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Notice of and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established by the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the shrub *Kardomia prominens* (A.R.Bean) Peter G.Wilson as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to *Kardomia prominens* (A.R.Bean) Peter G. Wilson as an Endangered Species in Part 2 of Schedule 1 of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Kardomia prominens is eligible for listing as Critically Endangered under Clause 4.3(a) (d) (e i, ii, iv) because: i) the distribution of the species is very highly restricted with both an area of occupancy and extent of occurrence of between 4 km^2 and 8 km^2; ii) the species is known from only one location; and iii) there is a continuing decline in the number of individuals and the geographic distribution of the species.

The NSW Threatened Species Scientific Committee has found that:

1. *Kardomia prominens* (A.R.Bean) Peter G.Wilson (Myrtaceae) was originally described by Bean (1997, as *Babingtonia prominens*) as a "Shrub to 2.5 m high. Bark grey, scaly and persistent. Stem flanges grey, flat, winged, not warty, entire. Leaves elliptic, 3.5-4. 1 mm long, 1.8-2. 1 mm wide, straight or somewhat curved, flat, obtuse, not keeled, entire; oil glands prominent on lower surface, evenly scattered; midrib not or faintly visible; petiole c. 0.5 mm long. Inflorescence axillary, 1 -flowered; peduncle 1.0-2.5 mm long; pedicels 2.5-6.0 mm long; bracteoles 2, linear, 1.5-2.5 x 0.4-0.5 mm, acute, persistent. Hypanthium obconical, 2.0-2.5 mm long, muricate, fused to the ovary except at top. Sepals compound; inner lobe obtuse, 0.3-0.5 x 1.0-1.3 mm, thick, entire; outer lobe acuminate, 1.0-1.3 mm long, thick, erect. Corolla white, up to 8 mm across; petals orbicular, 2.6-3.0 mm across, fimbriate, oil glands absent. Stamens 8-10, one stamen opposite each sepal, the remainder scattered, but never opposite a petal; filaments terete, not geniculate, sepaline filaments c. 0.5 mm long, other filaments c. 0.8 mm long, with brown connective gland; anthers adnate, c. 0.3 mm long, dehiscing by small slits; anther loculi fused. Style c. 0.5 mm long, set into a pit; stigma broadly capitate. Ovary 3-locular; floral disc concave; ovules 10-1 1 per loculus, arranged in two longitudinal rows on placenta. Fruit hemispherical, 2.0-2.2 x 3.5-4.0 mm; valves woody, slightly exserted. Seeds D- shaped, with flat sides and rounded backs, c. 1.0 mm long, minutely reticulate, pale brown; hilum terminal." (Bean 1997). The species was transferred to *Kardomia* following a revision of *Babingtonia* based on molecular and morphological data (Wilson *et al*. 2007).

2. *Kardomia prominens* is endemic to NSW and is known only from two populations in the Dorrigo area near Nymboida in the north-east of NSW. One of these populations, Moses Rock in Nymboida-Binderay National Park, is believed to be extinct. The extant population at Nymboida occurs on private land. The population size of *Kardomia prominens* at the time of listing in 2000 was estimated to be 1000 individuals (both mature and juvenile). Fewer than 50 of these were from a single population (Moses Rock), which in January 2000 may have been as low as two remaining individuals. The entire Moses Rock population was burnt during a severe wildfire in September 2003 (OEH 2017) and was not observed during a targeted search of the site "several

years" after the fire (D. Binns, pers. comm. Mar. 2019). The larger second population (at Nymboida) was still believed to contain around 1000 individuals in early 2019 (G. Phillips, pers. comm. May 2019).

3. *Kardomia prominens* has a very highly restricted geographic range. The upper bound estimated range, which assumes both populations are extant, has an Area of Occupancy (AOO) and an Extent of Occurrence (EOO) of 8 km^2, while the lower bound estimated range, including only the population that is known to be extant, has an AOO and EOO of 4 km^2.

4. The main threats facing *Kardomia prominens* include adverse fire regimes, impacts of the pathogen Myrtle Rust (*Austropuccinia psidii*) and drought. As in other closely related species in the family Myrtaceae that are found in similar habitats, *K. prominens* is likely to possess a requirement for seasonal temperature stratification to break seed dormancy (see Baskin and Baskin 1998; Myerscough 1998). Additionally, successive fires at short intervals could adversely impact on the species, as could a combination of fire and post-fire drought (see Le Breton 2019). Fires during the 2019/20 bushfire season appear to have burnt across all known sites of *Kardomia prominens* (Gallagher 2020). Laboratory testing has shown that *Kardomia prominens* is susceptible to infection by the pathogen Myrtle Rust (*Austropuccinia psidii*) (Berthon *et al*. 2018) and such infection could potentially drive the species to extinction in a very short period of time. Observations of drought-related mortality in recent years, coupled with the possible role of a dry summer following fire in the loss of the southern population, suggest the species may be sensitive to prolonged drought (G. Phillips, pers. comm. May 2019; Le Breton 2019). 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' and 'Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae' are listed in the Act as Key Threatening Processes.

5. Continuing declines in extent of occurrence, area of occupancy and number of locations or subpopulations have been observed in the past from the presumed loss of the southern population. Continuing declines in number of mature individuals at the northern population are inferred based on observations of drought-related mortality with limited recruitment and low seed fill (Le Breton 2019).

6. *Kardomia prominens* (A.R.Bean) Peter G.Wilson 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*:

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: Critically Endangered under Clause 4.3(a) (d) (e i, ii, 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.~~

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)(B)

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: Vulnerable under Clause 4.5(c)

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~~	~~highHigh~~

Clause 4.7 - Very highly restricted geographic distribution of species
(Equivalent to IUCN criterion D2)
Assessment Outcome: Vulnerable

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.

Dr Anne Kerle
Chairperson
NSW Threatened Species Scientific Committee

Supporting document:

Le Breton TD (2019) Conservation Assessment of *Kardomia prominens* (A.R.Bean) Peter G.Wilson (Myrtaceae). (NSW Threatened Species Scientific Committee: Hurstville, NSW).

References:

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Berthon K, Esperon-Rodriguez M, Beaumont LJ, Carnegie AJ, Leishman MR (2018) Assessment and prioritisation of plant species at risk from myrtle rust (*Austropuccinia psidii*) under current and future climates in Australia. *Biological Conservation* **218**, 154–162.

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Wilson PG, Heslewood MM, Quinn CJ (2007) Re-evaluation of the genus *Babingtonia* (Myrtaceae) in eastern Australia and New Caledonia. *Australian Systematic Botany* **20**, 302–318.