Threatened Species Assessment

Persoonia levis
Smooth Geebung

Taxonomy

Persoonia levis (Cav.) Domin

Hybrids with *P. linearis* occur occasionally where the two taxa are sympatric. These plants are referable to *P.* X *lucida*.

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criterion B1ab(iii)

Species Information

Description and Life History

The taxon is an erect or spreading shrub or small tree to c. 5 m high; bark lamellose-flaky; young branches glabrous to moderately hairy. Leaves alternate or subopposite, oblanceolate to obovate, narrowly elliptic or spathulate, 6-14 cm long, 13-80 mm wide, thickish, often asymmetric or falcate, flat, mucronate, bright green, smooth, glabrous (or sparsely hairy when young). Flowers solitary, mostly in axils of scale-leaves; pedicels 3-8 mm long, erect or spreading, sparsely to moderately hairy. Tepals 10-14 mm long, apiculate, glabrous to sparsely hairy, terminal spine to c. 1 mm long; anthers yellow; ovary glabrous. Drupe ovoid, to c. 16 mm long, c. 14 mm wide, green. The taxon flowers in summer (VicFlora 2020).

Generation Length

The generation length of *Persoonia levis* is estimated to be 35 to 70 years. The taxon is a long-lived shrub or small tree with a plausible longevity of many decades. Recruitment is inferred to be episodic following intense fire events which are estimated to have occurred at intervals of 35-70 years or more under pre-settlement conditions. The taxon has closely adherent and highly protective papery bark which is likely to insulate the main stem from all but the most intense fires, suggesting that a proportion of adults in most populations are likely to resprout following repeat fire events in lowland forest where fire intensity is likely to be lower than in nearby stands of heathland or heathy woodland. Episodic recruitment may be supplemented by sporadic recruitment in excellent seasons or in response to localised site disturbance events such as animal activity.

Distribution

The taxon is confined in Victoria to coastal areas of far East Gippsland. It also occurs in New South Wales (VicFlora 2020).

Habitat

The taxon is locally common on near-coastal heathlands (usually poorly-drained) and heathy woodlands (VicFlora 2020).

Threats

The taxon is threatened by fire which may incinerate adult plants, with population maintenance relying on a combination of resprouting individuals subject to lower intensity fire and germination of seed in the soil-stored seedbank, or dispersal into the site by animal vectors such as birds or mammals.

The taxon may also be threatened by extreme drought stress which may lead to adult mortality and recruitment failure, of both resprouting adults and young seed-based recruits.

As a member of the Proteaceae, the taxon may also be threatened by Cinnamon Fungus (*Phytophthora cinnamomi*) infection. Cinnamon Fungus has been observed to result in death of susceptible trees and shrubs in the Proteaceae in the Mallacoota district since at least the early 1970s (David Cameron pers. obs.), with demonstrable spread westward along the coast toward Wingan Inlet.

Climatic drying and warming has demonstrably increased the intensity, frequency, and landscape scale of intense fire events across the Victorian range of the taxon, most of which was incinerated in early January 2020. One consequence of the sheer extent and continuity of current and projected firegrounds is the elimination of unburnt stands within the dispersal range of the taxon, which were sources of bird or mammal-dispersed fruit. Repeat fire at intervals approaching or below the tolerable fire interval for the taxon can result in seedbank depletion, recruitment failure and, potentially, local extinction.

Given the broad leathery foliage of the taxon, the taxon may be susceptible to targeted or incidental browsing by Sambar Deer (*Rusa unicolor*), or Hog Deer (*Axis porcinus*), although this threat may be mitigated by the typically bitter taste of *Persoonia* foliage.

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.

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 2,817 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to have 1 to 3 locations, based on a single occurrence which is confidently indigenous, one which is tentatively indigenous (VicFlora 2020), and another three which are tentatively indigenous or arguably naturalised. Some of these occurrences are ecologically distinct and subject to distinguishable threats.

It is estimated to be subject to continuing decline in quality of habitat in response to the current and projected impact of the identified threats, such as increased fire, extreme drought stress, Cinnamon Fungus infection, climatic drying and warming, and browsing by deer.

Eligible under Criterion B2 as Vulnerable

The Area of Occupancy (AoO) is estimated to be 512 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is estimated to 1 to 3 locations and has 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 as Data Deficient

It is suspected that there are 500 to 1,000 mature individuals, but this qualifier is too weak to meet this criterion, and other thresholds under this criterion have not been met.

There is no available estimate of total Victorian population size, although it is plausibly in the hundreds and may not exceed 1,000 mature individuals.

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 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

VicFlora (2020) Flora of Victoria, Royal Botanic Gardens Victoria: *Persoonia levis.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/7f9d4002-862c-41bc-aef4-c2784013d5ca