Threatened Species Assessment

Cyperus subulatus
Pointed Flat-sedge

Taxonomy

Cyperus subulatus R. Br.

The typical form of this taxon, found on the coast of Queensland (Qld) and New South Wales (NSW), is tall (to 50 cm), with glumes 2.8-3.5 mm long and mostly red-tinged, and nuts 1.5-1.7 mm long and c. 0.7 mm diam. The plants found in inland Victoria, Qld and NSW are smaller (culms to 25 cm high), with glumes c. 2.5 mm long and often with little or no reddish tinge, and nut c. 1.2 mm long, c. 0.5 mm diam. They may represent a separate taxon (VicFlora, 2019).

Current conservation status

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

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a tufted perennial with very short rhizome. Culms trigonous, smooth, slightly swollen at base, to 50 cm high, 1.5 mm diam. Leaves not septate-nodulose, often as long as culms, 1-2 mm wide. Inflorescence simple, with 3-5 branches to 8 cm long; clusters spicate to subdigitate, broad-cylindric to obovoid, to c. 1 cm long, c. 5 cm diam.; involucral bracts leaf-like, 2 longer than inflorescence. Spikelets somewhat flattened, 6-20 per spike, 8-30 mm long, 1-1.5 mm wide inside view, 5-16-flowered; rachilla broadly winged, persistent, or spikelet felling as unit; glumes rather remote, somewhat appressed, with sides 1-3-nerved near keel, greenish tinged red-brown, 2.5-3.5 mm long; stamens 3; style 3-fid. Nut trigonous, narrow-obovoid to ellipsoid, yellow-brown to blackish, c. one-half as long as glume, 1.2-1.7 mm long, 0.5-0.7 mm diam. The taxon flowers from Spring to Summer (VicFlora, 2019).

Generation Length

The generation length of *Cyperus subulatus* is estimated to be 15 to 40 years. Generation time is difficult to estimate since longevity, mortality, and recruitment mode are uncertain. The longevity is plausibly 15-40 years. If drought and intense grazing by native herbivores resulted in mortality under pre-settlement conditions, then pulse recruitment is likely to have occurred following inundation at a pre-settlement interval of 10-25 years in response to La Niña cycles.

Distribution

The taxon is rare in Victoria, recorded in recent times only from the Jeparit and Natimuk areas (pre-1900 records exist from the Dimboola area). The taxon is also found in Queensland and New South Wales (VicFlora, 2019).

The taxon has been reliably recorded at only 4 Victorian sites in the Western Wimmera. In 1985, a collection was taken on freehold land 1.5 km north of Jeparit. It is unlikely that this occurrence survives since it was regarded as a weed in a wheat paddock and controlled with herbicide. In 1963, the taxon was collected at Clear Lake south-west of Natimuk. In 1991, the taxon was also collected on the shore of Clear Lake. In 1984, the taxon was also at the

Jallumba Swamp Wildlife Reserve south of Natimuk. In 1984, the taxon was also collected at a small lake on public land 3 km west-north-west of Clear Lake. This site is now included within the Jilpanger Nature Conservation Reserve. Three collections in the Shire of Dimboola in 1895 are imprecise district records and may have been taken at any of the above sites or at other sites where it is now likely to be locally extinct. The Victorian occurrences are remarkably disjunct from the closest interstate record in the Gundabooka National Park near Bourke in northern New South Wales.

Habitat

The taxon is recorded in recent times only from seasonally inundated areas (VicFlora, 2019). The Jeparit collection was taken in a wheat paddock on a hill in light sandy soil. The Clear Lake collection was found growing on the sandy shore of the lake in association with *Eleocharis gracils*.

Threats

The taxon is likely to have suffered significant historic decline in response to agricultural activity in close proximity to or intruding into, the inferred habitat of the taxon (namely, seasonally inundated swamps or margins of permanent lake systems). These wetlands, which range from freshwater to brackish or even quite saline, form an archipelago of often degraded remnants in an intensively cropped dryland agricultural landscape across the Western Wimmera. Most of these lakes are exposed to edge effects including weed invasion, sheep grazing, herbicide spray drift, eutrophication from fertiliser application, and fire break construction. Many have had their ecotones long cleared for cropping, and others are subject to incremental habitat loss through agricultural intensification on freehold land. All are subject to climatic drying which extends the duration and intensity of drought and lowering of water tables, thus reducing the opportunity for seed-based recruitment. Some lake systems become salinised and others hypersaline, exceeding the salinity tolerance of freshwater taxa.

It is likely that the Jeparit occurrence, which was in a wheat paddock, was eliminated in 1985 by inaccurate weed control.

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 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). It should be noted that the 3 extant occurrences occur in a straight line, connecting Jalumba Swamp with a small lake 3 km west-north-west of Clear Lake. Clear Lake itself lies directly between the other two sites. The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within the EoO.

The taxon is estimated to be severely fragmented naturally and anthropogenically at the landscape scale. Geographically isolated stands occur at separations typically exceeding the dispersal range of the taxon which has no specialised mechanism for long-distance dispersal. This precludes the possibility of recolonisation in the event of local extinction.

It is estimated to have 1 location. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above based on the current and projected impact of the identified threats.

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 abovr, it is severely fragmented, has 1 location and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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 estimate of population size for the taxon.

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.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens: *Cyperus subulatus*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/ea8ee1f1-96f5-4393-a029-691e24b08ea1