

# NSW Threatened Species Scientific Committee

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## Conservation Assessment of the Small-leaved Currant Bush, *Coprosma inopinata*, I.Hutton & P.S. Green 1993 (Rubiaceae)

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NSW Threatened Species Scientific Committee

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

Distribution: Endemic to Lord Howe Island, New South Wales (NSW)

Current EPBC Act Status: Not Listed

Current NSW BC Act Status: Endangered

**Proposed listing on NSW BC Act:** Critically Endangered

#### Reason for change:

Genuine change in extinction threat – increasing threat of habitat decline due to weed invasion and increasing hydrological deficit because of climate change.

Review of status was required as the current Endangered status was assigned under previous NSW legislation (*NSW Threatened Species Conservation Act 1995*) where the highest threat category available at the time of listing (2001) was Endangered.

#### Summary of Assessment

*Coprosma inopinata* was found to be eligible for listing as Critically Endangered under Criterion B1ab(iii), B2ab(iii), and Endangered under Criterion D.

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 all in one subpopulation; and, iv) There is inferred continuing decline in habitat quality as a consequence of increased aridity driven by climate change.

#### Description and Taxonomy

##### Taxonomy

*Coprosma inopinata* (Small-leaved Currant Bush) is a medium sized (<1 m), cliff dwelling shrub first described by Hutton & Green in 1993. Green 1994 stated that *Coprosma inopinata* is:

'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

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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 exerted. Style bifid, exerted, stigmatic lobes long, orange when ripe, crowned by the persistent long, 2 mm broad, one side flattened.'

## Distribution and Abundance

*Coprosma inopinata* is endemic to subtropical Lord Howe Island (NSW Government Office of Environment and Heritage, 2017). Lord Howe Island (31.54°S, 159.08°E) is the largest of a collection of small islands of volcanic origin in the Tasman Sea, 760 km northeast of Sydney (Department of Environment and Climate Change (NSW), 2007). The island is around 11 km long, and only 2.8 km at its widest point, with a total area of 1455 hectares and a maximum elevation of 875 m on its highest peak, Mount Gower (Department of Environment and Climate Change (NSW), 2007). The Lord Howe Island group was colonised by lineages of flora and fauna from mainland Australia, New Zealand and New Caledonia, and this diversity of sources combined with the island group's isolation has led to the evolution of a high number of endemic species and unique ecosystems (Auld and Leishman, 2015). There is a small community on the main island, however development and tourism are strictly controlled. Seventy-five percent of the main island, and all other islands in the Lord Howe Island Group, are conservation protected and the island group is UNESCO World Heritage listed (Department of Environment and Climate Change (NSW), 2007).

*Coprosma inopinata* is restricted to cliffs and ridgelines in the Southern Mountains region of Lord Howe Island, encompassing Mount Lidgbird (31.56°S, 159.08°E; 777 m elevation) and Mount Gower (31.59°S, 159.074°E; 875 m elevation) (NSW Government Office of Environment and Heritage, 2017). *Coprosma inopinata* occurs on south-easterly and south-westerly facing cliffs and ridgelines on Mount Gower and Mount Lidgbird, occurring either as small patches or isolated plants above 400 m elevation (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021b). The Mount Lidgbird and Mount Gower sites are approximately 2 km apart (C. Stehn pers. comm. 2022).

Habitat for the species is generally very difficult to access, often requiring helicopter winching, rock climbing or challenging hikes (Hutton, 2005; NSW Government Office of Environment and Heritage, 2016; Sheringham *et al.*, 2020). As a consequence, only the few plants that are accessible by foot at the Mount Gower monitoring plot have been regularly surveyed. Likely habitat has been well documented, however, and range and population estimates are considered reliable (NSW Government Office of Environment and Heritage, 2017; Sheringham *et al.*, 2020).

## Extent of Occurrence and Area of Occupancy

Extent of Occurrence (EOO) and Area of Occupancy (AOO) were calculated based on validated occurrence records drawn from Bionet, and recent monitoring reports (NSW Office of Environment and Heritage, 2022). This yielded 14 records, describing different clusters of very closely grouped plants at two sites on Mount Lidgbird and Mount Gower.

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EOO and AOO were estimated in GeoCAT (Bachman et al., 2011). Area of Occupancy (AOO) was calculated by overlaying 2 km x 2 km grid cells over the known occurrence and is the spatial scale of assessment recommended by IUCN (IUCN Standards and Petitions Committee, 2022). Extent of Occurrence (EOO) is based on a minimum convex polygon enclosing all known occurrences of the species recorded in Bionet, the method of assessment recommended by the IUCN (2022).

Surveys since 2001 have detected *C. inopinata* at a small number of sites confined to the Southern Mountains area of Lord Howe Island (NSW Government Office of Environment and Heritage, 2017). AOO for *Coprosma inopinata* is 8 km<sup>2</sup>. The entire population of *C. inopinata* occurs in an area that can be contained within two 2 km x 2 km grid squares, which is the smallest standard grid resolution recommended for assessments of AOO under the IUCN Standards and Petitions Committee (2022).

*Coprosma inopinata* is restricted to small lengths of narrow ridgeline on Mount Gower and Mount Lidgbird, and as a result EOO (0.651 km<sup>2</sup>) is less than the estimated AOO (8 km<sup>2</sup>). Where EOO is less than or equal to AOO then IUCN guidelines 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 (IUCN Standards and Petitions Committee, 2022). As such, the EOO for *C. inopinata* is also 8 km<sup>2</sup>.

Consistent and ongoing vegetation surveys across Lord Howe Island mean these estimates of EOO and AOO are likely to accurately reflect distribution of *Coprosma inopinata* across Lord Howe Island and are appropriate for assessment under the IUCN (2022) criteria.

## Population estimates

The population of *Coprosma inopinata* is stable, with surveys since 2016 finding a total population estimate of 200-300, including both mature and juvenile individuals, and a population estimate for mature individuals of 108-183 (NSW Government Saving our Species, 2021a). This very small population makes *C. inopinata* particularly vulnerable to stochastic processes.

This number is drawn from ongoing monitoring at a single permanent 5 m x 5 m monitoring site on Razorback, Mount Gower, the results of which are then extrapolated across all sites at which *Coprosma inopinata* is known to occur to produce a total population estimate (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021b). This site is formally monitored every two years, and individuals are opportunistically monitored both inside and outside monitoring sites when possible (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021b).

The choice of site for ongoing monitoring is primarily determined by accessibility, but this site is considered to provide a reliable representation of the broader population (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2019, 2021b). While other sites are well known, they are considered too dangerous to regularly access and monitor (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021b).

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All individuals in the monitoring plot are counted, and measurements of population structure are recorded (NSW Government Office of Environment and Heritage, 2016).

In 2018/19, 28 plants were recorded in the permanent monitoring plot, with 54% of the sampled population mature (15/28) (NSW Government Saving our Species, 2019). Eighty-three individuals were also found outside the monitoring site, however demographics for these individuals were not measured (NSW Government Saving our Species, 2019). In 2020/21, 18 plants were recorded at the permanent monitoring plot, with 61% of the sampled population mature (11/18) (NSW Government Saving our Species, 2021b). This represents a decline of four mature and six juvenile individuals from 2018/19 – 2020/21 (NSW Government Saving our Species, 2019, 2021b). This decline was probably driven by acute drought impacts on the species over this period (NSW Government Saving our Species, 2021b).

The population size is estimated to be 108-183 mature individuals, based on a total population estimate of 200-300 from 2018/19 – 2020/21 surveys, where 54-61% of individuals in the surveyed population were mature.

There were surveys conducted for *Coprosma inopinata* prior to 2018/19, however these were primarily intended to expand known sites for *C. inopinata*, and did not provide robust estimates of total population, or allow accurate estimation of population trends.

## Ecology

*Coprosma inopinata* is restricted to exposed cliffs and ridges above 400 m elevation (NSW Government Office of Environment and Heritage, 2017). The species grows 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 plant species on Lord Howe Island, *Geniostoma huttonii*, *Xylosma parvifolium* and *Carmichaelia exsul*, along with other, more common species (Hutton, 2001, 2005). These plants form dense, stunted communities of which *C. inopinata* is a part, with communities generally reaching less than one metre in height (Hutton, 2001, 2005; NSW Government Office of Environment and Heritage, 2017).

There are no formal data describing the longevity of *Coprosma 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). Similarly, there are no data available for age to maturity or senescence (C. Stehn pers. comm. 2022). This lack of life history data means generation length cannot be estimated for *C. inopinata*.

*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* are also generally considered to be bird dispersed, with brightly coloured, palatable fruits attractive to birds, and this is also likely true of *C. inopinata*, which produces fleshy, orange drupes (Lee *et al.*, 1988).

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During two decades of monitoring, *Coprosma inopinata* has not been observed to colonise adjacent habitat and appears to struggle to establish in the presence of other endemic or invasive species (C. Stehn pers. comm. 2022). Cliff-dwelling species like *C. inopinata* are commonly adapted to harsh, exposed conditions, allowing plants to thrive on cliff faces and ridgelines (Caperta *et al.*, 2014). However, rare and highly specialized species may also be less tolerant to changes in habitat or climate, which reduce their competitiveness with invasive and endemic generalist species in sub-optimal conditions (Caperta *et al.*, 2014; Elizabeth, 2007). *Coprosma inopinata* favours particularly exposed areas of cliff and ridgeline and faces little competition for this habitat (NSW Government Office of Environment and Heritage, 2016; C. Stehn. pers. comm. 2022).

The very small area (AOO = 8 km<sup>2</sup>) over which *Coprosma inopinata* occurs means wind dispersed pollen is likely to easily reach other individuals in the population, with records of pollen in other *Coprosma* species travelling and fertilising plants at least 3 km away (Wardle, 1971). *Coprosma inopinata* across different sites have been recorded successfully bearing fruit and seed (NSW Government Office of Environment and Heritage, 2017; NSW Government Saving our Species, 2019, 2021b). There are no available data around seed viability in *C. inopinata* or closely related species.

There is no evidence for severe fragmentation in *Coprosma inopinata*. Sites at Mount Lidgbird and Gower are considered to be a single population, with exchange of genetic material and seeds likely between Mount Lidgbird and Mount Gower; seeds are bird dispersed, and easily transferred across the 2 km between the main sites (C. Stehn. pers. comm. 2022). Although *C. inopinata* is likely to be a poor coloniser in sub-optimal habitat or if forced to compete with other species, where conditions are suitable it should be able to reestablish lost patches (C. Stehn pers. comm. 2022).

There is no evidence for population fluctuations in this species, with the overall population considered broadly stable (NSW Government Saving our Species, 2019, 2021b).

## Threats

### Increasing hydrological deficit as a result of climate change

While there is broad uncertainty in the projected range and severity of climate impacts on Lord Howe Island, Auld and Leishman (2015) determined that there was evidence for increase in temperature and a decrease in overall rainfall on Lord Howe Island over the last 50 years, stating 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 ± 0.6°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...”

The majority of plants endemic to the Lord Howe group are reliant on high humidity and are threatened by an increasingly dry environment (Auld & Leishman, 2015).

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Mortality of individuals between 2018 and 2021 as a result of drought (discussed below) demonstrates that *Coprosma inopinata* is negatively affected by reduced rainfall and moisture availability (NSW Government Office of Environment and Heritage, 2016). A less humid environment will likely favour less specialised invasive weed species and reduce suitable habitat available to native species like *C. inopinata* (Auld & Leishman, 2015). ‘Anthropogenic climate change’ is listed as a Key Threatening Process under the Act.

## **Drought**

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 that drought poses a threat not just to recruitment and establishment of comparatively vulnerable young plants, but also to established individuals.

The acute drought from 2018 to 2019 severely impacted multiple plant species on the island and communities, including *Coprosma inopinata*, and demonstrated that drought is a severe and ongoing threat for species on Lord Howe Island (International Union for Conservation of Nature and Natural Resources, 2020; NSW Government Saving our Species, 2021b). Specific modelling of drought risk for the Lord Howe group and surrounding pacific region is not available, however droughts across the Australian continent are becoming more severe as background climate becomes more arid (Abram et al., 2021), and this information combined with observations of increased temperature and reduced rainfall suggests drought is likely to pose a threat to endemic Lord Howe Island species, including *C. inopinata*.

## **Loss of cloud and habitat loss as a result of climate change**

The ongoing effects of climate change on the Lord Howe Island Group pose a direct threat to *Coprosma inopinata*. 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). Increase in sea temperatures is likely to increase the altitude at which clouds form, reducing available moisture at lower altitudes and pushing dependent species further towards the summit, dubbed the ‘lift-cloud-base hypothesis’ (Auld and Leishman, 2015).

Cloud forests serve as a ‘bucket’, absorbing rain and atmospheric moisture at the summit which then flows downhill, providing available moisture for plant communities further down the slope (Foster, 2001). 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 surface temperature, and associated cloud loss, and increasing vapour pressure deficits are therefore likely to reduce the quality and availability of habitat for *C. inopinata* in the future.

*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 (Auld and

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Leishman, 2015; C. Stehn pers. comm. 2022). The general lack of adjacent exposed cliffs and 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 any 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.

## **Root-rot, *Phytophthora cinnamomi***

*Phytophthora cinnamomi* is an introduced water mould (oomycete) pathogen that has had a devastating effect on plant communities worldwide, causing catastrophic dieback in many species, and is listed as the Key Threatening Process 'Dieback caused by the root-rot fungus *Phytophthora cinnamomi*' on the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and 'Infection of native plants by *Phytophthora cinnamomi*' on the NSW BC 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.

## **Competition by Invasive Weeds**

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).

An ongoing intensive weed eradication program started in 2004 has resulted in a decline in the number of mature weeds encroaching on habitat of *Coprosma inopinata* (Lord Howe Island Board, 2016; NSW Government Office of Environment and Heritage, 2017). There has been a reduction of 90% in mature weed plants on Lord Howe Island since weed eradication efforts began, and in 2020/21 only 0.01% of

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weeds removed in the Southern Mountains region were mature (NSW Government Office of Environment and Heritage, 2017; NSW Government Saving our Species, 2021a). However, there is evidence that the overall number of juvenile weeds may be increasing; in 2020/21 63 weeds were controlled per hectare, compared to 43 per hectare in 2019/20 (NSW Government Saving our Species, 2021a). This increase is possibly driven by drought and increasing aridity, 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). The increase in juvenile weeds highlights the severe ongoing threat of weed infestation and ecosystem decline in the absence of effective control.

## **Increased weed pressure in the absence of rodents**

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. Rats eat seeds and seedlings of many species and since their introduction following a shipwreck in 1918, ship rats 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) are currently 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 herbivory pressure from weed populations, including their seeds, 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).

## **Assessment against IUCN Red List criteria**

For this assessment it is considered that the survey of *Coprosma inopinata* has been adequate and there is sufficient scientific evidence to support the listing outcome.

### **Criterion A                      Population Size reduction**

**Assessment Outcome:** Data Deficient

**Justification:** There is insufficient data on historic population size, decline, and life history in *Coprosma inopinata* to make assessments under Criterion A. *Coprosma inopinata* has been recorded on Lord Howe Island since the early 1990s, however targeted surveys for the species have only been recorded since 2001, with formalised ongoing monitoring beginning in 2017. As a result, there is insufficient data on historic population size, decline, and life history to describe historic trends in population size.



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## **Criterion B**

## **Geographic range**

Assessment Outcome: Critically Endangered under B1ab(iii) and B2ab(iii)

Justification: *Coprosma inopinata* is completely restricted to a small number of cliff faces and rocky ridges in the Southern Mountains region of Lord Howe Island. As a result, both EOO and AOO for *C. inopinata* are 8 km<sup>2</sup>, below the threshold for Critically Endangered for both Criterion B1 (EOO <100 km<sup>2</sup>) and B2 (AOO < 10 km<sup>2</sup>).

In addition to these thresholds, at least two of three other conditions must be met. These conditions are:

- a) The population or habitat is observed or inferred to be severely fragmented or there is 1 (CR), ≤5 (EN) or ≤10 (VU) locations.

Assessment Outcome: Met for Critically Endangered (1 location)

Justification: *Coprosma inopinata* is only found at one location, being restricted to a very small area of rocky ridge and cliff habitat in the Southern Mountains region of Lord Howe Island (AOO/EOO = 8 km<sup>2</sup>). This highly restricted distribution means that the most serious plausible threats, plant pathogens, weed invasion, and/or climate change, are highly likely to affect *C. inopinata* across its entire range, and as a result there is only one location. There is no evidence that *C. inopinata* is severely fragmented.

- b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals.

Assessment Outcome: Subcriterion met – Continuing decline is inferred in (iii) area, extent and/or quality of habitat.

Justification: Observed and projected reduction in rainfall and humidity driven by climate change is inferred to reduce the quality of the habitat available to *Coprosma inopinata*. *Coprosma inopinata* is completely restricted to cliff faces and rocky ridges in the Southern Mountains region, and currently occupies all known suitable habitat (NSW Government Office of Environment and Heritage, 2017). This habitat is likely to become increasingly arid and less suitable for *C. inopinata* as rainfall declines, and more susceptible to the threat of encroachment by generalist weed species. *Coprosma inopinata* does not compete well with endemic or introduced species and so is unlikely to successfully compete for new habitat if it does become available as vegetation communities on peaks shift in response to climate change.

While the small mature population in *Coprosma inopinata* is currently considered to be generally stable, mature plants were lost during the 2018-2019 drought, demonstrating that increased aridity poses a threat to established individuals.

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c) Extreme fluctuations.

Assessment Outcome: Not Met

Justification: There is no evidence for extreme population fluctuations in *Coprosma inopinata*.

## **Criterion C**                      **Small population size and decline**

Assessment Outcome: Not Met

Justification: The very small populations size means *Coprosma inopinata* meets the threshold for the main clause under C. The population estimate for mature individuals is 108-183. This number is drawn from ongoing monitoring at a single permanent 5 m x 5 m monitoring plot, the results of which are then extrapolated across all sites at which *Coprosma inopinata* is known to occur to produce a total population estimate. This puts the total population below the Critically Endangered threshold (<250) for C.

However, neither further condition is met; there is no data supporting population decline for assessment against C1, and no evidence for ongoing decline in mature individuals for assessment against C2, and as a result *Coprosma inopinata* does not meet the conditions for listing under C.

At least one of two additional conditions must be met. These are:

- C1. An observed, estimated or projected continuing decline of at least: 25% in 3 years or 1 generation (whichever is longer) (CR); 20% in 5 years or 2 generations (whichever is longer) (EN); or 10% in 10 years or 3 generations (whichever is longer) (VU).

Assessment Outcome: Data Deficient

Justification: *Coprosma inopinata* has been recorded on Lord Howe Island since the early 1990s, however targeted surveys for the species have only been recorded since 2001, with formalised ongoing monitoring beginning in 2017. As a result, there is insufficient data on historic population size, decline, and life history to describe historic reduction in population size. Monitoring since 2017 suggests the population is currently stable.

- C2. An observed, estimated, projected or inferred continuing decline in number of mature individuals.

Assessment Outcome: Not Met

Justification: The small mature population in *Coprosma inopinata* is currently considered to be generally stable at 108-183 individuals. Mature plants were lost during the 2018-2019 drought, demonstrating that increased aridity poses a threat not just to recruitment and establishment of comparatively vulnerable young plants, but also to established individuals. However, there is insufficient data to determine whether the loss of these individuals constitutes an overall trend of decline in mature individuals for the species.

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In addition, at least 1 of the following 3 conditions:

- a (i). Number of mature individuals in each subpopulation  $\leq 50$  (CR);  $\leq 250$  (EN) or  $\leq 1000$  (VU).

Assessment Outcome: Met for Endangered ( $\leq 250$  in each subpopulation)

Justification: All mature individuals occur in a single subpopulation with an estimated size of 108-183 plants. This number is drawn from ongoing monitoring at a single permanent 5 m x 5 m monitoring plot, the results of which are then extrapolated across all sites at which *Coprosma inopinata* is known to occur to produce a total population estimate.

- a (ii). % of mature individuals in one subpopulation is 90 - 100% (CR); 95-100% (EN) or 100% (VU)

Assessment Outcome: Met for Critically Endangered (90 - 100% mature in one subpopulation)

Justification: All mature individuals occur in a single subpopulation. The species is wind pollinated and occurs across a very small area so there is likely to be genetic flow between all known sites.

- b. Extreme fluctuations in the number of mature individuals

Assessment Outcome: Not Met

Justification: There is no evidence for extreme population fluctuations in *Coprosma inopinata*.

## **Criterion D**                      **Very small or restricted population**

Assessment Outcome: Met for Endangered (<250 mature individuals)

Justification: The population estimate is 108 – 183 mature individuals. This number is drawn from ongoing monitoring at one permanent 5 m x 5 m monitoring plot combined with opportunistic monitoring of individuals on Razorback Ridge, the results of which are then extrapolated across the range in which *Coprosma inopinata* is known to occur to produce a total population estimate.

Even though Criterion D is met for Endangered, Criterion D2 needs to be additionally and independently assessed, as it is relevant to Clause 4.7 of the NSW Biodiversity Conservation Regulation 2017. The highest threat category for Criterion D2 is Vulnerable.

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D2. Restricted area of occupancy (typically <20 km<sup>2</sup>) or number of locations (typically <5) with a plausible future threat that could drive the taxon to CR or EX in a very short time.

Assessment Outcome: Met for Vulnerable D2

Justification: The entire population of *Coprosma inopinata* is known from only a single location with a small total AOO (8 km<sup>2</sup>), and a single threat could contribute to the extinction of the species in a very short time. A severe and ongoing drought could plausibly drive the species to extinction within one generation. Drought poses a severe threat to *C. inopinata*, and has led to the loss of mature individuals in previous years.

## **Criterion E                      Quantitative Analysis**

Assessment Outcome: Data deficient

Justification: No population viability analysis is available for *Coprosma inopinata*.

## **Conservation and Management Actions**

*Coprosma inopinata* is currently listed on the NSW *Biodiversity Conservation Act 2016* and a conservation project has been developed by the NSW Department of Planning and Environment under the *Saving our Species* program. The conservation project identifies priority locations, critical threats and required management actions to ensure the species is extant in the wild in 100 years. *Coprosma inopinata* sits within the site-managed management stream of the SoS program.

Activities to assist this species currently recommended by the SoS program include:

### Habitat loss, disturbance and modification

- Broad-scale weed control continuing across the Southern Mountains region under the Lord Howe Island Weed Management Strategy.
- Ongoing monitoring for rodent re-invasion following the completion of the Lord Howe Island Rodent Eradication Project.

### Ex situ conservation

- Seeds collected from multiple individuals/locations and over several collection events.

### Survey and monitoring

- Permanently tag and monitor accessible *Coprosma inopinata* individuals and record details of height class, age structure and reproductive status
- Continue monitoring trends in weed invasion
- Identify and estimate *Coprosma inopinata* populations outside of monitoring sites

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## References

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## Expert Communications

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## APPENDIX 1

### 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), Endangered under Clause 4.5 (b), and Vulnerable under Clause 4.7

#### 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.	

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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)**

<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.

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

**Assessment Outcome: Not Met**

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



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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 under Clause 4.6**

<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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