

## 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 *Hibbertia circinata* K.L.McDougall & G.T.Wright 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

*Hibbertia circinata* is eligible for listing as Critically Endangered, as the highest threat category met by the taxon across all categories, under Clauses 4.3(a) (d) (e iii) and 4.4 (a) (e i) (e ii B), because: i) the geographic range of the species is very highly restricted with an area of occupancy and extent of occurrence of 4 km<sup>2</sup>; ii) the species has a small population at a single location; and iii) there are inferred continuing declines in habitat area and quality and in the number of mature individuals of the species, resulting from the effects of an introduced plant pathogen.

The NSW Threatened Species Scientific Committee has found that:

1. *Hibbertia circinata* K.L.McDougall & G.T.Wright (family Dilleniaceae) was described by McDougall *et al.* (2018) as “Shrubs 1–1.5 m tall, with several to many ±erect stems, pubescent with simple, spreading to subappressed, straight, crisped or coiled hairs to 1.25 mm long (rarely to 2 mm long around leaf bases); new growth villous, vestiture persistent to lower branches. Leaves sessile with broad, partly stem-clasping bases which remain when the lamina separates at a distinct abscission line; lamina oblanceolate (or occasionally oblong to almost spatulate), entire (or rarely, irregularly toothed near apex), 15–55 mm long, 5–10(–12) mm wide, discolorous; adaxial surface dark green, pubescent, with semi-appressed hairs ranging from tightly coiled (to 0.2 mm diameter) to curled or ±straight, mostly to 0.5 mm long, but up to 2.5 mm long towards base and margin, abaxial surface pale grey-green, with hairs similar to those on adaxial surface but usually less appressed, apex obtuse, but the midrib protruding as a straight or recurved callus point to 1 mm long; margins flat in vivo, but often recurving on drying. Flowers apparently axillary, solitary (rarely paired), sessile, subtended by 2–4 hypsophylloids (*sensu* Toelken 2000), 3–12 mm long, grading toward normal leaves at the base. Sepals 5, ovate to obovate, obtuse to subacute, sometimes minutely apiculate, 5–6.5 mm long and 2.5–3.5 mm wide; outer 3 sepals sparsely to densely pubescent with simple hairs on both surfaces, at least distally but not on hyaline margins, c. 0.5 mm wide; inner 2 sepals usually slightly longer than outer sepals, glabrous or with a few scattered hairs distally on outer surface. Petals 5, yellow, obovate, 9–13 mm long, 7–11 mm wide, broadly emarginate, glabrous. Stamens 9–13, surrounding carpels, ±equal in length; filaments c. 1.5 mm long, free; anthers ±rectangular, c. 1.0 mm long, obtuse, dehiscent by terminal slits c. 0.5 mm long and extending down lateral margin for up to c. 0.2 mm. Staminodes absent. Carpels 3, laterally compressed, glabrous; style divergent, flattened, 1.0–2.0 mm long. Ovules 2 per carpel. Fruit not seen. Flowering has been observed at most times of the year but seems most prolific in spring.”
2. *Hibbertia circinata* is endemic to New South Wales where it is currently known to occur in a single population on the summit ridges of Mount Imlay, south west of Eden in the South East Corner Bioregion (SEWPaC 2012) between elevations of 800 and 850 metres above sea level (McDougall *et al.* 2018). The summit and upper slopes of Mount Imlay have shallow, loose

## NSW Threatened Species Scientific Committee

---

sandy soils dominated by rock fragments, derived from Merimbula Group rocks of sedimentary origin including sandstone, conglomerate, quartzite, siltstone and shale (NSW National Parks and Wildlife Service 1998).

3. *Hibbertia circinata* occurs in habitat described as shrubby woodland, with a tree canopy commonly dominated by *Eucalyptus sieberi* and a diverse shrub layer that includes *Boronia imlayensis*, *Oxylobium ellipticum*, *Xanthorrhoea australis*, *Tetraloche subaphylla*, *Dillwynia glaberrima* and *Amperea xiphoclada* (McDougall *et al.* 2018).
4. The single known population of *Hibbertia circinata* is estimated to comprise about 200 plants, based on a count of individuals during flowering in October 2016 (K. McDougall *in litt.* 2018). This population represents a single threat-defined location (see NSW TSSC, 2018). The geographic distribution of *H. circinata* is highly restricted, with an area of occupancy (AOO) of 4 km<sup>2</sup>, based on 2 km x 2 km grid cells, the scale recommended for assessing AOO by IUCN (2017). The extent of occurrence (EOO) is also estimated to be 4 km<sup>2</sup>. 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. The two figures are reported as equal in order to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (IUCN 2017).
5. The primary immediate threat to *Hibbertia circinata* is the introduced plant pathogen *Phytophthora cinnamomi*, also known as root-rot fungus or cinnamon fungus, which has invaded the Mount Imlay summit area adjacent to the single known population of *H. circinata* (McDougall *et al.* 2018). Although the direct susceptibility of *H. circinata* to *P. cinnamomi* has not yet been tested, other *Hibbertia* species have been shown to be susceptible. Further more, the species is likely to be negatively affected by *P. cinnamomi* indirectly through changes to vegetation structure and habitat. To date, there are no practical methods available to eradicate *Phytophthora cinnamomi* from areas of infestation in native vegetation, and limited methods to contain the spread of the pathogen at infected sites (DECC 2008). "Infection of native plants by *Phytophthora cinnamomi*" is listed as a Key Threatening Process under the Act.
6. A significant longer-term threat to the survival of *Hibbertia circinata* is anthropogenic climate change. The species is restricted to a single small population within a very narrow altitudinal band on the summit of an isolated mountain. Climate change projections by Grose *et al.* (2015) for the subregion encompassing Mount Imlay infer, with very high confidence, continued increases in average temperatures in all seasons, lower cool season rainfall totals and a harsher fire-weather climate. "Anthropogenic climate change" is listed as a Key Threatening Process under the Act.
7. *Hibbertia circinata* K.L.McDougall & G.T.Wright 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*:

# NSW Threatened Species Scientific Committee

---

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: Critically Endangered under Clause 4.3 (a) (d) (e iii).

<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: Critically Endangered under Clause 4.4 (a) (e i ii B).

<b>The estimated total number of mature individuals of the species is:</b>			
	(a)	for critically endangered species	very low, or
	<del>(b)</del>	<del>for endangered species</del>	<del>low, or</del>
	<del>(c)</del>	<del>for vulnerable species</del>	<del>moderately low,</del>
<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):	
		<del>(i)</del>	<del>for critically endangered species</del> very large, or
		<del>(ii)</del>	<del>for endangered species</del> large, or
		<del>(iii)</del>	<del>for 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:
			<del>(I)</del> for critically endangered species extremely low, or
			<del>(II)</del> for endangered species very low, or
			<del>(III)</del> for vulnerable species low,
		(B)	all or nearly all mature individuals of the species occur within one population,
		<del>(C)</del>	<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: Endangered under Clause 4.5 (b).

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

# NSW Threatened Species Scientific Committee

---

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 <del>critically endangered species</del>	<del>extremely high, or</del>
	(b)	for <del>endangered species</del>	<del>very high, or</del>
	(c)	for <del>vulnerable species</del>	<del>high.</del>

Clause 4.7 - Very highly restricted geographic distribution of species—vulnerable 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:

Turner K (2019) Conservation Assessment of *Hibbertia circinata* K.L.McDougall & G.T.Wright (Dilleniaceae). NSW Threatened Species Scientific Committee.

## References:

DECC (2008) NSW Statement of Intent 1: Infection of native plants by *Phytophthora cinnamomi*. NSW Department of Environment and Climate Change.

Grose M *et al.* (2015) Southern Slopes Cluster Report - Climate Change in Australia, Projections for Australia's Natural Resource Management Regions: Cluster Reports, eds. Ekström M *et al.*, CSIRO and Bureau of Meteorology, Australia.

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, Wright GT, Walsh NG (2018) *Hibbertia circinata* (Dilleniaceae: subgen. *Hibbertia*), a new species from south-eastern New South Wales. *Telopea* **21**, 39–44.

NSW NPWS (National Parks and Wildlife Service) (1998) Mount Imlay National Park Plan of Management. NSW NPWS, October 1998.

# NSW Threatened Species Scientific Committee

---

SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.

<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html>