Notice of Preliminary Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to list *Boronia ruppii* Cheel as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to *Boronia ruppii* Cheel in Part 2 of Schedule 1 (Endangered species) of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

How to make a submission

The NSW TSSC welcomes public involvement in the assessment process and places preliminary determinations on public exhibition on the NSW TSSC pages on the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) website. This public exhibition provides an opportunity for the public to comment on this preliminary determination as well as provide any additional information that is relevant to the assessment.

Postal submissions regarding this Preliminary Determination may be sent to:
Secretariat
NSW Threatened Species Scientific Committee
Locked Bag 5022
Parramatta NSW 2124.

Email submissions in Microsoft Word or PDF formats to:
scientific.committee@environment.nsw.gov.au

Submissions close 3 July 2026

What happens next?

After considering any submissions received during the public exhibition period the NSW TSSC will make a Final Determination and a notice will be placed on the NSW DCCEEW website to announce the outcome of the assessment. If the Final Determination is to support a listing, then it will be added to the Schedules of the Act when the Final Determination is published on the legislation website. www.legislation.nsw.gov.au.

Privacy information

The information you provide in your submission may be used by the NSW TSSC in the assessment to determine the conservation status and listing or delisting of threatened or extinct species, threatened populations and threatened or collapsed ecological communities or to assess key threatening processes.

The NSW TSSC may be asked to share information on assessments with NSW Government agencies, the Commonwealth Government and other State and Territory governments to collaborate on national threatened species assessments using a common assessment method and to assist in the management of species and ecological communities.

If your submission contains information relevant to the assessment it may be provided to state and territory government agencies and scientific committees as part of this collaboration.

If you wish your identity and personal information in your submission to be treated as confidential you must:

- *request your name be treated as confidential*, and
- *not include any of your personal information in the main text of the submission or attachments so that it can be easily removed.*

Professor Angela Moles, FRSN
Chairperson
NSW Threatened Species Scientific Committee

Public exhibition period: 10/04/2026 - 3/07/2026

Preliminary Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to list *Boronia ruppii* Cheel as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to *Boronia ruppii* Cheel in Part 2 of Schedule 1 (Endangered species) of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Boronia ruppii Cheel was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3(a)(d)(e i,iii). The main reasons for the species being eligible are: 1) the species has a very highly restricted geographic distribution with an estimated extent of occurrence of 12 km^2; 2) the species is considered to occur at a single threat-defined location; and 3) continuing decline is inferred in the area, extent and quality of habitat and number of mature individuals due to browsing and damage by herbivores, increased frequency and duration of drought due to climate change, clearing for mining and infrastructure, and competition and habitat alteration due to invasive weeds.

The NSW Threatened Species Scientific Committee has found that:

1. *Boronia ruppii* Cheel (family Rutaceae) is described by Duretto and Ladiges (2013) as a “shrub to 2 m tall. Branches stellate-tomentose, eglandular. Stellate hairs sessile; rays firm, ±straight, shiny. Leaves 1–3-foliolate, first few leaves of a branch usually 3-foliolate and then only unifoliolate ones produced; petiole 1–3 mm long; pinnate leaves 8–21 mm long, 6–26 mm wide; unifoliolate leaves and leaflets elliptic to broadly elliptic or spathulate, 4–18 mm long, 3–8 mm wide, obtuse, glabrous or with a few scattered hairs. Inflorescence 1–3-flowered, stellate-tomentose; peduncle 1–6 mm long; pedicels 3–8 mm long. Sepals ovate-deltate, 3.5–5 mm long, 2–3 mm wide, acute; abaxial surface densely stellate-tomentose. Petals 5–9 mm long, white to pink. Cocci glabrous.”

2. *Boronia ruppii* is a range-restricted species endemic to an area of serpentinite geology near Woodsreef, east of Barraba on the northwestern slopes of New South Wales (NSW) (OEH 2019). *Boronia ruppii* is currently known only from a small area of approximately 2 x 3 km in the vicinity of the now abandoned Woodsreef asbestos mine, with all occurrences being restricted to soils derived from the localised serpentinite geology (Irvin 2010; Spark 2015). Stands occur across a mixture of crown land tenures including the former mine site, the National Parks and Wildlife Service managed Woodsreef State Conservation Area, and a travelling stock reserve (Spark 2015).

3. *Boronia ruppii* has a very highly restricted geographic distribution. The extent of occurrence of *B. ruppii* (EOO) is estimated to be 4.9 km^2 based on a minimum convex polygon enclosing cleaned locality records of the species, the method of assessment recommended by IUCN (2024). The area of occupancy (AOO) is estimated to be 12 km^2 using 2 x 2 km grid cells, the scale recommended by IUCN (2024). Therefore, the EOO for *B. ruppii* was adjusted to 12 km^2 (equal to AOO)

for the purpose of this assessment, as recommended by IUCN (2024) where calculated values of AOO exceed the calculated EOO.

4. The estimated total number of mature individuals of *Boronia ruppii* is low, with the current minimum population estimated to be 435–517 mature individuals. Seedlings are rare and only 20 in total have ever been confirmed, with the most recorded in a single season being 5–6 following above-average rainfall (T. Soderquist pers. comm. June 2024). The population of *B. ruppii* is considered to be a single subpopulation based on the IUCN (2024) definition.

5. *Boronia ruppii* grows in open, dry, grassy woodland on soils derived from serpentinite (Duretto and Ladiges 2013; Spark 2015). Sites range in elevation from 480 m to 620 m, with many plants being recorded on rocky ridges and steep slopes (Spark 2015). *Boronia ruppii* is most often found in woodland dominated by *Eucalyptus* sp. aff. *macrorhyncha* (also known as *E.* sp. Woodsreef), another serpentinite endemic yet to be described. The canopy stratum also often contains *Angophora floribunda, Callitris glaucophylla* and *Acacia implexa* (Spark 2015). The grassy understorey is most often dominated by *Triodia scariosa* and/or *Themeda triandra*, with other grasses such as *Aristida personata, A. ramosa, Cymbopogon refractus* and *Poa sieberiana* also present at some sites. The shrub layer is often sparse to almost absent (G. Phillips pers. obs. September 2020). Other understorey species recorded with *B. ruppii* include *Dianella revoluta, Lepidosperma laterale, Dodonaea boroniifolia, Pimelea linifolia, Goodenia hederacea* subsp. *hederacea, Hibbertia obtusifolia, Hovea cymbiformis* and *Melichrus urceolatus* (Spark 2015).

6. As no fires have been recorded in the *Boronia ruppii* population (NSW NPWS 2024), there are currently no observations regarding fire response for the species. No major seedling recruitment episodes of *B. ruppii* have ever been recorded, with only occasional seedlings observed emerging following periods of substantial rain (T. Soderquist pers. comm. June 2024). Resprouting has been observed in heavily browsed plants, even those with almost all of the aboveground biomass removed (Spark 2015; T. Soderquist pers. comm. June 2024). Given the above, some individuals of *B. ruppii* may be capable of surviving and resprouting, at least after low severity fires, with the potential for fire-cued seedling recruitment, as demonstrated in other *Boronia* species (Mackenzie *et al*. 2021).

7. *Boronia ruppii* can flower year-round, however the primary flowering period is July to December, with fruits maturing in October to December (Duretto and Ladiges 2013, PlantNET 2024). Fruiting and seed production is sparse, with very low proportions of plants (~12-13% of flowering plants, or 10% of all plants) reported as producing fruit in a season (Irvin 2010). Seed production is limited even in seasons with adequate rainfall (RBGDT 2024).

8. The primary threats acting on *Boronia ruppii* include browsing and damage by herbivores including feral goats (*Capra hircus*), pigs (*Sus scrofa*) and rabbits (*Oryctolagus cuniculus*), increased frequency and duration of drought due to climate change, clearing for mining and infrastructure, and competition and habitat alteration due to invasive weeds (Spark 2015; OEH 2019). High frequency fire regimes may also pose a threat to the species in the future (OEH 2019). These threats often do not act independently, and the cumulative effects of threatening

processes, such as increased herbivore browsing during drought, have been noted as causing significant damage to, and loss of plants (OEH 2019; T. Soderquist pers. comm. June 2024). 'Competition and habitat degradation by feral goats (*Capra hircus*)', 'Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758', 'Competition and grazing by the feral European rabbit *Oryctolagus cuniculus* (L.)', 'Anthropogenic Climate Change', 'Clearing of native vegetation', 'Invasion of native plant communities by exotic perennial grasses', and 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' are listed as Key Threatening Processes under the Act.

9. *Boronia ruppii* is considered to occur across a single threat-defined location following IUCN (2024). This is due to the increased frequency and severity of drought being the most serious plausible threat that results in the lowest number of locations as drought effects, and their interaction with other threats such as increased herbivory, are likely to be consistent across the species' highly restricted range.

10. Continuing decline of *Boronia ruppii* is inferred in the area, extent and quality of habitat and number of mature individuals due to browsing and damage by herbivores, increased frequency and duration of drought due to climate change, clearing for mining and infrastructure, and competition and habitat alteration due to invasive weeds. Herbivore activity is known to cause mortality and heavy defoliation of *B. ruppii* (Irvin 2010; Spark 2015; OEH 2019), with drought amplifying the effects of this threat (T. Soderquist pers. comm. June 2024). Drought has also been noted as severely stressing plants, causing heavy defoliation and eliminating seasonal seed output (NSW Government 2018, 2019, 2020), and also alters habitat through canopy tree mortality (Allen *et al.* 2015). This habitat alteration may then reduce recovery potential in *B. ruppii* with each drought episode, amplifying the effects of drought- and herbivore-related decline.

11. Remediation works of the Woodsreef asbestos mine also have the potential to disturb and displace *Boronia ruppii* plants, especially those recolonising the tailings dump and other cleared areas of the mine (Spark 2015). Weeds such as Coolatai grass (*Hyparrhenia hirta*), fountain grass (*Cenchrus setaceus*) and blackberry (*Rubus anglocandicans*) have the ability to compete with and displace *B. ruppii* and degrade its habitat. These weeds can invade relatively undisturbed environments, and can also greatly increase the fire risk which is also projected to increase in the region due to climate change.

12. While the population of *Boronia ruppii* appears to have been stable in recent years (T. Soderquist pers. comm. June 2024), declines were observed prior to 2015. Dieback and mortality of mature individuals due to unknown causes was noted during 2003–2015 (Spark 2015), and the number of individuals at one site declined by approximately 30% following the erection of a protective fence in 2001 (T. Soderquist *in litt.* January 2025). Seedling recruitment is very rare (T. Soderquist pers. comm. June 2024), and so replacement of lost plants is uncertain over the long-term, given the current threats and in the case that further dieback episodes occur. Dieback events may be related to droughts and/or severe fire, which are likely to increase in risk and effect into the future, and are inferred to drive

continuing declines in the area, extent, and quality of habitat available and the number of mature individuals.

13. *Boronia ruppii* Cheel 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*:

Assessment against *Biodiversity Conservation Regulation 2017* criteria

The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: Critically Endangered under Clause 4.3(a)(d)(e i,iii)

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: Critically Endangered under Clause 4.3(a)(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(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	high.

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.

Professor Angela Moles, FRSN
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Phillips GP (2025) Conservation Assessment of *Boronia ruppii* Cheel (Rutaceae). A report by the NSW Department of Climate Change, Energy, the Environment and Water.

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OEH (Office of Environment and Heritage) (2019) Rupp's Boronia – profile. URL: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10100 (accessed 5 November 2025).

PlantNET (2024) *Boronia ruppii* in 'PlantNET (The NSW Plant Information Network System)'. Royal Botanic Gardens and Domain Trust, Sydney. URL: https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Boronia~ruppii (accessed 5 November 2025).

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Spark P (2015) *Flora Survey to Locate New Populations of* Boronia ruppii *in The Woodsreef & Upper Bingara Region Targeting Woodlands on Serpentinite Geology*. An unpublished report by North West Ecological Services for the Office of Environment and Heritage. 58 pp.