National Recovery Plan for the Bogong Eyebright *Euphrasia eichleri*

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Table of Contents

Summary	3
Species Information	3
Description	3
Distribution	3
Population Information	3
Habitat	4
Threats	4
Recovery Information	5
Overall Objective	5
Recovery Actions and Performance Criteria	6
Management Practices	9
Affected interests	9
Role and interests of indigenous people	9
Benefits to other species/ecological communities	9
Social and economic impacts	10
Acknowledgments	10
Bibliography	10
Priority, Feasibility and Estimated Costs of Recovery Actions	11

Figures

Figure 1. Distribution of Euphrasia eichleri in Victoria
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Summary

The Bogong Eyebright *Euphrasia eichleri* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. The species is endemic to the Victorian Alps, where about 1,100 plants were found in seven populations in 1998, although more recent surveys have failed to find any plants at the sites. Main threats to populations include grazing, accidental damage through trampling and climate change. This national Recovery Plan for *Euphrasia eichleri* 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 Bogong Eyebright *Euphrasia eichleri* is a perennial, semiparasitic herb growing to about 15cm tall. Dense glandular hairs are present on branches, leaves, rachis, bracts and calyces. Leaves are broadly oblong or wedge-shaped, to about 16 mm x 7 mm, the margins exhibiting several pairs of long, narrow teeth. Flowers appear in summer and are tubular, to 15 mm wide, white or very pale purple with 3–5 fine purple stripes and yellow markings on lower lobes. Fruit is an ovoid capsule that is densely bristly in apical parts (description from Barker 1982; Walsh & Entwisle 1999). There have been no specific biological or ecological studies of *Euphrasia eichleri*. The abundance of flowering plants may vary greatly between years.

Distribution

The Bogong Eyebright *Euphrasia eichleri* is endemic to the alps of eastern Victoria, where it is restricted to alpine and subalpine vegetation between the Bogong High Plains and Mt Bogong, and on the Dargo High Plains, from 1,600–1,860 m altitude (Walsh & Entwisle 1999), in the Australian Alps IBRA Bioregion (DEH 2000).



Figure 1. Distribution of Euphrasia eichleri in Victoria

Maps showing the detailed distribution of *E. eichleri* 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

In 1998, about 1,100 plants in seven populations were found, at the following locations within the Alpine National Park:

- Cope Creek: 272 plants
- Cope Saddle Rd: 114 plants

- Mt Nelse North Nelse Saddle: 151 plants
- Mt Nelse South: 80 plants
- Upper Watchbed Creek: 29 plants
- Watchbed Creek: 467 plants
- Whiterock Creek: 21 plants

Searches by N. Walsh in 2002 at all seven sites found no plants. Abundance prior to 1998 is not known.

Habitat

Euphrasia eichleri occurs in low open heath, grassland and *Sphagnum* bogs (Walsh & Entwisle 1999). Associated species include *Asperula gunnii*, *Asterolasia trymalioides*, *Carex breviculmis*, *Celmisia asteliifolia* spp. agg., *Deyeuxia brachyathera*, *Empodisma minus*, *Kunzea ericoides*, *Leptorhynchos squamatus*, *Leucopogon montanus*, *Luzula modesta*, *Oreomyrrhis eriopoda*, *Pentachondra pumila*, *Pimelea alpina*, *Poa costiniana*, *Poa hiemata*, *Podolepis robusta*, *Ranunculus victoriensis and Trachymene humilis*. *Euphrasia eichleri* has also been recorded from low open shrubland dominated by *Orites lancifolia* (Barker 1982). 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 no information on the distribution or abundance of *Euphrasia eichleri* prior to 1998, it is not possible to determine if the species has suffered any decline in range and/or abundance. The failure to find any plants at all seven sites in 2002 is cause for concern, but may not mean that the species has disappeared from these sites. Abundance may vary greatly from year to year, probably depending upon environmental factors such as fire and rainfall, so the species may possibly still exist in the soil seed bank. 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:

Grazing: DSE records indicate that cattle grazing has had major impacts on the Cope Creek and Cope Saddle Rd populations in the past, although cattle grazing 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 eichleri* 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 eichleri* are to:

- Acquire accurate information for conservation status assessments.
- Identify habitat that is critical, common or potential.
- Identify key biological functions
- Determine the growth rates and viability of populations.
- Manage threats to 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	Clarify taxonomy to enable an accurate conservation status assessment.	Updated records on all State databases.					
	Responsibility: RBG						
1.2	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.	• Determination or update of conservation status for inclusion on state and national threatened species lists.					
	Responsibility: DSE	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 relevant to community ecology and condition.	 Requirements for completion of essential life history stages, recruitment and dispersal identified at known sites. 					
	Responsibility: DSE	Habitat critical to the survival of the species is mapped.					
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference.	• Predictive model for potential habitat developed and tested.					
	Responsibility: DSE						
Specific	objective 3						
Identify	key biological functions						
3.1	Evaluate current reproductive/regenerative status, seed bank status and longevity, fecundity and recruitment levels.	 Seed bank/regenerative potential quantified for target populations. 					
	Responsibility: DSE						
3.2	Determine seed germination requirements by conducting laboratory and field trials aimed to identify key stimuli.	Stimuli for recruitment identified.					
	Responsibility: DSE	 invariagement strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival. 					

Action	Description	Performance Criteria				
Specific objective 4						
Determi	ne the growth rates and viability of populations					
4.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data.	Techniques for monitoring developed and implemented.Census data for target populations.				
	Responsibility: DSE					
4.2	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 5					
Manage	threats to populations					
5.1	Identify disturbance regimes to maintain habitat. Responsibility: DSE	 Assessment of ecological impacts of 2003 fires at Cope Creek Cope Saddle Rd, Mt Nelse North – Nelse Saddle, Mt Nelse South, Upper Watchbed Creek, Watchbed Creek, and Whiteroc Creek sites. 				
		 Preparation of management prescriptions for ecological burning (or protection from burning) at Cope Creek Cope Saddle Rd, Mt Nelse North – Nelse Saddle, Mt Nelse South, Upper Watchbed Creek, Watchbed Creek, and Whiterock Creek sites. 				
5.2	Control threats from high visitor numbers, and grazing, by re-routing tracks, fencing sites, caging plants and installation of appropriate signage.	Measurable seedling recruitment/vegetative regeneration and measurable reduction in plant mortality at Cope Creek Cope				
	Responsibility: PV	Saddle Rd, Mt Nelse North – Nelse Saddle, Mt Nelse South, Upper Watchbed Creek, Watchbed Creek, and Whiterock Creek sites. Note that <i>Euphrasia eichleri</i> may be 'naturally rare' and control of threats may not necessarily result in an increase in population sizes or recruitment.				
		Fencing erected at sites where licensed grazing occurs.				

Action	Description	Performance Criteria					
Specifie	Specific objective 6						
Establis	sh populations in cultivation						
6.1	Establish cultivated plants <i>ex situ</i> for inclusion in living collections to safeguard against any unforeseen destruction of wild populations.	•	Development of effective propagation and cultivation techniques.				
	Responsibility: RBG/DSE	•					
6.2	Establish a seed bank and determine seed viability.	•	Long-term storage facility identified.				
	Responsibility: DSE	•	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 E. eichleri.	•	Presentation(s) to community nature conservation groups.				
	Responsibility: DSE						
Abbrevia	ations						

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 eichleri*. 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 (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, competition from pest plants, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to alleviate these threats including weed control, 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 eichleri* 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

Populations of *Euphrasia eichleri* occur on land managed by Parks Victoria, who have approved the actions outlined in this Recovery Plan.

Role and interests of indigenous people

Indigenous communities on whose traditional lands *E. eichleri* 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 eichleri*, 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 national parks which include 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.

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Priority, Feasibility and Estimated Costs of Recovery Actions

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Conservation status									
1.1	Clarify taxonomy		100%	RBG	\$4,000	\$0	\$0	\$0	\$0	\$4,000
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	Identify key biol. functions									
3.1	Evaluate reproductive status	2	75%	DSE	\$0	\$0	\$10,000	\$10,000	\$0	\$20,000
3.2	Seed germination	2	75%	DSE	\$0	\$0	\$10,000	\$10,000	\$0	\$20,000
4	Growth rates, pop. viability									
4.1	Conduct censusing	2	100%	DSE	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$30,000
4.2	Collate, analyse and report	2	100%	DSE	\$4,000	\$4,000	\$4,000	\$4,000	\$10,000	\$26,000
5	Manage threats		_							
5.1	Identify disturbance regimes	2	75%	DSE	\$0	\$15,000	\$0	\$0	\$0	\$15,000
5.2	Control threats	3	75%	PV	\$0	\$6,000	\$6,000	\$6,000	\$6,000	\$24,000
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	\$46,000	\$47,000	\$52,000	\$52,000	\$38,000	\$235,000