Publication date: 5 December 2025

Notice of 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 *Persoonia acerosa* Sieber ex Schult. & Schult.f. as an ENDANGERED SPECIES in Part 2 of Schedule 1 of the Act and, as a consequence, to omit reference to *Persoonia acerosa* Sieber ex Schult. & Schult.f. from Part 3 of Schedule 1 (Vulnerable species) of the Act. Listing of Endangered species is provided for by Part 4 of the Act.

The NSW Threatened Species Scientific Committee is satisfied that *Persoonia acerosa* Sieber ex Schult. & Schult.f. has been duly assessed by the Commonwealth Threatened Species Scientific Committee under the Common Assessment Method, as provided by Section 4.14 of the Act. After due consideration of Commonwealth DCCEEW (2024), the NSW Threatened Species Scientific Committee has made a decision to list the species as Endangered.

Summary of Conservation Assessment

Persoonia acerosa Sieber ex Schult. & Schult.f. was found to be Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3(b)(d)(e i,iii) and Clause 4.4(b)(e i,ii A(II)) because: 1) the species has a highly restricted geographic distribution with an estimated extent of occurrence of 1,287–4,530 km^2 and area of occupancy of 212–224 km^2; 2) it is considered to be severely fragmented; 3) the number of mature individuals in each subpopulation is very low (≤250); and 4) there is an inferred continuing decline in the area, extent and quality of habitat and number of mature individuals due to the combined effects of adverse fire regimes exacerbated by climate change, habitat clearing, anthropogenic habitat disturbance, and weed invasion.

The NSW Threatened Species Scientific Committee has found that:

1. *Persoonia acerosa* Sieber ex Schult. & Schult.f. (family Proteaceae) is described as an "erect to spreading shrub, young branchlets glabrous to sparsely hairy. Leaves subterete and prominently channelled above, 1.2–2.3 cm long, *c*. 0.5 mm wide, strongly incurved, smooth, sparsely hairy when young, soon glabrescent. Inflorescences growing on into a leafy shoot; flowers mostly subtended by full-sized leaves; pedicels 1–2 mm long, spreading to suberect, glabrous or sparsely hairy. Tepals 8–10 mm long, glabrous. Ovary glabrous." (PlantNET 2022).
2. *Persoonia acerosa* is predominantly found within the Blue Mountains, especially on the central plateau with the majority of records occurring in or near the towns and villages along the Great Western Highway and Bells Line of Road. Fewer records are known from remote parts of the Blue Mountains and Wollemi National Parks, with fewer still from the Newnes Plateau in the northwest of the species' distribution. A collection of the species from the Cordeaux Dam catchment west of Wollongong in 2007 represents the southernmost occurrence and is approximately 75 km from populations in the Blue Mountains. Historically, there were also several other disjunct subpopulations occurring to the west and south of the Blue

Mountains, most notably at Hill Top in the Southern Highlands and at Jenolan Caves near Oberon, though both are now believed to be extinct.

3. *Persoonia acerosa* has a highly restricted distribution. It has an estimated extent of occurrence (EOO) of 1,287–4,530 km^2, based on a minimum convex polygon, the method of assessment recommended by IUCN (2024). The area of occupancy (AOO) is estimated to be 212–224 km^2 based on 2 km x 2 km grid cells, the scale recommended by IUCN (2024).

4. *Persoonia acerosa* is considered to have >10 subpopulations. The total number of subpopulations is difficult to interpret as the species may be highly susceptible to fragmentation due to ineffective pollination by what is likely the current dominant floral visitor, the European honeybee (*Apis mellifera*). The species typically occurs as individual plants or small groups of up to ten (Douglas 2014; Friedwald 2015; OzArk 2018; Brown 2020). The only exceptions are the two largest known populations which contain around 120–150 mature individuals each (Douglas 2014; OzArk 2018) but both are significant outliers with the next largest recorded population containing only 24 individuals (a mix of mature and juvenile plants in 2018) (OzArk 2018).

5. The population of *Persoonia acerosa* is considered to be severely fragmented. Many subpopulations may occur in habitat patches that are too small to support viable populations in the long-term, and most consist of a single individual, or occasionally up to ten plants. The largest subpopulations contain approximately 120–150 mature plants. Furthermore, most of these subpopulations are relatively isolated, occurring in an urban matrix which may limit seed dispersal and the opportunity to recolonise extinct subpopulations. The total number of mature individuals of *P. acerosa* is estimated to be 500–2,500.

6. *Persoonia acerosa* primarily occurs in heath and dry sclerophyll forest communities, generally above 600 m (Friedwald 2015). Associated species include *Eucalyptus racemosa*, *E. sieberi*, *E. piperita, E. sparsifolia*, *E. stricta* and *Angophora costata* (Benson and McDougall 2000). The majority of credible sightings and collection records of *P. acerosa* are associated with the Banks Wall Sandstone of the Narrabeen Group (Washington and Wray 2011; S. Douglas pers. comm. May 2022 in Commonwealth DCCEEW 2024). A few outlying occurrences, including the historical records from Hill Top and Cordeaux Dam in the southeast of the historical range, and the Bilpin record in the northeast of the species range, are associated with Hawkesbury Sandstone. *Persoonia* rely on symbiotic associations with microbes for nutrient fixation (Lambers *et al.* 2015). Therefore, soil microbial communities and conditions likely play a significant role in defining their habitat.

7. *Persoonia acerosa* mainly flowers from December to April (Benson and McDougall 2000). The species is primarily pollinated by native bees from the genus *Leioproctus* subgenus *Cladocerapis*, but also the genus *Exoneura* (Bernhardt and Weston 1996). Effective pollination opportunities are likely reduced by pollen theft from European honeybees, which are considered the main floral visitor. Many *Persoonia* species are wholly or substantially self-incompatible (Rymer *et al.* 2005), meaning that they are generally unable to or have a significantly reduced ability to produce viable fruit when fertilized by their own pollen and instead require pollen from another plant of the same species. It is unknown whether *P. acerosa* is self-

incompatible. Pollinated flowers produce fleshy fruit, which mature from October to November (Benson and McDougall 2000). The fruits may be consumed and dispersed by birds and mammals (Weston 2003). Germination is constrained by daily temperatures with the optimal temperature for germination being around 15°C (Catelotti *et al.* 2020). Once the seed germinates, it likely requires a suitable microbial assemblage for successful growth and establishment (Lambers *et al.* 2015).

8. *Persoonia acerosa* is an obligate seeder that is killed by fire (NSW OEH 2014) and relies on a soil seed bank for regeneration. The seeds exhibit physiological dormancy and are surrounded by a woody endocarp which physically restricts water from permeating the seed, preventing germination until dormancy is broken (Catelotti *et al.* 2020). The cues for germination are unknown but a combination of heat and smoke is potentially required (Auld and Ooi 2008; Ayre *et al.* 2009).

9. *Persoonia acerosa* is primarily threatened by adverse fire regimes exacerbated by climate change, habitat clearing, pollen theft, anthropogenic habitat disturbance, and weed invasion. 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition', 'Anthropogenic climate change', 'Clearing of native vegetation', 'Competition from feral honey bee, *Apis mellifera*,' and 'Loss and degradation of native plant an animal habitat by invasion of escaped garden plants, including aquatic plants' are listed as Key Threatening Processes under the Act.

10. *Persoonia acerosa* is estimated to occur in >10 (though possibly fewer than five) threat-defined locations based on the most serious plausible threat of adverse fire regimes that cause declines in biodiversity.

11. Continuing decline in the number mature individuals of *Persoonia acerosa* is inferred based on past surveys. Surveys undertaken on Council land in 2015 only relocated 9 of 25 known records made after 2000 and none made before 2000 (Friedwald 2015). It is not known whether the species persists in soil seed banks at locations where standing plants have apparently disappeared (*e.g.,* Ayre *et al*. 2009). Targeted surveys on National Parks tenure have also noted many records could not be relocated (OzArk 2018). In addition, the population at Hill Top is considered to have been extinct since 1986 (S. Douglas pers. comm. May 2022 in Commonwealth DCCEEW 2024).

12. Numerous threats working cumulatively are the likely drivers of continuing decline in the number of mature individuals and the area, extent and quality of habitat of *Persoonia acerosa*. Frequent fire limits the time available for plants to mature and accumulate a seed bank, reducing the number of potential recruits when the next fire occurs. Subpopulations on the urban fringe occurring in bushland, or along roadsides are at high risk of being burnt too frequently due to hazard reduction burns or human-ignited wildfires. Ten of the sites burnt during the 2019–20 fire season had also been burnt in 2013 or 2015, an interval of just four to six years or less than half the minimum time required for the species to replenish its seed bank (Auld *et al.* 2007; Auld and Ooi 2008). If they were extant at the time of the 2019–20 fire, at least some of these occurrences are likely to have been extirpated or greatly reduced. Several reports also comment on the confirmed or apparent removal of habitat for the species due to expanding urbanisation and clearing of habitat for associated infrastructure (Douglas 1999; Friedwald 2015). Furthermore, habitat

clearing or habitat degradation associated with clearing and settlement likely played a role in the local extinction of the Hill Top population (S. Douglas pers. comm. May 2022 in Commonwealth DCCEEW 2024). Losses through fire or clearing are compounded by anthropogenic disturbances such as slashing and other maintenance activities. Road and trail maintenance, recreational vehicle use and rubbish dumping have been noted as particularly affecting one of the larger populations at Lawson (NSW DPIE 2019). This is further compounded by the encroachment of woody weeds that proliferate after disturbance. Friedwald (2015) identified competition from *Pittosporum undulatum* as an important threat in urban areas due to the species tendency to create dense shade, its high fecundity and ready dispersal. *Pittosporum undulatum* is recognised as an escaped garden plant in the associated Key Threatening Process listing (NSW DPIE 2022), is not indigenous to the habitat of *P. acerosa*, and likely limits the habitat available for the species.

13. *Persoonia acerosa* Sieber ex Schult. & Schult.f is not eligible to be listed as a Critically Endangered species.

14. *Persoonia acerosa* Sieber ex Schult. & Schult.f 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 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,iii) and Clause 4.4(b)(e i,ii A(II))

Clause 4.2 – Reduction in population size of species
(Equivalent to IUCN criterion A)
Assessment Outcome: Data Deficient

(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,iii)

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,		
	(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 Clause C)
Assessment Outcome: Endangered under Clause 4.4(b)(e i,ii A(II))

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.

Clause 4.5 – Low total numbers of mature individuals of species
(Equivalent to IUCN criterion D)
Assessment Outcome: Not met

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.

Professor Angela Moles, FRSN
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Commonwealth DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2024) Conservation Advice for *Persoonia acerosa* (needle geebung). Commonwealth DCCEEW: Canberra.

References:

Auld TD, Denham AJ & Turner K (2007) Dispersal and recruitment dynamics in the fleshy-fruited Persoonia lanceolata (Proteaceae). Journal of Vegetation Science, 18(6), 903–910.

Auld TD, Ooi MK (2008) Applying seed germination studies in fire management for biodiversity conservation in south-eastern Australia. *Web Ecology*, **8(1)**: 4–54.

Ayre DJ, Ottewell KM, Krauss SL, Whelan RJ (2009) Genetic structure of seedling cohorts following repeated wildfires in the fire-sensitive shrub *Persoonia mollis* ssp. *nectens*. *Journal of Ecology* **97**: 752–760.

Benson D, McDougall L (2000) Ecology of Sydney Plant Species Part 7b: Dicotyledon families Proteaceae to Rubiaceae. *Cunninghamia* **6(4)**: 1017–1202.

Bernhardt P, Weston PH (1996) The pollination ecology of *Persoonia* (Proteaceae) in eastern Australia. *Telopea* **6(4)**: 775–804.

Brown I (2020) Survey for Needle Geebung (*Persoonia acerosa*) Upper Blue Mountains May-June 2020. Report to NSW National Parks and Wildlife Service, Blue Mountains Branch, Saving our Species program.

Catelotti K, Bino G, Offord CA (2020) Thermal germination niches of *Persoonia* species and projected spatiotemporal shifts under a changing climate. *Diversity and Distributions*, **26(5)**: 589–609.

Douglas SM (1999) Assessment of the conservation status of *Persoonia acerosa, Persoonia bargoensis, Persoonia glaucescens,* and *Olearia cordata*. Report to NSW National Parks & Wildlife Service (Sydney Zone Team). Ecological Surveys & Planning. In possession of author.

Douglas SM (2014) Report on the establishment of monitoring plots, and results from survey transects for *Persoonia acerosa* and *Pultenaea glabra.* Report to Blue Mountains City Council. Ecological Surveys & Planning. In possession of Blue Mountains City Council, Katoomba.

Friedwald D (2015) Survey report for the mapping of the vulnerable shrub species *Persoonia acerosa* and *Pultenaea glabra* on Council owned and managed bushland reserves within the Blue Mountains LGA. Report for the Blue Mountains City Council and Save Our Species program (NSW DPE). In the possession of NSW DPIE, Parramatta.

IUCN (International Union for the Conservation of Nature) (2024) *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 16. *International Union for the Conservation of Nature Standards and Petitions Subcommittee*. Available at: http://www.iucnredlist.org/documents/RedListGuidelines.pdf

Lambers H, Clode PL, Hawkins HJ, Laliberté E, Oliveira RS, Reddell P, Shane MW, Stitt M, Weston P (2015) Metabolic adaptations of the non-mycotrophic

Proteaceae to soils with low phosphorus. *Annual Plant Reviews, Phosphorus Metabolism in Plants*, **48**: 289.

NSW DPIE (Department of Planning Industry and Environment) (2019) *Saving Our Species annual report card for the Needle Geebung (*Persoonia acerosa*).* In possession of NSW Department of Planning Industry and Environment, Parramatta.

NSW DPIE (Department of Planning Industry and Environment) (2022) Key Threatening Process: Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants. Accessed: 20 June 2022. Available at:https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=20 265

NSW OEH (Office of Environment and Heritage) (2014) Fire Response Database. In possession of NSW Department of Planning Industry and Environment, Parramatta.

OzArk Environmental and Heritage Management P/L (2018) *Needle Geebung* Persoonia acerosa *distribution surveys: Saving Our Species 2017-2018. Report to Blue Mountains Region of the NSW National Parks and Wildlife Service. OzArk, Dubbo.* In possession of NSW Department of Planning Industry and Environment, Parramatta.

PlantNET (The NSW Plant Information Network System) (2022) *Persoonia acerosa*. Royal Botanic Gardens and Domain Trust, Sydney. Accessed: 1 February 2022. Available at: https://plantnet.rbgsyd.nsw.gov.au/cgi- bin/NSWfl.pl?page=nswfl&lvl=sp&name=Persoonia~acerosa

Rymer PD, Whelan RJ, Ayre DJ, Weston PH & Russell KG (2005) Reproductive success and pollinator effectiveness differ in common and rare *Persoonia* species (Proteaceae). Biological Conservation, 123(4), 521–532.

Washington HG, Wray RAL (2011) The geoheritage and geomorphology of the sandstone pagodas of the north-western Blue Mountains region (NSW). *Proceedings of the Linnean Society of New South Wales* **132**: 131–143.

Weston PH (2003) Proteaceae subfamily *Persoonioideae*. *Australian Plants* **22**: 62–91.