NATIONAL RECOVERY PLAN FOR THE BOMADERRY ZIERIA *Zieria baeuerlenii*

NSW GOVERNMENT Environment, Climate Change & Water

Australian Government

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DISCLAIMER

The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved, and may also be constrained by the need to address other conservation priorities. Approved recovery actions may be subject to modifications due to changes in knowledge and changes in conservation status.

Summary

This document constitutes the National Recovery Plan for the Bomaderry Zieria (*Zieria baeuerlenii)*. The plan considers the conservation requirements of the species across its known range, identifies the actions to be taken to ensure its long-term viability in nature and the parties who will undertake these actions.

The Bomaderry Zieria is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* as well as Endangered (Schedule 1, Part 1) on the NSW *Threatened Species Conservation Act, 1995*.

This species occurs only in NSW, with only one known population which is scattered within an area of about 0.5 km × 1 km of bushland on either side of Bomaderry Creek, north of Nowra on the NSW South Coast.

The overall objective of this Recovery Plan is to ensure that the current natural population of the Bomaderry Zieria is maintained.

The future recovery actions detailed in this Recovery Plan include:

- Reduce rabbit numbers
- Control weeds
- Minimise pedestrian and trampling impacts
- Monitoring
- Manage fire regimes
- Maintain ex-situ collections
- Translocation and educational project

Abbreviations used in this Plan

BCRP	Bomaderry Creek Regional Park
DECCW	Department of Environment, Climate Change and Water, New South Wales
EPA Act	*Environmental Planning and Assessment Act, 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
IUCN	International Union for the Conservation of Nature
REF	Review of Environmental Factors.
TSC Act	*Threatened Species Conservation Act 1995* (NSW)

SPECIES INFORMATION AND GENERAL REQUIREMENTS

Description

The Bombaderry Zieria (*Zieria baeuerlenii)* is a many-branched to somewhat straggly shrub which grows to an average height of 80 cm (although it has been recorded up to 144 cm tall). Plants are generally clonal, with several stems emerging from a common rootstock. Leaves are opposite and small and comprise three leaflets (trifoliate), with both surfaces covered with a dense velvety layer of mostly stellate hairs. The central leaflet is 6-18 mm long and 4-12 mm wide, whilst the secondary leaflets are similar in shape but slightly smaller (approximately three-quarters the size). Flowers are produced from August to October. The flowers are about 8 mm across, white to pinkish, with four broad lanceolate petals, arranged in small 3-7 flowered clusters arising from the leaf axils on a common stalk up to 10 mm long. Four large, green, leaf-like bracts surround each flower cluster. Fruit has never been recorded (Barratt 2007).

Distribution

There is only one known population of the Bombaderry Zieria. The population is scattered within an area of about 0.5 km × 1 km of bushland on either side of Bomaderry Creek, north of Nowra (Figure 2). The population has been recorded in 49 sites, clustered into seven groups. In 2007 at the time of the last census no stems were found in six sites (12%) where plants had been found previously in 1999. The total number of emergent stems (ramets) was 1254, a decline of 159 (11%) since 1999. This single population is considered vital to the long-term survival of the species.

The first collection of this species was made in 1883, but the collector gave the somewhat vague locality description of ‘lower Shoalhaven’. The second collection was made in 1943 from ’Bombaderry Creek’ and probably refers to the current population, rediscovered in 1987.

There is no evidence to suggest that the distribution of the Bombaderry Zieria ever extended outside the Bomaderry Creek locality, although it is likely that its numbers have been reduced by human activities on its margins.

Figure 1. The locations of the Bomaderry Zieria, Bomaderry Regional Park and identified Critical Habitat (NSW TSC Act) overlaid on an aerial photo of the Bomaderry Bushland.

Habitat

Most of the sites where the Bombaderry Zieria occurs have well drained shallow sandy soils derived from Nowra Sandstone and contain many sandstone outcrops (Barratt 1997b). The species occurs across an extremely narrow altitudinal range of only 10 m (34-44m ASL) on gentle slopes and has no pronounced aspect preference.

The 43 extant sites occur across a range of eucalypt open forest, woodlands with shrub understoreys and closed scrub.

The most common tree species in the forest/woodland communities are Red Bloodwood (*Corymbia gummifera*), Grey Gum (*Eucalyptus punctata*), Spotted Gum (*C. maculata*), Blue-leaved Stringybark (*E. agglomerata*), a Stringybark (*E. imitans*) and Turpentine (*Syncarpia glomulifera*).

The most common species in the closed-scrub communities is a Tea-tree (*Leptospermum sejunctum*).

Across the open-forest woodland the most common understorey shrub is a Tea-tree (*Leptospermum sejunctum*) and the most common herb/forb species is the Mat-rush (*Lomandra confertifolia*) and Wiry Panic (*Entolasia stricta*).

Site tenure

Thirty three of the 49 sites occur in Bomaderry Creek Regional Park. The remainder occur on land owned by Shoalhaven City Council. In the proposed Local Environment Plan the locations where the plants occur are zoned E2 – Environmental Conservation. The objectives of this zone are:

"*To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.*
To prevent development that could destroy, damage or otherwise have an adverse effect on those values."

Biology and ecology

Over the last 15 years there has been no observed fruit set and assessment of pollen viability has indicated that pollen may have a low viability (R. Winstanley unpublished, Barrett 1999). The species probably spreads via root suckers. Evidence so far indicates that the species may be incapable of sexual reproduction.

Population Genetics

Genetic analysis has been undertaken to assess genetic variation in the Bombaderry Zieria population (Sharma, 2001). The results of the analysis show that the population consists of at least 20 distinct genotypes. One of these has subsequently died. Some plants that were physically quite close together were genetically distinct. Subsequent to the Sharma (2001) study, plants have been found at another eight sites, but these plants have not been genetically tested.

The genetic work suggests that the Bomaderry Zieria is a distinct species that once reproduced sexually. The reason for its inability to continue to set viable seed is unknown. The most significant aspect of these results is that they establish that it is extremely unlikely that the species arose as a single hybridisation event followed by vegetative propagation.

Disturbance Regimes

Fire has burnt six of the sites where plants occur in the last 30 years. The plants respond to fire by resprouting vigorously if conditions are suitable. Regrowth appears to be subject to greater herbivore grazing than mature foliage on unburned plants (Barratt 1999). Three of the six sites that disappeared between 1999 and 2007 occurred in a dense overstorey of tea-tree and *Kunzea* vegetation unburnt for a long time. Senescence is apparent in sites in the same vegetation (Barrett 2007). It is possible that where the species grows among larger species some disturbance may be required for persistence.

Most of the population appear to have suffered somewhat during the extended dry period of the last 10 years. Dieback and subsequent regrowth is evident in over 30 of the 43 extant sites. No doubt dry periods have occurred before in the history of the species, but recovery from drought conditions is potentially compromised by threats such as rabbit browsing and weed invasion.

Legal Status

The Bomaderry Zieria is listed as Endangered under the *Threatened Species Conservation Act 1995* (TSC Act), and as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

International obligations

The species is not listed under any International agreement. However, this plan is consistent with the aims and recommendations of the Convention on Biological Diversity, which has been ratified by Australia, and will assist in meeting Australia's responsibilities under that convention.

Role and interests of indigenous people

The Local Land Councils, Elders and other groups representing indigenous people in the areas where the Bombaderry Zieria occurs have been identified. The Recovery Team will consider the roles and interests of these indigenous communities in the implementation of the recovery actions identified in this Plan.

Habitat critical to the survival of the species

In NSW the TSC Act makes provision for the identification and declaration of Critical Habitat. In response to a public nomination the Director-General of NPWS prepared a proposal to list Critical Habitat. This proposal was placed on public exhibition in May 2002, and 54 ha of the bushland was formally identified by the NSW Minister of the Environment as Critical Habitat for the Bomaderry Zieria in 2003. The boundary of the identified critical habitat is the local top of the watershed, to provide protection from pollutants and water borne pathogens such as *Phytophthora cinnamomi*, excepting in the north east portion of the area where the top of the watershed occurs beyond existing development. The identified Critical Habitat has not been declared by the NSW Minister of the Environment, primarily due to the creation of the Regional Park which protects most of the population. Figure 1 illustrates the area formally identified as Critical Habitat.

Biodiversity Benefits

The protection of the Bombaderry Zieria will require the protection of at least some of the Bomaderry bushland. Other threatened species recorded from Bomaderry bushland are listed in Table 1.

Table 1: Threatened species recorded in Bomaderry bushland.

Common Name	Scientific name	Status
Bauer's midge orchid	*Genoplesium baueri*	TSC Vulnerable
Albatross Mallee	*Eucalyptus langleyi*	TSC and EPBC Vulnerable
Yellow-bellied Glider	*Petaurus australis*	TSC Vunerable
Grey-headed Flying Fox	*Pteropus poliocephalus*	TSC Vulnerable
Large-footed Fishing Bat	*Myotis macropus*	TSC Vulnerable
Giant Burrowing Frog	*Heleioporus australiacus*	TSC and EPBC Vulnerable
Powerful Owl	*Ninox strenua*	TSC Vulnerable
Masked Owl	*Tyto novaehollandiae*	TSC Vulnerable
Square Tailed Kite	*Lophoictinia isura*	TSC Vulnerable
Glossy Black Cockatoo	*Calyptorhynchus lathami*	TSC Vulnerable

TSC = *Threatened Species Conservation Act 1995* (NSW); EPBC = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

Social and economic impacts

The declaration of the Bomaderry Creek Regional Park (BCRP) in 2002 protects a significant portion of Zieria habitat. Within the bounds of the regional park, the recovery plan should have no additional adverse social or economic consequences.

There are potential social and economic costs associated with protecting and managing the Bomaderry Zieria habitat on the residual SCC owned land. Possible alternative uses which may be restricted or prevented for some of the sites include the following:

- Residential developments, although most of the SCC land in the vicinity of the Bomaderry Zieria is proposed to be zoned for conservation
- Bomaderry Link Road and other infrastructure
- Recreational activities e.g. trail-bike riding.

The Shoalhaven City Council has proposed a connection between the residential areas to the west of the BCRP with the Princes Highway east of the park via a road through the middle of the BCRP. The road would separate the northern subpopulations of the Bomaderry Zieria from the southern subpopulations. The proposal was declared a controlled action in 2010 and is subject to approval under the EPBC Act.

Affected Interests

Stakeholders and those involved in implementing the plan include:

- NSW DECCW
- Shoalhaven City Council
- Bomaderry Creek Landcare Group

Threats

Browsing by rabbits

Regrowing plants are likely to be browsed by rabbits, as indicated by scrapings and dung in the vicinity of plants. At such times, other vegetation may be scarce or unpalatable, leaving fresh shoots highly favoured. There are so few Bomaderry Zieria plants remaining that even minor levels of browsing may be significant, particularly for some of the genetically distinct sub-populations.

Weeds

Weeds are prevalent on the margins of the Bomaderry bushland. Lantana (*Lantana camara*), Crofton weed (*Ageratina adenophora*), Mother of Millions (*Bryophyllum delagoense*), Kikuyu grass (*Pennisetum clandestinum*), Giant Parramatta grass (*Sporobolus fertilis*), Black-eyed Susan (*Thunbergia alata*), Morning Glory (*Ipomoea indica*) and Purpletop (*Verbena bonariensis*) are common in places. Some sites are impacted by weeds, particularly Mother of Millions. It is unlikely that weeds can be eliminated in the Bomaderry bushland, as the surrounding area provides a constant source of weed propagules. Ongoing work will be required to manage weeds as they affect the plants of this species.

Impacts from recreational activities

The Bomaderry Zieria occurs in a relatively small patch of urban bushland, in close proximity to tracks, picnic areas and recreational facilities. The species is impacted from trail bike riding and trampling.

Powerline and water main maintenance activities

Some of the sub-populations occur adjacent to easements for powerlines and water mains. Maintenance of these utilities or the access tracks has the potential to adversely impact these populations.

Inappropriate fire regimes

Although the species resprouts after fire, too frequent burning may exhaust the reserves of the plants and cause local extinction, particularly if rainfall in between the fires has been low. Some senescence has been noted where the plants are overtopped by rank tea tree and Kunzea vegetation, indicating that a fire may be beneficial to reduce competition for resources.

Road development

The proposed link road has the potential to seriously compromise the conservation status of the species. One site would probably be eliminated by the construction of the road, while a number of other plants are located within a few metres of the proposed road verge.

The road could potentially become a source of weeds into the population. Changes to the hydrology of the area may also result from the road, possibly impacting the population.

Stochastic events

There are at least 19 genetically distinct sub-populations of the Bomaderry Zieria (Sharma 2001). Some of these are very small, being only represented by a handful of stems over a few square metres of ground. These genotypes are at high risk from chance events, such as incidental damage during fire suppression operations.

Guidance for Environmental Management

Although this recovery plan cannot prescribe decision-making under Commonwealth or State environmental legislation, it is clear from the review conducted as the basis for this plan that the single known population is important to the long-term survival of this species.

Management Practices

To avoid significant impacts on the species, any of the following management practices or on ground works in the vicinity of *Z. baeuerlenii* require assessment:

- Clearing
- Herbicide and pesticide spraying
- Grazing
- The link road development
- Residential and recreational development

RECOVERY OBJECTIVES AND CRITERIA

Ability of Species to Recover

The Bomaderry Zieria will always be susceptible to local disturbances due to the small size of the population and the limited area of occupancy. In the absence of sexual reproduction, the recovery strategy is primarily focussed on managing the environment to minimise any loss, and ensuring that a genetic resource is held ex-situ in the event of localised losses. Long-term survival of the species in the urban bushland setting requires attention by the various agencies responsible for the management of the bushland.

Objectives

Over the life of this Recovery Plan:

a. to maintain the population of *Zieria baeuerlenii* in the Bomaderry bushland
b. to reduce or manage threats
c. to increase our knowledge of the habitat requirements and appropriate fire regimes to inform management activities

Performance Criteria

Over the life of this Recovery Plan:

a. the number of sites is maintained over the next five years
b. populations have remained stable (accepting that natural fluctuations may occur) over a five year period
c. knowledge of the habitat requirements and fire regimes of the species has increased

The estimated total cost of implementation of recovery actions over five years is $67 000.

Plan review and evaluation

DECCW will evaluate the performance of the recovery plan against the criteria identified. The Plan will be formally reviewed within five years from the date of its adoption as a national recovery plan under the EPBC Act, and will be revised if necessary.

RECOVERY ACTIONS

Previous Recovery Actions

- A Recovery Team was established by the NPWS in early 1998.
- A detailed survey was conducted by members of the Recovery Team, local community members and other volunteers during 1998 to determine the full extent of the species within the Bomaderry bushland. A few new sites were discovered and are included in the distribution map (Figure 1).
- The Centre for Plant Biodiversity Research, Canberra undertook a detailed study during 1998, into the genetic variation within and between 37 clusters of ramets of *Z. baeuerlenii* (Sharma 2001).
- A Fire Management Plan for the Bomaderry bushland was prepared 1998 by the SCC, DLWC, the ACF and the Rural Fire Service (Shoalhaven City Council 1998).
- A fire management plan has been prepared for the BCRP, and a Plan of Management is under development. Both of these documents specifically consider the Bomaderry Zieria
- An Honours thesis was completed (Barratt 1999).
- During 2004 the Bomaderry Creek Landcare Group received a grant from the Australian Government to eradicate weeds and establish a native vegetation buffer adjacent to some Bomaderry Zieria sites near the Nerang Picnic Area. As part of its undertaking to the government, the Group agreed to continue long-term monitoring and maintenance of the Zieria buffer zone.
- Ex-situ populations have been established at the Australian National Botanic Gardens, Wollongong Botanic Gardens, and at Booderee National Park and Botanic Garden at Jervis Bay. Nineteen of the 20 genotypes that were identified in 1999 are in cultivation in each of the Botanic Gardens. The unrepresented clone came from a cluster of plants that disappeared between the genetic analysis in 1999 and the ex-situ work in 2007. While there is no formal agreement to maintain the plants in perpetuity, each of the gardens intends to maintain the collection for the foreseeable future.
- In 2007 the NSW DECC commissioned a report detailing the status of *Zieria bauerlenii* across both the Regional Park and other parts of the Bomaderry Creek bushland.
- An access track for powerline maintenance that was adjacent to a sub-population was relocated.
- A walking track adjacent to another sub-population was relocated.
- A weed management strategy and accompanying Review of Environmental Factors (REF) for weed control has been prepared for BCRP.
- Weed control has been conducted at several sites.
- Rabbit control was conducted in 2006.

Proposed recovery actions

1. Reduce rabbit numbers

Elimination of rabbits is unlikely, but an ongoing program of rabbit control is necessary to maximise the survival potential of the species. Rabbit control is particularly important after fires or other disturbances.

Responsibility: DECCW and Shoalhaven City Council

Cost: $7000 over 5 years.

2. Control weeds

Several colonies are affected by weeds, particularly Mother of Millions. There needs to be an ongoing program of weed control, as re-invasion is likely in the urban bushland environment of the Bomaderry Bushland.

Responsibility: DECCW and Shoalhaven City Council

Cost: $20 000 over 5 years.

3. Minimise pedestrian and trampling impacts

Erect fencing to direct pedestrian traffic away from sites, or if more appropriate re-route tracks. These need not be exclusion fences, but lengths of fence to divert activity away from clusters of plants. At sites where fences are erected, signs will also be installed explaining the purpose of the fences in protecting the Bombaderry Zieria and its habitat.

Responsibility: DECCW and Shoalhaven City Council

Cost: $4000 over five years.

4. Monitoring

Monitoring of all colonies should occur every five years or shortly after major disturbances. Separate targeted monitoring should be conducted where concern exists regarding particular threatening processes, following fires to increase our understanding of the species response to fire, and following management inputs to assess responses. All ramets at all locations will be counted in the monitoring.

Responsibility: DECCW

Cost: $7000 over 5 years.

5. Investigate the impacts of fire

Initiate experimental burns and/or pruning of dense vegetation over some of the population and associated habitat to determine the effect of both fire and the effects of removal of dense vegetation. Then implement the appropriate fire regime.

Responsibility: DECCW.

Cost: $6000 over 5 years.

6. Maintain ex-situ collections

The small overall population size, presence of several distinct genotypes, active threats and relatively high risk of chance events eliminating some genotypes means that ex-situ collection must be part of the recovery strategy. There are ex-situ collections of the species at Wollongong Botanic Gardens, The Australian National Botanic Gardens and at Booderee Botanic Gardens. The largest collection is at Booderee Botanic Gardens. It is important that these collections be maintained, especially while there are active and on-going threats.

Responsibility: Australian National Botanic Gardens, Booderee Botanic Gardens, Wollongong Botanic Gardens.

Cost: $20 000 over 5 years

7. Translocation and education project

It is planned to establish a population of the Bomaderry Zieria in the Nerang Picnic Area (from the Booderee ex-situ collection). Any translocation will be undertaken in accordance with the guidelines in Vallee et al.(2004). This activity will include provision of an information sign and distribution of a leaflet explaining the importance of the species and its conservation needs to increase understanding and appreciation of the Zieria.

Responsibility: DECCW, Bomaderry Creek Landcare Group.

Cost: $3000 in year 1.

8. Recovery team

An effective recovery team is to be established to assist management of the population, given the community interest in the Bomaderry Bushland.

Responsibility: DECCW, SCC, Landcare Group.

Cost: In kind contribution by DECCW.

Summary of costs and actions identified in the Recovery Plan

Action No.	Action Title	Cost Estimate ($1000s/year)					Total Cost ($)	Responsible Party	Priority
		Year 1	Year 2	Year 3	Year 4	Year 5			
1	Reduce rabbit numbers	3	1	1	1	1	**7**	DECCW	1
2	Control weeds	4	4	4	4	4	**20**	DECCW	1
3	Minimise pedestrian and trampling impacts	2	2				**4**	DECCW	2
4	Monitoring			7			**7**	DECCW	1
5	Fire regimes	2	1	1	1	1	**6**	DECCW	2
6	Maintain ex-situ collections	4	4	4	4	4	**20**	DECCW	1
7	Translocation and education project	3					**3**	DECCW Landcare group	2
8	Recovery team								2
Total		**18**	**12**	**17**	**10**	**10**	**67**		

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