Threatened Species Assessment

Cullen tenax
Tough Scurf-pea

Taxonomy

Cullen tenax (Lindl.) J.W. Grimes

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *Psoralea tenax* (SAC 1989).

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

Proposed conservation status

Endangered in Victoria

Criteria A2ace+3ce; B2ab(ii,iii,iv,v)

Species Information

Description and Life History

Trailing or ascending perennial herb; stems to c. 50 cm long, glabrous or with sparse minute, appressed hairs. Leaves palmately 5-7-foliolate, to c. 15 cm long; leaflets linear-lanceolate to oblong-elliptic, 1-6 cm long, 1-5 mm wide, both surfaces glabrescent, dotted with glands, apices more or less acute, margins entire; stipules ovate, 2-4 mm long. Inflorescence rachis 2-6 cm long; peduncles 5-15 cm long, mostly longer than subtending leaves; flowers mostly in 2s or 3s along rachis; pedicels to c. 1.5 mm long; bract ovate, to c. 2 mm long, hairy; calyx campanulate, 2-5 mm long, sparsely hairy, teeth unequal, upper 4 about as long as calyx tube, lower one larger and longer than others; corolla 2-5 mm long, mauve or bluish. Pod ovoid, 2-4 mm long, included in calyx, glabrous, rugose-wrinkled, black; seed 1, c. 2.5 mm long, yellowish. Flowers most of the year (VicFlora 2019).

Generation Length

The generation length of *Cullen tenax* is estimated to be 20 to 25 years. Generation length is based on a longevity of 50 years or more and field observations, suggesting that the taxon recruits episodically in response to good seasonal rainfall or flood events at pre-settlement intervals determined by El Nino and La Nina cycles. There is little or no recruitment pulsed by fire alone, since the taxon can readily resprout following fire from well-established rootstocks.

Distribution

The taxon is widespread in Victoria, but is now much depleted from its former range and is seldom collected. It generally grows in drier parts of the state (VicFlora 2019).

Habitat

C. tenax formerly occupied a wider range of habitats than the present range, but all localities share the features of relatively fertile soils with average annual rainfall at or below 550 mm per annum. A degree of seasonal waterlogging would occur at most localities, the most notable exception is the Deddick River locality in East Gippsland which is gravelly ground in steep hilly country. Typically, *C. tenax* grows in the drier parts of the state and is found on grasslands or grassy woodlands in areas subject to seasonal flooding, frequently at sites slightly elevated above the level of the heavy floodplain clays. It is also found in and around sandy ephemeral streams and creek beds (SAC 1989; VicFlora 2019).

Perceptions of the taxon being associated with rocky sites are presumably an artefact of settlement history, such occurrences being relict populations in sites protected from both herbivory, and to some extent from competition from long unburnt *Themeda triandra* (Kangaroo Grass) and other native and exotic grasses.

The northern floodplain habitat is clearly different from plains populations in the south, since the former is subject to cyclical flood events which largely determine extent of competition e.g. pre-European settlement flood events in late spring to early summer were likely to favour *C. tenax* recruitment and vegetative spread and vigour at expense of or in the absence of serious grass competition (SAC 1989).

Threats

Land clearance, cultivation and heavy grazing have eliminated the taxon over most of its former range. It has failed to survive in the usual refuges such as railway reserves and roadsides. The taxon flowers in summer and autumn; it is likely that regular summer burning eliminates the taxon by preventing effective flowering and seeding. Severe summer drought periods combined with grazing pressure during such periods would tend to eliminate the plant. The major threats to the survival of the taxon may therefore be summarized as follows: excessive grazing by stock, rabbits and native animals, further reduction of natural habitat by land clearing, incorrect timing of summer burning resulting in destruction of seed, and natural causes such as floods, fire and drought (SAC 1989).

The taxon has a limited capacity to withstand competition from *T. triandra* and other grasses and is therefore threatened by an overabundance of these grasses in response to unnatural imposed grazing and fire regimes.

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 60 to 75 years is estimated to be 30 to 50%, based on (a), (c) and (e) above.

Past decline is based on habitat loss to agriculture, browsing pressure and unfavourable fire regimes. Historic decline since European settlement is likely to exceed 80% but a significant proportion of this decline in response to habitat loss and modification occurred prior to 1930.

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

Eligible under Criterion A3 as Endangered

The population reduction over the next 60 to 75 years is projected to be 30 to 50%, based on (c) and (e) above.

Future decline is based on the projected impacts of the identified threats.

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 (AoO) across the taxon's range is estimated to be 321 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 landscapes scales and anthropogenically at the landscape scale with individual occurrences at separations exceeding the dispersal range of the taxon, which has no specialised mechanism for long-distance dispersal.

It is estimated to have 2 locations. It has a continuing decline in (ii), (iii), (iv) and (v) above, based on the current and projected impact of the identified threats. It should be noted that recent local extinctions have been documented at sites in freehold paddocks at Warrambine near Skipton.

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 as Data Deficient

No reliable estimate of the total population size for the taxon is available.

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 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.

SAC (1989). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 96 *Psoralea tenax*.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Cullen tenax*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/dc36ae09-d32d-4c8e-8280-7db6bf903906