Threatened Species Assessment

Sminthopsis leucopus
White-footed Dunnart

Taxonomy

Sminthopsis leucopus (J. Gray, 1842)

Smith (1983) and Blacket (2006) confirmed that two subspecies within *Sminthopsis leucopus* are warranted, *Sminthopsis leucopus leucopus* from Tasmania, and *S. l. ferruginifrons* from the mainland.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2003).

Categorised as Near threatened in the 2013 Advisory list of threatened vertebrate fauna in Victoria (DSE 2013).

Proposed conservation status

Vulnerable in Victoria

Criterion B2ab(ii,iii,v)

Species Information

Description and Life History

In New South Wales and Victoria, the White-footed Dunnart has a head and body length of 67-98 mm and a tail length of 67-82 mm. Adults usually weigh 16-32 grams (Lunney 2008). The White-footed Dunnart is generally terrestrial, although evidence from Tasmania has shown the taxon to be an active climber (Mahoney and Ride 1988, Lyne 1967). It is nocturnal, displaying highest levels of activity in the six hours following sunset, and low levels of activity during the day (Laidlaw et al. 1997). It is an opportunistic feeder and generally insectivorous, predating upon a wide range of ground-dwelling arthropods up to 18 mm in length (Lunney et al. 1986). It is also known to eat small vertebrates on occasions, for example scincoid lizards (Lunney et al. 1986).

Both male and female White-footed Dunnarts are thought to have stable, undefended home ranges, with extensive overlap within and between sexes. Laidlaw et al. (1997) found the average home range to be around 0.9ha, and Cheetham and Wallis (1981) recorded male range lengths of 55-120 m. Some New South Wales studies (e.g. Lunney et al. 1986, Lunney and Leary 1989) have found evidence to suggest that two classes of males exist within a population: resident males and explorer males, which may travel up to 1025 m in one night. The Victorian study of Laidlaw et al. (1997) found no evidence to support this theory, although Wilson et al. (1986) found that males made longer journeys (up to 450 m) between October and November.

White-footed Dunnarts appear to have only one short breeding season during their lifetime (Menkhorst 1995). Nest sites have rarely been observed in Victoria. Laidlaw et al. (1997) observed a nest site in the Anglesea region, consisting of a burrow into a dense litter layer at the base of a mallee-form *Eucalyptus willisii.* In Tasmania, White-footed Dunnarts are known to build bark nests in the tops of tree-ferns, in rotting logs, in tree hollows, beneath wood piles and even in unused huts (Smith 2005, Lunney 2008). In Victoria, mating occurs in late July and August. The females give birth to up to 10 young in September or October. The young remain in the rudimentary pouch, attached to the mother's teats, for around two months (NSW Department of Environment and Conservation 2005). Like other dunnarts, female White-footed Dunnarts have an incomplete pouch, comprising a circular fold of skin with a central opening (Croft 2003). After detaching from the mother's teats, the young are suckled in the nest for a further month, before dispersing (NSW Department of Environment and Conservation 2005).

Generation Length

The generation length of the White-footed Dunnart is estimated to be 1 year. This is based on the figure in the Mammal Action Plan (Woinarski et al. 2014).

Distribution

The White-footed Dunnart occurs throughout Tasmania and in a band across southern Victoria and south-eastern New South Wales. An outlier population occurs in the Paluma area of north-eastern Queensland (Woinarski et al. 2012). In Victoria it is patchily distributed along the entire coastline, extending inland along major river valleys such as the Yarra, Tambo and Macalister Valleys (Menkhorst 1995). It is rarely found more than 150 km from the coast (Laidlaw et al. 1997, Morton et al. 1980). Victorian records for this species are concentrated in seven areas: southern Wannon, fringes of the Otway Ranges, southern Mornington Peninsula, Yarra Valley upstream of Warrandyte, foothills of the La Trobe Valley, Wilsons Promontory-Cape Liptrap, and East Gippsland (particularly in the Bairnsdale-Buchan area) (Menkhorst 1995). The taxon is found on a variety of soil types, ranging from coarse sands to silty clay loams, and occurs in areas of intermediate mean annual rainfall: from 660mm at Aireys Inlet to 1100mm in the Otway Ranges (Morton et al. 1980).

Habitat

The White-footed Dunnart occurs in a range of habitats in Victoria including coastal tussock grassland and sedgeland, wet heath, and forest and woodland with a dense (>50% cover) heathy understorey or mid-storey vegetation (Morton et al. 1980, Menkhorst 1995). In a study by Laidlaw et al. (1997) in coastal dry heath at Anglesea, around one quarter of observations were of individual White-footed Dunnarts in thick patches of heath, suggesting that this type of habitat is used as an opportunistic refuge. It is a taxon of early to mid-successional stages, post-fire and/or forestry operations. In the Otway Ranges in Victoria it has been found in regrowth 4-16 years post-fire, with peak numbers at 4-9 years post-fire (Wilson and Aberton 2006), providing evidence that it prefers early-successional habitats. In contrast, studies in south-eastern New South Wales found that the taxon's preferred early successional habitats were being restricted to areas of recently burnt and logged forest on ridges and mid-slopes. The primary habitat in this area comprised treeless ridges and mid-slopes with less than 51% ground cover. Gullies or areas with a ferny ground layer of vegetation were not selected by the taxon (Lunney and Leary 1989, Lunney et al. 1989).

The White-footed Dunnart is nocturnal, sheltering under strips of bark and small rotting logs, and burrows in the ground and tree hollows during the day (Lunney 2008).

Threats

Loss and fragmentation of habitat due to land clearing for agricultural and residential development, particularly in coastal areas, is likely to be causing population declines. In addition, habitat fragmentation may be contributing to the decline of genetic viability within already small populations. Habitat degradation in some coastal heathlands due to *Phytophthora* may be impacting some populations.

Predation of White-footed Dunnarts by foxes and cats is clear threat to populations, and although baiting programs such as DELWP's 'Southern Ark' programs may benefit White-footed Dunnarts in reducing fox predation, there is currently no effective broad-scale control measure for feral cat cats, which may increase in response to reduced fox activity. Intense extensive bushfires are likely to kill this ground-dwelling taxon and remove cover and nesting sites increasing the predation risk, particularly by feral cats and foxes, at least in the short-term, until the vegetation recovers.

Although several Victorian populations occur within conservation reserves (Lower Glenelg NP, Port Campbell NP, Wilsons Promontory NP, Croajingalong NP and Point Nepean NP), the management practices associated with public land, in particular the fuel management activities in certain zones within these sites (with the primary aim of protecting life and property), may be inappropriate for habitat conservation. Recreational users of these sites may also cause habitat modification and disturbance, for example trampling of coastal foredunes.

The taxon was also preliminarily assessed and considered to be subject to high genetic risk (DELWP unpublished data 2020).

Spatial analysis of likely habitat on all land tenures for the White-footed Dunnart indicates that 49% occurs within the CAR reserve system, including parks and reserves and special protection zones within State forest.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a*) *cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Ineligible under Criterion A

The past population reduction does not meet the threshold for eligibility under criterion A2, and the future population reduction does not meet the threshold for eligibility under criterion A3.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B2 as Vulnerable

The Area of Occupancy (AoO) across the taxon's range is estimated to be 1,187 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

It is suspected to have a continuing decline in (ii), (iii) and (v) above and is suspected to have 8 locations. Continuing declines are based on the likelihood of future fire regimes, causing reduced habitat quality, and increased predation by feral cats and foxes following fire. Fire and predation may be serious threats but are likely to impact subpopulations at different intensities and seasonality.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C

It is inferred that there are 1,000 to 5,000 mature individuals, but this qualifier is too weak and other thresholds under this criterion have not been met.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	< 50	< 250	< 1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO < 20 km2 or number of locations ≤ 5

Evidence:

Ineligible under Criterion D

It is inferred that there are 1,000 to 5,000 mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Blacket, M. J., Cooper, S. J. B, Krajewski, C. and Westerman, M. (2006). Systematics and evolution of the dasyurid marsupial genus Sminthopsis: II The murina species group. *Journal of Mammalian Evolution* 8, 149-170.

Cheetham, R. J. and Wallis, R. L. (1981). Field notes on the white-footed dunnart, *Sminthopsis leucopus* Gray (Marsupialia: Dasyuridae). *Victorian Naturalist* 98, 248-51.

Croft D.B. (2003) Behaviour of Carnivorous Marsupials, in Jones M.E., Dickman C.R. and Archer M. (eds) *Predators with Pouches: The biology of carnivorous marsupials*, CSIRO Publications, Melbourne.

DSE (2013) *Advisory List of Threatened Vertebrate Fauna in Victoria 2013.* Department of Sustainability and Environment, Melbourne

Laidlaw W.S., Hutchings S. and Newell G.R. (1997), Home range and movement patterns of *Sminthopsis leucopus* (Marsupialia: Dasyuridae) in coastal dry heathland, Anglesea, Victoria. *Australian Mammalogy,* 19:1-9.

Lunney, D. (2008). White-footed Dunnart *Sminthopsis leucopus.* Pp 145148 in Van Dyck, S. and Strahan, R. (eds). *The Mammals of Australia*. 3rd edition. Reed New Holland, Sydney.

Lunney, D., Ashby, E., Grigg, J. and O'Connell, M. (1986). Food availability and habitat selection of *Sminthopsis leucopus* (Gray) (Marsupialia: Dasyuridae) in logged forest on the south coast of New South Wales. *Australian Mammalogy* 9, 105-110

Lunney, D., O'Connell, M., Sanders, J. and Forbes, S. (1989). Habitat of the white-footed dunnart *Sminthopsis leucopus* (Gray) (Dasyuridae: Marsupialia) in a logged, burnt forest near Bega, New South Wales. *Austral Ecology* 14, 325-344.

Lunney, D., and Leary, T. (1989). Movement patterns of the White-footed Dunnart *Sminthopsis leucopus* (Marsupialia: Dasyuridae) in a logged, burnt forest near Bega on the south coast of New South Wales. *Australian Wildlife Research* 16, 207-215.

Lunney, D., Menkhorst, P., and Burnett, S. (2008) *Sminthopsis leucopus*. In *IUCN red list of threatened species*. Version 2012.1. Accessed 22 June 2012.

Lyne G. (1967) *Marsupials and Monotremes of Australia*, Angus and Robertson Ltd, Sydney.

Mahoney, J.A. and Ride, W.D.L. (1988). Dasyuridae. pp. 14-33. In D.W. Walton (ed.) *Zoological Catalogue of Australia. Volume 5. Mammalia*. Australian Government Publishing Services, Canberra.

Menkhorst, P. (1995). *Mammals of Victoria: distribution, ecology and conservation.* Oxford University Press in association with Dept. of Conservation and Natural Resources, Melbourne.

Menkhorst P. and Knight F. (2001) *A field guide to the mammals of Australia*. Oxford University Press, South Melbourne.

Morton R.S., Wainer J.W. and Thwaites T.P. (1980) Distribution and habitats of *Sminthopsis leucopus* and *S. murina* (Marsupialia: Dasyuridae) in south-eastern Australia. *Australian Mammalogy* 3: 19-30

NSW Department of Environment and Conservation Threatened Species website, accessed 8th October 2005, from http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10758

Parks and Wildlife Service Tasmania (2005) *Wildlife of Tasmania*, accessed 8th October 2005, from http://www.parks.tas.gov.au/wildlife/mammals/wfdunn.html

SAC (2003). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 682 *Sminthopsis leucopus*

Smith, A.M.A. (1983). The subspecific biochemical taxonomy of A*ntechinus minimus, A. swainsonii* and *Sminthopsis leucopus* (Marsupialia: Dasyuridae). *Australian Journal of Zoology* 32, 753-762.

Smith M.J. (2005) *Marsupials of Australia Volume 2*, Lansdowne Editions, Melbourne.

Troughton E. (1964) A review of the marsupial genus Sminthopsis (Pascogalinae) and diagnoses of new forms. *Proceedings of the Linnean Society of NSW,* 89:307-321.

Wilson, B.A. and Aberton, J.G. (2006). Effects of landscape, habitat and fire and the distribution of the white-footed dunnart *Sminthopsis leucopus* (Marsupialia: Dasyuridae) in the Eastern Otways, Victoria. *Australian Mammalogy* 28, 27-38.

Wilson, B. A., Bourne, A. R., and Jessop, R. E. (1986). Ecology of small mammals in coastal heathland at Anglesea, Victoria. *Australian Wildlife Research* 13, 397-406.

Woinarski J.C.Z., Burbidge A.A. and Harrison P. L. (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing.