

Samolus valerandi Water Pimpernel

Taxonomy

Samolus valerandi L.

The Australian Plant Name Index records that 'The status of this taxon in Victoria is uncertain, as it is unclear whether plants collected there are native or naturalised.'

Current conservation status

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

Proposed conservation status

Vulnerable in Victoria

Criteria A2ce+3ce+4ce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); D2

Species Information

Description and Life History

The taxon is a tender, more or less rosetted, glabrous perennial (or annual) forb, to c. 20 cm high. Leaves cauline and basal, ovate, elliptic or obovate, shortly petiolate, 1-4 cm long, 8-20 mm wide, thin-textured, light green, apex rounded. Flowers in an elongating leafless raceme, to c. 12 cm long; pedicels slender, to c. 1 cm long, each with a linear bract c. 1 mm long shortly below midway; calyx hemispherical, 1-1.5 mm long at anthesis (rapidly enlarging to c. 3 mm in fruit), lobes broadly acute or obtuse, one-third to half as long as calyx; corolla lobes blunt, spreading, exceeding calyx by c. 0.5 mm, free shortly above base, white; stamens and staminodes inserted at throat of corolla. Capsule c. spherical, c. 2 mm diam. The taxon flowers mainly from November to March (VicFlora, 2019).

Generation Length

The generation length of *Samolus valerandi* is estimated to be 3 to 10 (midpoint 5) years. This is based on a plausible longevity of 1-5 years and the inference that the taxon recruits sporadically, opportunistically or continuously without reliance on fire.

Distribution

The taxon is restricted in Victoria to the east (e.g., Dargo, Bruthen areas, upper Snowy and Genoa Rivers, etc.). It also occurs in Queensland, New South Wales, Australian Capital Territory, Europe, Africa, North and South America and it is apparently naturalised in Western Australia (VicFlora, 2019).

The taxon is of ambiguous origin status in Victoria. In 2007, the Australian Plant Census noted that 'The status of this taxon in Victoria is uncertain, as it is unclear whether plants collected there are native or naturalised.' Whilst many specimen collectors note that the taxon associated with invasive weeds, this is insufficient grounds to infer post-settlement naturalisation since riparian habitats are notoriously prone to weed invasion. A strictly indigenous status in Victoria, as in NSW, the ACT and Queensland, is supported by Victorian collections as early as the 1850s and the observation of the plant in weed-free Warm Temperate Rainforest on Royd Creek near its confluence with the Wallagaraugh River in the Genoa district in 1988 (David Cameron pers. obs.).

Habitat

The taxon is relatively rare in Victoria, occurring on damp, often shaded banks of lowland streams (VicFlora, 2019). Collectors frequently record the taxon in association with invasive exotic weeds such as *Rubus fruticosus* spp. agg. (Blackberry), *Salix species* (Willow) and *Verbena bonariensis* (Purple-top Verbena). This is supported by quadrat data in the VBA which confirms that the taxon is almost invariably associated with numerous aggressive exotics including *Conium maculatum* (Hemlock), *Cyperus eragrostis* (Drain Flat-sedge), *Gamochaeta purpurea* (Purple Cudweed), *Holcus lanatus* (Yorkshire Fog), *Hypericum perforatum* (St John's Wort), *Juncus articulatus* (Jointed Rush), *Paspalum distichum* (Water Couch), *Persicaria maculata* (Redshank), *Prunella vulgaris* (Self-heal), *Rubus anglocandicans* (Common Blackberry), *Rubus polyanthemus* (Forest Blackberry), *Salix X rubens* (Basket Willow) and *Vinca major* (Blue Periwinkle).

Threats

The taxon is a habitat specialist restricted to perennially wet sites such as creek and river banks, swamp margins and seepage lines and is therefore highly dependent on the hydrological stability of its riparian habitat.

Historically, the taxon is likely to have suffered a significant decline in at least the settled districts such as the Dargo, Tambo Crossing, Bruthen, Buchan, Orbost and Genoa districts in response to habitat loss to agriculture, and habitat modification through agricultural activity, stock grazing and upstream forestry operations.

Current and projected threats include incremental habitat loss and modification in response to agricultural intensification, climatic warming and drying, changing seasonality of rainfall, drought stress, reduced streamflow, weed invasion and targeted and casual browsing, pugging, wallowing and excavation of riparian habitats by stock, Sambar Deer, feral horses and feral pigs. Where extensive regrowth forest occurs in upstream or upslope catchments as a result of bushfire or forestry operations (or both) there may be reduced streamflow during the early decades of forest regeneration.

Inappropriate fire regimes, including bushfires influenced by climate change and planned burning, are also projected to reduce streamflow by initiating forest regeneration at an increasing frequency and landscape scale.

The greatest current and future threat to the taxon is competition from weeds. Riparian habitats are notoriously prone to weed invasion in part because recurrent flood events destabilise the habitat and provide recurrent opportunities for colonisation and recolonisation by disturbance-adapted taxa. In addition, weed propagules are readily dispersed downstream by water, ensuring that the suite of available weeds is cumulative over time and maximised in the lower reaches of waterways such as the Snowy River which harbours perhaps the greatest concentration of water-dispersed weeds in Victoria, many of which originate in settled districts on the Monaro Tableland in New South Wales.

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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%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p>			
<p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p> <p><i>based on any of the following:</i></p>			

Evidence:

Eligible under Criterion A2 as Vulnerable

The population reduction over the past 10 to 30 years is estimated to be 10 to 40%, based on (c) and (e) above.

Although the taxon has undoubtedly suffered significant historic decline through habitat loss to agriculture in many districts and weed invasion of most habitats, only a small proportion of this decline is likely to have occurred in the last three generations.

The 2019-20 bushfires in eastern Victoria are believed to have impacted around 48% of the taxon's modelled habitat. The overall impacts of the fire are yet to be determined.

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 10 to 30 years is projected to be 10 to 30%, based on (c) and (e) above.

Future decline is based on the current and projected impact of the identified threats.

Eligible under Criterion A4 as Vulnerable

The population reduction over any 10 to 30 year period, including both past and future, is estimated to be 10 to 40%, based on (c) and (e) above.

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 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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 1,297 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to have fewer than ten locations. It is widely distributed through east Gippsland, and the identified threats, notably weed invasion, are expected to act with varying intensity in different areas.

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 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			

Evidence:

Ineligible under Criterion C as Data Deficient

There is insufficient evidence to determine the number of mature individuals. Quadrat data suggests the taxon tends to occur at low density, with projective foliage cover typically less than 1%, rarely exceeding 1% at the quadrat scale.

Criterion D. Very small or restricted populations		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 km ² or number of locations ≤ 5

Evidence:

Eligible under criterion D2 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. 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



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VicFlora (2019) Flora of Victoria, Royal Botanic Gardens Victoria: *Samolus valerandi*. Retrieved from:
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