

## Notice of and reasons for 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 *Helichrysum calvertianum* (F.Muell.) F.Muell. as a VULNERABLE SPECIES in Part 3 of Schedule 1 of the Act. Listing of Vulnerable species is provided for by Part 4 of the Act.

### Summary of Conservation Assessment

*Helichrysum calvertianum* is eligible for listing as Vulnerable, as the highest threat category met by the taxon across all categories, under Clause 4.3 (c) (d) (e i, iii) because: i) the species has a highly restricted geographic range with an extent of occurrence of 673 km<sup>2</sup> and an area of occupancy of 40 km<sup>2</sup>; ii) the species has an estimated population size of between 2500 and 3500 mature individuals; iii) its habitat and some mature individuals continue to be threatened by ongoing habitat disturbance; iv) there are estimated to be <10 locations; and v) the lower bound for the number of mature individuals in each population is <1000.

The NSW Threatened Species Scientific Committee has found that:

1. *Helichrysum calvertianum* (F.Muell.) F.Muell. (family Asteraceae) is a “twiggy subshrub to 30 cm high, much-branched; stems glabrescent with sparse woolly and minute glandular hairs, the lower leaves caducous leaving prominent scars. Leaves crowded, linear, 3–8 mm long, 0.5–0.8 mm wide, margins revolute and concealing the lower surface, surfaces green and glabrous, viscid. Heads terminal and solitary on branches, hemispherical, 0.7–1 cm long, 1–1.5 cm diam.; involucral bracts with margins woolly-ciliate towards base, laminae reflexed at maturity; intermediate bracts longest with white papery laminae often tinged pink towards the apex, outermost bracts golden and hyaline, innermost with long claws and with small white papery laminae. Florets numerous, all bisexual. Achenes oblong, terete, minutely glandular; pappus of many barbellate bristles, subplumose at the tip.” (PlantNET 2019).
2. *Helichrysum calvertianum* is endemic to New South Wales where it is currently only known from the Wingecarribee Shire. There are seven known populations. Only one population occurs within the reserve estate, in the northern part of Morton National Park.
3. *Helichrysum calvertianum* is a perennial paper daisy flowering from winter to summer (PlantNet 2019). It occurs in dry sclerophyll forest and heathland with rock outcrops, predominantly on Hawkesbury sandstone soils at altitudes between approximately 650 and 855 m (S. Douglas *in litt.* June 2016; PlantNet 2019). Rainfall ranges from 850 mm per annum at the western-most sites, to over 1500 mm at the eastern-most site (S. Douglas *in litt.* June 2016). It is likely the seeds are wind dispersed (Benson and McDougall 1994). The fire response of *H. calvertianum* is unknown (Benson and McDougall 1994).
4. *Helichrysum calvertianum* has a highly restricted geographic distribution. The extent of occurrence is estimated to be 673 km<sup>2</sup>, based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2017). The area of occupancy is estimated to be 40 km<sup>2</sup>, based on the species occupying 10 (2 km x 2 km) grid cells, the spatial scale of assessment recommended by IUCN (2017).

## NSW Threatened Species Scientific Committee

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5. There are currently incomplete data on the abundance of *Helichrysum calvertianum* as no formal survey of population size over its distribution has been undertaken. From database records and recent field observations, Douglas (*in litt.* June 2016) estimated the total number of mature individuals to be between 2,500 and 3,500.
6. Threats to *Helichrysum calvertianum* and its habitat include ongoing anthropogenic disturbance, impacts of feral animals, weed invasion and an inappropriate fire regime. Many of the populations are close to tracks and prone to disturbance from vehicle usage and from track maintenance activities. Plant death and damage as a result of crushing by vehicles (trail bikes, 4WDs and potentially mountain bikes) has been observed (S. Douglas *in litt.* June 2016). Vehicle disturbance leads to disturbance of highly erodible and skeletal soils, and increased weed invasion through weed propagules introduced from vehicles (S. Douglas *in litt.* June 2016). Other examples of disturbance to the habitat include dumped soil and rubble, and clearing associated with power line maintenance, firebreaks and road construction (S. Douglas *in litt.* June 2016). Feral animals, particularly rabbits (*Oryctolagus cuniculus*), are likely to adversely affect mature plants and recruitment by browsing, grazing, and digging (followed by erosion) (S. Douglas *in litt.* June 2016). Invasion by weeds (*Erigeron karvinskianus* and *Rubus anglocandicans*) is adversely affecting the population at Fitzroy Falls. The Penrose State Forest population is affected by invasion of *Pinus radiata* which occurs adjacent to the site (S. Douglas *in litt.* October 2017, December 2018). Although the fire response of *H. calvertianum* is not known, changes to fire frequency (including an absence of fire) may affect plant recruitment. *Helichrysum calvertianum* plants at Mount Gibraltar have not been found at the site since 2004 despite targeted searches undertaken in 2010 and 2016 (S. Douglas *in litt.* June 2016) and the species may now be extinct there. The possible loss of the species from this site may be due to a combination of high intensity fire, erosion of skeletal soil habitat on rock outcrops, rabbit impacts and recreational pressures (S. Douglas *in litt.* June 2016). 'Competition and grazing by the feral European Rabbit *Oryctolagus cuniculus* (L.)', and 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants' are listed as Key Threatening Processes under the Act.
7. *Helichrysum calvertianum* (F.Muell.) F.Muell. is not eligible to be listed as an Endangered or a Critically endangered species.
8. *Helichrysum calvertianum* (F.Muell.) F.Muell. is eligible to be listed as a Vulnerable species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing a high risk of extinction in Australia in the medium-term future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

# NSW Threatened Species Scientific Committee

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

<b>(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:</b>			
	(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.
<b>(2) - The determination of that criteria is to be based on any of the following:</b>			
	(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: Vulnerable via Clause 4.3 (c\*) (d) (e: i, iii).

\* Although *Helichrysum calvertianum* meets the thresholds for restricted geographic distribution (EOO and AOO) for an endangered species, only at the vulnerable threshold are two of the three other required conditions met.

<b>The geographic distribution of the species is:</b>			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted.
<b>and at least 2 of the following 3 conditions apply:</b>			
	(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.

# NSW Threatened Species Scientific Committee

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

Assessment Outcome: Vulnerable via Clause 4.4 (c) (e) (i, ii, (A(III))).

<b>The estimated total number of mature individuals of the species is:</b>			
	(a)	for <del>critically endangered species</del>	<del>very low, or</del>
	(b)	for <del>endangered species</del>	<del>low, or</del>
	(c)	for vulnerable species	moderately low.
<b>and either of the following 2 conditions apply:</b>			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
		(i)	for <del>critically endangered species</del> very large, or
		(ii)	for <del>endangered species</del> large, or
		(iii)	for <del>vulnerable species</del> 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 <del>critically endangered species</del> extremely low, or
			(II) for <del>endangered species</del> very low, or
			(III) for vulnerable species low,
		(B)	<del>all or nearly all mature individuals of the species occur within one population,</del>
		(C)	<del>extreme fluctuations occur in an index of abundance appropriate to the species.</del>

Clause 4.5 - Low total numbers of mature individuals of species  
(Equivalent to IUCN criterion D)

Assessment Outcome: Not met.

<b>The total number of mature individuals of the species is:</b>			
	(a)	for <del>critically endangered species</del>	<del>extremely low, or</del>
	(b)	for <del>endangered species</del>	<del>very low, or</del>
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability  
(Equivalent to IUCN criterion E)

Assessment Outcome: Data Deficient

<b>The probability of extinction of the species is estimated to be:</b>			
	(a)	for <del>critically endangered species</del>	<del>extremely high, or</del>
	(b)	for <del>endangered species</del>	<del>very high, or</del>
	(c)	for vulnerable species	high.

# NSW Threatened Species Scientific Committee

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

Assessment Outcome: Not met.

For vulnerable species,	<del>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.</del>
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Dr Marco Duretto  
Chairperson  
NSW Threatened Species Scientific Committee

## Supporting Document:

Scott J (2019) Conservation Assessment of *Helichrysum calvertianum* (F.Muell.) F.Muell. (Asteraceae).  
Version 1.0. NSW Threatened Species Scientific Committee.

## References:

Benson D, McDougall L (1994) Ecology of Sydney plant species. Part 2. Dicotyledon families  
Asteraceae to Buddlejaceae. *Cunninghamia* **3**, 789–1004.

IUCN Standards and Petitions Subcommittee (2017) 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 21 March 2019).