Department of Sustainability and Environment

Action Statement

Flora and Fauna Guarantee Act 1988 No. 5 (Revised in 2009)

Bald-tip Beard Orchid

Calochilus richiae

This Action Statement is based on the Recovery Plan prepared for this species by DSE under contract to the Australian Department for the Environment, Water, Heritage and the Arts. The first Action Statement for this species was prepared in 1991.

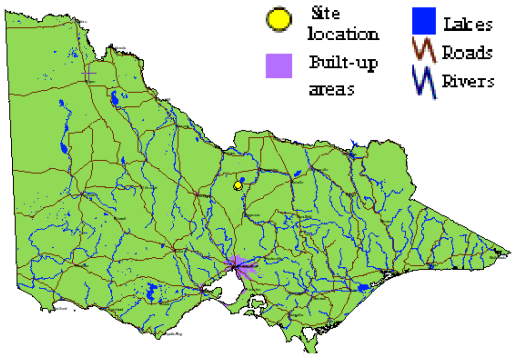
Description

The Bald-tip Beard Orchid (*Calochilus richiae*) is a terrestrial, deciduous herb that grows to 35 cm in height. The single stout fleshy leaf is dark green, ribbed and V-shaped in cross-section. In October, it bears a loose raceme of up to five flowers. The flowers are yellowish-green to reddish-brown with darker stripes, and the tepals are up to 15 mm in length (Nicholls 1929, Walsh and Entwistle 1994, Backhouse and Jeanes 1995, Bishop 1996, Jeanes and Backhouse 2000). *C. richiae* is easily distinguished from other members of the *Calochilus* genus by the short purplish calli which cover the basal two-thirds its ovate labellum, and its glabrous apex which has a narrow, inrolled tip (Walsh and Entwistle 1994, Backhouse and Jeanes 1995, Berwick *et al.* 2000).

Bald-tip Beard Orchid
(Photo: DSE/Backhouse)

Distribution

C. richiae is endemic to Victoria, where it is known from approximately four individuals in a single wild population in the Victorian Midlands bioregion (Environment Australia 2000). The species was originally discovered by Mrs. Rich in 1928, but was not relocated until 1968 by J. Jamison (Jones 1969). Anecdotal evidence, however, suggests that the second population was previously unknown, and that the population discovered by Mrs. Rich had been destroyed by illegal collection (Berwick *et al.* 2000). Historically, *C. richiae* was probably never common (Jones 1991). Although its past distribution is unknown, the long history of environmental impacts within the Box-Ironbark forest (Muir *et al.* 1995) suggests that, if additional populations of *C. richiae* existed prior to European settlement, they are unlikely to still persist elsewhere in this ecosystem (Berwick *et al.* 2000).



Distribution in Victoria
(Flora Information System DSE 2007)

Abundance

C. richiae is only known from a single population. A steady decline in flowering plants has been observed at the known site: from 21 - 23 plants in 1980-1981, to eight in 1988, six in 1995, and only one flowering plant in 1996 (G. Backhouse pers. comm.). Between zero and four plants have flowered each year since then: four flowering plants in 2004, one in 2005, none in 2006 (although four plants grew), none in 2007, and no plants were observed in August 2008 (P. Krake pers. comm.; VROTPop data). It is likely that illegal collecting of whole plants has contributed to this decline, together with poor rainfall and drought conditions at the site. The critically low population numbers suggest that natural environmental fluctuations, such as extended periods of low rainfall, are a potential threat to the species' survival. The population's small size also threatens its reproductive capacity and potential to set seed, and thus the likelihood of seedling recruitment.

Important populations

The sole population occurs in Rushworth State Forest, in north-central Victoria.

Habitat

C. richiae occurs in Heathy Dry Forest (Muir *et al.* 1995) dominated by Red Stringybark (*Eucalyptus macrorhyncha*), Red Box (*E. polyanthemos*) and Red Ironbark (*E. tricarpa*). The low shrubby understorey includes Golden Wattle (*Acacia pycnantha*), Hedge Wattle (*A. paradoxa*), Common Beard-heath (*Leucopogon virgatus*), Gorse Bitter-pea (*Daviesia ulicifolia*), Black-anther Flax-lily (*Dianella revoluta*), Cat's Claws (*Grevillea alpina*), Daphne Heath (*Brachyloma daphnoides*), Drooping Cassinia (*Cassinia arcuata*) and Austral Grass-tree (*Xanthorrhoea australis*). The sparse grassy ground layer is dominated by Wallaby Grass (*Joycea pallida*). The soil is shallow, stony clay loam overlying Devonian sandstone and interbedded siltstone sediments (Duncan and Traill 1999, Berwick *et al.* 2000). Across central Victoria, Heathy Dry Forests have been severely affected by historic mining activity. Given that *C. richiae* is nationally endangered, the following areas are considered to be critically important: the area within 200 m of the known population, vegetation corridors that link the known population with areas of similar habitat, areas that may be potentially used as a translocation site, and the catchment that provides the necessary hydrology for the known population.

Life history and ecology

C. richiae is a terrestrial, deciduous herb which emerges annually from a fleshy and irregular (potato-shaped to carrot-shaped) subterranean tuber. The species is dormant during the drier summer months, and soaking rains break the dormancy period in autumn. Each plant then produces a single, elongate, fleshy basal leaf which grows throughout the winter. Flowering only occurs in spring, and flowers generally only remain open for a few days. Male scollid wasps (genus *Campsomeris*) are attracted to the flowers by visual stimuli and/or pheromones (Backhouse and Jeanes 1995). Once attracted to a flower, the male wasp usually attempts to copulate with the labellum, mistaking it for a female wasp and effecting pollination. Following pollination, fruits usually take 5 - 8 weeks to mature. Each mature capsule may contain tens of thousands of microscopic seeds which are dispersed by the wind when the capsule dries out. *C. richiae* reproduces solely from seed.

Observations suggest that the period available for effective pollination may be quite short, possibly only a few days. Pollinators may become habituated to the presence of flowers in their territory after a period of time, and rates of pollination may therefore decline (C. Bower pers. comm.). Pollinator-habituation may be important when considering a species such as *C. richiae* that has a critically low population size.

The role of fire in the ecology of *C. richiae* is not understood, but is likely to be an important factor: other species in this genus exhibit strong flowering responses in the years following fire (e.g. *C. robertsonii* at Anglesea and the Grampians, and *C. paludosus* at the Grampians). Fire is an integral part of the physical environment of most vegetation types in southern Australia (Gill *et al.* 1999) and is required to maintain plant diversity (Wark 1996). By removing the surrounding vegetation, fire increases light levels and temperature at ground level and may also increase the availability of moisture (Purdie 1977). It alters the soil ecology and increases the prevalence of mycorrhizal fungal symbionts. Allelopathic inhibition by the surrounding vegetation is also reduced or removed following a fire (Gill *et al.* 1981). Seedling establishment may therefore be critically dependent on fire.

The timing of fire is also important. The optimal fire season for orchids is late summer or early autumn, after seed dispersal but prior to new shoot growth. Fuel reduction burning of state forests in spring and autumn is considered to be a threatening process for many orchid species.

Variations in seasonal climatic conditions, most notably rainfall and temperature, also influence flowering. Flowering in *C. richiae* is often aborted when flower opening is followed by periods of sustained hot, dry weather.

The foliage and fruit of *C. richiae* appear to be highly palatable and are actively sought by browsing animals. Seed capsules are also frequently lost to predation (Schoknecht 1991; Backhouse and Jeanes 1995). Seed from *C. richiae* has been successfully germinated asymbiotically in laboratory trials, but seedlings could not be established in soil (M. Clements pers. comm.). Using symbiotic fungi from *C. robertsonii*, *C. richiae* has recently been successfully germinated and protocorms have been established. However, other *Calochilus* species have proven extremely difficult to maintain in cultivation, with plants becoming smaller each season and disappearing within five years (M. Thomas pers. comm.).

Detailed investigations of *C. richiae* ecology are urgently required to enable effective population recovery and management. Aspects of the species' life history which need further investigation include plant longevity, length of dormancy, conditions for seed germination and seedling establishment, population structure and demography, pollination biology, mycorrhizal relationships, responses to fire, seasonal variations in flowering and fruiting, and the long-term consequences of predation.

Conservation status

The Bald-tip Beard Orchid (*C. richiae*) is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The Bald-tip Beard Orchid (*C. richiae*) is listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (DSE 2005).

It is considered endangered in Victoria according to the Department of Sustainability and Environment's *Advisory List of Rare or Threatened Vascular Plants in Victoria – 2005* (DSE 2005).

There are only four plants remaining in a single wild population. As part of the recovery plan preparation, the conservation status of *C. richiae* was assessed as critically endangered using IUCN (2001) criteria. This recommended conservation status is based on the verification of species distribution and abundance information gathered during the preparation of the recovery plan, and represents the most up-to-date conservation assessment available for the Bald-tip Beard Orchid.

Decline and threats

Grazing

High - Grazing by invertebrates and native herbivores is a serious threat at the single known site. In 1989, six of the 11 maturing seed capsules were eaten by herbivores (Schoknecht 1991). In 2004, the leaves and buds of two of the four plants were grazed almost to ground level.

Site disturbance

High - Soil and site disturbance caused by human activities such as fuel reduction burning, illegal firewood collection, rubbish dumping, mining/ prospecting, tourism and recreational activities are a threat at the site. The general location of this site is well known, and there is also a risk of accidental trampling on plants and/or seedlings. The site is within state forest and is subject to a mining lease and mineral exploration licence.

Illegal collection

High - There is evidence of illegal collection in the past. There has been a suggestion that up to a dozen plants were illegally collected from this site in the early 1980s. Misguided protection of plants may also be an issue. During one season, all flowering stems were cut off by a local enthusiast to discourage collection (Jones 1991).

Ecology / biology

High - There is a high risk of extinction due to the small population size. The conditions for seedling recruitment and maintenance of the pollinator/ mycorrhizal fungal symbionts are unknown.

Previous management actions

A number of conservation measures have been undertaken at the known site, including:

- The site is registered internally as Site of Significance by DSE (Forest Management) and must be considered before a coupe plan is submitted. As a result, commercial timber production (post harvesting and firewood collection), prescribed burning and silvicultural activities have been suspended from the immediate area.
- Commercial timber production (mainly posts and firewood) has been excluded from the immediate area of the orchid population since 1980.
- The presence of the orchid is considered in DSE regional fire planning.
- Areas of potential habitat within the Whroo-Costerfield State Forest and Mt Black Flora Reserve have been identified and searched as a result of the Box-Ironbark Threatened Flora Survey. No new *C. richiae* populations were located.
- Some site security is achieved by maintaining strict secrecy as to the exact location of the population.

- The licensee has agreed to the establishment of a buffer zone around the orchid population where no mineral exploration will occur.
- Much of the site was fenced in 2001, and fences are maintained regularly.
- All plants have been protected from grazing since 2003.
- A permanent monitoring transect was established at the site in 2003.
- A permanent photo point was established in 2003.
- Fine-scale site management commenced in 2003.
- The site was supervised by DSE rangers to control visitor access during the flowering period (late September – October) 2004. Since this time, no plants have flowered and so supervision has not been necessary.
- Methods of monitoring macropod population density are currently being assessed.
- A regional recovery team has been established.
- Local field naturalists collected seed in 1989 for propagation by the Australian National Botanic Gardens, Canberra. The seed was successfully germinated in culture, but the plants could not be established in soil (M. Clements pers. comm.).
- Four seed capsules were collected in 2003. This seed has been variously placed in storage, sown around the base of existing plants and used in fungal baiting trials.
- Four seed capsules in 2003 were left on the plants to naturally dehise.
- In 2004, two root pieces were harvested from a living *C. richiae* plant by M. Clements (Centre for Plant Biodiversity Research (CPBR), Canberra) for *ex situ* research and fungal isolation.
- *C. richiae* has been successfully germinated and protocorms established at the Royal Botanic Gardens, Burnley, in 2007-09 using the *C. robertsonii* fungi.
- Leaf samples of *C. richiae* and *C. robertsonii* were collected by CPBR staff in 2004 for use in DNA analysis.

Objectives and intended management actions

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.

Long term objective

To ensure that the Bald-tip Beard Orchid (*C. richiae*) can survive, flourish and retain its potential for evolutionary development in the wild.

Specific Objectives, Actions and Targets

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

Action	*Targets*	*Responsible*
1. Acquire baseline population data by conducting detailed field surveys including (a) identification of the area and extent of populations, (b) estimates of the number, size and structure of populations, and (c) inference or estimation of population change	▪ Baseline data collected. ▪ Conservation status reassessed. ▪ Populations accurately mapped.	▪ DSE
2. Assess habitat characteristics and/or condition. Accurately survey known habitat and collect floristic and environmental information relevant to community ecology and condition.	▪ Habitat data collected and analysed.	▪ DSE
3. Conduct surveys to identify and search potential habitat. Identify and survey potential habitat using ecological and	▪ Predictive model for potential habitat developed and tested.	▪ DSE North East

	bioclimatic information that may indicate habitat preference.	▪ Potential habitat searched.	
4.	Undertake research to identify key biological functions.	▪ Critical life history stages identified. ▪ Recruitment and dispersal identified at known sites. ▪ Seed bank/regenerative potential quantified for each/target population. ▪ Stimuli for recruitment/regeneration identified.	▪ DSE
5.	Undertake detailed population monitoring and collect demographic information. 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 established. ▪ Census data for target populations collected.	▪ DSE North East
6.	Analyse population trends. Collate, analyse and report on census data and compare with management histories.	▪ Population growth rates determined and Population Viability Analysis completed for target populations.	▪ DSE

Objective II To secure populations, community occurrences or habitat from potentially incompatible use

Action	*Targets*	*Responsible*
7. Develop management prescriptions and/or zoning for state forest.	▪ Forest management plan identifies species and provides for its protection and active management. ▪ Special Protection Zone in Rushworth State Forest established.	▪ DSE North East
8. Deploy personnel to supervise visitor access to the site.	▪ Ranger presence in the area increased on weekends during the flowering period. Daylight watches of the site conducted if necessary during the flowering period.	▪ DSE North East

Objective III To improve the extent and/or condition of habitat

Action	*Targets*	*Responsible*
9. Control the potential introduction and / or spread of Cinnamon Fungus (*Phytopthora cinnamomi*).	▪ No areas infested *P. cinnamomi*. ▪ If infestation is detected, area infested with *P. cinnamomi* not significantly increased.	▪ DSE North East
10. Control introduced animals to reduce grazing. Control predators / herbivores and investigate grazing impacts by fencing sites and / or caging plants. The existing fence needs to be extended.	▪ Measurable reduction in grazing damage or loss. ▪ Measurable seedling recruitment in affected population.	▪ DSE North East
11. Control site disturbance by protecting site and modifying management activities.	▪ Measurable seedling recruitment/vegetative regeneration and a measurable reduction in plant mortality. ▪	▪ DSE North East

Objective IV To increase the number of populations or individuals

Action	*Targets*	*Responsible*
12. Manage microhabitat for seedling recruitment.	▪ Measurable increase in recruitment at site.	▪ DSE North East
13. Hand pollinate plants and collect seed.	▪ Seed from known site in short term storage.	▪ DSE, Royal Botanic Gardens
14. Test seed viability and restock population with seed.	▪ Seed viability determined. ▪ Measurable increase in recruitment at site.	▪ DSE, Royal Botanic Gardens
15. Establish procedures for the non-destructive isolation of the mycorrhizal fungus from living plants.	▪ Mycorrhizal fungus isolated and in culture.	▪ DSE, Royal Botanic Gardens
16. Propagate seedlings and/or cuttings for reintroduction or reinforcement. Establish cultivated plants *ex situ* for inclusion in living collections to safeguard against any unforeseen destruction of wild populations.	▪ Effective propagation and cultivation techniques developed. ▪ At least 30 plants in cultivation that are disease free and vigorous.	▪ DSE, ▪ Royal Botanic Gardens

Objective V To increase community awareness and support

Action	*Targets*	*Responsible*
17. Involve community groups and volunteers in recovery activities.	▪ Opportunities for involvement identified, promoted and supported.	▪ DSE North East

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This Action Statement has been prepared under section 19 of the Flora and Fauna Guarantee Act 1988 under delegation from Mr Peter Harris, Secretary, Department of Sustainability and Environment, July 2009.

Published by the Victorian Government Department of Sustainability and Environment

Melbourne, July 2009

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

ISSN 1448-9902

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