National Recovery Plan for the Thick-lip Spider-orchid *Caladenia tessellata*

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Australian Government

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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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Cover photograph: Thick-lip Spider-orchid *Caladenia tessellata* Grantville, Victoria © Gary Backhouse

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Summary

The Thick-lip Spider-orchid *Caladenia tessellata* is a small geophytic terrestrial orchid that is endemic to mainland south-eastern Australia, where it occurs in New South Wales and Victoria. About 19 populations are known, containing about 450 plants. The species has suffered a major decline in abundance throughout much of its range, largely due to loss of habitat. Major threats to remaining populations include disturbance to or destruction of plants and habitat, grazing and altered fire regimes. The Thick-lip spider Orchid is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is also listed as Threatened under the Victorian *Flora and Fauna Guarantee Act 1988*, and Endangered under the New South Wales *Threatened Species Conservation Act 1995*. This national Recovery Plan for *C. tessellata* is the first recovery plan for the species, and details its distribution, habitat, threats and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Thick-lip Spider-orchid *Caladenia tessellata* is a perennial terrestrial orchid emerging annually from an underground tuber. It has a single, sparsely hairy, linear-lanceolate leaf to 6 cm long. A slender, hairy, wiry flower stem to 30 cm tall bears one or two small (to 30 mm across) yellowish-green flowers with maroon stripes and suffusions. The perianth segments are up to 25 mm long, slender to broadly obovate, and tapering to short, fine points. The dorsal sepal is erect and incurved, the lateral sepals are deflexed and forward-pointing, and the petals are often strongly deflexed against the ovary. The labellum is broadly heart-shaped, the lateral lobes are thickened and obliquely erect and the margins entire (or occasionally with a few short teeth). The broad, central cluster of glossy purple to black, short, thick, clubbed calli are densely packed at the base, and often break up with 2 rows extending well onto the labellum mid-lobe. *Caladenia tessellata* is most similar to *Caladenia cardiochila* but can be distinguished by its usually smaller, duller flowers, often with more strongly deflexed perianth segments. In addition, the labellum generally has a broader, more open cluster of calli that sometimes breaks up towards the apex, with two rows extending onto the midlobe (description from Bernhardt 1993; Backhouse & Jeanes 1995; Bishop 1996; Jones 2006). The species is illustrated in Bishop (1996, plate 350) and Jeanes and Backhouse (2006, pg. 91).

Little is known about the biology and ecology of *C. tessellata*. The species is dormant during summer, and dormancy is broken in response to soaking rains in autumn, with leaf emergence in late autumn-early winter. The plants flower from late September to early November and the flowers remain open for a few days to a few weeks, depending on pollination and climatic conditions. Fruits usually take 5–8 weeks to mature following pollination, and plants reproduce solely from seed. The average longevity of *C. tessellata* plants is not known. *Caladenia tessellata* grows in a complex relationship with a mycorrhizal fungus that is necessary for seed germination, and provides some nutrients to the orchid. The type and degree of dependence upon the fungus, particularly of mature plants, are not known. Pollination is probably via sexual deception through the process of pseudocopulation (Peakall & Beattie 1996), with pollination by an undescribed black wasp of the genus *Phymatothyninus* observed at one site in New South Wales (GEC 2003). Response to fire is not well understood. Plants in several populations flower regularly in the absence of fire. In others, however, especially those growing in dense heath, flowering is much more sporadic and probably relies on periodic fire to remove surrounding vegetation and stimulate flowering.

Caladenia tessellata was described in 1876 from plants collected at Hunters Hill, near Sydney NSW. There is some uncertainty as to whether the Victorian populations are *C. tessellata* or an undescribed species, and also whether the East Gippsland populations are the same taxon as the South Gippsland populations (D.L. Jones CPBR pers. comm.). However, until these taxonomic questions are clarified, all populations in this Recovery Plan will be treated as *C. tessellata*. Clarification of the taxonomy of all populations currently attributed to *C. tessellata* is an action in this Recovery Plan.

Distribution

The Thick-lip Spider-orchid is endemic to mainland south-eastern Australia, where it is distributed from the central coast of New South Wales to the Westernport region of southern Victoria (Figure 1), in the South East Coastal Plain, South East Corner, and Sydney Basin bioregions (*sensu* DEH 2000). The species usually occurs on or near the coast, but in southern New South Wales, extends well inland to

Braidwood. Maps showing the distribution of *C. tessellata* are available from the Department of Environment, Climate Change and Water (NSW) and the Department of Sustainability and Environment (Vic).

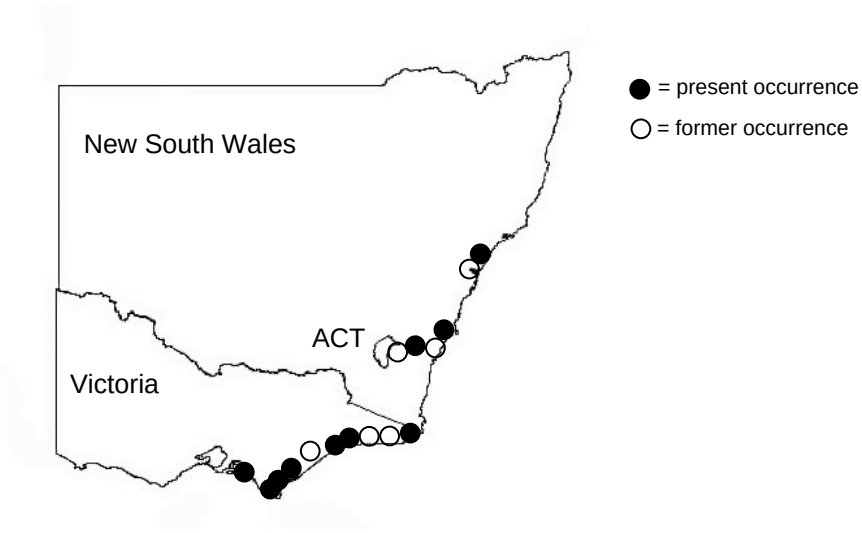

Figure 1. Current and former distribution of *Caladenia tessellata*

Population Information

The Thick-lip Spider-orchid is known from about 19 populations containing about 450 plants (Table 1).

Table 1. Population information for *Caladenia tessellata*

Location	Pop. size	Extent	Land Mgr	Comments
New South Wales				
Morton National Park	~60 plants	<10 ha	DECCW	
Munmorah State Recreation Area	~20 plants	<10 ha	DECCW	Plants reported as 'scattered; not seen since 1999'
Braidwood (private property)	~10 plants	<1 ha	private	
South Pacific Heathland Reserve	~10 plants	<1 ha	DoL	Plants not seen since 2001
Wyrrabalong National Park	<10 plants	<2 ha	DECCW	Plants not seen since 1997
Porter Creek Wetland Reserve	<10 plants	<2 ha	WSC	Plants not seen since 1999
Victoria				
Wilsons Promontory National Park	~100 plants	c. 50 ha	PV	At least 3 sub-pops; however, plants not seen at 2 sites for >10 years
Wonthaggi Heathlands Nature Conservation Reserve	~40 plants	c.25 ha	PV	
Colquhoun State Forest	<40 plants	c. 25 ha	DSE	Plants in 5 small, scattered groups
Won Wron State Forest	~30 plants	c. 20 ha	DSE	Plants in 3 small, scattered groups
Gurdies Nature Conservation Reserve	~30 plants	c. 20 ha	PV	Plants occur in 3 separate groups
Genoa	~25 plants	<1 ha	?	
Mallacoota	~20 plants	<5 ha	PV	
Ewing Morass Wildlife Reserve	<20 plants	<10 ha	PV	
Croajingalong National Park	~10 plants	c. 50 ha	PV	
Moormurng Flora and Fauna Reserve	<10 plants	<1 ha	PV	
Nooramunga Multipurpose Coastal Park	<10 plants	<1 ha	PV	
Yarram	<10 plants	<5 ha	?	
Tarwin Lower	1 plant	<1 ha	?	

Abbreviations: DECCW = Department of Environment,Climate Change and Water (NSW); DoL = Department of Lands (NSW); DSE = Department of Sustainability and Environment; PV = Parks Victoria

Six populations occur in New South Wales and 13 populations occur in Victoria. Data on population size are likely to be underestimates, as flowering rates at some sites, especially those in thick heath or heathy woodland, may be suppressed in the absence of recent fire.

Habitat

Little is known of the precise habitat requirements of *C. tessellata*. In New South Wales, the species is generally found in grassy dry sclerophyll woodland on clay loam or sandy soils, less commonly in heathland on sandy loam soils. The population at Braidwood occurs in dry, low *Eucalyptus mannifera*, *E. rossii* and *Allocasuarina* species woodland with a sparse understorey and stony soil. In Victoria, *C. tessellata* grows in heathland, heathy or grassy woodland, and grassy or sedgy open forests in well drained sand and clay loams. A proposed recovery action is to determine habitat that is critical to the survival of *C. tessellata.*

Decline and Threats

The Thick-lip Spider-orchid was once relatively common and widespread in coastal areas between Newcastle in New South Wales and Westernport in Victoria, but has suffered a substantial decline in overall abundance. There are herbarium records of *C. tessellata* from Sydney and suburbs (Como, Loftus, Penshurst, Berowra, Sutherland, Caringbah, Castlecrag), Royal National Park, Queanbeyan, Heathcote, Huskisson, Ulladulla, Jervis Bay, Wyong (NSW); and Howe Range, Cann River, Sale/Stratford, Mt. Raymond and Port Albert (Vic). However, plants have not been seen at most of these sites for a number of years and the local populations may be extinct. Destruction of habitat, largely for urban and industrial development, is undoubtedly the cause of this historic decline. Remaining populations of *C. tessellata* are generally small and highly fragmented. There is a high risk of local extinction due to a small population size at many sites, and the highly disjunct distribution of the species. It is possible that some ecological functions such as conditions for the maintenance of pollinator and fungal activity have been adversely affected at many sites. Remaining populations of *C. tessellata* are at risk from a variety of current and potential threats, including those below.

Disturbance/destruction

Disturbance to or destruction of plants and habitat is probably the major current risk faced by most populations. There is a potential for road/track maintenance activities and fire protection works to damage trackside plants at the Moormurng, Tarwin Lower, Wonthaggi Heathlands and Wilsons Promontory sites. The population at the South Pacific Heathland Reserve at Ulladulla (NSW) may have been destroyed by roadworks. Accidental trampling and site disturbance are problems at the Wilsons Promontory, Colquhoun, Moormurng and Won Wron sites, as plants occur close to vehicle and walking tracks. Accidental site disturbance caused by road maintenance activities is a threat at the Genoa site as some plants occur quite close to a gravel road. Disturbance caused by feral pigs is a potential problem at the Braidwood (private property) site. Trampling and site disturbance are serious problems at the Gurdies site. Most plants occur close to tracksides and are at risk from walkers and track maintenance/fire protection activities. Rubbish dumping is a potential threat at the Colquhoun SF site and Wonthaggi Heathlands NCR, which is utilised for recreational activities and therefore is at risk of accidental trampling by people, dogs, bicycles etc. Trampling by feral deer is also a risk for populations in South Gippsland.

Altered fire regimes

It is highly likely that some populations of *C. tessellata*, especially those growing in heath or heathy woodland, require periodic summer fire to reduce surrounding vegetation and stimulate flowering and seedling establishment. The prolonged absence of fire (or other biomass reduction process such as mowing) may be detrimental as it reduces flowering and thus the ability of the populations to sustain themselves, leading to local extinctions. The timing of fire is also important, with the best time for orchids being late summer or early autumn, after seed dispersal but prior to new shoot growth. Fuel reduction burning of forests in spring and late autumn is considered to be a threatening process for many orchid species.

Grazing/predation

Grazing by macropods is an existing or potential threat at almost all sites. Grazing by a range of introduced herbivores is also a problem at many sites: European Rabbit *Oryctolagus cuniculus* (Braidwood and Moormurng sites); Hog Deer *Axis porcinus* (Wilsons Promontory NP site); Fallow Deer *Dama dama* and Sambar Deer *Cervus unicolor* (Moormurng site). Consumption of orchid tubers by bandicoots has been observed at Munmorah, Wyrrabalong and Porter Creek Wetland sites.

Weed invasion

Weeds are generally not considered a serious problem at most sites, although Cluster Pine *Pinus pinaster* has invaded the Wonthaggi Heathlands site, and Bridal Creeper *Asparagus asparagoides* is established at the Moormurng site. Horses and vehicles have the potential to introduce weeds at the Moormurng FFR and Wonthaggi Heathlands NCR sites.

Recovery Information

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of the Thick-lip Spider-orchid in the wild and to increase the probability of populations becoming self-sustaining in the long term. Within the duration of this Recovery Plan, the specific objectives for the recovery of the Thick-lip Spider-orchid are to:

1. Determine taxonomy, distribution, abundance and population structure
2. Determine habitat requirements
3. Ensure that all populations and their habitat are protected and managed appropriately
4. Manage threats to populations
5. Identify key biological functions
6. Determine growth rates and viability of populations
7. Establish a population in cultivation
8. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for the Thick-lip Spider-orchid and will be implemented and managed by the Department of Sustainability and Environment (for Victoria) and Department of Environment, Climate Change and Water (for NSW), 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 the Thick-lip Spider-orchid. 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 area and extent of populations, the number, size and structure of populations, and inference or estimation of population change. **Responsibility: DSE, DECCW**	• All known population sites searched during flowering season. • Sites mapped for population size, condition and habitat.
1.2	Determine taxonomy of all populations attributed to *C. tessellata* through molecular and morphological studies. **Responsibility: DSE, DECCW, CPBR**	• Taxonomy of all populations clarified
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, DECCW**	• 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, DECCW**	• Survey potential habitat at five sites. • Predictive model for potential habitat developed & tested at two sites.

Specific Objective 3: Ensure that all populations and their habitat are protected and managed appropriately		
3.1	Protect populations on public land. **Responsibility: DSE**	• Public Authority Management Agreements under the *FFG Act 1988* for the Genoa, Mallacoota, Tarwin Lower and Yarram sites and Special Protection Zones for Colquhoun SF and Won Wron SF sites initiated.
3.2	Protect populations on private land. **Responsibility: DECCW**	• Private land management agreement at the Braidwood site initiated.
Specific Objective 4: Manage threats to populations		
4.1	Control threats from pest plants. **Responsibility: DSE, PV, DECCW**	• Reduction in cover of weeds at and near all sites.
4.2	Control threats from pest animals. **Responsibility: DSE, PV, DECCW**	• Reduction in damage by pest animals at and near all sites.
4.3	Control the threat of direct damage by human activities. **Responsibility: DSE, PV, DECCW**	• Impact of human activities at all sites monitored and reduced (e.g. by signage, fencing) if required.
4.4	Manage microhabitat for seedling recruitment, collect seed and restock populations with seed. **Responsibility: DSE, DECCW**	• Measurable increase in recruitment at three treated sites.
Specific Objective 5: Identify key biological functions		
5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels. **Responsibility: DSE, DECCW**	• Reproductive ecology and regenerative potential quantified for four representative sites. • Seed bank potential quantified for four representative sites.
5.2	Identify key stimuli for seed germination. **Responsibility: DSE, DECCW, RBG**	• Stimuli for recruitment identified. • Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival.
5.3	Identify optimal fire regimes to maintain habitat. **Responsibility: DSE, PV, DECCW**	• Preparation and implementation of management prescriptions for ecological burning undertaken at four sites.
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, DECCW**	• Techniques for monitoring developed and implemented. • Population growth rates determined and Population Viability Analysis completed for four populations.
Specific Objective 7: Establish a population in cultivation		
7.1	Establish plants in cultivation to provide a research population and potentially for reintroductions. **Responsibility: DSE, RBG, NOGN**	• Effective propagation and cultivation techniques developed. • At least 50 healthy, genetically diverse, mature plants in cultivation.
7.2	Establish a seed bank in storage and determine seed viability. **Responsibility: RBG**	• Seed from five populations in storage.
Specific Objective 8: Build community support for conservation		
8.1	Identify opportunities for community involvement in the conservation of the Thick-lip Spider-orchid. **Responsibility: DSE, PV, DECCW**	• Community nature conservation groups and Landcare groups aware of the species and support its conservation.

Abbreviations: CPBR – Centre for Plant Biodiversity Research Biology, Canberra; DECCW – Department of Environment, Climate Change and Water (NSW); DSE – Department of Sustainability and Environment (Victoria); NOGN – Native Orchid Growers Network; 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 *Caladenia tessellata* necessary for specific population management. 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 structured to acquire baseline data, assess habitat

condition, including ecological and biological function, and maintain or improve population growth through protection and management.

On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to mitigate these threats including weed control, caging / fencing, control of pest animals, and fire management. Broadscale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers and 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 seed bank dynamics and recruitment. Successful *in situ* population management will be founded on understanding the obligate relationships between *C. tessellata* and associated mycorrhizal fungi, as well as its response to environmental processes. These are directly linked to seed production, recruitment and regeneration 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. In addition to the above, *ex situ* conservation measures will be required and will include seed storage and plant cultivation. Cultivating *ex situ* populations will also aim to increase the amount of seed available for reintroduction to sites. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

Affected Interests

The Thick-lip Spider-orchid occurs on a variety of land tenures including parks, reserves, state forest, crown land, and on private property. Consequently, its management is the responsibility of the Department of Environment ,Climate Change and Water (NSW), Wyong Shire Council, the Department of Sustainability and Environment (Vic) and Parks Victoria. The recovery plan has the support of government agencies, statutory authorities and community groups involved in orchid conservation in Victoria and New South Wales (Department of Sustainability and Environment, Department of Environment ,Climate Change and Water, Parks Victoria, National Herbarium of Victoria, Royal Botanic Gardens Melbourne), who will assist in the management and monitoring of this species.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands the *C. tessellata* occurs are being 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.

Biodiversity Benefits

The recovery plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria and New South Wales. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data could also benefit a number of other plant species growing in association with *C. tessellata*, particularly those species with similar life forms and/or flowering responses. At Moormurng, *C. tessellata* occurs with the nationally threatened Dwarf Kerrawang *Rulingia prostrata*, while at Wonthaggi, *C. tessellata* grows with two other nationally threatened orchids, the Eastern Spider-orchid *Caladenia orientalis* and the Dense Leek-orchid *Prasophyllum spicatum*. Management activities to protect *C. tessellata* will also benefit these other threatened plants.

The recovery plan will also provide an important public education role as orchids have the potential to act as ‘flagship species’ for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasion and habitat degradation. Germination and cultivation techniques developed during the recovery phase will be of use for other threatened orchids elsewhere in southeast Australia while the requirement to recover species across state boundaries will better develop working relationships between state departments on a broader range of biodiversity conservation issues.

Social and Economic Impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Most populations occur on public land, either crown land reserved for various public purposes, or on road reserves managed by a variety of local and State government agencies. Any protection measures required at these sites (e.g. fencing, signage, track closures) will have minimal impact on current recreational and commercial activities. Protection of these populations has been negotiated with the relevant land manager. Protection of the few populations on private land or on land managed by other authorities will be achieved through voluntary agreements with landowners 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	**Distribution, abundance**									
1.1	Surveys	1	100%	DSE, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
1.2	Taxonomy	2	100%	DSE, DECCW, CPBR	$5,000	$5,000	$0	$0	$0	$10,000
2	**Habitat requirements**									
2.1	Known habitat	1	100%	DSE, DECCW	$15,000	$15,000	$0	$0	$0	$30,000
2.2	Potential habitat	2	75%	DSE, DECCW	$0	$0	$15,000	$15,000	$0	$30,000
3	**Habitat protection**									
3.1	Public land	1	100%	DSE	$5,000	$5,000	$0	$0	$0	$10,000
3.2	Private land	1	100%	DECCW	$5,000	$5,000	$0	$0	$0	$10,000
4	**Threat management**									
4.1	Pest plants	1	90%	DSE, PV, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
4.2	Pest animals	1	90%	DSE, PV, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
4.3	Human damage	1	90%	DSE, PV, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
4.4	Seedling recruitment	1	75%	DSE, DECCW	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
5	**Biological functions**									
5.1	Reproductive status	2	75%	DSE, PV, DECCW	$0	$5,000	$5,000	$5,000	$0	$15,000
5.2	Seed germination	2	100%	DSE, DECCW, RBG	$0	$0	$5,000	$5,000	$5,000	$15,000
5.3	Disturbance regimes	1	75%	DSE, PV, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
6	**Population viability**									
6.1	Censusing	1	100%	DSE, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
7	**Cultivation**									
7.1	Cultivated plants	2	75%	DSE, RBG, NOGN	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
7.2	Seed bank	2	100%	RBG	$0	$0	$2,000	$2,000	$2,000	$6,000
8	**Community support**									
8.1	Community extension	3	100%	DSE, PV, DECCW	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
				TOTALS	$117,000	$122,000	$114,000	$114,000	$94,000	$561,000