

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 the shrub *Pimelea bracteata* Threlfall as a **CRITICALLY ENDANGERED SPECIES** in Part 1 of Schedule 1 of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Pimelea bracteata was found to be eligible for listing as Critically Endangered under Clause 4.2(1)(a);(2)(a). The main reason for this species being eligible is that it is expected to undergo a very large population decline. There is an inferred population decline over the past 6 years (44-77%) and based on this decline, the projected decline over a three generation time period (including the past and the future) is estimated to be 99-100%.

The NSW Threatened Species Scientific Committee has found that:

1. *Pimelea bracteata* Threlfall (family Thymelaeaceae) is described by PlantNET (2019) as a “shrub to 2 m high, stems glabrous. Leaves narrow-elliptic to oblanceolate, those immediately below the involucre often wider, usually 6–10 mm long, 3–6 mm wide, often with a purplish tinge. Flowers in bracteate heads, bracts completely surrounding the head; head usually nodding on short lateral shoot; peduncle 1–5 mm long. Bracts 6–8, 10–18 mm long, 7–15 mm wide, glabrous, yellow-green often tinged with purple or red. Flowers 15–26 in each head, 12–17 mm long, pale yellow. Fruit 3–4.5 mm long, green.” *Pimelea bracteata* has been referred to as *Pimelea ligustrina* var. *glabra* Maiden & Betche and *Pimelea* sp. B *sensu* Jacobs & Pickard (1981).
2. *Pimelea bracteata* is endemic to New South Wales where it is currently known from the Southern Tablelands. The main areas of occurrence of *P. bracteata* are in the northern area of Kosciuszko National Park, Scabby Range Nature Reserve, neighbouring State Forests and freehold land.
3. *Pimelea bracteata* is a localised shrub occurring in wetlands and along waterways and stream edges in high altitude treeless subalpine valleys (K. McDougall and G. Wright *in litt.* August 2017; PlantNET 2019). It has been recorded in wet heathland and closed heath (McDougall and Walsh 2007; K. McDougall and G. Wright *in litt.* August 2017). The populations of *Pimelea bracteata* do not appear to be even-aged, indicating that recruitment is not solely dependent on disturbance events such as fire. Regeneration from seed has been observed within many populations (G. Wright and K. McDougall *in litt.* May 2017). Regeneration following a fire in Kosciuszko National Park in 2003 was observed from both resprouting plants and the establishment of seedlings (Walsh & McDougall 2004). The lifespan of *Pimelea bracteata* is unknown, however based on other subalpine or resprouting *Pimelea* species (NSW Fire Response Database 2014), it is estimated to be at least 15-50 years.
4. *Pimelea bracteata* has a highly restricted geographic distribution. The extent of occurrence (EOO) was estimated to be 4161 km² based on a minimum convex polygon enclosing all reliably mapped occurrences of the species, the method of assessment recommended by IUCN (2017). The area of occupancy (AOO) was estimated to be 116 km² based on the species occupying 29 (2 km x 2 km) grid cells, the spatial scale of assessment recommended by IUCN (2017).
5. In 2013, many woody species were observed to be in poor health in Kosciuszko National Park including *Pimelea bracteata* which was showing signs of foliage dieback (McDougall *et al.* 2018).

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The total abundance of *P. bracteata* prior to the dieback was estimated to be between 7,500 and 15,000 mature individuals. Since that time there has been a severe decline in the abundance of *P. bracteata* based on observations at sites throughout its range (K. McDougall and G. Wright *in litt.* August 2017). From 12 sites (out of approximately 21 known sites), estimates from 2013 to either 2016 or 2019 suggest a decline in the order of 44-77% over this time. The current estimated number of mature individuals is likely to be between 2,500 and 7,000. Based on this observed decline since 2013, and assuming a constant decline rate, the projected decline over a three-generation time period (including the past and the future) is estimated to be 99-100%.

6. The main threat to *Pimelea bracteata* is unknown but reasonably inferred to be pathogen or invertebrate-induced dieback. The species is also threatened by habitat disturbance from feral horses, pigs and deer, as well as access to sites by people and vehicles. Dieback is estimated to have led to a decline of 44-77% in the population of *P. bracteata* over the past 6 years. The cause of the decline is being investigated but three separate factors have been identified: 1) Plant pathogens *Phytophthora gregata* and *P. cryptogea* were detected in *Pimelea bracteata* plants that were dead or dying and had collar rot; 2) Mycelia similar to that produced by *Armillaria luteobubalina*, an aggressive native pathogen of woody plants, were found on the lower stems of symptomatic plants at two sites. Although the presence of this fungus has not been confirmed for *Pimelea bracteata*, it has recently been implicated in the deaths of subalpine shrubs and the poor condition of eucalypt woodland near Round Mountain in Kosciuszko National Park (K. McDougall *et al.* 2018); and/or 3) The mite *Aceria pimeliae*, previously only known from New Zealand (though it is uncertain if it may also be native to Australia), was identified on *Pimelea bracteata* samples with the plant deformity 'witches broom'. Any one of these factors may be the cause of dieback in *Pimelea bracteata* or dieback may involve a combination of them, along with environmental factors. Collar rot from *Phytophthora* infection is the most likely cause because *Pimelea bracteata* has no capacity to recover once its water and nutrient transport system is severed (K. McDougall and G. Wright *in litt.* August 2017). Dieback affects plants of all size classes (McDougall *et al.* 2018) and is associated with large scale plant mortality. Whilst some limited seedling recruitment has been observed at some sites following adult mortality, there is no evidence that these recruiting plants can persist in the long-term, as indicated by the death of many recruits at one site when revisited. Overall, regeneration is poor or non-existent (McDougall *et al.* 2018). Possible vectors for the spread of dieback include people and vehicles as there are management trails that cross creeks in affected populations. Horses, pigs and deer could also be possible vectors (McDougall *et al.* 2018) as disturbance to the habitat by these feral animals has been observed. Horses tend to cross creeks at the same spot, which leads to broad and denuded areas. Deer are an increasing problem, particularly in the northern area of Kosciuszko National Park where they disturb the creeks by wallowing. Pigs tend to occur in grasslands rather than creeks but may disturb *P. bracteata* habitat (K. McDougall pers. comm. November 2018). An estimated 50% of the range of *Pimelea bracteata* was burnt during the 2019-2020 fire season. The ability of the species to recover from this fire may be compromised by pathogens, drought and post-fire disturbance of habitat by feral horses and deer. 'Habitat degradation and loss by Feral Horses (brumbies, wild horses), *Equus caballus* Linnaeus 1758' and 'Herbivory and environmental degradation caused by feral deer' are listed on the Act as Key Threatening Processes.
7. *Pimelea bracteata* Threlfall is eligible to be listed as a Critically Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

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Clause 4.2 – Reduction in population size of species
(Equivalent to IUCN criterion A)

Assessment Outcome: Critically Endangered under Clause 4.2(1)(a);(2)(a).

(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,	
	(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.

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Clause 4.4 - Low numbers of mature individuals of species and other conditions
(Equivalent to IUCN criterion C)

Assessment Outcome: Vulnerable under Clause 4.4 (c)(d)(i).

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.

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Clause 4.7 - Very highly restricted geographic distribution of species—vulnerable species
(Equivalent to IUCN criterion D2)

Assessment Outcome: Vulnerable under Clause 4.7.

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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Supporting Documentation:

Scott J, Auld TD (2019) Conservation Assessment of *Pimelea bracteata* Threlfall (family Thymelaeaceae). NSW Threatened Species Scientific Committee.

References:

IUCN Standards and Petitions Subcommittee (2017) Guidelines for Using the IUCN Red List Categories and Criteria. Version 13 Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.

McDougall KL, Walsh NG (2007) Treeless vegetation of the Australian Alps. *Cunninghamia* **10**, 1–57.

McDougall KL, Wright GT, Burgess TI, Farrow R, Khaliq I, Laurence MH, Wallenius T, Liew ECY (2018). Plant, invertebrate and pathogen interactions in Kosciuszko National Park. *Proceedings of the Linnean Society of New South Wales* **140**, 295–312.

NSW Office of Environment and Heritage (OEH) (2014) Fire Response Database. (currently unavailable for access by public online)

PlantNET (The NSW Plant Information Network System) Royal Botanic Gardens and Domain Trust, Sydney. <http://plantnet.rbgsyd.nsw.gov.au> (accessed 09 July 2019).
<http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Pimelea~bracteata>

Walsh NG, McDougall KL (2004) Progress in the recovery of the flora of treeless subalpine vegetation in Kosciuszko National Park after the 2003 fires. *Cunninghamia* **8**, 439–452.