Threatened Species Assessment

Nymphoides spinulosperma
Marbled Marshwort

Taxonomy

Nymphoides spinulosperma Aston

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

Endangered in Victoria

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

Species Information

Description and Life History

The taxon is a perennial; stems to 1.5 m long, floating, stoloniferous. Petioles of basal leaves 11.5-47 cm long; blades very broad-ovate or sometimes near-circular, (2.5-)4-9.5(-12) cm long, usually mildly crenate, sometimes entire, deeply cordate, upper surface often mottled green and maroon-brown, sometimes green only, typically with a small cyclamen-coloured spot at the point of petiole insertion. Flowers heterostylous, in spaced pairs along short inflorescence; calyx 7.5-11 mm long; corolla 24-42 mm diam., lobes 5, with broad laciniate wings, not keeled; stigmas 2. Capsule 7.5-11 mm long, c. equal to calyx; seeds ellipsoid, strongly laterally compressed, 1.1-1.5 mm long, black when mature, moderately densely covered with long fine tapered acute tubercles 6 or more times as long as wide; caruncle circular, prominent. Flowers and fruits mostly from November to February (VicFlora 2018).

N. spinulosperma is an aquatic perennial herb with broad, floating leaves, attached by long stems to floating stolons. The stems bear yellow flowers which have five petals, each with a finely fringed wing on each side (SAC 2001).

Generation Length

The generation length of *Nymphoides spinulosperma* is inferred to be 5 to 20 years. This is based on a longevity of potentially decades, and field observations of seed germination on a cycle with a frequency of annual to several years.

Distribution

In Victoria, the taxon is confined to a few widely spaced localities, and is known only from the Wannon and Wimmera botanical regions where it is recorded from Leah Swamp near Apsley and from four locations in the St Arnaud-Marnoo area (Aston 1997). Only two populations occur in reserves (SAC 2001).

Habitat

In Victoria, the taxon occurs only in seasonal to permanent freshwater swamps to 75 m deep. The swamps are dominated by *Eragrostis infecunda* at altitudes from 150-170 m, and sited mostly in open grazing lands (VicFlora 2018; Aston 1997).

Threats

The taxon is threatened by historic and continuing habitat loss to agriculture and hydrological modification in response to draining of wetlands. It is also threatened by cropping, weed invasion and, increasingly, by climatic drying and warming, which results in increasing frequency, intensity, and duration of extreme drought. Climatic drying also results in reduced reliability of seasonal flooding, reliable seed-based recruitment, and increased mortality of rootstocks.

The taxon is apparently at risk from its very localised occurrences, its dependence on seasonal flooding of shallow swamplands, and the fact that all except two of its known populations are on private property subject to grazing and/or cultivation. The two exceptions are quite small wildlife reserves in Victoria. The restricted nature of the taxa's distribution means *N. spinulosperma* is threatened by stochastic events (SAC 2001).

Leah Swamp, west of Apsley, was visited in November 2008 when it was fully inundated with abundant Growling Grass Frogs and extensive *Myriophyllum variifolium*. However, there were no *Nymphoides* under the Red Gums, and no Cane Grass, mostly a sedgy-forby ground layer. St Arnaud is mostly Cane Grass dominated, and one site was cropped and obliterated in 2012. Searches for the taxon were conducted in 2012 at all of the known sites between St Arnaud and Marnoo, however swamps were all dry and water only occurred in dams, so no *Nymphoides* were seen.

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 Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 451 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally at the regional and landscape scales, and anthropogenically at the landscape scale. All occurrences are in discrete waterbodies situated at separations exceeding the low inferred dispersal range of the taxon, therefore the probability of recolonisation, in the event of local extinction, is remote.

It has a continuing decline in (ii), (iii), (iv) and (v) above, based on the current and projected threats.

It has extreme fluctuations in (iv) above, based on the 'dependence of the taxon on seasonal flooding of shallow swamplands' (Aston 1997), which is dependent on the timing and reliability of winter rainfall.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 20 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, the taxon is severely fragmented, and has a continuing decline in (ii), (iii), (iv) and (v) and extreme fluctuations in (iv) 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

A consistent estimate of the population size is unavailable since it is subject to extreme fluctuation.

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

Aston, H.I. (1997). *Nymphoides spinulosperma* (Menyanthaceae): a new species from south-eastern Australia. *Muelleria, 10*, 21-25.

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DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014.* Department of Environment and Primary Industries, Melbourne.

SAC (2001). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 579 *Nymphoides spinulosperma.*

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Nymphoides spinulosperma*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/52d6635d-79f3-4815-bc0a-cd11ba4f076f