



**FLORA & FAUNA
GUARANTEE**

FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

Petauroides volans subsp. *volans* Kerr 1792 - Greater Glider

Date of receipt of nomination: 10 November 2016
Date of preliminary recommendation: 21 November 2016
Date of final recommendation: 16 March 2017

File No.: FF/54/3751

Validity: The nomination is for a valid item.

Prescribed Information: The prescribed information was provided.

Name of the Nominator is adequately provided.

Name of the item is adequately provided.

The nominated taxon is accepted by the Scientific Advisory Committee (SAC) as a valid taxon because it has been formally described and it is accepted as a valid taxon by Museum Victoria.

Largest of all the gliding possums, the Greater Glider is endemic to eastern Australia. In the 1990s the species was considered '... common residents of eucalypt forest in eastern Victoria and higher rainfall areas in the Midlands'. The species has also been recorded from south east of Ballarat and to a lesser extent the Gippsland Plain (Menkhorst 1995). The preferred habitats include forest dominated by *Eucalyptus regnans* in the Eastern Highlands, *E. fastigata*, *E. viminalis* and *E. radiata* forest in east Gippsland, *E. radiata* forest in north-east Victoria and moist peppermint-stringybark-gum forest in the southern foothills of the Eastern Highlands (Menkhorst op. cit.). The species feeds almost exclusively on the leaves, buds and flowers of eucalypts. Apparently suitable forest in the Otway Ranges, the Grampians, Mt Cole, Wilsons Promontory and far south-western Victoria is not occupied by the species.

Greater Gliders are much more abundant in high altitude forest than in coastal forests and prefer forest on highly fertile soils. Menkhorst (1995) notes that local distribution of Greater Gliders is heavily influenced by the presence of eucalypts with foliage rich in nutrients (especially nitrogen and phosphorous). They also require trees with large hollows for denning during the day and raising young.

While the Greater Glider is '...well represented in a number of conservation reserves...' (Menkhorst 1995), the bulk of its distribution remains in forest available for timber harvesting. Wood production practices are known to substantially deplete Greater Glider populations and gliders usually die if all or most of their home range is intensively logged or cleared (Menkhorst op. cit.). Unless they are linked as part of an interconnecting network of reserves, local populations risk extinction through catastrophe or by loss of genetic vigour through inbreeding. Again Menkhorst (1995) notes that agricultural development has already isolated populations in the Wombat Forest, Gippsland Highlands and Gelliondale Forest and in smaller areas on the fringes of the Eastern Highlands. McKay (1988) notes that conservation of the species '...is utterly dependent on sympathetic forest management which retains buffer strips of old forest between coupes and preserves old 'habitat trees' and their potential successors in small unlogged areas.'

A description of the Greater Glider can be found in Menkhorst and Knight (2004).

Eligibility for listing as a taxon 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 2011*.

Based on the evidence that the Greater Glider has declined in range and abundance, and that the processes thought to be responsible still exist and are likely to continue, the SAC believes the nomination meets the following Flora and Fauna Guarantee listing criteria:

Evidence that criteria are satisfied:

Criterion 1.1 *The taxon is in a demonstrable state of decline which is likely to result in extinction*

Evidence:

Recent survey data and other information suggest that the Greater Glider has undergone significant declines in distribution and abundance in Victoria. Studies in the central Highlands of Victoria (Lindenmayer et al. 2011) show

that from 160, one hectare sites across 180 000 ha in 1987 there were greater gliders in 42 sites. This fell by 8.8 % a year until 2010. Old growth areas in National Parks tended to have much higher glider counts than areas designated for wood production. Of the 42 sites, those burnt in 2009 have had no detections of greater gliders since that fire event.

More recently Lumsden et al. (2013) showed extensive declines of Greater Glider compared to surveys of the species in the 1990's in a large area of the Central Highlands. Results showed glider occupancy in only 16% (32 sites) of sites where they had been previously recorded, with most of the records being concentrated in 1 to 2 areas. Lumsden et al. (op. cit.) noted that: '...a striking result of these surveys was the scarcity of the greater glider, which was, until recently, common across the central highlands.'

The occupancy models Lumsden (op cit.) generated for the greater glider post surveys are now predicting it to occur quite patchily and only to the northeast of the area surveyed.

In East Gippsland, a large portion of areas surveyed in 2015 showed declines in Greater Glider populations. At least 50% of the 1 km transects surveyed in the 1990's showed occupancy of greater glider. In 2015 after the transects were surveyed four times each the results showed;

- 4 of 18 transects in the Genoa area contained only one animal
- Of 20 transects in Yalmy/Martin's Creek, one transect contained a single animal and another transect contained 2
- 1 of 18 transects contained 1 greater glider in the foothill forest between Orbost and Lakes Entrance
- 4 of 18 transects contained 1 greater glider in the coastal forest between Lakes Entrance and Bairnsdale.

Demonstrable declines of the species have been recorded in Mount Alfred State Park (Department of Environment and Energy 2016) and in the Cathedral Ranges. Around the Cathedral Ranges State Park there has been a significant decline in observations at both Little River valley and the adjacent Blue Range. In the mid 1990's both areas were reported to have reliable high numbers of greater gliders (S. Smith pers. comm.). In the Blue Range the animal has not been located since 2009. Both these areas were burnt in the 2009 Victorian fires. Smith believes that although the 2009 fire severely impacted the greater glider on Blue Range, the decline had probably started occurring before the 2009 fires, possibly because of drought.

A population of Greater Gliders near Lake Tyers State Park (Burnt Bridge) was known for its high density of gliders. This population has declined and it is now difficult to detect greater gliders in the area, despite their eye shine being easy to detect. Recent spotlight tours in this area by local naturalist Jim Reside (2015-2016) have failed to locate any Greater Gliders (J. Reside pers. comm.).

A recent Commonwealth assessment of Greater Gliders made the following comment:

'Major bushfires in 2003, 2006–2007 and 2009 burnt much of the greater glider's range in the state, and further fragmented its distribution as evidenced by surveys and species records (Lumsden et al. 2013, Vic SAC 2015). Reoccupation of burnt sites in subsequent years is likely to be a slow process due to the small home ranges (1–2 ha) of the species and its limited dispersal capabilities (L. Lumsden pers. comm., cited in Vic SAC 2015). It also depends on there not being further significant fires in the interim (Vic SAC 2015). Since the 2009 fires, which burnt the Kinglake East Bushland Reserve and nearby areas, spotlighting records of greater gliders in these areas have significantly declined (Cobern pers. comm. 2015). The occupancy model in Lumsden et al. (2013) predicts that areas most likely to be occupied following the 2009 fires are now patchily distributed.'

In Mt Alfred State Forest (East Gippsland) there has been significant decline of the Greater Glider population. Victorian Mammal Survey Group data also indicate a serious reduction in Greater Glider abundance in the Central Highlands area of Victoria and in East Gippsland (submission information).

Criterion 1.2 *The taxon is significantly prone to future threats which are likely to result in extinction*

Evidence:

Some of the processes that affect Greater Glider survival appear to be increasing (e.g. drought, extreme heat events, possible increased fire frequency). The difficulty in providing mitigation strategies for these processes may make continued population declines likely.

Sub-criterion 1.2.2 *The threat is currently operating and is expected to operate at a level in the future which is likely to result in the extinction of the taxon.*

Evidence:

The SAC understands that the currently known threats to Greater Glider are occurring in all areas of its range. Direct evidence of declines in Victoria can be seen in two broad areas: Central Highlands and East Gippsland. The following specific threats to the greater glider are current and are expected to operate at a level in the future which could lead to the extinction of the species in the long term.

Wildfire

Wildfire destroys the preferred habitat (particularly hollow-bearing trees used for denning) and directly kills greater gliders. A number of researchers have indicated that wildfire is a major threat and/or cause of the decline of the greater glider in SE Australia (Berry et al. 2015, Lindenmayer et al. 2011, 2013, Lumsden et al. 2013, McNabb

et al. 2012, L. Bluff pers. comm.). The species' sensitivity to wildfire in Victoria has also been reported in van der Ree and Loyn (2002) and Possingham et al. (1994).

With Global Climate Change, wildfires in south-eastern Australia have been modelled to increase in frequency and intensity. Fire seasons are also predicted to become much longer (CSIRO 2015, Lui et al. 2010, Williams et al. 2001). Wildfire as a threat to the greater glider is ongoing and its entire habitat is susceptible. The threat is extremely difficult to control and could eventually result in extinction of this species.

Planned or prescribed burns

In addition to wildfire, 'prescribed burns' pose a significant ongoing risk to the Greater Glider and its habitat. Planned burns in the lowland foothills of Gippsland have caused major destruction of hollow bearing trees, which are required by Greater Glider for denning. Bluff (2016) identified that in areas of mapped fire coverage, prescribed burns destroyed 19% of hollow bearing trees. The policy of burning 90% of bark off trees also frequently results in incineration of the canopy, destroying Greater Glider food resources.

Timber harvesting

Timber harvesting in greater glider habitat has been proven to cause declines and/or local extinctions of greater glider populations (Lindenmayer et al. 2011, Kavanagh and Webb 1998, Lunney 1987, Dunning and Smith 1986, Tyndale-Biscoe and Smith 1969). Timber harvesting practices reduces the number of hollow bearing trees available for denning by tree removal or as a result of regeneration burns after the logging (Lindenmayer et al. 2011, 2002; Lunney 1987). In addition, the species does not cope well with habitat change (Kavanagh and Wheeler 2004, Tyndale-Biscoe and Smith 1969). Although all animals may not die from the initial impact they will die shortly afterwards. This is due to life history traits: affinity with home range, small home ranges, attachment to hollow bearing trees they use for denning and their specialist diet (Tyndale-Biscoe 2005).

In Victoria timber harvesting is widespread in the eastern and central parts of state. This is also the main distribution and habitat of the greater glider. Considering the known impacts of timber harvesting on gliders (Kavanagh and Webb 1998, Lunney 1987, Tyndale-Biscoe and Smith 1969, Dunning and Smith 1986), it is likely that other local extinctions of this species have already occurred and will continue to occur in the future.

Drought

Many researchers believe declines in greater gliders may be linked to increased dry periods or drought (Lumsden et al. 2013, Lindenmayer et al. 2011, S. Smith pers. Comm.). Droughts have also been associated with increases in wildfire and both these impacts are predicted to increase in intensity in the future (CSIRO 2015).

Hyper-predation

Changes in predator-prey interactions in SE Australia may also be a contributing factor causing declines in the greater glider (Lindenmayer 2011, Kavanagh and Webb 1998). This may possibly be due to changes in the natural diet of the Sooty Owl (a key glider predator) from terrestrial prey to more arboreal prey (Bilney *et al.* 2010). The decline in terrestrial prey can be attributed to the introduction of the red fox causing local extinctions of a number of terrestrial prey species (Woinarski et al. 2016).

Habitat fragmentation

Local extinctions from fire, timber harvesting, drought or predation across the range of the greater glider will lead to a loss of habitat connectivity. McCarthy and Lindenmayer (1999) and Possingham et al (1994) found small patch sizes (McCarthy and Lindenmayer: less than 500 ha; Possingham et al. less than 1000 ha) of habitat are unviable for the greater gliders long-term viability. Lindenmayer and Taylor (2003) found evidence of genetic erosion in the species after 5-6 generations in small forest patches (approximately 20ha) near Tumut in southern New South Wales.

The data presented on distribution and abundance are the result of reasonable surveys and provide clear evidence that the taxon is rare in terms of abundance and distribution.

Additional Information

- Greater Gliders have recently been classified as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of Environment and Energy 2016).

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 Herald Sun'	Wednesday 14 December 2016
'The Weekly Times'	Wednesday 14 December 2016
'Alpine Observer'	Wednesday 14 December 2016
'Ballarat Courier'	Wednesday 14 December 2016
'La Trobe Valley Express'	Thursday 15 December 2016
'Mansfield Courier'	Wednesday 14 December 2016

'Snowy River Mail' Wednesday 14 December 2016
 Government Gazette Thursday 15 December 2016

Submissions closed on Friday 24 February 2017.

Further evidence provided:

Four submissions were received on this item but no evidence was provided to warrant a change to the Scientific Advisory Committee's preliminary recommendation that the taxon is eligible for listing.

Final Recommendation of the Scientific Advisory Committee

The SAC concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11(1) of the Act because criteria 1.1 and 1.2 and subcriterion 1.2.2 of the Flora and Fauna Guarantee Regulations 2011 have been satisfied.

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

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Endorsement by the Convenor of the Scientific Advisory Committee

Date



11/4/17

Prof Emeritus Barbara Evans
Convenor