Threatened Species Assessment

Zoysia macrantha subsp. *walshii*
Walsh's Couch

Taxonomy

Zoysia macrantha subsp. *walshii* M.E. Nightingale

The name *Z. matrella* (L.) Merr. has been erroneously applied to *Z. macrantha* subsp. *walshii*, but true *Z. matrella* of the tropics (including Asia and northern Australia) is a variable but generally finer and softer grass differing in the pronouncedly oblique (rather than truncate) attachment of the spikelet to the pedicel (VicFlora 2016).

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criteria A2ce+3ce+4ce; B2ab(ii,iii,iv,v)

Species Information

Description and Life History

Zoysia macrantha is a rhizomatous perennial with rhizomes often deeply buried, culms and leaves on erect stems to 30 (but often only to c. 10) cm high. Leaves glabrous; blade 1-10 cm long and 1-4 mm wide, often inrolled when young, rigid, often sharp-pointed; ligule minute, but usually with longer (to 2 mm) hairs at the sides. Inflorescence a spike-like raceme mostly 1.5-4 cm long. Spikelets 2-5 mm long, with short pedicels expanded near the truncate apex; glume shining, often blackish, acute to acuminate, occasionally with a short (to 1 mm) awn, margins fused near base; lemma slightly shorter than glume; palea shorter than lemma.

Subspecies *walshii* is distinguished from subsp. *macrantha* in the shorter stature (rarely more than c. 10 cm high), finer leaves (to 1. 5 mm wide) and smaller spikelets (2-3 mm long). The taxon flowers from November to April (VicFlora 2016).

Generation Length

The generation length of *Zoysia macrantha* subsp. *walshii* is estimated to be 35 to 65 (midpoint 50) years. An estimate of generation length is based on an estimated longevity of 35-65 years or more, and the likelihood that the taxon recruits sporadically and opportunistically in response to seasonal conditions or localised disturbance events from locally dispersed seed with some potential for very occasional water-mediated longer-distance dispersal. The taxon is a rhizomatous perennial of coastal and inland habitats with relatively stable substrates. Rhizomes are often deeply buried, suggesting adult plants are likely to persist for decades in the absence of gross disturbance to the substrate. Seed-based recruitment is likely to be a rare event with established clones persisting indefinitely through vegetative resprouting from the rhizome.

Distribution

The taxon is apparently restricted in Victoria to scattered sites in western Victoria (including the Port Campbell area, Wilkin south of Casterton, Mosquito Swamp near the South Australian border and near Dimboola from where not re-collected since before 1900) and scattered sites east of Port Phillip to the Gippsland Lakes where there

appears to be some introgression with subsp. *macrantha*. It is also found in South Australia and Tasmania (VicFlora 2016).

Circumstantial evidence suggests both subspecies of *Zoysia macrantha* may have some tendency to naturalise as noted for subsp. *macrantha* at Port Melbourne and potentially also at Snowy Creek near Mitta Mitta where collected by T.C. Martin between 1887 and1889, suggesting a transient occurrence.

Habitat

The taxon occurs in coastal saltmarsh and halophytic vegetation fringing salt lakes (VicFlora 2016). Scant specimen data suggests that in coastal sites the taxon is typically adjacent to the upper margins of saltmarsh. At Mosquito Swamp near Lake Mundi in the Dergholm district in far western Victoria near the South Australian border the taxon is recorded growing around the edge of a swamp likely to be dominated by *Baumea articulata* (Jointed Twig-sedge), *B. juncea* (Bare Twig-sedge) or *Lepidosperma longitudinale* (Pithy Sword-sedge). At Lake Corangamite the taxon is recorded on the edge of salt marsh. There is no support for the taxon occupying halophytic vegetation fringing salt lakes anywhere in the state.

Threats

The taxon has undoubtedly suffered significant historic decline through habitat loss and degradation through agricultural clearance and other activities including stock grazing of adjoining grassland or grassy woodland at inland sites.

The key long-term threat to the taxon is sea level rise in response to climatic warming, resulting in an increase in the incidence, frequency and duration of inundation of its habitat by seawater or brackish lake water. Although all its coastal habitats are already saline through salt spray accumulation, projected sea level rise and increasing frequency and intensity of storm surge events may increase salinity beyond the tolerance of the taxon or exceed its tolerance of inundation or prolonged water-logging.

Some occurrences may be threatened by coastal development or visitor pressure. Some may also be threatened by weed invasion and any potential inland migration of the taxon and its habitat in response to sea level rise may be blocked by existing weed infestations. The most invasive exotic environmental weeds include *Euphorbia paralias* (Sea Spurge) in coastal habitats and *Lophopyrum ponticum* (Tall Wheat-grass) in both coastal and inland habitats. *Euphorbia paralias* (Sea Spurge) is currently progressing eastward along the coast of Victoria, forming dense monocultures which exclude all other plant taxa, as it has in Western Australia, South Australia and northern Tasmania.

Some inland occurrences may be threatened by rubbish dumping which has been documented over many decades around Lake Corangamite. The taxon is likely to be relatively tolerant of grazing and may even benefit from reduced competition from taller plants targeted by exotic herbivores.

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 105 to 195 years is estimated to be 30 to 60% (midpoint 40%), based on (c) and (e) above.

An estimate of past decline is based on the historic impact of the identified threats.

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 100 years is projected to be 15 to 60% (midpoint 40%), based on (c) and (e) above.

An estimate of future decline is based on the projected impact of the identified threats.

Eligible under Criterion A4 as Endangered

The population reduction over any 105 to 195 year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 80% (midpoint 50%), based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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 32 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 landscape scales and anthropogenically at the landscape scale in inland districts. All known occurrences are isolated from each other at spacings greatly 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 3 locations, and has a continuing decline in (ii), (iii), (iv) and (v) above based on the projected impact of the identified threats, such as sea level rise, climatic warming, coastal development, visitor pressure, weed invasion, and rubbish dumping.

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 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. 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

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VicFlora (2016). Flora of Victoria, Royal Botanic Gardens Victoria: *Zoysia macrantha* subsp. *walshii*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/e2146a44-112c-46ba-900a-eee7646abe3a