Threatened Species Assessment

Tmesipteris parva
Small Fork-fern

Taxonomy

Tmesipteris parva N.A. Wakef.

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criterion A2bce+3ce+4bce; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

Fronds unbranched, less than 15 cm long, maturing in one season. Leaves crowded (c. 4-5 per cm), gently curved, lanceolate, 9-14 mm long, not markedly smaller on younger portions of branch, soft to firm; base mostly symmetrical; apex acute to shortly pointed. Sporophyll lobes smaller than leaves. Synangium capsule-like, c. 3 mm long, with globular lobes.

Generation Length

The generation length of *Tmesipteris parva* is suspected to be 50 to 80 years. Most *Tmesipteris* species attain maturity within the first few years but given the longevity of the gametophytes and sporophytes the generation length is likely to be much longer. The host plants (treeferns) have a potential lifespan of several hundred years.

Distribution

In Victoria the taxon occurs in the Dandenong Ranges, Yarra Ranges and adjacent ranges, Wilsons Promontory, Cape Liptrap, and East Gippsland east of Lakes Entrance. It also occurs in New South Wales and Tasmania.

Habitat

The taxon occurs in Wet Forest, Cool Temperate Rainforest and Warm Temperate Rainforest as an epiphyte on treeferns.

Threats

The Small Fork-fern occurs in forest types that occupy the wettest, most bushfire-protected sites. The primary current and future threat to the taxon is climate change-driven severe droughts and the associated predicted increase in the frequency and intensity of bushfires. The taxon is believed to have a majority of its Victorian sites occurring within the boundary of the 2019-20 bushfires.

Forestry operations including timber harvesting and road construction in or adjacent to its habitat in parts of its range may also pose a threat in the short-term due to edge effects including increased light and wind penetration, elevated temperatures and reduced humidity. In addition to edge effects, permanent roads create conditions suitable for weed establishment, especially for Blackberries (*Rubus* species). The taxon is also threatened by

rutting, wallowing, antler rubbing and targeted browsing by deer, particularly Sambar (*Rusa unicolor*), which target rainforest and other riparian communities.

Past declines are attributed to land clearing for agriculture and plantation establishment. In East Gippsland, forestry operations and large-scales bushfires have contributed to the suspected historic decline in Small Fork-fern (Mueck & Peacock (1992). Ough & Murphy (2004) noted the effects of forestry operations on treeferns in the Central Highlands.

Likely habitat for Small Fork-fern occurs substantially within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks, reserves and special protection zones in State forest. There are no species-specific protections for Small Fork-fern included in the Victorian Code of Practice for Timber Production 2014, however other more general prescriptions such as protection and buffering of rainforest, old growth and waterways also provide protection from timber harvesting. In recent years, modified harvesting and forest regeneration practices have been implemented in native forest to further mitigate the potential threat from forestry operations to threatened species and their habitats.

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 150 to 240 years is estimated to be 30 to 50%, based on (b), (c), and (e) above.

The number of mature individuals is likely to have decreased since European settlement in due to bushfires, drought, loss of habitat due to clearing for agriculture and the localised impacts of forestry operations in some areas. The taxon is believed to have a majority of its Victorian sites occurring within the extent of the 2019-20 bushfires. It is believed to be fire-sensitive and it is considered to be at risk of post-fire impacts.

Eligible under Criterion A3 as Endangered

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

The taxon is believed to have a majority of its Victorian sites occurring within the extent of the 2019-20 bushfires. It is believed to be fire-sensitive and it is considered to be at risk of post-fire impacts. Frequent bushfires are likely to directly kill plants and open rainforest remnants to desiccation and invasion by non-rainforest taxa. The high risk of future bushfires suggest that the taxon may become close to extinction in the next 100 years.

In the short term, forestry operations may continue in the vicinity of some subpopulations, although the risk is relatively low given the existing protections for rainforest.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 240 year period, including both past and future (up to 100 years in the future), is estimated to be 50 to 75%, based on (b), (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) is estimated to be 388 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is considered to be severely fragmented, as it is restricted to widely scattered small patches of suitable habitat.

It is estimated to have two locations. The threats of the impacts of climate change and fire arguably apply across the entire range of the taxon. In East Gippsland, bushfire is the greatest threat. In other parts of its range, land clearing and Myrtle Wilt are equally important threats.

It and has continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the continuing presence at sites of threats such as Sambar deer, and the likelihood of increased drought and fire frequency and intensity in the future.

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

It is inferred that there are 360 to 1,800 mature individuals, but this qualifier is too weak to meet the threshold for this criterion.

Half of the herbarium records that give an indication of abundance mention this taxon is common and the other half mention this taxon is rare at the site. It is estimated that rare records would encompass 1 to 10 individuals at a site, whereas common records may encompass 20 to 50 individuals at a site, on average. There have been 194 records of this species in the Atlas of Living Australia, suggesting that the minimum number of individuals is likely to be greater than 194.

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:

Ineligible under criterion D

It is inferred that there are 360 to 1,800 mature individuals.

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)

Mueck, S.G., Peacock, R.J. (1992) Impacts of intensive timber harvesting on the forests of East Gippsland, Victoria. *Value Adding and Silvicultural Systems Project. VSP Technical Report 15*. Department of Conservation and Natural Resources, Victoria.

Ough, K., & Murphy, A. (2004). Decline in tree-fern abundance after clearfell harvesting. *Forest Ecology and Management* 199(1): 153-163.

VicFlora (2017). Flora of Victoria, Royal Botanic Gardens Victoria: *Tmesipteris parva.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/17b007e0-1125-4793-ac5a-c678ca6193c3