

***Zieria parrisiae* J.D. Briggs & J.A. Armstr. (Rutaceae)**

Distribution: Endemic to NSW

Current EPBC Act Status: Endangered

Current NSW TSC Act Status: Critically Endangered

Proposed change for alignment: upgrade to Critically Endangered on EPBC Act

Conservation Advice: *Zieria parrissiae* J.D. Briggs & J.A. Armstr. (family Rutaceae).

Summary of Conservation Assessment

Zieria parrissiae is eligible for listing as Critically Endangered under Criterion B1ab(iii) (v) and B2ab (iii) (v); C2a(ii).

The main reasons for the species being eligible for listing in the Critically Endangered category are i) that the species has a very highly restricted geographic range with an area of occupancy (AOO) estimated to be approximately 4 km² based on a single 2 x 2 km grid cell, the scale recommended for assessing AOO by IUCN (2016) AND an extent of occurrence (EOO) that is also 4km² based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2016); ii) a continuing decline is projected in area and extent and quality of habitat and the number of mature individuals due to wildfire, drought and severe browsing; and iii) there are less than 250 mature individuals and all are in one population.

Assessment against IUCN Red List criteria

Criterion A Population Size reduction.

Assessment Outcome: data deficient.

Justification: Insufficient data to assess.

Criterion B Geographic range

Assessment Outcome: Critically Endangered under Criterion B1 (a), (b) (iii) (v). B2 (a), (b) (iii) (v).

Justification: The species is known from one area representing an extent of occurrence (EOO) and area of occupancy (AOO) of 4 km². Area of occupancy was based on occupancy of one 2 x 2 km grid cell, the scale of assessment recommended by IUCN (2016). EOO is also 4 km² based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2016).
and at least 2 of the following:

a) the population or habitat is observed or inferred to be severely fragmented or known to exist at one location,

Assessment Outcome: subcriterion met.

Justification: Only one location is known. The major threats (browsing, fire and drought) all occur across all the one known population.

b) a projected or continuing decline is observed, estimated, inferred or projected.

Assessment Outcome: subcriterion met.

Justification: A continuing decline is projected in (iii) quality of habitat, and (v) number of mature individuals. Wildfire events, drought and severe browsing by native and non-native animals, which are likely to cause significant reductions due to a very small population size, occupying an extremely small area.

c) extreme fluctuations:

Assessment Outcome: data deficient.

Justification: This is currently unknown.

Criterion C Small population size and decline.

Assessment Outcome: Critically Endangered via C2a(i)(ii).

Justification: The total number of mature individuals of *Zieria parrissiae* is estimated to be less than 250 mature plants. The estimated range is from 150 to possibly up to 300.

C1. Assessment Outcome: data deficient.

Justification: Insufficient data to assess decline.

or

C2. Continuing decline in number of mature individuals:

Assessment Outcome: subcriterion met.

Justification: A continuing decline is projected in (iii) quality of habitat, and (v) number of mature individuals. This is mainly due to a very small population size, occupying an extremely small area. This makes it highly susceptible to extinction through events such as wildfire, drought and severe browsing by native and non-native animals.

And one of the following:

(a)(i) the number of mature individuals in each population is less than certain thresholds:

Assessment Outcome: subcriterion met at Endangered threshold.

Justification: the number of mature individuals in the one population is estimated to be <250.

(a)(ii) the % mature individuals in one population

Assessment Outcome: subcriterion met at Critically Endangered threshold.

Justification: All mature individuals are in one population.

b) Extreme fluctuations in the number of mature individuals

Assessment Outcome: data deficient.

Justification: This is currently unknown.

Criterion D Very small or restricted population.

Assessment Outcome: Endangered via D1.

Justification: D1. The total number of mature individuals of *Zieria parrissiae* is estimated to be <250.

Criterion E Quantitative Analysis.

Assessment Outcome: Data deficient.

Justification: Insufficient data to assess.

Description

NSW Scientific Committee (2010) state that "*Zieria parrissiae* J.D.Briggs & J.A.Armstr. (family Rutaceae) has been described by Armstrong (2002) as:

'A many-branched shrub up to 3 m; younger branches not ridged, densely tuberculate, pubescent all over with short stellate hairs, the stems and tubercles often with a reddish tinge; older branches becoming etuberculate, glabrescent. Leaves palmately trifoliolate, opposite, petiolate. Petiole (1.5) 2.0-4.0 (5.0) mm long, densely tuberculate, with a dense velvety indumentum of very short stellate hairs. Central leaflet narrow oblanceolate-lanceolate (18) 25-35 (44) x (1.5) 3.0-4.0 (5.5) mm, dark green above, paler green beneath; upper surface densely tuberculate, pubescent with very short stellate hairs; the primary vein deeply sunken, the secondary veins slightly sunken; lower surface densely tuberculate, with a dense velvety indumentum of short stellate hairs; apex acute to obtuse; margin somewhat dentate (because of the large tubercles), recurved; primary vein prominently raised, densely tuberculate and densely stellate-pubescent, secondary veins slightly raised and less

conspicuous. Secondary leaflets similar to central leaflet but smaller, usually 0.75-0.85 times as long. Inflorescence axillary, almost as long as the leaves (3) 9-24 (33)-flowered. Peduncle (3) 10-15 (16) mm long, densely tuberculate, densely pubescent with short stellate hairs. Bracts generally deciduous (only one bract or bracteole present at each node of the inflorescence), narrow lanceolate to oblanceolate, 2.0-5.0 x 0.5-1.0 mm, tuberculate on the lower surface only, moderately to densely stellate-pubescent, foliaceous but very much smaller. Pedicel terete, 2.5-5.0 mm long, sparsely tuberculate, moderately pubescent with very short stellate hairs. Flowers white, conspicuous, 7.0-9.0 mm diameter. Calyx lobes deltoid, 1.3-1.8 x 1.0-1.3 mm, very much shorter than the petals, tuberculate and stellate hairy on the outer surface, etuberculate and glabrous on the inner surface. Petals imbricate in bud, ovate-elliptic, 4.0 x 2 mm with a small inflexed mucro at the apex, both surfaces with a fine pubescence of very short stellate hairs. Stamens not persisting in the fruiting stage; filaments 1.5-1.8 mm long, glabrous, not warty or tapering; anthers 0.7 x 0.6 mm, not apiculate, attached in the lower third, deep orange in colour (cream in dry state). Disc interrupted and distinct, glabrous, white. Ovary not tuberculate, glabrous. Style c. 0.5 mm long, glabrous. Stigma 0.3 mm broad, lobed. Fruit reddish-brown when immature, becoming green at maturity, densely tuberculate on carpel surface, glabrous. Cocci lacking an appendage. Seed grey to grey-brown, striate, 1.8 x 1.3 mm; covering to the raphe shiny black, not striate. Seed surface: ridges well-developed, flattened and not prominent, short; branches and cross-ridges common, wax present. Elaiosome 1.3 x 1.0 mm."

"*Zieria parrisiae* was first discovered in 1986. The species has been known by a number of informal names, including 'Z. *parrisiae* J. D. Briggs & J. A. Armstr. ms (Armstrong 5091)' (Armstrong & Harden 2002), 'Z. species I' (Armstrong 1991), 'Z. sp. 15' (Briggs & Leigh 1988) and 'Z. sp. Q (Box Range North)' (J.D. Briggs pers. comm. 2008). *Zieria parrisiae* is distinguished from closely related *Z. buxijugum* and *Z. formosa* by the less velvety coverage of stellate hairs on the upper surface of its leaves, and from *Z. tuberculata* by the presence of prominent warts on its fruits."

Distribution

NSW Scientific Committee (2010) state that "*Zieria parrisiae* is endemic to New South Wales and is restricted to a single population on private land, west of Pambula. Further surveys in and around the area have failed to locate any additional populations (Briggs & Leigh 1990; NSW NPWS 2002; J.D. Briggs pers. comm. 2008)."

"The population of *Z. parrisiae* includes an extremely low to very low number of mature individuals. When last surveyed in 2001, the population included 36 mature individuals and 85 smaller plants."

Currently the estimated population size is between 150 and possibly 300 plants, but likely to be less than 250 mature plants.

Ecology

NSW Scientific Committee (2010) state that "*Zieria parrisiae* grows in skeletal, grey, sandy loam amongst broken rhyolite rocks and boulders, in the ecotone between shrubby heath and open dry sclerophyll forest (Briggs & Leigh 1990; NSW NPWS 2002). The species flowers prolifically between late September and early November (Briggs & Leigh 1990; Armstrong 2002; NSW NPWS 2002). Its fire response is unknown, however many species of *Zieria* are killed by fire. Plants have been observed to resprout after defoliation following browsing."

Threats

NSW Scientific Committee (2010) state that "*Zieria parrisiae* is threatened by demographic and environmental stochasticity due to its very highly restricted distribution and extremely low mature

population size. Browsing by feral goats caused a major population decline in the 1980s before the goats were removed from the area (Briggs & Leigh 1990; Armstrong 2002; NSW NPWS 2002). The population was further threatened by browsing by Swamp Wallabies (*Wallabia bicolor*) until a fence was constructed around it in 2002. The integrity of the fence is infrequently inspected to determine whether it remains an effective barrier. Potential breaches to the fence caused by treefall or vandalism may therefore go undetected for some time. Given the risks associated with the known impact of browsing on the population, the uncertain security of the fence, and the uncertain management practices that may accompany future changes in ownership, the species is projected to undergo a future decline (J.D. Briggs pers. comm. 2008).” Monitoring in 2012 showed that the fences remained effective and allowed some increase in population size.

Conservation and Management Actions

There is a recovery plan for this species (NSW NPWS 2002) and a NSW Saving Our Species site managed program for the species in NSW that is designed to minimise disturbance, adverse grazing or fire impacts and use translocation as a means to enhance known sites and establish an additional site.

Habitat loss, disturbance and modification

- Prevent disturbance of known and suitable habitat;
- Instigate appropriate fire management that is not detrimental to the species. This requires consideration of all components of the fire regime and adherence to fire frequency thresholds in the NSW Rural Fire Service Bush Fire Code Threatened Species Hazard Reduction list for plants.
http://www.rfs.nsw.gov.au/__data/assets/pdf_file/0017/24335/ThreatenedSpeciesHazardReductionList-Part1-Plants.pdf

Invasive species

- reduce impact of browsing through exclusion fencing at known population.

Ex situ conservation

- Develop a targeted seed collection program for ex situ seed banking and possibly an ex situ living collection.

Stakeholder Management

- Maintain engagement and consultation with land owners and managers of sites where there are known populations for conservation management and protection of the species.

Survey and Monitoring priorities

- Monitor known sites annually to determine trends in population size over time.
- Monitor known sites to ensure fencing to exclude herbivores continues to be effective.

Information and research priorities

- Undertake further ecological research into the species' life history, ecology and germination requirements relevant to the persistence of the species. Priorities include seed germination requirements; time for juvenile plants to mature and possibly resprout; capacity of plants to resprout after browsing impacts and impact of browsing on growth and reproduction.

References

- Armstrong JA (1991) *Zieria*. In 'Flora of New South Wales. Volume 2'. (Ed. GJ Harden). (University of New South Wales Press: Kensington).
- Armstrong JA (2002) *Zieria* (Rutaceae): a systematic and evolutionary study. *Australian Systematic Botany* **15**, 277-463.
- Armstrong JA, Harden GJ (2002) *Zieria*. In 'Flora of New South Wales. Volume 2'. (Ed. GJ Harden). (University of New South Wales Press: Kensington).
- Briggs JD, Leigh JH (1988) Rare or threatened plants: 1988 revised edition. Australian National Parks and Wildlife Service Special Publication No. 14, Canberra.
- Briggs JD, Leigh JH (1990) Delineation of Important Habitats of Threatened Plant Species in South-Eastern New South Wales. Australian Heritage Commission, Canberra.
- IUCN (2008) 'Guidelines for using the IUCN Red List Categories and Criteria. Version 7.0.' (Standards and Petitions Working Group of the IUCN Species Survival Commission Biodiversity Assessments Subcommittee: Switzerland)
- IUCN Standards and Petitions Subcommittee (2016) Guidelines for Using the IUCN Red List Categories and Criteria. Version 12. Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.
- NSW NPWS (2002) 'Draft Recovery Plan for *Zieria formosa*, *Zieria buxijugum* and *Zieria parrisiae*.' NSW National Parks and Wildlife Service, Hurstville NSW.
- NSW Scientific Committee (2010) Final Determination to list the shrub *Zieria parrisiae* J.D. Briggs & J.A. Armstr. as a CRITICALLY ENDANGERED SPECIES. Accessed 6th September 2016. <http://www.environment.nsw.gov.au/determinations/zieriaparrisiaeFD.htm>

NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the shrub *Zieria parrisiae* J.D. Briggs & J.A. Armstr. as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act, and as a consequence, to omit reference to *Zieria parrisiae* J.D. Briggs & J.A. Armstrong from Part 1 of Schedule 1 (Endangered species) of the Act. Listing of Critically Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Zieria parrisiae* J.D.Briggs & J.A.Armstr. (family Rutaceae) has been described by Armstrong (2002) as:

‘A many-branched shrub up to 3 m; younger branches not ridged, densely tuberculate, pubescent all over with short stellate hairs, the stems and tubercles often with a reddish tinge; older branches becoming etuberculate, glabrescent. Leaves palmately trifoliolate, opposite, petiolate. Petiole (1.5) 2.0-4.0 (5.0) mm long, densely tuberculate, with a dense velvety indumentum of very short stellate hairs. Central leaflet narrow oblanceolate-lanceolate (18) 25-35 (44) x (1.5) 3.0-4.0 (5.5) mm, dark green above, paler green beneath; upper surface densely tuberculate, pubescent with very short stellate hairs; the primary vein deeply sunken, the secondary veins slightly sunken; lower surface densely tuberculate, with a dense velvety indumentum of short stellate hairs; apex acute to obtuse; margin somewhat dentate (because of the large tubercles), recurved; primary vein prominently raised, densely tuberculate and densely stellate-pubescent, secondary veins slightly raised and less conspicuous. Secondary leaflets similar to central leaflet but smaller, usually 0.75-0.85 times as long. Inflorescence axillary, almost as long as the leaves (3) 9-24 (33)-flowered. Peduncle (3) 10-15 (16) mm long, densely tuberculate, densely pubescent with short stellate hairs. Bracts generally deciduous (only one bract or bracteole present at each node of the inflorescence), narrow lanceolate to oblanceolate, 2.0-5.0 x 0.5-1.0 mm, tuberculate on the lower surface only, moderately to densely stellate-pubescent, foliaceous but very much smaller. Pedicel terete, 2.5-5.0 mm long, sparsely tuberculate, moderately pubescent with very short stellate hairs. Flowers white, conspicuous, 7.0-9.0 mm diameter. Calyx lobes deltoid, 1.3-1.8 x 1.0-1.3 mm, very much shorter than the petals, tuberculate and stellate hairy on the outer surface, etuberculate and glabrous on the inner surface. Petals imbricate in bud, ovate-elliptic, 4.0 x 2 mm with a small inflexed mucro at the apex, both surfaces with a fine pubescence of very short stellate hairs. Stamens not persisting in the fruiting stage; filaments 1.5-1.8 mm long, glabrous, not warty or tapering; anthers 0.7 x 0.6 mm, not apiculate, attached in the lower third, deep orange in colour (cream in dry state). Disc interrupted and distinct, glabrous, white. Ovary not tuberculate, glabrous. Style c. 0.5 mm long, glabrous. Stigma 0.3 mm broad, lobed. Fruit reddish-brown when immature, becoming green at maturity, densely tuberculate on carpel surface, glabrous. Cocci lacking an appendage. Seed grey to grey-brown, striate, 1.8 x 1.3 mm; covering to the raphe shiny black, not striate. Seed surface: ridges well-developed, flattened and not prominent, short; branches and cross-ridges common, wax present. Elaiosome 1.3 x 1.0 mm.’

2. *Zieria parrisiae* was first discovered in 1986. The species has been known by a number of informal names, including ‘*Z. parrisiae* J. D. Briggs & J. A. Armstr. ms (Armstrong 5091)’ (Armstrong & Harden 2002), ‘*Z. species I*’ (Armstrong 1991), ‘*Z. sp. 15*’ (Briggs & Leigh 1988) and ‘*Z. sp. Q* (Box Range North)’ (J.D. Briggs pers. comm. 2008). *Zieria parrisiae* is distinguished from closely related *Z. buxijugum* and *Z. formosa* by the less velvety coverage of stellate hairs on the upper surface of its leaves, and from *Z. tuberculata* by the presence of prominent warts on its fruits.

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3. *Zieria parrisiae* is endemic to New South Wales and is restricted to a single population on private land, west of Pambula. Further surveys in and around the area have failed to locate any additional populations (Briggs & Leigh 1990; NSW NPWS 2002; J.D. Briggs pers. comm. 2008).
4. *Zieria parrisiae* grows in skeletal, grey, sandy loam amongst broken rhyolite rocks and boulders, in the ecotone between shrubby heath and open dry sclerophyll forest (Briggs & Leigh 1990; NSW NPWS 2002). The species flowers prolifically between late September and early November (Briggs & Leigh 1990; Armstrong 2002; NSW NPWS 2002). Its fire response is unknown, however many species of *Zieria* are killed by fire. Plants have been observed to resprout after defoliation following browsing.
5. The population of *Z. parrisiae* includes an extremely low to very low number of mature individuals. When last surveyed in 2001, the population included 36 mature individuals and 85 smaller plants. The extent of occurrence and area of occupancy are each estimated at 4 km², based on 2 x 2 km grid squares, the spatial scale recommended for assessing areas of occupancy IUCN (2008).
6. *Zieria parrisiae* is threatened by demographic and environmental stochasticity due to its very highly restricted distribution and extremely low mature population size. Browsing by feral goats caused a major population decline in the 1980s before the goats were removed from the area (Briggs & Leigh 1990; Armstrong 2002; NSW NPWS 2002). The population was further threatened by browsing by Swamp Wallabies (*Wallabia bicolor*) until a fence was constructed around it in 2002. The integrity of the fence is infrequently inspected to determine whether it remains an effective barrier. Potential breaches to the fence caused by treefall or vandalism may therefore go undetected for some time. Given the risks associated with the known impact of browsing on the population, the uncertain security of the fence, and the uncertain management practices that may accompany future changes in ownership, the species is projected to undergo a future decline (J.D. Briggs pers. comm. 2008). 'Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758' is listed as a Key Threatening Process under the *Threatened Species Conservation Act* 1995.
7. *Zieria parrisiae* J.D. Briggs & J.A. Armstr. is eligible to be listed as a Critically Endangered species as, in the opinion of the Scientific Committee, it is facing an extremely high risk of extinction in New South Wales in the immediate future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation* 2002:

Clause 15

The geographic distribution of the species is estimated or inferred to be:

(a) very highly restricted,

and:

(d) a projected or continuing decline is observed, estimated or inferred in:

(i) an index of abundance appropriate to the taxon

(ii) geographic distribution, habitat quality or diversity, or genetic diversity

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Clause 16

The estimated total number of mature individuals of the species is:

(a) very low,

and:

(d) a projected or continuing decline is observed, estimated or inferred in:

(i) an index of abundance appropriate to the taxon

(ii) geographic distribution, habitat quality or diversity, or genetic diversity

Clause 17

The total number of mature individuals of the species is observed, estimated or inferred to be:

(a) extremely low.

Dr Richard Major
Chairperson
Scientific Committee

Proposed Gazettal date: 31/07/09
Exhibition period: 31/07/09 – 25/09/09

References:

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