The Minister's delegate approved this conservation advice on 01/10/2015

Conservation Advice

Sminthopsis psammophila

sandhill dunnart

Conservation Status

Sminthopsis psammophila (sandhill dunnart) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The species is eligible for listing as Endangered as, prior to the commencement of the EPBC Act, it was listed under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth).

The main factors causing the species to be eligible for listing in the Endangered category are:

The range of the sandhill dunnart has declined greatly in the past and there is ongoing decline (Woinarski et al., 2014). It is currently located in three widely separated areas, and the calculated area of occupancy is less than 500 km^2, but may be up to 2000 km^2 (Woinarski et al., 2014). There is inferred decline in the area of occupancy, in the area, extent and quality of habitat, and in the number of mature individuals (Woinarski et al., 2014).

Woinarski et al. (2014) reviewed the conservation status of the sandhill dunnart and considered it to be Vulnerable. The Threatened Species Scientific Committee is using the findings of Woinarski et al. (2014) to consider whether reassessment of the conservation status of each of the threatened mammals listed under the EPBC Act is required.

Description

The sandhill dunnart is a small, carnivorous marsupial, with a head and body length of approximately 8-12 cm, and a tail length approximately 10-12 cm (Pearson and Churchill, 2008). The head is pale grey with thin black markings extending from the shoulders to between the eyes, which also bear black rings (Pearson and Churchill, 2008). The underside of the body and feet are white. Ears are large. The tail is pale grey above, dark grey below, tapering towards the tip (Pearson and Churchill, 2008). This species is distinguished from other members of the genus by the ventral crest of blackish-grey hairs on the terminal quarter of the tail (Pearson and Churchill, 2008).

Distribution

The sandhill dunnart was first collected near Lake Amadeus in the south west of the Northern Territory (NT) in 1894, but has not been recorded from the NT since (Pearson and Churchill, 2008; Woinarski et al., 2014).

More recently, the species has been recorded from five, widely-separated localities in the Great Victoria Desert (South Australia and Western Australia), and on the Eyre Peninsula, with a calculated area of occupancy between 500 and 2000 km^2 (Woinarski et al., 2014). There is no robust estimate of population size, and local abundance can be highly variable between years (Woinarski et al., 2014).

Sandhill dunnarts occupy sandy, semi-arid and arid areas of southern central Australia, especially where sand dunes occur and when the vegetation is dominated by spinifex hummock grassland (*Triodia* spp.) (Woinarski et al., 2014). Overstorey vegetation is variable, with groves of desert oak (*Allocasuarina decaisneana*), or low, open *Eucalyptus* and *Callitris* woodlands being recorded (Pearson and Churchill, 2008).

Sandhill dunnarts shelter during the day in nests made in the centre of large hummock grasses such as spinifex (Pearson and Churchill, 2008), especially in grasses that start to die off in the

centre (Woinarski et al., 2014), where they build a circular depression (Churchill, 2001). Adult females also dig burrows that can be up to 90 cm long, ending in a small chamber containing nesting material of leaves and bark (Churchill, 2001). Males use a greater variety of nest sites than females, including small burrows between spinifex clumps, hollow logs, and existing burrows of the Mitchell's Hopping-mouse (*Notomys mitchelli*).

Parts of the range of the sandhill dunnart are contained in national parks, nature reserves or other conservation lands; however, threatening processes impact in reserved and non-reserved areas (Woinarski et al., 2014). Surveys between 2008 and 2012 across the Great Victorian Desert suggest that in this area the sandhill dunnart is largely restricted to the north west part of the Yellabinna Regional Reserve, where spinifex height and cover as well as habitat productivity are likely to be important influences on abundance (Woinarski et al., 2014). Captive populations are maintained in sanctuaries in Alice Springs and Pearcedale, Victoria (Woinarski et al., 2014).

Threats

The main identified threats to the sandhill dunnart are:

- Predation by feral cats (*Felis catus*), which is likely to have had a severe impact on the species over its entire range (Woinarski et al., 2014). On the Australian mainland, predation by feral cats on native mammals has impacted most heavily on smaller species weighing less than 220g (Dickman, 1996), and the sandhill dunnart weighs 25-55g (Pearson and Churchill, 2008), indicating that it there is an increased likelihood of extinction or significant decline (Woinarski et al., 2014)..
- Predation by red foxes (*Vulpes vulpes*), which is likely to have had a severe impact on the species over its entire range (Kinnear et al., 2002; Woinarski et al., 2014).
- Inappropriate fire regimes, which are likely to have had a severe consequence for the species over its entire range (Woinarski et al., 2014). The pre-European fire regime of frequent small fires has been replaced by infrequent, widespread and intense summer fires (Latz, 1995). In central Australia the removal of traditional fire practices has resulted in a reduction in the structural diversity of the habitat, leading to reductions in suitable cover in unburnt patches and decreased food availability in recently burnt areas (Churchill, 2001). Extensive hot fires in summer are now common in the spinifex deserts, and these destroy habitat over very large areas, limiting recolonisation as the vegetation recovers (Woinarski et al., 2014). Frequent fire is also a threat, as the sandhill dunnart requires old, well-established spinifex hummocks as shelter (Woinarski et al., 2014). In Yellabinna Regional Reserve in the Great Victoria Desert, prescribed burning on the perimeter of the primary habitat was implemented to provide protection from large uncontrolled fires; however, this did not work (Woinarski et al., 2014).
- Habitat loss and fragmentation, which are likely to have had very severe consequence for the species on a local scale (Woinarski et al., 2014). For example, by 2001, 57% of land on the Eyre Peninsula had been cleared for agriculture, and the remaining vegetation was heavily fragmented, with 88% in areas of less than 20 hectares (Churchill, 2001). This has led to major reduction in suitable habitat in this region. Increased patchiness of suitable habitat leads to further vulnerability to large fires (Churchill, 2001).

Potential threats to the sandhill dunnart include:

- Introduced herbivores (Churchill, 2001). These impact on the survival of native species in several ways, for example: by reducing the available food supply and cover for herbivorous native mammals, changing the species composition of vegetation, and causing erosion of waterholes (Churchill, 2001).
- Invasion by buffel grass (*Cenchrus ciliaris*), which has replaced native grasslands and has invaded areas occupied by the sandhill dunnart (Woinarski et al., 2014). Increases in fuel load are correlated with buffel grass invasion (Miller et al., 2010), leading to more frequent and more intense fires.

Conservation Actions

Conservation and Management Actions

Invasive species (including threats from grazing, trampling, predation)

- Implement the threat abatement plan for predation by feral cats (Department of the Environment, 2015).
- Where possible, control feral cats in and around sites where the sandhill dunnart occurs, using a broad-scale, targeted feral cat eradication technology or other method, ensuring there are no detrimental effects on the sandhill dunnart (Woinarski et al., 2014). For example, when the Curiosity® bait for feral cats is available, and if broad-scale baiting proves feasible and effective for feral cat control (with minimal or acceptable non-target impacts), then implement its widespread aerial deployment in national parks and other conservation areas identified by local or regional groups. Ensure the Curiosity® bait is available to large landholders controlling feral cats. In Western Australia, use Eradicat® bait for control of feral cats. Implement additional control after rain and fire.
- Implement the threat abatement plan for predation by the red fox (DEWHA, 2008).
- Build a network of large enclosures that exclude introduced predators and herbivores, to function as safe havens for sandhill dunnarts and other threatened species.
- Expand predator control wherever new or suspected populations of the sandhill dunnart occur.
- Eliminate buffel grass (*Cenchrus ciliaris*) from in and around sites where the sandhill dunnart occurs (Woinarski et al., 2014).

Fire

- Develop and implement a suitable fire management strategy for the habitat of the sandhill dunnart that prevents frequent widespread, intense, hot fires. Consider small-scale, 'patch' burning of smaller areas in cooler seasons. Also consider the regeneration potential of spinifex *Triodia* spp. hummock grassland.
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bush fire risk management plan/s, risk register and/or operation maps.

Habitat loss disturbance and modifications

- Ensure there is no inappropriate disturbance in areas where the sandhill dunnart occurs.
- Investigate formal conservation arrangements, management agreements and covenants for any unprotected populations on private land.
- Ensure adequate surveys are undertaken prior to vegetation clearance or landscape modification activities.
- Manage any other known, potential or emerging threats to habitat quality, such as grazing or weed invasion.

Impacts of domestic species

- Where livestock grazing occurs in or near sandhill dunnart localities, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect sandhill dunnart habitat.
- Manage total grazing pressure at important sites through exclusion fencing or other barriers.

Stakeholder engagement

- Promote awareness of the sandhill dunnart to landholders and local communities (Woinarski et al., 2014). Work with local communities and mining companies to monitor

and manage the sandhill dunnart (Woinarski et al., 2014). Discuss the importance of remnant vegetation and threatened species with relevant landholders.
- Maintain the South Australian Sandhill Dunnart Recovery Team to better coordinate recovery actions at the local level. Ensure the team includes members from state government authorities, councils, environmental groups, and other interested parties.
- Distribute information to drovers and graziers in relevant areas to raise awareness of the species' requirements and threatening processes.

Other Conservation Actions

- Maintain both captive breeding populations (Woinarski et al., 2014).

Survey and Monitoring priorities

- Conduct targeted surveys throughout the range of the sandhill dunnart to better define its distribution and abundance. Accurately identify potentially suitable habitat (especially breeding habitat) and undertake survey work to locate and map any additional populations. Survey areas where tracks, scats and diggings have been found that are likely to belong to this species.
- Monitor the progress of any recovery, including the effectiveness of management actions and the need to adapt them if necessary. Monitor the response of populations of the sandhill dunnart to control of introduced predators.
- Support and enhance existing monitoring programmes. Programmes are ongoing on the Eyre Peninsula and Great Victoria Desert in South Australia (Woinarski et al., 2014). Monitoring has occurred in sand dune areas on the Eyre Peninsula, and at Yellabinna Regional Reserve since 2008, the second locality revealing a resident population, with variable abundance across similar sites regarding spinifex cover, abundance and height (Woinarski et al., 2014). Monitoring on the Eyre Peninsula has also revealed a resident population, whose abundance is influenced by the number of subadults (Woinarski et al., 2014).
- Establish a monitoring programme at the extant localities in Western Australia to determine trends in population numbers, recruitment and mortality, as well as impacts of threats and impacts of any threat abatement activities.
- Ensure that an annual monitoring and research programme is implemented for all populations.

Information and research priorities

- Assess the relative impact of threats, such as the population-level impacts of predation by feral cats and red foxes (Woinarski et al., 2014). Assess population-level responses to local eradication of red foxes and feral cats (Woinarski et al., 2014).
- Assess the relative impact of patch burning on sandhill dunnarts; also assess population-level responses to managed fire (Woinarski et al., 2014).
- Clarify the taxonomy of the species across the full extent of its range. Identify the levels of gene flow among extant populations. Such information will inform the species' conservation status and further management actions.
- Investigate the need for Indigenous consultation or specific community or land manager consultation in areas where the sandhill dunnart occurs.

References cited in the advice

Churchill S (2001). Recovery Plan for the sandhill dunnart (*Sminthopsis psammophila*). South Australia Department for Environment and Heritage, Adelaide.
Available on the Internet at:
http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Threatened_species_ecological_communities/Recovery_planning/Plans_for_threatened_animals_in_SA/land-mammals

Department of the Environment (2015). Threat abatement plan for predation by feral cats. Department of the Environment, Canberra.
Available on the Internet at:
http://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/draft-feral-cats-2015

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Threat abatement plan for predation by the European red fox. DEWHA, Canberra.
Available on the Internet at:
http://www.environment.gov.au/resource/predation-european-red-fox

Dickman CR (1996). Overview of the impacts of feral cats on Australian native fauna. Australian Nature Conservation Agency, Canberra.

Kinnear JE, Sumner NR and Onus ML (2002). The red fox in Australia–an exotic predator turned biocontrol agent. Biological Conservation 108: 335-359.

Latz P (1995). Bushfires and Bushtucker: Aboriginal plant use in central Australia. IAD Press, Alice Springs.

Miller G, Friedel M, Adam P and Chewings V (2010). Ecological impacts of buffel grass (*Cenchrus ciliaris* L.) invasion in central Australia–does field evidence support a fire-invasion feedback? The Rangeland Journal 32: 353-365.

Pearson DJ and SK Churchill (2008). Sandhill Dunnart, *Sminthopsis psammophila*. In 'The Mammals of Australia' (eds C Van Dyck and R Strahan). Reed New Holland, Chatswood, NSW.

Woinarski JCZ, Burbidge AA and Harrison PL (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing. Collingwood, Vic.