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Zieria formosa J.D. Briggs & J.A. Armstrong (Rutaceae)

Review of Current Information in NSW

June 2008

Current status:

Zieria formosa is currently listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). The NSW Scientific Committee recently determined that *Zieria formosa* meets criteria for listing as Critically Endangered in NSW under the *Threatened Species Conservation Act* 1995 (TSC Act), based on information contained in this report and other information available for the species.

Species description:

Zieria parrisiae is described in Armstrong (2002) as follows: "Rounded shrub up to 1.5 m high and 1 m across; younger branches terete, tuberculate, with a dense pubescence of short stellate hairs (also covering the tubercles); older branches less tuberculate, glabrescent. Leaves palmately trifoliolate, opposite, petiolate. Petiole 2.4 mm long, tuberculate, with a dense pubescence of short stellate hairs. Central leaflet lanceolate (10) 15-30 (37) x (2) 3-5 (6) mm, light green above, slightly lighter again below; upper surface tuberculate, densely pubescent with short stellate hairs, primary vein deeply sunken, secondary veins also sunken; lower surface sparsely tuberculate, with a dense velvety indumentum of short stellate hairs; apex obtuse (occasionally almost acute); margin slightly dentate, strongly recurved; primary vein prominently raised, tuberculate and densely stellate-pubescent; secondary veins slightly raised. Secondary leaflets similar to the central leaflet but smaller, usually 0.75-0.85 times as long. Inflorescence axillary, slightly longer than the leaves (9) 26-45 (77)-flowered. Peduncle (3) 10-20 (24) mm long, tuberculate, densely stellate-pubescent. Primary bracts deciduous (only one bract or bracteole present at each node of the inflorescence), narrow oblanceolate, 1.5-6 x 0.5-1.5 mm, abaxial surface tuberculate, adaxial surface not tuberculate, both surfaces densely stellate-pubescent. Pedicel terete, 1-3 mm long, sparsely and inconspicuously tuberculate, densely stellate-pubescent. Flowers pale pink, occasionally fading almost white, very conspicuous, 6-9 mm diameter. Calyx lobes deltoid, 1.5-2 x 1-1.2 mm at their base, very much shorter than the petals and about twice the length of the calyx tube, tuberculate and densely stellate-pubescent on the abaxial surface, not tuberculate and sparsely hairy on the adaxial surface with appressed mostly simple hairs, the surface distinctly reddish-brown in fresh and dried specimens and the apex terminated with a red tubercle. Petals valvate in bud, obovate-elliptic with an acute apex, 3.5-4 x 2 mm, with a small inflexed mucro at the apex; abaxial surface with sparsely scattered red-tinged tubercles and a fine pubescence of very short stellate hairs; adaxial surface glabrous-glabrescent. Stamens not persisting in the fruiting stage; filaments 1.5-1.8 mm long, glabrous, not tapering but with several conspicuous tubercles near their upper end and distinctly incurved from that point; anthers 0.7-0.8 x 0.6 mm, with a very small white apical point 0.15 mm long, versatile and attached at a point about one-third the distance from the base, the pollen is orange but this is normally hidden by the cream

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back to the inwardly and downwardly facing anthers (pollen cream in the dry state). Disc interrupted and distinct, glabrous, somewhat finely warty, pale pink infused with minute dark-blue dots. Ovary glabrous, densely tuberculate, red-brown in colour. Style 1-1.2 mm long, glabrous. Stigma 0.3-0.4 mm broad, lobed. Fruit dark red-brown when immature, often becoming greenish-brown at maturity, densely tuberculate (i.e. glands obvious on carpel surface), glabrous or occasionally with very sparsely scattered stellate hairs. Cocci lacking an appendage. Seed dark brown to grey-brown often with a few black patches, striate, (1.5) 2-2.5 (2.8) x (I) 1.2-1.6 (1.8) mm; the covering to the raphe smooth and shiny, not striate. Seed surface: ridges well-developed, flattened and long; branches and cross-ridges occasional. Elaisosome 1.5-2.5 x 0.8-1.1 mm.”

Taxonomy:

Zieria formosa was first by J. D. Briggs & J. A. Armstrong. The species has been known by a number of informal names, including: *Zieria* sp. 'O' (Lochiel) (Briggs & Leigh 1990); *Zieria* species H, (Armstrong 1991); *Zieria* sp. 7 (Briggs & Leigh 1996). *Zieria formosa* is distinguished from closely related *Z. buxijugum* by the presence of small terminal appendages on its anthers and wider leaflets (3-5 mm wide cf. 2-3mm wide in *Z. buxijugum*). The presence of warts in its fruits distinguishes it from *Z. furfuracea*. The velvety coverage on the upper surface of its leaves distinguishes it from *Z. parrisiae* and *Z. tuberculata*.

Distribution and number of populations:

Zieria formosa is known from only one population south-west of Pambula on the far south coast of NSW (Briggs & Leigh 1990; Armstrong 2002; Armstrong & Harden 2002; NSW NPWS 2002). The population extends across three private properties. Most of this land is zoned for rural residential use. The species is not known to occur within a conservation reserve (Briggs & Leigh 1990; Briggs & Leigh 1996; NSW NPWS 2002; Armstrong 2002).

Several searches of similar habitat in the region by several botanists failed to locate other populations (Briggs & Leigh 1990; Armstrong 2002; expert advice 2008).



Figure 1 Location of *Zieria formosa* in NSW.

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Ecology:

Key habitat requirements

The only known population of *Z. formosa* occurs at an altitude of 50 m on the upper north-east-facing section of a moderately steep ignimbrite rock outcrop (Briggs & Leigh 1990; NSW NPWS 2002; Armstrong 2002). This species grows in skeletal, grey, sandy loam amid broken rocks and boulders (Briggs & Leigh 1990). The vegetation is a shrub-dominated community and includes *Acacia mearnsii* (Black Wattle), *Commersonia fraseri* (Blackfellows' Hemp), *Dodonaea triquetra* (Largeleaf Hop-bush), *Prostanthera nivea* (Snowy Mintbush), *Pittosporum undulatum* (Sweet Pittosporum), *Kunzea ambigua* (White Kunzea), *Leptospermum flavescens* (Yellow Tea-tree), *Stypantra glauca* (Nodding Blue Lily), *Plectranthus parviflorus* (Cockspur Flower), *Dendrobium speciosum* (Rock Lily), *Cheilanthes tenuifolia* (Rock Fern), *Platysace lanceolata* (Shrubby Platysace) and *Hymenanthera dentata* (Tree Violet) (Briggs & Leigh 1990; Armstrong 2002; Armstrong & Harden 2002; NSW NPWS 2002).

Life history

Zieria formosa produces masses of pale pink flowers from September to October (Briggs & Leigh 1990; NSW NPWS 2002; Armstrong 2002). It is thought to be pollinated by insects such as native bees, hover flies and blowflies (NSW NPWS 2002). Fruit develop quickly and by the end of December the majority of the seed shed is complete (NSW NPWS 2002, Armstrong 2002).

There is little data on the longevity of this species in the wild but it is estimated to be around 20-30 years (expert advice). The age to maturity is around five to 10 years (expert opinion). Hence the generation length (IUCN 2008) can be estimated to be around 12 to 22 years.

Number of mature individuals:

In 1987 *Z. formosa* had a total adult population (plants more than 1 m in height) of 125 (and no seedlings) (Briggs & Leigh 1990). A survey undertaken in 1999 recorded 74 dead plants, probably as a result of the 1997/1998 drought, two years later these individuals had virtually decomposed (NSW NPWS 2002). By April 2001 the adult population had declined to 38 plants (but with another 700 smaller plants) (NSW NPWS 2002; Armstrong 2002). In October 2002 there were still about 40 plants over 1 metre high. There has been no survey since (expert advice).

Threats:

The small total population size, low numbers of large, reproductively mature plants, and the extremely small area occupied by *Z. formosa* expose the species to high risks of extinction through events such as wildfire, drought and severe browsing by native and non-native herbivores. Drought in particular appears to be a major threat to this species as during the extreme dry conditions in 1997/1998 it appeared to have low tolerance, with more than two-thirds of the adult population lost (NSW NPWS 2002).

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The surrounding land has been sub-divided for rural residential development. The impacts of this may include habitat degradation and weed infestation (NSW NPWS 2002).

Extreme fluctuations:

There is no information/evidence of this species experiencing extreme fluctuations.

Population reduction and continuing declines:

Between 1987 and 2001 (about one generation length) the adult population had reduced by 70%, apparently as a result of drought. Standing plants appear to be very vulnerable to extended dry spells and these effects may be compounded by fires at times when the population is suffering drought impacts, as well as threats associated with rural-residential development in the vicinity, notably habitat degradation and weed invasion.

Extent of Occurrence (EOO) & Area of Occupancy (AOO):

The entire distribution of the species falls within a single 2 x 2 km grid cell, the spatial scale recommended for estimation of AOO by IUCN (2008). Both the EOO and AOO are estimated to be less than 4 km² (NSW NPWS 2002; expert advice 2008).

Severe fragmentation:

There is no information/evidence that this species is severely fragmented.

References:

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- 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) pp. 277-288 (NSW University Press: Kensington, NSW).
- Briggs JD, Leigh JH (1990) 'Delineation of Important Habitats of Threatened Plant Species in South-Eastern New South Wales'. (Australian Heritage Commission: Canberra)
- Briggs JD, Leigh JH (1996) 'Rare or Threatened Plants: 1995 Revised Edition.' (CSIRO Publishing: Collingwood, Vic)
- 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 Sub-committee: Switzerland)
(<http://intranet.iucn.org/webfiles/doc/SSC/RedList/RedListGuidelines.pdf>).
- NSW NPWS (2002) 'Draft Recovery Plan for *Zieria formosa*, *Zieria formosa* and *Zieria parrisiae*. NSW NPWS, Hurstville NSW.

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Explanatory note

Between 2007 and 2009 the NSW Scientific Committee undertook a systematic review of the conservation status of a selection of plant and animal species listed under the Threatened Species Conservation Act. This species summary report provides a review of the information gathered on this species at the time the Review was undertaken.

The Scientific Committee's report on the Review of Schedules project and final determinations relating to species that were either delisted or had a change in conservation status can be found on the following website: www.environment.nsw.gov.au .

The Committee gratefully acknowledges the past and present Committee members and project officers who ably assisted the Committee in undertaking the Review of Schedules Project. Information on the people involved in the project can be found in the Acknowledgement section of the project report entitled "Review of the Schedules of the Threatened Species Conservation Act 1995. A summary report on the review of selected species" which is available on the abovementioned website.

This species summary report may be cited as:

NSW Scientific Committee (2008) *Zieria formosa*. Review of current information in NSW. June 2008. Unpublished report arising from the Review of the Schedules of the Threatened Species Conservation Act 1995. NSW Scientific Committee, Hurstville.