

Action Statement

Flora and Fauna Guarantee Act 1998

No. 225

Purple Eyebright

Euphrasia collina subsp. *muelleri*

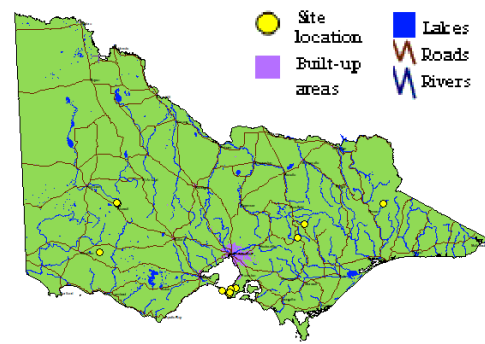
This Action Statement is based on a draft Recovery Plan prepared for this species by DSE under contract to the Australian Government Department of the Environment, Water, Heritage and the Arts.

Description

Purple Eyebright (*Euphrasia collina* subsp. *muelleri*) is a semi-parasitic, short-lived, perennial herb, 90–410 mm high, which branches at, or slightly above, ground level. The upper leaves are generally 5.9–14 mm in length, with up to four pairs of teeth; the leaf bases are cuneate. The flowers are lilac, pink or white, occasionally with a yellow spot behind the lower lobe. The five petals are fused for the greater part of their length. Short erect hairs occur over the external surface of the calyx and sometimes the corolla. The anthers are 1.4–1.9 mm long and the seeds are 0.8–1.35 mm in length. Flowering occurs from July to November (Barker 1999; Walsh and Entwisle 1996).

Distribution

Purple Eyebright was once widespread across south east Australia, but is now believed to be endemic to Victoria. From the small amount of historical data available, it is assumed that the subspecies once ranged from northern NSW through Victoria to the southern parts of the Flinders Ranges in South Australia. Its geographic range has retracted substantially to approximately ten sites on the Mornington Peninsula, Jamieson, Little River and Benambra on the Gippsland Plain (three of these populations may be extinct and require further investigation). Previously reported occurrences at Deep Lead and Maryborough are not supported by vouchered collections and are here considered dubious. A substantial population of *E. collina* subsp. *collina* was located at Deep Lead in October 2004, and it is possible that these plants were the source of the record for this locality. Further taxonomic verification is also required for the Little River, Nunniong Plateau and Merricks North populations.



Distribution in Victoria
(Flora Information System DSE 2007)

Abundance

It is estimated that 150–1500 individuals exist. These plants occur in ten populations; however no recent sightings have been recorded at four of these sites. The extent of range and abundance of *Euphrasia collina* subsp. *muelleri* prior to European settlement is not fully known, but it is certain that more populations (and presumably more individuals) existed.

Important populations

The key populations for *Euphrasia collina* subsp. *muelleri* are as follows:

National Parks	Mornington Peninsula National Park (Green's Bush, Mornington Peninsula).
	Snowy River National Park (Little River - possibly extinct).
State Parks	Arthurs Seat State Park (McKellar Flora Reserve, Mornington Peninsula - not seen at this site for at least two years).
	Paddys Ranges State Park (taxonomy uncertain).
State Forest	Special Protection Zone established along Tambo River - zone no. 629.
	Williams Creek Natural Features Scenic Reserve (roadside, Wren's Flat).
Flora and Fauna Reserves	Deep Lead Flora and Fauna Reserve A (doubtfully subsp. <i>muelleri</i>).
	Deep Lead Flora and Fauna Reserve B (Now considered one population).
Roadsides (council jurisdiction)	Junction Road A (Merricks North - possibly extinct).
	Main Ridge (Purves Road, Mornington Peninsula).
Private Land	Junction Road B (Merricks North - possibly extinct).

Habitat

In Australia, the *Euphrasia* genus generally occurs in environments where light is periodically or permanently abundant as a result of either environmental extremes or frequent disturbances such as fire (Potts 1999). *Euphrasia* species which are dependent on disturbance may be more vulnerable to extinction due to the unpredictability of these environmental variables (Potts 1999). Habitats suitable for *Euphrasia collina* subsp. *muelleri* tend to be prone to fire or periodic inundation by water. Examples range from open grassland and grassy woodland to heath in perched swamps and heathy woodland.

Scarlett (pers. comm.) suggests that the pre-1750 habitat for *Euphrasia collina* subsp. *muelleri* was Kangaroo Grass (*Themeda triandra*) communities, which included grasslands, woodlands and forests. Associated communities currently include Austral Grass-tree (*Xanthorrhoea australis*) dominated sandy heath on the Mornington Peninsula; Silver-leaf Stringybark (*Eucalyptus cephalocarpa*) - Messmate Stringybark (*E. obliqua*) open forest at Merricks North; Snow Gum (*E. pauciflora*) grassy woodland near Benambra; Narrow-leaf Peppermint (*E. radiata*) - Candlebark (*E. rubida*) grassy open forest near Jamieson; and Red Stringybark (*E. macrorhyncha*) heathy woodland at Deep Lead (Barker 1982; Downe 2002; JCVRFASC 1999; Potts 1997; Scarlett pers. comm.; Williams and Molnar 1997).

Life history and ecology

The grassy vegetation communities once occupied by the taxon are now significantly depleted as a result of grazing and clearing (Scarlett pers. comm.).

Given that some species of *Euphrasia* are known to increase in abundance after fire, it is possible that changes to pre-existing fire regimes have also led to declines at those sites where disturbance is a requirement (Scarlett pers. comm.). Fires at Arthurs Seat in the late 1980s, however, did not bring about an obvious increase in plant numbers at that site (N. Walsh, pers. obs.).

Euphrasia species generally have poor seed dispersal capabilities (within 20-30 cm of parent plant) and therefore tend to form dense isolated stands when population numbers are high, thus flourishing when environmental variables are most favourable (Potts 1999; Scarlett pers. comm.). It is suspected that germination is triggered by fire, but this has not been confirmed. If so, the implementation of regular fire regimes (as opposed to mowing or other forms of biomass reduction) on a number of suitable sites may be the most appropriate form of management. Searching, particularly on sites previously recorded that were burnt in the 2003 fires in north east Victoria, may help to inform this theory.

Conservation status

National conservation status

Purple Eyebright is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Victorian conservation status

Purple Eyebright is listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988*.

It is considered endangered in Victoria according to DSE's *Advisory List of Rare or Threatened Plants in Victoria - 2005* (DSE 2005).

Potentially threatening processes

Lack of biomass reduction

The subspecies may be highly dependent on open environments, either on a permanent or intermittent basis. Lack of biomass reduction may constitute the major threat to the subspecies.

Weed invasion

Weeds include: Sweet Pittosporum (*Pittosporum undulatum*), Radiata Pine (*Pinus radiata*), Bluebell Creeper (*Sollya heterophylla*), Bitou Bush (*Chrysanthemoides monilifera*) and Coast Wattle (*Acacia longifolia* subsp. *sophorae*). These species are known to occur at or near a number of the sites on the Mornington Peninsula. *Chrysanthemoides monilifera* is a 'Weed of National Significance'.

Grazing

Grazing by macropods may occur. Most populations subjected to grazing by stock have been destroyed.

Reservation status

Inadequately reserved - further protection is required for the roadside populations at Wren's Flat and possibly Junction Road if the taxon returns. Negotiation with landholders for the Junction Road site will also be required.

Long term objective

To ensure that the Purple Eyebright can survive, flourish and retain its potential for evolutionary development in the wild.

Specific objectives, actions and targets

The intended management actions listed below are further elaborated in DSE's Actions for Biodiversity Conservation (ABC) system. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities.

Inappropriate biomass reduction / fire regimes

Purple Eyebright appears to be highly dependent on open environments, either on a permanent or intermittent basis. Biomass reduction must be carefully timed to prevent destruction of plants. This constitutes the major threat to the subspecies. Control of wildfire using bulldozers and other related equipment would cause major deleterious impacts to certain populations.

Grazing

Rabbits and macropods may graze the subspecies. Such damage would have the greatest negative impact following biomass reduction and shortly after germination.

Previous management action

- Ecological burning and weed control have been undertaken at several sites.
- All populations were monitored in spring 2006. No plants were observed flowering at most sites near Melbourne due to the weather conditions, but plants have been found further north and in Gippsland.
- Seed and cuttings were collected for propagation trials in 2004-2006.
- Taxonomy has been resolved to determine that the species of *Euphrasia* at Paddys Ranges and Deep Lead is not *E. collina* subsp. *muelleri*.
- Existing and potential habitat has been surveyed and environmental information was collected.
- Monitoring plots have been established at Wrens Flat.
- Post-fire monitoring occurred Wren's Flat in 2007 - this population was burnt in the bushfires in late 2006. Initial results suggest that the population may have been destroyed.

Objective I To increase knowledge of biology, ecology and management requirements

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
1. Acquire baseline population data. Conduct detailed field and desk top surveys including identification of the area and extent of the population; estimates of the number, size and structure of the population; and inference or estimation of population change.	<ul style="list-style-type: none">▪ Updated records on all state databases (Flora Information System, VROTPop and Herbarium).▪ Populations accurately mapped.	DSE
2. Assess habitat characteristics and/or condition. Accurately survey known habitat, and collect and analyse floristic and environmental information relevant to community ecology and condition.	<ul style="list-style-type: none">▪ Ecological requirements identified for the completion of essential life history stages, recruitment and dispersal.▪ Core habitat mapped.	DSE
3. Conduct survey to locate suitable habitat. Identify and survey potential / historical habitat using ecological and bioclimatic information that may indicate habitat preference.	<ul style="list-style-type: none">▪ Predictive model for potential habitat developed and tested.	DSE
4. Identify disturbance regimes to maintain habitat or promote regeneration and recruitment.	<ul style="list-style-type: none">▪ Preparation of management prescriptions for ecological burning or slashing at Snowy River National Park, Arthurs Seat State Park, Paddys Ranges State Park, Nunniong Plains Natural Features Scenic Reserve, Williams Creek Natural Features Scenic Reserve, Merricks North Roadside, Main Ridge Roadside and at Merricks North private land if required.	DSE, Parks Victoria
5. Undertake research to identify key biological functions. Evaluate current reproductive / regenerative status, seed bank status and longevity, fecundity and recruitment levels. Determine seed germination requirements by conducting laboratory and field trials aimed to identify key stimuli.	<ul style="list-style-type: none">▪ Seed bank / regenerative potential quantified for target populations.▪ Stimuli for recruitment/regeneration identified.▪ Management strategies identified to maintain, enhance or restore regenerative processes fundamental to reproduction and survival.	DSE Royal Botanic Gardens
6. Analyse population trends. Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. Collate, analyse and report on census data and compare with management histories.	<ul style="list-style-type: none">▪ Techniques for monitoring developed and implemented.▪ Census data for target populations collected.▪ Population growth rates determined.▪ Population Viability Analysis completed for targeted populations.	DSE

Objective II To secure populations or habitat from potentially incompatible land use or catastrophic loss.

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
7. Negotiate Memorandum of Understanding or appropriate management agreement for public land.	<ul style="list-style-type: none"> Negotiate formal conservation agreements for sites at Merricks North and Main Ridge by 2008. 	DSE
8. Erect / maintain signs to restrict or discourage access.	<ul style="list-style-type: none"> Erect "Significant Roadside Vegetation" signs on all roadside sites. 	DSE
9. Erect / maintain structures to restrict or discourage access. Control threats from high visitor numbers by preventing access, re-routing tracks, fencing sites, caging plants if required.	<ul style="list-style-type: none"> Measurable seedling recruitment and /or vegetative regeneration at Mornington Peninsula National Park, Snowy River National Park, Arthurs Seat State Park, Paddys Ranges State Park, Nunniong Plains Natural Features Scenic Reserve, Williams Creek Natural Features Scenic Reserve, Deep Lead Flora and Fauna Reserve, Merricks North and Main Ridge. A measurable reduction in plant mortality at Mornington Peninsula National Park, Snowy River National Park, Arthurs Seat State Park, Paddys Ranges State Park, Nunniong Plains Natural Features Scenic Reserve, Williams Creek Natural Features Scenic Reserve, Deep Lead Flora and Fauna Reserve, Merricks North and Main Ridge. 	DSE, Parks Victoria, Mornington Peninsula Shire
10. Negotiate a co-operative management agreement with a private landholder.	<ul style="list-style-type: none"> Establish a private land conservation agreement for threatened taxa at Merricks North. 	DSE
11. Liaise with private landholders. Ensure that information and advice about the recovery of Purple Eyebright has been provided to private land managers and landholders.	<ul style="list-style-type: none"> All relevant private land managers are aware of the species and its management needs. 	DSE
12. Liaise with government agencies. Ensure that information and advice about the recovery of Purple Eyebright has been provided to public land managers, local government authorities and Catchment Management Authorities.	<ul style="list-style-type: none"> All relevant authorities and public land managers are aware of the species and its management needs. 	DSE

Objective III To improve the condition of habitat

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
13. Manage environmental weeds. Control threats from pest plants by using broadscale application of herbicide and hand removal of weeds.	<ul style="list-style-type: none"> Measurable seedling recruitment and /or vegetative regeneration at Mornington Peninsula National Park, Snowy River National Park, Arthurs Seat State Park, Paddys Ranges State Park, Nunniong Plains Natural Features Scenic Reserve, Williams Creek Natural Features Scenic Reserve, Deep Lead Flora and Fauna Reserve, Merricks North and Main Ridge. 	DSE, Parks Victoria, Mornington Peninsula Shire

- A measurable reduction in plant mortality at Mornington Peninsula National Park, Snowy River National Park, Arthurs Seat State Park, Paddys Ranges State Park, Nunniong Plains Natural Features Scenic Reserve, Williams Creek Natural Features Scenic Reserve, Deep Lead Flora and Fauna Reserve, Merricks North and Main Ridge.

Objective IV To increase the number of populations or individuals

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
14. Store reproductive material. Establish a seed bank.	<ul style="list-style-type: none"> ▪ Long-term storage facility identified. ▪ Seed from target populations in storage. 	DSE, Royal Botanic Gardens
15. Determine seed viability.	<ul style="list-style-type: none"> ▪ Seed viability determined for target populations. 	Royal Botanic Gardens

Objective V To increase community awareness and support

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
16. Involve community groups and volunteers in recovery activities.	<ul style="list-style-type: none"> ▪ Opportunities for involvement identified, promoted and supported. 	DSE

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