



**FLORA & FAUNA  
GUARANTEE**

**FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE**  
**FINAL RECOMMENDATION ON A NOMINATION FOR LISTING**

**Reduction in biodiversity of native vegetation by Sambar (*Cervus unicolor*)**  
(Potentially Threatening Process)

**Date of receipt of the nomination:** 4 November 2005  
**Date of preliminary recommendation:** 13 June 2006  
**Date of final recommendation:** 13 March 2007

**File No.:** FF/54/0564

**Validity:** The nomination is for a valid item.

**Prescribed Information:** The prescribed information was provided.

**Name of the Nominator** is adequately provided.

**Name and Description of the process:**

In the opinion of the SAC the process is adequately defined and described.

The nominated process is defined as the 'Reduction in biodiversity of native vegetation by Sambar (*Cervus unicolor*)'. Sambar Deer were introduced into Victoria in the 1860s (Bentley 1998). The species is now widespread in the forests of the Eastern Highlands from near Melbourne to the ACT (Peel *et al.* 2005, Mason 2005a, DSE 2006) and their range is still expanding (Downes 1979, 1983a,b; Bentley 1998, Moriarty 2004, Menkhorst and Knight 2004). The expanding range and increase in numbers of Sambar in south eastern Australia has been documented by many observers (O'Bryan 1977, Deer Advisory Council of Victoria 1979, Bentley 1998, DSE 2004, Parks Victoria unpublished data). Logging (Mason 2002), partial clearing and bushfires have probably aided this spread (Bentley 1967 in Frith 1979) by opening up habitat and allowing animals to move more readily throughout forested areas.

Sambar have been observed consuming large amounts of vegetation by both browsing and grazing (Mason 2005b). They are known to travel several kilometres from daytime bedding areas to their nocturnal feeding grounds where large aggregations (up to 50 animals) have been reported (Mason 2005b). Feeding behaviour includes standing vertically to break down branches to access leaves and fruit. Males use their antlers to break down branches of preferred food plants, with Cherry Ballart (*Exocarpos* spp.) and tree-fern species (*Cyathea* spp.) particularly targeted (Mason 2003, Peel *et al.* 2005, Mason 2005b). Sambar are adaptable in their diet, eating a wide range of plants across their range but selectively browsing a number of species when they are available. They are known to consume a wider range of plant material than any other deer species in Victoria and have also been recorded feeding on various mosses, with some observers suggesting that consumption of bryophytes may be higher than previously realised (Mason 2005a) as well as rare species of fungi (D. Cameron DSE *pers. comm.*).

Evidence provided by Stockwell (2003), Keith and Pellow (2005), and Peel *et al.* (2005) document the impacts of Sambar, as well as other deer species on vegetation communities and individual taxa. Such evidence is also consistent with descriptive accounts in popular publications, photographic and video footage and overseas studies on deer (Caughley 1983 in Jesser 2005, Yerex 2001 in Jesser 2005, Harrison 2005b, Keith and Pellow 2005, Slee 2007, A. Gibb, video footage Mt Cobbler 2007).

Threats exist to at least five plant species listed under the **Flora and Fauna Guarantee Act 1988** (Buff Hazelwood *Symplocos thwaitesii*, Shiny Phebalium *Nematolepis wilsonii* [Murphy *et al.* 2006, Wright *et al.* in prep.], Maiden's wattle *Acacia maidenii*, Slender Lignum *Muehlenbeckia gracillima* and Yellow Elderberry *Sambucus australasica*. *Nematolepis wilsonii* is also listed as nationally threatened (Vulnerable) under the Commonwealth **Environment Protection and Biodiversity Conservation Act 1999** and three of these species are assessed as Endangered by DSE using IUCN criteria (**Table 1**). There is also concern that movement of Sambar deer through recently burnt forests will place additional FFG-listed flora at risk (eg. Snow Pratia *Lobelia gelida* which is restricted to the Buffalo Plateau and near Mt Reynard, DSE 2007). There are also two FFG-listed communities that may be potentially threatened by the process [Warm Temperate Rainforest (East Gippsland Alluvial Terraces) Community, Warm Temperate Rainforest (Coastal East Gippsland) Community, **Table 2**]. Some observers recognised many years ago that Sambar utilised rainforests as habitat (Victorian Deer Conservation Co-operative 1971). Also potentially threatened at some sites are some 'key structural species' whose individual diminution represents a much wider ecological impact (eg. Yellow-wood *Acromychia oblongifolia*, Mutton-wood *Rapanea howittiana*; D. Cameron DSE, *pers. comm.*). Seedling or coppicing plants are particularly foraged by deer and the loss of these over time will result in a significant shift in community structure and/or species composition.

Species	Status under FFG Act 1988	Status in DSE (2005)	Reference
<i>Symplocos thwaitesii</i> Buff Hazelwood	<u>Listed</u>	endangered	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Acacia maidenii</i> Maiden's Wattle	<u>Listed</u>	endangered	D. Cameron unpub. data
<i>Muehlenbeckia gracillima</i> Slender Lignum	<u>Listed</u>	endangered	D. Cameron unpub. data
<i>Nematolepis wilsonii</i> Shiny Phebalium	<u>Listed</u>	vulnerable	Murphy <i>et al.</i> (2006); D. Cameron unpub. data
<i>Cyathea leichardtiana</i> Prickly Tree-fern	<u>Listed</u>	vulnerable	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Acacia daviesii</i> Timbertop Wattle	<u>Listed</u>	vulnerable	D. Cameron unpub. data
<i>Sambucus australasica</i> Yellow Elderberry	<u>Listed</u>	vulnerable	D. Cameron unpub. data
<i>Adiantum formosum</i> Black-stemmed Maidenhair	-	vulnerable	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Lysimachia japonica</i> Creeping Loosestrife	-	vulnerable	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Acronychia oblongifolia</i> Yellow-wood	-	rare	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Gynatrix macrophylla</i> Gippsland Hemp Bush	-	rare	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Marsdenia flavescens</i> Yellow Milk-Vine	-	rare	Peel <i>et al.</i> (2005); D. Cameron unpub. data
<i>Zieria smithii</i> Sandfly Zieria	-	rare	Peel <i>et al.</i> (2005); D. Cameron unpub. data

Table 1: Threatened flora species affected by Sambar in Victoria.

Floristic Community or Ecological Vegetation Class	Observed consequences	Status under FFG Act 1988	Reference
Warm Temperate Rainforest (East Gippsland Alluvial Terraces) Community	Loss of species, loss of structure, loss of vegetation, loss of fauna refuges from predation.	<u>Listed</u>	SAC 1995, Peel <i>et al.</i> 2005
Warm Temperate Rainforest (Coastal East Gippsland) Community	"	<u>Listed</u>	SAC 1996, Peel <i>et al.</i> 2005
Warm Temperate Rainforest (Far East Gippsland) Community	"	<u>Listed</u>	Peel <i>et al.</i> 2005
Littoral Rainforest	"	-	Peel <i>et al.</i> 2005
Alpine Bog Community	Loss of species, erosion, loss of vegetation cover, loss of structure.	<u>Listed</u>	SAC 1991, F. Coates <i>pers. obs.</i>
Fen (Bog Pool) Community	"	<u>Listed</u>	SAC 1991, F. Coates <i>pers. obs.</i>
Riparian Shrubland	Loss of species, loss of structure, loss of vegetation.	-	Peel <i>et al.</i> 2005
Riparian Forest	Loss of species, loss of structure, loss of vegetation, loss of fauna refuges from predation, erosion.	-	Peel <i>et al.</i> 2005
Estuarine Wetland	Loss of species, loss of structure, loss of vegetation, loss of fauna refuges from predation, erosion.	-	Peel <i>et al.</i> 2005
Sand Sheet Grassland	Loss of species, loss of structure, loss of vegetation, loss of fauna refuges from predation.	-	Peel <i>et al.</i> 2005
Salt Marsh	Loss of species, loss of structure, loss of vegetation, loss of fauna refuges from predation, erosion.	-	Peel <i>et al.</i> 2005
Swamp Scrub	Heavy browsing of species including shrubs, tree-ferns, herbs and grasses; wallows leading to loss of ground-layer plants; alteration of drainage patterns; and loss of predator refuges for ground mammals.	-	Peel <i>et al.</i> 2005

Table 2: Plant communities that appear to be adversely affected by Sambar in East Gippsland.

The range of flora or fauna affected or potentially affected was adequately stated in the nomination.

Significance of the threat which the potentially threatening process poses or has the potential to pose was adequately stated in the nomination.

#### **Eligibility for listing as a potentially threatening process under the Flora and Fauna Guarantee**

The nominated item satisfies at least one criterion of the set of criteria prepared and maintained under Section 11 of the Flora and Fauna Guarantee Act 1988, and stated in Schedule 1 of the Flora and Fauna Guarantee Regulations 2001.

#### **Evidence that criteria are satisfied:**

**Sub-criterion 5.1.1** *the potentially threatening process poses or has the potential to pose a significant threat to the survival of two or more taxa:*

##### *Evidence:*

Sambar are currently a significant threat to 13 species of plant (Table 1). The FFG-listed plants Shiny Phebalium *Nematolepis wilsonii*, Buff Hazelwood *Symplocos thwaitesii*, Maiden's Wattle *Acacia maidenii*, Slender Lignum *Muehlenbeckia gracillima* and Yellow Elderberry *Sambucus australasica* are especially threatened by Sambar. Yellow-wood *Achronychia oblongifolia* also appears to be threatened by Sambar (D. Cameron, unpubl. data).

**Sub-criterion 5.2.1** *the potentially threatening process poses or has the potential to pose a significant threat to the evolutionary development of two or more taxa*

##### *Evidence:*

By threatening the long-term survival of numerous species and communities (Table 2), Sambar are directly threatening the evolutionary development of several species and the habitat of others. Many plant species are in decline or survive in already severely fragmented populations where reproductive output is reduced due to consumption of flowers, seeds and fruits, by browsing and antler rubbing (Peel *et al.* 2005, D. Cameron unpubl. data). There is evidence of a demonstrated further reduction in the range and size of populations of certain plant species, particularly species endemic to Victoria, with local extinctions being a likely end result.

#### **Additional Information**

- There is a large international literature related to the impact of deer browsing and grazing on habitats and flora/fauna (see references).
- In Victoria Sambar (along with all other deer species) are currently classified as 'protected wildlife' under the Wildlife Act 1975.
- The NSW Scientific Committee recently listed 'deer herbivory' as a key threatening process in that state (NSW Scientific Committee 2005).

#### **Advertisement for public comment**

In accordance with the requirements of Section 14 of the Flora and Fauna Guarantee Act 1988, the preliminary recommendation was advertised for a period of at least 30 days.

The preliminary recommendation was advertised in:

'The Age' - on 19 July 2006

'The Weekly Times' - on 19 July 2006

'The Snowy River Mail' - on 19 July 2006

*Government Gazette* - on 20 July 2006

Submissions closed on 29 September 2006.

#### **Further evidence provided:**

Forty-four submissions were received on this item but no evidence was provided to warrant a review of the Scientific Advisory Committee's preliminary recommendation that the process is eligible for listing.

#### **Documentation**

The published information, research data and expert opinion provided to the SAC have been assessed. The SAC is of the opinion that this evidence supports the nomination under the two criteria given above and that this evidence is not the subject of scientific dispute.

#### **Decision of the Scientific Advisory Committee**

The SAC has assessed the information provided with the nomination, the published literature, unpublished data, public submissions and additional expert advice and has found uniform agreement that Sambar numbers in Victoria are high and

increasing and that the species continues to extend its range. All available evidence suggests the impact Sambar are having on native vegetation in Victoria is increasing.

The Committee therefore makes the following conclusions. The Committee believes there is currently sufficient scientific evidence to demonstrate that:

- (a) reduction in biodiversity of native vegetation by Sambar poses or has the potential to pose a significant threat to the survival of two or more taxa;
- (b) the process operates at a landscape level;
- (c) Sambar are the key species contributing to this threat;
- (d) the threat is distinguishable, additional and distinct from any threat posed by native herbivores.

#### **Final Recommendation of the Scientific Advisory Committee**

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11 of the Act because sub-criteria 5.1.1 and 5.2.1 have been satisfied. The SAC also concludes that no evidence exists to suggest that primary criteria 5.2 and 5.1 cannot be satisfied as a consequence of sub-criteria 5.1.1 and 5.2.1 being satisfied.

The Scientific Advisory Committee makes a final recommendation that the nominated item be supported for listing on Schedule 3 of the **Flora and Fauna Guarantee Act 1988**.

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**Endorsement by the Convenor of the Scientific Advisory Committee**

**Date**



**Dr Michael Clarke**  
Convenor

2/5/07