

NSW Threatened Species Scientific Committee

Exhibition period: 01/02/19 – 29/03/19

Proposed Listing date: 01/02/19

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 *Zieria odorifera* subsp. *warrabahensis* Duretto & P.I.Forst. 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

Zieria odorifera subsp. *warrabahensis* is eligible for listing, as the highest threat category met by the taxon across all categories, as Critically endangered under Clause 4.3 (a) (d) (e i & iii) because: i) the distribution of the species is highly restricted with both the area of occupancy and extent of occurrence equal to 4-8 km²; ii) the species is known from only two locations; and iii) there is a continuing decline in the abundance and habitat quality of the species.

The NSW Threatened Species Scientific Committee has found that:

1. *Zieria odorifera* subsp. *warrabahensis* Duretto & P.I.Forst. (family Rutaceae) is described as an erect shrub to 40 cm tall; branches ridged, with a moderately dense indumentum of mainly stellate and some bifid hairs between the ± glabrous leaf decurrencies; leaves trifoliolate, sparsely pilose sometimes with hairs concentrated on midribs; petioles 1–1.5 mm long, glandular verrucose; terminal leaflets narrowly elliptic to oblanceolate, 2.5–5 × 1–3 mm, margins slightly to obviously glandular dentate, adaxial surface not glandular verrucose; inflorescence usually longer than the subtending leaves, 1–3-flowered; peduncle 3–5 mm long, sparsely stellate hairy; pedicels 1–1.5 mm long, with 1 mm, abaxial surfaces glabrous or with a sparse indumentum of minute stellate hairs; petals c. 2.5 × 1.2 mm, adaxial surface sparsely pilose, abaxial surface with a dense stellate indumentum; gynoecium glabrous; cocci and seed not seen (Duretto and Forster 2008; PlantNET 2016).
2. *Zieria odorifera* subsp. *warrabahensis* is endemic to New South Wales (NSW) and is known only from a limited area in and near Warrabah National Park, west of Armidale in northern NSW. It is found in both heath and *Eucalyptus prava*/*Callitris endlicheri* layered woodland on granite outcrops (Duretto and Forster 2008; PlantNET 2016; L. Copeland *in litt.* May 2016, November 2016, January 2017).
3. *Zieria odorifera* subsp. *warrabahensis* is known from only two herbarium collections made c. 2.7 km apart. Two surveys for this taxon in October 2006 determined that the subspecies is confined to a small area in Warrabah National Park and adjacent private property, and it is apparently absent from other areas of the park that contain apparently suitable habitat. The population contains c. 100 mature individuals (L. Copeland *in litt.* May 2016, November 2016, January 2017); the number of mature individuals is therefore estimated to be very low.
4. The distribution of *Zieria odorifera* subsp. *warrabahensis* is very highly restricted. The area of occupancy (AOO) and the extent of occurrence (EOO) are estimated to be 4–8 km². The AOO is based on 2 km x 2 km grid cells, the scale recommended for assessing AOO by IUCN (2016). The EOO is reported as equal to AOO, despite the range of the species, measured by a minimum convex polygon containing all the known sites of occurrence, being less than AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2017).
5. Threats to *Zieria odorifera* subsp. *warrabahensis* include grazing by feral goats and inappropriate fire regimes (L. Copeland, *in litt.* May 2016, January 2017). During two separate surveys of the taxon across its entire range in October 2006, it was observed that a number of plants, both within and outside Warrabah National Park, had been heavily browsed with most leaves gone and only semi-broken stems remaining. Goats are prolific in the area, and are most likely to be responsible for this damage (L.

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Copeland, *in litt.* January 2017). The fire response of *Z. odorifera* subsp. *warrabahensis* has not been recorded but it is likely to resprout following fire given that this behaviour has been documented for New England populations of *Z. odorifera* (Clarke et al. 2009) (which can be assumed to be *Z. odorifera* subsp. *williamsii* based on their location). While individuals of *Z. odorifera* subsp. *warrabahensis* are therefore likely to survive fire, repeated burns within a short interval may kill the plants, especially if their resources are already depleted as a result of frequent grazing (L. Copeland, *in litt.* January 2017). An absence of fire may limit population replacement unless the species can recruit new individuals in the absence of fire. The population's limited extent makes it highly susceptible to localised events such as clearing, disturbance and weed invasion. 'Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758', 'Clearing of native vegetation' 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.

6. *Zieria odorifera* subsp. *warrabahensis* Duretto & P.I.Forst. is eligible to be listed as a Critically 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 immediate future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Overall Assessment

Critically endangered under Clause 4.3

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.

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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: Data Deficient.

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: Endangered under Clause 4.5.

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.
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Dr Marco Duretto
Chairperson
NSW Threatened Species Scientific Committee

References:

Clarke PJ, Knox KJE, Campbell ML, Copeland LM (2009) Post-fire recovery of woody plants in the New England Tableland Bioregion. *Cunninghamia* **11**, 221–239.

Duretto MF, Forster PI (2008) New subspecies for *Zieria odorifera* J.A.Armstr. (Rutaceae) from northern New South Wales. *Austrobaileya* **7**, 681–690.

IUCN Standards and Petitions Subcommittee (2016) Guidelines for Using the IUCN Red List Categories and Criteria. Version 12. Prepared by the Standards and Petitions Subcommittee.

<http://www.iucnredlist.org/documents/RedListGuidelines.pdf>

PlantNET (The NSW Plant Information Network System) Royal Botanic Gardens and Domain Trust, Sydney.
<http://plantnet.rbgsyd.nsw.gov.au> (accessed 24 November 2016).