Threatened Species Assessment

Hypocreopsis amplectens
Clasping Hypocreopsis

Taxonomy

Hypocreopsis amplectens T.W. May & P.R. Johnst.

Hypocreopsis amplectens is a distinctive macro-fungus, first described in 2007 from collections from Australia and New Zealand. It was first observed in Australia in 1993, at Nyora, and was informally known as *Hypocreopsis* sp. "Nyora" until its formal description. Both morphology and DNA-sequence data confirm the conspecificity of the Australian and New Zealand material. Within Australia, the species has been observed at four sites in Victoria, and there are voucher collections in MEL for these localities.

There is an observation from northern New South Wales, that from a photograph is certainly a member of the genus *Hypocreopsis,* and quite similar in appearance to *H. amplectens,* but there is no voucher collection. On balance, given that the species does occur also in New Zealand, this occurrence is accepted. Three years after the original record the observer re-visited the site and could not locate the species.

A sight observation was submitted to Fungimap from Cloister Lagoon (Tasmania) with no supporting image. This record is considered to be incorrect. The site was re-visited by Julie Fielder (c. 2014) using the precise coordinates from the original record, and the taxon was not found, but there were abundant lichens on wood that could be mistaken for *H. amplectens* due to clasping habit.

It is relevant that two other species in the genus (*H. rhododendri* and *H. lichenoides*) are considered rare and listed on informal and/or formal conservation threat schedules for some countries and regions (Ainsworth, 2003). These two species have a similar ecology to *H. amplectens*, growing on wood infected by another fungus, *Hymenochaete* sp..

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *Hypocreopsis* sp. "Nyora" (SAC 2006).

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

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(iii,iv,v); C2a(i)

Species Information

Description and Life History

The taxon forms fruit-bodies on wood but is most likely a myco-parasite rather than a saprobe. Fruit-bodies are often overlying or near fruit-bodies of *Hymenochaete* sp., which is a resupinate fungus, and it is assumed at present that *Hymenochaete* sp.is the host. The identity of the *Hymenochaete* sp. is not known, and nor is it known if there are one or more species of *Hymenochaete* associated with *H. amplectens*. Reproduction is by spores. There are no known resting stages (such as sclerotia) and therefore establishment of new individuals is presumably from spores. Spores are not thick-walled or darkly pigmented, and so are assumed not to survive fire.

Generation Length

The generation length of *H. amplectens* is inferred to be 7 years. For wood-decay fungi, Dahlberg and Mueller (2011) suggest a 20 to 50 years span for 3 generations. The span is based on the time taken for the substrate to decay. Given that *H. amplectens* occurs only on wood and seems to be dependent on a wood-decay fungus *Hymenochaete* sp. as host, it is treated as a wood-decay fugus for estimating generation time. Dahlberg and Mueller (2011) suggest adjusting the generation time according to the durability of the woody substrate. We do not have this information but note that the diameter of substrate for *H. amplectens* is usually around 5 cm, and therefore will decay more quickly than larger substrates. Therefore, we take the lower end of the range (21 years, for 3 generations) and convert to one generation to give 7 years.

Individual fruit-bodies of *H. amplectens* have been observed to persist for up to three years.

Distribution

In Victoria, *H. amplectens* has been observed at four sites: Wanderslore (Yarra Valley), Greens Bush (Mornington Peninsula) and two sites in West Gippsland, Adams Creek Nature Conservation Reserve (near Nyora) and Grantville. It has been a target species of the Fungimap fungi mapping scheme since 1999. In that time, only 19 records have been submitted to Fungimap (of which four are duplicate records of MEL herbarium specimens, and two are from outside of Victoria), making it one of the least recorded of the 100 target species (frequently recorded species have more than 1,000 records). There is a further record in the Victorian Biodiversity Atlas (VBA, also duplicated in Fungimap database). In total, there are 17 separate records of *H. amplectens* from Victoria from the four sites, over the period 1992 to 2018.

Habitat

The taxon occurs in heathy woodlands or forests on dead wood that is mostly standing or partially fallen (rather than lying close to the ground), in relatively long unburnt sites, not burnt for 30 years or more. Host plants include *Leptospermum myrsinoides, L. continentale, Melaleuca squarrosa, Banksia marginata* and *Kunzea leptospermoides* - with *H. amplectens* frequently associated with a species of the fungus *Hymenochaete*, which is assumed to be the host of *H. amplectens*. Several observations note that fruit-bodies are in 'sheltered' or 'shady' areas, but it is also recorded from more open areas.

Threats

Fire is a significant threat, especially repeated fires at short intervals. Due to the occurrence on standing, dead wood of relatively small diameter (about 5-10 cm), the entire substrate could be consumed by fire. It is not known how the taxon re-colonizes after fire, but it is assumed to be from unburnt populations as spores are not expected to survive fire. Because it is a myco-parasite, re-establishment after fire also required re-establishment of the presumed host (*Hymenochaete* sp.). There has been a recent (February 2019) wildfire at Grantville. Whether or not this specifically burnt the *H. amplectens* site and how the individuals were affected, is not yet known. Climate change may potentially increase the intensity and frequency of fires, and increased temperatures. Because the taxon forms fruit-bodies on aerial substrates, of relatively low diameter, it is particularly exposed to higher temperatures. In addition, land clearing is a significant threat. Immediately adjacent to the type locality in the Adams Creek Nature Conservation Reserve, sand mining, which completely removes the native vegetation is being actively carried out. Since the discovery of the species in the 1990s a new sand mine, occupying an area of about 50 hectares has been established.

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:

Ineligible under Criterion A

The past population reduction does not meet the threshold for eligibility under criterion A2, and the future population reduction does not meet the threshold for eligibility under criterion A3.

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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 12 km², based on accepted, post-1970 records from the VBA.

The taxon is estimated to be severely fragmented. Across the whole range, *H. amplectens* occurs in only small areas, even within the current native vegetation, which is often itself highly fragmented, particularly in west Gippsland, where two of the four sites where the species has been observed occur. In addition, where it does occur, it is found within a relatively small area (one to several hectares) within the larger area of the conservation reserves.

It is estimated to have a continuing decline in (iii), (iv) and (v) above, based on the response to the identified threats.

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 C2 as Critically Endangered

It is estimated that there are 72 mature individuals, based on intensive surveys for the species at known and potential locations. It is assumed that each substrate unit (i.e. piece of wood) supports a single mature individual, even when there is more than one fruit-body present. Recording so far has not counted substrate units, only fruit-bodies. However, many of the fruit-bodies are single, and so counts of fruit-bodies more or less match counts of individuals.

Intensive surveys at Wanderslore have located 21 fruit-bodies. At Nyora, at any one time, there have only been in the order of 10 fruit-bodies. At Grantville, at any one time there have only been in the order of 5 fruit-bodies. No more than 5 fruit-bodies have been reported from Green's Bush. The total mature individuals observed over all time is therefore 41. It is noted that not all are necessarily mature, as some may be immature (not showing ostioles) or overmatured (decayed and no longer releasing spores). Therefore, the counts are maximums, and the number of mature individuals may be less.

To allow for unreported fruit-bodies at known sites, figures are doubled. The population at Green Bush is considered extinct because several surveys in recent years have failed to locate fruit-bodies there. Therefore the current population is estimated on the basis of maximum 36 observed fruit bodies as 72 individuals, of which 42 are at Wanderslore.

For the related Northern Hemisphere species (*H. rhododendri*) a specific polymerase chain reaction (PCR) assay has been developed (Grundy et al., 2012). Use of this assay on wood samples showed that *H. rhododendri* does not form mycelia within stems of the plant but is considered to be growing in and on the fungal substrate. Therefore, counts of fruit-bodies are a reasonably accurate way of counting genetic individuals, and would only miss mycelial phases growing on the fungal host. If there is a mycelial phase on the host, it is not known if this phase would produce "crops" of fruit-bodies, or if there would be a single phase of fruit-body production. If there is a single phase, then any mycelia would not represent mature individuals.

Due to the small diameter of the underlying wood, it is unlikely that there would be multiple flushes from a mycelium beyond the inferred generation time of 7 years.

The number of mature individuals is projected to continue to decline, and the number of mature individuals in each subpopulation is 50 or fewer.

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

It is estimated that there are 72 mature individuals.

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

References

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