National Recovery Plan for the Basalt Peppercress *Lepidium hyssopifolium*

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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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Contents

Summary

The Basalt Peppercress *Lepidium hyssopifolium* is a small perennial herb endemic to south-eastern Australia, where it occurs in New South Wales, Victoria and Tasmania. There is little information on the previous distribution and abundance of the species, but its decline almost certainly relates to the widespread degradation and loss of grassland and grassy woodland habitats in south-eastern Australia. The Basalt Peppercress is currently known from about 35 populations containing about 1,700 plants. Current threats include grazing, competition and weed invasion, and habitat disturbance and destruction. The species is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. This national Recovery Plan for the Basalt Peppercress 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 Basalt Peppercress *Lepidium hyssopifolium* Desvaux is an erect, many-branched perennial herb growing to 1 m in height and belonging to the Family Brassicaceae. Basal leaves are toothed or pinnately lobed, with hairy, serrated margins. Stem leaves are linear-lanceolate, toothed or entire with hairy serrated margins, 1–4 cm long and 1–3 mm wide. The stems and stem leaves are covered with fine, short, erect hairs. Leaves have an ear-like lobe or appendage at their base. The inflorescence is borne on an elongated raceme, the flowers are tiny, greenish and inconspicuous, the sepals 0.8 mm long and petals reduced or absent. A distinguishing feature is the presence of two stamens. Silicula are elliptic to ovate, 3–5 mm long and 2–3 mm wide. Fruit are sometimes hairy with narrow wings and are borne on hairy, terete pedicels 3–5 mm long. The spreading fruit stalks are slightly curved, circular in cross section and covered with short hairs (description from Cropper 1993; Entwisle 1996). The Basalt Peppercress is a prolific seed producer and seed can remain viable in the soil for at least two years (possibly substantially longer), although the large seed size means dispersal away from the parent plant is limited (Cropper 1987, 1993). The species requires disturbance for seed germination and seedling recruitment (Cropper 1993).

Taxonomy

Prior to a review in 1982, the name *Lepidium hyssopifolium* was misapplied to three separate species: *Lepidium africanum* (an introduced weed species), *Lepidium pseudohyssopifolium* and *Lepidium pseudotasmanicum*. *Lepidium hyssopifolium* can be distinguished from similar native and introduced species by the presence of two stamens, some auriculate leaves, a lack of lobed or dissected upper stem leaves, and minute, soft, erect hairs on pedicels, fruits and stems. *Lepidium hyssopifolium* contains several segregates that are recognised but not described. The species is in the process of being redefined, and is likely to be split into several taxa (N. Scarlett pers. comm.1999). Until official determinations, classifications and identification keys have been prepared, all populations currently known as *L. hyssopifolium* are included here.

Distribution

The Basalt Peppercress is endemic to south-eastern Australia, where it is widely but patchily distributed from south-eastern New South Wales through Victoria to eastern Tasmania (Figure 1). In New South Wales the species is currently known from near Bathurst and Bungendore, in the South Eastern Highlands IBRA bioregion (*sensu* DEH 2000), and there is an old record from near Armidale in the New England Tablelands bioregion. In Victoria, the species occurs mostly west of Melbourne, in the Victorian Midlands and Victorian Volcanic Plain bioregions. In Tasmania, it is confined to the east of the State, in the Tasmanian South East, Tasmanian Northern Midlands, Ben Lomond and Flinders bioregions, and formerly occurred in the Freycinet and Tasmanian Midlands bioregions. Maps showing the distribution of the Basalt Peppercress are available from each State nature conservation agency.

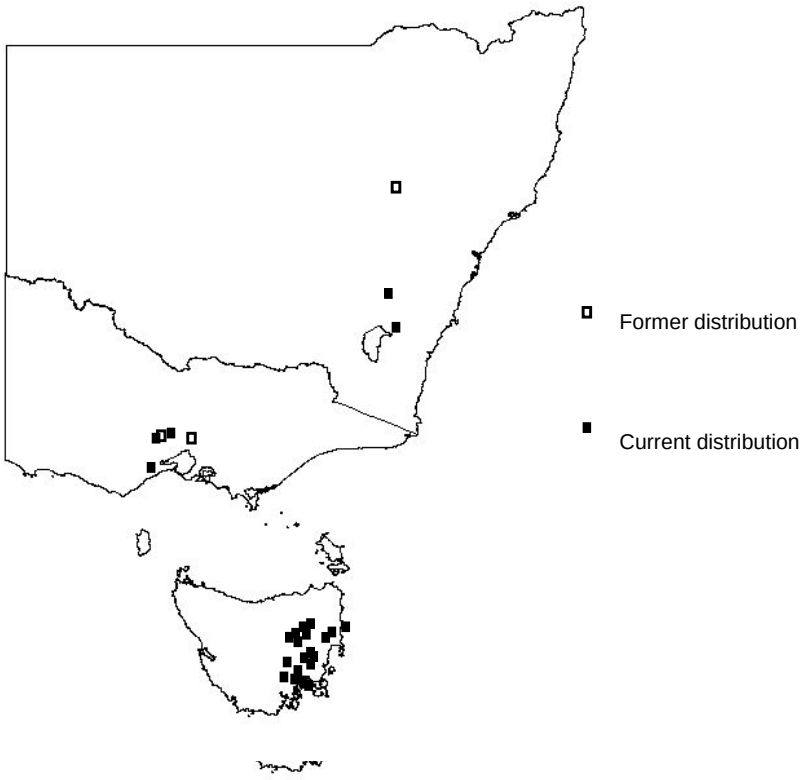

Figure 1. Former and current distribution of Basalt Peppercress

Population Information

The Basalt Peppercress is currently known from about 35 populations containing about 1,700 plants (Table 1), most of which occur in Tasmania. There are three populations containing about 40 plants in New South Wales and seven populations containing about 500 plants in Victoria. There are about 27 populations in Tasmania containing about 1,200 plants, distributed across the east of the State. The largest populations are at Tunbridge (~500 plants), Wyldes Plain (~200 plants) and Oatlands (~130 plants), while most other sites have fewer than 40 plants (DPIWE 2003). Adequate site information for most of the Tasmanian populations was unavailable and hence determination of the most important populations in Tasmania will be actioned through this Recovery Plan.

Habitat

The original habitat in which the Basalt Peppercress occurred is not precisely known, but was probably eucalypt and/or *Allocasuarina* woodland with a grassy understorey, and native temperate grasslands (Leigh *et al*. 1984). Almost all remaining populations of Basalt Peppercress occur in heavily modified, non-natural environments, usually amongst exotic pasture grasses and weed species, sometimes with an overstorey of introduced tree species. Soils are light to heavy, often friable, clay loams. Most sites are on roadsides, on fringes of developed agricultural land or occur in small reserves within an agricultural landscape. The population at Tunbridge (TAS) occurs at a site with reasonable native vegetation cover, in this case *Eucalyptus amygdalina* and *Acacia mearnsii* woodland (Kirkpatrick & Gilfedder 1998), while the Gib TSR site (NSW), despite a long history of periodic disturbance, still has a floristically diverse native grassland.

Microsite conditions appear to be important for the establishment and persistence of Basalt Peppercress. Plants appear to establish on relatively open bare ground where there is limited competition from other plants (both native and introduced species), rather than in areas with

thick ground cover. At several sites, plants have established under the canopy of introduced tree species such as Monterey Cypress (*Cupressus macrocarpus)* and Radiata Pine (*Pinus radiate)*. In this situation plants are usually small and spindly due to decreased light and moisture under the heavy canopy, but are apparently able to persist due to lack of competition from other shade-intolerant forbs and grasses (Nick Jaschenko DSE, pers. comm.). At the private land site in Bungendore (NSW), several plants emerged in a newly established garden bed in 2004, and the population has since increased to about 30 plants (R. Rehwinkel pers. comm.).

Open grassy sites without tree cover also support Basalt Peppercress if other ground layer species are not dominant (Kirkpatrick & Gilfedder 1998; Cropper 1987). Some disturbance of the soil also provides suitable habitat for colonisation and establishment, especially where open areas exists and competition from other plants (both native species and weeds) is light. Plants opportunistically colonise disturbed ground (Cropper 1993). The plant tolerates a range of environmental conditions, as all but one existing site is highly degraded and modified. Establishment and survival may be disturbance-driven rather than habitat specific. Disturbance of soil stored seed may be required for seed germination, in combination with open bare ground and suitable soil moisture conditions for the survival of seedlings.

Table 1. Population and threat information for the Basalt Peppercress

Location/Site	Pop size (yr)	Manager	Threats (High Medium Low)	Comments
New South Wales				
Bathurst	14 plants (2004) 3 plants (2008)	private land	• weed invasion (H) • eucalypt dieback (H) • grazing-domestic stock (L) • dryland salinity (?)	site fenced to exclude stock, although pasture grass esp. *Phalaris* & weed growth threaten plants
Bungendore (Gib TSR)	5 plants (2008)	Livestock Health & Pest Authority	• grazing-domestic stock (H)	plants on Gib Travelling Stock Route
Bungendore	30 plants (2008)	private land	• disturbance/destruction (H)	plants in a garden bed; seed likely to have been in soil for at least several years
Victoria				
Moorabool Resevoir, Bolwarrah	~220 plants (2000)	Central Highlands Water, DSE	• weed invasion (M) • grazing-rabbits (L)	most important site in Victoria; adult plants robust, fecund & producing seed; site actively managed for species
Bolwarrah Flora Reserve, Bolwarrah	~180 plants (2000)	Parks Victoria	• weed invasion (H) • grazing-kangaroos, rabbits (M)	
roadside, Lagoon Road, Trentham	50 plants (1995)	Shire of Hepburn	• soil slippage, erosion (M) • weed invasion (L)	plants occur on a steep road cutting
roadside, Spargo Creek Road	~375 plants (1986) 63 plants (2000)	Shire of Moorabool, DSE	• weed invasion (H)	
roadside and private property, Bolwarrah	'few' plants (2003)	Shire of Moorabool, private	threats not determined	size & current status unknown
private property, Bolwarrah	'few' plants (2003)	private	threats not determined	size & current status unknown
river bank, Winchelsea	1 plant (2003)	?	threats not determined	
Tasmania				
private land Tunbridge	~500 plants (2003)	private	threats not determined	
private land & roadside, Conara (Wyldes Plain)	200+ plants (2003)	private?	threats not determined	
reserve, Oatlands	~130 plants (2003)	?	threats not determined	

Decline and Threats

The decline of the Basalt Peppercress has not been well documented, but it almost certainly relates to the widespread degradation and loss of grassland and grassy woodland in south-

eastern Australia. Temperate grasslands are among the most threatened plant communities in Australia (Barker 1999), so habitat critical to survival has been greatly reduced in extent and quality. The species no longer occurs at eight sites from which it was recorded in Tasmania (DPIWE 2003), at least four sites in Victoria, and one site in NSW (which has resulted in a substantial range contraction south; see Figure 1). However, the species may occur at other locations, as there has been some confusion in identification, and it may be overlooked by its 'weedy' appearance, especially as it is similar to the introduced weed species *Lepidium africanum*. Seed may also remain viable in the ground for some years and germinate when the soil has been disturbed, as evidenced at the Bungendore private land site.

Remaining populations are generally small, containing fewer than 40 individuals, and occur in tenuous situations in highly modified landscapes. The majority of remnant sites are on roadsides, or small flora and nature reserves within developed agricultural land, or on fringes of developed agricultural land. The Basalt Peppercress produces large seeds that lack any apparent long-distance dispersal mechanism, so recruitment is likely to be close (within a few metres) to a parent plant. The geographic spread of populations may be expected to be slow and natural introduction of seed to new sites is unlikely. While some populations are likely to have large soil seed stores that could replenish populations under suitable recruitment conditions, in Tasmania *in situ* germination was not commonly observed and seedling mortality rates were high (Kirkpatrick & Gilfedder 1998). The recent decline and loss of the species from several sites suggests that it is vulnerable to local extinction, especially from inappropriate roadside management and lack of active site management.

The Basalt Peppercress appears to require areas of relatively fertile bare ground along with exclusion from stock grazing, but this combination of site conditions is scarce across the known geographic range. As a result *L. hyssopifolium* is seriously threatened (Kirkpatrick & Gilfedder 1998; Cropper, 1987, 1993). Persistent grazing by sheep and cattle (with no rest period) is detrimental to the survival of this species, as new recruits cannot establish. Whilst resprouting from basal stock is a survival strategy, plants can not flower and produce seed if plants are continually grazed. Where growth suppression zones beneath introduced conifers extend from a non-grazed road reserve to a grazed, but unploughed sheep or cattle paddock, *L. hyssopifolium* was found in the road reserve and not in the paddock. This may be explained either by the effect of stock camping beneath trees or by grazing. The exclusion of stock is required for the perpetuation of this species at known sites. Roadsides provide opportunities for this if actively managed, as do city parks, cemeteries and grassy woodland remnants managed for conservation (Kirkpatrick & Gilfedder 1995).

Conservation of the Basalt Peppercress faces some unique challenges, as there are apparently elements of this altered landscape that have enabled the species to survive (albeit in a precarious fashion) in these landscapes. The species tolerates a range of environmental conditions, as all but one existing site is highly degraded and modified. Survival appears to be disturbance-driven rather than habitat specific. Populations fluctuate in response to disturbance, and successful recruitment of soil stored seed is critical for population maintenance and growth. Therefore its survival relies on active habitat manipulation. Fencing sites alone may not be sufficient if this allows growth of other forbes and grasses that may outcompete the Basalt Peppercress. If weeds are suppressed and ground cover vegetation is patchy, with areas of bare ground maintained, plants are often large, robust and produce prolific seed (Tumino, pers. obs.). Raking or soil scraping in targeted areas may stimulate germination. A lack of native species at several sites would also allow for soil scraping without detriment to the existing vegetation community. Periodic disturbance of targeted areas on a seasonal or annual rotational basis may best provide suitable habitat conditions for the persistence of populations.

Current major threats to populations are discussed below:

<u>Competition/weed invasion</u>
Weed invasion is a major threat at most sites, especially as all populations are in an agricultural landscape dominated by exotic flora. At some sites, the shade and nutrient requirements of overstorey trees helps to reduce competition, including weeds, enabling the Basalt Peppercress to persist. However, should these trees senesce or die, or be removed, weed establishment and other competition is highly likely to threaten the populations. Increased weed competition at some sites (e.g. Bathurst) is also occurring where stock grazing has been removed (R. Armstrong pers. comm.).

Grazing and trampling

Most of the native grassy woodland habitat is highly disturbed as a result of intensified agriculture, including grazing by sheep and cattle and the introduction of pasture grasses (Kirkpatrick & Gilfedder 1998). Plants on roadsides and reserves may be at risk from grazing by rabbits and perhaps native macropods. Remaining populations on private land are probably at most risk from stock grazing. The Bathurst site in NSW has been fenced to exclude stock, although will now require active management to prevent the plants being swamped by the dense growth of pasture grasses.

Loss of overstorey trees

The Basalt Peppercress appears to be at least partially shade-tolerant, and many remaining plants occur under the canopy cover of standing trees, including introduced tree species. This creates a potential problem, as biodiversity conservation principles would usually advise that the exotic species be removed and replaced with indigenous species. Monterey Cypress is not self-perpetuating and the senescence and death of individuals also poses a threat. However the loss (including deliberate removal) of the overstorey trees will threaten *L. hyssopifolium*, as dense swards of exotic grasses and herbs will replace bare zones and provide above ground competition. If existing trees are removed the only likely way to maintain *L. hyssopifolium* is to mechanically disturb the soil to stimulate seedling germination and then manage competition recruitment. Appropriate trees such as *Allocasuarina littoralis*, *Acacia melanoxylon* or *Eucalyptus* spp. need to be established alongside the Monterey Cypress to provide future habitat. Eucalypt dieback (possibly due to dryland salinity) is a potential threat to the population in New South Wales.

Habitat disturbance/destruction

While the Basalt Peppercress requires some disturbance for seed germination and recruitment, populations on private land and on roadsides are at risk from inappropriate land management, such as intensive grazing, changing from grazing to cropping and road works and maintenance activities.

Erosion

Soil slippage and water erosion pose a threat at the Trentham roadside site (N. Jaschenko, DSE pers. comm.)

Recovery Information

Existing Conservation Measures

A number of conservation measures for the protection of the Basalt Peppercress have been initiated. Populations at Bathurst (NSW) and Moorabool Reservoir (Vic) have been fenced to exclude domestic stock and rabbits. Soil scraping and seed dispersal are being trialed at the Bathurst site to increase germination (R. Armstrong pers. comm.). Survey, monitoring and pest plant control has been undertaken at the Bolworrrah and Moorabool sites (Vic). Twenty plants reintroduced site in Moorabool Reservoir, where tube stock have been planted amongst native trees. The work at Moorabool has been assisted by volunteers who have contributed to weed control, seed collection and plant propagation. Seed from the Bungendore private land population has been collected and stored at the NSW herbarium (R. Rehwinkel pers. comm.).

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of the Basalt Peppercress 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 Basalt Peppercress are to:

1. Determine distribution, abundance and population structure
2. Determine habitat requirements
3. Determine and manage threats to populations
4. Protect habitat on private and public land
5. Identify key biological and ecological functions
6. Determine growth rates and viability of populations

7. Establish a population in cultivation
8. Establish new populations in the wild
9. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for *L. hyssopifolium* and will be managed by the Department of Primary Industries and Water (for Tasmania), the Department of Sustainability and Environment (for Victoria) and the Department of Environment, Climate Change and Water (for NSW), who will maintain liaison with each other over implementation. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialists on research, *in situ* management, community education and cultivation. 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: Determine distribution, abundance and population structure		
1.1	Clarify taxonomic issues within the taxon. **Responsibility: LTU, RBG**	• Determination of taxonomic status of species, and assignment to all populations.
1.2	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, DPIPWE, DECCW**	• 15 sites mapped for population size, condition and habitat.
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, DPIPWE, DECCW**	• Species/habitat specific survey design prepared. • Habitat critical to survival mapped for five extant populations.
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference. **Responsibility: DSE, DPIPWE, DECCW**	• Predictive model for potential habitat developed & tested at five sites.
Specific Objective 3: Determine and manage threats to populations		
3.1	Control threats from pest plants. **Responsibility: PV, DSE, DECCW, DPIPWE**	• Reduction in cover of weeds at ten sites.
3.2	Control threats from grazing animals. **Responsibility: PV, DSE, DECCW, DPIPWE**	• Exclusion of stock grazing from five sites. • Effective rabbit control at five sites.
3.3	Control the threat of direct damage by human activities. **Responsibility: PV, DSE, DECCW, DPIPWE**	• Five at-risk populations fenced and/or signposted.
3.4	Plan and manage tree cover replacement at key sites. **Responsibility: DSE**	• Active tree cover replacement programs undertaken at two sites.
3.5	Determine reasons for eucalypt dieback. **Responsibility: DECCW**	• Improved health of eucalypts.
Specific Objective 4: Protect habitat on private and public land		
4.1	Protect populations on public land. **Responsibility: DSE, DPIPWE, DECCW**	• Public Authority Management Agreements or similar in place for five populations on public land. • Actions to protect species incorporated in relevant reserve management plans.
4.2	Protect populations on private land. **Responsibility: DSE, DPIPWE, DECCW**	• Voluntary agreements in place for five populations on private land.

Specific Objective 5: Identify key biological and ecological functions		
5.1	Identify disturbance regimes required to facilitate recruitment and establishment. **Responsibility: DSE, DPIPWE, DECCW**	• Preparation and implementation of management prescriptions for disturbance at five sites.
5.2	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels. **Responsibility: DSE, DPIPWE, DECCW**	• Reproductive ecology and regenerative potential quantified for four representative sites. • Seed bank potential quantified for five representative sites.
5.3	Identify key stimuli for seed germination requirements. **Responsibility: DSE, DPIPWE, DECCW**	• Stimuli for recruitment identified. • Management strategies identified to maintain, enhance or restore 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, DPIPWE, DECCW**	• Techniques for monitoring developed and implemented. • Population growth rates determined and Population Viability Analysis completed for all 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: RBG, DSE**	• Effective propagation and cultivation techniques developed. • At least 200 mature plants in cultivation.
7.2	Establish a seed bank and determine seed viability. **Responsibility: RBG, DECCW**	• Seed from all extant populations in storage.
Specific Objective 8: Establish new populations in the wild		
8.1	Identify potential sites and select site(s) for translocation. **Responsibility: DSE, DECCW**	• Criteria for site suitability identified and two suitable sites selected.
8.2	Prepare site(s) and introduce plants. **Responsibility: DSE, DECCW**	• Reintroduction plan prepared with agreement from all stakeholders. • Plants established at new sites.
8.3	Maintain site and monitor translocated plants. **Responsibility: DSE, DECCW**	• Minimum 50% survival of reintroduced plants after two years.
Specific Objective 9: Build community support for conservation		
9.1	Identify opportunities for community involvement in the conservation of the Basalt Peppercress. **Responsibility: DSE, PV, DPIPWE, DECCW**	Community nature conservation , Landcare groups, land owners and managers aware of the species and support its conservation.

Abbreviations: DECCW – Department of Environment, Climate Change and Water (NSW); DPIPWE – Department of Primary Industries and Water (Tas); DSE – Department of Sustainability and Environment (Vic); LTU – La Trobe University, Melbourne; PV – Parks Victoria; RBG – Royal Botanic Gardens, Melbourne

Biodiversity Benefits

The Recovery Plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria and Tasmania. Principally, this will be through the protection and management of native grassland habitat where appropriate.

Management Practices

Management practices required to conserve the Basalt Peppercress include:

- Surveys and publicity to locate new populations, especially in Victoria and New South Wales.
- Weed and grazing control.
- Research into the ecology and management of the species and its habitat, especially in fire and other disturbance regimes required to maintain populations.

Affected Interests

Several government departments and agencies have an interest in the conservation of the Basalt Peppercress, including the Department of Environment, Climate Change and Water (NSW), the Department of Primary Industries and Water (Tas), Department of Infrastructure and Energy (for Tasmanian roadside populations), Department of Sustainability and Environment (Victoria), Parks Victoria and Central Highlands Water. Others with an interest include various local councils, shires and private landholders who manage important populations of *L. hyssopifolium*. State Government managers have been contacted and have approved the actions outlined in this recovery plan, subject to availability of sufficient funding.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands the Basalt Peppercress occurs are being advised, through the relevant regional indigenous facilitators in each State, of the preparation of this Recovery Plan and invited to be involved in the implementation of the plan.

Social and Economic Impacts

The implementation of this Recovery Plan is unlikely to cause significant adverse social and economic impacts. Several sites occur on public land. Sites on private land will be protected through voluntary agreement with the property owner/manager, and where possible will use incentives available through regional natural resource management programs to assist conservation programs.

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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	Taxonomy	1	100%	LTU, RBG	$2,000	$8,000	$0	$0	$0	$10,000
1.2	Surveys	1	100%	DSE, DPIPWE, DECCW	$10,000	$10,000	$10,000	$0	$0	$30,000
2	**Habitat requirements**									
2.1	Known habitat	1	100%	DSE, DPIPWE, DECCW	$15,000	$15,000	$15,000	$0	$0	$45,000
2.2	Potential habitat	1	75%	DSE, DPIPWE, DECCW	$0	$10,000	$10,000	$15,000	$0	$35,000
3	**Threat management**									
3.1	Pest plants	1	75%	PV, DSE, DPIPWE, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
3.2	Grazing animals	1	75%	PV, DSE, DPIPWE, DECCW	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
3.3	Human damage	1	100%	PV, DSE, DPIPWE, DECCW	$2,000	$2,000	$2,000	$0	$0	$6,000
3.4	Tree cover	1	75%	DSE	$0	$8,000	$8,000	$10,000	$10,000	$36,000
3.5	Eucalypt dieback	2	50%	DECCW	$5,000	$5,000	$5,000	$0	$0	$15,000
4	**Habitat protection**									
4.1	Public land	1	75%	DSE, DPIPWE	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
4.2	Private land	1	50%	DSE, DPIPWE, DECCW	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
5	**Biology, ecology**									
5.1	Disturbance regimes	1	75%	DSE, DPIPWE, DECCW	$0	$25,000	$25,000	$25,000	$10,000	$85,000
5.2	Reproductive status	2	75%	DSE, DPIPWE, DECCW	$0	$0	$5,000	$5,000	$5,000	$15,000
5.3	Seed germination	2	75%	DSE, DPIPWE, DECCW	$0	$0	$5,000	$5,000	$5,000	$15,000
6	**Growth rates pop viability**									
6.1	Population censusing	2	100%	DSE, DPIPWE, DECCW	$10,000	$10,000	$5,000	$5,000	$5,000	$35,000
7	**Cultivation**									
7.1	Cultivated plants	3	50%	RBG, DSE	$0	$0	$12,000	$15,000	$10,000	$20,000
7.2	Seed bank	3	50%	RBG	$0	$0	$2,000	$2,000	$2,000	$4,000
8	**Translocation**									
8.1	Site selection	3	50%	DSE	$0	$0	$7,000	$7,000	$0	$14,000
8.2	Site prep., introduction	3	50%	DSE	$0	$0	$0	$15,000	$15,000	$30,000
8.3	Maintenance, monitoring	3	50%	DSE	$0	$0	$0	$0	$10,000	$10,000
9	**Community support**									
9.1	Community extension	3	100%	DSE, PV, DPIPWE	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
				TOTALS	**$81,000**	**$130,000**	**$148,000**	**$141,000**	**$109,000**	**$590,000**