Threatened Species Assessment

Geranium solanderi var. *solanderi*
Austral Crane's-bill

Taxonomy

Geranium solanderi var. *solanderi.* Carolin

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criterion A2bce; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a decumbent to ascending perennial; stems to 50 cm long, with short spreading or recurved hairs and long (sometimes deciduous) patent to slightly recurved and/or crisped hairs; taproot c. spherical to napiform. Leaves orbicular to reniform, to 6 cm long; palmatisect with 5-7 deeply 2- or 3-fid primary lobes, often further dissected, ultimate lobes obtuse to subacute, upper surface glabrescent, or with scattered, curved hairs, lower surface with sparse, long, spreading hairs; stipules triangular to narrow-ovate, short-acuminate or often short-laciniate. Flowers solitary or paired; peduncles 0.7-2.5 cm long, pedicels 0.6-2.5 cm long; sepals ovate to narrow-elliptic, 4-5.5 mm long, (sub)acute, pubescent with minute, glandular and eglandular hairs, and longer spreading hairs, margins occasionally translucent, mucro 0.5-0.9 mm long; petals obovate, 5-7.5 mm long, c. truncate to retuse, bright pink; anthers pink to lemon with purple dehiscence lines. Fruits 1.2-1.5 cm long; mericarps unevenly pubescent, hairs becoming longer toward awn, suture margins irregularly short-ciliate; seed rugose with large isodiametric alveolae with occasional membranous deposits. Flowers October-January (VicFlora 2016)

The taxon formerly included *Geranium* spp. 1, 2 and 4, but now it is more narrowly defined. It is characterised by the long, patent indumentum on most stems, bright pink petals with c. obscure veins and retuse apices, anthers with dark purple dehiscence lines, uneven mericarp indumentum and cauline leaves with narrow (but usually not linear) lobes (VicFlora 2016).

Generation Length

The generation length of *Geranium solanderi* var. *solanderi* is inferred to be 20 to 30 years. It is thought that the longevity and generation times may vary from grassland on volcanic land (i.e. probably 20-50 years as for *Geranium* sp. 1) to alluvial sites in marginally forested habitats, where it is possibly only 10-20 years (e.g. in the Warrandyte district). The average generation time is still likely to be 20-30 years.

Distribution

The taxon has a scattered distribution outside of the north-west of the State (VicFlora 2016).

Habitat

This is an uncommon taxon of damp to dryish, usually sheltered sites, in grassy woodlands, often along drainage lines or in seepage areas (VicFlora, 2016).

Threats

Threats to the taxon variously include climate change, including decreased rainfall, off-target damage from herbicide application, land clearing for urban/agricultural use, grazing by domestic stock, weed invasion, lack of recruitment, vegetation closure, edge effects, and other impacts of habitat fragmentation.

The bushfires of 2019/2020 are believed to have impacted around 22% of the taxon's modelled habitat, with a further 46% of modelled habitat projected to be damaged as of early January 2020. The overall impacts of the fire are yet to be determined. The taxon is likely to be threatened by feral herbivores, notably Sambar Deer (*Rusa unicolor*), and soil and vegetation disturbance as a result of fire recovery activities such as machinery impacts and the removal of hazardous trees. Drought, hot weather, and repeat fires have the potential to damage or destroy recovering plants and/or seedlings. The taxon's recovery depends on the effective control of the impacts of herbivores and by preventing soil disturbance following fire recovery.

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 90 years is suspected to be 50 to 75%, based on (b), (c) and (e) above.

Previous estimates were confident of a past decline exceeding 50%. Given the extent of modification of the relatively fertile land-types representing suitable habitat, including sustained grazing, herbicide, and super-phosphate use, the decline is potentially considered to be substantially higher than that figure. The only part of the former habitat where the taxon appears to still be relatively common is in montane East Gippsland, along Ingeegoodbee Track.

The bushfires of 2019/2020 are believed to have impacted more than 22% of the taxon's modelled habitat, but the overall impacts of the fire are yet to be determined.

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

There are inadequate data from which to make projections of future decline. Previous estimates were less confident regarding a future decline that exceeds 50%. While many smaller occurrences are highly vulnerable, the larger eastern populations are far more secure.

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 307 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented, has 3 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 as Data Deficient

There is insufficient evidence to determine the number of mature individuals.

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 D2 as Vulnerable

The taxon is inferred 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.

VicFlora (2016). Flora of Victoria, Royal Botanic Gardens Victoria: *Geranium solanderi* var. *solanderi*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/e6d11d08-e937-4cd9-bc9b-6f22076241df