National Recovery Plan for the Lemon-scented Zieria *Zieria citriodora*

Geoff Sutter

Australian Government

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Prepared by Geoff Sutter, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg, Victoria.

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This Recovery Plan has been developed with the involvement and cooperation of a range of stakeholders, but individual stakeholders have not necessarily committed to undertaking specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

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Summary

The Lemon-scented Zieria, *Zieria citriodora,* is a small shrub that is endemic to south-eastern Australia, where it occurs in a limited area of north-eastern Victoria and south-eastern New South Wales. The species is known from just three populations containing about 450 plants. Current or potential threats include browsing by native herbivores and domestic stock and disturbance from off-road vehicles. The Lemon-scented Zieria is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. This national Recovery Plan for *Z. citriodora* is the first recovery plan for the species, and details its distribution, habitat, potential threats and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Lemon-scented Zieria *Zieria citriodora* J.A. Armstrong (family Rutaceae) is a small, procumbent to rounded shrub growing to about 20 cm high and 30 cm wide. The stems have a dense covering of fine, simple hairs and are dotted with oil glands. The leaves are **a**lternate, trifoliate, terminal leaflet lanceolate or linear, 4–5 mm long and 2 mm wide, the surfaces dotted with oil glands and strongly lemon-scented when crushed. The inflorescence is usually longer than leaves and has 1–3 tiny, pale pink to white flowers, the sepals triangular, hairy and 2 mm long, the petals 3–4 mm long, with minute hairs. Flowering occurs from late winter to summer. The fruits are hairy and dotted with oil glands, the seeds 3 mm long, black and striated (description from Walsh & Entwisle1996). Little is known of the biology or ecology of *Z. citriodora*. Plants can re-sprout from layered stems (i.e. layered stems taking root when in contact with the soil) (Armstrong 2002).

Distribution and Population Information

Zieria citriodora is restricted to a small area of south-eastern Australia (Figure 1), where it occurs in Victoria and New South Wales in the South Eastern Highlands IBRA bioregion (*sensu* DEH 2000). There are two populations near Cooma in New South Wales, one on crown land near Numeralla containing about 150 plants (1998 count) and the second on private land near Kybeyan containing about 30 plants (1986 count) (DECCW unpubl. data). The Victorian population of *Z. citriodora* contains about 260 plants (2004 count) and occurs near Omeo in the Alpine National Park (DSE unpubl. data). Maps showing the approximate distribution of *Z. citriodora* are available from the Department of Environment, Climate Change and Water (for NSW) (www.environment.nsw.gov.au) and the Department of Environment and Sustainability (for Vic) (www.dse.vic.gov.au).

Habitat

In New South Wales, *Z. citriodora* grows on moderately steep, generally north to south-west facing slopes near small ephemeral creeks at 800–1,000 m altitude. The soils are shallow gravelly or sandy loams overlying decomposed granite or metamorphosed sediments. Associated flora species consist of an overstorey containing Brittle Gum *Eucalyptus mannifera*, Red Stringybark *E. macrorhyncha* and Broad-leaved Peppermint *E. dives* and an understorey of Stunted Sheoak *Allocasuarina nana*, Mountain Banksia *Banksia canei*, Daphne Heath *Brachyloma daphnoides*, Prickly Broom-heath *Monotoca scoparia*, Grey Beard-heath *Leucopogon attenuatus*, Sharp Beard-heath *L. fraseri*, Twin-flower Beard-heath *L. fletcheri* subsp. *brevisepalus*, Hairy Beard-heath *L. microphyllus* var. *pilibundus*, Shrubby Platysace *Platysace lanceolata*, Heathy Bush-pea *Pultenaea procumbens*, Grey Guinea-flower *Hibbertia obtusifolia*, Leafy Bossiaea *Bossiaea foliosa*, Spiny-headed Mat-rush *Lomandra longifolia* and Violet Daisy-bush *Olearia iodochroa* (Briggs & Leigh 1990).

In Victoria, *Z. citriodora* occurs on open rocky slopes with exposed northern and western aspects with an altitude of 900 m and rainfall in excess of 1400 mm/year. The substratum is ignimbrite (Snowy River Volcanics) and Buchan Limestones. Associated flora species consist

of an overstorey containing Candlebark *Eucalyptus rubida* and an understorey of Red-stem Wattle *Acacia rubida*, Ploughshare Wattle *A. gunnii*, Hop Bitter-pea *Daviesia latifolia*, Mountain Banksia, Grey Guinea-flower, Black-anther Flax-lily *Dianella revoluta s.l.* and Digger's Speedwell *Derwentia perfoliata* (DSE unpubl. data).

A proposed recovery action is to determine habitat critical to the survival of *Z. citriodora*.

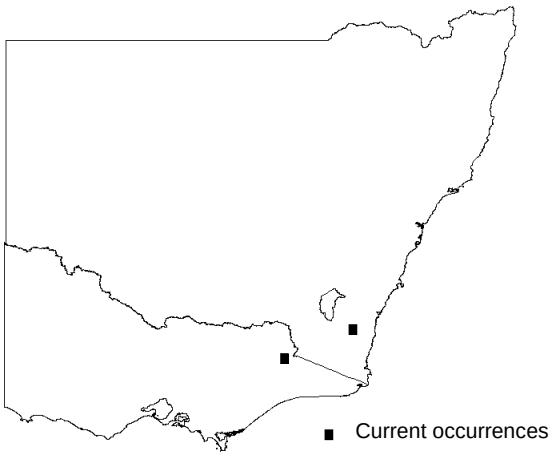

Figure 1. Distribution of *Zieria citriodora*

Decline and Threats

All of the known populations of *Z. citriodora* occur in areas where there has been little landclearing since European settlement. There are no historic records of the species from other sites. Therefore, it would appear that the species is naturally rare and has probably not suffered a major decline since European settlement. Neither of the two populations in New South Wales occurs in conservation reserves, and all populations are small, containing few plants. Major current or potential threats include:

Browsing

The two populations in New South Wales have been heavily browsed by native herbivores (Briggs & Leigh 1990) and the Kybeyan population has also been browsed by domestic stock. There has been no research to determine the effect of browsing by native herbivores or domestic stock on this species (Briggs & Leigh 1990). No browsing has been observed in the Victorian population.

Disturbance

Habitat in the vicinity of the Numeralla (NSW) population may be under pressure from rural-residential development. Off-road vehicles in the vicinity of the Numerella population and have the potential to impact on habitat. Both NSW populations are close to vehicle tracks, and there is some risk that grading of tracks may damage nearby plants.

Altered fire regimes

The potential impact of fire on *Z. citriodora* is unclear. The Numeralla (NSW) site was burnt in 1997. During a survey of the site in 1998, 154 plants were vigorously re-sprouting from their rootstock, and 109 seedlings found (J. Briggs, DECCW pers. comm. 2008). However, there has been no research to determine the effect of fire on germination from seed or the longevity of the soil seed bank. Fire frequencies are expected to be low at all sites due to the naturally slow accumulation of ground layer biomass, and too–frequent fires may exhaust the soil seed bank and the ability of mature plants to resprout after fire.

Recovery Information

Existing Conservation Measures

Plants from the NSW populations have been propagated successfully from cuttings and approximately 50 plants are currently in cultivation at the Australian National Botanic Gardens in Canberra. Material from cuttings for the Victorian population was recently sent to the Royal Botanic Gardens in Melbourne for propagation.

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of *Z. citriodora* in the wild and to increase the probability of important populations remaining self-sustaining in the long term. Within the duration of this Recovery Plan (5 years), the specific objectives of recovery for *Z. citriodora* are to:

1. Determine current abundance and population structure
2. Determine habitat requirements
3. Negotiate protection for all unreserved populations
4. Manage threats to populations
5. Identify key biological characteristics
6. Determine growth rates and viability of populations
7. Maintain populations in cultivation
8. Build community support for conservation of the species

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for *Z. citriodora* and will be implemented and managed by Victorian Department of Sustainability and Environment and the NSW Department of Environment, Climate Change and Water, supported by other agencies, educational institutions, regional natural resource management authorities and community groups as appropriate. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist groups on research, *in situ* management, community education and cultivation as required. Contact will be maintained between the State agencies on recovery issues concerning *Z. citriodora*. The Recovery Plan will run for a maximum of five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption.

Recovery Actions and Performance Criteria

Action	Description	Performance Criteria
Specific Objective 1: Determine distribution, abundance and population structure		
1.1	Undertake surveys to determine the current extent, size and structure of populations. **Responsibility: DSE, PV, DECCW**	• All known sites resurveyed to determine for population size, structure and condition.
Specific Objective 2: Determine habitat requirements		
2.1	Survey known habitat and collect floristic and environmental information relevant to community ecology and condition. **Responsibility: DSE, PV**	• Species/habitat specific survey design prepared. • Habitat critical to survival mapped for any extant populations.
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference. **Responsibility: DSE**	• Survey potential habitat at four sites. • Predictive model for potential habitat developed & tested at two sites.

Specific Objective 3: Negotiate protection for all unreserved populations		
3.1	Increase protection for the Numerella (NSW) population. **Responsibility: DECCW**	• Increased legislative and management protection for the Numerella site including formal reservation if appropriate. • Actions to protect species incorporated in relevant management plans.
3.2	Secure protection for the Kybeyan private land site. **Responsibility: SRCMA, DECCW**	• Voluntary Conservation Agreement or an Incentives Property Vegetation Plan established.
Specific Objective 4: Manage threats to populations		
4.1	Monitor all populations to detect any threats. Implement control measures for current (and any newly identified) threats as required. **Responsibility: DECCW, CMSC, PV**	• All sites monitored at least every second year and any identified threats (e.g. browsing, disturbance) controlled.
Specific Objective 5: Identify key biological functions		
5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels. **Responsibility: DSE**	• Reproductive ecology and regenerative potential quantified for all populations. • Seed bank potential quantified for all populations.
5.2	Identify key stimuli for seed germination requirements. **Responsibility: DSE**	• Stimuli for recruitment identified. • Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival.
5.3	Investigate response to fire. **Responsibility: DSE, DECCW, CMSC**	• Identification of fire impacts, preparation and implementation of fire management prescriptions at all sites.
Specific Objective 6: Monitor populations and determine viability		
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. **Responsibility: DSE, PV**	• Techniques for monitoring developed and implemented. • Population growth rates determined and Population Viability Analysis completed for all populations.
Specific Objective 7: Establish plants in cultivation		
7.1	Maintain plants in cultivation to provide a research population and potentially for reintroductions. **Responsibility: RBG-M, RBG-S**	• Development of effective propagation and cultivation techniques. • At least 30 mature plants from seed/cuttings from both populations in cultivation.
7.2	Establish a seed bank and determine seed viability. **Responsibility: RBG-M, RBG-S**	• Seed from all populations in storage.
Specific Objective 8: Build community support for conservation		
8.1	Identify opportunities for community involvement in the conservation of *Z. citriodora*. **Responsibility: PV**	Community nature conservation and Landcare groups aware of the species and support its conservation.

Abbreviations: CMSC – Cooma Monaro Shire Council; DECCW – Department of Environment, Climate Change and Water (NSW); DSE – Department of Sustainability and Environment (Victoria); PV – Parks Victoria; RBGM/S – Royal Botanic Gardens Melbourne/Sydney; SRCMA – Southern Rivers Catchment Management Authority

Management Practices

The strategy for recovery is the maintenance and enhancement of habitat quality, which may also require an understanding of the ecological and biological requirements of *Z. citriodora.* The emphasis is on acquiring and using knowledge to guide *in situ* management techniques that maintain populations and promote regeneration and recruitment. To achieve this, recovery actions are primarily structured to (i) update data on current populations, (ii) regularly monitor populations and identify any major threats, (iii) control threats to populations to maintain or improve population size, and (iv) engage the community in recovery actions.

On-ground site management will aim to control any identified threats and thereby reduce the risk of decline or extinction. Threats that may require management include off-road vehicular activities, grazing by domestic stock and browsing by native herbivores, and inappropriate fire regimes. A range of strategies will be necessary to alleviate these threats including fire management, fencing, negotiation with NSW private landowner, local government and state fire authorities. In addition, searches of potential habitat should continue to better define the overall distribution of the species.

Affected Interests

Affected interests include the Department of Environment, Climate Change and Water (NSW), the Department of Sustainability and Environment (Vic) and Parks Victoria, who manage or are involved in the management of sites where the species occurs. One population occurs on private land in NSW, and the landholder will be contacted during implementation of the plan.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands *Z. citriodora* occurs have been advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and invited to provide comments and be involved in the implementation of the plan.

Social and Economic Impacts

The implementation of this Recovery Plan is unlikely to cause significant adverse social and economic impacts. Two populations occur on public land. The NSW population on private land occurs on a site with low agricultural productivity and the lost opportunity cost in protecting the site is expected to be small. The site will be protected through voluntary agreement with the property owner, supported where possible by incentives available under natural resource management programs.

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Bibliography

Armstrong, J.A. (2002). The genus *Zieria* (Rutaceae): a systematic and evolutionary study. Australian Systematic Botany 15(3):277-463.

Briggs, J. and Leigh, J. (1990). *Zieria citriodora* in: Delineation of important habitats of threatened plant species in south-eastern New South Wales. Research report to the Australian Heritage Commission, CSIRO. Division of Plant Industry. Canberra.

DEH (2000). Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1. - Summary Report. Department of Environment and Heritage, Canberra.

Walsh, N.G. and Entwisle, T.J. (eds) (1999). Flora of Victoria. Vol 4-Dicotyledons-Cornaceae to Asteraceae. Royal Botanic Gardens, Melbourne.

Priority, Feasibility and Estimated Costs of Recovery Actions

Action	*Description*	*Priority*	*Feasibility*	*Responsibility*	*Cost estimate*					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	**Distribution, abundance**									
1.1	Surveys	1	100%	DECCW, DSE, PV	$12,000	$0	$12,000	$0	$12,000	$36,000
2	**Habitat requirements**									
2.1	Known habitat	1	100%	DSE	$10,000	$10,000	$0	$0	$0	$20,000
2.2	Potential habitat	2	60%	DSE	$0	$10,000	$10,000	$10,000	$0	$30,000
3	**Habitat protection**									
3.1	Unreserved public land	1	80%	DECCW, CMSC	$2,000	$2,000	$0	$0	$0	$4,000
3.2	Private land	1	70%	DECCW, SRCMA	$2,000	$2,000	$0	$0	$0	$4,000
4	**Threat management**									
4.1	Monitoring, control	1	100%	DECCW, PV	$15,000	$0	$15,000	$0	$15,000	$45,000
5	**Biological characteristics**									
5.1	Reproductive status	3	80%	DSE	$5,000	$5,000	$5,000	$0	$0	$15,000
5.2	Seed germination	3	80%	DSE	$0	$0	$5,000	$5,000	$5,000	$15,000
5.3	Fire impact	2	80%	DSE	$0	$0	$10,000	$10,000	$5,000	$25,000
6	**Monitoring populations & determine viability**									
6.1	Monitor populations	1	70%	DSE	$9,000	$9,000	$9,000	$9,000	$9,000	$45,000
7	**Cultivation**									
7.1	Cultivate plants	1	100%	RBG M/S	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
7.2	Seed bank	2	100%	RBG M/S	$3,000	$3,000	$3,000	$3,000	$3,000	$15,000
8	**Community support**									
8.1	Community extension	3	50%	PV	$1,000	$1,000	$1,000	$1,000	$1,000	$5,000
				TOTALS	$64,000	$47,000	$75,000	$43,000	$55,000	$284,000