



FLORA & FAUNA
GUARANTEE

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

***Plectorrhiza tridentata* (Lindl.) Dockrill - Tangle Orchid**

DOCID107-417469679-742

Dates of consideration: 13 May, 19 June, 8 July, 24 August, 7 October 2020

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 is accepted as a valid taxon by the Royal Botanic Gardens (RBG) Victoria.

Current conservation status

Plectorrhiza tridentata has been classified in Victoria as 'rare' (DEPI 2014) and in Queensland as 'least concern' (QLD Government 2020).

Eligibility for listing as a taxon under the Flora and Fauna Guarantee Act 1988

The Scientific Advisory Committee has assessed the eligibility of this nomination based on its extinction risk within Victoria in accordance with Section 16C(4)(c) of the *Flora and Fauna Guarantee Act 1988* (the Act).

This nomination was made to the Committee on 4 May 2020 in accordance with the Act and Flora and Fauna Guarantee Regulations 2011 and was accepted as a nomination by the Committee on 13 May 2020.

Amendments to the Act came into operation on 1 June 2020 and the Flora and Fauna Guarantee Regulations 2011 have since been replaced by the Flora and Fauna Guarantee Regulations 2020.

The SAC is required to consider this nomination in accordance with the Act as amended and the criteria for determining eligibility for listing prescribed in the Flora and Fauna Guarantee Regulations 2020. In its application of the relevant eligibility criteria, the SAC has, as required by the nationally adopted Common Assessment Method, had regard to the *IUCN Red List Categories and Criteria (Version 3.1)* and the *Guidelines for Using the IUCN Red List Categories and Criteria (Version 14, 2019)*.

Species information

Description and Life History

Tangle Orchid *Plectorrhiza tridentata* is a pendent evergreen epiphyte, with 1 or rarely 2 or more branching shoots (Benson & McDougall 2000, Bishop 2000). Stems are 1–35 cm long. Leaves are narrow-elliptic to ovate or obovate to oblong, 3–10 cm long, 3.5–16 mm wide and green to purplish. Inflorescences are 1–12 cm long, 2–15-flowered, straight to gently curved, pendent to spreading; pedicel plus ovary c. 6 mm long. Flowers are weakly cupped and strongly fragrant (lemony). Sepals and lateral petals oblong-ovate, brown and green or dark and light green, c. 5mm long. Labellum white with green or brown markings; midlobe c. 1.5 mm long, triangular, acute; lateral lobes c. 2mm long, triangular; spur 2–3 mm long, curved (VicFlora 2020, NSW Flora Online 2020).

The main substrate this orchid has been recorded on is the outer branches of trees e.g. *Tristaniopsis laurina*, *Syzygium smithii*, *Backhousia myrtifolia* (Gowland et al. 2013) and rarely on rocks. Plants are often suspended by one or a few of the numerous, tangled, aerial roots. Like related orchids, the Tangle Orchid has wind-dispersed seeds and forms a symbiotic relationship with a *Rhizoctonia*-like fungus for germination and establishment (Gowland op cit.). The species has a degree of host specificity that is reflected, in part, by the relationship between the fungus and the tree (Gowland op

cit.) and is pollinated by insects. Thus, the growth and distribution of *P. tridentata* is dependent on the co-existence of multiple organisms.

Generation Length

The longevity of orchids (as with many perennial plants) is difficult to estimate, as there is debate about whether a generation is from seed germination to seed production, or whether it takes into account the longevity of vegetative parts. A lack of information concerning mortality factors complicates the story. One 'best guess' is 10 years (Backhouse & Cameron 2005), but this is likely to be an underestimate (Backhouse & Cameron 2005). In an assessment under IUCN criteria (Rouse 2018) generation time was estimated at 30 years (20–40 years). Time to first flowering for many orchids is >2 years in cultivation, and >4 years in the wild (Backhouse & Cameron 2005). Flowers of *P. tridentata* can be found from September to January (Ralley 2011). There are reports of individuals of *P. tridentata* growing c. 500 mm and being at least 20 years old (Stephenson 2005).

Distribution

The species is endemic to eastern Australia and recorded from Queensland, New South Wales and Victoria (Benson & McDougall 2000, VicFlora 2020). Its occurrence in Victoria is at the southernmost extent of its distribution.

Until very recently the Tangle Orchid was thought to be confined to east of the Snowy River (Jeanes & Backhouse 2006, VicFlora 2020), however in 2019 (before the 2020 East Gippsland fires) a small population was recorded on the west bank of the Snowy River (*Trust for Nature* media release, 12/3/2020). There are previous records of populations of the species in certain national parks, viz. Croajingolong National Park in Warm Temperate Rainforest of the Howe Range (NRE 1996, SAC 1996). There are occurrences of Tangle Orchid outside the Howe Range (i.e. through the Gippsland Ranges towards the Snowy River).

The species is '*Not often encountered*' (Jeanes & Backhouse 2006) and the Royal Botanic Gardens Victoria notes it as 'Restricted but locally abundant in rainforest east of the Snowy River, commonly overhanging watercourses from branches of stream-side trees and shrubs' (accessed Sept. 2020, VicFlora 2020). There are just over 100 records of the species in the Victorian Biodiversity Atlas (VBA)/Royal Botanic Gardens data (AVH) and many of these records are populations isolated from one another in pockets of rainforest. It is understood that the species is common in cultivation (nursery-orchid trade), however illegal trade and take from the wild is undocumented.

Habitat

Tangle Orchids grow on a variety of host trees, often on the outermost limbs and, as indicated above, usually over water (Jeanes & Backhouse 2006). It is also sometimes recorded as a lithophyte (Vleck 2007). Within Victoria it has been recorded from the FFG Act listed community 'Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range)' (SAC 1996) and is apparently confined to Warm Temperate Rainforest in Victoria (Bishop 2000).

Threats

Illegal take

'Collection of native orchids' is an FFG Act-listed Potentially Threatening Process (SAC 1993). Tangle Orchids are threatened by illicit collection for the nursery trade (Jeanes & Backhouse 2006) and possibly also the essential oil trade (see internet material below).

Fire

Evergreen epiphytic and lithophytic orchid species that grow in trees or on exposed rock surfaces are aerial and therefore at risk of being burnt during an intense bushfire (Duncan 2012). Fire can be particularly damaging to epiphytic species. If a bushfire is sufficiently intense to reach the canopy, it can not only kill orchid plants, but potentially kill their host trees (Lilly Pilly and Kanooka) as well. This is what occurred in Kinglake NP following the 2009 bushfires where a large proportion of the preferred host trees of a similar epiphytic orchid *Sarcochilus australis* were killed by the fire front (Duncan 2012, p.5). In some cases, these species are likely to recolonise by seed from nearby unburnt areas, but in other cases these species may require conservation intervention to assist in their recovery.

Some orchid workers, when discussing 1980's fire events and impacts on epiphytic orchids, have a different view, i.e. Adams & Lawson (1984) – March 1983 fires

'*Sarcochilus australis* and *Plectorrhiza tridentata*, which perished in great numbers, will probably regenerate by seed from plants in surviving pockets of rainforest. Pollinators also survived the fires and set a good crop of capsules on flowering plants of all five species.'

However, with the apparent increase in landscape-scale fire events there is concern that repeated bushfires will be especially damaging to epiphytic orchids. A recent report (DELWP 2020) demonstrates this issue, i.e. Discussion on the 2020 East Gippsland fires & rainforest impacts

‘Rainforest in Victoria develops in the long-term absence of severe disturbance such as fire, and there are significant areas of rainforest within the current fire extent. Almost 100% of each of the communities within East Gippsland are within the projected impact area.’

‘In addition to the burnt extent, these sites are at high risk of the future indirect impacts of bushfire such as soil erosion, exposure and elevated levels of feral herbivore browsing.’

In January 2020 available data suggested that 100% of Howe Range was burnt and 80+% of the Tangle Orchid habitat was estimated to have been within the burn area (DELWP 2020).

Deer herbivory

A number of workers have identified and described the impacts of feral and native herbivores on terrestrial orchids, which could also apply to epiphytic orchids. For example, Keith & Pellow (2005) make the following point:

‘...second mechanism of deer impact on the viability of plant populations is through the reduction of fruit production, as the resulting decline in seed banks reduces the capacity for seedling recruitment. These effects are likely to be most significant in species such as terrestrial orchids and lilies, in which all reproductive material may be consumed in a single visit, and those species whose reproductive effort is largely limited to the post-fire period.’

Sambar Deer *Cervus unicolor* are widespread in the east of the Victoria (VBA data) and known to threaten rainforest communities as well as certain rainforest flora (Peel et al. 2005, SAC 2007). It is likely Sambar deer feed on epiphytic orchids when encountered during foraging. Additionally, the impacts of Sambar Deer have increased significantly in recent years, both in intensity and geographic extent (Davies et al. 2020).

Climate change

Climate change due to global warming interacts with habitat loss and fragmentation, introduced and invasive species and human population growth, and many ecosystems are likely to undergo severe modification (De & Medhi 2014). It is a major threat to pollination services and there is a need to conserve plant communities in which orchids live. The combination of higher temperatures and lower rainfall may make forests more susceptible to fire and it may lead to extinction of local species (De & Medhi op cit.). Additionally, any changes to the high humidity levels and the shaded, warm and protected habitats that this taxon require are likely to affect their long-term survival.

Decision by the Scientific Advisory Committee

The eligibility of the nominated taxon (including the extinction risk and the category of threat that applies to the taxon) to be specified in the Threatened List must be determined in accordance with the eligibility criteria prescribed for the purposes of Division 2 of Part 3 of the Act.

The relevant eligibility criteria are prescribed in Schedule 1 of the Flora and Fauna Guarantee Regulations 2020, which provides that a taxon is at risk of extinction in a particular category of threat and is therefore eligible to be specified in the Threatened List in relation to that category if a primary criterion for that category is met. Where applicable, a primary criterion is met if any one of its subcriteria is satisfied.

Categories of Threat

Plectorrhiza tridentata does not satisfy the criteria for Category 1: Extinct, since it is currently traded in nursery trade. It does not satisfy the criteria for Category 2: Extinct in the wild because additional expert advice indicates that some populations remain in Victoria, New South Wales and Queensland. The species satisfies the criteria for **Critically endangered** in Victoria as follows:

Primary criterion 3.1

As per the definition of ‘critically endangered’ in the FFG Act, the taxon of flora or fauna is considered to be critically endangered.

Critically endangered, in relation to a taxon of flora or fauna, means that the taxon is facing an extremely high risk of extinction in the wild in the immediate future.

Tangle orchids are restricted to appropriate rainforest gully habitats of East Gippsland. This area has experienced severe landscape-scale bushfires which threaten the long-term viability of the taxon in Victoria. Some populations may now be extinct. Additional threats are likely to include herbivory by Sambar deer, impacts of climate change on rainforest habitats and illegal take for the nursery and possibly the essential oil trade. The species is prone to the effects of human activity or stochastic events within a very short time period and an uncertain future, and thus at risk of local extinction. Key threats include fuel reduction burns or wildfires (that could harm the taxon by increasing mortality or inhibiting regeneration); climate change that aggravates or accelerates the impact of fire and the browsing of herbivores; in particular, Sambar

deer. A projected decline is likely to occur in the absence of any appropriate intervention. Local catastrophic events including frequent wildfires (both in scale and intensity) together with the current severe and prolonged regional drought conditions throughout East Gippsland could potentially lead to the local extinction of the species.

The taxon is assessed as being eligible for listing as Critically Endangered under Primary criterion 3.1 – subcriteria 3.1.1; 3.1.2 (a); 3.1.3 (b)(i), (ii) and 3.1.4

The taxon was assessed as not eligible under Subcriterion 3.1.5

Subcriterion 3.1.1 *The taxon has undergone, is suspected to have undergone, or is likely to undergo in the immediate future, a very severe reduction in population size.*

(3.1.1 is equivalent to IUCN Criterion A)

Evidence:

The species has most likely suffered severe population decline in the 2020 bushfires (at least 50% and up to 80% of its habitat). Future population estimates range from 100–1500, down from 1500–3000 (Rouse 2018).

Subcriterion 3.1.2 *The taxon's geographic distribution is extremely restricted and at least 2 of the following circumstances apply—*

- (a) *the distribution of the population or habitat of the taxon is severely fragmented or restricted to a limited number of threat-based locations;*
- (b) *there is a continuing decline or reduction in any one of the following—*
 - (i) *extent of occurrence;*
 - (ii) *area of occupancy;*
 - (iii) *area, extent or quality of habitat;*
 - (iv) *number of locations or subpopulations;*
 - (v) *number of mature individuals;*

(3.1.2 is equivalent to IUCN Criterion B)

Evidence:

The species geographic distribution is extremely restricted and (a) it occurs in the listed community 'Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range)' (SAC 1996) and (b) (i) and (ii) is rare in other similar Warm Temperate Rainforest areas, which are similarly restricted in distribution and extent.

Subcriterion 3.1.3 *The taxon's estimated total number of mature individuals is very low and evidence suggests that—*

- (a) *the number will continue to decline at a very high rate; or*
- (b) *the number is likely to continue to decline and any one of the following apply—*
 - (i) *each subpopulation is extremely small;*
 - (ii) *most of the individuals are in one subpopulation;*
 - (iii) *extreme fluctuations occur in the number of mature individual members.*

(3.1.3 is equivalent to IUCN Criterion C)

Evidence:

The species had low numbers of mature individuals before the 2020 bushfires (estimated to be between 1500 and 3000 mature individuals (Rouse 2018)), and these are likely to have been reduced; and (b) the numbers are likely to decline because it existed in (i) small isolated populations, some of which are likely to be locally extinct.

Subcriterion 3.1.4 *The taxon's estimated total number of mature individuals is extremely low.*

(3.1.4 is equivalent to IUCN Criterion D)

Evidence:

The estimated total number of mature individuals of species in Victoria is likely to be extremely low. The taxon is assessed as being eligible for listing as Critically Endangered under Criteria 3.1.1., 3.1.2., 3.1.3 and 3.1.4. The taxon was not demonstrated to be Extinct, or Extinct in the wild.

These criteria are substantially equivalent to listing as Critically Endangered under IUCN criteria A2abc+A3c+A4ac (Rouse 2018).

Documentation

The published information provided to and sourced by the SAC has been assessed. To the best of their knowledge, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Preliminary Recommendation by the Scientific Advisory Committee

Proposed conservation status (category of threat)

List as 'Critically Endangered' in Victoria

As outlined above, the nominated taxon satisfies at least one criterion of the set of criteria prepared and maintained under Division 2 of Part 3 of the Act and stated in Schedule 1 of the Flora and Fauna Guarantee Regulations 2020.

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing as Critically Endangered in Victoria because Primary criterion 3 – subcriteria 3.1.1., 3.1.2, 3.1.3 and 3.1.4 of the FFG Regulations 2020 have been satisfied.

The Scientific Advisory Committee therefore makes a preliminary recommendation that the nominated taxon be supported for listing as Critically Endangered under the *Flora and Fauna Guarantee Act 1988*.

Endorsement by the Convenor of the Scientific Advisory Committee

Date



Emeritus Prof Barbara Evans
Convenor

16 October, 2020

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Internet material

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