

Cyperus nervulosus Annual Flat-sedge

Taxonomy

Cyperus nervulosus (Kuk.) S.T. Blake

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2001).

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

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(iii)c(iv)+2ab(iii)c(iv)

Species Information

Description and Life History

Dwarf tufted annual. Culms trigonous, smooth, to 20 cm high, to 1 mm diam. Leaves not septate-nodulose, as long as culms or much shorter, to 2 mm wide. Inflorescence simple, of 2-6 branches to 6 cm long, or head-like; spikes short, broad-ovoid, to 4 cm diam.; involucre bracts leaf-like, 2-4 exceeding inflorescence. Spikelets flattened, 5-20 per spike, 5-20 mm long, 2-3 mm wide in side view, 6-54-flowered; rachilla not or scarcely winged, persistent; glumes obtuse, with excurved mucro to 0.7 mm long, with keel 3-5-nerved, sides hyaline, pale yellow- to red brown, 2-2.5 mm long (excluding mucro); stamens 2; stigmas 2. Nut biconvex, elliptic, from one-third to one-half as long as glume body, 0.5-0.8 mm long, 0.3-0.5 mm wide, grey to blackish, colliculate, patterned in fine longitudinal rows,. The taxon flowers in spring-summer (VicFlora 2017).

Generation Length

The generation length of *Cyperus nervulosus* is estimated to be 5 to 25 years. This is based on the plausible frequency of pre-settlement flood events which are likely to have been triggered by La Nina cycles at 2-7 year intervals for sites directly connected to Murray River system and its anabranches such as Hattah and Mildura and less frequently for lake systems such as Lake Carpul which relied on local rainfall events.

Distribution

The taxon is apparently confined in Victoria to the far north-west (Mildura, Hattah Lakes, Robinvale) (VicFlora 2017). The taxon is more likely to persist at Mildura and Lake Carpul, where it was last collected in 1982 and 1977 respectively and much less likely to persist at Lake Hattah where it was last collected in 1953. Regular monitoring of vegetation in the Lake Hattah area has been undertaken since it was last collected at this site, with no further detection of the species, suggesting it may have become locally extinct at this site.

Habitat

The taxon is found occasionally on damp sandy soil fringing receding water in lakes and watercourses (VicFlora 2017).

(SAC 2001).noted that *C. nervulosus* is an extremely localised plant occurring in seasonally wet sites in far north-west Victoria between Mildura and Robinvale. It is known only from four collections at the National Herbarium, and

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only two of these since the 1950's. The data presented on distribution and abundance are the result of reasonable surveys and provide clear evidence that the taxon is rare in terms of abundance and distribution

Threats

The taxon is vulnerable to population decline resulting from habitat loss and modification (SAC 2001).

Historically, the taxon may have declined in response to habitat loss and modification to agricultural activity e.g. Hattah-Kulkyne district and peri-urban infrastructure e.g. Mildura district. The key current and future threat is reduced reliability, seasonality, frequency and amplitude of flood events in response to diversion for agriculture, climatic drying and environmental watering regimes which may not simulate pre-settlement hydrological regimes. Flooding is now exceedingly rare and dependent on La Nina events and environmental flows are at the discretion of the water manager.

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.

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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

The taxon is estimated to be severely fragmented anthropogenically at the landscape scale within Victoria, since recolonization is greatly compromised by reduced reliability of flooding.

It is estimated to have 1 location and has a continuing decline in (iii), due to the reduced reliability, seasonality, frequency and amplitude of flood events in response to diversion for agriculture, climatic drying and environmental watering regimes which may not simulate pre-settlement hydrological regimes. Flooding is now exceedingly rare and dependent on La Nina events. Flooding is no longer reliable and dependent on environmental flows at the discretion of the water manager.

It is estimated to have extreme fluctuations in (iv) above. It was subject to extreme fluctuation in population size under pre-settlement conditions in response to flood events triggered by La Nina cycles. Population size of each cohort would have been determined by the size and viability of the soil-stored seedbank, the duration and habitat penetration of floodwaters and recruitment success.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has 1 location, has a continuing decline in (iii) and extreme fluctuations in (iv) above.

The taxon is estimated to be severely fragmented, is estimated to have 1 location and has a continuing decline in (iii) and extreme fluctuations in (iv) above.

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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 as Data Deficient

There is no available evidence to support an estimate of the current population size, since the taxon has not been observed, collected or monitored in recent years. Also, population size is very difficult to estimate since it is known to fluctuate significantly in response to seasonal conditions.

Criterion D. Very small or restricted populations		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 km ² 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.



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SAC (2001). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Flora and Fauna Guarantee, Nomination No. 570 *Cyperus nervulosus*.

VicFlora (2017). Flora of Victoria, Royal Botanic Gardens. *Cyperus nervulosus*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/bf6bc9bb-b145-40a9-93ac-8a3111d5a0b5>