Threatened Species Assessment

Cyclosorus interruptus
Swamp Shield-fern

Taxonomy

Cyclosorus interruptus (Willd.) H. Ito

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)+2ab(iii); D

Species Information

Description and Life History

Rhizome long-creeping, slender, growing tips covered in scales. Fronds erect, to 1 m; stipe 45-60 cm long, glabrous, dark brown at base, paler and flattened above, shallowly grooved. Lamina oblong-lanceolate, pinnate with pinnae moderately to deeply lobed, mid-green and glossy above, paler beneath, coriaceous, glabrous on upper surface; rachis and mid-rib deeply grooved, grooves not connecting, rachis moderately or densely covered with scales and scattered red glands, under surface of mid-rib and veins covered in scales. Pinnae tapering in length from stipe to apex, oblong to lanceolate; lobes acute, triangular or ovate, sometimes slightly falcate, margin entire or crenulate, weakly recurved; veins free except for lowest veins in adjacent lobes which join to form single excurrent vein. Sori copious, round; indusium kidney-shaped, covered with acicular hairs and scattered glands; spores black (VicFlora 2018).

Generation Length

The generation length of *Cyclosorus interruptus* is estimated to be 4 to 20 years. Other species of Thelypteridaceae are reasonably short-lived (Herbert 2006). It is expected that *C. interruptus* could attain maximum size within a short period of time, perhaps around four years based on cultivated related species and may live for up to around 20 years.

Distribution

The taxon occurs on the east side of Darlots Creek south of Tyrendarra on private land, c. 2 km SSE from the intersection of Ettrick-Tyrendarra Road and the Princes Highway.

Habitat

The taxon occurs on a grassy creekside flat that is prone to inundation. Vegetation studies from other states show that it frequently occurs in brackish-saline, estuarine or near-coastal areas, often in paperbark swamps (Sinclair et al. 2012).

Threats

Sinclair et al. (2012) noted that livestock presumably pose a long-term threat to this species. The streamside habitat is unfenced and accessible to stock (in 2012, sheep), although the taxon has apparently tolerated stock for many years. Given that the plants grow about 2 km from the coast (less than 5 m above sea level) with obviously

estuarine elements nearby (e.g. *Juncus kraussii* occurs in extensive beds shortly downstream), the population of is potentially at risk from rising sea levels which may occur as a result of climate change. The taxon relies on very moist soil to survive and reproduce, and these soils may dry out in droughts, especially if the creek does not periodically flood and inundate the site.

Weed invasion may also present a threat, though Sinclair et al. (2012) noted that the long-lived, strongly rhizomatous habit of the plant might make established plants resilient to the effects of some competition. Weeds may, however, in future alter the site to the extent that the germination of new plants is suppressed.

The most serious and likely threat is its very small population size and restricted distribution, making it highly vulnerable to extinction from chance events. Sinclair et al. (2012) suggested that the small and isolated Victorian population has low genetic diversity, reducing its ability to adapt, and increasing its vulnerability to environmental change.

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 A4 as Vulnerable

The population reduction over any 12 to 60 year period, including both past and future, is estimated to be 15 to 30%, based on (a) and (c) above.

There is no evidence that this taxon has declined in the past in Victoria, and it may be a recent arrival into Victoria from elsewhere. Potential threats such as clearing for farmland, drought and increased salination may lead to a significant future decline.

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 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 Area of Occupancy (AoO) to ensure consistency with the definition of AoO as an area within EoO.

It is estimated to have 1 location, as all key identified threats apply across its range and can rapidly affect all individuals of the taxon present.

It has a continuing decline in (iii) above, as the low altitude of the site puts it at risk of increase in salinity that would make its current habitat unsuitable.

Eligible under Criterion B2 as Critically Endangered

The 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, it has 1 location and has a continuing decline in (iii) 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

The taxon is estimated to have 40 to 45 mature individuals, but other thresholds under this criterion have not been met.

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 D as Critically Endangered

The taxon is estimated to have 40 to 45 mature individuals. The number of clumps given by Sinclair et al. (2012) is 42. No change in the threats listed has occurred since 2012 so it would be reasonable to suspect that a similar number of individuals occurs presently.

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

Herbert, J. (2006). *National recovery plan for the fern Chingia australis*. Report to Department of the Environment and Water Resources, Canberra. Queensland Parks and Wildlife Service, Brisbane

Sinclair S., Stajsic V. and Sutter. G (2012*). Cyclosorus interruptus* (Thelypteridaceae): new to Victoria. *Muelleria* 30: 183-188.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens: *Cyclosorus interruptus*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/3ffa9ab3-f4a0-41b7-bbe2-a26c2a8e68bd

.