Threatened Species Assessment

Livistona australis
Cabbage Fan-palm

Taxonomy

Livistona australis (R. Br.) Mart.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2014).

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

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(i,ii,iii,iv,v); C1

Species Information

Description and Life History

The taxon is a long-lived single-stemmed monoecious tree to 30 m maximum height; in Victoria the largest palm (23 m high) was estimated to be 155 years old (1995) and in NSW estimated to be 197 years old (1995) (plant 30 m high). In Victoria (Cabbage Tree Creek) age to reproductivity was estimated to be around 40 years; a cultivated tree at Cabbage Tree township achieved reproductivity in 22 years. Flowering occurs between August and October and flowers are insect pollinated and are outbreeding or self-fertile. Fruits ripen in about 18 months and ripe fruits ultimately drop to the ground, 95% at Cabbage Tree Creek within several metres of the trunk. Plants do not flower again in under two years. Seeds of fruits that do not fall to the ground are eaten and dispersed by Currawongs, Grey-headed Flying-foxes and perhaps other bird species. Seeds can also be transported by flood waters. Plants cope with fire with little mortality in the population.

Generation Length

The generation length of *Livistona australis* is inferred to be 50 to 200 years. This is based on the taxon's great longevity and the typically massed cohort of juveniles presumably pulsed by flood events. Field observations indicate that most occurrences comprise multiple age classes with little evidence of adult mortality.

Distribution

The taxon is very rare in Victoria and is known from only three subpopulations in the Orbost district - Cabbage Tree Creek, its tributary Caley Creek and the lower Brodribb River between Lake Curlip and its confluence with the Snowy River. The few plants in Lilly Pilly Gully, Wilsons Promontory (if still extant after recent bushfires), are presumed plantings. The taxon also occurs in NSW and Queensland (VicFlora 2019).

Habitat

The taxon is restricted, in Victoria, to flood-prone riparian flats in both intact and perennially disturbed stands of Warm Temperate Rainforest and stands of Riparian Forest dominated by Eucalyptus botryoides (Southern Mahogany or Bangalay).

Threats

Threats to the taxon include: climate change (decreased rainfall, increased evaporation, extreme temperatures); altered fire regimes changing habitat parameters (replacing intact mature stands of Warm Temperate Rainforest with degraded rainforest and Riparian Forest); deposition of excessive silt on seedlings during floods; physical environmental damage to soils and vegetation (e.g. wallows) by Sambar; weed invasion; smothering by co-occurring indigenous species at seedling stage; browsing by Sambar and (in future) Hog Deer; and reduced seed dispersal by Grey-Headed Flying-Fox (as extreme temperatures reduce the size of the Victorian population of this vector). The greatest current threat is invasion by exotic transformer weeds such as *Hedera hibernica* (Atlantic Ivy), *Lonicera japonica* (Japanese Honeysuckle) and *Tradescantia fluminensis* (Tradescantia). The greatest emerging threat is herbivory by Sambar Deer (*Rusa unicolor*) which are currently undergoing an explosive increase in population density throughout the region. Unfragmented native vegetation throughout Palms Reserve will allow the Sambar population to become large and sedentary across the core habitat of the taxon in Victoria. Extrapolating Sambar activity into the future, can predict a very severe decline in recruitment rates throughout the Victorian range, noting the remoteness of Palms Reserve as core habitat highly favourable for Sambar.

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 Vulnerable

The population reduction over past 150 to 600 years is estimated to be 40%, based on (c) and (e) above.

An estimate of past decline is based on habitat loss as a result of agricultural development in the Orbost district. The bushfires of 2019/2020 may have impacted at least part of the taxon's habitat, and the taxon is sensitive to fire. However the degree of damage is yet to be determined.

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 years is projected to be 50 to 70%, based on (c) and (e) above.

This is based on the projected impact of the identified threats, particularly to recruitment by weed invasion by transformer species and herbivory by Sambar.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 600 year period, including both past and future (up to 100 years in the future), is suspected to be 50 to 75%, 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 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 Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 24 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of the AoO as an area within the EoO.

The taxon is inferred to have 1 location. It has a continuing decline in (i), (ii), (iii) and (v) above. The taxon is subject to continuing declines in response to the current and projected impact of the identified threats, particularly to recruitment by weed invasion by transformer species and herbivory by Sambar.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 24 km², based 2 x 2 km² grids derived from accepted, post-1970 records from the VBA. As above, it has 1 location and a continuing decline in (i), (ii), (iii) 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:

Eligible under Criterion C1 as Critically Endangered

It is estimated that there are 52 mature individuals. The population number is based on Orscheg and Parsons (1996).

There is estimated to be a continuing decline of 25 to 70% within one generation.

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 Endangered

It is estimated that there are 52 mature individuals.

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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VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria *Livistona australis*. Cabbage Fan-palm. Retrieved from https://vicflora.rbg.vic.gov.au/flora/taxon/8bce21c0-d48f-4408-83ac-c510c417bdb0