Threatened Species Assessment

Philotheca difformis subsp. *difformis*
Small-leaf Wax-flower

Taxonomy

Philotheca difformis subsp. *difformis* (A. Cunn. ex Endl.) Paul G. Wilson

Willis (1973) considered *P. difformis* to be widespread within Victoria, including it with the more common *P. angustifolia*. Apart from several older collections, simply labelled 'Murray River' (which are questionably Victorian), there are only 6 Victorian collections of *P. difformis* (and only 4 within the last 80 years). The extent of its distribution in this State requires clarification (VicFlora 2017).

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2003).

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

Proposed conservation status

Endangered in Victoria

Criteria A4ce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a bushy shrub to about 1 m high. Branchlets with dark, stipule-like excrescences and large oil glands, more or less hairy all over. Leaves fleshy, club-shaped, 3-4 mm long, 1-2 mm wide, apex rounded with a sunken terminal gland, upper surface smooth, lower surface concave with several large glands along the margin. Inflorescences terminal, 1-4-flowered, each pedicel without an obvious peduncle. Flowers 5-merous; sepals deltoid, c. 1 mm long; petals narrow-elliptic, 4-5 mm long, white, hairy inside and out (at least toward the margins), persisting in fruit; anthers not glandular beneath white apiculum; ovary sparsely pilose, carpels free for most of their length. Follicles shortly beaked, c. 5 mm long; seed subreniform, 2.5-4 mm long. Flowers sporadically through the year, but mostly from September to November (VicFlora 2017).

Generation Length

The generation length of *Philotheca difformis* subsp. *difformis* is inferred to be 20 to 50 years. Generation length is based on a maximum longevity of 25-30 years and an inferred pre-settlement fire interval that greatly exceeds the estimated longevity. The taxon is likely to recruit episodically post-fire from a long-persistent seedbank, with some sporadic recruitment in response to localised disturbance events.

Distribution

The taxon is apparently very rare and restricted in Victoria and only recorded from three localities: the north-west near Ouyen (1913), the northern Grampians (1977), and the Bendigo area (1884). There has been only one collection of the taxon within the last 80 years (SAC 2003; Bayly 1999). The taxon also occurs in South Australia, New South Wales, and Queensland.

Habitat

The taxon occurs in Sandstone Ridge Shrubland with lateritic ironstone concretions on the surface or else on sandstone outcrops. In other states, it occurs in sandy or rocky sites supporting mallee and dry woodland communities (VicFlora 2017).

Threats

Historically, the taxon underwent some but not widespread habitat loss. This is because the few reliable records occur in Sandstone Ridge Shrubland with lateritic ironstone concretions on the surface or else on sandstone outcrops, which are of low fertility and not targeted for agricultural clearance. However, the apparent extinction of the 1913 record at Walpeup near Ouyen suggests occurrences in this district have at least experienced significant historic decline.

The current and projected threats to the taxon include the impact of climatic drying and the projected increase in fire frequency which, together, result in recruitment failure. It is unclear whether herbivory is a significant threat since the high oil content of Rutaceae in general is likely to reduce the palatability of this taxon.

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 Vulnerable

The population reduction over the past 60 to 150 years is suspected to be 30 to 55% (midpoint 40%), based on (c) and (e) above.

The magnitude of past decline is difficult to estimate with any confidence, but the apparent extinction of the 1913 record at Walpeup near Ouyen suggests occurrences in this district have at least experienced significant historic decline.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 60 to 100 years is projected to be 30 to 55% (midpoint 40%), based on (c) and (e) above.

Future decline is based on the current and projected impact of climatic drying and the projected increase in fire frequency.

Eligible under Criterion A4 as Vulnerable

The population reduction over any 60 to 150 year period, including both past and future (up to 100 years in the future), is inferred to be 30 to 55% (midpoint 40%), 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 B1 as Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 3,059 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 scale and anthropogenically at the landscape scale. All confirmed and extant subpopulations occur at separations greatly exceeding the dispersal range of the taxon which has no specialised mechanism for long-distance dispersal.

Two locations could potentially be identified since the habitat in the Northern Grampians and in the Kamarooka forest is sufficiently distinct to suggest that the identified threats are likely to operate somewhat independently in each region.

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 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, is estimated to have 2 locations 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 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

Bayly, M.J. (1999). Eriostemon. In N.G. Walsh and T.J. Entwisle (Eds.), *Flora of Victoria Vol. 4, Cornaceae to Asteraceae.* Melbourne: Inkata Press.

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

SAC (2003). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 696 *Philotheca difformis* subsp. *difformis*. Department of Environment and Primary Industries, Victoria.

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