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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 *Xylosma parvifolia* Jessup 1984 as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to *Xylosma parvifolia* Jessup. in 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

Xylosma parvifolia Jessup 1984 (*Salicaceae*) was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: 4.3(a)(d)(e,i,iii)

The main reasons for this listing are: 1) it has a very highly restricted geographic range (EOO 8 km²); 2) the total number of mature individuals is extremely low; 3) it is found at only a single location in the southern mountains region of Lord Howe Island; and 4) there is inferred continuing decline in habitat quality as a consequence of increased hydrological deficit driven by climate change, ongoing weed invasion, and changes in community structure and disturbance regimes.

The NSW Threatened Species Scientific Committee has found that:

1. *Xylosma parvifolia* was first described by Jessup (1984). *Xylosma* is in the family Salicaceae. PlantNET (2023) describes *X. parvifolia* as a:

“Shrub to 2 m high, branchlets and petioles minutely puberulous. Leaves ovate-elliptical, lamina 0.4–1.2 (–3) cm long, 0.4–0.8 (–1.5) cm broad, serrate; apex obtuse; petiole reddish brown, 2–3 mm long. Inflorescence to 3 (–5)-flowered; flowers solitary or in short racemes. Sepals 5, obovate, c. 1 mm long, glabrous. Male flowers with c. 12 stamens; filaments 2–2.5 mm long. Female flowers with ovoid-globose ovary, 2 mm long; styles 2, very short. Fruit ovoid-globose, 3 mm long, slightly fleshy, purple.”
2. *Xylosma parvifolia* is endemic to Lord Howe Island (NSW Government Office of Environment and Heritage, 2016; NSW Flora Online (PlantNet, accessed May 2023).
3. *Xylosma parvifolia* is restricted to 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, 2016). The maximum distance between Mount Gower and Mount Lidgbird sites is around 2 km (C. Stehn pers. comm. June 2022).
4. Much of the habitat of the species is challenging to access, and monitoring sites are restricted to the few areas regularly accessible by foot, however likely habitat has been well documented and range and population estimates are likely to be

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reliable (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021; Sheringham et al., 2020).

5. *Xylosma parvifolia* has a highly restricted range, with both an Extent of Occurrence (EOO) and Area of Occupancy (AOO) of only 8 km². 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 2016). The entire known population of *X. parvifolia* 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.
6. The total mature population is estimated to be 180-200 individuals (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021; C. Stehn pers. comm 2022). Of the entire population, a minimum of 90% are estimated to be mature (C. Stehn pers. comm 2022). While individuals likely to be saplings and juveniles have been observed, the stunted nature of some plants can make estimation of age and maturity difficult (NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2021; C. Stehn pers. comm 2022).
7. *Xylosma parvifolia* is restricted to narrow, exposed, south-westerly or south-easterly cliff faces and ridges on Mount Gower and Mount Lidgbird (NSW Government Office of Environment and Heritage, 2016). *Xylosma parvifolia* occurs in open, exposed sites with minimal canopy cover, and does not tolerate crowding (NSW Government Office of Environment and Heritage, 2016; C. Stehn pers. comm. 2022). The species shares general habitat and features of ecology with three other threatened plants, *Carmichaelia exsul*, *Geniostoma huttonii* and *Coprosma inopinata*, along with more common species (Hutton, 2001, 2005; NSW Government Office of Environment and Heritage, 2016).
8. Little is known about mechanisms of reproduction and dispersal in *Xylosma parvifolia*. *Xylosma* species are typically dioecious (producing male and female flowers on separate plants), and this is almost certainly also true of *X. parvifolia* (Chase & Gardens, 2002; H. Sleumer, 1974). *X. parvifolia* flowers between December and May, producing small, white flowers (NSW Government Office of Environment and Heritage, 2016). The genus *Xylosma* contains both wind pollinated and insect pollinated species, but it is not known which system is employed by *X. parvifolia* (Pfeiffer, 2018; Weber, 2008). *X. parvifolia* produces small, purple fruits, likely to be attractive to birds.
9. During two decades of monitoring, *Xylosma parvifolia* has not been observed to colonise adjacent habitat, and while it persists well at sites where it is already established it appears to struggle to compete with other endemic or invasive species for new space (C. Stehn pers. comm. 2022).
10. The main threats to *Xylosma parvifolia* are decline in habitat quality and mature individuals as a consequence of increasing hydrological deficit resulting from climate change, competition by invasive weeds, decline in habitat quality and

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mature individuals as a consequence of changes in disturbance regimes, loss of mature individuals as a consequence of landslips, increased likelihood and severity of storms as a consequence of climate change, and root-rot *Phytophthora cinnamomi*. Of these 'Anthropogenic Climate Change', 'Invasion and establishment of exotic vines and scramblers', 'Invasion of native plant communities by exotic perennial grasses', 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants', and 'Infection of native plants by *Phytophthora cinnamomi*' are listed as Key Threatening Processes under the NSW Biodiversity Conservation Act.

11. Ongoing climate change on the Lord Howe Island Group poses a direct threat to *Xylosma parvifolia*. There has been an increase in temperature and a decrease in overall rainfall on Lord Howe Island over the last 50 years (Auld and Leishman (2015). Many 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 and Leishman, 2015). 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 (Auld and Leishman, 2015). Cloud lift poses a direct threat to *X. parvifolia*, as it requires moisture from the cloud capping the mountain summits. Ongoing increase in sea temperature, and associated cloud lift and aridity, is therefore likely to reduce the quality and availability of habitat for *X. parvifolia*.
12. Invasive weeds pose a severe and ongoing threat to *Xylosma parvifolia* (Lord Howe Island Board, 2016; NSW Government Saving our Species, 2021). Weeds encroach on the habitat of *X. parvifolia*, outcompeting existing plants for resources and space and inhibiting recruitment by reducing the likelihood *X. parvifolia* 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 cattleyanum* var. *cattleyanum* (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 *X. parvifolia* (Lord Howe Island Board, 2016; NSW Government Saving our Species, 2021; T. Auld pers. comm. 2022).
13. Changes in disturbance regimes and community structure pose an ongoing threat to *Xylosma parvifolia*, resulting in a decline in recruitment and mature individuals. The long history of invasive species and ecosystem decline on Lord Howe Island prior to conservation efforts means that little is known about the historic disturbance regimes under which *X. parvifolia* evolved, and the patterns of ecosystem progression and dispersal by which *X. parvifolia* maintained populations and spread to new habitat. However, the apparent lack of new colonisation by *X. parvifolia* and a decline in mature individuals strongly suggests that there has been a shift in the patterns of disturbance and dispersal upon which *X. parvifolia* was dependant. There is currently no clear approach to ameliorating this threat.
14. *Xylosma parvifolia* is not competitive in undisturbed vegetation, and appears dependant on disturbance to provide new suitable habitat before being displaced

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(C. Stehn pers. comm. 2022). Herbivory by feral goats may previously have provided ongoing disturbance at the sites at which *X. parvifolia* is present, preventing ecological progression from disturbed habitat to climax communities, allowing *X. parvifolia* to remain at these sites (C. Stehn pers. comm. 2022). However, following the removal of goats, these communities have again slowly begun to progress, reducing the quality of habitat and increasing competition with *X. parvifolia*, ultimately resulting in the loss of mature individuals (NSW Government Saving our Species, 2021; C. Stehn pers. comm. 2022). Three mature plants were lost from a single monitoring plot between 2016/17 and 2020/21, a decline inferred to be a result of crowding and competition as a consequence of this progression and competition (Department of Environment and Climate Change (NSW), 2007; Lord Howe Island Board, 2016; NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2017, 2019, 2020, 2021; Stehn pers. comm. 2022).

15. *Xylosma parvifolia* no longer appears to colonise new sites, likely driven by an inability to compete with invasive weeds, and possible changes in habitat as a result of climate change. Over two decades of monitoring *X. parvifolia* has not been observed to colonise any new habitat, either in apparently suitable adjacent habitat, or in newly disturbed areas following landslips (Department of Environment and Climate Change (NSW), 2007; Lord Howe Island Board, 2016; NSW Government Office of Environment and Heritage, 2016; NSW Government Saving our Species, 2017, 2019, 2020, 2021; C. Stehn pers. comm. 2022). As a consequence, *X. parvifolia* is confined to the sites in which it is currently established, the habitat quality of which is in decline.
16. 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 Mount Lidgbird (Auld and Leishman 2015). These storms may damage *Xylosma parvifolia* directly, or increase the likelihood of land-slips as a result of heavy rain.
17. *Xylosma parvifolia* is threatened by damage or destruction by landslips (NSW Government Saving our Species 2021). Landslips in 2021 prevented access to some monitoring sites (NSW Government Saving our Species, 2021). There is currently no way to prevent or mitigate the threat of landslips at sites where *X. parvifolia* is present (C. Stehn pers. comm. 2022).
18. *Xylosma parvifolia* Jessup 1984 (*Salicaceae*) 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 Act criteria

The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: Critically Endangered under Clauses 4.3(a)(d)(e,i,iii)

Clause 4.2 – Reduction in population size of species

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(Equivalent to IUCN criterion A)

Assessment Outcome: Data Deficient

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| (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. | |

Clause 4.3 - Restricted geographic distribution of species and other conditions (Equivalent to IUCN criterion B)

Assessment Outcome: Critically Endangered 4.3(a)(d)(e,i,iii)

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| 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: Endangered 4.4 (b)(ei,ii(A(II),B))

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| The estimated total number of mature individuals of the species is: |
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| | (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. |

Clause 4.5 - Low total numbers of mature individuals of species

(Equivalent to IUCN criterion D)

Assessment Outcome: Endangered 4.5(b)

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| 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

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| 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)

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Assessment Outcome: Met for Vulnerable

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| 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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Professor Kristine French
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Rowell, T. (2024) Conservation Assessment of *Xylosma parvifolia* Jessup 1984. NSW Threatened Species Scientific Committee.

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