

Threatened Species Assessment

Eucalyptus cadens Warby Range Swamp-gum

Taxonomy

Eucalyptus cadens J.D. Briggs & Crisp

Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

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

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

Proposed conservation status

Endangered in Australia

Criteria A2bce+3ce; B1ab(ii,iii,v)+2ab(ii,iii,v)

Species Information

Description and Life History

The Warby Range Swamp-gum is a spreading tree reaching 25 m in height. The taxon is known for its characteristic leaning habit. The rough, compact bark is present for the first 10 m of the trunk, with smooth, ribbony, green-grey bark developing further up the tree. It has greenish-grey, sessile, juvenile leaves that are petiolate and initially opposite but becoming alternate, elliptic to ovate (sometimes with mild crenulation developing at the margins) and somewhat discolourous. Leaves are up to 50 mm long and 20 mm wide. New growth is very glaucous, developing particularly in the crown. This glaucous foliage distinguishes it from its close relative, the Black Gum (*Eucalyptus aggregata*). Adult leaves are bluish-green, narrow and elliptic, ranging from 70 - 150 mm in length and 10 - 20 mm in width. Inflorescences are axillary with seven flowers and peduncles up to 6 mm in length. Buds are pedicellate, tapering at both ends, 3 mm in diameter, up to 8 mm long with a conical operculum. Flowers are white. Ovules are in four vertical rows. Flowering occurs between March and June. Fruit is obconical, relatively sessile, 6 mm in diameter and up to 5 mm long. The 3 valves are raised slightly above the rim of the fruit (VicFlora 2019).

The taxon is a long-lived tree producing a large amount of seed that will only germinate successfully and grow to maturity in the wild in seasonally waterlogged and permanently moist sites associated with perennial springs. It can also regenerate vegetatively from its epicormic buds and lignotubers at its base.

Generation Length

The generation length of *Eucalyptus cadens* is inferred to be 200 to 300 years. This is based on a longevity of 200 or potentially 500 years or more, so the generation time is probably in the order of centuries. It is likely to have episodic mortality and recruitment.

Distribution

The taxon is endemic to north-eastern Victoria. It was originally thought to be restricted to a single locality in the Warby Ranges, but is now known from four sub-catchments of the Ovens River. The majority of stands are associated with the southeastern foot-hills of the Pilot Range near Beechworth and Wooragee, with additional locations in the eastern foothills of the Warby Range. Sixty stands have now been recorded from six sub-populations, which were defined by groupings of stands on the same tributary.

Eucalyptus cadens

Warby Range Swamp-gum

The total population is estimated to be 7,790, covering a total area of ~41 ha. Most stands are small at generally one hectare or less, with the largest stand being 5.5 ha. Over seventy-five percent of the population currently occurs on private land on seventeen individual landholdings. The Warby Range Swamp-gum has been recorded at Beechworth Historic Park and more recently the Chiltern Mount Pilot National Park.

Habitat

The taxon tends to occur in woodlands often in or around the peripheries of springs, soaks, and water bodies. Spring-soak herbfield communities are often dominated by *E. cadens*, with combinations of Rush (*Juncus* spp.), Sedge (*Carex* spp.) and Twig Sedge (*Baumea* spp.) in the understorey. Other trees and shrubs occurring in these communities include Blakely's Red Gum (*E. blakelyi*), Bundy (*E. goniocalyx* s.s.), Red Stringybark (*E. macrorhyncha*), and Silver Wattle (*Acacia dealbata*).

Threats

Threats to the taxon include impacts of trampling and grazing by domestic stock, and associated weed invasion and competition affecting seedling recruitment. Land clearing and modification is a significant reason for historical decline and an ongoing threat on private land sites. Fire does not directly threaten the taxon as it re-shoots well from epicormic buds or lignotubers, but smaller plants are vulnerable to post fire browsing by native and exotic herbivores. Changes to hydrology from human induced drainage of preferred spring soak habitat, and water extraction from bores or wells sunk in the vicinity of stands, are threats on private land, while climate change induced drying of habitat is a longer term threat to all sites.

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>based on any of the following:</p> <ul style="list-style-type: none"> (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 600 to 900 years is estimated to be 50 to 75%, based on (b), (c) and (e) above.

Eucalyptus cadens Warby Range Swamp-gum

Past reduction is based on an estimation of the amount of preferred habitat (spring soak drainage lines) in the area that has been cleared or substantially modified since European settlement.

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

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 years is projected to be 20 to 70% (likely 50%), based on (c) and (e) above.

A projected decline excluding climate change is approximately 20%, but with climate change there may be a 70% decline or even greater. There may also be differential declines in private and public estates, with greater declines on freehold due to stock grazing exacerbating climate change impacts.

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

It is inferred to have 1 location, as long term drying of preferred spring soak habitat is a potential pervasive threat which may have an ongoing and significant impact on the taxon across its limited geographical area.

It has a continuing decline in (ii), (iii) and (v) above based on the impacts of the identified threat, notably domestic stock grazing, weed competition, and climate change.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 184 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon has 1 location, and has a continuing decline in (ii), (iii) and (v) above.

Eucalyptus cadens

Warby Range Swamp-gum

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 estimated that there are 7,000 to 8,000 mature individuals, but other thresholds under this criterion have not been met.

Numbers are based on survey data collected by Glen Johnson in 2004 which had an estimated figure of 7761 plants.

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:

Ineligible under Criterion D

It is estimated that there are 7,000 to 8,000 mature individuals, which exceeds the threshold for criterion D.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Briggs, J. D. and Crisp, M. D. (1989). *Eucalyptus cadens* (Myrtaceae), a new swamp gum from the Warby Range, North-East Victoria. *Muelleria* 7 (1): 7-13



Eucalyptus cadens Warby Range Swamp-gum

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

DSE (2008). Action Statement – *Eucalyptus cadens* Warby Range Swamp-gum (No. 21). Department of Sustainability and Environment. Retrieved from:
https://www.environment.vic.gov.au/__data/assets/pdf_file/0024/32694/Warby_Range_Swamp-gum_Eucalyptus_cadens.pdf

SAC (1991). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 38 *Eucalyptus cadens*

TSSC (2016). Threatened Species Scientific Committee Conservation Advice: *Eucalyptus cadens*. Canberra: Department of the Environment and Energy.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus cadens*. Retrieved from:
<https://vicflora.rbg.vic.gov.au/flora/taxon/2a22cb56-5007-4ac1-8a17-1a442de438ad>