

Zannichellia palustris Horned Pondweed

Taxonomy

Zannichellia palustris L.

Current conservation status

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

The taxon is an annual or perennial monoecious herb. Leaves opposite, 2-7 cm long, <1 mm wide; margins entire; apex acute with a mucro. Male flowers (2-)4(-8)-locular. Female flowers with minute c. 1 mm long cup-like perianth; style c. 1 mm long. Fruit 2-4 mm long, dorsally curved. The taxon flowers and fruits September to April (VicFlora 2021).

Generation Length

The generation length of *Zannichellia palustris* is inferred to be 1 to 25 years (midpoint 5 years). The taxon is a facultatively annual or weakly rhizomatous perennial which is inferred to recruit from soil-stored seedbanks, in the event of the water body (in which an occurrence has been observed) drying out completely. It is unclear whether this occurred naturally at the time of European settlement or whether it is an artefact of imposed hydrological regimes. If seed recruitment is a regular event, then it is likely to have been cued at the time of European settlement by flood events at intervals determined by El Niño and La Niña cycles.

Distribution

The taxon is only known in Victoria from a single record in a swamp near Kerang. There are several records of this taxon in wetlands off the Murray River immediately downstream of the Victorian border. It is possible that more populations exist in north western Victoria (VicFlora 2014).

Habitat

The taxon occurs in fresh or slightly saline water, in swamps, and slow-moving water (VicFlora 2014). At Johnson Swamp, the taxon was recorded in water 30 cm deep in association with *Myriophyllum caput-medusae* and *Vallisneria americana*, taxa that are characteristic of permanent or at least semi-permanent wetlands. Since Johnson Swamp used to be linked into the irrigation system, filling up and maintained in an unnaturally wet and macrophyte dominated condition with macrophytes such as *Phragmites* or *Typha*, the occurrence at this site may be opportunistic and adventive. The site is likely to have been unsuitable habitat for the taxon at the time of European settlement.

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Threats

On the assumption that the Johnson Swamp occurrence can be considered indigenous to Victoria, the taxon is threatened by imposed hydrological regimes including water diversion for agriculture, and unnatural depth and duration of flooding. It is also threatened by inappropriate environmental watering of sites such as Johnson Swamp, which had been held artificially wet prior to 1999 resulting in an unnatural overabundance of macrophytes such as *Phragmites australis* or *Typha* taxa.

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 style="text-align: center;">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>			

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.

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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 4 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 based on its limited dispersal ability, the barriers to dispersal, and/or the lack of habitat separating them. Such fragmentation precludes the possibility of recolonisation in the event of local extinction.

It is estimated to have 1 location, and has a continuing decline in (iii) above based on the impacts of current and future identified threats, such as imposed hydrological regimes.

It is inferred to be subject to extreme fluctuations in (iv) above, at least under the current management of the Johnson Swamp site.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is estimated to be severely fragmented, has 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 insufficient evidence to determine the number of mature individuals.

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. 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

VicFlora (2021). Flora of Victoria, Royal Botanic Gardens Victoria: *Zannichellia palustris*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/96e5e5c4-9494-4885-b4c4-cc9f7007bc1b>