Department of
Sustainability and
Environment

National Recovery Plan for the Bog Willow-herb *Epilobium brunnescens* subspecies *beaugleholei*

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Australian Government

Victoria
The Place To Be

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Cover photograph: Bog Willow-herb *Epilobium brunnescens* subspecies *beaugleholei*, by John Eichler.

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Conservation status

The Bog Willow-herb *Epilobium brunnescens* subspecies *beaugleholei* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 and Threatened under the Victorian Government *Flora and Fauna Guarantee Act* 1988. It is known from just a single site in the highlands of eastern Victoria, where the single population covers just 1m^2. This national Recovery Plan for the Bog Willow-herb details the species' distribution and biology, conservation status, threats, and recovery objectives and actions necessary to ensure its long-term survival.

Description

The Bog Willow-herb *Epilobium brunnescens* subspecies *beaugleholei* is a prostrate, mat-forming, perennial herb. Stems root at the nodes and grow beyond the flowering regions. Leaves are elliptic or ovate, opposite, to 14 mm x 7 mm, sparsely hairy, with some glandular hairs. Margins are smooth, or with a few shallow teeth. Flowers appear in summer and are white, to 8 mm wide on stalks to 7 cm long. There are four obovate petals, to 4 mm long, each indented at the apex. Fruit is a narrow, cylindrical capsule, to 24 mm long, containing small dark, granular seeds attached to long, silky hairs (description from Walsh & Entwisle 1996). Little is known of the reproductive biology of *E. brunnescens* subsp. *beaugleholei*.

Two other willow-herbs, *Epilobium billardierianum* and *Epilobium gunnianum* occur near to where *E. brunnescens* subsp. *beaugleholei* grows. Those species may be distinguished by the variously toothed leaves, versus the mostly entire leaves of *E. brunnescens* subsp. *beaugleholei* (Walsh & Entwisle 1996).

Distribution

Epilobium brunnescens subsp. *beaugleholei* is endemic to Victoria, where it is known from a single site in the Snowy Range, north of Licola (Walsh & Entwisle 1996), Alpine National Park in the Australian Alps IBRA Bioregion (DEH 2000). Two other sub-species of *Epilobium brunnescens* (subsp. *brunnescens* and subsp. *minutiflorum*) are native to and widespread in New Zealand (Webb *et al.* 1988). The Australian *E. brunnescens* subsp. *beaugleholei* represents a distinct sub-species that has probably evolved in isolation since Gondwanan break-up (West & Raven 1977).

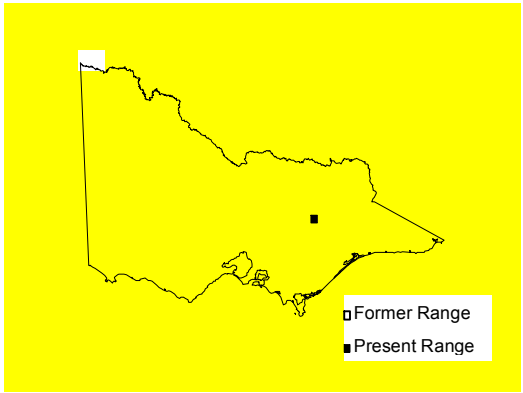

Figure 1. Distribution of Bog Willow-herb in Victoria

Maps showing the detailed distribution of the Bog Willow-herb 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

The single population of Bog Willow-herb occurs at Conglomerate Creek Falls in the Snowy Range, north of Licola, in the Alpine National Park. The population covers only about $1m^2$ in $12m^2$ of habitat.

Habitat

The single population of Bog Willow-herb occurs on moist, moss-covered rocks receiving splash from a perennial sub-alpine waterfall (Walsh & Entwisle 1996). It occurs with various bryophyte mats and receives little direct sunlight. Plants permeate the mossy substrate with their long nodal roots, and there is little to no soil on the wet rock where plants reside (West & Raven 1977). The altitude is c. 1320above sea level. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Threats

The Bog Willow-herb is known only from the single site, and there is no information on past distribution, so it is not possible to determine if the species has suffered any decline in range. However, the species seems to have undergone a substantial decline in abundance over the last 20 years. In 1983, Neville Scarlett (La Trobe University) recorded 50 plants over $900m^2$ of habitat (DSE database). At the same site in 2001, John Eichler (pers. comm.) recorded just 3 patches totalling $1m^2$ cover over an area of $12m^2$. The reasons for the apparent decline are not clear.

The Bog Willow-herb must be considered at extreme risk of extinction. Given the tiny area of occupancy and few plants, the risk from stochastic events is quite high. Rock fall is a major risk to the population, and climate change impacts, including extended drought, may alter the moisture level of the habitat, rendering it unsuitable for the continued existence of the plants. Other threats include illegal collection and inadvertent damage by visitors.

Recovery Information

Directions for recovery of the Bog Willow-herb include habitat conservation, restoration and management, combined with an understanding of the species' ecological and biological requirements. 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.

Objectives

The **overall objective** of recovery is to minimise the probability of extinction of *Epilobium brunnescens* subsp. *beaugleholei* 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 *Epilobium brunnescens* subsp. *beaugleholei* 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 including (a) identification of the area and extent of the population; (b) estimates of the size and structure of the population and (c) inference or estimation of population change. **Responsibility: DSE**	• Determination or update of conservation status for inclusion on state and national threatened species lists. • Population accurately mapped.
Specific objective 2 **Identify habitat that is critical, common or potential**		
2.1	Accurately assess 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 indicating habitat preference. **Responsibility: DSE**	• Predictive model for potential habitat developed and tested.
Specific objective 3 **Manage threats to populations**		
3.1	Control threats by preventing access, re-routing tracks and/or installing appropriate fencing or conservation signage. **Responsibility: PV**	• Measurable seedling recruitment/vegetative regeneration and a reduction in plant mortality. • Appropriate strategies for minimising visitor impacts such as strategically placed conservation signage and fencing.
Specific objective 4 **Identify key biological functions**		
4.1	Evaluate current reproductive status, longevity, fecundity and recruitment levels. **Responsibility: DSE**	• Regenerative potential quantified for the population.
4.2	Determine seed germination requirements by conducting laboratory and field trials aimed to identify key stimuli and determine stimuli for vegetative regeneration. **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 response against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. **Responsibility: DSE**	• Techniques for monitoring developed and implemented. • Census data collected.
5.2	Collate, analyse and report on census data and compare with management history. **Responsibility: DSE**	• Population dynamics determined.
Specific objective 6		
Establish populations in cultivation		
6.1	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. Successful plant division and growth in glasshouse conditions are described in West and Raven (1977). • At least 30 mature plants in cultivation.
6.2	Establish a seed bank and determine seed viability. **Responsibility: DSE, RBG**	• Long-term storage facility identified. • Seed from target populations in storage.
Specific objective 7		
Build community support for conservation		
7.1	Identify opportunities for community involvement in the conservation of *Epilobium brunnescens* subsp. *beaugleholei*. **Responsibility: DSE**	• Presentation(s) to community nature conservation groups.

Abbreviations

DSE - Department of Sustainability and Environment

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 *Epilobium brunnescens* subsp. *beaugleholei*. 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 and possible collection. A range of strategies will be necessary to alleviate these threats including, fencing and conservation signage.

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 *Epilobium brunnescens* subsp. *beaugleholei* 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

The single population of *Epilobium brunnescens* subsp. *beaugleholei* occurs in the Alpine National Park, which is managed Parks Victoria, who have approved the actions outlined in this Recovery Plan, subject to the availability of sufficient resources for implementation.

Role and interests of indigenous people

Indigenous communities on whose traditional lands *Epilobium brunnescens* subsp. *beaugleholei* 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 *Epilobium brunnescens* subsp. *beaugleholei*, 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 will not cause significant adverse social and economic impacts. The Bog Willow-herb occurs only on public land, at just a single site within the Alpine National Park. At the most, there might be some regulation of visitor access to the waterfall to protect the species, through fencing or signage.

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**									
1.1	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	$6,000	$0	$0	$0	$0	**$6,000**
2.2	Identify, survey potential habitat	1	75%	DSE	$10,000	$0	$0	$0	$0	**$10,000**
3	**Manage threats**									
3.1	Control threats	2	75%	PV	$0	$5,000	$5,000	$5,000	$5,000	**$20,000**
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	2	50%	DSE, RBG	$0	$6,000	$6,000	$6,000	$6,000	**$24,000**
6.2	Establish a seed bank	2	50%	DSE, RBG	$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**
				TOTAL	**$38,000**	**$31,000**	**$51,000**	**$51,000**	**$37,000**	**$208,000**