

# Majestic Spider Orchid

## *(Caladenia winfieldii)*

### RECOVERY PLAN



Department of Environment and Conservation  
Kensington

## FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

DEC is committed to ensuring that threatened taxa are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) taxa, always within one year of endorsement of that rank by the Minister.

This IRP replaces IRP 15, prepared by Emma Holland, Kim Kershaw and Andrew Brown in 1996.

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. It is intended that, if the species is still ranked as Endangered (EN) at the end of the five-year term, this IRP will be reviewed and the need for further recovery actions assessed.

This IRP was approved by the Director of Nature Conservation on 30 April 2008. The allocation of staff time and provision of funds identified in this IRP is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate as of April 2008.

This IRP was prepared with financial support from the Australian Government to be adopted as a National Recovery Plan under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

## IRP PREPARATION

This IRP was prepared by Ian Wilson<sup>1</sup>, Andrew Brown<sup>2</sup> and Kym Pryor<sup>3</sup>.

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## ACKNOWLEDGMENTS

The following have provided assistance and advice in the preparation of this IRP:

Roger Hearn	Regional Ecologist, Warren Region, DEC
Andrew Crawford	Technical Officer, Threatened Flora Seed Centre, DEC
Amanda Shade	Assistant curator of displays and development, Botanic Gardens and Parks Authority

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and DEC's Donnelly District Threatened Flora team and Species and Communities Branch for assistance.

**Cover photograph** by Erica Shedley.

## CITATION

Department of Environment and Conservation (2009). Majestic Spider Orchid (*Caladenia winfieldii*) Recovery Plan. Commonwealth Department of the Environment, Water, Heritage and the Arts, Canberra.

**SUMMARY**

<b>Scientific Name</b>	<i>Caladenia winfieldii</i>	<b>Common Name</b>	Majestic Spider Orchid
<b>Family</b>	Orchidaceae	<b>Flowering Period</b>	October – November
<b>DEC Regions</b>	Warren	<b>DEC Districts</b>	Donnelly
<b>Shires</b>	Manjimup	<b>Recovery Teams</b>	Warren Region Threatened Flora Recovery Team (WRTFRT)

**Illustrations and/or further information:** Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Western Australia; Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. <http://florabase.dec.wa.gov.au>; Hoffman N. and Brown A. (1992) *Orchids of South West Australia*. 2nd Ed, University of Western Australia Press, Nedlands; Hopper S.D. and Brown A.P. (2001) *Contributions to Western Australian Orchidology: 2. New taxa and circumscriptions in Caladenia (spider, fairy and dragon orchids of Western Australia)*. Nuytsia, Vol 14, No 1/2: Pp27-307; Hearn, RW, Meissner, R, Brown, AP, Macfarlane, TD and Annel, TR (2006) *Declared Rare and Poorly Known Flora in the Warren Region*. Australian Government Department of Environment and Heritage and Western Australian Department of Conservation and Land Management.

**Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 15 (1996-1999)** prepared by Emma Holland, Kim Kershaw and Andrew Brown.

The criteria for success in the previous plan have been met, as follows: The total number of mature plants in the wild population has increased over the period of the plan.

The species' recovery has occurred due to a reduction of threatening processes due to the completed recovery actions listed below. Other recovery actions included in the previous plan are ongoing and are included in this revised plan.

**Current status:** *Caladenia winfieldii* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in December 1993 and is currently ranked as Endangered (EN) under IUCN Red List Criterion D (IUCN 2001), due to there being less than 250 mature individuals in the wild. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats are feral pigs, inappropriate fire regimes, kangaroo grazing, hydrological changes and dieback.

*Caladenia winfieldii* is currently known from a single population in DEC's Donnelly District.

**Description:** *Caladenia winfieldii* is an erect, tuberous herb 30-60 cm tall with pink flowers 8-12 cm long and 5-10 cm across. The lip (or labellum) is darker pink towards the apex and has a slender fringe up to 6 mm long. The leaf is narrow, hairy, and 10-15 cm long. The species is closely related to *C. harringtoniae* and also resembles *C. gardneri* in its pink colouration.

**Habitat requirements:** *Caladenia winfieldii* grows in grey sandy loam, rich in humus, along seasonal creeks. The associated vegetation is low woodland, comprising *Eucalyptus rudis*, *Melaleuca preissiana* and *Banksia littoralis* over scrub and herbs.

**Habitat critical to the survival of the species, and important populations:** Habitat critical to the survival of *Caladenia winfieldii* includes the area of occupancy of the population, areas of similar habitat surrounding the population, additional occurrences of similar habitat that may contain the species or be suitable for future translocations and the local surface/groundwater catchment.

**Benefits to other species or ecological communities:** *Caladenia winfieldii* occurs in association with the closely related Declared Rare Flora (DFA) species *C. harringtoniae* (VU).

**International obligations:** This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity ratified by Australia in June 1993 and will assist in implementing Australia's responsibilities under that Convention. The species is listed under the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES). This recovery plan does not affect Australia's obligations under any other international agreements.

**Indigenous Consultation:** Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Caladenia winfieldii*, or groups with a cultural connection to land that is important for the species' conservation, and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has revealed that the population does not occur at a site of Aboriginal significance. Where no role is identified for the Indigenous community associated with this species in the

development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the Indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

**Social and economic impact:** The implementation of this recovery plan is unlikely to cause significant social impact. However, it may potentially cause economic impact as the area is used for timber harvesting.

**Affected interests:** Stakeholders potentially affected by the implementation of this recovery plan include the Forest Products Commission and DEC, as they are responsible for managing the state forest in which *Caladenia winfieldii* is located.

**Evaluation of the plan's performance:** DEC in conjunction with the Warren Region Threatened Flora Recovery Team will evaluate the performance of this recovery plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

### Completed Recovery Actions

1. Feral pig activity was reported in the area in 1994. Since March 1996, District personnel have removed 51 mature and juvenile pigs adjacent to the populations. Monitoring of trapping sites and bait stations is ongoing.
2. Further timber extraction within the catchment has been deferred until potential impacts on *Caladenia winfieldii* have been identified and addressed.
3. In 1997 it was observed that 14 plants in Subpopulation 1a had been damaged by Cabbage White caterpillars (*Pieris* sp.). To reduce this damage the bases of plants were dusted with Carbaryl Cabbage Dust.
4. The population is excluded from prescribed burns, excepting approved research burns.
5. A fence was erected around Subpopulation 1a in 1996 to exclude feral pigs and kangaroos. Inspection during the subsequent flowering season revealed several plants growing outside the fenced area which was subsequently extended to include these plants. A fence was also erected to protect Subpopulation 1b.
6. Plants in both subpopulations were marked in the field, each with an assigned number for long term population studies and monitoring. This marking also allows tracking of hand pollination and the source of genetic material that has been put into storage.
7. Seed was collected for genetic testing and cryostorage from Subpopulation 1a in 1996, 1998 and 1999 and both Subpopulations 1a and 1b in 1997. The Botanic Gardens and Parks Authority currently holds two seed collections for *Caladenia winfieldii* with associated mycorrhizal soil fungi from the plants 'collar region'. Neither collection has been quantified or tested in germination trials. The fungi are now in culture at the BGPA.

### Ongoing and future recovery actions

1. The Warren Region Threatened Flora Recovery Team is overseeing the implementation of this recovery plan and will include information about it in its annual report to DEC's Corporate Executive.
2. Donnelly District DEC staff regularly monitor both subpopulations and have conducted hand pollination of the species, resulting in an increase in the number of plants.

**Recovery plan objective:** The objective of this recovery plan is to abate identified threats and maintain or enhance the viable *in situ* population to ensure the long-term preservation of the species in the wild.

### Recovery criteria

**Criteria for success:** The number of populations has increased or the number of mature individuals in the known population has increased by twenty percent or more over the term of the plan.

**Criteria for failure:** The number of mature individuals in the known population has decreased by twenty percent or more over the term of the plan.

### Recovery actions

- |   |   |
|---|---|
| 1. Coordinate recovery actions  | 8. Promote awareness  |
| 2. Monitor population   | 9. Dieback control  |
| 3. Feral pig control  | 10. Conserve genetic material   |
| 4. Monitor and if necessary undertake weed control  | 11. Conduct further surveys   |
| 5. Extend exclusion fencing   | 12. Obtain biological and ecological information                              |
| 6. Develop and implement a fire management strategy   | 13. Develop and implement a translocation proposal                            |
| 7. Demonstrate that the forest has recovered sufficiently to accommodate another round of timber harvesting | 14. Review the recovery plan and assess the need for further recovery actions |

## 1. BACKGROUND

**Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 15 (1996-1999)** prepared by Emma Holland, Kim Kershaw and Andrew Brown.

The criteria for success in the previous plan have been met with the number of mature plants in the wild increasing by more than 10% over the period of the plan.

Actions carried out under the previous plan include:

- 1.1 Continue feral pig control:** DEC Donnelly District staff have implemented pig control, resulting in the removal of 51 mature and juvenile pigs adjacent to the population. Monitoring of trapping sites and bait stations is ongoing.
- 1.2 Exclude the population from prescribed burns:** The population was excluded from all planned spring burns of surrounding vegetation and, with the exception of approved research burns, will be excluded from future prescribed burns. Firebreaks have been maintained adjacent to the population to enhance wildfire suppression activities.
- 1.3 Monitor population:** DEC Donnelly District staff have conducted annual monitoring of factors such as habitat degradation, population stability (expansion and decline), pollination activity, seed production, recruitment, and longevity.
- 1.4 Extend the exclusion fencing:** The exclusion fence has been modified to include all plants found outside the fenced area of Population 1a. Ongoing monitoring of kangaroo impact on the fence has been undertaken to maintain its effectiveness.
- 1.5 Defer further timber extraction in the catchment:** The population has been excluded from all planned timber harvesting activities within its catchment. The reintroduction of forest post timber extraction is being monitored for hydrological drawdown.
- 1.6 Conduct further surveys:** DEC Donnelly District staff with assistance from interested parties including members of the Western Australian Native Orchid Study and Conservation Group (WANOSCG), have surveyed for new populations in areas of suitable habitat.
- 1.7 Information dissemination:** Biodiversity conservation and the protection of Threatened Flora has been promoted within and external to the Donnelly District, mainly through local print media.
- 1.8 Survey for translocation sites:** DEC Donnelly District staff with assistance from the Warren Region Threatened Flora Recovery Team have conducted surveys seeking suitable areas of habitat for potential translocation sites for the species.

These and other recovery actions included in the previous plan are ongoing and are included in the revised plan.

### History

*Caladenia winfieldii* is named in honour of the late Mr Harry Winfield, a former field officer with the Western Australian Forests Department for 42 years who discovered the species. He brought the species to the attention of the Department of Conservation and Land Management (CALM) in 1987 and it was formally described by Steve Hopper and Andrew Brown in 2001.

Despite extensive surveys for the species only one other subpopulation of *Caladenia winfieldii* has ever been located. Subpopulation 1b was discovered 700 m north of the original population in 1997 by Pemberton and Manjimup DEC District staff.

The Western Australian Herbarium holds a specimen of *Caladenia winfieldii* recorded as having been collected from a location south of Manjimup in 1969. Unfortunately the population has not been relocated, as old landmarks and forestry tracks are overgrown and have disappeared.

The geographic restriction of the species suggests that *Caladenia winfieldii* is naturally rare and requires specific components within the ecosystem for reproduction and survival. The cause of such geographic restriction for *C. winfieldii* is unknown, although it may be related to a dependence on specific factors such as rare localised pollinators or associated mycorrhizal fungi.

## Description

*Caladenia winfieldii* is an erect, tuberous herb 30-60 cm tall with pink flowers 8-12 cm long and 5-10 cm across, these emitting a faint sweet odour. The lip (or labellum) is darker pink towards the apex and has a slender fringe up to 6 mm long. The leaf is narrow, hairy and 10-15 cm long. The species is closely related to *C. harringtoniae* with which it grows, but has larger, darker pink flowers, broader petals and broader, slightly clubbed sepals. *C. winfieldii* also resembles *C. gardneri* in its pink colouration but is darker in colour and has tapering sepals that lack prominently swollen clubs (Hopper and Brown 2001).

## Distribution and habitat

*Caladenia winfieldii* is known from just one population (two subpopulations) south-east of Manjimup in DEC's Donnelly District. The species grows in grey sandy loam that is rich in humus along a seasonal creek and adjacent to a seasonal swampy flat. The associated vegetation is woodland comprising *Eucalyptus rudis*, *Melaleuca preissiana* and *Banksia littoralis* over scrub and herbs. The species is often found growing at the base of and in the skirts of *Xanthorrhoea preissii*.

**Table 1 - Summary of population land vesting, purpose and management**

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
<b>1a. SE of Manjimup</b>	Donnelly	Manjimup	Conservation Commission of Western Australia	State Forest	DEC
<b>1b. SE of Manjimup</b>	Donnelly	Manjimup	Conservation Commission of Western Australia	State Forest	DEC

Populations in **bold text** are considered to be Important Populations.

## Biology and ecology

Prior to fencing the population it was observed that most *Caladenia winfieldii* plants grew through the skirts of *Xanthorrhoea preissii* or close to associated shrubs. It is assumed that these areas provided some protection from grazing kangaroos and pig damage.

As is the case with the closely related *Caladenia harringtoniae*, it is likely that flowering is stimulated by summer fire but this is not essential and many plants flower in the absence of fire. Evidence suggests that *C. winfieldii* may be killed by fire during its active growing period between late April and early November (A. Brown personal communication).

Most Western Australian orchids are pollinated by insects, such as wasps, gnats, flies and bees (Brown and Hoffman 1992). It is unclear if *Caladenia winfieldii* relies on colour, desire for pollen or sexual attraction to lure pollinators. However, it appears that pollinators are rare in the area. A 1995 survey of the *Caladenia winfieldii* population found that most flowers had shrivelled by early November and had failed to set seed. One naturally pollinated plant was found in November 1996. Flowers were hand pollinated in November 1996 and all developed healthy seed capsules, indicating that there is no internal mechanism that prevents viable seed set.

It appears that in the years following seed collection all plants that set seed had disappeared. This indicates that *Caladenia winfieldii* puts a large amount of effort into seed production (R. Hearn<sup>1</sup> personal communication).

As with other geophytic Western Australian orchids, seed germination is aided by a specific mycorrhizal soil fungus. The fungus sends hyphae into the outer cells of the underground stems of adult plants where they are digested, providing essential starches for the plant.

## Threats

*Caladenia winfieldii* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in December 1993 and is currently ranked as Endangered (EN) under IUCN Red List Criterion D (IUCN 2001), due to there being less than 250 mature individuals in the wild. The species is also listed as Endangered under

<sup>1</sup> Regional Ecologist, DEC's Warren Region.

the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) The main threats are insect damage, feral pigs, inappropriate fire regimes, kangaroo grazing, hydrological changes dieback and weeds.

- **Insect damage** from Cabbage White caterpillars *Pieris* sp. has been observed in both subpopulations since 1997. Plants have consequently been dusted with insecticide in order to reduce the damage.
- **Feral pigs** and evidence of their diggings has been observed in the area of the population over a period of several years. Pig diggings can destroy the underground storage tubers of the orchid and affect the growth of symbiotic fungi essential for providing starches for the plant and seed germination (Hoffman and Brown 1992). The areas of both subpopulations have now been fenced.
- **Inappropriate fire regimes** may cause a significant decline in the population. As *Caladenia winfieldii* is known from a single location, fire during the species' active growing period between April and early November could potentially destroy the population.
- **Kangaroo grazing** is likely to have an impact upon the species in open sites. While both known subpopulations have now been fenced to prevent grazing, kangaroos pose a threat to the expansion of subpopulations beyond the enclosed areas.
- **Rising water table** as a result of timber harvesting activities in the catchment may have an impact on the ecosystem in which the species occurs. Timber extraction within the catchment is likely to alter the hydrological regime, causing flooding and siltation (due to the close proximity of the stream and the naturally high water table at the site).
- **Dieback** (*Phytophthora cinnamomi*) is present at the *Caladenia winfieldii* site and may impact on the species. Associated species including *Xanthorrhoea preissii*, *Eucalyptus marginata*, *Banksia littoralis*, and several *Melaleuca* and *Hakea* species are susceptible to the fungus and the loss of these plants from the habitat would remove the protective cover of the orchid and potentially expose it to increased grazing pressure.
- **Weed invasion** is a threat to Subpopulation 1a. Weeds compete with *Caladenia winfieldii* for space and resources, and fuel loads built up by annual grasses potentially increase the frequency and severity of fire.

**Table 2 - Summary of population information and threats**

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. SE of Manjimup	State Forest	1989 200+ 1995 14 1997 57 1998 81 1999 99 2000 97 2001 92 2002 71 2003 166 2004 186 2005 126 2006 45+ (partial survey)	Healthy	Insect damage, feral pigs, kangaroo grazing, inappropriate fire regimes, rising water table, flooding and siltation, dieback, weed invasion.
1b. SE of Manjimup	State Forest	1997 27 1998 19 1999 7 2000 5 2001 4 2002 1 2003 3 2004 1 2005 3	Poor	Insect damage, feral pigs, kangaroo grazing, inappropriate fire regimes, rising water table, flooding and siltation, dieback.

Note: Number of plants indicated from 1995 to 2005 indicates numbers of mature flowering plants seen. 2006 data is from a partial survey only and does not indicate decline in the subpopulation.

### Guide for decision-makers

Table 2 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined habitat critical to the survival of *Caladenia winfieldii* require assessment for the potential for a significant level of impact.

## **Habitat critical to the survival of the species, and important populations**

Given that *Caladenia winfieldii* is ranked as EN, it is considered that all known habitat for wild populations is habitat critical to the survival of the species, and that all wild populations are important populations.

Habitat critical to the survival of *Caladenia winfieldii* includes the area of occupancy of the population, areas of similar habitat surrounding the population (i.e. grey sandy loam, rich in humus adjacent to seasonal creeks and seasonally wet flats), additional occurrences of similar habitat that may contain the species or be suitable for future translocations and the local surface/groundwater catchment.

## **Benefits to other species/ecological communities**

*Caladenia winfieldii* occurs in association with the closely related species *C. harringtoniae* (VU). Actions taken for the protection of *C. winfieldii* will also benefit associated species and the ecological community in which it exists.

## **International obligations**

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity that was ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The species is listed under the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES). However this recovery plan does not affect Australia's obligations under any other international agreements.

## **Indigenous Consultation**

Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Caladenia winfieldii*, or groups with a cultural connection to land that is important for the species' conservation, and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has revealed that the population does not occur on a site of Aboriginal significance, although it is located within 1.5 km of a significant site. Where no role is identified for the Indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the Indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

## **Social and economic impacts**

The implementation of this recovery plan is unlikely to cause significant social impact. However, it may potentially cause economic impact as the area is used for timber harvesting.

## **Affected interests**

Stakeholders potentially affected by the implementation of this recovery plan include the Forest Products Commission and DEC as they are responsible for managing the State Forest in which *Caladenia winfieldii* is located.

## **Evaluation of the plan's performance**

DEC in conjunction with the Warren Region Threatened Flora Recovery Team (WRTFRT) will evaluate the performance of this recovery plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.



## 2. RECOVERY OBJECTIVE AND CRITERIA

### Objectives

The objective of this recovery plan is to abate identified threats and maintain or enhance the viable *in situ* population to ensure the long-term preservation of the species in the wild.

**Criteria for success:** The number of populations has increased or the number of mature individuals in the known population has increased by twenty percent or more over the term of the plan.

**Criteria for failure:** The number of mature individuals in the known population has decreased by twenty percent or more over the term of the plan.

## 3. RECOVERY ACTIONS

### Completed recovery actions

Feral pig activity was reported in the area in 1994. Since March 1996 District personnel have removed 51 mature and juvenile pigs adjacent to the populations. Monitoring of trapping sites and bait stations is ongoing.

Further timber extraction within the catchment has been deferred until potential impacts on *Caladenia winfieldii* have been identified and addressed.

In 1997 it was observed that 14 plants in Subpopulation 1a had been damaged by Cabbage White caterpillars (*Pieris* sp.). To reduce this damage the bases of plants were dusted with Carbaryl Cabbage Dust within a week of the observation.

The population is excluded from prescribed burns, excepting approved research burns.

A fence was erected around Subpopulation 1a in 1996 to exclude feral pigs and kangaroos. Inspection during the subsequent flowering season revealed several plants growing outside the fenced area which was subsequently extended to include these plants. A fence was also erected to protect Subpopulation 1b. Since then three more plants have been observed growing outside the extended fence.

Plants in both subpopulations were marked in the field, each with an assigned number for long term population studies and monitoring. This marking also allows tracking of hand pollination and the source of genetic material that has been put into storage.

Seed was collected from Subpopulation 1a in 1996, 1998 and 1999 and both Subpopulations 1a and 1b in 1997 for genetic testing and cryostorage. Most seed was collected between November and December following a combination of natural and artificial pollination events. The Botanic Gardens and Parks Authority (BGPA) currently holds two seed collections for *Caladenia winfieldii* with associated mycorrhizal soil fungi from the plants 'collar region'. Neither collection has been quantified or tested in germination trials. The fungi are now in culture at the BGPA. Seed taken for storage in 1996 is of known parentage for three plants with the mother plant known for the fourth.

### Ongoing and future recovery actions

The Warren Region Threatened Flora Recovery Team is overseeing the implementation of this recovery plan and will include information on progress in its annual report to DEC's Corporate Executive.

Donnelly District DEC staff regularly monitor both subpopulations and have conducted hand pollination of the species, resulting in an increase in the number of plants.

The following recovery actions are roughly in order of descending priority, influenced by their timing over the term of the plan. However this should not constrain addressing any of the priorities if funding is available for 'lower' priorities and other opportunities arise.

## 1. Coordinate recovery actions

The Warren Region Threatened Flora Recovery Team (WRTFRT) will continue to coordinate recovery actions for *Caladenia winfieldii* and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions  
**Responsibility:** WRTFRT  
**Cost:** \$1,500 per year.

## 2. Monitor population

Regular monitoring of factors such as habitat degradation, weed invasion, population stability (expanding or declining), pollination activity, seed production, recruitment, longevity and the success or failure of recovery actions is essential. The population will be inspected annually and Rare Flora Report Forms completed.

**Action:** Monitor population  
**Responsibility:** DEC (Donnelly District) through the WRTFRT  
**Cost:** \$2,500 per year.

## 3. Feral pig control

DEC's Donnelly District staff will continue the monitoring of pig pellet and grain feeding stations, and undertake appropriate measures to remove feral pigs and control their potential impacts.

**Action:** Feral Pig Control  
**Responsibility:** DEC (Donnelly District) through the WRTFRT  
**Cost:** \$ 3,500 per year.

## 4. Monitor and if necessary undertake weed control

Weeds are a potential threat to *Caladenia winfieldii* plants in Subpopulation 1a. The advance of weeds towards the population will be monitored over the course of the five year plan and should weed invasion become a threat, the following steps will be taken to control the problem and minimise the impact:

1. Determine which weeds are present and select appropriate herbicides.
2. Control invasive weeds by hand removal and spot spraying as weeds first emerge.
3. Schedule weed control to include spraying at other threatened flora populations within the District.
4. Monitor populations following weed control and undertake follow-up control if necessary.

**Action:** Monitor and if necessary undertake weed control  
**Responsibility:** DEC (Donnelly District) through the WRTFRT  
**Cost:** \$1,500 per year.

## 5. Extend exclusion fencing

As kangaroo grazing and pig activity threatens all unfenced *Caladenia winfieldii* plants, the exclusion fence will be extended to include any additional plants found outside the fenced area.

**Action:** Extend exclusion fencing  
**Responsibility:** DEC (Donnelly District) through the WRTFRT  
**Cost:** \$800 in years 1, 3 and 5.

## 6. Develop and implement a fire management strategy

The habitat of *Caladenia winfieldii* is currently excluded from prescribed burns. This policy will be maintained until further scientific information becomes available regarding the species' response to fire. Fire exclusion of the area will be maintained by Donnelly District.

Research burns will take place after the approval of a science project proposal. Research findings will be used to develop and implement a fire management strategy to ensure fire occurs at a frequency, intensity and season that maximises the size and health of the population.

**Action:** Develop and implement a fire management strategy  
**Responsibility:** DEC (Donnelly District) through the WRTFRT  
**Cost:** \$2,500 in the second year (research burns) and \$1,500 in years 3 and 4 (follow-up).

## 7. Demonstrate that the forest has recovered sufficiently before another round of timber harvesting occurs

Further timber extraction may be allowed within the catchment only when it can be demonstrated the forest has recovered sufficiently to accommodate another round of harvesting. Timber extraction would not occur within the immediate vicinity of the orchid, but may be allowed nearby if it is not considered a threat.

**Action:** Demonstrate that the forest has recovered sufficiently to accommodate another round of timber harvesting  
**Responsibility:** DEC (FMB, Donnelly District, SCB) through the WRTFRT  
**Cost:** \$200 per year.

## 8. Promote awareness

The importance of biodiversity conservation and the protection of Threatened Flora will be promoted to the public. This will be achieved through an information campaign using the local print and electronic media. This is especially important as there is only one known population of *Caladenia winfieldii* and increased awareness may result in the discovery of others.

**Action:** Promote awareness  
**Responsibility:** DEC (Donnelly District, SCB, Strategic Development and Corporate Affairs) through the WRTFRT  
**Cost:** \$1,500 in the first year, \$1,000 in years three and five.

## 9. Dieback control

The site should be routinely monitored for *Phytophthora cinnamomi* (dieback) and the area treated appropriately as required. Selective or broad scale treatment with Phosphonate at the site will be implemented if deaths of associated species (i.e. *Xanthorrhoea preissii*, *Eucalyptus marginata*, *Banksia littoralis*) occur.

**Action:** Dieback control  
**Responsibility:** DEC (Donnelly District) through the WRTFRT  
**Cost:** \$1,500 in years 1-4 if required.

## 10. Conserve genetic material

Due to the low numbers of *Caladenia winfieldii* left in the wild and the threats to the single known population, collection of seed may potentially cause a reduction in seedling recruitment. This could be damaging to the health and size of the population and plants are currently being hand-pollinated to promote a higher seed set. If regular monitoring reveals no adverse effect from seed collection, a proportion of the seed will be collected annually from the population. Collections will aim to sample and preserve the widest genetic range possible.

If adequate seed collection is not possible, other methods of preserving the genetic range of the species will be investigated. The cultivation of living collections from other sources such as tubers or tissue culture is a possibility. These processes are likely to be more costly. Genetic conservation of the species should be incorporated into ongoing research.

**Action:** Conserve genetic material  
**Responsibility:** DEC (Donnelly District) through the WRTFRT, TFSC and BGPA  
**Cost:** \$1,500 per year.

#### 11. Conduct further surveys

Surveying areas of suitable habitat for new populations of *Caladenia winfieldii* and possible translocation sites will be undertaken on a systematic basis during the flowering period of the species (October - early November), particularly in seasons following summer wildfire (December-March). Volunteers from the local community, Wildflower Societies, Naturalist Clubs and WANOSCG will be invited to participate in these surveys which will be supervised by DEC staff.

**Action:** Conduct further surveys  
**Responsibility:** DEC (Donnelly District, SCB) through the WRTFRT  
**Cost:** \$1,200 per year.

#### 12. Obtain biological and ecological information

Research designed to increase understanding of the biology and ecology of *Caladenia winfieldii* will provide a scientific base for the management of the species in the wild. Research will include:

1. Response to seasonal fire events.
2. Pollination biology.
3. Investigation of factors determining level of flower and fruit abortion.
4. Study of seed development, seed germination and protocorm development.
5. The longevity of individual plants, and time taken to reach maturity.
6. Knowledge of the extent of genetic variation within the population.
7. Quantification of level of invertebrate damage to seed capsules.

**Action:** Obtain biological and ecological information  
**Responsibility:** DEC (Science Division, SCB, Donnelly District) through the WRTFRT  
**Cost:** \$5,000 in year 2 and \$7,000 in years 3-4.

#### 13. Develop and implement a translocation proposal

The development of new *Caladenia winfieldii* populations through translocation is essential for the long-term conservation of the species. Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*.

**Action:** Develop and implement a translocation proposal  
**Responsibility:** DEC (Science Division, Donnelly District) through the WRTFRT  
**Cost:** \$2,500 in year 3 and \$1,200 in years 4-5.

#### 14. Review the recovery plan and the need for further recovery actions

At the end of the fifth year, this recovery plan will be reviewed and the need for further recovery actions assessed.

**Action:** Review the recovery plan and the need for further recovery actions  
**Responsibility:** DEC (SCB, Donnelly District) through the WRTFRT

**Cost:** \$1,500 in the fifth year.

### Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	WRTFRT	Ongoing
Monitor populations	High	DEC (Donnelly District) through the WRTFRT	Ongoing
Feral pig control	High	DEC (Donnelly District) through the WRTFRT	Ongoing
Monitor and if necessary undertake weed control	High	DEC (Donnelly District) through the WRTFRT	Ongoing
Extend exclusion fencing	High	DEC (Donnelly District) through the WRTFRT	2012
Develop and implement a fire management strategy	High	DEC (Donnelly District) through the WRTFRT	2011
Demonstrate that the forest has recovered sufficiently to accommodate another round of timber harvesting	High	DEC (FMB, Donnelly District, SCB) through the WRTFRT	Ongoing
Promote awareness	Medium	DEC (Donnelly District, SCB, Strategic Development and Corporate Affairs) through the WRTFRT	2013
Dieback control	Medium	DEC (Donnelly District) through the WRTFRT	2011
Conserve genetic material	Medium	DEC (Donnelly District) through the WRTFRT and Threatened Flora Seed Centre (TFSC), KPBG	2011
Conduct further surveys	Medium	DEC (Donnelly District, SCB) through the WRTFRT	Ongoing
Obtain biological and ecological information	Medium	DEC (Science Division, SCB, Donnelly District) through the WRTFRT	2012
Develop and implement a translocation proposal	Medium	DEC (Science Division, Donnelly District) through the WRTFRT	2012
Review the recovery plan	Medium	DEC (SCB, Donnelly District) through the WRTFRT	2013

## 4. TERM OF PLAN

### Western Australia

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If the taxon is still ranked EN (WA) after five years, the need for further recovery actions and an update of this IRP will be assessed.

### Commonwealth

In accordance with the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) this adopted recovery plan will remain in force until revoked.

The recovery plan must be reviewed at intervals of not longer than 5 years.

## 5. REFERENCES

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- Hopper S.D. and Brown A.P. (2001) Contributions to Western Australian Orchidology: 2. New taxa and circumscriptions in *Caladenia* (spider, fairy and dragon orchids of Western Australia). *Nuytsia*, Vol 14, No 1/2: Pp27-307
- Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. <http://florabase.dec.wa.gov.au>
- World Conservation Union (2001) *IUCN Red List Categories: Version 3.1*. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

## 6. TAXONOMIC DESCRIPTION

Excerpt from: Hopper, S.D. and Brown, A. P. (2001) *Caladenia winfieldii*. In: *Nuytsia*, Vol. 14, No. 1/2. Pp 159 – 160.

*Plant* solitary, rarely up to three scapes. *Leaf* erect, linear, 10-15 cm x 6-8 mm, pale green, basal third usually irregularly blotched with red-purple. *Scape* 30-60 cm tall. *Flowers* 1 or 2, c. 5-10 cm across, pale to dark pink; floral faint, sweet. *Sepals and petals* stiffly held, linear-lanceolate in basal 1/5-1/3 then abruptly narrowing to a long-acuminate apex; osmophore slightly tumescent, 10-30 mm long in sepals, absent from petals, fawn, consisting of minute densely packed globular sessile glandular cells. *Dorsal sepal* erect and slightly incurved, 3.5-7.5 cm x 7 mm. *Petals* spreading horizontally then obliquely downcurved, 3-5.5 cm x 3-5mm. *Labellum* obscurely 3-lobed, 2-coloured, basal half of lamina pale pink with slightly darker radiating stripes, distal half uniformly dark pink with a recurved apex, stiffly articulate curving from erect to horizontal, middle third nearly horizontal, apical third sharply recurved, margins at widest point moderately curved upwards and terminated by obliquely ascending margins and calli; lateral lobes obliquely ascending with entire margins near the claw, becoming fimbriate with slender clubbed narrowly fusiform dark to pale pink calli to 6 mm long which are abruptly decrescent near midlobe; midlobe margins with short slender forward-facing obtuse calli decrescent towards the apex. *Lamina calli* in 4 rows extending at least 4/5 the length of the labellum, dark pink (pater proximally), sometimes white at base, golf stick-shaped, the longest c. 2 mm tall, decrescent towards apex and becoming sessile. *Column* 14-18 x 6-8 mm, broadly winged, pink with darker blotches and pale yellow suffusions. *Anther* c. 3 mm long, yellow. *Stigma* c. 3 mm long, pinkish. *Capsule* not seen.

*Caladenia winfieldii* is also similar to *C. harringtoniae*, with which it grows, but differs in its somewhat broader petals, its sepal with an osmophore, its longer labellum, its taller broader column, and uniformly pink colouration. *C. winfieldii* also resembles *C. gardneri* in its pink colouration, but is darker and has slender and tapering rather than swollen osmophores.

## SUMMARY OF RECOVERY ACTIONS AND COSTS

	Year 1			Year 2			Year 3			Year 4			Year 5		
Recovery Action	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.
Coordinate recovery actions	1,500	0	500	1,500	0	500	1,500	0	500	1,500	0	500	1,500	0	500
Monitor population	2,500	0	800	2,500	0	800	2,500	0	800	2,500	0	800	2,500	0	800
Feral pig control	2,500	500	1,000	2,500	500	1,000	2,500	500	1,000	2,500	500	1,000	2,500	500	1,000
Monitor and if necessary undertake weed control	800	0	700	800	0	700	800	0	700	800	0	700	800	0	700
Extend exclusion fencing	300	0	500	0	0	0	300	0	500	0	0	0	300	0	500
Develop and implement a fire management strategy	0	0	0	1,300	200	1,000	800	200	500	800	200	500	0	0	0
Demonstrate that the forest has recovered sufficiently to accommodate another round of timber harvesting	5000	0	0	200	0	0	200	0	0	200	0	0	200	0	0
Promote awareness	400	300	800	0	0	0	300	200	500	0	0	0	300	200	500
Dieback control	600	200	700	600	200	700	600	200	700	600	200	700	0	0	0
Conserve genetic material	800	0	700	800	0	700	800	0	700	800	0	700	800	0	700
Conduct further surveys	1,500	100	300	1,500	100	300	1,500	100	300	1,500	100	300	1,500	100	300
Obtain biological and ecological information	0	0	0	2,000	800	2,200	3,500	1,200	2,300	3,500	1,200	2,300	0	0	0
Develop and implement a translocation proposal	0	0	0	0	0	0	1,200	300	1,000	800	200	1,000	800	200	1,000
Review the recovery plan	0	0	0	0	0	0	0	0	0	0	0	0	1,000	200	300
<b>Total</b>	15,900	1,100	6,000	13,700	1,800	7,900	16,500	2,700	9,500	15,500	2,400	8,500	12,200	1,200	6,300
<b>Yearly Total</b>	<b>23,000</b>			<b>23,400</b>			<b>28,700</b>			<b>26,400</b>			<b>19,700</b>		

Ext. = External funding (funding to be sought), Other = in kind contribution by landholders, local government etc, DEC = in kind contribution by various DEC divisions.

Total DEC: \$73,800

Total Other: \$9,200

Total External Funding: \$38,200

**Total Costs: \$121,200**