

Chlorovibrissea bicolor Two-tone Vibrissea

Taxonomy

Chlorovibrissea bicolor (G.W. Beaton & Weste) L.M. Kohn

The taxon was first described as *Vibrissea bicolor* and transferred to the genus *Chlorovibrissea*.

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criterion B2ab(iii,v)

Species Information

Description and Life History

An ascomycete fungus with fruit bodies to 18 mm high with fertile heads c. 5 mm across (Fuhrer 2005).

The fruit-body has a height to 20 mm; a thin stem supporting a round head. The head has a diameter to 5 mm; nearly round or lobed; yellow when fresh, drying black; often powdered with white spores; shallow groove (umbilicus) on the underside around top of stem. The stem is central with a diameter to 1 mm; dark green, drying to black and finely scurfy; tough, stiff when fresh, with short hairs. The basal disc is small. The taxon is scattered or in large groups; extremely rare (Grey 2005).

Generation Length

The generation length of *Chlorovibrissea bicolor* is estimated to be 15 to 45 years. This is based on the inferred longevity of individual fallen logs from the time they first became waterlogged, to the time when they decay beyond recognition. The taxon is only capable of colonising decaying logs, whilst required nutrients are available to support the saprotrophic life history of the fungus. It is assumed that the mycelium, which inhabits each decaying log or log sector, results from a single spore germination event. It is also assumed that the resulting mycelial genet persists for the duration of the substrate. The longevity of each fallen log is likely to be considerably shorter than is observed for fallen logs in wet forests, which are elevated above water or waterlogged soil and are not as liable to become waterlogged.

Distribution

All reliable site and specimen records in Australia are confined to southern and central Victoria where known by only four collections in the Australian Virtual Herbarium (AVH): (1) Melba Gully, Lavers Hill, Otways where collected in 1976, (2) Cement Creek, Acheron Way near Warburton where collected in 1977 and confirmed in the 1990s, (3) The Beeches, Myrtle Loop, Lady Talbot Drive near Marysville where collected by the Field Naturalists Club of Victoria Fungi Group in 2005, and (4) The Ada Tree near Powelltown where collected in 2015.

The taxon was also recorded on the Great Ocean Road near Maits Rest, 14 km west of Apollo Bay in the Otways in 1968. The taxon was previously recorded at Amiets Track near Lavers Hill in the Otways but, when the site was revisited more recently, the site was under a pine plantation and the taxon presumed extinct at the site. The taxon is also reported to occur in Big Pats Creek at East Warburton in the Starvation Creek area (Cam Beardsell pers).



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comm. to Bruce Fuhrer). The Atlas of Living Australia (ALA) also records the taxon at Balook and Tarra Valley in the Tarra-Bulga National Park in the Strzelecki Ranges in South Gippsland where recorded in 2013 and 2018.

Habitat

The taxon is a rare ascomycete of wet, shaded fern gullies and rainforest, where it grows on waterlogged and semi-submerged wood (Fuhrer 2005). Specifically, the habitat consists of very wet forests of south-eastern Australia and the substrate consists of wet fallen logs either totally or partially submerged in running water; saprotrophic (Grey 2005).

The taxon is a habitat specialist consistently associated with Cool Temperate Mixed Forest, dominated by Myrtle Beech *Nothofagus cunninghamii* and Southern Sassafras *Atherosperma moschatum*, with an emergent stratum typically dominated by Mountain Ash *Eucalyptus regnans* and with an understorey dominated by Soft Tree-fern *Dicksonia antarctica*.

Threats

The taxon is a habitat specialist highly dependent on the hydrological stability and old-growth condition of its Cool Temperate Mixed Forest habitat. Any disruption to the hydrological stability of the microhabitat, to which the taxon is restricted, threatens the ability of the taxon to produce mature fruit bodies and release spore onto a receptive substrate. The greatest threat to the taxon is therefore climatic drying, and all four Victorian taxa of *Chlorovibrissea* were observed to decline in their fruiting capacity during the 12 years of the Millennium Drought from 1995-2007 (Bruce Fuhrer pers. obs.).

Persistence of the taxon relies on the continued structural integrity of its Cool Temperate Mixed Forest habitat. This Ecological Vegetation Class (EVC) is listed as a threatened community under the *Flora and Fauna Guarantee Act 1988* (FFG Act). This is because of its susceptibility and observed decline in response to climatic drying and warming; the increasing frequency, intensity and landscape scale of bushfire and fuel reduction burning; indirect impact of nearby forestry operations, and the elevated incidence of Myrtle Wilt in response to human activity.

Cool Temperate Mixed Forest is a pyric disclimax community encompassed within Cool Temperate Rainforest, which is also listed as a threatened community under the FFG Act. This is because of its susceptibility and observed decline in response to the above threatening processes.

Myrtle Wilt is a disease uniquely afflicting the Cool Temperate Rainforest canopy-dominant Myrtle Beech (*Nothofagus cunninghamii*). The disease is caused by the airborne fungal pathogen *Chalara australis*. *Chalara* infection leads inexorably to the death of the infected tree, resulting in extensive gap creation, drying out of the understorey, and the decline and death of shade-dependent rainforest taxa, such as *Chlorovibrissea bicolor*. It also leads to an increased risk of fire ingress into the rainforest habitat and stand replacement by sclerophyll forest, as has been documented in the Central Highlands following the 2009 Black Saturday bushfire. Anthropogenically-induced epidemic rates of *Chalara* infection resulting in extensive gap creation in Cool Temperate Rainforest has been listed as a threatening process under the FFG Act.

The taxon is threatened by any physical disturbance which removes tree canopy within the rainforest habitat, including road construction and maintenance, fire management activity, and the construction and maintenance of tourist infrastructure. This last threat is directly implicated by park and reserve management at Melba Gully, Cement Creek, The Beeches, and the Ada Tree.

While conducting an ecological impact assessment prior to the construction of the Rainforest Gallery, the taxon was discovered on a waterlogged fallen log below the Acheron Way at Cement Creek (Fuhrer and Cameron pers. obs.). This necessitated the relocation of the infrastructure footprint to avoid direct impact on the highly localised occurrence of the taxon at the site and to reduce the risk of instigating *Chalara* infection of veteran *Nothofagus* individuals.

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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%

<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p>	<p>based on any of the following:</p>	<p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>
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Evidence:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

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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 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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 (AoO) across the taxon's range is estimated to be 28 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 naturally at the regional and landscape scale. Geographically isolated occurrences are interpreted as distinct subpopulations since they occur at spacings greatly exceeding the likely dispersal range of the taxon, which has spore dispersal mediated by localised air currents within the dense understorey of tall wet forest vegetation at the 10-100 m scale. This precludes the possibility of recolonisation in the event of local extinction.

The taxon is considered to occur in one location as all key identified threats apply across its range and can rapidly affect all individuals of the taxon present.

It has a continuing decline in (iii) and (v) above due to the identified threats.

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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:

Ineligible under Criterion C

It is suspected that there are 50 to 250 mature individuals, but other thresholds under this criterion have not been met.

Criterion D. Very small or restricted population ^α		Critically Endangered ^α	Endangered ^α	Vulnerable ^α
Number of mature individuals (observed or estimated) ^α		< 50 ^α	< 250 ^α	< 1,000 ^α
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. ^α		- ^α	- ^α	D2. Typically: [¶] AoO < 20 km ² or number of locations ≤ 5 ^α

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is estimated to be very restricted.

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

Fuhrer, B. A. (2005) *A field guide to Australian fungi*. Bloomings Books, Melbourne.

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