Threatened Species Assessment

Drosera arcturi
Alpine Sundew

Taxonomy

Drosera arcturi Hook.

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; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

Tuber absent. Stem usually short, 20-50(-100) mm long, mostly underground, old leaf-bases persistent. Leaves in basal open rosette, more or less linear, 20-80 mm long, slightly narrowed basally so that petiole not readily distinguishable from lamina, sheathing at base; stipules absent. Inflorescence axillary, 1(-2), 20-120 mm long, 1(-2)-flowered; bracts linear-triangular, 2-5 mm long; sepals 5, narrowly elliptic, 5-9 mm long, shortly connate at base, glabrous, margin entire, apex obtuse; petals 5, obovate, 6-11 mm long, white, apex obtuse; styles 3 or 4, thick, with stigmas capitate or reniform. Flowers December-February (VicFlora 2019).

Generation Length

The generation length of *Drosera arcturi* is estimated to be 30 to 50 years. There is very little data regarding the taxon's longevity, but if it is clonal with persistent rhizomes then it is potentially long lived, particularly given the persistence of a *Sphagnum* substrate, and likely rarity of recruitment opportunities.

Distribution

D. arcturi occurs in several bioregions, including the Victorian Alps and the Highland Falls (both Southern and Northern). It also occurs in NSW, Tasmania, and New Zealand.

Habitat

The taxon usually occurs in moist shallow depressions of wet heaths and bogs, often with *Sphagnum* (VicFlora 2019). Its poor competitive ability restricts it to either *Sphagnum cristatum* dominated bogs or *Psychrophila introloba* wet herb fields on stony seepage pavements, typically fed by late lying snow patches on sheltered southern and eastern slopes. It is also found on exposed rocky areas below snowpatches, and in *Caltha introloba* herbland.

Threats

Alpine taxa are prone to range contraction due to climate change, of which the impacts are likely to be seen first in marginal, lower-elevation sub-populations, especially wet vegetation types. Large fires are becoming more frequent, and two fires at a short interval will be particularly detrimental. Increasing physical impacts of feral horses and deer might be countered in some areas by recovery from cattle grazing. The taxon is considered to be vulnerable to overlapping by *Empodisma,* or taller *Carex* (e.g. *C. gaudichaudiana*) shrubs which restrict its habitat.

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

As *D. arcturi* is an alpine taxon, it is prone to range contraction due to climate change and physical damage.

Given that around 50% of wetland areas have been lost since settlement (Costin *et al* 1959; Wimbush 1970), it is reasonable to assume there has also been a 50% loss of *Drosera* habitat, and therefore plants.

An estimate of 30-50 % decline since 2003 when cattle were excluded from alpine parks may have stabilised or even recovered, but this recovery may be outweighed by the effects of feral horses and deer.

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 90 to 100 years is projected to be 30 to 50%, based on (c) and (e) above.

The future rate of decline given a warming, drying climate is likely to be similar to that in the past, perhaps another 50% loss after 100 years. The recent spate of extensive alpine fires and associated warming is likely to have accelerated net decline suggesting future decline will plausibly be in the 30-50% range.

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 Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 7,786 km^2, based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented, considering the limited dispersal ability of the taxon, the barriers to dispersal, and the lack of habitat separating them.

It is inferred to have 4 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above, due to the identified threats.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 116 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 4 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

It is estimated that there are 10,000 to 20,000 mature individuals, which exceeds the thresholds for criterion C.

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 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

Conn, B.J. (1996). Droseraceae. In: Walsh, N.G.; Entwisle, T.J. (eds), *Flora of Victoria* Vol. 3, Dicotyledons Winteraceae to Myrtaceae. Inkata Press, Melbourne.

Costin A. B., Wimbush D. J., Kerr D. and Gay L. W. (1959) *Studies in catchment hydrology in the Australian alps. I. Trends in soils and vegetation.* CSIRO Division of Plant Industry, Melbourne.

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

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Drosera arcturi.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/807f6c8b-7983-46e7-b857-35ac9be3081e

Wimbush D. J. (1970) *Hydrological Studies on Sphagnum Bogs in the Snowy Mountains, New South Wales.* Masters thesis, University of Sydney.