Threatened Species Assessment

Swainsona purpurea
Purple Swainson-pea

Taxonomy

Swainsona purpurea (A.T. Lee) Joy Thomps.

S. stipularis var. *purpurea* was re-described as *Swainsona purpurea* (Thompson 1990) and has been accepted as a valid taxon by the National Herbarium of Victoria (SAC 1991).

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1991).

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

Proposed conservation status

Endangered in Victoria

Criteria B1ab(iii)+2ab(iii)

Species Information

Description and Life History

The taxon is an erect or spreading annual or perennial herb, to 50 cm tall; stems often densely pubescent with appressed medifixed hairs. Leaves mostly 3-12 cm long; leaflets 3-11, linear or elliptic, lateral leaflets 10-30 mm long, 1-5 mm wide, terminal leaflet usually longer than upper laterals, apices acute to emarginate, sometimes mucronate, both surfaces often sparsely pubescent; stipules to c. 10 mm long. Racemes mostly 3-20-flowered; flowers usually 12-14 mm long, rarely smaller; calyx pubescent, teeth much shorter than or equal to tube; petals purple; standard usually 10-15 mm long, usually 10-15 mm wide, broad-ovate to suborbicular, clawed; keel usually 10-13 mm long, semicircular, apex obtuse, often curved upward, twisted laterally as flower ages; style tip more or less straight. Pod variable, fusiform-ellipsoid, mostly 10-60 mm long, 2-5 mm wide, curved, pubescent, stipe to c. 4 mm long; seeds to c. 20, cordate, c. 2 mm long, mottled olive-green to brown. The taxon flowers from August to October (VicFlora 2017).

Swainsona species are largely renascent perennials, resprouting in suitable conditions from a persistent rootstock. This gives individual plants the capacity to persist between years given suitable conditions. Walsh *et al.* (1996, cited in DSE 2001) commented that *S. purpurea* can behave as an annual. Growth and flowering among most *Swainsona* spp. appear to be stimulated by available moisture. Thus plants are most frequently observable following adequate spring rainfall. Plants are usually seen in the first spring following a fire. Soil disturbance will also often stimulate germination (DSE 2001).

All species observed during a spring 1999 study produced copious flowers and abundant quantities of seed, though significant variation in flowering and seed production occurs according to seasonal conditions (DSE 2001). Flowering and seed production is apparently only curtailed when plants begin to dry off from insufficient moisture. The most common method of reproduction appears to be vegetative in *S. greyana*, *S. purpurea* and *S. sericea* (in Mallee populations). The latter species, where it occurs on the Northern Plains, exhibits none of the rhizomatous habit observed in Mallee populations (DSE 2001).

Swainsona species produce hard-coated seeds which frequently require some treatment to break their dormancy. It is surmised that, to stimulate germination, either heat treatments, including fire or extreme soil temperatures, or

physical disturbances such as soil scraping which can rupture the seed coat, are required in conjunction with moisture (DSE 2001). Growth of *Swainsona* species appears to be more vigorous in sites with an open understorey, consistent with many native species in grassy ecosystems. Plants perform better in an environment where there are gaps in the herb layer, high light intensity and low competition from other plants (DSE 2001).

Despite the abundance of seed produced by *Swainsona* species, the incidence of recruitment by this means is believed to be irregular and of variable success. Scientific data specifically about persistence of viable seed-banks, and germination of *Swainsona* seed, is inadequate (DSE 2001).

Generation Length

The generation length of *Swainsona purpurea* is estimated to be 5 to 25 years. This is based on its perennial forb habit, and the observation that the taxon can resprout vegetatively from a persistent rootstock and survive through summer with favourable summer rain. It is also based on the likelihood that the taxon recruits from a long-persistent, soil-stored seedbank in favourable seasons, at intervals determined by La Niña and El Niño cycles.

Distribution

In Victoria, the taxon is very rare and known only from the far north-west on the Raak Plains and near Lake Hattah (VicFlora 2017). Principal populations occur on the northern Raak Plain within the Murray-Sunset National Park. The taxon is restricted to two localities, one of less than 20 km², containing about 1,000 plants (Scarlett 1984, cited in DSE 2001) and the other containing six plants (expert opinion) (SAC 1991). A designated Mineral and Stone Production area is located within the Park boundary (DSE 2001).

DSE (2001) noted that at the time, the number of extant populations was approximately 3+, the approximate number of plants was 52,000+ and the range was 30 km.

Habitat

The taxon is restricted to low-lying chenopod shrublands on dunes and low-lying, copi rises of saline gypseous loams, usually around lake margins (VicFlora 2017; DSE 2001). Associated species include chenopod shrubs such as Glassworts (*Halosarcia* spp.), Rounded Noon-flower *(Disphyma clavellatum)*, Small-leaf Sea-heath *(Frankenia sessilis)*, and a variety of herbs including Shiny Elachanth *(Elachanthus glaber)*, Woolly Yellow-heads *(Tricanthodium skirrophorus)* and Dense Crassula *(Crassula colorata)* (DSE 2001).

The Raak (saline shrubland) communities occur on small sandy rises made of gypsum (copi). Dominant plants in these shrublands include *Halosarcia* spp. (samphires) and *Atriplex vesicaria* (Bladder Saltbrush) or *A.papillata* (Coral Saltbrush) (SAC 1991).

Threats

The taxon is threatened by habitat loss to gypsum mining and quarrying, grazing by kangaroos and stock, and recruitment failure in response to the increasing risk of extreme drought events. The fact that the plant is found on two very small sites is an adequate indication of its vulnerability to threat (SAC 1991).

The foliage and flowers of *Swainsona* species are highly palatable to grazing animals. Kangaroos and cattle are known to eat the plants at flowering and seeding times (additional field observations), to the extent that the taxon may not be reproducing adequately (SAC 1991). However, although *Swainsona* species are adversely affected by intense and continuous grazing by stock, rabbits or native herbivores, particularly in spring flowering and seeding periods, it appears that light grazing at other times in their lifecycle can benefit the plants (DSE 2001).

The larger site, of about 1,000 plants, is on uncommitted public land proposed for gypsum mining and quarrying, which could destroy the plant and its habitat in some areas (Scarlett 1984, cited in DSE 2001). Should these operations proceed they will also endanger other rare plants within the Raak community, specifically *Dysphania simulans* (Spiked Pigweed), *Trichanthodium skirrophorum* (Woolly Yellow-heads) and Roepera compressa (Rabbit-ears Twin-leaf) (SAC 1991).

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:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been, or will be, a reduction in population sufficient to meet any threshold for Criterion A.

The magnitude of past decline is unknown since it is unclear what proportion of the taxon's former habitat has been lost to gypsum mining and quarrying. It is also not clear what the impact of livestock grazing on freehold land within the Raak Plain is likely to have been within the last three generations.

The magnitude of future decline cannot be estimated since it is unknown whether gypsum mining and quarrying remains a future threat to the habitat of this taxon, and the other identified threats operate stochastically and with unpredictable intensity.

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 1,175 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally at the subregional scale and anthropogenically at the landscape scale. Geographically isolated stands occur at distances apart that are likely to exceed the dispersal range of the taxon which has no specialised mechanism for long-distance dispersal.

The taxon is estimated to have two locations. It has a continuing decline in (iii) above, based on the potential risk of habitat loss to gypsum mining and quarrying, grazing by kangaroos and livestock and the increasing risk of extreme drought events.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 48 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, it is severely fragmented, has two locations and a continuing decline in (iii) 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 suspected that there are 1,000 to 50,000 mature individuals, but this qualifier is too weak.

The lower bound is based on an estimate of 1,000 plants at one site (Scarlett 1984 cited in DSE 2001; SAC 1991). The upper bound is based on an estimate of 52,000 plants (DSE 2001), although this estimate may not distinguish adult individuals from other life stages. There are no recent figures available.

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.

DSE (2001). *Action Statement - Twelve threatened Swainson-peas and Darling-peas (Swainsona species) No. 126.* Department of Sustainability and Environment, Melbourne. Retrieved from: https://www.environment.vic.gov.au/__data/assets/pdf_file/0025/32596/Downy-Swainson-pea_Twelve_threatened_Swainson-peas_and_Darling-peas_Swainsona_species.pdf

Jeanes, J.A. (1996). Fabaceae. In N.G. Walsh and T.J. Entwisle (Eds.), *Flora of Victoria Vol. 3, Dicotyledons Winteraceae to Myrtaceae.* Inkata Pres, Melbourne.

SAC (1991). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 27 *Swainsona purpurea*. Department of Environment and Primary Industries, Victoria.

Thompson J. (1990) New species and new combinations in the genus Swainsona (Fabaceae) in New South Wales. *Telopea* 4(1): 1-5.

VicFlora (2017). Flora of Victoria, Royal Botanic Gardens Victoria: *Swainsona purpurea*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/d092a192-755b-4b67-b2f9-ad1c864f11a4