

**Advice to the Minister for Sustainability, Environment, Water, Population and Communities
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)

Hoplogonus simsoni (Simson's stag beetle)

2. Description

Simson's stag beetle belongs to a group of flightless, black, ground-dwelling beetles, with distinctive elytral (forewing) spines. Males have elongate mandibles or jaws. The species is the largest Tasmanian endemic stag beetle, growing to 24 mm. Males and females are superficially similar, but the mandibles are much longer and straighter in males, and the body of the female is broader and shorter.

The species prefers wet eucalypt forests, but also occurs in rainforest and damp eucalypt forest. Species abundance is influenced by altitude, slope, leaf litter depth and forest structure. Highest numbers occur within wet eucalypt forest below 300 m with shallow slopes, a deep leaf litter layer and a well developed upper understorey. This indicates that this species prefers a relatively cool, moist microhabitat that has not been subject to major disturbance (such as severe wildfire) for 50 years or longer. Leaf litter is likely to be the major food source for larvae, and may also maintain a cool, moist microclimate and refuge from predators for larvae and adults (Meggs et al. 2004).

3. National Context

Simson's stag beetle is endemic to Tasmania, occurring only in north-eastern Tasmania, centred on the Blue Tier area.

The species has been well surveyed (e.g. Meggs 1996, 1997, 1998; Munks et al. 2004). The currently known distribution is likely to be correct as much of its current known range is surrounded by unsuitable habitat (e.g. dry eucalypt forest, altitudinal barriers) and where potential habitat does exist, studies on other litter invertebrates have failed to find this species (e.g. Meggs et al. 2003).

Simson's stag beetle is poorly reserved across its range, with 67% of its known range currently unreserved (53% in State forest, 12% on private land and 2% on other public land) (TSS 2006).

It is currently 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

There are little specific data on overall population numbers of Simson's stag beetle. Currently published figures include an estimate of close to 40 million individuals (Fox et al. 2004). The figure is based on interpreting known population densities.

The species is not evenly distributed throughout its range and generally occurs at low densities. In one study, the species was found to occur at very high densities (>5 individuals/m²) at only one location, in high densities (3–5/m²) at three locations and in moderate densities (1–3/m²) at four locations, but over most of its range it occurred at lower densities (<1/m²) (Meggs et al. 2003).

The Simson's stag beetle has a likely generation length of 1–3 years, based on estimates of longevity of adult beetles (Meggs et al. 2003).

There are a number of threats operating on the Simson's stag beetle that could lead to a reduction in population numbers. The major threats to threatened forest-dwelling stag beetles in Tasmania are:

- loss of habitat, particularly due to clearing for agriculture or establishment of forestry plantations;
- removal of coarse woody debris by harvesting for firewood and high intensity burns; and
- illegal collection of beetles.

Firewood collection not associated with forestry activities and the illegal collection of beetles for the insect collection trade are considered to be minor threats. Wildfire is also a likely threat (TSS 2006).

The key threat to this species is habitat loss caused by vegetation clearing, in particular by the conversion of native forest to forestry plantations or agricultural land (TSS 2006). A major part (53%) of the distribution of Simson's stag beetle is in State Forest and may be subject to extensive forestry activities. In these areas, a high percentage of potential habitat for this species has been identified by the forest industry as having potential for conversion to pine plantations. The species has not been found in pine plantations that have been converted from wet eucalypt forest, despite active searching (Meggs et al. 2004). The suitability of hardwood plantations for the species is not clear and is being investigated. Areas of native forest where the species occurs that are on private property (about 12%) and unreserved crown land are also possibly threatened by conversion to forest plantations and pasture crops.

Habitat modification is also a threat to the species. Forestry activities, other than forest conversion to plantation, can modify the vegetation, leaf litter layer and coarse woody debris in an area (TSS 2006). This threat is relevant to all parts of the predicted range of the species that is not within reserves. The most likely forestry regime within the species' range that will cause habitat modification is clearfelling followed by high intensity regeneration burning and aerial sowing of seed. High intensity burns have the potential to remove coarse woody debris unless properly managed.

There are forestry policies currently in place to manage known sites and potential habitat for Simson's stag beetle (FPB 2000). However, the extent to which mitigation measures are required to be implemented and the success of the measures are not clear.

Historically, Simson's stag beetle will have undergone some habitat loss and modification as a result of forestry and agricultural activities (much of the range of the species has already been subject to some form of native forest forestry activity), but there is no information on the extent of this decline. The species will likely undergo future declines as a result of threats. With regard to the extent of future declines, Fox et al. (2004) present predictive modelling for six management scenarios based on increasing levels of forestry practices across the species' range. They suggest that, within the next 10 years, forestry practices are not likely to cause Simson's stag beetle to decline by more than 20 percent. However, there are limitations to the modelling, which are discussed under criterion 5. In particular, the Committee notes that this model was developed for management purposes and not as a tool for assessing the conservation status of the species.

There are insufficient quantitative data to assess the species under this criterion.

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

The distribution of Simson's stag beetle is reasonably well known. It has been found at over 100 point sites. The current estimate of extent of occurrence of the species is 265 km² (DPIW 2006). Based on the area of potential habitat, broadly defined as being all relatively undisturbed wet forest types (including mixed/rainforest) within the species range, the area of occupancy of Simson's stag beetle is estimated to be 182 km² or 72% of the species' extent of occurrence (Meggs et al. 2003).

The species is confined to an area of fairly contiguous native forest (Meggs et al. 2003) without major disjunctions in its distribution. Thus, the Committee does not consider that the species' distribution is severely fragmented.

Threats to Simson's stag beetle include forestry and agricultural activities, as outlined in criterion 1, with forestry practices being the key potential threat. Fifty-three percent of the species' distribution is in State Forest and 67% is outside reserved areas. A high percentage of potential habitat for this species has been identified by the forest industry as having potential for conversion to pine plantation. The species has not been found in pine plantations that have been converted from wet eucalypt forest, despite active searching (Meggs et al. 2004).

Forestry practices are required to manage for this species, as outlined under criterion 1, but there are no data on the effectiveness of management and mitigation measures. Predictive modelling by Fox et al. (2004) suggest that the species' population could decline by up to 20 percent in the next 10 years as a result of forestry practices. The Committee considers that Simson's stag beetle will undergo ongoing declines in area of occupancy, quality of habitat and numbers of individuals as a result of future forestry and agricultural practices.

In conclusion, the Simson's stag beetle has a limited geographic distribution, much of which occurs within State Forests that will be subjected to forestry operations. The species is likely to undergo some future decline as a result of forestry and agricultural practices. However, modelling information suggests that impacts on the species resulting from forestry operations may be limited. The Committee considers that the species' geographic distribution is limited and precarious for its survival.

Therefore, the species is **eligible** for listing as **vulnerable** 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

There are little specific data on overall population numbers of Simson's stag beetle. Currently published figures include an estimate of close to 40 million individuals (Fox et al. 2004). The figure is based on interpreting known population densities.

The species is not evenly distributed throughout its range and generally occurs at low densities. In one study, the species was found to occur at very high densities (>5 individuals/m²) at only one location, in high densities ($3-5$ /m²) at three locations and in moderate densities ($1-3$ /m²) at four locations, but over most of its range it occurred at lower densities (<1 /m²) (Meggs et al. 2003).

The total number of mature individuals is very unlikely to be limited and 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

As discussed under criterion 3, the number of mature individuals of Simson's stag beetle is very unlikely to be limiting. Therefore, the species is **not eligible** for listing under this criterion.

Criterion 5 – Probability of extinction in the wild

Fox et al. (2004) modeled the impact of six different forestry management scenarios on the species, which projected population declines after 100 years ranging from 8–38%. With regard to forestry plantation conversion operations, the magnitude of the population decline was consistently proportional to the net amount of habitat lost to conversion. Under the six scenarios, there was no appreciable risk of extinction over the next 100 years for this species.

The model is likely to be more indicative of the impact of the various management regimes rather than a tool to assess the probability of species' extinction. While the model did include a stochastic wildfire regime, the main assumption of the model was that Simson's stag beetle would recover at similar rates to the recovery of leaf litter (i.e. well within the planned rotation times for native forest silvicultural regimes). The long-term monitoring study (Munks 1998) will be useful in testing this assumption. Another assumption of the model was that the informal areas set aside for the species (such as streamside reserves, wildlife habitat strips and other small reserves) provide equivalent habitat value for the species as large contiguous patches of forest. This assumption is untested.

The Committee notes that this model was not developed to assess the probability of extinction for this species for the purposes of assessing the conservation status of the species, and that therefore, it should not be used for assessment against this criterion. Therefore, there are insufficient quantitative data available to assess the probability of extinction for this species.

5. CONCLUSION

Conservation Status

The Simson's stag beetle is endemic to specific wet forests areas in north-eastern Tasmania. The species has a limited area of occupancy and extent of occurrence, and is threatened by future forestry and agricultural practices and wildfire. Fifty-three per cent of the species' potential habitat is within State Forest, which is subject to forestry operations, and 12 percent is on private land, which may be subject to forestry practices and clearing for agriculture. Therefore, this species has a geographic distribution that is both precarious for the survival of the species and is limited.

The species is **eligible** for listing as **vulnerable** under criterion 2.

Recovery Plan

There should be a recovery plan for this species as the ecology is poorly known and intensive land management activities (including forestry) are likely to require careful planning and adaptive management in order to provide protection.

6. Recommendation

- (i) 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:

Hoplogonus simsoni

- (ii) The Committee recommends that there should be a recovery plan for this species.

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Chair

Threatened Species Scientific Committee

References cited in the advice

- DPWI (2006). Data held by the Threatened Species Section, Tasmanian Department of Primary Industries and Water, Hobart and Forest Practices Authority, Hobart.
- Forest Practices Board (FPB) (2000). Forest Practices Code 2000. Forest Practices Board, Hobart.
- Fox J, Meggs J, Munks S and McCarthy M (2004). Chapter 1. Simson's stag beetle (*Hoplogonus simsoni*). In: Linking Landscape Ecology and Management to Population Viability Analysis. Part 2 – PVA for Eleven Forest Dependent Species. A report prepared by Melbourne University to Forestry Tasmania.
- Meggs JM (1996). Distribution and conservation status of two threatened species of Lucanid beetle in Tasmania. An unpublished report to the Forest Practices Board and Forestry Tasmania.
- Meggs JM (1997). Simson's stag beetle, *Hoplogonus simsoni*, in north-east Tasmania: distribution, habitat characteristics and conservation requirements. An unpublished report to the Forest Practices Board and Forestry Tasmania.
- Meggs JM (1998). Coupe surveys for *Hoplogonus simsoni* (Simson's stag beetle), 1997–98. A report to Forestry Tasmania, the Forest Practices Board and the Tasmanian Parks and Wildlife Service.
- Meggs JM, Munks SA and Corkrey R (2003). The distribution and habitat characteristics of a threatened lucanid beetle, *Hoplogonus simsoni*, in north-east Tasmania. *Pacific Conservation Biology* 9: 172–186.
- Meggs JM, Munks SA, Corkrey R and Richards K (2004). Development and evaluation of predictive habitat models to assist the conservation planning of a threatened lucanid beetle, *Hoplogonus simsoni*, in north-east Tasmania. *Biological Conservation* 118: 501–511.
- Munks, S, Richards, K, Meggs, J, Wapstra, M and Corkrey, R (2004). Distribution, habitat and conservation of two threatened stag beetles, *Hoplogonus bornemisszai* and *H. vanderschoori* (Coleoptera: Lucanidae) in north-east Tasmania. *Australian Zoologist* 32(4): 586–596.
- Threatened Species Section (TSS) (2006). Draft fauna recovery plan: threatened Tasmanian stag beetles 2006–2011. Department of Primary Industries and Water, Hobart.