Threatened Species Assessment

Korthalsella rubra subsp. *rubra*
Jointed Mistletoe

Taxonomy

Korthalsella rubra subsp. *rubra* (Tiegh.) Engl.

Korthalsella rubra subsp. *geijericola* Barlow from inland parts of southern Queensland and extending to south-western New South Wales grows mainly on *Geijera parviflora*. It differs from the nominate subspecies in having protruding floral cushions composed of a dense mat of white hairs and leaves only 0.2-0.5 mm long and fused as a rim on the face of the internode between the distinct flower clusters (VicFlora 2020).

Current conservation status

Categorised as Vulnerable in the 2014 *Advisory list of rare or threatened flora* (DEPI 2014).

Proposed conservation status

Endangered in Victoria

Criterion A2bc+3c+4bc; B2ab(i,ii,iii,iv,v); C1; D

Species Information

Description and Life History

Plant usually 10–16 cm high, usually branched near base only; internodes strongly flattened in 1 plane, narrow-cuneate to narrow-obovate, usually 10–18 mm long, 3–8 mm wide, contracted at apex, a central raised and distinct vein and usually a pair of lateral longitudinal, less distinct veins present. Leaves paired, 0.5–1 mm long, together continuous around node, membranous. Flowers usually 10–80 per cluster, in 2–5 rows almost encircling node initially, separating as internode expands; basal hairs long, sparse, reddish, mostly in a single row between flowers, not forming a dense protruding cushion; male flowers c. 0.5 mm diam., a few in all rows; female flowers to c. 0.5 mm diam. Fruit less than 2 mm long; seed disc-shaped, c. 1 mm diam. The taxon flowers mostly in spring (VicFlora 2021).

Generation Length

The generation length of *Korthalsella rubra* subsp. *rubra* is estimated to be 15 to 35 (midpoint 25) years. Hartigan (1960) determined that the average life expectancy of *Amyema* on *Eucalyptus* is 10 years, although field observations suggest longevity for many *Amyema* taxa in Victoria is substantially greater than this. Smith and Gledhill (1983) reported a 19-year-old *Viscum* plant, which is in the same family as *Korthalsella*, indicating potential for greater longevity. Field observation of the taxon at The Amphitheatre, Billy Goat Bend, Mitchell River National Park suggests individual plants can remain healthy for decades on a conspicuous individual *Syzygium smithii* host plant at this Dry Rainforest site (David Cameron pers. obs.). David Watson (2019) reports, however, that the generational turnover of the taxon on a variety of hosts in south-eastern Queensland may be only 10-15 years.

Distribution

In Victoria, the taxon is scattered in the lowlands and foothills of East Gippsland from the Mitchell River east to the New South Wales border. It also occurs in New South Wales, Queensland and New Guinea (VicFlora 2020).

Habitat

The taxon occurs in the canopy of mature stands of Warm Temperate Rainforest dominated by *Syzygium smithii (*Lilly Pilly). The taxon is usually parasitic on *Syzygium smithii* (VicFlora 2020) although it has also been recorded on *Elaeocarpus holopetalus* (Black Olive-berry) at Mt Drummer and a wider range of hosts in NSW and Queensland.

Threats

The main threat to the taxon is increased frequency and intensity of fire resulting from climate change. Fire can kill mistletoe species. More fire of greater intensity is likely to penetrate further into the Warm Temperate Rainforest habitat occupied by the taxon. These rainforests would otherwise be protected by their closed canopy, high humidity and soil moisture. Widespread fires would be particularly damaging as mistletoes are reliant on recovering after fire through bird-mediated dispersal of fruits from nearby areas.

Historically the taxon has suffered decline through habitat loss in response to agricultural clearance and intense bushfire. The greatest current threat to the taxon is increased frequency and intensity of fire resulting from climate change. Fire can kill mistletoe species. More fire of greater intensity is likely to penetrate further into the Warm Temperate Rainforest habitat occupied by the taxon. These rainforests would otherwise be protected by their closed canopy, high humidity and soil moisture. Widespread fires are particularly damaging as mistletoes are reliant on post-fire recovery through flying fox or bird-mediated dispersal of fruits from nearby areas.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [*(a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion A2 as Endangered

The population reduction over the past 45 to 105 years is inferred to be 50 to 80 (midpoint 65%), based on (b) and (c) above.

An estimate of past decline is based largely on the identified threats, which eliminate structurally intact mature Warm Temperate Rainforest. A proportion of the known sites were affected by the 2019/20, fires although the full impact of this event on the taxon is unknown. Given the very widespread nature of these fires it is unlikely that recolonisation can be successful before further extensive fires occur.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A2 as Endangered

The population reduction over the next 45 to 100 years is projected to be 50 to 80% (midpoint 65%), based on (b) and (c) above.

An estimate of future decline is based on the projected impact of the identified threats.

Eligible under Criterion A4 as Endangered

The population reduction over any 45 to 105 year period, including both past and future (up to 100 years in the future), is inferred to be 50 to 80% (midpoint 65%), based on (c) above. The causes of reduction may not have ceased, be understood or be reversible.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B2 as Endangered

The Area of Occupancy across the taxon's range is estimated to be 32 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented. Despite the fruit being bird-dispersed, it is unlikely that subpopulations would be recolonised from other subpopulations following extinction because they are too far apart. The typical movement of the Mistletoebird (*Dicaeum hirundinaceum*), a major vector of mistletoe seeds, is restricted to its home range of 20 hectares (Ward and Paton 2007).

It is estimated to have four locations. It has a continuing decline in (i), (ii), (iii) and (v) above. It is likely that more widespread fires and more frequent and severe fires will occur in East Gippsland as a result of climate change which will cause a decline in the quality of habitat, range and numbers.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Eligible under Criterion C as Endangered

The taxon is estimated to have 50 to 250 (midpoint 100) mature individuals. Very few records of this taxon report the number of individuals seen at the record site. Even if they did, it would not give a very good indication of the number of individuals in a subpopulation because plants are likely to be widely spaced within each rainforest stand, and high in the canopy where they will not be easily detected. Circumstantial observations suggest, however, that most occurrences comprise less than 10 mature individuals and total Victorian population size is estimated, with reasonable confidence, to comprise 50-250 mature individuals.

There is an estimated continuing decline of 30 to 50% within two generations.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	<·50	<·250	<·1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO <·20 km2 or number of locations ≤ 5

Evidence:

Eligible under criterion D as Endangered

The taxon is estimated to have 50 to 250 (midpoint 100) mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne. Retrieved from: https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf

Hartigan, D. (1960). The Australian mistletoe. *Journal of Forestry* 58: 211-216.

Smith, P.L. and Gledhill, D. (1983). Anatomy of the endophyte of *Viscum album* L. (Loranthaceae). *Botanical Journal of the Linnean Society* 87: 29-53.

VicFlora (2021). Flora of Victoria, Royal Botanic Gardens Victoria: Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/eecbfbba-57f7-45f0-a8e5-1d27cb9da4dd

Ward, M.J. and Paton, D.C. (2007). Predicting mistletoe seed shadow and patterns of seed rain from movements of the mistletoe bird, *Dicaeum hirundinaceum*. *Austral Ecology* 32: 113-121.