Publication date: 21/01/2022

**Notice 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 *Leionema westonii* L.M.Copel. & I.Telford 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

*Leionema westonii* was found to be Critically Endangered in accordance with the following provision in the *Biodiversity Conservation Regulation 2017*: Clause 4.3(a)(d)(e iii) and Clause 4.5(a). The main reasons for this species being eligible are: i) it has a very highly restricted geographical range; ii) the estimated total number of mature individuals is extremely low; iii) it is only found at a single location; and (iv) there is inferred continuing decline due to habitat disturbance from feral goats. All known individuals were burnt in the 2019-2020 fire season and recruitment is absent 18 months post burn. Drought conditions may have killed adults and prevented recruitment.

The NSW Threatened Species Scientific Committee has found that:

1. *Leionema westonii* L.M.Copel. & I.Telford (Rutaceae) was first discovered in 2004 and recently described by Copeland and Telford (2018). *Leionema westonii* is described by PlantNET 2020 as a "shrub, rhizomatous and much-branched, to 70 cm tall. Stems pilose with spreading white simple hairs. Leaves narrowly elliptic or linear, 6–16 mm long, 1–1.8 mm wide, apex obtuse, margin revolute, upper surface pilose, lower surface minutely white-papillose and sparsely pilose. Inflorescence terminal cymose, solitary flowers in the upper axils, exceeding leaves; pedicels 3–5.5 mm long, pilose, bearing a subulate, pilose bracteole 2.4–2.8 mm long just below the calyx. Calyx cup-shaped, 1.3–1.6 mm long, sparsely hispidulous, sometimes with minute stellate hairs, 5-toothed, the teeth triangular, c.1 mm long. Petals spreading, 4–4.6 mm long, white, upper surface glabrous, lower surface glandular punctate and sparsely and shortly pilose. Ovary papillose."

2. *Leionema westonii* is endemic to New South Wales. The species is known only from a single population in the Oxley Wild Rivers National Park (OWRNP) on the New England Tablelands of northeastern NSW. *Leionema westonii* occurs in a relatively flat to gently sloping area of woodland dominated by *Eucalyptus campanulata, Allocasuarina littoralis* and *Poa sieberiana* on shallow, loamy soil on metasediments at an altitude of 1080 m a.s.l. (Copeland and Telford 2018). Although there is a large area of potentially suitable habitat in the vicinity of the known site, no other populations of *L. westonii* have been found, despite several general surveys in the area (L. Copeland *in litt*. May 2016). Copeland (*in litt*. May 2016) further suggests that the species is "certainly not widespread or common". The area was subject to a prolonged drought then burnt

in late 2019 by a wildfire with high to extreme fire severity recorded in the area where the *L. westonii* population occurs (FESM 2020).

3. The geographic distribution of *Leionema westonii* is very highly restricted. The area of occupancy of *L. westonii* is estimated to be 4 km², based on the species' occupying one 2 km x 2 km grid cell, the spatial scale of assessment recommended by IUCN (2019). The extent of occurrence (EOO) is also estimated to be 4 km². 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. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2019).

4. In 2004, there were estimated to be fewer than 50 mature individuals of *Leionema westonii* in a single population over an area of less than 1 hectare (Copeland and Telford 2018). The fire in late 2019 burnt the entire population and there has been no regeneration of *L. westonii* to date (May 2021), some 18 months since the fire (L. Copeland *in litt.* October 2020, L. Copeland *in litt.* May 2021).

5. Little is known about the ecology of *Leionema westonii.* The species was observed to be rhizomatous (Copeland and Telford 2018) which may enable it to resprout after fire. Its response to fire, however, is unknown and further monitoring of the site is required to see if there is any post-fire regeneration of *L. westonii* from seedlings or resprouting plants.

6. Prior to the 2019 fire, the Northern Tablelands was in severe drought with some areas experiencing the driest conditions on record (BOM 2020). It is possible that most or all *Leionema* plants may have succumbed to water stress prior to the fire event. Since the fire, the recovery of the habitat where *Leionema westonii* occurs has been very slow and drought stress prior to the fire may have compromised the ability of many species, including *L. westonii,* to recover.

7. Grazing by feral goats (*Capra hircus* Linnaeus 1758) may be a threat to the recovery of *Leionema westonii* and its habitat. Prior to the 2019 fire, feral goats were relatively widespread and common throughout OWRNP and there was evidence of severely grazed vegetation in the National Park (L. Copeland *in litt.* May 2016). No grazing was specifically observed on *L. westonii* shrubs on the two occasions when the population was visited in 2004 (L. Copeland *in litt.* May 2016), but grazing has been a concern for the nearby Critically Endangered *Pimelea cremnophila* (Delgado 2018). Since the 2019 fire, feral goats are still present in the gorge, but numbers are low (A. Fawcett pers. comm. November 2020). However, as goats are still present in the area, vegetation regenerating after the fire is considered to be at risk from grazing. 'Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758' is listed as a Key Threatening Process on the BC Act.

8. *Leionema westonii* L.M.Copel. & I.Telford 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: Critically Endangered under Clause 3(a)(d)(e iii) and Clause 4.5(a)**

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

| | | | |
|---|---|---|---|
| **(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 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: Data Deficient.**

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| **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: | | |
| | | | | (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: Critically Endangered under Clause 4.5 (a).**

| **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.**

| **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)**
**Assessment Outcome: Vulnerable under Clause 4.7.**

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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. |

Dr Anne Kerle
Chairperson
NSW Threatened Species Scientific Committee

**Supporting Documentation:**

Scott J (2020) Conservation Assessment of *Leionema westonii* L.M.Copel. & I.Telford (Rutaceae). NSW Threatened Species Scientific Committee.

**References:**

BOM (2020) Bureau of Meteorology recent and historical rainfall maps. Commonwealth of Australia 2020. Available at: http://www.bom.gov.au/climate/maps/rainfall/?variable=rainfall&map=drought&period=12month&region=ns&year=2019&month=12&day=31

Copeland LM, Telford IRH (2018) *Leionema westonii* (Rutaceae), a rare new species from north-eastern New South Wales, Australia. *Telopea* **21**, 19–24.

Delgado E (2018) Conservation Assessment of *Pimelea cremnophila.* NSW Threatened Species Scientific Committee.

Fire Extent and Severity Mapping (FESM) (2020) New South Wales Department of Planning, Industry and Environment. This dataset can be accessed at: https://data.gov.au/dataset/ds-nsw-c28a6aa8-a7ce-4181-8ed1-fd221dfcefc8/details?q=

IUCN Standards and Petitions Committee (2019) Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee. Accessed from http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

PlantNET (The NSW Plant Information Network System) Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au (accessed 09 September 2020). Available at: https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Leionema~westonii

**A notice of determination to provisionally list this species as a critically endangered species was listed on 30/01/2020**