Threatened Species Assessment

Carpha alpina
Small Flower-rush

Taxonomy

Carpha alpina R. Br.

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

Species Information

Description and Life History

Tufted perennial, very shortly rhizomatous. Culms rigid, glabrous, striate but smooth, 2-10 cm high, 0.7-1.5 mm diam. Leaf-blades ± stiff, somewhat channelled, flattened distally, mostly shorter than the culms, 0.5-2 mm wide; sheaths yellow-brown, striate, shining. Inflorescence of 1-3 loose clusters, 1-10 cm long, with 1 or 2 involucral bracts as long as or slightly exceeding inflorescence. Spikelets 2-10 per cluster, 8-12 mm long; glumes acute, keeled above, straw-coloured, the lowest 2 or 3 empty, c. half the length of the upper glumes, two larger glumes 8.5-9.5 mm long, with a setaceous or ± linear empty glume above; hypogynous bristles 7-10 mm long, pale red-brown, plumose except the tips antrorsely scabrous for 1-1.5 mm. Nut narrow-ellipsoid, minutely reticulate, glistening, pale to dark red-brown, on a short stipe c. 0.5 mm long, the body 2.5-3.5 mm long, 0.8-1.0 mm diam., with persistent style-base 3-5 mm long. The taxon flowers in summer (VicFlora 2019).

Generation Length

The generation length of *Carpha alpina* is estimated to be 20 to 50 years. DELWP's vital attribute database contains *C. nivicola* only, which is a very similar species from the same habitat, and often confused with *C. alpina.* That species is long lived (>50 years), with a juvenile period of 2 years. It resprouts vegetatively after fire, but seed response is not specified. Seeds should last >50 years in the soil, consistent with decadal frequency of disturbance, such as fire or drought. With on-going recruitment, generation length in undisturbed vegetation is likely to be slightly greater than the mid-point of plant lifespan.

Distribution

The taxon is locally common in alpine and higher subalpine tracts (VicFlora 2019). The Victorian Biodiversity Atlas (VBA) suggests the taxon is also found around Mts Wellington and Howitt.

Habitat

The taxon is often dominant (with *Poa* spp.) in tall alpine herbfield and forms extensive carpets. It is also found in open heaths, herbfields, grasslands, in cold-air drainage valleys and along gravelly stream banks.

Threats

Van Rees (1984) found that the closely related *C. nivicola* was grazed by cattle when they entered alpine bogs. *C. alpina* is also grazed by hares, but not to any substantial degree (Green et al 2013). The impacts of cattle grazing

are likely to be indirect, via physical destruction of alpine bog habitat, rather than over-grazing per se, although cattle are no longer active in most of its habitat (usually 1400 m or above). Feral horses are still impacting on habitat on the Bogong High Plains. Alpine bog habitat is subject to reduction through the impact of climate change (Whinam *et al* 2003), particularly bogs that are marginal already with respect to altitude and rainfall. Increased frequency of fire, related to climate change, is also a major threat to the extent of habitat.

No references were found which informed population dynamics or gave better specific information regarding threatening processes.

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

Given that an estimated 50% of alpine bog has been lost since settlement, up to 50% of *Carpha* habitat is assumed to have been lost since then.

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

The impacts of herbivore grazing are likely to be indirect, via physical destruction of alpine bog habitat, rather than over-grazing per se. Alpine bog habitat is subject to reduction through the impact of climate change (Whinam et al 2003), particularly bogs that are marginal already with respect to altitude and rainfall. Increased frequency of fire, related to climate change, is also a major threat to the extent of habitat.

The activity of deer and feral horses, and depletion through climate change (leading to reduced precipitation and increased fire) will continue.

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 3,205 km², based on accepted, post-1970 records from the VBA.

The taxon is estimated to be severely fragmented. Alpine species tend to exist in variable-sized 'islands' of habitat within a matrix of lower-altitude forest. This tends to isolate sub-populations reproductively, but not in terms of threats such as fire. Fragmentation is of most concern for small outlying sub-populations, such as Mts Wellington or Howitt.

It is inferred to have 4 locations. 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 80 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it 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

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

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