Department of
Sustainability and
Environment

National Recovery Plan for the Thick Eyebright *Euphrasia crassiuscula* subspecies *glandulifera*

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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 Thick Eyebright *Euphrasia crassiuscula* subspecies *glandulifera* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. The Thick Eyebright is endemic to the Victorian Alps, where about 1,300 plants occur in just three populations in 1998. Main threats to populations include grazing, accidental damage through trampling and climate change. This national Recovery Plan for the Thick Eyebright 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 Thick Eyebright *Euphrasia crassiuscula* subspecies *glandulifera* is a perennial, semiparasitic herb, to 20 cm (rarely 30 cm) tall with many crowded ascending branches rising from a reduced stem. Glandular hairs are short to long, and sparse to dense on lowest leaves and parts of the branches. Leaves are opposite, ovate or elliptic, to about 13 x 8 mm, with margins bearing 1-3 pairs of teeth. Flowers appear in summer and are pale to deep lilac or purple, rarely white. The flowers bear anthers with connectives surrounded by long, usually dense hairs. Fruit is an ovoid capsule slightly compressed laterally, to about 8.5 mm long and 3.2 mm broad (Barker 1982; Walsh & Entwisle 1999).

Three subspecies of *Euphrasia crassiuscula* have been described by Barker (1982); subsp. *crassiuscula*, subsp. *glandulifera*, and subsp. *eglandulosa*. All three subspecies are confined to mountain areas in the Victorian Alps (Barker 1982). They are distinguished from other Australian species of *Euphrasia* in having a conspicuous dense long woolly fringe of eglandular hairs, which often lines the leaves, bracts and calyces (Barker 1982). *Euphrasia crassiuscula* subsp. *glandulifera* differs from *Euphrasia crassiuscula* subsp. *eglandulosa* in having dense hairs on the back of the anthers (Barker 1982). *Euphrasia crassiuscula* subsp. *glandulifera* and *Euphrasia crassiuscula* subsp. *crassiuscula* both have anther backs densely hairy. However, while *Euphrasia crassiuscula* subsp. *crassiuscula* does not have glandular hairs, except on the corolla, *Euphrasia crassiuscula* subsp. *glandulifera* has glandular hairs present on axes and leaves of lower parts, sometimes extending to upper leaves (Barker 1982).

Distribution

Euphrasia crassiuscula subsp. *glandulifera* is endemic to Victoria, where it occurs at three sites in the north-east near Mt Bogong and Mt Nelse, at about 1800–1950 m altitude (Walsh & Entwisle 1999), in the Australian Alps IBRA Bioregion (DEH 2000).

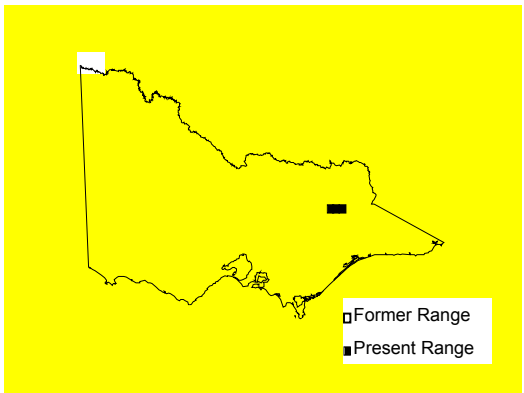

Figure 1. Distribution of *Euphrasia crassiuscula* subsp. *glandulifera* in Victoria

Maps showing the detailed distribution of the Thick Eyebright 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

Three populations of Thick Eyebright, containing about 1,300 plants, occur in the following locations within the Alpine National Park:

- Quartz Ridge, west side of foot track from Bogong Creek Saddle to Mt Bogong: about 150 plants in 0.5 ha.
- Hooker Plateau, Mt Bogong, both sides of walking track between Hooker Plateau and Mt Bogong central: about 450 plants in 9 ha.
- Mt Nelse, Bogong High Plains: about 700 plants in 3 ha.

At least three further populations are described by Barker (1983), but have not been recently confirmed and population sizes at those sites are unknown.

Habitat

The Thick Eyebright occurs in low open to closed alpine heath. Associated species include *Asterolasia trymalioides*, *Aciphylla glacialis*, *Celmisia pugioniformis*, *Craspedia aurantia*, *Craspedia maxgrayi*, *Grevillea australis*, *Kunzea muelleri*, *Leucopogon montanus*, *Orites lancifolia* and *Poa hiemata*. Plants occurred in shallow alpine loams derived from sedimentary substrate, on gentle to steep (c. 10–40^{o}) slopes, on eastern aspects at all three sites. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Threats

There is little information on the past distribution of the Thick Eyebright, so it is not possible to determine if the species has suffered any decline in range. Two of these populations were significantly affected by those fires and it is not yet known if and how they will recover. The extensive wildfires in early 2003 burnt over two populations and caused an apparent loss of about 50% of individuals within these populations (N. Walsh, pers. obs.), although the long term response of these populations is not known. Threats are generally rated as low, with populations most at risk from inadvertent damage, as plants are easily damaged by human trampling or herbivore grazing. Given the extremely limited distribution and very low numbers of plants, the risk from stochastic events is probably high. Climate change represents a substantial future threat. The main threats are summarised as follows:

Trampling: Two populations are located close to walking tracks and some plants are at risk from trampling.

Grazing: Populations may have been at risk from cattle grazing, although this has now been stopped within the Alpine National Park.

Climate change and drought: Increased temperatures and decreased rainfall expected with global warming may lead to long-term drying of sites, threatening this and many other alpine species. Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases is listed as a Key Threatening Process under the EPBC Act. The effects of climate change potentially threaten all sites.

Altered fire regimes: The effects of fire on high altitude *Euphrasia* species is not known, although some lowland *Euphrasia* species may need fire for seed germination or maintenance of open habitat.

Recovery Information

Overall Objective

The **overall objective** of recovery is to minimise the probability of extinction of *Euphrasia crassiuscula* subsp. *glandulifera* 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 *Euphrasia crassiuscula* subsp. *glandulifera* are to:

- Acquire accurate information for conservation status assessments.
- Identify habitat that is critical, common or potential.
- Manage threats to populations.
- Identify key biological functions
- Determine the growth rates and viability of populations.
- Establish populations in cultivation.
- 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 adoption.

Recovery Actions and Performance Criteria

Action	Description	Performance Criteria
Specific objective 1		
Acquire accurate information for conservation status assessments		
1.1	Acquire baseline population data by conducting detailed field and desk top surveys including (a) identification of the area and extent of populations; (b) estimates of the number, size and structure of populations and (c) estimation of population change. **Responsibility: DSE**	• Determination or update of conservation status for inclusion on state and national threatened species lists. • Target populations accurately mapped.
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**	• Requirements for completion of essential life history stages, recruitment and dispersal identified at known sites. • Habitat critical to the survival of the species is mapped.
2.2	Identify and survey potential habitat, using ecological and bioclimatic information. **Responsibility: DSE**	• Predictive model for potential habitat developed and tested.
Specific objective 3		
Manage threats to populations		
3.1	Identify disturbance regimes to maintain habitat. **Responsibility: DSE**	• Assess the impact of 2003 wildfires on all 3 known populations • Determine impact of slashing on track-side populations.
3.2	Control weeds. **Responsibility: PV**	• Reduce or eliminate potentially threatening weed invasion.
Specific objective 4		
Identify key biological functions		
4.1	Evaluate current reproductive/regenerative status, seed bank status and longevity, fecundity and recruitment levels. **Responsibility: DSE**	• Seed bank/regenerative potential quantified for target populations.
4.2	Determine seed germination requirements by conducting laboratory and field trials aimed to determine key stimuli. **Responsibility: DSE**	• Stimuli for recruitment/regeneration identified. • Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival.

Action	Description	Performance Criteria
Specific objective 5		
Determine the growth rates and viability of populations		
5.1	Measure population trends and responses against recovery actions by collecting information including recruitment, mortality, life history stages and morphological data. **Responsibility: DSE**	• Techniques for monitoring developed and implemented. • Census data for target populations.
5.2	Collate, analyse and report on census data and compare with management histories. **Responsibility: DSE**	• Population growth rates determined and Population Viability Analysis completed for target populations.
Specific objective 6		
Establish populations in cultivation		
6.1	Attempt to establish cultivated plants *ex situ* for inclusion in living collections to safeguard against any unforeseen destruction of wild populations. **Responsibility: DSE, RBG**	• Development of effective propagation and cultivation techniques. • At least 30 mature plants in cultivation.
6.2	Establish a seed bank and determine seed viability. **Responsibility: DSE**	• Long-term storage facility identified. • Seed from important populations in storage.
Specific objective 7		
Build community support for conservation		
7.1	Identify opportunities for community involvement in the conservation of the Thick Eyebright. **Responsibility: DSE**	• Presentation(s) to community nature conservation groups.

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 *Euphrasia crassiuscula* subsp. *glandulifera*. 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, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to alleviate these threats including fire management, fencing, and control of pest animals.

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 recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between *Euphrasia crassiuscula* subsp. *glandulifera* 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.

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

All known populations of *Euphrasia crassiuscula* subsp. *glandulifera* occur on land managed by Parks Victoria, who have approved the actions outlined in this Recovery Plan subject to the availability of sufficient funding.

Role and interests of indigenous people

Indigenous communities on whose traditional lands *E. crassiuscula* subsp. *glandulifera* 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 *Euphrasia crassiuscula* subsp. *glandulifera*, 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. All populations occur within the Alpine National Park, which includes biodiversity conservation as a high priority in management. Any protection measures for populations (such as fencing or signposting) will have negligible impact on current commercial and recreational activities.

Acknowledgments

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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**									
1.2	Collect baseline data	1	100%	DSE	$6,000	$0	$0	$0	$0	**$6,000**
2	**Habitat requirements**									
2.1	Survey known habitat	1	100%	DSE	$10,000	$0	$0	$0	$0	**$10,000**
2.2	Identify, survey potential habitat	1	75%	DSE	$10,000	$0	$0	$0	$0	**$10,000**
3	**Manage threats**									
3.1	Identify disturbance regimes	2	75%	DSE	$0	$15,000	$0	$0	$0	**$15,000**
3.2	**Control weeds**	2	100%	PV	$0	$10,000	$10,000	$6,000	$6,000	**$32,000**
4	**Identify key biol. functions**									
4.1	Evaluate reproductive status	2	75%	DSE	$0	$0	$10,000	$10,000	$0	**$20,000**
4.2	Seed germination	2	75%	DSE	$0	$0	$10,000	$10,000	$0	**$20,000**
5	**Growth rates, pop. viability**									
5.1	Conduct censusing	2	100%	DSE	$6,000	$6,000	$6,000	$6,000	$6,000	**$30,000**
5.2	Collate, analyse and report	2	100%	DSE	$4,000	$4,000	$4,000	$4,000	$10,000	**$26,000**
6	**Establish pops. in cultivation**									
6.1	Establish cultivated plants	3	50%	DSE, RBG	$0	$6,000	$6,000	$6,000	$6,000	**$24,000**
6.2	Establish a seed bank	2	50%	DSE	$0	$4,000	$4,000	$4,000	$4,000	**$16,000**
7	**Education, communication**									
7.1	Community extension	3	100%	DSE	$6,000	$6,000	$6,000	$6,000	$6,000	$30,000
				TOTALS	**$42,000**	**$51,000**	**$56,000**	**$82,000**	**$38,000**	**$239,000**