Department of Sustainability and Environment

# Action Statement

Flora and Fauna Guarantee Act 1988 No. 103

# Twelve threatened Spider-orchids

## *Caladenia species*

### Description and distribution

The genus *Caladenia* is represented in Victoria by 78 taxa. Of these, one taxon is considered extinct, eighteen taxa are endangered, eight taxa are vulnerable and five taxa are considered rare. A further fifteen taxa are poorly known but suspected to be in one of the above categories (NRE 2000).

This Action Statement addresses 12 threatened (vulnerable or endangered) taxa of *Caladenia* listed below. All taxa are members of the Genus *Caladenia*, Section *Calonema*, commonly referred to as Spider-orchids. Taxa within this section are characterised by their large, attractive flowers with long filamentous segments often ending in fine, elongated tips, which may be conspicuously clubbed or densely covered, with dark-coloured glandular hairs. Individual species' descriptions can be found in *The Orchids of Victoria* (Backhouse and Jeanes 1995) and *The Flora of Victoria Volume 2* (Walsh and Entwisle 1994).

The Spider-orchids addressed in this Action Statement occur over a wide area. Six taxa (*Caladenia formosa, Caladenia hastata, Caladenia lowanensis, Caladenia tensa, Caladenia versicolor* and *Caladenia xanthochila*) occupy areas of western Victoria and south-east South Australia. Three taxa (*Caladenia amoena, Caladenia audasii* and *Caladenia rosella*) occur in central Victoria while the three remaining taxa (*Caladenia fragrantissima* ssp. *orientalis, Caladenia robinsonii* and *Caladenia thysanochila*) occupy coastal areas to the south-east of Melbourne. Distribution maps for each taxon are presented in the detailed species' descriptions at the end of this Action Statement.

### Habitat

Spider-orchids occupy a wide range of habitats throughout Victoria including alpine meadows, open mallee, shrublands, closed coastal shrublands, heathlands, woodlands, heathy woodlands and open forests. They are found generally in well-drained soils, including deep sands, sand and clay loams and dry skeletal soils.

The Spider-orchids addressed in this Action Statement occur in Grassy Dry Forests and Box-Ironbark Forests (*C. amoena, C. audasii, C. rosella*), coastal heathlands (*C. hastata, C. fragrantissima* ssp. *orientalis*), near costal heathy and herb-rich woodlands (*C. robinsonii, C. thysanochila*) and inland grassy, heathy or herb-rich woodlands (*C. formosa, C. lowanensis, C. tensa, C. versicolor, C. xanthochila*).

A defining feature of most of these habitats is that they are considered uncommon. This may be due to these habitats having been naturally uncommon prior to European settlement or more typically because of clearing for agriculture and urbanisation since European settlement. Most species occur within severely fragmented ecosystems that are subject to a range of potentially threatening processes typical of such environments.

### Life history and ecology

All Spider-orchids are terrestrial, deciduous herbs, emerging annually from spherical, subterranean tubers that are protected by a tough, fibrous tunic. Most plants shoot in response to soaking rains in early autumn, first producing only a leaf that remains almost dormant through the winter. All of the taxa addressed by this Action Statement flower in late winter to spring.

Flowers may remain open for a few days to a few weeks depending on pollination and climatic factors. Fruits usually take 5-8 weeks to mature following pollination. Each mature capsule may contain tens of thousands of microscopic seeds

that are dispersed by the wind when the capsule dries out in early summer.

Most spider-orchids are believed to grow in a complex relationship with mycorrhizal fungi (Warcup 1981). The fungus assimilates some nutrients for the orchid, but the degree of dependence upon the fungus is not known. Most members of the Spider-orchid group are pollinated by sexual deception through a process called pseudocopulation (Jones 1988). Spider-orchids are characterised by the often large, attractive flowers with long tapering sepals and petals ending in clubs or covered with dark glandular hairs that are the source of the sexual attractants for the pollinators, usually male thynnid wasps, attracted to the flowers by scent mimicking female thynnid wasp pheromone. Once it reaches the flower, the male attempts to copulate with the labellum of the flower, mistaking it for the female wasp, and effects pollination. The identities of the pollinator(s) for most species are not known. While thynnid wasps are the most likely pollinators, a small native calictid bee (*Neoproctus* species) has been reported as a pollinator of the Rosella Spider-orchid *Caladenia rosella* (C. Beardsell *pers. comm.*). Observations suggest that the period available for effective pollination may be quite short, maybe only a few days. Successful pollination may be influenced by the receptivity of the stigma to pollen, the number of pollinators in an area, insect behaviour and climatic conditions.

The role of fire in the ecology of the various Spider-orchid species is not known, but is likely to be an important factor, at least for some species which have exhibited strong flowering responses in the years following fire. The variation in seasonal climatic conditions, most notably rainfall and temperature also influences flowering.

## Conservation status

Each taxon has been listed under the Commonwealth Endangered Species Protection Act 1992 and therefore is listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Table 1 summarises the status of each taxon in Australia (ANZECC 1999) and Victoria (NRE 2000) and indicates status under the Victorian **Flora and Fauna Guarantee Act 1988**.

## Decline and threats

Most of the *Caladenia* taxa addressed in this Action Statement have been described in the last ten years, the exceptions being *C. audasii, C. hastata* and *C. rosella*. For the recently described taxa, most have been split from larger complexes and hence little information is known of their former range, whether their range has declined and if so, the rate of decline. For some taxa (eg. *Caladenia thysanochila*), it is likely that they once occupied a very restricted habitat and range while for other taxa (eg. *Caladenia formosa*), the species may have once been present over thousands of square kilometres.

**Table 1: Conservation Status**

| Scientific name | Australia | Victoria | FFG |
|---|---|---|---|
| *Caladenia amoena* | E | e | L |
| *Caladenia audasii* | E | e | L |
| *Caladenia formosa* | V | v | L |
| *Caladenia fragrantissima* ssp. *orientalis* | E | e | L |
| *Caladenia hastata* | E | e | L |
| *Caladenia lowanensis* | E | e | L |
| *Caladenia robinsonii*[+] | E | e | L |
| *Caladenia rosella* | E | e | L |
| *Caladenia tensa* | E | e | L |
| *Caladenia thysanochila*[+] | E | e | L |
| *Caladenia versicolor* | V | v | N |
| *Caladenia xanthochila* | E | e | L |

Abbreviations: **Australia:** E=endangered in Australia; V=vulnerable in Australia; **Victoria:** e=endangered in Victoria; v=vulnerable in Victoria; **FFG:** L=listed on Schedule 2 of the FFG Act; N=nominated for listing under the FFG Act.

This information is important for assessing threats to known populations, when developing actions to counter-balance these threats and when looking at broader remedial actions such as plant re-introductions and trans-locations. The twelve *Caladenia* taxa are listed as threatened for varied reasons. Most of the taxa have small distributions, restricted habitats and a large proportion of their total population occurs at one or a few locations. Most taxa (*C. amoena, C. audasii, C. fragrantissima* ssp. *orientalis, C. hastata, C. lowanensis, C. robinsonii, C. rosella, C. thysanochila, C. versicolor* and *C. xanthochila*) also have small total populations.

The single biggest issue for the decline of most of the taxa is habitat destruction. Five of the taxa (*C. formosa, C. lowanensis, C. tensa, C. versicolor* and *C. xanthochila*) occupy broad riverine plains habitats (of central and western Victoria) on reasonably fertile soils that have been cleared over large parts of their range for agricultural production. Extant populations tend to occupy fragmented forests and woodlands within largely agricultural landscapes and it is this fragmentation and the associated site degradation arising from it, that may now represent the greatest threat to the long-term conservation of these species. Habitat of *C. amoena*, *C. audasii* and *C. rosella* has been severely reduced and altered by historic mining activities and more recent urban development. For the remaining taxa (*C. fragrantissima* ssp. *orientalis*, *C. hastata, C. robinsonii* and *C. thysanochila*), habitat destruction has been caused by the urban and industrial development of their near-coastal habitat. These taxa now occupy areas close to and within urban development and the subsequent impacts associated with this and the management constraints placed on these sites are the largest threats to extant populations of these taxa.

Populations of the twelve threatened *Caladenia* taxa are currently under threat from a variety of sources of varying magnitude and concern. The major issues are weed invasions, grazing by introduced and native herbivores, inappropriate fire regimes and habitat disturbance. The risk posed to extant populations by these threats may vary depending on geographical, environmental, biological and social factors. Threats may be acting singularly or in series to present a risk to populations.

## Existing conservation measures

### Reservation

Representation of the *Caladenia* taxa in conservation reserves varies from well represented to not reserved. Examples include *C. lowanensis* and *C. tensa*, which have a very high proportion of their total population represented within conservation reserves while *C. amoena, C. fragrantissima* ssp. *orientalis, C. robinsonii, C. versicolor* and *C. xanthochila* are unreserved across their range. *Caladenia formosa* is reserved in South Australia but believed unreserved in Victoria. Table 2 summarises the abundance and reservation of the twelve *Caladenia* taxa in Victoria.

**Table 2: Reservation**

| Species name | Reserved | | Unreserved | | % plants reserved |
|---|---|---|---|---|---|
| | Sites | Plants | Sites | Plants | |
| *Caladenia amoena** | 0 | 0 | 2 | 45 | 0 |
| *Caladenia audasii* | 2 | 4 | 1 | 1 | 80 |
| *Caladenia formosa* | 0 | 0 | 3 | 1000's | 0 |
| *Caladenia fragrantissima* ssp. *orientalis** | 0 | 0 | 4 | <100 | 0 |
| *Caladenia hastata* | 2 | 20 | 0 | 0 | 100 |
| *Caladenia lowanensis* | ?3 | 230 | 1 | 10 | 95 |
| *Caladenia robinsonii*+ | 0 | 0 | 1 (?2) | 20 | 0 |
| *Caladenia rosella* | 2 | 110 | 2 | 10 | 92 |
| *Caladenia tensa* | >5 | many | ? | ? | >80 |
| *Caladenia thysanochila*+ | 0 | 0 | 1 | 2 | 0 |
| *Caladenia versicolor* | 0 | 0 | ?4 | >200 | 0 |
| *Caladenia xanthochila* | 0 | 0 | 2 | 117 | 0 |

* Recorded from sites designated as conservation reserves but yet to be gazetted. + Recorded from local government reserve

### Conservation actions

- Grazing management through fencing and/or caging of populations (*C. amoena, C. audasii, C. hastata, C. lowanensis, C. robinsonii, C. rosella, C. tensa, C. thysanochila, C. xanthochila*);
- Fire management (*C. fragrantissima ssp. orientalis, C. hastata, C. robinsonii, C. thysanochila, C. xanthochila*);
- Population monitoring (*C. amoena, C. audasii, C. formosa, C. hastata, C. lowanensis, C. robinsonii, C. rosella, C. tensa, C. thysanochila, C. versicolor, C. xanthochila*);
- Ex-situ conservation/cultivation – seed collection and storage, mycorrhizal fungus collection and storage (*C. amoena, C. audasii, C. hastata, C. lowanensis, C. robinsonii, C. xanthochila*); and
- Weed/pest animal control (*C. amoena, C. hastata, C. lowanensis, C. robinsonii, C. tensa, C. xanthochila*).

### Research

- J. Anthony (in prep.), PhD thesis investigating population biology and ecology of C. lowanensis (University of Melbourne);
- R. Raleigh (in prep.), PhD thesis investigating propagation, cultivation and re-introduction of threatened Caladenia species (RMIT University); and
- T. Huynh (in prep.), PhD thesis investigating the anatomical and morphological adaptations of three Caladenia taxa including C. formosa and C. fragrantissima ssp. orientalis (University of Melbourne).

## Conservation objectives

### Long term objective

Minimise the probability of extinction of the twelve threatened *Caladenia* taxa in the wild and increase the probability of each population of each taxon becoming self-sustaining through appropriate protection and management.

### Objectives of this Action Statement

1. Within five years, locate and accurately document populations of all twelve threatened *Caladenia* taxa in Victoria;
2. Ensure that all recorded populations are adequately protected;
3. Increase the number of plants in the wild;
4. Establish a genetically representative *ex-situ* collection of all taxa in cultivation;
5. Increase the number of populations in the wild;

## Intended management actions

The following actions are generally applicable. For the specific actions for each taxon are presented in the attached summaries.

**1. Determine conservation status.**

Undertake Spring surveys of known populations and surveys of potential habitat to identify new populations. Years 1 and 2.

*Responsibility: NRE - Parks, Flora and Fauna*

**2. Reservation**

Protect populations on public land through appropriate legislation or planning mechanisms. Years 2 to 4.

*Responsibility: NRE - Parks, Flora and Fauna*

**3. Conservation outside reserves**

Protect populations on private land through land management agreements. Where possible, funding will be sought to protect populations on private land through programs such as Landcare and Bushcare. Partnerships involving NRE, landholders, land managers and other stakeholders will be pursued. Years 2 to 5.

*Responsibility: NRE – Parks, Flora and Fauna, Catchment Management Authorities, local government authorities, Trust for Nature, landholders.*

**4. Threat management**

Prepare and implement specific management plans for all threatened *Caladenia* taxa, addressing key threats, and employing integrated management techniques (grazing management, weed management, fire management). Years 1 to 5.

*Responsibility: NRE – Parks, Flora and Fauna, NRE – Forests, Parks Victoria, Local Government, landholders.*

**5. *Ex-situ* conservation**

Establish *ex-situ* conservation program for all endangered *Caladenia* taxa – includes seed collection and storage, endophyte collection and storage, propagation and cultivation. Years 3 to 5.

*Responsibility: NRE – Parks, Flora and Fauna; Royal Botanic Gardens, Melbourne, RMIT University, University of Melbourne*

**6. Translocation**

Establish new populations of endangered *Caladenia* taxa within secure and suitable habitat. Years 4 and 5.

*Responsibility: NRE – Parks, Flora and Fauna; Royal Botanic Gardens, Melbourne; Parks Victoria.*

### 7. Information management

Monitor populations and incorporate data into VrotPop monitoring database. Maintain a database of cultivated plants. Years 1 to 5.

*Responsibility: NRE – Parks, Flora and Fauna; Royal Botanic Gardens, Melbourne.*

## Other desirable management actions

### 8. Ecological research

Determine pollinators, their ecology and natural pollination levels for each taxon. Determine the genetic relationship of disjunct populations.

*Responsibility: RMIT University, University of Melbourne; Royal Botanic Gardens, Melbourne*

## References


ANZECC (1999) *Threatened Australian Flora.* Australian and New Zealand Environment and Conservation Council. Environment Australia, Canberra.

Backhouse, G.N. & Jeanes, J.A. (1995) *The Orchids of Victoria.* The Meigunyah Press, Melbourne.

Beardsell, D. and Beardsell, C. (1992) A rare new *Caladenia* species from central Victoria, and its relationship with other recently described taxa in south eastern Australia. *Australian Systematic Botany* **5**: 513-519.

Carr, G.W. (1991) New taxa in *Caladenia* R. Br., *Chiloglottis* R. Br. and *Gastrodia* R. Br. (Orchidaceae) from south-east Australia. Miscellaneous Paper No. 1, Indigenous Flora and Fauna Association, Melbourne.

Jones, D.L. (1988). *Native Orchids of Australia.* Reed, Melbourne.

NRE (2000) *Rare or Threatened Vascular Plants in Victoria - 2000.* Department of Natural Resources and Environment, East Melbourne, Victoria.

NRE (in prep.) A *typology of vegetation in Victoria: Towards a census of Victorian plant communities.* Department of Natural Resources and Environment, Melbourne.

Todd, J.A. (2000) Recovery Plan for twelve threatened Spider-orchid *Caladenia* taxa (Orchidaceae: Caladeniinae) of Victoria and South Australia 2000 – 2004. Department of Natural Resources and Environment, Melbourne.

Walsh, N.G. & Entwisle, T.J. (1994) *Flora of Victoria Vol 2. Ferns and Allied Plants: Conifers and Monocotyledons.* Inkata, Melbourne.

Warcup, J.H. (1981) The mycorrhizal relationships of Australian orchids. *New Phytology* **87**: 371-381.


### Personal communications

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**Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.**

**Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: http://www.dse.vic.gov.au**

**This Action Statement was first published in 2000 and remains current. This version has been prepared for web publication. It retains the original text of the action statement, although contact information, the distribution map and the illustration may have been updated.**





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## Charming Spider-orchid *Caladenia amoena*

| | |
|---|---|
| **Conservation status** | Endangered in Australia, endangered in Victoria |
| **Current distribution** | Plenty, Wattle Glen - north east of Melbourne – Victorian Midlands Bioregion |
| **Current abundance** | Approximately 45 plants in the wild |
| **Habitat** | Box-Ironbark Forest; Grassy Dry Forest (*sensu* NRE, in prep.) |
| **Reservation status** | Unreserved |
| **Management** | Parks Victoria, private landholder |
| **Conservation objectives** | Reservation, protection and fine-scale management of populations and *ex situ* cultivation/re-introduction |

**Conservation actions undertaken:**

- Control of annual and perennial exotic grasses at Plenty
- Fencing of populations at Plenty to control grazing
- Caging of plants at Wattle Glen to control pests and predators
- Control of visitor access to Plenty site
- Hand pollination of plants at both sites
- Collection and storage of capsules (Perth, WA)
- Fine-scale habitat management at both sites
- Population monitoring
- Production of information brochure
- Survey of potential habitat in the Plenty Valley
- Selection of re-introduction site
- Preparation of a Recovery Plan under the Commonwealth **Environment Protection and Biodiversity Conservation Act 1999**
- Establishment of regional recovery team

**Intended Management Actions:**

- Ensure that populations on public land at Plenty are protected by reservation and zoning under appropriate legislation
- Endeavour to protect populations on private land at Wattle Glen through appropriate land management agreements
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Control animal pests and predators through fencing and/or caging of populations or habitat
- Control high-priority weed species at known sites (eg. Perennial Veldt-grass, annual grasses)
- Manage micro-habitat using litter scattering and seed-bed preparation techniques
- Hand pollinate plants as required
- Harvest and store seed
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of cultivated plants
- Prepare an introduction plan and introduce plants to at least one reserved site in the Plenty Valley

**Other Desirable Management Actions:**

- Salvage plants from private land if required
- Identify pollinator and determine natural pollination levels

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE Port Phillip Region; Parks Victoria Plenty Gorge Parklands; Royal Botanic Gardens, Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE Port Phillip Region, Box Hill; Parks Victoria Plenty Gorge Parklands, Plenty

Biology – Gary Backhouse, NRE, Melbourne; Campbell Beardsell, Consultant Biologist, Cottles Bridge; Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne; Dale Tonkinson, NRE, Heidelberg

## Audas' Spider-orchid *Caladenia audasii*

| | |
|---|---|
| **Conservation status:** | Endangered in Australia, endangered in Victoria |
| **Current distribution:** | Bendigo, Deep Lead & Kingower – Victorian Midlands Bioregion |
| **Current abundance:** | Five plants in the wild |
| **Habitat:** | Box-Ironbark Forest; Grassy Dry Forest (*sensu* NRE, in prep.) |
| **Reservation status:** | Reserved at Bendigo (One Tree Hill Regional Park) |
| **Management:** | Parks Victoria, Committee of Management, NRE - Forests |
| **Conservation objectives:** | Protection and fine-scale management of populations and *ex situ* cultivation/re-introduction of plants |

**Conservation actions undertaken:**

- Caging of plants at Bendigo and Kingower
- Weed control at Bendigo and Kingower
- Hand pollination of plants at all sites
- Collection and storage of seed (Perth, WA)
- Fine-scale habitat management at all sites – leaf litter scattering, summer watering etc.
- Population monitoring
- Surveys of potential habitat
- Preparation of a Recovery Plan under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
- Establishment of regional recovery team

**Intended Management Actions:**

- Pursue the protection of population on public land at Kingower via a Public Authority Management Agreement
- Pursue the protection of population on public land at Stawell by reservation under the (Crown Land (Reserves) Act 1978), in line with Environment Conservation Council recommendations
- Control high-priority weed species at all sites (eg. annual grasses, Freesia sp.)
- Control animal pests and predators at Bendigo through re-designed caging of populations
- Fence population at Bendigo to control visitor access
- Hand pollinate plants as required
- Harvest and store seed
- Manage micro-habitat using litter scattering and seed-bed preparation techniques
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of cultivated plants
- Select introduction sites
- Prepare an introduction plan and introduce plants to at least one reserved site in the Victorian Midlands

**Other Desirable Management Actions:**

- Determine genetic relationship of three populations
- Further identify and survey potential habitat in the Victorian Midlands Bioregion for other populations

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE North West; Parks Victoria; C. audasii Recovery Team; Bendigo Field Naturalists Club; Stawell Field Naturalists Club; Royal Botanic Gardens, Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE North West Region, Bendigo and Horsham; Parks Victoria, Bendigo; Parks Victoria, Horsham; Biology – Gary Backhouse, NRE, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

# Elegant Spider-orchid *Caladenia formosa*

| | |
|---|---|
| Conservation status: | Vulnerable in Australia, vulnerable in Victoria |
| Current distribution: | SW Victoria – Naracoorte Coastal Plain Bioregion |
| Current abundance: | 1000's of plants in Victoria; <100 plants in South Australia |
| Habitat: | Damp Sands Herb-rich Woodland; Shallow Sands Woodland; Plains Sedgy Woodland (*sensu* NRE, in prep.) |
| Reservation status: | Unreserved in Victoria (proposed for protection within Special Protection Zones under the West Victorian RFA – Commonwealth of Australia 2000); Reserved in South Australia at Mt Monster and Mt Scott Conservation Parks |
| Management: | NRE – Forests (Meereek, Beear State Forests) |
| Conservation objectives: | Reservation, protection and broad-scale habitat management |

**Conservation actions undertaken:**

- Population monitoring
- Preliminary surveys of potential habitat

**Intended Management Actions:**

- Identify and survey potential habitat in the Naracoorte Coastal Plain Bioregion for new populations and accurately determine plant numbers within known populations
- Identify key populations
- Protect populations on public land in south west Victoria through appropriate legislation or planning mechanisms
- Endeavour to protect identified populations on private land through appropriate land management agreements
- Identify high-priority weed species for control at all sites and control through use of broad-scale habitat management techniques and targeted control of high-risk species
- Conduct annual censusing of populations and incorporate data into VrotPop database

**Other Desirable Management Actions:**

- Collect Vital Attribute Data following planned fires to determine appropriate fire regimes for C. formosa habitat and prepare a fire management plan for key populations
- Control animal pests and predators at all sites and investigate grazing impacts by macropods and rabbits at sites south of Edenhope
- Identify pollinator and determine natural pollination levels
- Determine genetic relationship of Victorian and South Australian populations

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE South West Region, NRE Forests; Trust for Nature (Victoria), University of Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE South West Region, Horsham; NRE Forests, Horsham; NRE Forests, Hamilton

Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Eastern Spider-orchid *Caladenia fragrantissima ssp. orientalis*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Wonthaggi, Cape Paterson, Walkerville (south east Victoria) – South East Coastal Plain Bioregion |
| Current abundance: | <100 plants in the wild |
| Habitat: | Coastal Heathland; Heathy Woodland (*sensu* NRE, in prep.) |
| Reservation status: | Unreserved (occurs on unreserved crown land at Wonthaggi) |
| Management: | Parks Victoria, Shire of South Gippsland, private land holders |
| Conservation objectives: | Reservation, protection, broad-scale habitat management and fine-scale habitat management if required |

**Conservation actions undertaken:**

- Population identification

**Intended Management Actions:**

- Identify and survey potential habitat in the South East Coastal Plain Bioregion for new populations and accurately determine plant numbers within known populations
- Identify key populations
- protect populations on public land at Wonthaggi via reservation under the Crown Land (Reserves) Act 1978 and at Walkerville via Public Authority Management Agreement under Flora and Fauna Guarantee Act 1988
- Endeavour to protect populations on private land at Cape Paterson under appropriate land management agreements
- Control high-priority weed species at all sites through use of broad-scale habitat management techniques and targeted control of high-risk species (eg. Coast Tea-tree, Coast Wattle, Maritime Pine)
- Control animal pests and predators at all sites and investigate grazing impacts by macropods and rabbits at Wonthaggi after fire
- Monitor sites for the presence of Cinnamon Fungus
- Hand-pollinate plants where necessary
- Harvest and store seeds
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database on cultivated plants

**Other Desirable Management Actions:**

- Collect Vital Attribute Data following planned fires to determine appropriate fire regimes for C. fragrantissima ssp. orientalis habitat and prepare a fire management plan for key populations
- Identify pollinator and determine natural pollination levels
- Assess potential habitat and select introduction sites
- Prepare an introduction plan and establish C. fragrantissima ssp. orientalis in at least one reserved site in South Gippsland

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE Port Phillip Region; Parks Victoria Wonthaggi; Friends of Wonthaggi Heathlands, University of Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE Port Phillip Region, Box Hill; Parks Victoria, Wonthaggi; Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Mellblom's Spider-orchid *Caladenia hastata*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | SW Victoria, near Portland – Naracoorte Coastal Plain Bioregion |
| Current abundance: | 20 plants in the wild |
| Habitat: | Heathy Woodland; Damp Heathy Woodland; Damp Heathland (*sensu* NRE, in prep.) |
| Reservation status: | Reserved (Point Danger Coastal Reserve; Discovery Bay Coastal Reserve) |
| Management: | Parks Victoria, Point Danger Coastal Reserve Committee of Management |
| Conservation objectives: | Site and plant protection, broad-scale and fine-scale habitat management |

**Conservation actions undertaken:**

- Population monitoring at both sites and habitat monitoring at Point Danger
- Caging of plants at both sites
- Biomass removal/weed control using mechanical techniques and fire
- Hand-pollination of plants
- Seedling establishment trials at both sites
- Searching of potential habitat for new populations
- Ecological burning of suitable habitat to promote flowering and search of burn sites for plants
- Collection and storage of seed; collection, identification and storage of the mycorrhizal fungal associate and propagation and seedling establishment trials (Perth, WA)
- Preparation of a Recovery Plan under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and establishment of regional recovery team

**Intended Management Actions:**

- Control/restrict visitor access to populations
- Identify and further survey potential habitat in the Naracoorte Coastal Plain Bioregion for other populations
- Control high-priority weed species at all sites through use of broad-scale habitat management techniques and targeted control of high-risk species (eg. Boneseed, Coast Wattle)
- Control animal pests and predators at all sites using cages
- Monitor sites for the presence of Cinnamon Fungus
- Hand-pollinate plants as required
- Harvest and store seeds
- Implement fine-scale microhabitat management such as scattering leaf litter, seed-bed preparation, and scattering of seeds near parent plants in late summer
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Establish seedlings in cultivation and maintain a number of plants ex situ
- Maintain a database on cultivated plants

**Other Desirable Management Actions:**

- Identify pollinator and determine natural pollination levels
- Collect Vital Attribute Data following planned fires to determine appropriate fire regimes for C. hastata habitat and prepare a fire management plan for Point Danger
- Assess habitat and select introduction sites
- Prepare an introduction plan and establish a new population of C. hastata in at least one reserved site near Portland

**Responsible agencies / organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE South West Region; Portland Aluminium; Parks Victoria, Discovery Bay Coastal Park; Point Danger Coastal Reserve Committee of Management; Royal Botanic Gardens, Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE South West Region, Portland; Parks Victoria, Portland, Portland Aluminium, Portland

Biology – Gary Backhouse, NRE, Melbourne; Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Wimmera Spider-orchid *Caladenia lowanensis*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Kiata & Glenlee, Western Victoria – Murray Darling Depression Bioregion |
| Current abundance: | 240 plants at three sites |
| Habitat: | Cypress-pine/Box Woodland |
| Reservation status: | Reserved at Kiata Flora Reserve and Glenlee Flora and Fauna Reserve |
| Management: | Parks Victoria, private land holder |
| Conservation objectives: | Protection of plants and broad-scale habitat management (fine-scale management where necessary) |

**Conservation actions undertaken:**

- Population monitoring
- Hand pollination
- Seed collection
- Preliminary surveys of potential habitat
- Rabbit control
- Woody weed control

**Intended Management Actions:**

- Identify and survey potential habitat in the Murray Darling Depression Bioregion for new populations and accurately determine plant numbers within known populations
- Identify key populations
- Endeavour to protect identified populations on private land through appropriate land management agreements
- Control high-priority weed species at all sites through use of broad-scale habitat management techniques and targeted control of high-risk species (eg. Perennial Veldt Grass, annual grasses)
- Control animal pests and predators at Kiata Flora Reserve and Glenlee Flora and Fauna Reserve through rabbit-proof fencing and the use of targeted control of pest species (eg. rabbits)
- Prevent disturbance and damage to populations by controlling access to and within Kiata Flora Reserve and Glenlee Flora and Fauna Reserve by appropriate fencing and track closures
- Hand pollinate plants where populations reach critically low numbers
- Harvest and store seed
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the associated mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of C. lowanensis plants in cultivation

**Other Desirable Management Actions:**

- Collect Vital Attribute Data following planned fires to determine appropriate fire regimes for C. lowanensis habitat and prepare a fire management plan for key populations
- Assess habitat preferences and select introduction sites
- Prepare an introduction plan and establish a new population of C. lowanensis in at least one reserved site near Kiata/Glenlee
- Identify pollinator and determine natural pollination levels

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE North West Region; Parks Victoria Wimmera Conservation Reserves; Gerang Landcare Group (Friends of Kiata Flora Reserve); University of Melbourne

**Contacts:**

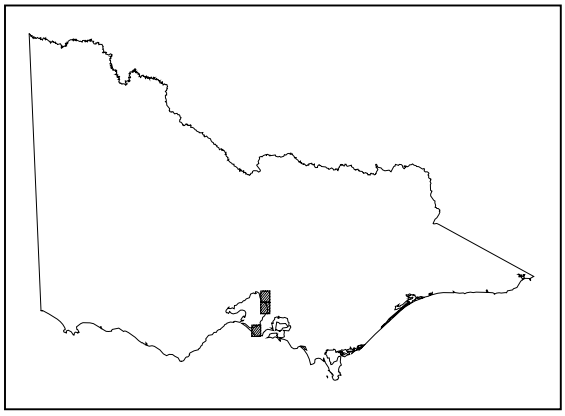
Management – NRE Flora and Fauna Programs, Melbourne; NRE North West Region, Horsham; Parks Victoria, Horsham

Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Frankston Spider-orchid *Caladenia robinsonii*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Rosebud, south east of Melbourne – South East Coastal Plain Bioregion |
| Current abundance: | Approximately 20 plants in the wild |
| Habitat: | Heathy Woodland, Damp Sands Herb-rich Woodland, Heathy Herb-rich Woodland (*sensu* NRE in prep.) |
| Reservation status: | Unreserved (occurs on land owned and managed by Mornington Peninsula Shire Council) |
| Management: | Mornington Peninsula Shire Council |
| Conservation objectives: | Protection and fine-scale management of population; *ex-situ* cultivation and re-introduction |

**Conservation actions undertaken:**



- Fencing of reserve and construction of pedestrian walking paths
- Construction of Cinnamon Fungus controls
- Burning of the eastern half of the reserve
- Woody and herbaceous weed control
- Hand pollination of plants
- Collection and storage of seed (Perth, WA)
- Population monitoring
- Production of a draft critical habitat determination and draft Public Authority Management Agreement
- Identification and searching of potential habitat both near the current population and known former habitat near Frankston
- Preparation of a draft Recovery Plan under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and establishment of regional recovery team

**Intended Management Actions:**

- Identify and survey potential C. robinsonii habitat on the Mornington Peninsula
- Reserve populations on public land at Rosebud through a Public Authority Management Agreement (under FFG Act)
- Control high-priority weed species through broad-scale habitat management techniques and targeted control of high-risk species (eg. Coast Tea-tree, Coast Wattle, Perennial Veldt Grass)
- Control animal pests and predators through caging of plants and targeted pest animal control
- Monitor the reserve for Cinnamon Fungus and implement a quarantine strategy if necessary
- Hand pollinate plants as required
- Harvest and store seed
- Implement fine-scale microhabitat management using litter scattering and seed-bed preparation techniques
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of cultivated plants

**Other Desirable Management Actions:**

- Identify pollinator and determine natural pollination levels
- Collect Vital Attribute Data to help determine appropriate burning regimes and prepare a fire management plan for the reserve
- Assess habitat and select introduction sites and prepare an introduction plan and establish a new population of C. robinsonii in at least one reserved site on the eastern shores of Port Phillip Bay

**Responsible agencies / organisations:**

- Department of Natural Resources and Environment, Victoria – PFF, PP; Parks Victoria; Mornington Peninsula Shire Council; Southern Peninsula Indigenous Flora and Fauna Association; Royal Botanic Gardens, Melbourne

**Contacts:**

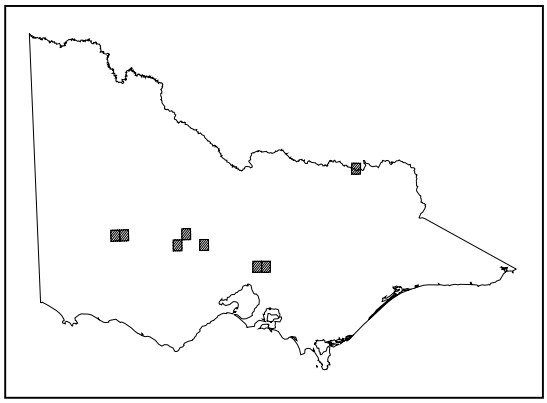
Management – NRE Flora and Fauna Programs, Melbourne; NRE Port Phillip Region, Box Hill; Mornington Peninsula Shire Council, Rosebud

Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Rosella Spider-orchid *Caladenia rosella*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Cottles Bridge, Research and Christmas Hills, north east of Melbourne and Deep Lead near Stawell (unconfirmed for several years) – Victorian Midlands Bioregion |
| Current abundance: | Approximately 130 plants in the wild in four populations |
| Habitat: | Box-Ironbark Forest; Grassy Dry Forest (*sensu* NRE, in prep.) |
| Reservation status: | Reserved (One Tree Hill Bushland Reserve, covenanted properties) |
| Conservation objectives: | Protection and fine-scale management of populations and *ex situ* cultivation/re-introduction of plants |

**Conservation actions undertaken:**



- Control of annual and perennial introduced herbs
- Caging of plants at Cottles Bridge and Christmas Hills to control pests and predators
- Fencing of Christmas Hills population
- Hand pollination of plants
- Control of annual grasses through burning
- Collection and storage of seed (Perth, WA; RBG, Melbourne)
- Fine-scale habitat management – leaf litter scattering etc.
- Population monitoring
- Conservation covenants protecting most of the Cottles Bridge population
- Translocation of plants at Cottles Bridge

**Intended Management Actions:**

- Identify and survey potential habitat for other populations (eg. Deep Lead)
- Control high-priority weed species
- Control animal pests and predators through caging of populations or fencing of habitat
- Hand pollinate plants if populations reach critically low numbers
- Harvest and store seed
- Implement fine-scale microhabitat management using litter scattering techniques
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of cultivated plants

**Other Desirable Management Actions:**

- Determine genetic relationship between Cottles Bridge and Deep Lead populations (if latter able to be located)
- Select introduction sites
- Prepare an introduction plan and establish a new population of C. rosella in at least one reserved site the Victorian Midlands bioregion, north east of Melbourne

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE Port Phillip; Parks Victoria; Trust for Nature (Victoria); land holders; Royal Botanic Gardens, Melbourne

**Contacts:**

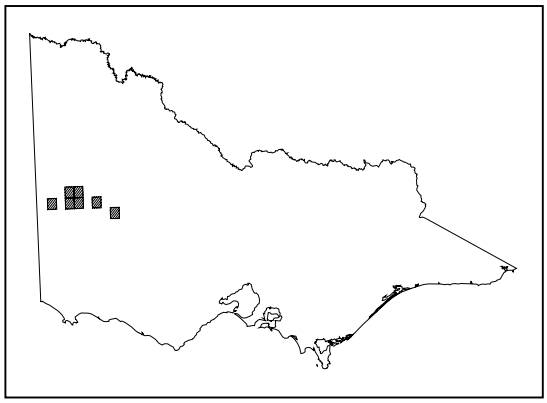
Management – NRE Flora and Fauna Programs, Melbourne; NRE Port Phillip Region, Box Hill; Parks Victoria, Warrandyte State Park

Biology – Cam Beardsell, Biological Consultant, Cottles Bridge; Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Rigid Spider-orchid *Caladenia tensa*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Western Victoria – Murray Darling Depression Bioregion |
| Current abundance: | 1000's of plants in Victoria; |
| Habitat: | Pine/Box Woodland; Sand Mallee; Heathy Woodland (*sensu* NRE, in prep.) |
| Reservation status: | Reserved in Victoria (Lt Desert National Park, Kiata Flora Reserve, West Wail Flora Reserve); Also reserved in South Australia |
| Management: | Parks Victoria |
| Conservation objectives: | Distribution/abundance estimates and broad-scale habitat management |

**Conservation actions undertaken:**



- Population monitoring
- Preliminary surveys of potential habitat in Victoria
- Hand pollinating of plants at West Wail in 1994

**Intended Management Actions:**

- Identify and survey potential habitat in the Murray Darling Depression Bioregion for new populations and accurately determine plant numbers within known populations
- Identify key populations in Victoria
- Ensure that protection of key populations forms an integral part of park management plans
- Control high-priority weed species at key population sites through use of broad-scale habitat management techniques and targeted control of high-risk species (eg. Perennial Veldt Grass)
- Control animal pests and predators at key populations sites using suitably designed fences or targeted pest animal control techniques
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus

**Other Desirable Management Actions:**

- Identify pollinator and determine natural pollination levels
- Determine genetic relationship of Victorian populations
- Collect Vital Attribute Data following fires to determine appropriate fire regimes for C. tensa habitat and prepare a fire management plan for key populations.

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE North West Region; Parks Victoria Wimmera Conservation Reserves

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE North West Region, Horsham; Parks Victoria, Horsham

Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Fringed Spider-orchid *Caladenia thysanochila*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Mount Eliza, south east of Melbourne – South East Coastal Plain Bioregion |
| Current abundance: | No plants observed in wild since 1990 |
| Habitat: | Hills Herb-rich Woodland (*sensu* NRE, in prep.) |
| Reservation status: | Unreserved (occurs on land owned and managed by Mornington Peninsula Shire Council) |
| Management: | Mornington Peninsula Shire Council |
| Conservation objectives: | Protection and fine-scale management of population and *ex-situ* cultivation/re-introduction of plants |

**Conservation actions undertaken:**

- Fencing of site (botanical reference area) in 1992
- Burning of habitat in 1994 and 1997
- Slashing of habitat in 1993
- Woody and herbaceous weed control
- Hand pollination of plant in 1990
- Population monitoring

**Intended Management Actions:**

- Identify and further survey potential Caladenia thysanochila habitat on the Mornington Peninsula
- Protect populations on public land at Mount Eliza through a Public Authority Management Agreement (under Flora and Fauna Guarantee Act 1988)
- Control high-priority weed species through broad-scale habitat management techniques and targeted control of high-risk species (eg. Sweet Vernal Grass, Yorkshire Fog Grass, Brown-top Bent, Flatweed)
- Control animal pests and predators through caging of plants and targeted pest animal control
- Hand pollinate plants (if they appear)
- Harvest and store seed
- Implement fine-scale microhabitat management using litter scattering and seed-bed establishment techniques and orchid-sensitive herbaceous weed control techniques
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of cultivated plants

**Other Desirable Management Actions:**

- Collect Vital Attribute Data to help determine appropriate burning regimes for reserve and prepare a fire management plan for the site
- Assess habitat and select introduction sites
- Prepare an introduction plan and establish a new population of C. thysanochila in at least one reserved site on the Mornington Peninsula

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE Port Phillip Region; Mornington Peninsula Shire Council; Friends Group; Royal Botanic Gardens, Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE Port Phillip Region, Box Hill; Mornington Peninsula Shire Council, Rosebud

Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

## Candy Spider-orchid *Caladenia versicolor*

| | |
|---|---|
| Conservation status: | Vulnerable in Australia, vulnerable in Victoria |
| Current distribution: | SW Victoria near Stawell – Victorian Midlands Bioregions |
| Current abundance: | Several hundred of plants in Victoria |
| Habitat: | Plains Sedgy Woodland (*sensu* NRE, in prep.) |
| Reservation status: | Unreserved in Victoria (proposed for protection within a Special Protection Zone nominated under the West Victorian RFA – Commonwealth of Australia 2000) |
| Management: | NRE – Forests, Wimmera Mallee Water |
| Recovery objectives: | Reservation, protection and broad-scale habitat management |

**Conservation actions undertaken:**

- Population monitoring
- Preliminary surveys of potential habitat in Victoria

**Intended Management Actions:**

- Identify and survey potential habitat in the Victorian Midlands and Naracoorte Coastal Plain Bioregions for new populations and accurately determine plant numbers within known populations
- Identify key populations in Victoria
- Assess and control high-priority weed species at all sites through use of broad-scale habitat management techniques and targeted control
- Harvest and store seed
- Conduct annual censusing of populations and incorporate data into VrotPop data base
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of C. versicolor plants in cultivation
- Reserve populations on public land at Lake Fyans (under the Crown Land (Reserves) Act 1978) pending the current Native Title Claim over the area

**Other Desirable Management Actions:**

- Identify pollinator and determine natural pollination levels
- Control animal pests and predators at all sites and investigate grazing impacts by macropods and rabbits at Lake Fyans using suitably designed animal exclosures and/or control techniques
- Prevent disturbance and damage to populations by controlling access to public land sites and rationalising vehicle tracks at Lake Fyans Reserve
- Assess habitat preferences and select one introduction site
- Prepare an introduction plan and establish a new population of C. versicolor in at least one reserved site the Victorian Midlands bioregion, near Stawell

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE North West Region, NRE Forests; Wimmera Mallee Water; Parks Victoria; Stawell Field Naturalists Club; Royal Botanic Gardens, Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE North West Region, Horsham

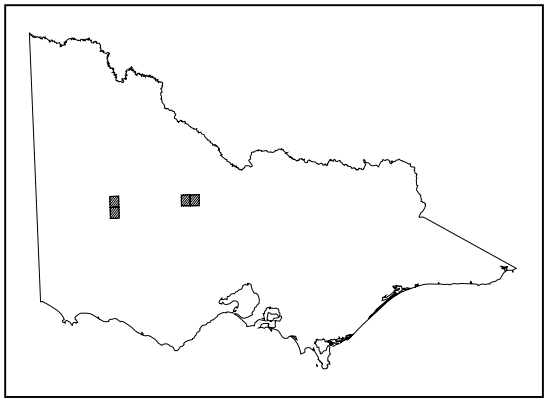
Biology – Geoff Carr, Ecology Australia Pty Ltd, Melbourne; Jeff Jeanes, Royal Botanic Gardens, Melbourne

# Yellow-lip Spider-orchid *Caladenia xanthochila*

| | |
|---|---|
| Conservation status: | Endangered in Australia, endangered in Victoria |
| Current distribution: | Western Victoria near Murtoa and central Victoria near Inglewood – Murray Darling Depression and Riverina Bioregions |
| Current abundance: | 120 plants in Victoria |
| Habitat: | Shallow Sands Woodland, Alluvial Terraces Herb-rich Woodland (*sensu* NRE, in prep.) |
| Reservation status: | Unreserved in Victoria |
| Management: | Committee of Management, NRE - Forests |
| Recovery objectives: | Reservation, protection and broad and fine-scale habitat management |

**Conservation actions undertaken:**

- Population monitoring
- Preliminary surveys of potential habitat in Victoria
- 2 x collars collected in 1994 for fungal isolation
- seed collection and storage (Perth, WA)
- fencing of both populations in 2000
- burning of Inglewood site in 2000



**Intended Management Actions:**

- Identify and survey potential habitat in the Murray Darling Depression and Riverina Bioregions for new populations and accurately determine plant numbers within known populations
- Identify key populations in Victoria
- Pursue the reservation of populations on public land in Victoria under appropriate legislation, in line with the Environment Conservation Council recommendations
- Endeavour to protect populations on private land through appropriate land management agreements
- Control high-priority weed species at all sites through use of broad-scale habitat management techniques and targeted control of high-risk species (eg. annual grasses, indigenous shrubs)
- Control animal pests and predators at all sites using suitably designed animal exclosures and targeted pest animal control techniques
- Hand pollinate plants when necessary
- Harvest and store seed
- Conduct annual censusing of populations and incorporate data into VrotPop database
- Isolate and culture the mycorrhizal fungus
- Establish seedlings in cultivation and maintain a number of plants ex-situ
- Maintain a database of C. xanthochila plants in cultivation

**Other Desirable Management Actions:**

- Collect Vital Attribute Data from habitat containing C. xanthochila populations to determine appropriate fire regimes and from this develop a fire management strategy for key populations
- Identify pollinator and determine natural pollination levels
- Determine genetic relationship of Victorian populations
- Assess habitat preferences and select one introduction site
- Prepare an introduction plan and establish one additional reserved population in the wild

**Responsible agencies/organisations:**

- Department of Natural Resources and Environment, Victoria – Parks Flora and Fauna, NRE North West Region, NRE Forests; Committee of Management; Bendigo Field Naturalists Club; Royal Botanic Gardens, Melbourne

**Contacts:**

Management – NRE Flora and Fauna Programs, Melbourne; NRE North West Region, Bendigo and Horsham; Biology – Cam Beardsell, Consultant Biologist, Cottles Bridge; Jeff Jeanes, Royal Botanic Gardens, Melbourne