

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister's delegate approved this Conservation Advice on 15/07/2016.

Conservation Advice

Macrotis lagotis

greater bilby

Conservation Status

Macrotis lagotis (greater bilby) is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The species is eligible for listing as prior to the commencement of the EPBC Act, it was listed as Vulnerable under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth). The greater bilby is listed in Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

The greater bilby is listed as Endangered in Queensland (*Nature Conservation Act 1992*), Vulnerable in the Northern Territory (*Territory Parks and Wildlife Conservation Act 2006*), Vulnerable in South Australia (*National Parks and Wildlife Act 1972*), Presumed Extinct in NSW (*Threatened Species Conservation Act 1995*) and as Vulnerable in Western Australia (*Wildlife Conservation Act 1950*).

The main factors that are the cause of the species being eligible for listing in the Vulnerable category are that it is patchily distributed and has a small area of occupancy (reduced to 20 percent of its former range (Southgate 1990); the population size is estimated to be fewer than 10 000 mature individuals, and it is undergoing continual decline (Woinarski et al., 2014).

Description

The greater bilby is a medium-sized burrowing marsupial with long, soft, blue-grey fur over most of the body and white to cream on the belly. It has large ears, a long pointed snout and a black tail with a white tip. It has forelimbs that have three stoutly clawed toes (and two unclawed toes) that enable the greater bilby to burrow effectively. The hind limbs are slender. The greater bilby grows to 55 cm long with a tail up to 29 cm long and reaches a maximum weight of 2500 g for males and 1100 g for females (Johnson 2008).

Distribution

Before European settlement the greater bilby occurred over 70 percent of the Australian mainland. Since the late 1800s, greater bilbies have disappeared from at least 80 percent of their former range (Southgate 1990).

The range of the Bilby has declined northwards and the decline is continuing. Wild populations are restricted predominantly to the following locations (Johnson 2008, cited in Woinarski et al., 2014):

- Northern Territory: The Tanami Desert
- Western Australia: The Gibson Desert, Little Sandy Desert, Great Sandy Desert and parts of the Pilbara and Southern Kimberley (GHD 2014)
- Queensland: One isolated population in South-west Queensland, approximately in the area between Boulia and Birdsville

The majority of remnant, naturally occurring populations of the greater bilby occur on Aboriginal lands (Bradley et al., 2015). Bilbies have been successfully introduced to Thistle Island (39 km²), South Australia in 1998, and successfully reintroduced to the three fenced mainland islands:

Arid Recovery Reserve near Roxby Downs, Scotia Sanctuary in western New South Wales and Yookamurra Sanctuary in South Australia (Woinarski et al., 2012).

Relevant Biology/Ecology

The greater bilby is a solitary species that shelters in burrows during daylight (and intermittently during the night) (Woinarski et al., 2014). The greater bilby is an omnivore that primarily digs for food. Diet consists of invertebrates such as lepidopteran larvae, termites, ants, grasshoppers, spiders and beetles, and other items such as seeds, bulbs (*Cyperus bulbosus*), and fungi (Burbidge et al., 1988; Gibson 2001; Southgate & Carthew 2006).

The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (Woinarski et al., 2014). Males range more widely than females from their home burrows, and home ranges can vary considerably in size in different locations. Greater bilbies can use up to 18 of these burrows concurrently over several months, as well as construct a new burrow on average every 2.5 weeks (Moseby & O'Donnell 2003). The mean female home range is 0.18 km², and the mean male home range is 3.16 km² (Moseby & O'Donnell 2003). There are many active and disused burrows within the home range.

Breeding varies depending on seasonal conditions and food availability, with litters mostly of one or two but sometimes three (McCracken 1990). Pouch life is approximately 75-80 days, with females tending their young in a burrow for another two weeks (Woinarski et al., 2014). Longevity can be up to 11 years, however in the wild, most animals are unlikely to survive that long (Southgate et al., 2005; McRae 2004; Jones et al., 2009 cited in Woinarski et al., 2014). Females commence breeding at five months and males at eight months. Generation time is assumed to be c. 4 years (Woinarski et al., 2014).

Threats

Table 1 – Threats impacting the greater bilby, based on the *Greater Bilby Recovery Summit Report and Interim Conservation Plan* (Bradley et al., 2015) and the *Action Plan for Mammals 2012* (Woinarski et al., 2014). Threat prevalence and intensity varies due to location so they have been categorised into broad geographic partitions of 'northern range bilbies' (where the threats posed by fire are higher) and 'southern range bilbies' (where the threat of foxes is more significant). A map depicting the separation can be found in the *Greater Bilby Recovery Summit Report and Interim Conservation Plan* on page 27. Threats are not ordered by severity of risk as this varies significantly depending on location.

Threat factor	Range	Threat type and status	Evidence base
Invasive species			
Predation by foxes (<i>Vulpes vulpes</i>)	Northern	potential	Fox presence is negatively correlated with the presence of greater bilbies (Southgate, 1990); fox predation is a major cause of mammal extinction and decline in Australia (Kinnear et al., 2002). Foxes are more abundant, and therefore a more significant threat in the southern range (Bradley et al., 2015). Abundance of rabbits leads to elevated predator densities, and rabbits are also largely restricted to the Southern part of the bilby distribution (Bradley et al., 2015).
	Southern	known current	

Predation by feral cats (<i>Felis catus</i>)	Northern	potential	Predation by feral cats has been observed during attempted reintroduction at Dryandra, Arid Recovery, Lorna Glen (K. Morris pers. comm. cited in Woinarski et al., 2014), Venus Bay and in the Tanami Desert (Pavey 2006); predation by feral cats is severe in Queensland (Woinarski et al., 2014).
	Southern	known current	
Habitat loss and fragmentation			
Land clearing	Northern	potential	Land clearing leads to loss of habitat, degradation of surrounding habitat, increased predation and fragmentation effects (Bradley et al., 2015).
	Southern	known current	
Infrastructure development	Northern	potential	Infrastructure associated with mining developments may threaten the greater bilby through vegetation clearance, increased risk of road kill, causing barriers to dispersal and gene flow, and elevated predator densities resulting from increases in food and water resources (Bradley et al., 2015).
	Southern	current known	
Impacts of domestic species			
Introduced herbivores & water points	Northern	current known	Greater bilby distribution is associated with an absence or low intensity of both rabbits, and stock/pastoralism (Bradley et al., 2015; Woinarski et al 2012). Rabbits (<i>Oryctolagus cuniculus</i>) support higher densities of cats and foxes. Pastoralism leads to increases in water points, which can also cause elevated densities of introduced predators. There are anecdotal reports of fox expansion associated with increases in water points for example in the Pilbara (NatureMap, 2016). Introduced herbivores remove vegetative cover and cause soil compaction; these effects are greater closer to water points. Herbivores also congregate along drainage lines, which are often prime bilby habitat, in the Pilbara and Tanami (Bradley et al., 2015).
	Southern	current known	
Fire			
Too frequent	Northern	known current	Extensive and intense fires remove vegetation (cover) from large areas, potentially causing increased predation pressure, including by introduced predators. Extensive fires may also affect the availability of food resources. Fire frequency is higher in the northern range. (Bradley et al., 2015).
	Southern	potential	

Conservation Objectives

- Maintain the current distribution of bilbies, and seek to expand this distribution.
- Implement landscape-scale control of introduced predators at key bilby sites.
- Maintain the existing insurance populations on feral predator-free islands and fenced areas, and potentially increase the number of these insurance populations.
- Develop and implement a national monitoring program for bilbies.

Conservation Actions

The following actions are mostly drawn from the Greater Bilby Recovery Summit Report and Interim Conservation Plan (Bradley et al., 2015), as well as the Mammal Action Plan (Woinarski et al., 2012). As the majority of remnant, naturally-occurring populations of bilbies occur on Aboriginal lands, it is recognised that the skills, knowledge and expertise of Indigenous communities are essential to the implementation of recovery actions.

Conservation and Management priorities

Invasive species

- Develop regional predator management strategies.
- Manage feral cats and foxes to reduce predation on bilbies, by refining, trialling, and implementing introduced predator control techniques in and around areas where bilbies occur (primarily baiting, grooming trap, shooting, training rangers and neighbouring pastoralists to trap, traditional hunting, fox and feral cat-specific baiting, trapping, grooming trap, shooting).
- Reduce the numbers of introduced herbivores, including rabbit populations, in and around areas where bilbies occur.

Habitat loss and fragmentation

- Enlarge and reconnect wild populations that are fragmented; work with landholders and neighbouring pastoralists to maintain and improve habitat quality and manage feral predators.
- Manage and restore habitat with the aim of creating sufficiently large areas to support subpopulations of up to 10 000 individuals.

Impacts of domestic species

- Manage levels of feral herbivores below thresholds at which they impact habitat quality for bilbies.

Fire

- Define and promote appropriate region-specific fire management to minimise large scale fires and promote mosaics of vegetation with heterogeneous structure and age classes, e.g. through patch burning, traditional burning, linear fire breaks etc.

Breeding, propagation and other ex-situ recovery action

- Develop a greater bilby metapopulation management plan that guides the use of the reintroduced populations on islands and within fenced sanctuaries, exchanges between these and the wild population, and how they might be used for the long term conservation of the species.

Stakeholder Engagement

- Have an effective recovery team to lead and coordinate the conservation and recovery of the greater bilby nationally.
- Develop an engagement strategy which realises opportunity for participation and support, and which engenders community awareness and understanding for greater bilby conservation. All potential relevant parties will be included in this – public sector, resource sector, agricultural sector, Traditional Owners, NGOs and general community.
- Land managers (including pastoralists, indigenous communities, Indigenous Protected Areas, etc) should be given information about managing fire and invasive species for the benefit of the greater bilby.

Survey and Monitoring priorities

- Implement national monitoring and survey protocols to assess national trends.
- In addition, implement an integrated monitoring program of threats (especially fire, predators) at important occupied habitat, to assess the effectiveness of current management actions and inform future management actions.

Information and research priorities

- Develop a prioritised, targeted research program incorporating social, cultural and ecological elements which informs effective greater bilby conservation. This plan is likely to address the following issues:
 - Determine size of habitat required to support high bilby numbers.
 - Determine intensity of grazing that negatively affects bilby populations.
 - Experimentally determine whether a reduction or removal of stock can restore habitat suitability and enable reintroduced bilbies to persist.
 - Undertake research on immigration corridors, source populations and feral cat movement during boom and bust events in South West QLD to enable implementation of effective predator control.
 - Determine the impact of feral cats on bilbies in a system with few foxes and rabbits.
 - Determine impact of broad scale predator baiting programs on abundance and composition of predator communities and how this affects total predation pressure on bilbies.
 - Test efficacy of manipulative management measures aimed at reducing feral cat abundance and determine the effort required to reduce feral cats to levels that allow bilby persistence and recovery.
 - Test response of bilbies (plus habitat quality, food availability, predators) to experimental fire manipulation in five different bilby subpopulations.
 - Determine the effect of turning on and off water points on predator composition and their relative abundance/occupancy.
 - Determine the required conditions for successful release of captive animals into the wild, including history of sites, results of previous translocations, traits which improved the survival of release animals in the past.
- Prioritise research into biological controls to manage predation.

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