

Threatened Species Assessment

Dasyurus maculatus maculatus Spot-tailed Quoll

Taxonomy

Dasyurus maculatus maculatus (Kerr, 1792)

Current conservation status

Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1991).

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

Proposed conservation status

Endangered in Victoria

Criterion C2a(i), D

Species Information

Description and Life History

The Spot-tailed Quoll is the largest marsupial carnivore on mainland Australia. Males have a head and body length of 380-760 mm, a tail length of 370-550 mm and weigh up to 7 kg (average 3 kg), while females have a head and body length of 350-450 mm, a tail length of 340-420 mm and weigh up to 4 kg (average 2 kg). Fur colour ranges from light to very dark brown, with conspicuous white spots over the body and tail. No other quoll taxon in Australia has a spotted tail. The Spot-tailed Quoll has a relatively large head with a wide jaw gape and characteristic large dentition of a carnivore, including long, curved canine teeth (Edgar and Belcher 1995).

Although generally thought to be nocturnal, Spot-tailed Quolls are also known to hunt during the day. They are carnivores with a diet that mostly comprises small-medium sized (< 5 kg) mammals, but also includes birds, reptiles, fish, amphibians, and invertebrates (Belcher 1995; Andrew 2005; Belcher et al. 2007; Jarman et al. 2007). Some food, particularly from macropods and lagomorphs, is taken as carrion (Jarman et al. 2007). Home ranges are appreciably larger for males (ranging up to a few thousand hectares in size) than for females (a few hundred hectares) (Andrew 2005; Belcher and Darrant 2004, Claridge et al. 2005; Glen and Dickman 2006b, 2011). Home range sizes may be smaller in higher quality habitat in northern New South Wales (with relatively high quoll densities) than in southern New South Wales and Victoria (Glen and Dickman 2011).

Breeding occurs annually, in winter, with an average litter size of five. Females reach maturity by 1 year although some females do not breed until their second year. (Belcher et al. 2008; Glen 2008).

Generation Length

The generation length of the Spot-tailed Quoll is estimated to be 2 to 5 years, derived as the midpoint of age at first breeding (1 year) and longevity (three years) (Jones et al. 2003). The Mammal Action Plan (Woinarski et al. 2012) also determines generation length to be 2 to 5 years.

Distribution

The taxon has an extensive range in eastern Australia from south-eastern Queensland to western Victoria, but its area of occupancy has contracted historically by up to 50% (Maxwell et al. 1996) and its distribution is now highly



Dasyurus maculatus maculatus Spot-tailed Quoll

fragmented. It has been extirpated from many parts of its former range, most notably including south-eastern South Australia. Long and Nelson (2012a) listed 16 important subpopulations, of which three occur in Victoria -- Great Otway National Park, Budj Bim (Mt Eccles) National Park, and East Gippsland. However, the failure to detect any quolls despite substantial survey effort in the south-west of their Victorian range indicates that the population in the Great Otway National Park and Budj Bim National Park are now locally extinct. Genetic analyses of samples collected from this area have revealed they are from north-eastern New South Wales animals which are genetically distinct, and are therefore unreported escapees from captivity.

Habitat

The taxon may occur in a wide range of habitats including closed forests (including temperate and sub-tropical rainforest), tall eucalypt forests, open woodlands, open forests, drier rain-shadow woodlands and coastal heathlands (Belcher and Darrant 2004). It shows appreciable variation in density across habitat types, as well as in association with features such as gullies, escarpments and rock piles (Belcher 2004). During the day they shelter in fallen logs, boulder piles, burrows, tree hollows and occasionally under dwellings (DELWP 2016, Andrew 2005).

Threats

Threats to the taxon include predation by (and competition with) Red Foxes, wild Dogs and feral Cats; habitat loss and fragmentation; inappropriate fire regimes; poisoning associated with control of non-native predators; targeted poisoning and trapping; and forestry operations. The taxon is also considered at high genetic risk.

The main stronghold for this species is in the upper Snowy River area of East Gippsland. Additional research is needed to identify the causes of decline, including genetics, small population size, predation or competition for prey. The 2019-20 bushfires are believed to have impacted more than 30% of the taxon's modelled habitat. Most Upper Snowy sites (north of Gelantipy) were not within the fire extent.

Spatial analysis of likely habitat for Spot-tailed Quoll on all land tenures indicates that 59% occurs within the CAR reserve system, including parks and reserves, special protection zones and areas excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code). Species-specific protections for Spot-tailed Quoll are included in the Code. Other more general forestry prescriptions also provide protection from timber harvesting. In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

Dasyurus maculatus maculatus

Spot-tailed Quoll

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% |
| <p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p> <p><i>based on any of the following:</i></p> <ul style="list-style-type: none"> (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 km ² | < 5,000 km ² | < 20,000 km ² |
| B2. Area of occupancy (AOO) | < 10 km ² | < 500 km ² | < 2,000 km ² |
| 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 | | | |

Dasyurus maculatus maculatus Spot-tailed Quoll

Evidence:

Eligible under Criterion B as Vulnerable

The Area of Occupancy (AoO) is estimated to be 419 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is suspected to have 2 to 20 (midpoint 10) locations. Subpopulations are large, with many locations that are unlikely to be affected by single events or a suite of events.

It has continuing declines in (i), (ii), (iii), (iv) and (v) above, based on targeted surveys and monitoring (general monitoring during Ark programs) throughout the taxon's range since 2006. Declines are due primarily to impact of feral predators, extensive high intensity bushfires, and the cumulative impacts of planned burns and historic forestry operations.

| 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:

Eligible under Criterion C2 as Endangered

It is estimated that there are 100 to 500 mature individuals. This is based on recent surveys of the remaining subpopulation in the Upper Snowy River area.

The number of mature individuals is projected to continue to decline, and both subpopulations may have fewer than 250 individuals.

Future and ongoing declines are expected, due to increasing fire frequency and the impacts of feral animals, particularly foxes and cats.

Dasyurus maculatus maculatus Spot-tailed Quoll

| 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 km ² or number of locations ≤ 5 [Ⓜ] |

Evidence:

Eligible under Criterion D as Endangered

It is estimated that there are 100 to 500 mature individuals.

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

References

- Andrew, D. L. (2005). Ecology of the Tiger Quoll *Dasyurus maculatus maculatus* in coastal New South Wales. M.Sc. thesis, University of Wollongong.
- Belcher, C. (1995). Diet of the Tiger Quoll (*Dasyurus maculatus*). *Wildlife Research* 22, 341-357.
- Belcher, C. (2004). The largest surviving marsupial carnivore on mainland Australia: the Tiger or Spotted-tailed Quoll *Dasyurus maculatus*, a nationally threatened, forest-dependent species. In *Conservation of Australia's forest fauna*. (Ed. D. Lunney.) pp. 612-623. (Royal Zoological Society of New South Wales: Mosman.)
- Belcher, C.A. and Darrant, J.P. (2004). Home range and social organisation of the marsupial carnivore, *Dasyurus maculatus maculatus* (Marsupialia: Dasyuridae) in south-eastern Australia. *Journal of Zoology, London* 262, 271-280
- Belcher, C., Burnett, S., and Jones, M. (2008) Spotted-tailed Quoll, *Dasyurus maculatus*. In *The mammals of Australia*. (Ed S. Van Dyck and R. Strahan.) pp. 60-62. Reed New Holland: Sydney.
- Belcher, C., Nelson, J. L. and Darrant, J. P. (2007). Diet of the Tiger Quoll (*Dasyurus maculatus*) in south-eastern Australia. *Australian Journal of Zoology* 55, 117-122.
- Claridge, A. W., Paull, D., Dawson, J., Mifsud, G., Murray, A. J., Poore, R. N., and Saxon, M. J. (2005). Home range attributes of the spotted tailed quoll (*Dasyurus maculatus*), a marsupial carnivore, in a rainshadow woodland. *Wildlife Research* 32, 7-14.
- DELWP (2016). *National recovery plan for the Spotted-tailed quoll Dasyurus maculatus*. Department of Environment, Land, Water and Planning. Australian Government, Canberra.
- DSE (2013) *Advisory List of Threatened Vertebrate Fauna in Victoria 2013*. Department of Sustainability and Environment, Melbourne
- Edgar, R. and Belcher, C. (1995). Spotted-tailed quoll. *The Mammals of Australia*. 2nd ed. (Ed. R. Strahan.) pp. 18-19.
- Glen A. S. and Dickman C. R. (2006b). Home range, denning behaviour and microhabitat use of the carnivorous marsupial *Dasyurus maculatus* in eastern Australia. *Journal of Zoology* 268, 347-354.
- Glen, A. S. and Dickman C. R. (2011). Why are there so many Spotted-tailed Quolls *Dasyurus maculatus* in parts of north-eastern New South Wales? *Australian Zoologist* 35, 711-718.



Dasyurus maculatus maculatus Spot-tailed Quoll

Jarman, P. J., Allen, L. R., Boschma, D. J., and Green, S. W. (2007). Scat contents of the spotted-tailed quoll *Dasyurus maculatus* in the New England Gorges, north-eastern New South Wales. *Australian Journal of Zoology* 55, 63-72.

Jones, M. E., Oakwood, M., Belcher, C. A., Morris, K., Murray, A. J., Woolley, P. A., Firestone, K. A., Johnson, B. and Burnett, S. (2003). Carnivore concerns: problems, issues and solutions for conserving Australasia's marsupial carnivores. In *Predators with pouches: the biology of carnivorous marsupials*. (Eds M. E. Jones, C. R. Dickman, and M. Archer.) pp. 422-434. CSIRO Publishing: Collingwood.

Nelson, J. Belcher, C., and Scroggie, M. (2010). *The distribution and status of the Spotted-tailed Quoll in the Alpine and Snowy River National Parks, and refinement of a remote camera survey protocol*. Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg.

SAC (1991). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 146 *Dasyurus maculatus*.

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