Threatened Species Assessment

Corynotheca licrota
Sand Lily

Taxonomy

Corynotheca licrota R.J.F. Hend.

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criteria A2ce+4ce; D

Species Information

Description and Life History

The taxon is a tufted, rhizomatous perennial herb to c. 70 cm high with fibrous, sometimes rather fleshy roots. Leaves grass-like, linear, flat, shining, to 60 cm long, often withering early, reduced to bracts on the inflorescence. Inflorescence erect, widely branched. Flowers solitary or in clusters of up to 6, 8-12 mm wide, white to pale yellow; perianth segments spreading, 3.5-5.5 mm long, longer than the stamens, petals emarginate. Capsule pendulous, ovoid to obovoid, to 7.5 mm long. Seeds 1-5 per fruit, 2-2.5 mm long, caruncle with 2 prominent lobes (resembling miniature moose-antlers). The taxon flowers between September and November (VicFlora 2021). The leaves of the taxon appear after cool-season rains and are present for much of the time without a flower-stem, where flowering takes place over a relatively short period (Cunningham et al. 1992).

This short-lived herbaceous species responds positively to disturbance, notably including fire, and is reproductive within a year of germination. It remains reproductive for a small number of years (up to 5-10) and then retreats to the soil seed store between disturbances. It may germinate and establish in the absence of fire but requires (very) open ground layers in its habitat and few trees. Survival rate within the soil seed store is unknown but is suspected to be extended (quite a few decades).

Generation Length

The generation length of *Corynotheca licrota* is inferred to be 30-50 to 80-100 years. Two contrasting interpretations of the current and pre-settlement behaviour of the taxon are available.

One expert suggests the taxon is a short-lived herbaceous species which responds positively to disturbance, notably including fire, is reproductive within a year of germination, remains reproductive for only a small number of years (up to 5-10) and then retreats to the soil seed store between disturbances. It may germinate and establish in the absence of fire but requires (very) open ground layers in its habitat and few trees. Survival rate within the soil seed store is unknown but is suspected to be extended (quite a few decades). The generation length is considered difficult to assess as the taxon is now largely restricted to highly disrupted sites which now experience much shorter generations than prior to European settlement. On this interpretation generation time could be as low as 2-4 years if subject to frequent disturbances or up to 80 years if dependent on very infrequent fire events to promote recruitment.

By contrast, a second expert infers that fire-promoted regrowth is from persistent rootstocks rather than fire-cued seed recruitment, and is confident that longevity is at least 30 years and plausibly 50-100 years, noting the likely

persistence through the Millennium Drought of a 1995 record on Mournpall Track on the northern boundary of the Hattah-Kulkyne National Park. Seed recruitment is agreed to be fire-cued, but may also occur in good seasons. On this interpretation generation time is based largely on fire intervals under undisturbed pre-European settlement conditions and is therefore arguably 50 years or more.

Distribution

The taxon is restricted in Victoria to a few sites in the northern Sunset Country and Hattah area in the far northern Mallee region. It has been recorded in the Murray-Sunset and Hattah-Kulkyne National Parks (NP) and Annuello Flora and Fauna Reserve, with a southern outlier in Baring Bushland Reserve, a small reserve west of Patchewollock. Its range extends to inland parts of all mainland states, namely WA, NT, SA, NSW and Queensland (VicFlora 2021).

Habitat

In Victoria the taxon occurs on sand dunes with mallee-scrub or Pine-Buloke (*Callitris gracilis* and *Allocasuarina luehmannii*) woodland (VicFlora 2021). The taxon is largely restricted to former or extant semi-arid woodland on dune country. It occurs on highly disturbed former woodland dunes in Hattah-Kulkyne NP and the few Sunset Country records are from similar woodland sites, though somewhat less disturbed. These soils are free draining, barely colonised loamy sands. Site data indicates the core habitats from Annuello through Hattah-Kulkyne to Rocket Lake are primarily sandy sites where primary soil texture in the topsoil layer is loamy sands, the Pink Lakes site is likely to be a similar soil texture but close to saline ground water influence. The site west of Patchewollock appears to be an outlier in a different soil type with some influence of calcrete in the sub-soil, noting the site in the northern Annuello Flora and Fauna Reserve may also have calcrete influence and likely to be ecotonal between Loamy Sands Mallee and Red Swale Mallee, as suggested by the presence of *Grevillea huegelii, Halgania andromedifolia, Olearia muelleri, O. pimeleoides* and *Westringia rigida.*

Threats

Historically, the taxon is likely to have suffered only modest decline through habitat loss to agriculture since siliceous loamy sands were cleared for agriculture only at the periphery of the known range of the taxon in Victoria, in contrast to the preferential clearing of siliceous loamy sands in South Australia. However, the taxon is likely to have suffered significant historic decline in population density in response to heavy browsing by stock, kangaroos, goats and rabbits. Browsing continues to be a key current and ongoing threat to the taxon.

Although the leaves of the taxon do not appear to be particularly palatable to stock, they are grazed at times. This occurs particularly during the drier winter-spring periods, when ephemeral grasses and forbs are not abundant (Cunningham et al. 1992).

The principal current threat is from uncontrolled rabbit browsing and overabundant kangaroo browsing. Both rabbits and kangaroos are currently subject to concerted control efforts within Hattah-Kulkyne NP, with less effective efforts in the Murray-Sunset NP. Rabbit control is only partially achieved in Hattah-Kulkyne NP, but macropod control is effective. Occurrences within Hattah-Kulkyne NP are currently protected by exclusion of stock grazing, and by targeted control of kangaroo and rabbit population densities. The taxon is therefore conservation-dependent within the reserve system, dependent on current and future exclusion of stock grazing and control of native and exotic herbivores.

The taxon seems well able to survive and reproduce in weedy habitats that no longer support Semi-arid Woodland. It also occurs in far more arid sites further inland and is not suspected to be greatly threatened by climate change at present. However, climatic drying and reducing reliability of winter-spring rains may threaten the taxon in the longer term, with reduced leaf and flower production. As a result, this increases the long-term risk of seedbank depletion and eventual exhaustion and local extinction. However, the time frame over which this risk is likely to operate may be at the generational time-scale. In the short to medium-term, climatic drying and changing seasonality from reliable winter-spring to monsoonal driven summer rainfall, are likely to increase the risk of targeted browsing by herbivores during drier winter-spring periods.

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 90 to 300 years is inferred to be 30 to 70% (midpoint 50%), based on (c) and (e) above.

An estimate of past decline is based substantially on habitat loss for cropland, exacerbated by periods of rabbit plague and overabundant kangaroos.

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

Eligible under Criterion A4 as Endangered

The population reduction over any 90 to 300 year period, including both past and future (up to 100 years in the future), is inferred to be 0 to 90% (midpoint 50%), based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Past decline is based on habitat loss for cropland, exacerbated by rabbits and kangaroos. Future decline cannot be estimated with confidence since the impact of browsing by rabbits and over-abundant kangaroos is highly dependent on the maintenance and success of control measures within parks and other reserves. Furthermore, the magnitude of other emerging threats, such as the direct and indirect impact of climatic drying and warming and changing seasonality, cannot be predicted. If current browsing controls are maintained the taxon is expected to slowly increase in abundance, at least until other emerging threats overtake browsing as the key threat.

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:

Ineligible under Criterion B

The Extent of Occurrence across the taxon's range is estimated to be 4,200 km² and the Area of Occupancy (AoO) is estimated to be 39 km², but other thresholds under this criterion have not been met.

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 estimated that there are 50 to 250 (midpoint 150) 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 Endangered

It is estimated that there are 50 to 250 (midpoint 150) mature individuals (I. Sluiter pers. comm.). However, since there are at least 15 discrete stands documented, at which tufts or ramets are potentially clonal, connected by rhizome, a lower bound of 15 mature individuals or genets is plausible.

A second opinion considers the taxon to be is a short-lived disturbance ephemeral, with fluctuating population size, often represented only by a soil-stored seedbank, with population size ranging from 0 through 450 to an upper bound of 1000 mature individuals. This opinion noted that the preferred habitat has been preferentially selected and cleared and suffered major disruption from high (past) populations of rabbits and suggests that, for most of its life history, this taxon may have no mature individuals in the field.

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

References

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VicFlora (2020). Flora of Victoria, Royal Botanic Gardens Victoria: *Corynotheca licrota.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/ab22ce96-b3f6-45fe-b7a4-6551256d4b67