with the results published in 2014. We evaluated the status of all 315 terrestrial and 58 marine Australian indigenous mammal species and 125 terrestrial and six marine subspecies that were known to have occurred at European settlement. These included 151 terrestrial and 46 marine species, and 40 terrestrial and two marine subspecies that occured in Western Australia.

THE REPORT CARD

It is fairly well-known that Australia has the worst record for recent mammal extinctions of any country. But the action plan revealed that the number of extinctions is actually about 50 per cent higher than what is listed under the *Environment Protection and Biodiversity Conservation Act 1999*. This number is also far greater than that recorded for any other group of Australian animals. At least 30 species of terrestrial mammals are known to have become extinct since 1788 but this number could rise as research is carried out into subfossils, and species that occurred in Australia at European settlement are still being discovered. In the southern Kimberley, for example, remains of three hitherto unknown extinct species of native rodents were found in caves in 2004, and in Queensland a new species of rabbit-rat (*Conilurus capricornensis*), known only from recent bone deposits, was described in 2010. So, in a little over 200 years, more than 10 per cent of Australia's endemic mammals have been lost.

The action plan also outlines the status, threats, distribution, ecology, past and current conservation efforts and the future actions necessary to conserve all threatened and near-threatened mammal species. It also overviewed the status of each species and subspecies in 1992, 2002 and 2012 (based on 2012 knowledge) so trends could be elucidated and a 'Red List Index' calculated to help guide future management.

The major findings throughout the country are shocking. Post-European settlement extinctions began in Australia around 1860 and have continued at a rate of about one to two extinctions per decade since. Sadly, two mammal species have become extinct in the past decade: the Christmas Island pipistrelle (*Pipistrellus murrayi*) in 2009 and the Bramble Cay melomys (*Melomys rubicola*) sometime in the past few years. The Christmas Island shrew (*Crocidura attenuata*) has not been seen for some decades and has been evaluated as Critically Endangered (Possibly Extinct), so the number of known extinctions may be 33.

Using the IUCN Red List categories and criteria we found that 57 land mammal species (of which 55 are endemic to Australia) are threatened, and a further 52 (42 endemic) are near threatened. At least 12 have populations of fewer than 1500 individuals. Many others have suffered massive declines since European settlement but don't meet the IUCN criteria for listing, which focus on extinction risk, based on geographic range, population size and the recent rate of decline (in 10 years or three generations,

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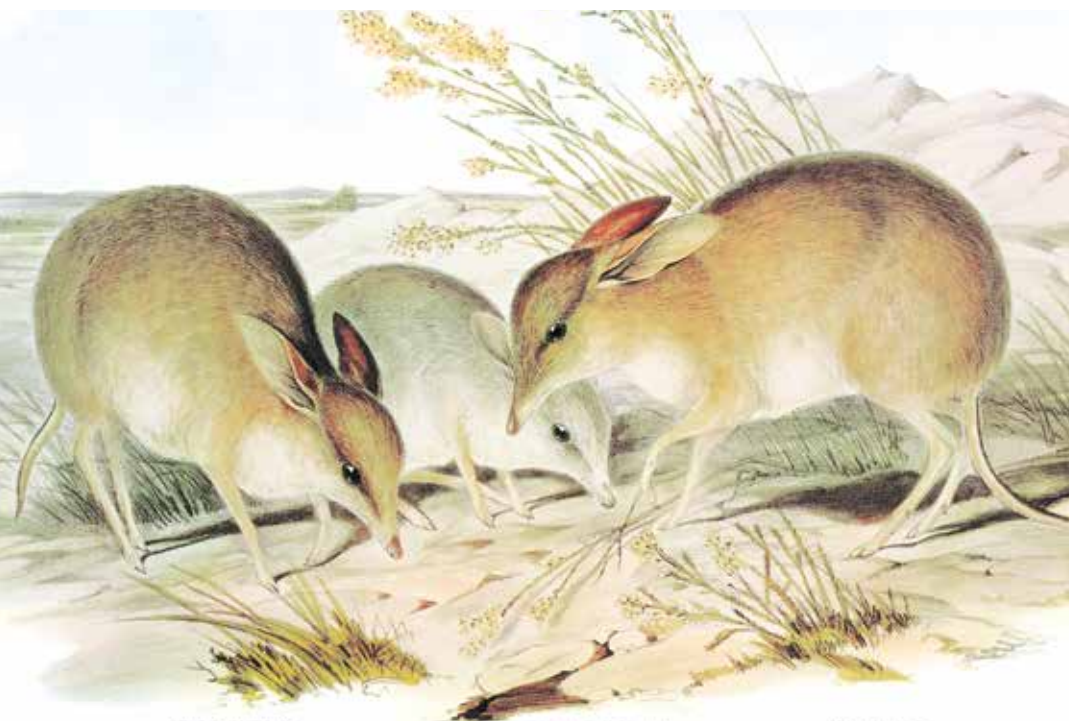
Main Quokkas occur only in the south-west of WA and numbers are declining.
Photo – Willi Laufmann/Sallyanne Cousans Photography
Inset Golden-backed tree rat.
Photo – David Bettini

Below Kantjilpa, also known as pig-footed bandicoots, are one of 20 species of Australian mammals that are extinct, and the cause was probably predation by feral cats.
Illustration – From The Mammals of Australia *by John Gould (1863)*



Changes in status since 1992 to WA mammals

Improved status

Chuditch (*Dasyurus geoffroii*): widespread fox control under *Western Shield*, assisted colonisations
Quenda (*Isoodon obesulus fusciventer*): widespread fox control under *Western Shield*
Koomal (*Trichosurus vulpecula hypoleucus*): widespread fox control under *Western Shield*
Boodie (*Bettongia lesueur*): assisted colonisation to islands and mainland islands
Mala (*Lagorchestes hirsutus* (inland)): assisted colonisation to Trimouille Island
Tammar (western) (*Macropus eugenii derbianus*): widespread fox control under *Western Shield*, assisted colonisations
Western brush wallaby (*Macropus irma*): widespread fox control under *Western Shield*
Greater stick-nest rat (*Leporillus conditor*): assisted colonisation to islands and mainland islands
Southern right whale (*Eubalaena australis*): recovery since whaling ceased in 1963
Humpback whale (*Megaptera novaeangliae*): recovery since whaling ceased in 1963

Worsened status

Northern quoll (*Dasyurus hallucatus*): ingestion of poisonous cane toads
Butler's dunnart (*Sminthopsis butleri*): declined in the Northern Territory, not recorded in WA since 1966
Numbat (*Myrmecobius fasciatus*): predation by feral cats and foxes
Western ringtail possum (*Pseudocheirus occidentalis*): cat and fox predation, urban development and a drying climate
Northern brushtail possum (*Trichosurus vulpecula arnhemensis*): predation by feral cats, and past inappropriate fire regimes
Woylie (*Bettongia penicillata*): predation by feral cats and foxes, novel disease
Spectacled hare-wallaby (*Lagorchestes conspicillatus*): multiple factors including predation and past inappropriate fire regimes
Nabarlek (*Petrogale concinna*): information lacking; probably a combination of predation by feral cats and past inappropriate fire regimes
Black-flanked rock-wallaby (*Petrogale lateralis lateralis*): multiple factors including residual effects of land clearing and fox and feral cat predation

Quokka (*Setonix brachyurus*): fox predation; threatened in the future by climate change
Ghost bat (*Macroderma gigas*): habitat loss due to mining, roost site disturbance, collision with barbed wire fences
Pilbara leaf-nosed bat (*Rhinonicteris aurantia* Pilbara population): habitat loss due to mining
Brush-tailed rabbit-rat (*Conilurus penicillata*): predation by feral cats, and past inappropriate fire regimes
Black-footed tree-rat (*Mesembriomys gouldii*): predation by feral cats, and past inappropriate fire regimes
Plains mouse (*Pseudomys australis*): predation by feral cats and foxes, habitat degradation due to livestock and feral herbivores, predation by wild dogs
Heath mouse (*Pseudomys shortridgei*): residual effects of land clearing, predation by feral cats
Central rock-rat (*Zyzomys pedunculatus*): predation by feral cats, and past inappropriate fire regimes
Pale field-rat (north-western) (*Rattus tunneyi tunneyi*): inadequate knowledge, probably predation by feral cats, and past inappropriate fire regimes

whichever is longer). Of the threatened species, nine are Critically Endangered, 10 are Endangered and 36 are Vulnerable. The Red List Index shows that mammals have declined at a greater rate than Australian birds (as shown in *The action plan for Australian birds 2010*).

For each threatened species and subspecies we identified the main threats to survival, or, for extinct species, the probable cause of extinction. For extinct terrestrial species, the number one reason was predation by feral cats, which underpins many wildlife recovery programs including *Western Shield* (see 'Hope for WA mammals' on page 46). WA species considered to have become extinct primarily due to cats include the kantjilpa or pig-footed bandicoot (*Chaeropus ecaudatus*), desert bandicoot (*Perameles eremiana*), central hare-wallaby (*Lagorchestes asomatus*), crescent nailtail wallaby (*Onychogalea lunata*), lesser stick-nest rat (*Leporillus apicalis*) and long-tailed hopping-mouse (*Notomys longicaudata*). Predation by feral cats was also identified as the number one threat to threatened species but predation by red foxes and the effects of inappropriate fire regimes came very close behind. These threats are interrelated and research in northern Australia shows that feral cats hunt much more effectively in recently burned areas than in well-vegetated ones and that very large fires have led to increased cat predation on, and decline of, threatened mammals.

Above left Pale field-rat.

Above Ghost bats are declining in parts of Australia due to habitat loss and collisions with barbed-wire fences.
Photos – Andrew Burbidge

Below Gilbert's potoroos are recovering due to research and assisted colonisations.
Photo – Matt Swan/Parks and Wildlife

Hope for WA mammals

Parks and Wildlife's *Western Shield* program has been operating since 1996. It is the biggest wildlife conservation program ever undertaken in Australia and aims to protect, recover and boost numbers of WA animals. It does this through broadscale baiting programs to reduce European red fox and feral cat density using 1080 poison. This is the manufactured version of a poison that occurs naturally in the native *Gastrolobium* genus of plants, commonly called 'poison peas'. While native animals have evolved with these plants and have a high tolerance to the poison, introduced animals do not.

Parks and Wildlife lays about one million poison baits each year across nearly three million hectares of department-managed land throughout the State from as far north as Karratha, through the forests of the south-west to areas east of Esperance in the south. About 300,000ha of this is baiting undertaken in the rangelands for cat control research.

The second phase of the program is to increase native animal populations through the reintroduction of native animals to baited areas throughout the State where they previously occurred. More than 140 native animal translocations have been undertaken throughout WA since the start of *Western Shield*.

This program is supported by sponsorship from Alcoa, BHP Billiton Worsley Alumina (Worsley) and Tronox.

Top A feral cat spotted with a phascogale.
Photo – Parks and Wildlife

Above Southern right whales are recovering since whaling ceased in 1963.
Photo – Lin Sutherland/OceanwideImages.com

CAUSE FOR OPTIMISM

It is not all gloom and doom. Positive outcomes have come from the action plan. While 55 species and subspecies throughout Australia have a worsened conservation status since 1992, 19 have an improved status. Others have increased, but did not qualify for an improvement in their 2012 Red List status. For example, Parks and Wildlife's work with Gilbert's potoroo (*Potorous gilbertii*), via assisted colonisation on Bald Island Nature Reserve and a 'mainland island' (a fenced enclosure to exclude foxes and cats) in Waychinicup National Park had almost reached the numbers necessary for it to be moved from Critically Endangered to Endangered.

It is important that we learn from these success stories and apply the knowledge to other species.

In WA there is a long history of research into, and management of, threatened mammals. So, how are our mammals faring? We found that 18 WA terrestrial species and subspecies had a worsened conservation status since 1992, while 10 had an improved conservation status (see 'Changes in status since 1992 to WA mammals' on page 45). Programs being carried out by Parks and Wildlife, together with a number of private and community organisations and volunteers are making headway, but until these numbers are reduced, there is still work to be done.

MARINE MAMMALS

The picture for marine mammals is somewhat different. Two species of great whales, the southern right (*Eubalaena australis*) and humpback (*Megaptera novaeangliae*), are recovering after whaling was banned in 1963, but other great whales have yet to respond and have not increased from the remaining very low numbers. Australia's only endemic marine mammal, the Australian sea lion (*Neophoca cinerea*) is Vulnerable, having a small population and a continuing decline due to a variety of threats, including entanglement and drowning in fishing gear. The dugong (*Dugong dugon*) was evaluated as Near Threatened. A major problem in evaluating the status of Australia's marine mammals is lack of information, leading us to assess 46 species and subspecies as 'data deficient'. Much more information on distribution and population numbers and trends is needed before we can say which species are threatened and focus management actions to conserve them.

WHERE TO FROM HERE?

While there have been some improvements, carrying on with 'business as usual' is likely to result in even more extinctions. Australia has the world's most distinctive mammals, including those from the most ancient lineages. Most have been on this land and in its seas for hundreds of thousands to millions of years. *The action plan for Australian mammals 2012* provides us with the evidence that Australia's loss of mammals is an ongoing problem, not just an unfortunate characteristic of early

Above The mulgara is one of several Australian mammals with a low public profile. *Photo – Babs and Bert Wells/Parks and Wildlife*

pioneering days. Urgent action is required to stop further losses.

For land mammals, the single most beneficial action is broadscale control of feral cats, a task that is becoming feasible after registration of Eradicat, a cat bait developed by Parks and Wildlife. In the interim, the threat can be moderated to some extent by building 'mainland islands', local baiting, assisted colonisation (translocation) of threatened species to cat-and fox-free islands, stronger biosecurity on islands of conservation significance, and more considered management of dingoes (which can suppress cat populations in at least some regions) and fire (which can increase exposure of mammals to predators). Fox control in WA via *Western Shield* has had major benefits for some mammals, but the case of the woylie, which increased in numbers after fox control only to decline again, shows that fox control on its own is insufficient for many species – feral cat control is also necessary and Parks and Wildlife is working on integrated fox and cat baiting. Better fire management, especially in the Kimberley and the arid interior, is also required and has commenced in the Kimberley as part of the State Government's award-winning *Kimberley Science and Conservation Strategy* (see 'Protecting the nature of the Kimberley', *LANDSCOPE*, Summer 2014–15). For marine mammals, more research into populations of the many data deficient species is badly needed.

The low public profile of many Australian mammals contributes to the limited recognition of our loss. Few people know of ningauis, planigales, mulgaras, kowaris, phascogales or dibblers, let alone have seen them. With knowledge, awareness and familiarity, we can encourage greater affinity, care and sense of responsibility

Protecting the nature of the Kimberley

The largest conservation project ever undertaken in Western Australia was established in 2011 as part of the State Government's *Kimberley Science and Conservation Strategy* to both understand and maintain the incredible beauty and natural values of the north Kimberley, including its mammal species.

Parks and Wildlife, native title holders and Indigenous ranger groups, government agencies, non-government organisations and pastoralists are working together to protect country and manage threats such as fire, feral animals and weeds.

Better management of fire has halved the area burnt by destructive late dry season fires, improving habitat for threatened wildlife. Cattle numbers have been reduced by up to 44 per cent in key areas, resulting in increased numbers and distribution of threatened mammals.

Dr Andrew Burbidge is a former Director of Science and threatened species in predecessor departments to Parks and Wildlife and is currently chair of the WA Threatened Species Scientific Committee. He can be contacted by email (amburbidge@westnet.com.au).

Professor John Woinarski has been involved in research, management and policy relating to Australia's threatened species for more than 30 years. He is employed part-time with the Northern Australian hub of the National Environmental Research Program at the Research Institute for the Environment and Livelihoods of Charles Darwin University.

Professor Peter Harrison has worked as a marine ecologist for more than 30 years and is Director of the Marine Ecology Research Centre at Southern Cross University. His diverse research and teaching interests encompass marine mammals to corals, with a focus on linking research findings to improved conservation and management outcomes. He has worked in a wide range of marine environments around the world from the equator to the Antarctic.

The action plan for Australian mammals 2012 *relied on the contributed expertise of more than 200 people, who reviewed draft accounts for individual taxa, provided unpublished data and taxonomic opinion and helped provide assessments of conservation status. Damian Milne collated, analysed and mapped a complex distributional database for terrestrial mammals, and Greg Luker compiled maps for marine mammals. Its publication was supported by funding from the Australian Wildlife Conservancy, the Norman Wettenhall Foundation, the North Australian Hub of the National Environmental Research Program and the Australian Department of the Environment.*

For more information, consult The action plan for Australian mammals 2012 *by J.C.Z Woinarski, A.A. Burbidge and P.L. Harrison (2014) available from www.publish.csiro.au/pid/7010.htm.*