National Recovery Plan for the Tall Astelia *Astelia australiana*

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Australian Government

State Government Victoria
Department of Sustainability and Environment

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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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Cover photograph: Tall Astelia *Astelia australiana* by Seraphina Cutler

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Summary

The Tall Astelia (*Astelia australiana)* is a rare lily endemic to southern Victoria, where it grows in wet forests in the Central Highlands and Otways Range, Victoria. The species is known from 12 populations, 11 of which are in the Central Highlands and one in the Otway Range. Major threats to the species include wildfire, weed invasion, altered hydrology leading to drying of sites and disturbance/destruction of plants and habitat. The Tall Astelia is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act). This recovery plan for Tall Astelia is the first 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 Tall Astelia (*Astelia australiana)* (J.H. Willis) L.B. Moore, in the family Asteliaceae (formerly considered part of the family Liliaceae), is a robust perennial herb growing to about 1.8 m high. Tufts of leaves arise from a branching rhizome, the leaves are linear, 60–230 cm long and 4–15 cm wide, the lower surface with a dense silvery, silky covering of hairs. The inflorescence grows to 1.2 m high, with the tiny flowers borne on multiple racemes up to 20 cm long, each subtended by a leaf-like bract. Flowers are 12–18 mm wide and green to deep maroon. The species is gynodioecious, with flowering tufts producing either bisexual flowers or female flowers. Female flowers have rudimentary stamens and sometimes produce fruit without fertilisation. The berry is orange, globular, 6–10 mm long and bears up to 14 seeds. Flowering occurs from November to February (description from Walsh & Entwisle 1994).

Growth of Tall Astelia is slow, with plants taking at least 10 years to reach reproductive maturity (Woolfrey 1999), and may live for several decades (Turner & Sydes 1995). The incidence of flowering in Tall Astelia populations is extremely low (Turner & Sydes 1995; Turner *et al.* 1996; Woolfrey 1998), and there is no record of flowering in the Otways population (Steve McDougall DSE, pers. comm.). Actual sex ratios of plants in each population, details of sexual function of hermaphrodites and the levels of natural seed set between female and hermaphrodite plants are not known.

The pollinator of Tall Astelia is thought to be a small fly (Turner & Sydes 1995) but whether seed set occurs in the absence of pollination is unknown. Flowering tufts are frequently in close proximity and of the same type (either female or hermaphrodite), raising the possibility they are members of the same clone. Any cross-pollination between nearby flowering tufts may thus effectively be self-pollination. Self-incompatibility has not been demonstrated for Tall Astelia, but twisted pollen tubes and swollen tips have been noted in selfed and outcrossed pistils, suggesting that self-pollination may be less successful in fertilisation than out-crossed pollination (M. Sydes pers. comm. *in* James 1997).

Although fruit and seeds have been observed from several populations, there are few records of seedlings (Turner & Sydes 1995; Turner *et al*. 1996; Woolfrey 1998) and there is a lack of knowledge of germination requirements. Seeds are probably dispersed by birds and mammals (James & Ashburner 1997). Seed germination and early growth in cultivation has been achieved (Neville Walsh, Royal Botanic Gardens Melbourne, pers. comm.). However, cultivated plants have suffered crown rot when planted in the ground (Jeff Jeanes, Royal Botanic Gardens Melbourne, pers. comm.).

Distribution

The Tall Astelia is endemic to Victoria where it occurs in two widely-separated areas, one in the Central Highlands in the Powelltown–Beenak area, and the second near Lavers Hill in the Otway Range (Figure 1), in the South Eastern Highlands IBRA bioregion (*sensu* DEH 2000). Maps showing the distribution of Tall Astelia are available from the Department of Sustainability and Environment (DSE), Melbourne.

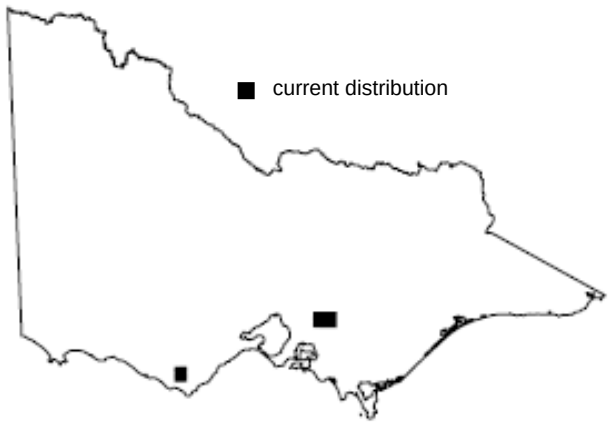

Figure 1 Distribution of *Astelia australiana*

Population Information

Tall Astelia is known from 12 populations within four major river catchments: La Trobe (Pioneer Creek Middle and West branches, Bjorksten and Woodall Creeks); Bunyip (Seven Acre, Walker, Worlley Creek and Tarago River); Yarra (Tomahawk, Egg Rock and McCrae Creeks) and Aire (Ciancio Creek) (Table 1). Populations tend to occur as groups of plants scattered along drainage lines. Floods may break up clumps of plants or dislodge plants that may re-establish further downstream if dislodged plants are washed onto suitable habitat (Turner *et al.* 1996).

The actual number of Tall Astelia plants is not known. The species can form dense groves or large colonies as a result of its rhizomatous habit, making it difficult to distinguish individual plants, as one plant may be represented by many tufts (Moorrees 1998). An expanse of plants may consist of a limited number of individual plants with many tufts, or many individual plants or both (Turner & Sydes 1995). The total number of individual Tall Astelia plants is therefore unknown, but probably small (fewer than 10,000 individuals).

Genetic analysis indicates that individual sites do contain a mixture of genotypes and that a considerable amount of genetic differentiation occurs among populations (James 1997; James & Ashburner 1997). This highlights the importance of all populations in conserving the genetic diversity of the species (James 1997; James & Ashburner 1997).

The complex of populations in the Central Highlands is of particular importance as they contain the largest concentration of Tall Astelia and most of the genetic diversity of the species (James 1997). The Otways colony is significant as it represents a geographically disjunct and genetically distinct population. Populations along the Egg Rock Creek are also of importance as they represent the occurrence of the species within a different habitat (Riparian Thicket).

Table 1 Population information for *Astelia australiana*

Location	Catchment	Size (no. tufts)	Extent	Mgr
Egg Rock Creek (Kirth Kiln State Park)	Yarra	48	<0.1 ha	PV
Tomahawk Creek (Kirth Kiln State Park)	Yarra	86	<0.1 ha	PV
McCrae Creek (Kirth Kiln State Park)	Yarra	extinct?	?	PV
Walker Creek (State Forest)	Bunyip	>1,000	~0.5 ha	DSE
Worlley Creek (State Forest)	Bunyip	51 – 250	~0.5 ha	DSE
Tarago River (State Forest)	Bunyip	>4,000	many small (<0.2 ha) patches	DSE
Seven Acre Creek (State Forest)	Bunyip	>1,000	~10 ha	DSE
Bjorksten Creek (State Forest)	La Trobe	>2,000	~25 ha	DSE
Woodall Creek (State Forest)	La Trobe	250–500	~1.5 ha	DSE
Pioneer Creek West Branch (State Forest)	La Trobe	>1,000	~1.5	DSE
Pioneer Creek Middle Branch (State Forest)	La Trobe	>1,000	~1 ha	DSE
Ciancio Creek (Great Otways National Park)	Aire	50–250	~0.3 ha	PV

Abbreviations: DSE = Dept Sustainability & Environment; PV = Parks Victoria

Habitat

Most populations of Tall Astelia occur in Cool Temperate Rainforest dominated by Myrtle Beech *(Nothofagus cunninghami)i*. The population at Egg Rock Creek (Yarra River catchment) occurs in Riparian Thicket dominated by Scented Paperbark *(Melaleuca squarrosa)* and Woolly tea-tree *(Leptospermum lanigerum)*. Most populations occur in gully heads and along stream margins on undulating upland plateaus, on moist soils. All sites are characterised by shaded, moist conditions and high humidity. Proposed recovery actions include the determination of habitat that is critical to survival of Tall Astelia.

Decline and Threats

The former distribution and abundance of Tall Astelia is not well known, but the species appears to have been restricted to wetter forest types in the Central Highlands and Otway Range. Tall Astelia may well have occurred elsewhere in the Otways, but the Beech Forest land system in which the only known population there occurs has been extensively cleared for agriculture (Pitt 1981). In the Central Highlands, Tall Astelia was formerly more widespread, but is believed to have declined as a result of successive forest fires (Willis 1970). In the Yarra catchment the species was reported to have been abundant, with records from the McCrae and Tomahawk Creeks (Willis 1939). All of the McCrae colonies and a number of the Tomahawk colonies have not been seen since the 1939 fires, and are presumed extinct. Current populations within the Yarra catchment are small, comprising seven patches along the Egg Rock and Tomahawk Creeks consisting of 141 tufts in total (Woolfrey 2000).

Tall Astelia has a very restricted distribution, sparse seed production, low level of seedling recruitment and a possibly low number of extant genetic individuals, all of which render the species susceptible to decline and extinction though stochastic events. The geographically disjunct Otways populations and the more isolated of the Central Highlands populations (e.g. Tomahawk and Egg Rocks) are likely to be at high risk. Its long lifespan may exacerbate the detrimental effects of genetic drift, in-breeding depression or loss of particular adaptive allele combinations resulting from recent losses of individuals (e.g. due to clearing or fire over the past century, James 1997). There is also significantly reduced seed set in plants from the Kirth Kiln populations relative to that observed at other sites (Turner *et al*. 1996), which may be a consequence of the low genetic diversity found at the sites and their relative geographical isolation (e.g. James 1997).

A variety of current and potential threats exist at the known populations of Tall Astelia (DSE 2003), including:

Fire
Tall Astelia and its Cool Temperate Rainforest habitat are believed to be highly vulnerable to fire (Willis 1970; Pritchard 1997), and fire is probably the single greatest threat to the survival of the species. Loss of habitat through fire or other major disturbance is highly likely to lead to loss of colonies (Yugovic & Moorrees 1992). The species' distribution has already been reduced by successive forest fires (Willis 1970) and populations within Riparian Thicket habitat (in Kirth Kiln State Park) may be especially vulnerable to this threat (Woolfrey 2000). The proximity of regrowth forest to Tall Astelia populations occurring in Cool Temperate Rainforest may affect the chances of the species remaining unburnt during wildfires, with areas of rainforest surrounded by immature regrowth forest more likely to burn than those surrounded by mature forest (DSE 2003).

Weed invasion/competition
Invasion by environmental weeds, especially Blackberry (*Rubus fruticosus*) is considered a current threat for some populations (Turner & Sydes 1995; Woolfrey 2000), especially where gaps in the canopy and disturbance of soil allow establishment of weed species.

Disturbance/destruction of plants and habitat
Disturbance to and destruction of plants and habitat are ongoing actual and potential threats. Several populations occur in State Forest used for timber production, and timber harvesting and associated road construction activities have the potential to affect Tall Astelia and its habitat. This threat has largely been addressed through forest zoning and management prescriptions (DSE 2003), with Special Protection Zones and buffers variously established around populations, habitat and in surrounding catchments.

Trampling resulting from monitoring activity or frequent visitation may pose a threat to individuals and populations via direct damage to plants, particularly in dense populations (Turner *et al.* 1996), and, due to the highly erodible nature of the gully habitat of Tall Astelia, trampling may also have unforseen consequences through disturbance to the root zone (Woolfrey 2000). Trampling damage was observed at the Otways site in 1998 (Woolfrey 1998). Road maintenance may impact on populations,

through direct physical damage, altered water regimes and increased exotics. Road widening activities may have caused damage to the Woodall Creek headwaters population, with trees pushed over within 10 m of the population. The Woodall creek roadside population also appears to have been impacted as a direct consequence of road widening activities, with the number of tufts possibly reduced from 11 to one. The site is severely degraded.

There is also a potentially high threat of physical damage from feral animals, especially Sambar which are common in the Central Highlands. Grazing of Tall Astelia has been observed from the Woodall Creek roadside, Middle Pioneer and Middle branch populations (Turner & Sydes 1995), although the actual risk of damage is not currently known. Fire suppression operations may also threaten populations, through construction of containment lines through or near populations, and the use of fire retardant.

Altered hydrology (including that brought about by climate change)
Alterations to the natural flow regimes of rivers and streams along which Tall Astelia occurs is a potential threatening process in catchments subject to logging activity, including those logged within the past 40 years. Climate change has the potential to significantly impact on Tall Astelia and its habitat through reduced rainfall and increasing temperatures drying habitat. Reduced stream flows in regrowth ash forest may also affect Tall Astelia populations and its habitat, with long-term reductions (>40 years) in stream flows associated with regrowth ash forest (DSE 2003).

Disease
The disease Myrtle Wilt caused by the pathogenic fungus *Chalara australis* has the potential to cause significant changes to the floristic composition and environmental conditions of the Cool Temperate Rainforest habitat of Tall Astelia. Pure and mature stands of *Nothofagus cunninghamii* are considered at higher risk of infection, while young stands, and those occurring in association with Southern Sassafras (*Atherosperma moschatum*) and Blackwood (*Acacia melanoxylon)* are considered less at risk (Cameron & Turner 1996). An infection of these trees by Myrtle Wilt within Cool Temperate Rainforest habitat would open up the canopy, altering environmental conditions and potentially promoting competition (DSE 2003). Myrtle Wilt occurs in both the Otways and Central Highlands but currently not in the immediate vicinity of Tall Astelia populations.

The pathogenic fungal disease *Pythium* species has also been detected in some Tall Astelia populations. These may live as facultative parasites with the potential to cause softening of the tissue of plants, resulting in death, especially of seedlings, which could be a reason for the general lack of recruitment observed in Tall Astelia. A possible relationship between *Pythium* and the high proportion of dead and missing plants from the small and very small classes of Tall Astelia may warrant further investigation (Turner *et al*. 1996). The exact relationship with *Astelia* is not known but the potential risk is deemed high.

Phytophthora cinnamomi (Cinnamon Fungus) has also been detected at several Tall Astelia sites (Turner *et al*. 1996). However no conclusive pathogenic relationship has been established between Cinnamon Fungus and Tall Astelia. Although frequently present at sites where Tall Astelia occurs, it is generally assumed that the moist habitats in which Tall Astelia grows are unsuitable to produce disease in susceptible species. Alterations to climate and/or hydrology of habitat that leads to drying out may cause *P. cinnamomi* infection to become a problem.

Recovery Information

Current Conservation Measures

A number of measures have been undertaken for the conservation of Tall Astelia, including:

- Periodic surveys since the 1970s to determine distribution and abundance, monitoring since 1993 and collection of biological and ecological data (Turner & Sydes 1995; Turner *et al*. 1996; Moorrees 1998; Woolfrey 1998, 1999, 2000).
- Protection of populations in State Forest through the establishment of Special Protection Zones in the headwaters of Seven Acre Creek, Tomahawk Creek, Bjorkstens Creek and Tarago River coupled with 100 m buffers around populations and 40 m stream buffers upstream of populations. Where the vegetation is Cool Temperate Rainforest, wider buffers (40 m from the rainforest edge) apply. A 100 m buffer applies around areas of Cool Temperate Rainforest or Riparian Thicket supporting Tall Astelia within the Central Highlands, with a 40 m buffer upstream of colonies and a 40 m buffer on isolated plants growing on road batters (DSE 2003).
- Incorporation of the Otway population in the Great Otway National Park and the Egg Rock and Tomahawk Creek populations in the Kirth Kiln State Park.

- Genetic analysis of population diversity (James 1997; James & Ashburner 1997).
- Collection of 300 seeds from the Central Highlands populations and storage at the Royal Botanic Gardens, Melbourne, as a part of the Victorian Conservation Seed bank project (Jeff Jeanes RBG, pers. comm.).

Recovery Objectives

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

1. Improve knowledge of distribution, abundance and population structure
2. Improve knowledge of habitat requirements
3. Ensure that all populations and their habitat are protected and managed appropriately
4. Identify and manage threats to populations
5. Identify key biological functions important to conservation management
6. Determine growth rates and viability of populations
7. Maintain and expand the seed bank
8. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for the Tall Astelia and will be implemented and managed by the Department of Sustainability and Environment, 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. 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: Improve knowledge of distribution, abundance and population structure		
1.1	Undertake surveys to determine area & extent of populations, number, size & structure of populations, and inference or estimation of population change. **Responsibility: DSE, PV**	• Population sites mapped for population size, condition and habitat at all sites.
Specific Objective 2: Improve knowledge of habitat requirements		
2.1	Survey known habitat & collect floristic & environmental information relevant to community ecology and condition. **Responsibility: DSE, PV**	• Habitat critical to survival mapped for all populations.
2.2	Identify & survey potential habitat, using ecological & bioclimatic information that indicate habitat preference. **Responsibility: DSE**	• Potential habitat at 5 new sites surveyed. • Predictive model for potential habitat developed & tested at 5 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**	• All sites in State Forest managed according to Code of Forest Practice and management shown to be effective. • Individual threats in national and state parks addressed through actions under Specific Objective 4 below.
Specific Objective 4: Identify and manage threats to populations		
4.1	Control threats from pest plants with priority sites including Pioneer, Woodall, McCrae Ck and Otways. **Responsibility: DSE, PV**	• Reduction in cover of weeds at priority sites.
4.2	Restrict physical site disturbance caused by human activities. **Responsibility: DSE, PV**	• No physical damage to Tall Astelia individuals or populations from human activity. • Access to population location information restricted.
4.3	Assess risk of altered hydrology to populations. **Responsibility: DSE, PV**	• Hydrological impact assessed and management prescriptions revised where necessary.
4.4	Assess risk of fire to populations. **Responsibility: DSE, PV**	• Fire risk assessed and management planning revised where necessary
4.5	Assess risk of disease spread & impact on habitat of *A. australiana*. **Responsibility: DSE, PV**	• Risk of *Pythium* sp. and *P. cinnamomi* evaluated.
4.6	Monitor and address impact of grazing/disturbance by feral animals (particularly deer). **Responsibility: DSE, PV**	• Impact of grazing/disturbance by feral animals monitored and control measures implemented if required.
Specific Objective 5: Identify key biological functions important to conservation management		
5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity & recruitment levels. **Responsibility: DSE, RBG**	• Reproductive ecology and regenerative potential quantified for 5 representative sites. • Seed bank potential quantified for 5 sites.
5.2	Identify key stimuli for seed germination requirements. **Responsibility: DSE, RBG**	• Stimuli for recruitment identified.
Specific Objective 6: Determine the growth rates and viability of populations		
6.1	Measure population trends & responses against recovery actions by collecting information on recruitment, mortality, timing of life history stages & morphological data. **Responsibility: DSE**	• Techniques for monitoring developed and implemented. • Population growth rates determined and Population Viability Analysis completed for 5 populations.
Specific Objective 7: Maintain and expand the seed bank		
7.1	Expand the seed bank and determine seed viability. **Responsibility: RBG**	• Seed from 5 populations (incl. Otway R) in storage. • Viability trials carried out.

Specific Objective 8: Build community support for conservation		
8.1	Identify opportunities for community involvement in the conservation of *A. australiana*. **Responsibility: DSE, PV**	• Community nature conservation groups, Landcare groups and conservation management networks aware of the species and support its conservation.

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 *Astelia australiana* 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.

High quality habitat is essential for Tall Astelia (James 1997). Thus any activities that may alter habitat need to be controlled. Alterations to microclimate, catchment hydrology or sediment loads (e.g. resulting from fire, climate change, logging activities, road maintenance) may have adverse effects on the species as the majority of Tall Astelia populations occur along stream lines and gully heads. 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, wildfire and grazing by pest animals. A range of strategies will be necessary to mitigate these threats including weed control and control of visitor impacts. Broadscale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers. In addition, searches of known and potential habitat and collation of existing data 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 recruitment and regeneration. Successful *in situ* population management will be founded on understanding the response of Tall Astelia to environmental processes. These are directly linked to seed production, recruitment and regeneration and are thus vital to recovery. Ongoing demographic censusing will be necessary to monitor the success of particular management actions. In addition to the above, *ex situ* conservation measures will be required and will include long-term seed collection and storage.

Affected Interests

All populations of Tall Astelia occur on Crown Land, either national park, state park or state forests. Consequently their management is variously the responsibility of DSE and Parks Victoria.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands *A. australiana* 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.

Biodiversity Benefits

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. Tall Astelia is known primarily from areas of Cool Temperate Rainforest, a listed threatened ecological community under the FFG Act. The establishment of one Special Protection Zone for Tall Astelia also protects the habitat of Leadbeater's Possum, listed as Endangered under the EPBC Act.

Social and Economic Impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. All populations of Tall Astelia occur on Crown Land, some of which already has conservation of biodiversity as a management priority. Other populations occur in state forest used for timber production, and protection will be achieved through mechanisms that will have minimal impact on timber production.

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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, PV	$10,000	$10,000	$10,000	$8,000	$8,000	$46,000
2	**Habitat requirements**									
2.1	Known habitat	1	100%	DSE, PV	$0	$10,000	$10,000	$0	$0	$20,000
2.2	Potential habitat	2	75%	DSE	$0	$0	$10,000	$10,000	$0	$20,000
3	**Habitat protection**									
3.1	Public land	1	100%	DSE	$3,000	$3,000	$0	$0	$0	$6,000
4	**Threat management**									
4.1	Pest plants	1	75%	DSE, PV	$15,000	$15,000	$10,000	$10,000	$10,000	$60,000
4.2	Human disturbance	2	75%	DSE, PV	$5,000	$5,000	$0	$0	$0	$10,000
4.3	Altered hydrology	1	75%	DSE, PV	$15,000	$15,000	$10,000	$10,000	$10,000	$60,000
4.4	Fire risk	1	75%	DSE, PV	$0	$0	$10,000	$10,000	$10,000	$30,000
4.5	Myrtle Wilt	1	50%	DSE, PV	$15,000	$15,000	$10,000	$10,000	$10,000	$60,000
4.6	Grazing	2	50%	DSE, PV	$0	$0	$5,000	$10,000	$15,000	$30,000
5	**Biological functions**									
5.1	Reproductive status	2	75%	DSE, RBG	$0	$10,000	$10,000	$10,000	$5,000	$35,000
5.2	Seed germination	2	75%	DSE, RBG	$0	$0	$0	$10,000	$5,000	$15,000
6	**Population viability**									
6.1	Censusing	1	100%	DSE	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000
7	**Cultivation**									
7.1	Seed bank	3	75%	RBG	$0	$0	$5,000	$2,000	$2,000	$9,000
8	**Community support**									
8.1	Community extension	3	50%	DSE, PV	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
				TOTALS	$80,000	$100,000	$107,000	$107,000	$92,000	$486,000