

THREATENED SPECIES SCIENTIFIC COMMITTEE

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

The Minister approved this conservation advice and retained this species in the Endangered category, effective from 1 September 2020

Conservation Advice

Dasyurus maculatus maculatus (southeastern mainland population)

Spotted-tailed Quoll, south eastern mainland

Taxonomy

Conventionally accepted as *Dasyurus maculatus maculatus* (Kerr, 1972).

Sub-species Information

There are two sub-species recognised for the Spotted-tailed Quoll - *Dasyurus maculatus gracilis*, restricted to north-eastern Queensland, and *Dasyurus maculatus maculatus*, that occurs from southern Queensland through to south-western Victoria and Tasmania. While studies have found the Tasmanian populations are distinct from the mainland populations of *Dasyurus maculatus maculatus* to warrant subspecific status, the Tasmanian subspecies has not yet received formal published taxonomic recognition (DELWP 2016). As such, the two southern subspecies are referred to as *Dasyurus maculatus maculatus* (southeastern mainland population), and *Dasyurus maculatus maculatus* (Tasmanian population). These populations were formally recognised under section 517 of the *Environment Protection and Biodiversity Conservation Act 1999* in May 2004.

This Conservation Advice relates to the population of *Dasyurus maculatus maculatus* from south-eastern mainland Australia.

Summary of assessment

Conservation status

The highest category for which *Dasyurus maculatus maculatus* (southeastern mainland population) (Spotted-tailed Quoll, southeastern mainland) is eligible to be listed is Vulnerable. However, the recent 2019-20 bushfires in eastern and southern Australia may have accelerated any population decline, given that 29 per cent of the Spotted-tailed Quoll's distribution range overlaps with the fire-affected extent. Until the results of post-bushfires population monitoring are available, the Committee will take a precautionary approach and recommend the species remains eligible for listing as Endangered under Criterion 3.

Dasyurus maculatus maculatus (southeastern mainland population) has been found to be eligible for listing under the following categories:

Criterion 3: C2(a)(i): Endangered

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of new information provided to the Committee to review the listing status of the Spotted-tailed Quoll.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 32 business days between 17 May 2019 and 3 July 2019. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species/sub-species information

Description

The Spotted-tailed Quoll is a nocturnal, cat-sized, carnivorous marsupial with reddish-brown fur and distinctive white spots over its back and tail (Cronin 1991; Edgar & Belcher 2008). Males are 380–759 mm in head and body length, and females are 350–450 mm. Tail length is 370–550 mm for males and 340–420 mm for females. Males weigh up to 7 kg and females up to 4 kg (Edgar & Belcher 2008) although the mean weight range for male adults is 2.8–4.6 kg and 1.5–2 kg for females (Belcher 2003; Green & Scarborough 1990; Jones 1997; Körtner et al. 2004).

Distribution

The Spotted-tailed Quoll (southeastern mainland population)) occurs in eastern Australia from south-eastern Queensland to western Victoria. Populations are now fragmented and isolated and estimates of the decline range from 50–90 percent for the mainland and 25–50 percent for the population in New South Wales since European settlement (DELWP 2016). It has been extirpated from many parts of its former range, most notably including south-eastern South Australia (Woinarski et al. 2014).

The New South Wales government has established four priority sites for landscape scale monitoring and management of the Spotted-tailed Quoll. Monitoring of populations at each of these sites has occurred since at least 2016 using a consistent method (camera traps). These sites represent a broad geographic (north-south, coast-inland), habitat and climatic distribution of the species range within New South Wales. Monitoring results have found stable populations at each of the sites. These sites are Byadbo Wilderness (Kosciuszko National Park), Barren Grounds Nature Reserve and Budderoo National Park (South Coast), Jenolan-Kanangra (Jenolan/Greater Blue Mountains) and Northern Tablelands (Guy Fawkes River National Park, New England National Park and Oxley Wild Rivers National Park).

The National Recovery Plan for the Spotted-tailed Quoll lists populations considered to be important to their long-term survival, based on current knowledge. Noting that other populations may be added to this list, the Recovery Plan identifies the following populations:

- East Gippsland (VIC)
- Marylands National Park and adjacent areas (NSW)
- Barrington (NSW)
- North Coast (NSW)
- South Coast – Barren Grounds Nature Reserve and Budderoo National Park (NSW)
- Limeburner's Creek Nature Reserve (NSW)
- Northern Tablelands – Guy Fawkes River National Park, New England National Park, Oxley Wild Rivers National Park (NSW)
- Greater Blue Mountains (NSW)
- Tallaganda / Badja (NSW)
- Jenolan-Kanangra (NSW)
- Kosciuszko National Park / Snowy Mountains Byadbo (NSW)
- Stanthorpe to Wallangarra, Granite Belt/New England Tablelands (QLD)
- Cherrabah Homestead (between Warwick and Killarney) (QLD)
- Main Range-McPherson Range west (QLD)
- Lamington Plateau-McPherson Range east (QLD)
- Burnett Range (QLD)

- Dalby region (QLD)

Cultural significance

The Spotted-tailed Quoll is a culturally and spiritually significant species to Aboriginal people, especially in Queensland. The species is represented in the Dreamtime through totemism, country and story.

Relevant biology/ecology

The Spotted-tailed Quoll is carnivorous, feeding on a wide variety of prey such as small-medium sized (less than 5 kg) mammals, birds, reptiles, fish, amphibians, and invertebrates (Belcher 1995; Andrew 2005; Glen and Dickman 2006a; Belcher et al. 2007; Jarman et al. 2007).

Spotted-tailed Quolls are solitary animals (Todd et al. 2007) that occur at low densities (Körtner *et al.* 2015). Males have larger ranges of up to a few thousand hectares in size, while females have smaller ranges of several hundred hectares (Andrew 2005; Claridge et al. 2005; Glen and Dickman 2006b, Belcher and Darrant 2004). Home range sizes may vary depending on the quality of habitat – ranges may be smaller in the higher quality habitat in northern New South Wales than in southern New South Wales and Victoria (Glen and Dickman 2011).

The Spotted-tailed Quoll is a mainly forest dependent species but occurs in a variety of habitats including closed forests (including temperate and sub-tropical rainforest), tall eucalypt forests, open woodlands, open forests, drier rainshadow woodlands and coastal heathlands (Oakwood et al. 2007). The highest densities of the species have been recorded from both wet and dry forest habitats (Watt 1993; Mansergh 1995; Jones & Rose 1996; Belcher 2000; Dawson 2005; Glen & Dickman 2006b). During the day Spotted-tailed Quolls shelter in fallen logs, boulder piles, burrows, tree hollows and occasionally under dwellings (Woinarski et al. 2014).

Breeding occurs annually in winter. Females produce one litter per year with an average litter size of five. Spotted-tailed quolls reach sexual maturity at one year of age, however some females do not breed until their second year (Todd et al. 2007). A generation length of 2.5 years is derived as the midpoint of age at first breeding (1 year) and longevity (three years) (Woinarski et al. 2014).

Threats

Table 1: Threats impacting the Spotted-tailed Quoll (southeastern mainland population) in approximate order of severity of risk, based on available evidence.

Number	Threat factor	Threat type and status	Evidence base
1.0	Habitat loss and fragmentation		
1.1	Habitat loss and modification	Known current	<p>Habitat loss and modification is likely the greatest threat (DELWP 2016), as the species requires very large areas of natural bushland with high densities of small and medium sized mammals, birds, reptiles, fish, amphibians, and invertebrates to support resident breeding populations.</p> <p>There is demonstrated absence or reduced abundance in cleared areas and the large home range size required by the species reduces viability in smaller fragments of</p>

			suitable habitat (Woinarski et al. 2014).
1.2	Timber production	Known current	Timber harvesting occurs throughout a considerable proportion of the species range. This has the effect of reducing the structural complexity of the habitat, including the loss of hollow-bearing trees, and reducing the abundance of some preferred prey species (DELWP 2016).
1.3	Mortality associated with road traffic	Known current	The species is susceptible to road mortality when scavenging road-killed fauna. Juvenile males are most likely at risk due to extensive ranging behaviour and thus more likely to encounter roads (DELWP 2016).
2.0	Invasive species		
2.1	Predation by feral cats (<i>Felis catus</i>)	Known current	Predation by feral cats has been implicated in the decline and extinction of many terrestrial mammals in Australia (Woinarski et al. 2014; Radford et al. 2018). Competitive and/or predatory interactions are likely occurring and may be suppressing Spotted-tailed Quoll populations (DELWP 2016). There is some correlative, experimental and modelling evidence of impacts from feral cats (Woinarski et al. 2014).
2.2	Predation by European Red Fox (<i>Vulpes vulpes</i>)	Suspected current	Predation by foxes has been implicated in the decline and extinction of many terrestrial mammals in Australia (Radford et al. 2018). Competitive and/or predatory interactions are likely occurring and may be suppressing Spotted-tailed Quoll populations. (DELWP 2016). There is strong correlative, experimental and modelling evidence of impacts from red foxes (Woinarski et al. 2014).
2.3	Wild Dogs (<i>Canis lupus familiaris</i>)	Suspected current	Competitive and/or predatory interactions are likely occurring and may be suppressing Spotted-tailed Quoll populations (DELWP 2016). There is some correlative, experimental and modelling evidence of impacts from wild dogs (Woinarski et al. 2014).
2.4	Cane toads (<i>Rhinella marina</i>)	Suspected current	Other species of quolls have deaths attributed to poisoning from cane toads, as such they are likely to be

			susceptible where their ranges overlap. Climate change may potentially extend the range of cane toads, which may increase the likelihood of future interactions (DELWP 2016),
2.5	Poisoning associated with control of non-native predators	Suspected current	<p>Poison baits extensively used throughout the range of the species (DELWP 2016). Repeated field trials where quolls have been exposed to baits with 1080 have however demonstrated that mortality from poisoning is uncommon and that population-level effects are not apparent (Körtner <i>et al.</i> 2003, Körtner and Watson 2005, Claridge and Mills 2007, Körtner 2007).</p> <p>Some low levels of mortality associated with 1080 baiting indicate adverse impacts may be greater where local population sizes are small or isolated (Woinarski <i>et al.</i> 2014). Overall the level of risk to the species is minor.</p>
3.0	Fire		
3.1	Too frequent burning	Known current	High frequency fire may reduce the structural complexity of their habitat and the abundance of some of their preferred prey (Woinarski <i>et al.</i> 2014).
3.2	Increase fire frequency/intensity due to climate change	Suspected future	<p>The scale, frequency and intensity of bushfires are increasing with climate change, compounding the impacts of fire.</p> <p>Current climate change predictions suggest that the number of extreme fire weather days will increase, providing conditions for a greater number and more severe wildfires (CSIRO & Bureau of Meteorology 2015).</p> <p>Research indicates the species does recover after initial population reduction from the direct impacts of fire. However, this is likely to depend on availability of rocky refugia. In areas with little or no rock, initial impacts are likely to be more severe and populations take longer to recover.</p>

			<p>In 2019-20 catastrophic wildfire conditions culminated in fires that affected large parts of eastern Australia, covering an unusually large area and, in many places, burning with an unusually high intensity. The full impact of the 2019-20 bushfires has yet to be determined. The bushfires will not have impacted all areas equally: some areas burnt at very high intensity whilst other areas burnt at lower intensity, potentially even leaving patches unburnt within the fire footprint. However, initial analysis estimates that 29 per cent of the Spotted-tailed Quoll's distribution range was affected by fire. The large overlap between the Spotted-tailed Quoll's distribution and the fire extent has led to it being identified as one of the priority species for urgent management intervention (DAWE 2020).</p>
4.0	Purposeful killing		
4.1	Purposeful killing	Known current	<p>Reports of purposeful killings in NSW in response to Spotted-tailed Quolls preying upon chickens is known to be a regular occurrence in the rural/natural bushland interface. NSW Government programs are managing this threat through public awareness campaigns, with evidence of positive results in attitudinal and behaviour change.</p>

How judged by the Committee in relation to the EPBC Act criteria and regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
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>based on any of the following:</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:

Insufficient data

The generation length of the Spotted-tailed Quoll (southeastern mainland population) is estimated to be two and a half years (Woinarski et al. 2014), giving a seven and a half year time scale for three generations. Thus for this criterion population reduction is measured over the default 10 year period from 2009 to 2019.

The Spotted-tailed Quoll has declined in distribution and abundance throughout its range, and many populations are now fragmented and isolated. The extent of reduction in the species' range is unknown, although it may have been as high as 50% in parts of its range (DELWP 2016).

Despite declines across much of its range, the Spotted-tailed Quoll (southeastern mainland population) has remained abundant in some areas of NSW, at least up until the 2019-20 bushfires. For example, a study of a population of Spotted-tailed quolls in Marengo and Chaelundi State Forests in northern NSW found high local abundance (Glen and Dickman 2011). Monitoring of populations at four priority sites in NSW has found stable populations at each site. At Byadbo Wilderness in NSW, numbers were stable to mid-2019 since annual monitoring of approximately 4000 ha began in 2002, at between 20-30 Spotted-tailed Quolls (Dawson 2005), with the exception of a temporary drop in the male population in the 12 months following the 2003 wildfires (Dawson 2005). Between eight and 12 females were observed in any one year since 2002, which provides strong evidence of a stable breeding, resident population. The population estimate grew from 20 individuals in 2016/17 to a population of 30 individuals by mid 2019 (J Dawson 2019. pers comm 30 July).

The Barren Grounds Nature Reserve/Budderoo National Park site in NSW was established in September 2016 and has been continuously monitored. The population estimate grew from between 20-30 individuals in 2016-17 to an estimate of 45-50 individuals by mid 2019, distributed across almost 10 000 ha of national park and including 7-18 females in any one year (J Dawson 2019. pers comm 30 July).

The Jenolan-Kanangra site in NSW was established in January 2017, based on strong anecdotal evidence of increasing Spotted-tailed Quoll sightings and activity, attributed to the long-term intensive fox control program for protection of the local Brush-tailed Rock Wallaby (*Petrogale penicillata*) colony. Since commencement of targeted monitoring of quolls, the site recorded up to 45 individual Spotted-tailed Quolls each year across the approximate 6000 ha monitoring grid, including 6-10 females annually. This also represents a resident breeding population that appears stable, at least up until the 2019-20 bushfires (J Dawson 2019. pers comm 30 July).

The Northern Tablelands site in NSW is a composite site comprising six separate camera trap monitoring grids in three different national parks (Guy Fawkes River National Park, New England National Park, and Oxley Wild Rivers National Park). The overall population of the Spotted-tailed Quoll across the three sites appeared stable and was estimated at approximately 130-150 individual quolls before the 2019-20 bushfires (J Dawson 2019. pers comm 30 July).

Initial analysis after the 2019/2020 bushfires has found extensive overlap of the fires and many of the NSW monitoring sites, with the Marengo and Chaelundi State Forest areas, the Guy Fawkes River National Park, New England National Park, Oxley Wild Rivers National Park, and the Jenolan/Kanangra-Boyd National Park all having burns across approximately 80% of their area. However, the Barren Grounds/Budderoo National Park site and the Byadbo Wilderness Area both appear to be unaffected by the 2019/2020 bushfires.

Given the species naturally occurs at low densities and is highly cryptic (Körtner et al 2015), assessments based on presence-only records in existing databases may provide an underestimate of population size and distribution, making it difficult to make precise estimates of population reduction. While local declines have been observed or suspected across much of the species' range over the past few decades, in localised areas of New South Wales the species persisted in abundance until 2019 (Glen and Dickman 2011). The presence of these 'stronghold' populations is likely to have bolstered the total population size for the Spotted-tailed quoll.

The recent 2019-20 bushfires in eastern and southern Australia may have accelerated any population decline, with 29 per cent of the species distribution overlapping with the fire-affected extent. These fires covered an unusually large area and, in many places, burnt with an unusually high intensity. The impact of bushfires on the Spotted-tailed Quolls has yet to be examined but the extent of potential mortality from the fire itself as well as mortality from post-fire conditions has led the Department to identify it as one of the priority species for urgent management intervention (DAWE 2020).

Following assessment of the data the Committee has determined that there is insufficient data to assess the species against this criterion. There may have been population decline and distributional contraction in some parts of the species' range, but the extent of this is unquantified. The 2019-20 bushfires may have caused further population declines, but data are required from field assessments before any decline can be quantified. Increasing frequencies of extensive and high intensity fires may also cause future declines, but again, no estimates for the scale for these projected declines is available at present.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR 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

Evidence:

Not eligible

The extent of occurrence (EOO) is estimated at 596,344 km² and the area of occupancy (AOO) at 2,512 km². These figures are based on the mapping of point records from 1997 to 2017, obtained from state governments, museums and CSIRO. The EOO was calculated using a minimum convex hull, and the AOO calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014 (DotE 2015).

The Spotted-tailed Quoll has contracted at the northern and southern edges of their distribution, with any populations that are remaining being very fragmented. In southern Queensland, Spotted-tailed quolls are likely extinct from the D’Aguilar Range west of Brisbane and from coastal districts from Coolangatta to Bundaberg, and the remaining distribution and abundance are poorly known (DELWP 2016).

In Victoria, Spotted-tailed quoll populations are more likely to be small and isolated, and prone to extirpation through chance events (Todd et al 2007). Extensive camera trapping is currently undertaken throughout large areas of the species’ range in south-west Victoria under the ‘Ark’ programs, and it is highly likely resident populations no longer exist in these areas, representing a significant range contraction. The only area in Victoria where they are regularly recorded is in the upper Snowy River and tributaries and the Errinundra Plateau area of East Gippsland (Nelson 2007b).

The Committee has determined that although the distribution has declined, and some parts of the remaining distribution are fragmented, the species’ EOO and AOO do not meet the thresholds for listing under this criterion.

Criterion 3. Population size and decline			
	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (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 3 C2(a)(i) for listing as Endangered

Spotted-tailed quolls occur at low densities over large areas, are highly cryptic (Körtner et al 2015), and often occur in areas that are remote and therefore hard to survey and monitor (DELWP 2016). As such there is limited information on the Spotted-tailed quoll's abundance and density throughout its distribution, or the rates of turnover in wild populations (Glen 2008).

Despite having declined historically across much of its geographical range, the Spotted-tailed Quoll remains abundant in areas of NSW, (Glen and Dickman 2011), where they are distributed within large areas of contiguous forested land, from the Queensland border to the Victorian border. Higher densities have been reported in forested areas of north-eastern New South Wales than anywhere else in the range (Woinarski et al. 2014). For example, Glen (2008) captured 60 individual Spotted-tailed Quolls over a 22 month study period in the Marengo and Chaelundi State Forests. Glen and Dickman (2011) attributed the relatively high abundance in this region as due to the relatively extensive and unmodified native forest network and the low abundance of Red Foxes. Monitoring of populations at four priority sites (described under Criterion 1) in NSW found stable populations at each site, at least up to mid 2019.

Noting the difficulties in developing precise population estimates, the previous EPBC Act listing advice (TSSC 2004) suggested that the population size for this subspecies was between 2000 and 10 000 mature individuals, although this estimate has relatively low reliability (Woinarski et al. 2014). Threatening processes thought to be responsible for the decline of the Spotted-tailed Quoll (such as habitat loss and modification, fragmentation and introduced predators) are broad-scale threats which apply to a wide range of areas within the species' distribution. Small, isolated populations are at risk of extinction due to stochastic events and deleterious genetic effects combined with their reduced capacity to overcome sporadic or sustained elevated mortality rates associated with threatening processes (DEWLP 2016). Ongoing declines are inferred across much of its range, with the exception of important locations in NSW described under Criterion 1.

The Committee considers that the estimated total number of mature individuals of this species is at least limited, and potentially low. A continuing decline is inferred and the geographic distribution is precarious for the survival of the species because the number of mature individuals in each population is fewer than 1000 individuals. Therefore, the species meets the relevant elements of Criterion 3 to make it eligible for listing as Vulnerable. However, the recent 2019-20 bushfires in eastern and southern Australia may have accelerated any population decline, given that 29 per cent of the Spotted-tailed Quoll's distribution range overlaps with the fire-affected extent. These fires covered an unusually large area and, in many places, burnt with an unusually high intensity. The impact of bushfires on the species has yet to be examined but the extent of potential mortality from the fire itself as well as potential mortality from post-fire conditions has led to the Spotted-tailed Quoll being identified as one of the priority species for urgent management intervention (DAWE 2020). It is possible that the population decline has exceeded 20% over the past 5 years, and the overall population size could be less than 2500. Increasing frequencies of similar fire events could cause further declines in the future. Until the results of post-bushfires population monitoring are available, the Committee will take a precautionary approach and recommend the species remains eligible for listing as Endangered under Criterion 3.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low (Medium-term future)¹
Number of mature individuals	< 50	< 250	< 1,000
D2 ¹ Only applies to the Vulnerable 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: area of occupancy < 20 km ² or number of locations ≤ 5

¹ The IUCN Red List Criterion D allows for species to be listed as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments may include information relevant to D2. This information will not be considered by the Committee in making its recommendation of the species' eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the [common assessment method](#).

Evidence:

Not eligible

There is no precise estimate of population size or number of mature individuals for this species. However, the population is estimated to be fewer than 10 000 (with a low-medium reliability rating), with a continuing decline. In addition, the Spotted-tailed Quoll does not meet the quantitative threshold for Vulnerable under subcriterion D2. The area of occupancy is estimated to be <2500 km², so the species does not meet the requirements for listing under D2.

The Committee has determined that the species is not eligible for listing under this criterion.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Insufficient data to determine eligibility

The majority of populations have minimal demographic data, and the variability of data between populations is not well understood. Longer term studies in NSW have provided some demographic data, and these data have been used in population viability analysis for Victorian populations to identify key threats to population viability (DELWP 2016). For example, Todd et al. 2007 conducted a population viability model for the species in Victoria, which highlighted the elevated extinction risk to small, isolated populations with fewer than 10 females. However, this model also highlights a number of significant knowledge gaps, such as basic demographic data, including population structure, survival rates and longevity.

Further knowledge of population demographic parameters, including age-specific mortality, juvenile dispersal and reproductive life span, are required to be able to develop more reliable and precise population viability assessments.

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Conservation actions

Recovery Plan

The 'National Recovery Plan for the Spotted-Tailed Quoll' (DELWP 2016) was developed by the Victorian state government, and adopted under the EPBC Act in 2016. It is due to expire in 2021. Following expiry of the existing recovery plan, development of a new recovery plan for the species is recommended as cross-jurisdictional coordination is considered to be crucial for the species.

Primary Conservation Actions

1. Conduct rapid on-ground surveys to establish extent of population loss as a result of the 2019-20 bushfires, and to provide a baseline for ongoing monitoring. Ideally, such assessments will occur across populations that had a range of pre-fire population sizes, densities and relative connectivity with other populations; and across populations that experienced a range of fire intensities.
2. Protect unburnt areas that are within or adjacent to recently burnt areas from further fire, in order to provide refuge sites, as well as protecting (from fire) unburnt areas that are not adjacent to burnt areas.
3. Consider undertaking control of foxes, wild dogs and possibly cats to support recovery of populations affected by fires, or populations living near areas that have been affected by fire.
4. Control introduced herbivores in burnt areas to support habitat recovery post fire.
5. Weed control and habitat restoration works may support the regeneration of forest at some localised sites.
6. Salvage logging in forestry areas may adversely impact the species, and should be avoided at sites with populations of Spotted-tailed Quolls.
7. Spotted-tailed quoll populations are limited to large, relatively intact patches of forest. Core habitat areas and corridors need to be identified and protected at a landscape scale.
8. Further clearance or fragmentation of habitat of important populations should be avoided. No clearing of existing habitat should occur if it were to result in fragmenting important populations, and/or reduce population size below viable levels.
9. Maintain or increase densities of hollow-bearing trees, which are a source of shelter and a correlate of increased prey density. Many prey of the spotted-tailed quoll are reliant on tree hollows for shelter and breeding and hence their abundance will be influenced by forestry practices. Fallen logs, including burnt logs, should also be maintained as they are an important structural feature of their habitat and are used for den sites.
10. Determine the distribution and status of populations throughout its range, and investigate key biological and ecological attributes.

Conservation and management priorities

- Habitat loss disturbance and modifications
 - Develop guidelines on minimum habitat requirements that can be used to direct the formation of habitat retention prescriptions or other requirements in commercially harvested forests.
 - Implement monitoring programs to evaluate the effectiveness of current habitat retention prescriptions at supporting viable populations of the Spotted-tailed Quoll in commercially harvested forests.
 - Identify landholders in areas where the Spotted-tailed Quoll is known to occur and encourage them to protect and manage their land in a manner that is compatible with maintenance of Spotted-tailed Quoll habitat through voluntary conservation agreements.

- Maintain and restore habitat corridors on unprotected freehold land.
- Invasive species (including threats from grazing, trampling, predation)
 - In areas burnt by the 2019-20 bushfires, control of introduced predators may be required to support population recovery, and control of introduced herbivores will aid habitat recovery. Weed control and habitat restoration may be needed in localised areas to support forest regeneration.
 - Monitor the abundance of the Spotted-tailed Quoll and introduced predators in areas with and without predator control programs.
 - Conduct population viability analysis to investigate the impact of increased mortality resulting from poison-baiting practices on the long-term viability of Spotted-tailed Quoll populations throughout their range.
 - Assess the potential impact of strychnine use in areas of known or potential Spotted-tailed Quoll habitat.
 - Review existing information on alternative poison delivery or biological control systems to identify systems with high target species specificity that could be applied in areas occupied by the Spotted-tailed Quoll.
 - Map the current distribution of the Spotted-tailed Quoll and the Cane Toad to identify areas of overlap, and determine factors that affect the survival of quolls in these areas.
 - Monitor the survival of Spotted-tailed Quolls in areas newly colonised by Cane Toads.
 - If it is considered that Cane Toads are a threat to quoll populations, identify and implement appropriate threat abatement actions where feasible.
- Fire
 - Incorporate the need for protection of rocky outcrops and riparian zones into planning processes for fire management (including fire suppression activities as well as prescribed burning practices) within areas of known Spotted-tailed Quoll habitat.
 - Investigate the impact of bushfires, planned burns and fire suppression activities on Spotted-tailed Quoll populations and use this information to refine prescriptions for planned burns in areas of quoll habitat.

Stakeholder Engagement

- Continue to conduct stakeholder surveys to determine the target audience and avenues for raising public awareness, and develop a communication and public education strategy based on the findings.
- Prepare education resources and distribute these to the identified target audience.
- Involve the community in survey and monitoring efforts for the species.

Survey and monitoring priorities

- Undertake field surveys in areas where the distribution and status of populations are poorly known.
- Expand the existing program to monitor Spotted-tailed Quoll population status, determine factors influencing habitat quality, identify threats and implement management actions at representative sites throughout the species' range.

- Conduct rapid on-ground surveys to establish extent of population loss, following the 2019-20 bushfires, and provide a baseline for ongoing monitoring.

Information and research priorities

- Conduct further surveys and research to determine the status of Spotted-tailed Quoll populations throughout the range.
- Use the results of these surveys to examine population dynamics and determine whether populations persist at low abundance or are becoming locally extinct and re-occupied (metapopulation model).

Recommendations

- (i) The Committee recommends that *Dasyurus maculatus maculatus* retain its current listing status of Endangered the list referred to in section 178 of the EPBC Act as there is insufficient evidence to support transferring it to a different category and inclusion of the species in that category is having a beneficial impact on the continued survival of the species.
- (ii) The Committee recommends that the current recovery plan should be retained and updated as required.

Threatened Species Scientific Committee

5 April 2020

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