Threatened Species Assessment

Hakea asperma
Native Dog Hakea

Taxonomy

Hakea asperma Molyneux & Forrester

Current conservation status

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

Proposed conservation status

Critically Endangered in Australia

Criteria B1ab(iii); D

Species Information

Description and Life History

The taxon is a suckering shrub to c. 1.3 m high; stems erect; branchlets glabrous. Leaves rigid, terete, (2-)3-9(-10) cm long, 0.8-1.3 mm wide, not grooved, white-pubescent when young; apex straight. Inflorescence 6-10-flowered; rachis 1-1.5 mm long, sericeous; pedicel c. 5 mm long, sericeous; perianth 4-4.5 mm long, white, glabrous, rarely with silky hairs at base; pistil 7-8 mm long; pollen presenter an oblique disc. The taxon flowers in November (1 record) (VicFlora 2018).

The taxon is known to only reproduce asexually via root-suckers (VicFlora 2019). The taxon extends by single ramet production along buried or occasionally exposed roots (its obligate method of population extension), has only terete leaves, a sericeous rachis, and sets no fruit. While pollen has been observed escaping from anthers of *H. asperma*, no testing has been undertaken by the authors to ascertain its viability, nor whether any fertilisation takes place. Future DNA studies may shed light on the inability of *H. asperma* to set fruit. The taxon persists by ramet production. The taxon flowers early November to mid-December (Molyneux & Forrester 2009).

Generation Length

The generation length of *H. asperma* is inferred to be 1,000 years. Each known occurrence comprises one or very few vegetative clones which appear to have lost the capacity to produce fruit or seed perhaps as long ago as the end of the last ice age. The taxon is currently known by three clonal stands which, in the absence of seed recruitment, are inferred to be of inestimable age.

Distribution

The taxon is endemic to Victoria and located at three sites in East Gippsland, above the north side of at Native Dog Flat on the Upper Buchan River (the type population), Native Cat Flat on the Nunniong Plateau, and the headwaters of Splitters Creek, south of Mt Wombargo (Molyneux and Forrester, 2009; VicFlora, 2018).

Habitat

The taxon occurs on the lower slopes of a small steep hill of Devonian igneous origin, where sufficient soil depth and area exists to support the root systems between broken, often buried rock. An occasional root is exposed growing over shallow rock. Associated eucalypts include *Eucalyptus* sp. aff. *stellulata* (an undescribed mallee with several locally endemic populations), a dwarf form of *E. pauciflora* subsp. *pauciflora, E. rubida* and *E. viminalis* subsp. *viminalis*. Other associated taxa include *Bossiaea foliosa, Daviesia latifolia, D. ulicifolia, Goodenia*

hederacea, Lomatia myricoides, Persoonia confertiflora and *Polyscias sambucifolius* (Molyneux and Forrester 2009; VicFlora 2018).

Threats

The overriding threat to the taxon is climatic drying, leading to an increasing risk of repeat fire events which are projected to increase the risk of recruitment failure (death of vegetative resprouts), increase the exhaustion of root system resources and increase exposure of resprouts to browsing by Sambar Deer (*Rusa unicolor*) in particular. Clonal stands in flood-prone valleys or flats are also at risk of recurrent flood damage. Extreme and protracted drought stress may also result in recruitment failure. The taxon also has an exceedingly small population size, which may comprise no more than a single or very few genetic individuals or genets at each known site, which renders the taxon highly susceptible to extinction by repeat fire events or other stochastic events.

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

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.

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 60 km², based on three reliably documented subpopulations.

The taxon is severely fragmented naturally at the landscape scale since it is apparently inability of seed set and therefore has no capacity for recolonisation in the event of local extinction. Each occurrence is interpreted as relictual, having survived by vegetative resprouting for, potentially, thousands of years.

One to three locations are identified, since the key threat of climatic drying operates uniformly across the highly restricted geographic and ecological range of the taxon.

It has a continuing decline in (iii) above, based on increasing risk of fire and browsing by Sambar Deer.

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

The taxon is estimated to have 3 mature individuals, but other thresholds under this criterion have not been met.

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 Critically Endangered

Each known occurrence may comprise no more than a single or very few genetic individuals (Molyneux & Forrester 2009).

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

Molyneux, W.M. and Forrester, S.G. (2009). A new *Hakea* species Proteaceae: Grevilleoideae from East Gippsland, Victoria. *Muelleria, 27*(2), 225-226.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Hakea asperma*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/1971d688-5191-4589-b85a-40070c7143e8