

Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (the Committee) on Amendments to the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

1. Scientific name (common name)

Sarcophilus harrisii (Tasmanian Devil)

2. Description

The Tasmanian Devil is the world's largest surviving marsupial carnivore. The species has a black coat with variable patches of white on its chest, shoulder and rump, and a stocky frame with the fore legs longer than the hind legs. The Tasmanian Devil is a nocturnal hunter and scavenger (Pemberton and Renouf 1993) and typically weighs between 7.7 - 13.0 kg (males) or 4.5 - 9 kg (females) (Jones 2001, Jones et al. in press). The species will eat the carcasses of a range of vertebrates, but mostly of possums and macropods (Guiler 1970, Jones and Barmuta 2000, Jones 2003, Owen and Pemberton 2005).

The Tasmanian Devil matures at approximately two years of age, breeding once a year during February to June with up to four young carried in the pouch each year (M. Jones pers. comm., H. Hesterman pers. comm., Devil Disease Project unpubl. data). The Tasmanian Devil lives for up to six years in the wild (Jones 2001; Jones et al. in press; Guiler 1978), has an estimated generation length of three years; and has home ranges that overlap considerably. Pemberton (1990) found that Tasmanian Devils occupy several different dens, change dens every 1-3 days, and travel a mean nightly distance of 8.6 km.

3. National Context

Tasmanian Devils no longer exist on the Australian mainland. The species is now found only throughout Tasmania, excluding Tasmania's offshore islands.

Tasmanian Devils are found in a wide range of habitats, from sea level to all but the highest peaks of Tasmania as well as in forestry plantations and pastures (Jones and Rose 1996, Jones and Barmuta 2000). Open forests and woodlands are preferred, while tall or dense wet forests are avoided (Jones and Rose 1996; Jones and Barmuta 2000). The distribution of the species across Tasmania appears to be continuous but with population densities being lowest in the buttongrass plains of the south west and highest in the dry and mixed sclerophyll forests and coastal heath of Tasmania's eastern half and north west coast (Jones and Rose 1996).

The Tasmanian Devil is listed as vulnerable under the Tasmanian *Threatened Species Protection Act 1995*.

4. How judged by the Committee in relation to the EPBC Act criteria

The Committee judges the species to be **eligible** for listing as **vulnerable** under the EPBC Act. The justification against the criteria is as follows:

Criterion 1 – It has undergone, is suspected to have undergone or is likely to undergo in the immediate future a very severe, severe or substantial reduction in numbers

Population estimates for the Tasmanian Devil, based on state wide (hair tubing) surveys and modeling work, were undertaken in the mid 1990s. These estimates indicated a total population size ranging from 130 000 to 150 000 individuals, with an average of approximately 50% of any population likely to be mature individuals (Jones and Rose 1996, M. Jones pers. comm., N. Mooney pers. comm.).

More recent trapping data, collected in 2004, provides an approximate estimate of the species' current overall population size and is based on more rigorous population density estimates. These estimates indicate that the total population size ranges between 20 000 and 50 000 mature individuals.

There are relatively rigorous density estimates from a range of sites across Tasmania. Hair tubing surveys show a very low density of Tasmanian Devils in the south west of Tasmania and the highest occurrence of the species in the dry and mixed sclerophyll forests and coastal heath of Tasmania's eastern half and north west coast (Jones and Rose 1996).

Statewide roadside spotlight surveys show significant local population declines and trapping data also support this finding. In particular, annual spotlighting surveys over the past ten years (comparing mean annual sightings per ten km route across the core Tasmanian Devil range between 1991-1993 and 2001-2003) have shown a 28% overall population decline in this region (Hawkins et al. submitted, Driessen and Hocking 1992).

Threats to the Tasmanian Devil include Tasmanian Devil Facial Tumour Disease (DFTD), and road deaths.

Devil Facial Tumour Disease

Hawkins et al. (submitted) present evidence that Devil Facial Tumour Disease (gross facial tumours, occurring most commonly on the face, around the mouth, and jowls) is an emerging, now widespread disease, associated with local population declines of up to 80% since the first report of disease symptoms in 1996. During the period from 1970 to 1995, despite considerable trapping data on the species, there were no documented, or other reports, of symptoms resembling Devil Facial Tumour Disease. Local declines have been most marked in areas where the disease has been present the longest. Evidence for a species decline consists of long term spotlighting data, widespread trapping data, and laboratory confirmed disease reports showing the distribution of the disease.

Devil Facial Tumour Disease is an infectious, spreading disease known only to affect the Tasmanian Devil with thirty eight sites now having been confirmed positive for the disease. These sites cover an area of approximately 33 000 km² across eastern and central Tasmania, and an estimated 51% of the species' known extent of occurrence. The currently affected region covers the majority of the high density eastern population (approximately 65% of the Tasmanian Devil's total population).

Devil Facial Tumour Disease is primarily confined to adults and is consistently fatal, with mortality occurring only a few months after the initial symptoms appear. Jones et al. (2004) found that the genetic diversity of the Tasmanian Devil was low relative to many Australian marsupials, including placental carnivores. It is known that low levels of genetic diversity can reduce a

species' resistance to disease (Acevedo-Whitehouse et al. 2005). One current theory suggests that the disease is transmitted between individuals through biting (AUSVET 2005), and that the spread of the disease is more likely during breeding time. However, no causal or transmission agent has yet been identified for Devil Facial Tumour Disease.

It is conceivable that the response to the disease by Tasmanian Devils on the west coast of Tasmania may differ from that currently being experienced on the east coast, and that the same level of decline will not be seen in the Tasmanian Devil's western population. Jones et al. (2004) have identified a genetically distinct population of the Tasmanian Devil in north western Tasmania and there may be up to three subpopulations of the Tasmanian Devil (i.e. a north western, a south western, and an eastern population). It is possible that the north western and south western populations may have some resistance to the disease due to a more effective immune response, however recent investigations have to date found no evidence to support this (A. Kreiss, pers. comm.). As Devil Facial Tumour Disease is infectious, one theory suggests that the disease may not affect lower density populations as dramatically (i.e. Tasmanian Devils in western Tasmania). Basic epidemiological theory argues that infectious diseases are dependent on population densities, and so do not typically persist or threaten low density populations. However, should transmission of the disease be closely linked to the mating interactions of Tasmanian Devils, this may indicate that the impact of the disease may be in fact less density dependent.

Marked population declines have been detected in the north eastern region, in association with the earliest reports of the disease at Mount William National Park. The degree of decline appears to be dependent on the arrival date of the disease. Consequently, the most immediately threatened location may be the region where Devil Facial Tumour Disease has been reported prior to 2003 (i.e. across 15 000 km² of eastern Tasmania). For example, in the three years following the first diagnosis of the disease at Bicheno, a population decline of 69% was recorded.

While no local population extinctions have been observed to date, there are also no data currently available indicating any deceleration in the spread or impact of Devil Facial Tumour Disease on the Tasmanian Devil. The disease appears to be continuing to spread swiftly westwards across Tasmania and continues to persist in those areas where it has been detected.

While it is possible that populations may recover successfully from the disease, there are no data to indicate recovery in any affected population to date. Based on the documented decline of the species since 1996 when Devil Facial Tumour Disease was first reported in the species, the Tasmanian Devil has, and is likely to continue to, experience a substantial decline in numbers. This decline has, and is likely to continue to, occur across at least an estimated 51% of its extent of occurrence, which is known to include approximately 65% of the species' total population size (i.e. it is the species' core range area). In some cases, where the disease has been present since the late 1990s, the reduction in local populations and in numbers of mature individuals has been severe (i.e. up to 80%).

Some local populations of the Tasmanian Devil have undergone a substantial reduction in numbers and a further decline in numbers, based on the projected effects of Devil Facial Tumour Disease, is likely to occur in the immediate future.

Roadkills

Tasmanian Devils favour predictably rich sources of food such as carcass from rubbish dumps and roads (Jones and Barmuta 2000, N. Mooney pers. comm.). Tasmanian Devils have been trapped at many sites across all 'roaded' areas of Tasmania and these areas closely match the core distribution of the species. In some cases, the construction of roads, and the subsequent availability

of carrion, may have assisted the spread of the Tasmanian Devil and increased the population size of the species. However, local road kill impacts documented at Cradle Mountain and Freycinet National Parks across a seventeen month period (Jones 2000; M. Jones pers. comm.) and a recent three year study of road kill frequency on the main roads of Tasmania estimated that 1 700 Tasmanian Devils were being killed annually (Hobday and Minstrell pers. comm.). This suggests that between 2-4% of the Tasmanian Devil's total population is killed on roads each year.

In summary, the Tasmanian Devil is currently threatened by mortality from road collisions, but predominantly by Devil Facial Tumour Disease. In particular, the eastern region which is currently affected by Devil Facial Tumour Disease covers the majority of the higher density populations of the Tasmanian Devil (an estimated 65% of the total population). Devil Facial Tumour Disease has now been reported from 51% of the species' extent of occurrence and local population declines of up to 80% have been observed.

The Tasmanian Devil has undergone, and is likely to continue to undergo, a substantial reduction in numbers.

Therefore, the species is **eligible** for listing as **vulnerable** under this criterion.

Criterion 2 – Its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited

The Tasmanian Devil is found throughout Tasmania with the exception of Tasmania's offshore islands. The species' extent of occurrence is equivalent to the area of mainland Tasmania, (i.e. 64 030 km²) (Jones and Rose 1996). As the species' distribution is continuous across this area, the species estimated area of occupancy is also 64 030 km².

Hawkins et al. (submitted) analysed Tasmanian Devil sightings from spotlighting surveys conducted annually across different areas of Tasmania since the first reports of Devil Facial Tumour Disease (Hocking and Driessen 1992, Driessen and Hocking 1992). The most dramatic declines in sightings occurred in the area of eastern Tasmania (approximately 24 000 km²) across which disease symptoms had been reported prior to 2003.

If declines continue at the same rate, an extrapolation of documented local declines indicates that Tasmanian Devils may become absent from their core area in ten years time (i.e. local population extinctions may occur). On this basis, the extent of occurrence may contract by 24 000 km² (i.e. to 40 000 km² or less in the next ten years). In a worse case scenario, it is conceivable that similar declines might develop across the entire 33 000 km² area currently known to be affected by the disease, leading to a contraction of the extent of occurrence to 31 000 km². The species' area of occupancy would similarly contract to 40 000 km² or less in the next ten years if Devil Facial Tumour Disease persists even in very low density populations.

However, to date, there is no evidence indicating any significant recent changes in either the species' extent of occurrence or its area of occupancy and no local population extinctions have been documented.

The geographic distribution of the Tasmanian Devil is not restricted.

Therefore, the species is **not eligible** for listing under this criterion.

Criterion 3 – The estimated total number of mature individuals is limited to a particular degree and: (a) evidence suggests that the number will continue to decline at a particular rate; or (b) the number is likely to continue to decline and its geographic distribution is precarious for its survival

Based on the most current evidence, the total population size of the Tasmanian Devil is estimated to lie within the range of 20 000 to 50 000 mature individuals. This figure is much lower than population estimates of the mid 1990s (e.g. 130 000 to a maximum of 150 000 individuals, including mature individuals and juveniles) (M. Jones pers. comm., N. Mooney pers. comm.). This may be a result of the different survey and population modeling methods used as well as evidence of species decline.

Noting that the potential error in these estimates remains high, the Devil Disease Project Team has estimated an approximate population range for each regional population of the Tasmanian Devil. These estimates are: north western: 3 000 - 12 500 mature individuals, south western: 1 200 – 3 500 mature individuals; eastern: 11 000 - 34 000 mature individuals.

The estimated total number of mature individuals is not limited.

Therefore, the species is **not eligible** for listing under this criterion.

Criterion 4 – The estimated total number of mature individuals is extremely low, very low or low

The total population size of the Tasmanian Devil is currently estimated to be between 20 000 to 50 000 mature individuals.

The estimated total number of mature individuals is not extremely low, very low, or low.

Therefore, the species is **not eligible** for listing under this criterion.

Criterion 5 – Probability of extinction in the wild

There are no data available to assess the species against this criterion.

5. CONCLUSION

The Tasmanian Devil has an estimated total population size ranging between 20 000 to 50 000 mature individuals. The species' extent of occurrence and its area of occupancy are considered to be the same (i.e. 64 030 km², equal to the size of mainland Tasmania) due to the species' continuous distribution across the state. However, the species' highest density and core range is considered to be in eastern Tasmania, consisting of an estimated 65% of the species' total population size.

The Tasmanian Devil is threatened by Devil Facial Tumour Disease, and road collisions. Spotlighting surveys undertaken in the core range of the Tasmanian Devil indicate that there has been a 28% decline of sightings of the Tasmanian Devil over a ten year period from 1991/1993 to 2001/2003.

Devil Facial Tumour Disease is having a major impact on the species, predominantly affecting mature individuals. This disease was first detected in 1996 and has now been confirmed at 38 locations across eastern and central Tasmania, covering an area of approximately 33 000 km² representing an estimated 51% of the species' extent of occurrence. Sixty-five per cent of the Tasmanian Devil's total population occurs in this area. The disease is infectious, fatal to the Tasmanian Devil, and continuing to spread west across the species' extent of occurrence. To date, knowledge on the cause of the disease and the means by which it is transmitted remains poor.

Local population declines of up to 80% have been recorded and are directly correlated with the presence and impact of Devil Facial Tumour Disease, with the most marked declines occurring in populations where the disease has been present the longest. There are currently no available data to indicate that either the spread of Devil Facial Tumour Disease will slow, or that the impact of the disease on the Tasmanian Devil will diminish.

The Tasmanian Devil has undergone, and is likely to continue to undergo, a substantial reduction in numbers.

The species is **eligible** for listing as **vulnerable** under criterion 1.

6. Recommendation

The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the **vulnerable** category:

***Sarcophilus harrisii* (Tasmanian Devil)**

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