Threatened Species Assessment

Spyridium furculentum
Forked Spyridium

Taxonomy

Spyridium furculentum W.R. Barker & Kellermann

The taxon was previously known as *Spyridium* sp. 1, and prior to 1991 the name *S. bifidum* was misapplied to the taxon.

Current conservation status

Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *Spyridium* sp. 1 (SAC 2005).

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

Proposed conservation status

Critically Endangered in Australia

Criteria A2c+3c+4c; B1ab(i,ii,iii,iv,v); C1

Species Information

Description and Life History

The taxon is a shrub to about 1.6 m high. Young branchlets are coarsely stellate-hairy. Stem leaves are Y-shaped or, rarely, wedge-shaped with an apical notch, 6-10 mm long, lobes mostly from half to as long as undivided base, 1-2 mm wide, upper surface initially with scattered stellate hairs, usually becoming hairless but tuberculate (from bases of fallen hairs) at least toward the apex and along margin, lower surface moderately densely stellate-hairy and with, margin curled under. The floral leaves are obcordate, 3-8 mm long, 2-5 mm wide, densely white stellate-hairy on the upper surface. Flowers are aggregated in terminal hemispherical heads about 1 cm diameter that are subtended by 2-5 floral leaves. Fruits are about 2.5 mm long. The taxon flowers in spring (VicFlora 2019).

Generation Length

The generation length of *Spyridium furculentum* is estimated to be 25 to 50 years. This is based on a plausible longevity of 25-60 years, and a likely pre-settlement fire interval of 35-80 years or more. The taxon is inferred from related taxa to be a fire-sensitive obligate seed regenerator (OSR), which is likely to recruit episodically post-fire from a persistent soil-stored seedbank with some opportunistic recruitment in response to localised site disturbance (Carter and Downe 2006).

Distribution

The taxon is a very rare Victorian endemic, localised near the southern boundary of the Little Desert National Park, between Goroke and Dimboola and north-west of Mitre in the Western Wimmera (VicFlora 2019; Kellermann and Barker 2012). Only three subpopulations of Forked Spyridium are known, occurring in the following locations: Roadside, Cooack Fire Access Road (9 plants), Roadside, Cooack Settlement Road (120 plants), and Cooack (private property) (35 plants). The three subpopulations occur over a total range of only 2 km (Carter and Downe 2006).

Habitat

The taxon occurs in heathy mallee woodland vegetation, dominated by *Eucalyptus arenacea* and *Callitris rhomboidea*, with a diverse sclerophyllous shrub understorey on deep brown-white sand (VicFlora 2019; Kellermann & Barker 2012). It also occurs on windblown sandy soils, in low rainfall areas. Upper strata include *Eucalyptus arenacea*, *E. incrassata* , *Callitris rhomboidea, Allocasuarina muelleriana* and heathy and narrow-leaved shrubs including *Stenanthera conostephioides*, *Brachyloma daphnoides*, *Calytrix alpestris*, *C. tetragona*, *Hibbertia sericea*, *Styphelia ericoides*, *Leptospermum myrsinoides*, *Phebalium stenophyllum,* and *Persoonia juniperina* in the lower strata (Carter and Downe 2006).

Threats

Two of the three known stands occur on roadsides, both of which have been subject to disturbance by roadworks and/or weed invasion in recent years. The third occurs on private property with no formal or informal conservation agreement (SAC 2005). The private land site is within a fenced patch of relatively intact native vegetation, but future clearing or grazing with domestic stock, especially goats, could destroy those plants.

The taxon is threatened by habitat loss to agriculture, agricultural intensification, and road management activity, including the creation of fire breaks and mineral earth breaks. The greatest long-term threat to all occurrences is the impact of imposed fire regimes and climatic warming and drying. The response of the taxon to fire is unknown, however other *Spyridium* species germinate at temperatures expected during fire. The absence of fire may reduce or eliminate germination altogether, with the populations aging and dying out. Controlled or 'cool' burning may also be a risk as fire temperatures are not high enough to stimulate seed germination, but still may kill existing plants (Carter and Downe 2006).

These threats operate synergistically to increase the risk of adult mortality and recruitment failure through repeat fire events at intervals below the tolerable fire interval for the taxon, followed by extreme drought stress. Given the extremely limited distribution and very low numbers of plants, the risk from stochastic events is probably high (Carter and Downe 2006).

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 Critically Endangered

The population reduction over the past 75 to 150 years is estimated to be 50 to 80%, based on (c) above.

Past decline is based on the proximity of the only known occurrences to cleared farmland, suggesting a significant historic decline through habitat loss for agriculture.

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

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 75 to 100 years is projected to be 50 to 80%, based on (c) above.

Future decline is based on the projected impacts of the identified threats.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 75 to 150 year period, including both past and future (up to 100 years in the future), is estimated to be 50 to 80%, based on (c) 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			

Eligible under Criterion B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 12 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

The taxon is estimated to be severely fragmented naturally and anthropogenically at the landscape scale, with the three surviving stands at separations exceeding the dispersal range of the taxon.

It is estimated to have 1 location, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above based on the current and projected impact of the identified threats, notably roadwork disturbances, weed invasion, agricultural intensification, clearing or grazing of the land with domestic stock, inappropriate fire regimes, creation of fire breaks and mineral earth breaks, climatic warming and drying, and extreme drought stress.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 12 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is severely fragmented, has 1 location, 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				

Eligible under Criterion C as Critically Endangered

It is estimated that there are 136 to 500 (midpoint 164) mature individuals. The lower limit is based on the estimations from SAC (2005) of the three subpopulations, one of c. 100 plants, one of c. 30 plants and one of c. 6 plants. The midpoint is based on the estimate provided by Carter and Downe (2006) of 164 mature individuals, and the upper limit is based on a more recent estimate of population size from TSSC (2016) which states that "Surveys in 2008 estimated that there were 500 plants in five populations, found over a total range of only 2 km²". However, it is unclear whether these are all mature adults or if it includes recent seedling or juvenile recruits.

There is estimated to be a continuing decline of 30 to 50% within one generation.

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

Eligible under Criterion D as Endangered

It is estimated that there are 136 to 500 (midpoint 164) mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Carter, O., and Downe, J. (2006). *National Recovery Plan for the Forked Spyridium Spyridium species 1*. Melbourne: Department of Sustainability and Environment.

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Kellermann, J., and Barker, W.R. (2012). Revision of the *Spyridium bifidum - S. halmaturinum* complex (Rhamnaceae: Pomaderreae) from South Australia and Victoria. *Muelleria, 30*(1), 38-40.

SAC (2005). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 734 *Spyridium* sp. 1.

TSSC (2016). Threatened Species Scientific Committee Conservation Advice: *Spyridium furculentu.* Canberra: Department of the Environment and Energy.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Spyridium furculentum*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/e94442ca-dfce-44e8-8572-baf56fab2422