Department of
Sustainability and
Environment

National Recovery Plan for the Anglesea Grevillea *Grevillea infecunda*

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Australian Government

Victoria
The Place To Be

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This is a Recovery Plan prepared under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, with the assistance of funding provided by the Australian Government.

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 Anglesea Grevillea *Grevillea infecunda* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, and is protected (but not listed) under the Victorian *Flora and Fauna Guarantee Act* 1988 (all Victorian Grevilleas are protected). The species is endemic to a small area near Anglesea, about 150 km south-west of Melbourne, where about 1,600 plants occur in 11 wild populations. Main threats are recreational activities, Cinnamon Fungus *Phytophthora cinnamom*i, roadworks and inappropriate fire regimes. This national Recovery Plan for *G. infecunda* details the species' distribution and biology, conservation status, threats, and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Anglesea Grevillea *Grevillea infecunda* is an open, root-suckering shrub 0.3–1.2 m high. Leaves are 3–7 cm long, variable in shape, being either lobed, ovate, rhombic or oblong, coarsely toothed and prickly. The upper surface is dark green and hairless, while the lower surface is paler green and sparsely hairy. Flowers are yellow-green and brown with curved tubes about 8 mm long, hairy outside, hairless inside, and splitting into four petals to release a pale yellow-green red style to 25 mm long. Flowering time is from October to December. The fruit is a leathery, hairy capsule that splits to release winged seeds (description from Walsh & Entwisle 1996). *Grevillea infecunda* populations exhibit variable characters, particularly leaf shape, although the taxonomic and genetic significance of this variability is not known.

Pollen viability and fertility are extremely low, and this species has apparently lost the ability to reproduce sexually (Kimpton *et al*. 2002). Root-suckering is the only means of vegetative spread, and, as a result, all existing populations are now effectively isolated from one another. Root-suckering may be stimulated by fire (Marriott 1986) or slashing (O. Carter pers. obs.), however appropriate burning and/or slashing regimes for this species have not been identified.

Distribution

Grevillea infecunda is endemic to Victoria, where it occurs in hilly country near Anglesea and Aireys Inlet (Walsh & Entwisle 1996; Kimpton 2002), in the South East Coastal Plain IBRA Bioregion (DEH 2000). Popualtions occurs across a total distance of about 10 km, at elevations ranging from 110 m to 260 m above sea level (Angair & Kimpton 2002). There is an apparently valid mid-nineteenth century record from near Brighton, south-east of Melbourne and 100 km east of Anglesea, which suggests a formerly more widespread, perhaps disjunct distribution.

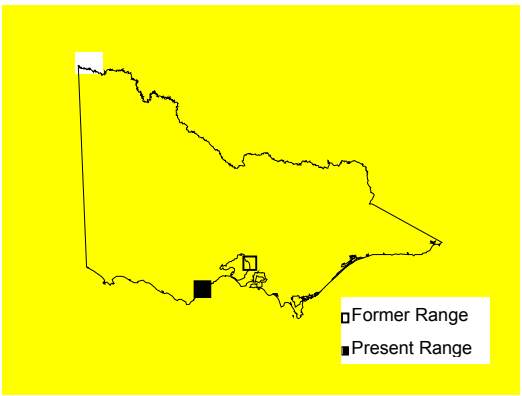

Figure 1. Former and current distribution of G*revillea infecunda* in Victoria

Maps showing the detailed distribution of *G. infecunda* are available from the Department of Sustainability and Environment Flora Information System (DSE-FIS). The FIS is a state-wide repository for flora grid and site distribution data, photographs and text descriptions. This

information is available on request in a variety of formats for natural resource management purposes.

Population Information

Grevillea infecunda is known from 11 populations containing about 1,600 individuals. The key populations are detailed as follows (from Angair & Kimpton 2002):

Angahook-Lorne State Park (managed by Parks Victoria)

- Bald Hills Rd near Salt Creek Track: 18 plants
- Salt Creek Track: 22 plants
- Bambra Road/north of Loves Track: 141 plants
- Grevillea Track off Bambra Road: 62 plants
- Link Track between Loves Track and Grevillea Track: 120 plants
- Breakfast Creek Road: >300 plants

'Anglesea Heath'

- Haggarts/Allardyce Tracks: 92 plants
- Gum Flat Road: 500 plants
- Tanners Road: 152 plants
- Tanners Road/Dangers Lane: 174 plants

The 'Anglesea Heath' is an area of crown land managed with a cooperative agreement between Alcoa and Parks Victoria under the *Conservation Forests and Lands Act* 1987. The site is leased by Alcoa under the *Mines (Aluminium Agreement) Act* 1961until 2011, at which time Alcoa will have an option of another 50-year lease. Under the Anglesea Heath Management Plan, the Anglesea Heath is divided into two different management zones, and all areas containing *Grevillea infecunda* are within the 'conservation zone' (D. Fuller pers comm.).

Otway State Forest

- Hammonds Road: 54 plants

Anecdotal evidence suggest two additional populations, one along the Colac-Forest Rd, and another west of the Alcoa lease site on private land, but these have not yet been confirmed.

Habitat

Grevillea infecunda occurs in dry sclerophyll forest and woodland, usually in sandy or gravelly soils. It is absent from areas where gravel has been extracted, and does not appear in vegetation with a dense upper stratum (Angair & Kimpton 2002). Species commonly found amongst populations of *Grevillea infecunda* include *Eucalyptus willisii*, *Eucalyptus radiata*, *Eucalyptus baxteri*, *Gahnia radula*, *Platylobium obtusangulum*, *Pultenaea gunnii* and *Xanthorrhoea australis*. *Allocasuarina littorale* often occurs in vegetation near to *Grevillea infecunda,* but the two species do not appear to occur together (O. Carter pers obs. 2002). Even where *Grevillea infecunda* occurs below *Eucalptus* spp., tree crowns tend to be widely spaced. Recovery actions include survey for critical, common and potential habitat that will further define habitat critical to the survival of the species.

Threats

The former distribution of *Grevillea infecunda* is not known with certainty, but is presumed to have been relatively continuous within the region where the species currently occurs. Current distribution is fragmented, reflecting the clearing that has occurred for residentail, industrial and agricultural development in the region, although a considerable amount of habitat still exists in the vicinity of Anglesea. If the old record from south-east of Melbourne is correct, then it represents an extinction of a significant, geographically separate population, as the area is all

now residential suburbs and it is highly unlikely any plants still occur there. All populations of *G. infecunda* are considered threatened, from a variety of causes. While some populations occur within the Angahook-Lorne State Park and Anglesea Heath, they are still threatened by recreational activities and Cinnamon Fungus infection, and populations on roadsides are especially vulnerable to accidental damage. Major threats are summarised as follows:

Recreational use: Probably the major threat to many populations, recreational use covers a variety of activities, including off-road vehicles (4WDs and trail-bikes), horse-riding and camping, through crushing or trampling plants and damaging habitat, especially through the creation of new tracks that pass through some *G. infecunda* populations. Campsite construction and firewood collection threatens the Hammonds Rd population.

Cinnamon Fungus *Phytophthora cinnamomi:* Cinnamon Fungus is present in at least five sites containing *G. infecunda*, although the species does not appear to be as susceptible to this pathogen as some other species, notably Austral Grass-Tree *Xanthorrhoea australis*, which is highly susceptible and often killed through infection. Many dead grass-trees occur in amongst apparently healthy *G. infecunda* plants, although the principle threat is likely to be through long-term changes to *G. infecunda* habitat. Dieback caused by the root-rot fungus *Phytophthora cinnamomi* is listed as a Key Threatening Process under the EPBC Act.

Road works: Road and track works including maintenance, widening, slashing and clearing of roadside vegetation damages *G. infecunda* populations on roadsides. Heavy vehicles have also driven over and crushed some plants.

Weed invasion: Weeds are currently a minor threat, although the naturalised native species Giant Paperbark *Melaleuca armillaris* is a threat to *G. infecunda* habitat at the Bald Hills Rd population.

Inappropriate fire regimes: *Grevillea infecunda* will resprout after fire, although the most appropriate fire regime for the species is not known. The last fire at most sites was in 1983.

Recovery Information

Overall Objective

The **overall objective** of recovery is to minimise the probability of extinction of *Grevillea infecunda* in the wild and to increase the probability of important populations becoming self-sustaining in the long term.

Within the life span of this Recovery Plan, the **specific objectives** of recovery for *Grevillea infecunda* are to:

- Acquire accurate information for conservation status assessments.
- Identify habitat that is critical, common or potential.
- Ensure that all populations and their habitat are protected and managed appropriately.
- Manage threats to populations.
- Identify key biological functions
- Determine the growth rates and viability of populations.
- Build community support for conservation.

Program Implementation

The Recovery Plan will run for five years from the time of implementation and will be managed by the Department of Sustainability and Environment. A Threatened Flora Recovery Team, consisting of scientists, land managers and field naturalists will be established to oversee threatened flora recovery in Victoria in general. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist sub-committees on research, *in situ* management, community education and cultivation. Regional Recovery Teams will be responsible for preparing work plans and monitoring progress toward recovery.

Program Evaluation

The Recovery Team will be responsible for annual assessments of progress towards recovery. This Recovery Plan will be reviewed within five years of the date of its adoption.

Recovery actions and performance criteria

Action	Description	Performance Criteria
Specific objective 1		
Acquire accurate information for conservation status assessments		
1.1	Clarify the taxonomy of populations to enable an accurate conservation status assessment. **Responsibility: RBG, DSE**	• Updated records on all State databases (FIS, VrotPop, Biosites and Herbaria).
1.2	Acquire baseline population data by conducting detailed field and desk top surveys to satisfy IUCN Red List Criteria (2000) including (a) identification of the area and extent of populations; (b) estimates of the number, size and structure of populations and (c) inference or estimation of population change. **Responsibility: DSE**	• Determination or update of conservation status for inclusion on state and national threatened species lists. • Determine extent of populations at Bald Hills Rd, 'Grevillea Track' off Bambra Rd, and Breakfast Creek Rd sites. • Population along the Colac-Forest Rd, between Boundary Rd and Road Night Ck Rd clarified (population may be *Grevillea aquifolium* but has not flowered yet for identity to be confirmed).
Specific objective 2		
Identify habitat that is critical, common or potential		
2.1	Accurately survey known habitat and collect floristic and environmental information describing community ecology and condition. **Responsibility: DSE**	• Quantify essential life history stages, and conditions suitable for vegetative regeneration. • Determine and map Habitat critical to the survival of the species.
2.2	Identify and survey potential habitat, using ecological, historical and anecdotal information that may indicate habitat preference. **Responsibility: DSE**	• Sites of potential habitat identified and surveyed.

Action	Description	Performance Criteria
Specific objective 3 **Ensure that all populations and their habitat are legally protected**		
3.1	Protect sites on public land. **Responsibility: DSE**	• Develop roadside management plans for the Surf Coast Shire and include the Hammonds Rd site as high priority for conservation. • Re-assess permits to horse-riders who are currently allowed to ride close to the Gum Flats Rd site, and from Gum Flats Rd to Breakfast Creek Rd.
Specific objective 4 **Manage threats to populations**		
4.1	Identify disturbance regimes to maintain habitat. **Responsibility: DSE**	• Preparation of management prescriptions for ecological burning at the Breakfast Creek Rd site and other sites as appropriate. • Preparation of management prescriptions for slashing at Bald Hills Rd, Salt Creek Track, Breakfast Creek Rd, Gum Flat Rd, Tanners Rd and Tanners Rd/Dangers Lane.
4.2	Control threats from PC, pest plants, high visitor numbers and recreational vehicles, using methods such as preventing access, re-routing or ripping tracks, brush-matting, tree-planting, application of chemical controls, hand removal of weeds, fencing, signage and revegetation at sites. **Responsibility: PV, DSE**	• Measurable vegetative regeneration (recruitment of non-clonal individuals is unlikely) and a measurable reduction in plant mortality at Bald Hills Rd near Salt Creek Track, Salt Creek Track, Bambra Road / north of Loves Track, Grevillea Track off Bambra Road, Link Track between Loves Track and 'Grevillea Track', Breakfast Creek Road, Haggarts / Allardyce Tracks, Gum Flat Road, Tanners Road and Tanners Road / Dangers Lane sites. • Fence to exclude recreational access (including vehicles and horse riders) from Gum Flats Rd, and Breakfast Creek Rd sites.

Action	Description	Performance Criteria
Specific objective 5		
Identify key biological functions		
5.1	Determine stimuli for vegetative regeneration. **Responsibility: DSE**	• Increased shoot numbers. • Management strategies identified to maintain, enhance or restore regenerative processes fundamental to reproduction and survival.
Specific objective 6		
Determine the growth rates and viability of populations		
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**	• Techniques for monitoring developed and implemented.
6.2	Collate, analyse and report on census data and compare with management histories. **Responsibility: DSE**	• Growth rates determined and Population Viability Analysis completed for targeted populations.
Specific objective 7		
Build community support for conservation		
7.1	Identify opportunities for community involvement in the conservation of *Grevillea infecunda*. **Responsibility: DSE**	• Presentation(s) to community nature conservation groups. • Inform and educate roadworks maintenance contractors, particularly roadside managers that advise the grader, of *Grevillea infecunda* at roadside sites.

ABBREVIATIONS

DSE Department of Sustainability and Environment, Victoria
PV Parks Victoria
RBG Royal Botanic Gardens, Melbourne

Management Practices

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of *Grevillea infecunda*. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are primarily structured to (i) acquire baseline data, (ii) assess habitat condition including ecological and biological function, (iii) protect populations to maintain or improve population growth and (iv) to engage the community in recovery actions.

On-ground site management will aim to mitigate threatening processes and thereby ensure against extinction. Major threats requiring management include accidental destruction (by recreational users or road maintenance contractors), competition from pest plants, inappropriate fire regimes and *Phytophthora cinnamomi*. A range of strategies will be necessary to alleviate these threats including weed control, fire management, fencing, and control of pest animals. Continued, appropriate fencing around *Grevillea infecunda* populations within State Park should restrict access and prevent physical disturbance. Future actions, including appropriate signage near roadside populations, and education of roadworks contractors by PV and the Surf Coast Shire should facilitate conservation of roadside sites.

Broadscale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers including private landholders. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The recovery plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of the mechanisms underlying regeneration. Successful *in situ* population management will be founded on understanding the relationships between *Grevillea infecunda* and associated flora, and its response to environmental processes. These are directly linked to biological function and are thus vital to recovery. Demographic censusing will be necessary to gather life history information and to monitor the success of particular management actions. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

To reduce the likelihood of unforseen development activities negatively impacting upon *Grevillea infecunda*, the threatened flora team should seek relevant information on it's distribution, ecology and/or habitat to relevant land managers. Such increased awareness should allow new populations to be found if they exist, and improve the likelihood of adequate searches being made during environmental impact assessments.

Affected Interests

Actions associated with the recovery of *Grevillea infecunda* are unlikely to affect any existing industry or private party. Almost all populations fall under the jurisdiction of Parks Victoria, the Department of Sustainability and Environment and the Surf Coast Shire. Sites at Anglesea Heath are on crown land leased by Alcoa of Australia Ltd, and managed by Parks Victoria and Alcoa. The one known site within State Forest is managed by DSE. The above management agencies have been contacted and have approved the actions outlined in this Recovery Plan subject to availability of sufficient funding. The Surf Coast Shire currently incorporates a Vegetation Protection Overlay, and Sites of Environmental Significance Overlay into its planning scheme and intends to develop a Threatened Species Overlay in the near future (D. Groves pers. comm).

Role and interests of indigenous people

Indigenous communities on whose traditional lands *Grevillea infecunda* occurs will be advised, through the relevant DSE Regional Indigenous Facilitator, of the preparation of this Recovery Plan and invited to provide comments if so desired. Indigenous communities will be invited to be involved in the implementation of the Recovery Plan.

Benefits to other species/ecological communities

The recovery plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with *Grevillea infecunda*, particularly those species with similar life forms and/or flowering responses.

The recovery plan will also provide an important public education role as threatened flora have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Many sites occur on public land and any protection measures required (eg. fencing, signage, track closures) will have minimal impact on current recreational and commercial activities. Populations on private land or land managed by other authorities will be protected through negotiation with and assistance to land owners and managers.

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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	**Conservation status**									
1.1	Clarify taxonomy	3	100%	RBG, DSE	$0	$3,000	$0	$0	$0	**$3,000**
1.2	Collect baseline data	2	100%	DSE	$10,000	$0	$0	$0	$0	**$10,000**
2	**Habitat requirements**									
2.1	Survey known habitat	2	100%	DSE	$20,000	$0	$0	$0	$0	**$20,000**
2.2	Identify, survey potential habitat	2	75%	DSE	$20,000	$0	$0	$0	$0	**$20,000**
3	**Legal protection of habitat**									
3.1	Protect public land habitat	2	75%	DSE	$0	$10,000	$0	$0	$0	**$10,000**
4	**Manage threats**									
4.1	Identify disturbance regimes	2	75%	DSE	$0	$10,000	$10,000	$0	$0	**$20,000**
4.2	Control threats	1	50%	PV, DSE	$10,000	$8,000	$8,000	$4,000	$4,000	**$34,000**
5	**Identify key biol. functions**									
5.1	Stimuli for regeneration	1	75%	DSE	$0	$12,000	$12,000	$0	$0	**$24,000**
6	**Growth rates, pop. viability**									
6.1	Conduct censusing	2	100%	DSE	$15,000	$15,000	$15,000	$15,000	$15,000	**$75,000**
6.2	Collate, analyse and report	2	100%	DSE	$1,000	$1,000	$1,000	$1,000	$5,000	**$9,000**
7	**Education, communication**									
7.1	Community extension	1	100%	DSE	$6,000	$6,000	$6,000	$6,000	$6,000	**$30,000**
				TOTALS:	**$82,000**	**$65,000**	**$52,000**	**$26,000**	**$30,000**	**$255,000**