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

## 1. Scientific name (common name)

*Cassinia tegulata* (Avenue Cassinia)

## 2. Reason for Conservation Assessment by the Committee

This advice follows assessment of information provided by a public nomination to list the Avenue Cassinia. The nominator suggested listing in the critically endangered category of the list.

The Avenue Cassinia is currently listed as endangered under the South Australian *National Parks and Wildlife Act 1972*.

This is the Committee's first consideration of the species under the EPBC Act.

## 3. Summary of Conclusion

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 2 to make it **eligible** for listing as **critically endangered.**

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 3 to make it **eligible** for listing as **endangered**.

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 4 to make it **eligible** for listing as **vulnerable**.

The highest category for which the species is eligible to be listed is **critically endangered**.

## 4. Taxonomy

The species is conventionally accepted as *Cassinia tegulata* by the Council of Heads of Australasian Herbaria (CHAH).

Taxonomic circumscription in this group is complex, and the resolution of species bounds may be clouded by hybridisation, including in areas in which the parent taxa may no longer be present. Orchard (2004) suggests that there may be several populations that comprise hybrids of *Cassinia tegulata* with closely related species. He suggests that *Cassinia adunca* may be considered a hybrid of *C. tegulata* and *C. complanata*. He also describes how *C. tegulata* has been genetically swamped by *C. complanata* in the Encounter Bay region of South Australia. Croft (2007) states that an unnamed species also appears to be an intermediate between *C. tegulata* and *C. rugata* (T.Croft 2007, pers. comm.). It is also possible that *C. rugata* may represent an ancient hybrid of *C. tegulata* and *C. longifolia* (Orchard, 2004). Orchard has stated that hybridisation of *Cassinia* species has typically been overstated, resulting from inadequate knowledge and field surveys. In general, these hybrids can usually be explained as undescribed species (Orchard 2007, pers. comm.). This assessment and advice is restricted to 'non-hybrid' populations.

## 5. Description

The Avenue Cassinia is a small to medium-sized shrub from the daisy (Asteraceae) family. It has an upright habit, grey-green to yellowish green, hairy, needle-like leaves, fissured brown bark and off-white to cream flowers at the end of branches. Flowers are honey-scented, but leaves and stems are odourless and not sticky (DEH, 2006).

## 6. National Context

The Avenue Cassinia is endemic to South Australia (Orchard, 2004). It is now known only from two populations separated by approximately 37 km. One population (the larger) is located 17 km west of Lucindale (the 'Avenue' population) and the other located 30 km from Blackford in south-eastern South Australia. The area of occupancy of these two populations is 0.05 $km^2$. A third population (of only 2 plants) was known at Naracoorte, but has recently been extirpated.

The 'Avenue' population occurs in roadside and associated rail corridor vegetation. The Blackford population also occurs in roadside vegetation. Both of these populations are managed by local government authorities. The 'Avenue' population that occurs in the rail corridor is also managed by the state government.

The Avenue Cassinia is listed as endangered under the South Australian *National Parks and Wildlife Act 1972*.

An apparent hybrid of *C. tegulata*, *'C. adunca'*, is found on the Fleurieu Peninsula in the Southern Lofty botanical region of South Australia. In the south-east of South Australia there is a suggestion that *C. tegulata* previously hybridised with *C. rugata* which has a very limited population in Victoria and is more restricted in south-eastern South Australia. However, there is no current evidence of a third population of *C. tegulata* in this area.

## 7. Relevant Biology/Ecology

The Avenue Cassinia flowers between February and April and fruiting occurs between late April and June. The Avenue Cassinia is found in open to dense shrubland, in slightly wet interdune areas, in grey or yellowish sand over clay. Associated species include grasses, sedges, *Melaleuca, Hakea, Acacia* and *Xanthorrhoea* species (Orchard, 2004).

It is not known whether this species is capable of vegetative reproduction, however *Cassinia* species in general are known to be capable of reproducing vegetatively. The Common Grass-blue Butterfly (*Zizina labradus*) may be one of the pollinators for the Avenue Cassinia as it was observed in large numbers in autumn 2005, exclusively visiting this species (Johnson 2005, pers. comm.).

Studies in 2005 indicate that a lack of recruitment may be affecting the 'Avenue' population as no juvenile plants were observed in this population (Johnson 2006, pers. comm.).

## 8. Description of Threats

The major threats to this species include land clearing and unknown processes inhibiting recruitment.

Although the substantial vegetation clearance that occurred in the past has ceased, minor land clearance may still occur in and around the two known populations, in association with service maintenance for powerlines, fire break creation and incidental roadworks.

During the 2005 survey of this species, 93 (22%) of the 425 plants sampled at the 'Avenue' site showed signs of senescence. No recent recruitment or juvenile plants were observed in the population (Johnson 2006, pers. comm.). This apparent lack of recruitment threatens this population as plants die and are not replaced.

It also appears likely that drainage, agroforestry and the use of groundwater for irrigation is affecting the groundwater hydrology of the area, which in turn may be affecting this species which requires seasonally moist soils. In addition, the effect of drought (and possibly climate change) is an ongoing threat to this species.

Other potential threats to this species include hybridisation (as has occurred at other sites as discussed in section 4 above), inappropriate fire regimes and fragmentation.

Grazing by native, domestic and introduced herbivores is also suspected as a threat to this species. Kangaroos, rabbits and sheep appear to graze in the habitat of the Avenue Cassinia, based on the presence of scats, skeletal material, warrens and wallows at the 'Avenue' site.

## 9. Public Consultation

The nomination was made available for public exhibition and comment for 30 business days. No comments were received.

## 10. How judged by the Committee in relation to the criteria of the EPBC Act and Regulations

The Committee judges that the species is **eligible** for listing as **critically endangered** under the EPBC Act. The assessment 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

This species is suspected to have undergone a reduction in numbers and it is suspected that this will continue in the future. This reduction is based on recent deaths, senescence of mature plants and the apparent lack of recruitment. Two plants at a site at Lucindale Road, Naracoorte, which formed a third population of this species, became extinct in approximately January 2006. The cause of this extinction is unknown (Johnson 2008, pers. comm.).

Several historical collections such as one from Blackford (1941), Kingston (date unknown) the Bluff (1921) and Encounter Bay (1932) in South Australia are no longer extant (Orchard, 2004). This indicates that the Avenue Cassinia previously had a more extensive range. The failure to relocate this species at all of these former collection sites despite an extensive survey effort indicates a decline in the extent of occurrence over the past six to nine decades (Orchard 2005, pers. comm.; Johnson 2005, pers. comm.).

The smaller known extant population (of approximately 28 plants, 30 km from Blackford in south-eastern South Australia) was discovered recently (in 2007). This population is likely to be a newly identified remnant rather than evidence of expansion of the range of this species.

In May 2005, the population at the larger site ('The Avenue') was estimated to be about 900 individuals. For this population, the age structure and health was recorded for a sub-sample of 425 individual plants. Of these, 93 (22%) plants showed signs of senescence, with 19 plants recorded as recently dead or near death (Johnson 2005, pers. comm.). No recent recruitment or juvenile plants were observed in the population (Johnson 2006, pers. comm.). Should this trend continue, this population of the species will decline over the coming decade. However, as there are no previous population estimates for this species, and there is no information available to assess whether the trend is likely to be sustained, there are insufficient data available to judge whether the reduction in numbers was, or will be, very severe, severe, substantial, or not substantial.

Although the Committee judges that the species has undergone a reduction in numbers and that it is likely to experience further declines, there are insufficient data available to judge whether the reduction was, or will be, very severe, severe, substantial, or not substantial. Therefore, the species has been demonstrated to have not met the required elements of Criterion 1, and is **not eligible** for listing in any category under this criterion.

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

The Avenue Cassinia is now known from only two isolated locations in south-eastern South Australia. The area of occupancy is approximately 0.05 $km^2$. The Committee considers that the species has a very restricted geographic distribution, given that historical collections indicate that the species was much more widespread in the past and is now only found at two locations on road reserves surrounded by agricultural land.

This species is subject to a range of threats (see section 8 above). As a result, it can be inferred that: the extent of occurrence; area of occupancy; area, extent and quality of habitat; and the number of mature individuals will continue to decline. On this basis, the Committee considers that the species' geographic distribution is precarious for its survival. The Committee considers that the species has a very restricted geographic distribution, which is precarious to its survival. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 2 to make it **eligible** for listing as **critically endangered**.

**Criterion 3: The estimated total number of mature individuals is limited to a particular degree; and either**

**(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**

The total number of mature individuals of the Avenue Cassinia was estimated to be 900 in May 2005, with an additional 28 mature individuals identified 30 km from Blackford in 2007. During the 2005 survey, 93 (22%) of 425 plants at the 'Avenue' site showed signs of senescence. No recent recruitment or juvenile plants were observed in the population (Johnson 2006, pers. comm.). This suggests a population decline of the species over the coming decade if this lack of recruitment continues.

The Committee considers that the total number of mature individuals is low and that the number will continue to decline. However, there is insufficient information to determine whether this decline will occur at a particular rate. This species is known from only two populations that are approximately 37 km apart and separated by agricultural land, and is exposed to a variety of threats (see section 8 above). The Committee considers the species' geographic distribution to be precarious for its survival (see Criterion 2).

The Committee considers that the estimated total number of mature individuals of the species is low, that the number is likely to continue to decline and that the species' geographic distribution is precarious for its survival. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 3 to make it **eligible** for listing as **endangered**.

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

The number of mature individuals in the 'Avenue' population is approximately 900 and there are approximately 28 mature individuals in the Blackford population. Given the apparent lack of recruitment in the 'Avenue' population, the fragmentation, and other threats to this species (see section 8), the Committee has concluded that the estimated total number of mature individuals of the species is low. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 4 to make it **eligible** for listing as **vulnerable**.

**Criterion 5: Probability of extinction in the wild that is at least:**

- **a) 50% in the immediate future; or**
- **b) 20% in the near future; or**
- **c) 10% in the medium-term future.**

There are insufficient data available to estimate a probability of extinction of the species in the wild over a relevant timeframe. Therefore, as the species has been demonstrated to have not met the required elements of Criterion 5, it is **not eligible** for listing in any category under this criterion.

## 11. CONCLUSION

### Conservation Status

The Avenue Cassinia was nominated for inclusion in the list of threatened species referred to in section 178 of the EPBC Act. The nominator has suggested listing in the critically endangered category.

The Committee considers that the species has a very restricted geographic distribution. It is now only found at two locations, but was more widespread in the past. The Committee considers that the geographic distribution of this species is precarious for its survival given its fragmentation, the apparent lack of recruitment in the larger population and the effect of other threats on the species. Therefore, the species has been demonstrated to have met sufficient elements of Criterion 2 to make it **eligible** for listing as **critically endangered**.

The Committee accepts that the estimated number of mature individuals is considered to be low and likely to continue to decline, given the apparent lack of recruitment in the larger population. In addition, the Committee determined under Criterion 2 that the species' geographic distribution is precarious for the survival of the species. Therefore, the species has been demonstrated to have met sufficient elements of Criterion 3 to make it **eligible** for listing as **endangered**.

The total number of mature individuals is estimated to be about 928. Given the apparent lack of recruitment in the 'Avenue' population, the fragmentation, and the other threats to this species (see section 8 above), the Committee considers that the estimated total number of mature individuals of the species is low. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 4 to make it **eligible** for listing as **vulnerable**.

The highest category for which the species is eligible to be listed is **critically endangered**.

**Recovery Plan**

The Committee considers that there should not be a recovery plan for this species as recovery actions are being effectively managed by the state government.

## 12. Recommendations

(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 **critically endangered** category:

***Cassinia tegulata* (Avenue Cassinia)**

(ii) The Committee recommends that there should not be a recovery plan for this species.

Associate Professor Robert J.S. Beeton

Chair

Threatened Species Scientific Committee

## 13. References cited in the advice

Croft T (2007). Personal communication by email, 6 November 2007, Department for Environment and Heritage.

Department for Environment and Heritage (DEH) (2006). Threatened Flora of the South East, Avenue Cassinia *Cassinia tegulata* Fact Sheet. South Australian Department for Environment and Heritage, Mount Gambier.

Johnson R (2005). Personal communication, 2005, Department for Environment and Heritage.

Johnson R (2006). Personal communication, 2006, Department for Environment and Heritage.

Johnson R (2008). Personal communication, 2008, Department for Environment and Heritage.

Orchard AE (2004). A revision of *Cassinia* (Asteraceae: Gnaphalieae) in Australia. 2. Sections *Complanatae* and *Venustae* in Australian Systematic Botany 17, 505-533.

Orchard AE (2005). Personal communication, 2005, Taxonomic expert on *Cassinia* species.

Orchard AE (2007). Personal communication by email, 2007, Taxonomic expert on *Cassinia* species.