

Notice and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the shrub *Persoonia oxycoccoides* Sieber ex Spreng. as an ENDANGERED SPECIES in Part 2 of Schedule 1 of the Act. Listing of Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Persoonia oxycoccoides was found to be endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3 (b) (d) (e i, ii, iii, iv) and Clause 4.4 (b)(e)(i)(ii, All). The main reasons for this species being eligible are that: i) the species has a highly restricted geographical distribution; ii) there is estimated to be a low number of mature individuals; iii) population sizes are estimated to be very low; iv) the species is considered to be severely fragmented; and v) there is continuing decline in Area of Occupancy, Extent of Occurrence, the number of subpopulations, the number of mature individuals and habitat quality, resulting from a range of threats.

The NSW Threatened Species Scientific Committee has found that:

1. *Persoonia oxycoccoides* Sieber ex Spreng. (family Proteaceae) is described by PlantNET (2020) as a “prostrate to spreading shrub, young branchlets sparsely to moderately hairy. Leaves narrow- to broad-elliptic to ovate, 0.4–1.1 cm long, 1.5–6 mm wide, flat, with recurved margins, ± discolorous, sparsely to moderately hairy when immature, glabrescent to sparsely so when mature, smooth to slightly scabrous; venation obscure. Inflorescences growing on into a leafy shoot; flowers subtended by reduced leaves or leaves; pedicels 2–5 mm long, erect to spreading, glabrous or rarely very sparsely hairy. Tepals 8–11 mm long, acute to apiculate, glabrous. Ovary glabrous.” Auld *et al.* (2020b) determined that the putative intergrades between *P. acuminata* and *P. oxycoccoides* should be treated as variants of *P. acuminata*.
2. *Persoonia oxycoccoides* is endemic to New South Wales where it is currently known from the Wingecarribee Shire in the south-eastern portion of the Central Tablelands, with the easternmost records in the municipality of Kiama, and a south-western outlier at Tallong in Goulburn-Mulwaree Shire in the Southern Tablelands. The historical northern limit of distribution is Colo Vale; the eastern limit is Budderoo National Park and environs (between Jamberoo and Robertson); and the southern and western limits are Tallong. It is known from Budderoo and Morton National Parks, Upper Nepean State Conservation Area and Stingray Swamp Flora Reserve.
3. *Persoonia oxycoccoides* occurs in “Heath to dry sclerophyll eucalypt forest, at 600 to 700 m altitude, on acid, sandy soils derived from sandstone.” (Weston & Johnson 1991, PlantNet 2020), although not all occurrences are on sandstone-

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derived soils. The species can also occur in the margins of montane swamps within wet heath (Douglas and Auld 2021). *Persoonia oxycoccoides* is self-incompatible (Weston pers. comm. 2019), and is thought to be pollinated by native bees, primarily from the genus *Leioproctus* subgenus *Cladocerapis*, but also reed bees in *Exoneura* (Bernhardt & Weston 1996). Seed dispersal is likely to be by birds and wallabies (Weston 2003, Rymer 2006, Auld *et al.* 2007). *Persoonia oxycoccoides* has been observed to resprout from a lignotuber post-fire at a site in Budderoo National Park (Weston, pers. comm. 2019) and is listed as a resprouter in the NSW Flora Fire Response database (OEH 2014).

4. *Persoonia oxycoccoides* has a highly restricted geographic distribution. The current extent of occurrence (EOO) is estimated to be 833 km² and is based on a minimum convex polygon enclosing all reliably mapped occurrences of the species, the method of assessment recommended by IUCN (2022). The area of occupancy (AOO) is estimated to be 76 km² based on the species occupying 19 (2 km x 2 km) grid cells, the spatial scale of assessment recommended by IUCN (2022).
5. Where available, population abundance data generally suggest very small (<10) to small numbers (10-100) of plants at a site, with a few populations (e.g. Upper Nepean SCA west) with an estimate of >100 plants. The best available information indicates that the total number of mature individuals is between 415 and 725 in the wild.
6. The main threats to *Persoonia oxycoccoides* include ongoing habitat loss and fragmentation, localised disturbance, adverse fire regimes, a potential reduction in effective pollination, and competition from weeds. The distribution of *Persoonia oxycoccoides* has been fragmented by land clearing for agriculture, plantation forestry, friable sandstone mining, infrastructure, and urban settlements (Douglas and Auld 2021). Urbanisation and/or rural-residential land use in areas of potential habitat and known locations for this species has intensified in recent years across most of the species' range. Localised disturbances at sites can cause the loss of plants and degradation of habitat. More than 20 mature *P. oxycoccoides* were recently killed or harmed following the application of herbicide as a fuel reduction method (Douglas and Auld 2021). Others have been damaged by vehicle use (Douglas and Auld 2021). Too frequent fire may limit recruitment of new plants while infrequent fire may result in plant mortality through competition with other dominant shrubs. Some 27-36% of the habitat of *P. oxycoccoides* was burnt during the 2019/2020 fire season (Gallagher 2020). Both Gallagher (2020) and Auld *et al.* (2020a) suggest that there is a medium risk to the recovery of *P. oxycoccoides* from the 2019/2020 fires due to the potential for post-fire impacts of weeds, *Phytophthora cinnamomi* and site disturbance. Effective pollination by native bees may be disrupted by fragmentation of habitat. Many *Persoonia* spp. are wholly or substantially self-incompatible, meaning that they cannot produce viable fruit without pollen from another plant of this species. The self-incompatible status of *Persoonia oxycoccoides* (Weston pers. comm. 2019) makes this species particularly vulnerable to habitat fragmentation, as plants that are isolated from others may not be able to set seed. 'Clearing of native vegetation' and 'High

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frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' are listed in the Act as Key Threatening Processes.

7. *Personia oxycoccoides* Sieber ex Spreng is eligible to be listed as an Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing a very high risk of extinction in Australia in the near future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Assessment against *Biodiversity Conservation Act Regulation 2017* criteria

The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: Endangered under Clause 4.3 (b) (d) (e i, ii, iii, iv) and Clause 4.4 (b)(e)(i)(ii, All)

Clause 4.2 – Reduction in population size of species

(Equivalent to IUCN criterion A)

Assessment Outcome: Not Met.

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

Clause 4.3 - Restricted geographic distribution of species and other conditions (Equivalent to IUCN criterion B)

Assessment Outcome: Endangered under Clause 4.3 (b) (d) (e i, ii, iii, iv).

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted,
and at least 2 of the following 3 conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	

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	(e)	there is a projected or continuing decline in any of the following:
	(i)	an index of abundance appropriate to the taxon,
	(ii)	the geographic distribution of the species,
	(iii)	habitat area, extent or quality,
	(iv)	the number of locations in which the species occurs or of populations of the species,
	(f)	extreme fluctuations occur in any of the following:
	(i)	an index of abundance appropriate to the taxon,
	(ii)	the geographic distribution of the species,
	(iii)	the number of locations in which the species occur or of populations of the species.

Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN criterion C)

Assessment Outcome: Endangered under Clause 4.4 (b)(e)(i)(ii, All).

The estimated total number of mature individuals of the species is:			
	(a)	for critically endangered species	very low, or
	(b)	for endangered species	low, or
	(c)	for vulnerable species	moderately low,
and either of the following 2 conditions apply:			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
	(i)	for critically endangered species	very large, or
	(ii)	for endangered species	large, or
	(iii)	for vulnerable species	moderate,
	(e)	both of the following apply:	
	(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and	
	(ii)	at least one of the following applies:	
		(A)	the number of individuals in each population of the species is:
		(I)	for critically endangered species extremely low, or
		(II)	for endangered species very low, or
		(III)	for vulnerable species low,
		(B)	all or nearly all mature individuals of the species occur within one population,
		(C)	extreme fluctuations occur in an index of abundance appropriate to the species.

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Clause 4.5 - Low total numbers of mature individuals of species (Equivalent to IUCN criterion D)

Assessment Outcome: Vulnerable under Clause 4.5c.

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability (Equivalent to IUCN criterion E)

Assessment Outcome: Data Deficient.

The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

Clause 4.7 - Very highly restricted geographic distribution of species– vulnerable species

(Equivalent to IUCN criterion D2)

Assessment Outcome: Not met.

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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Dr Anne Kerle
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

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