

## 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 Small-leaved Currant Bush, *Coprosma inopinata*, I.Hutton & P.S.Green as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to the shrub *Coprosma inopinata* I.Hutton & P.S.Green as ENDANGERED from 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

The Small-leaved Currant Bush, *Coprosma inopinata*, I.Hutton & P.S.Green (Rubiaceae) was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3 (a)(d)(e ,iii).

The main reasons for this listing are; i) It has a very highly restricted geographic range (AOO/EOO is 8 km<sup>2</sup>); ii) It is found at only a single location, scattered across a small area of ridgeline and cliffs in the Southern Mountains region of Lord Howe Island; iii) The total number of mature individuals is extremely low (<250); and, iv) There is inferred continuing decline in habitat quality as a consequence of increased aridity driven by climate change.

The NSW Threatened Species Scientific Committee has found that:

1. *Coprosma inopinata* (Small-leafed Current Bush) (family Rubiaceae) is a medium sized (<1 m high), cliff dwelling shrub first described by Hutton and Green in 1993, and there have been no subsequent revisions (Green, 1993). (Green, 1994) described *Coprosma inopinata* as a 'Compact, scrambling, prostrate shrub with shoots to 0-5 m tall, dioecious, young stems minutely puberulous. Leaves opposite, somewhat congested, coriaceous, mid-green above, whitish-green below, broadly lanceolate to elliptic, 7-13 mm long, 3-6 mm broad, base rounded-obtuse, apex acute, sometimes very slightly acuminate, tip more or less blunt, margins entire, slightly thickened and sometimes somewhat recurved, venation reticulate below, with 4-5 not strongly differentiated primary veins on each side of the midrib, obscure above, without domatia; petioles about 1 mm long, stipules 3-5 mm long, broadly triangular, with a prominent, acute and usually persistent, apiculus 2-3 mm long, minutely puberulous on the back and margins. Flowers axillary, usually solitary, pedicels 1 mm long, subtended by 4 irregular, erose, acute lobes to 0 -5 mm with purple margins, valvate in bud, in with a narrow tube 2 mm long. Stamens exserted. Style bifid, exserted, stigmatic lobes long, orange when ripe, crowned by the persistent long, 2 mm broad, one side flattened.'
2. *Coprosma inopinata* is endemic to subtropical Lord Howe Island (*NSW Government Office of Environment and Heritage, 2017*). The species is restricted to south-easterly and south-westerly facing cliffs and ridgelines in the Southern

## NSW Threatened Species Scientific Committee

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Mountains region of the island (encompassing Mount Lidgbird and Mount Gower, occurring either as small patches or isolated plants above 400 m elevation (NSW Government Office of Environment and Heritage, 2016; NSW Government Office of Environment and Heritage, 2017; NSW Government Saving our Species, 2021b). The Mount Lidgbird and Mount Gower sites are approximately 2 km apart (C. Stehn pers. comm. 2022).

- Coprosma inopinata* has a highly restricted range, with both an Extent of Occurrence (EOO) and Area of Occupancy (AOO) of only 8 km<sup>2</sup>. It occurs at only one threat-defined location, restricted to small lengths of narrow ridgeline on Mount Gower and Mount Lidgbird (NSW Government Office of Environment and Heritage 2017). The entire known population of *C. inopinata* occurs in an area that can be contained within two 2 km x 2 km grid squares the scale recommended for assessing area of occupancy by IUCN (2022). When EOO is less than or equal to AOO IUCN (2022) recommend EOO estimates be changed to be equal to AOO to ensure consistency with the definition of AOO as an area that fits within EOO.
- The total mature population is estimated to be between 108-183 plants. There was a decline of four mature and six juvenile individuals from 2018/19 – 2020/21 driven by acute drought over this period (NSW Government Saving our Species, 2019, 2021b). Surveys were conducted for *Coprosma inopinata* prior to 2018/19, however these were primarily intended to expand known sites for *C. inopinata*, and did not provide estimates of total population, or allow estimation of population trends.
- Coprosma inopinata* is restricted to exposed cliffs and ridges above 400 m elevation (NSW Government Office of Environment and Heritage, 2017). They grow on sunny, exposed rock, without any canopy cover from tall trees (Hutton, 2001, 2005). *Coprosma inopinata* shares general habitat and features of ecology with three other threatened plants species, *Geniostoma huttonii*, *Xylosma parvifolium* and *Carmichaelia exsul*, along with other, more common species (Hutton, 2001, 2005).
- Coprosma inopinata* is dioecious, typically flowering between October and November and fruiting from March to September (T. Auld pers. comm. 2021). All studied *Coprosma* species are anemophilous (wind pollinated), and this is almost certainly true of *C. inopinata* (Merrett and Robertson, 2012; Wardle, 1971). *Coprosma inopinata* is likely to be bird dispersed. There is no formal data around longevity, maturity, or senescence in *C. inopinata*, however observations in the field suggest it may be long lived, from 10-50+ years (T. Auld pers. comm. 2021, C. Stehn pers. comm. 2022).
- During two decades of monitoring, *Coprosma inopinata* has not been observed to colonise adjacent habitat and appears to struggle to compete with other endemic species and invasive species (C. Stehn pers. comm. 2022).
- The main threats to *Coprosma inopinata* are increasing hydrological deficit and habitat loss as a result of climate change, pathogen infection, and competition with introduced and native plant species. ‘Anthropogenic Climate Change’, ‘Infection of Native Plants by *Phytophthora cinnamomi*’, and ‘Loss and degradation of native

## NSW Threatened Species Scientific Committee

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plant and animal habitat by invasion of escaped garden plants, including aquatic plants' are listed as Key Threatening Processes under the Act.

9. Ongoing climate change on the Lord Howe Island Group poses a direct threat to *Coprosma inopinata*. There has been an increase in temperature and a decrease in overall rainfall on Lord Howe Island over the last 50 years, with Auld and Leishman (2015) finding that: "...sea level temperatures around Lord Howe Island have risen by some 0.6°C since 1940... average annual air temperature on Lord Howe Island is expected to rise (compared with 1990 levels) by  $1.3 \pm 0.6^\circ\text{C}$  by 2030, although there is much uncertainty around such estimates...For annual rainfall, we found over the last 50 years there had been a decline of 31% (95% CL 4–79%)...Both minimum and maximum temperatures at sea level increased in the last 50 years...".
10. Plant species on Lord Howe Island depend on consistent and ongoing formation of cloud to provide the high humidity and moisture on which they depend (Auld & Leishman, 2015). Cloud forests serve as a 'bucket', absorbing rain and atmospheric moisture at the summit which then flows down, providing available moisture for plant communities further down the slope (Foster, 2001). Increase in sea temperatures is likely to increase the altitude at which clouds form, increasing aridity at lower altitudes and pushing dependent species further towards the summit, dubbed the 'lift-cloud-base hypothesis' (Auld and Leishman, 2015). Loss of cloud poses a direct threat to species that live in cloud forest at the summit of Mount Gower and Mount Lidgbird, as well as species such as *C. inopinata* that are found below the cloud line and receive moisture created by cloud formation at the summit. Ongoing increase in sea temperature, and associated loss of cloud and increasing hydrological deficit is therefore likely to reduce the quality and availability of habitat for *C. inopinata* in the future.
11. Mortality of *Coprosma inopinata* between 2018 and 2021 as a result of drought (discussed below) demonstrates that *C. inopinata* is negatively affected by reduced rainfall and moisture availability (NSW Government Office of Environment and Heritage, 2016). Acute drought in 2018/2019 severely impacted multiple plant species and communities on Lord Howe Island, including *Coprosma inopinata*, and demonstrated that drought is a severe and ongoing threat (*International Union for Conservation of Nature and Natural Resources, 2020; NSW Government Saving our Species, 2021b*). Drought was responsible for the loss of 10 individuals between 2018 and 2021, 5% of the total estimated population (NSW Government Saving our Species, 2021b). Juvenile and mature plants were affected, suggesting aridity and drought pose a threat not just to recruitment and establishment of comparatively vulnerable young plants, but also to established individuals. Droughts across the Australian region are becoming more severe as background climate becomes more arid (Abram et al., 2021), and this is likely to increase the threat drought poses to endemic Lord Howe Island species, including *C. inopinata*.
12. *Coprosma inopinata* is confined to cliffs and ridges at relatively high elevations (~400-600 m), above which habitat is generally unsuitable, largely opening into plateaux dominated by dense vegetation, especially Gnarled Mossy Cloud Forest (C. Stehn pers. comm. 2022). The general lack of adjacent exposed cliffs and

## NSW Threatened Species Scientific Committee

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ridgelines at higher elevations means that there is limited accessible habitat into which *C. inopinata* can move as increasing aridity makes their current habitat less suitable (C. Stehn pers. comm. 2022). As a poor competitor, *C. inopinata* is likely to struggle to colonise new habitat that may become available as aridity forces resident plant communities to higher elevations. Even if resident plant communities are pushed from habitat potentially suitable for *C. inopinata*, components of these communities, like established trees or generalist weed species, are likely to persist and present an ongoing barrier to colonisation.

13. Climate change may increase the likelihood and severity of sub-tropical storms on and around Lord Howe Island, posing an additional severe threat to plant communities towards the peaks of Mount Gower and Lidgbird (Auld and Leishman 2015). These storms may damage *Coprosma inopinata* directly or increase the likelihood of land-slips.
14. *Phytophthora cinnamomi* is an introduced water mould (oomycete) pathogen that causes catastrophic dieback in many species, and is listed as the Key Threatening Process 'Infection of native plants by *Phytophthora cinnamomi*' in the Act. *Phytophthora cinnamomi* affects a huge variety of plants across families, including the closely related New Zealand *Coprosma australis*, and so is likely to pose a considerable threat to *Coprosma inopinata* (Auld and Hutton, 2004; Government of South Australia Phytophthora Technical Group, 2006; NSW Department of Environment and Climate Change, 2008). *Phytophthora cinnamomi* was detected in a small orchard on Lord Howe Island in 2003 and is now considered a resident threat (Auld and Hutton, 2004). It has so far been contained, however movement of residents and tourists across the island risk its spread in the future.
15. Invasive weeds pose a severe and ongoing threat to *Coprosma inopinata* (Lord Howe Island Board, 2016; NSW Government Saving our Species, 2021a). Weeds encroach on the habitat of *C. inopinata*, outcompeting existing plants for resources and space and inhibiting recruitment by reducing the likelihood *C. inopinata* seeds will find sufficient space and resources to germinate (Lord Howe Island Board, 2016; T. Auld pers. comm. 2022). Of particular concern are *Ageratina adenophora* (Crofton Weed), *Lilium formosanum* (Formosan Lily), *Cenchrus clandestinus* (Kikuyu Grass), *Asparagus aethiopicus* (Ground Asparagus), and *Psidium cattleianum* var. *cattleianum* (Cherry Guava) (Lord Howe Island Board, 2016; T. Auld pers. comm. 2022). These weed species remain common across Lord Howe Island, and threaten multiple endemic plants and communities, including *C. inopinata* (Lord Howe Island Board, 2016; NSW Government Saving our Species, 2021; T. Auld pers. comm. 2022). Despite an ongoing intensive weed eradication program, the overall number of juvenile weeds may be increasing (NSW Government Saving our Species, 2021a). This increase is possibly driven by drought and reduction in available moisture, with generalist weed species on Lord Howe Island likely more successful than endemics in changing environments, and by the removal of rats (discussed below) (Lord Howe Island Board, 2016; NSW Government Saving our Species, 2021b).
16. Introduced rodents, in particular the ship rat (*Rattus rattus*) and house mouse (*Mus musculus*), have had a devastating effect on native flora of Lord Howe Island and

# NSW Threatened Species Scientific Committee

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have been the driving factor in the extinction of at least two Lord Howe Island plant species (Department of Environment and Climate Change (NSW), 2007). An extensive program of rodent eradication on the main island began in 2019 (Harper *et al.*, 2020). This program appears to have been successful and rodents (rats and mice) have been eradicated from the island. However, the program has not yet been officially declared successful and ongoing monitoring is in place, both for rodents and to quantify the benefits and/or ecosystem changes resulting from the pest eradication. Historically rodents have not been considered a direct threat to *Coprosma inopinata* because of its inaccessible habitat (Lord Howe Island Board, 2017). However, there are indications that rodent control has inadvertently removed predation pressures from weed populations, as well as from native vegetation. In the absence of rodents, weed populations may increase and spread, posing a more significant threat to *C. inopinata* (NSW Government Saving our Species, 2021; C. Stehn pers. comm. 2022).

17. The Small-leaved Currant Bush, *Coprosma inopinata*, I.Hutton & P.S.Green (Rubiaceae) 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:**

*Coprosma inopinata* was found to be Critically Endangered under Clause 4.3 (a)(d)(e, iii)

### **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.	

## NSW Threatened Species Scientific Committee

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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 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 C)

**Assessment Outcome: Not Met**

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:

## NSW Threatened Species Scientific Committee

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			(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: Endangered under Clause 4.5 (b)**

<b>The total number of mature individuals of the species is:</b>			
	(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**

<b>The probability of extinction of the species is estimated to be:</b>			
	(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: Met for 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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Senior Professor Kristine French  
 Chairperson  
 NSW Threatened Species Scientific Committee

# NSW Threatened Species Scientific Committee

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## Supporting Documentation:

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## NSW Threatened Species Scientific Committee

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