Threatened Species Assessment

Calostemma luteum
Yellow Garland-lily

Taxonomy

Calostemma luteum Sims

This taxon cannot be distinguished from *Calostemma purpureum* unless fertile. *C. luteu*m can be distinguished by the generally larger flowers with more widely spreading lobes and predominately yellow flower colour, and fewer scape bracts (VicFlora, 2014).

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 A2ce+3ce+4ce

Species Information

Description and Life History

Calostemma luteum has a broadly ovoid bulb, 2-6 cm diam. Leaves several, linear, flat, 10-50 cm long, 5-10 mm wide, developing as fruits mature (VicFlora, 2014). It is a long-lived bulbous geophyte with a deep-seated bulb descending (in the soil) by contractile roots to depth of c. 15-20 cm; post-fire resprouter.

Individuals are very long lived with replacement and renewal of all tissues (roots, bulb-plate, bulb scales, leaves) over several years. Propagation exclusively by seeds. Plants monoecious, flowers bisexual outcrossing or selfing. Pollination is by insects or self-pollinating; gene flow short distance only by pollination vector and seed dispersal. Recruitment is episodic, by virtue of relatively rare or infrequent mass-flowering events in response to substantial summer rainfall. Seeds ripen c. 4 weeks after flowering and all germinate immediately when shed, typically around the parent plants; there is no carry-over of seeds. Dispersal of the large seeds over greater distances is feasible with rare extreme river flood events. Plants are highly toxic (alkaloids) and little grazed, if at all. Populations are typically very dense.

Generation Length

The generation length of *Calostemma luteum* is inferred to be 40 to 60 years. This is based on the taxon's considerable longevity, with a continuous turnover of tissues (roots, baseplate, bulb-scales, and leaves); thus replacing or renewing the tissues of all organs are over several years.

Distribution

The taxon is localised in the far north-west, known only from a single population on the Murray River floodplain west of Merbein. It is common in the drainage systems of the Darling River in New South Wales and Queensland, and the Murray River floodplain in South Australia (VicFlora, 2014).

Habitat

The taxon occurs on sandy clay loam on the floodplain of the River Murray, generally associated with *Eucalyptus camaldulensis* in full sun or partial shade.

Threats

Calostemma luteum is threatened by invasion of weeds that compete with or smother plants; declining rainfall resulting from climate change, resulting in lowered growth and reproductivity; and reduced frequency and duration of extreme flood events because of climate change and river regulation.

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 120 to 180 years is suspected to be 50 to 70%, based on (c) above.

The Murray River environment has been severely modified by horticulture and agriculture and infrastructure development.

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

Eligible under Criterion A2 as Endangered

The population reduction over the next 100 years is suspected to be 30 to 50%, based on (c) above.

Future reduction is based on declining rainfall resulting in reduced growth, survival of recruits and adults and recruitment of plants.

Eligible under Criterion A4 as Endangered

The population reduction over any 120 to 180 year period, including both past and future (up to 100 years in the future), is estimated to be 40 to 75%, based on (a), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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:

Ineligible under Criterion B as Data Deficient

There is insufficient evidence to determine the Extent of Occurence (EoO) or Area of Occupancy (AoO).

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 10,000 to 50,000 mature individuals, which exceeds the thresholds for criterion C.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 50	< 250	D1 < 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 has five or fewer locations and there are plausible future threats that could drive the taxon to become critically endangered or extinct within a very short time.

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

Lang, P.J. (2008), Calostemma abdicatum (Amaryllidaceae), a new species of Garland Lily endemic to the Everard Ranges, and a comparison of the three species within Calostemma R.Br. *Journal of the Adelaide Botanic Gardens 22*: 54-55

Telford, IRH (1987). Calostemma, *Flora of Australia 45*: 382-383.

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