



Department of  
Parks and Wildlife



Interim Recovery Plan No. 361

# Granite Spider Orchid (*Caladenia granitora*)

**Interim Recovery Plan**  
**2016–2021**



**Department of Parks and Wildlife, Western Australia**

March 2016

## List of Acronyms

The following acronyms are used in this plan:

ADTFCRT	Albany District Threatened Flora and Communities Recovery Team
BGPA	Botanic Gardens and Parks Authority
CALM	Department of Conservation and Land Management
CCWA	Conservation Commission of Western Australia
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
DEC	Department of Environment and Conservation
DAA	Department of Aboriginal Affairs
DOL	Department of Lands
DPaW	Department of Parks and Wildlife
DRF	Declared Rare Flora, now known as Threatened Flora
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
NRM	Natural Resource Management
PICA	Public Information and Corporate Affairs
RDL	Department of Regional Development and Lands
SCB	Species and Communities Branch
SWALSC	South West Aboriginal Land and Sea Council
TFSC	Threatened Flora Seed Centre
TPFL	Threatened and Priority Flora Database
UNEP-WCMC	United Nations Environment Program World Conservation Monitoring Centre
WA	Western Australia
WANOSCG	Western Australian Native Orchid Study and Conservation Group

# Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015a) and Department of Parks and Wildlife Corporate Guideline No. 35 (DPaW 2015b). Plans outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened flora, fauna and ecological communities, and begin the recovery process.

Parks and Wildlife is committed to ensuring that threatened flora 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) flora, always within one year of endorsement of that rank by the Minister.

This plan will operate from March 2016 to February 2021 but will remain in force until withdrawn or replaced. It is intended that, if *Caladenia granitora* is still ranked CR in Western Australia following 5 years of implementation, this plan will be reviewed and the need for further recovery actions assessed.

This plan was given regional approval on 14 March 2016 and was approved by the Director of Science and Conservation on 16 March 2016. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at March 2016.

**Plan preparation.** This plan was prepared by:

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**Acknowledgments.** The following people provided assistance and advice in the preparation of this plan:

Sarah Barrett	Threatened Flora Conservation Officer, Parks and Wildlife Albany District
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Thanks also to the staff of the Western Australian Herbarium for providing access to Herbarium databases and specimen information, and Parks and Wildlife Species and Communities Branch staff for assistance.

Cover photograph by Garry Brockman.

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# Summary

<b>Scientific name:</b>	<i>Caladenia granitora</i>	<b>Shire:</b>	Albany
<b>Family:</b>	Orchidaceae	<b>NRM region:</b>	South Coast
<b>Common name:</b>	Granite Spider Orchid	<b>IBRA region:</b>	Esperance Plains
<b>Flowering period:</b>	October–November	<b>IBRA subregion:</b>	Fitzgerald ESP 01
<b>DPaW region:</b>	South Coast	<b>Recovery team:</b>	Albany District Threatened Flora and Communities Recovery Team
<b>DPaW district:</b>	Albany		

**Distribution and habitat:** *Caladenia granitora* is confined to the south coast of Western Australia where it is found between Mount Manypeaks and Cheyne Beach, growing in shallow grey sands (sometimes coarse) on coastal granite headlands. Habitat is low heath 0.2 to 1.2m in height comprising *Taxandria marginata*, *Hakea trifurcata*, *Darwinia citriodora*, *Ricinocarpos glaucus*, *Anthocercis viscosa*, *Banksia formosa*, *Calothamnus quadrifidus*, *Andersonia sprengelioides*, *Eutaxia myrtifolia*, *Darwinia diosmoides* and *Spyridium globulosum*. *Caladenia granitora* is also recorded from a *Lepidosperma* herbfield (Hopper and Brown 2001).

**Habitat critical to the survival of the species, and important populations:** It is considered that all known habitat for wild populations is critical to the survival of *Caladenia granitora*, and that all wild populations are important populations. Habitat critical to the survival of *C. granitora* includes the area of occupancy of populations and areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

**Conservation status:** *Caladenia granitora* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Endangered (EN) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criterion D due to their being fewer than 250 mature individuals known. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

**Threats:** The main threats to the species are recreational activities, road maintenance, altered fire regimes and small population size.

**Existing recovery actions:** The following recovery actions have been or are currently being implemented and have been considered in the preparation of this plan:

1. Land managers have been notified of the location and threatened status of the *Caladenia granitora*.
2. Seed collected by the Botanic Gardens and Parks Authority (BGPA) from Population 1 is in long term storage.
3. Numerous surveys have been undertaken for *Caladenia granitora* in the Albany region.
4. Declared Rare Flora markers have been installed at Subpopulation 1b.

**Plan objective:** The objective of this plan is to abate identified threats and maintain or enhance extant populations to ensure the long-term conservation of the species in the wild.

### Recovery criteria

**Criteria for recovery success:** The plan will be considered a success if one or more of the following take place.

- No important populations have been lost and the number of mature plants within those populations has remained within a 15% range or has increased by >15% over the term of the plan from 63 to 72 or more; or
- New populations have been found, increasing the number of known populations from four to five or more over the term of the plan with no net loss of mature plants; or
- The area of occupancy has increased by >15% over the term of the plan with no net loss of mature plants.

**Criteria for recovery failure:** The plan will be considered a failure if one or more of the following take place.

- Important populations have been lost; or
- The number of mature plants has decreased by >15% from 63 to 54 or less; or
- The area of occupancy has decreased by >15% over the term of the plan with a net loss of mature plants.

### Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Rehabilitate habitat adjacent to the track through Subpopulation 1a
4. Collect and store seed and fungal isolates
5. Develop and implement a translocation proposal
6. Develop and implement a fire management strategy
7. Obtain biological and ecological information
8. Undertake surveys

9. Ensure long-term protection of habitat
10. Liaise with land managers and Aboriginal communities
11. Map habitat critical to the survival of *Caladenia granitora*
12. Promote awareness
13. Review this plan and assess the need for further recovery actions

# 1. Background

## History

*Caladenia granitora* was formally described in 2001 from specimens collected near Mt Manypeaks in October 1987 (Hopper and Brown 2001). The species is confined to coastal granite headlands between Mt Manypeaks and Cheyne Beach. A possible hybrid between *C. granitora* and *C. longicauda* was located west of this range at Misery Beach, Torndirrup, however, there is some doubt as to parentage as *C. granitora* has not been found at this site.

*Caladenia granitora* has been extensively searched for over the past 25 years with few populations/plants found. The species is currently known from four populations, comprising 63 plants. Due to its distinctive habitat (coastal granites) there is a high likelihood of detection if plants are present. It was listed as threatened flora on 2 December 2014.

## Description

Growing 20–35cm high, *Caladenia granitora* has a single, hairy leaf 10–18cm long by 6–8mm wide. It has up to two yellowish-cream, white and red flowers 30–5cm across with an erect narrowly-clubbed dorsal sepal, spreading to down-swept, narrowly-clubbed lateral sepals, spreading to down-swept petals and a white and red, red-tipped, outward projecting labellum with relatively short fringe segments and four or more rows of pale red or white calli, which extend to about two-thirds the length of the labellum (Brown *et al.* 2013).

*Caladenia granitora* appears most closely related to *C. infundibularis* which is found between the Leeuwin-Naturaliste Ridge and Northcliffe. Both species have a similar flattened labellum that projects outwards before turning down near the apex. *C. granitora* can be distinguished from *C. infundibularis* by its smaller, paler flowers and easterly distribution (Brown *et al.* 2013; Hopper and Brown 2001).

A possible hybrid between *Caladenia granitora* and *C. longicauda* has been recorded at Misery Beach, Torndirrup. However, the solitary plant was found outside of the known range of *C. granitora*.

*Caladenia granitora* is named from granite and the Latin *ora* (coast), referring to the coastal granite habitat of the species (Hopper and Brown 2001).

## Illustrations and/or further information

Brown, A., Dixon, K., French, C. and Brockman, G. (2013) Field Guide to Orchids of Western Australia. Simon Nevill Publications, Australia; 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* 14(1–2): 27–314; Western Australian Herbarium (1998–) *FloraBase – the Western Australian Flora*. Department of Parks and Wildlife.

<http://florabase.dpaw.wa.gov.au/>.

## Distribution and habitat

*Caladenia granitora* is confined to the south coast of Western Australia where it is found between Mount Manypeaks and Cheyne Beach, growing in shallow grey sands (sometimes coarse) on coastal granite headlands. Habitat is low heath 0.2 to 1.2m in height comprising *Taxandria marginata*, *Hakea trifurcata*, *Darwinia citriodora*, *Ricinocarpos glaucus*, *Anthocercis viscosa*, *Banksia formosa*, *Calothamnus quadrifidus*, *Andersonia sprengelioides*, *Eutaxia myrtifolia*, *Darwinia diosmoides* and *Spyridium globulosum*. *Caladenia granitora* is also recorded from a *Lepidosperma* herbfield (Hopper and Brown 2001).

**Table 1. Summary of population land vesting, purpose and manager**

TPFL population number & location	DPaW district	Shire	Vesting	Purpose	Manager
1a. Cheyne Beach	Albany	Albany	LGA	Recreation reserve	City of Albany
1b. Cheyne Beach	Albany	Albany	LGA	Road reserve	City of Albany
1c. Cheyne Beach	Albany	Albany	LGA	Recreation reserve	City of Albany
2. Mt Manypeaks	Albany	Albany	CCWA	Nature reserve	Parks and Wildlife
3. Mt Manypeaks	Albany	Albany	CCWA	Nature reserve	Parks and Wildlife
4. SW of Cheyne Beach	Albany	Albany	RDL	Trig Station	Parks and Wildlife

## Biology and ecology

*Caladenia granitora* flowers between late September and early November with fruit set between November and early December. The species has narrow sepaline clubs which emit pheromones that deceive male thynnine wasps into thinking a female wasp is present. Once attracted, the male wasps attempt copulation with the labellum of the flower and in the process inadvertently deposit or remove pollen. Research on *Caladenia* pollination (Phillips *et al.* 2009; Stoutamire 1983) and preliminary studies of the pollination of *C. granitora* (R. Phillips, unpublished data) suggest that pollination is likely to involve an undescribed species of wasp belonging to the genus *Thynnoides*.

Seed capsules are thought to contain up to 30,000 seeds which are wind dispersed (Batty 2001). Seeds are thought to require the establishment and maintenance of a relationship with a specific mycorrhizal fungus for germination, growth and development (Ramsay *et al.* 1986; Swarts *et al.* 2010). There are no estimates of seed viability available for *C. granitora*, however, in other *Caladenia* species seed viability is approximately 60 to 90% (Swarts 2007).

It is expected that plants of *Caladenia granitora* will reach reproductive maturity about three years following germination, as has been shown for *C. huegelii* (Swarts 2007). Estimates for other *Caladenia* species have shown that plants can live in excess of 30 years (K. Dixon, unpublished observation). There are no estimates available for population structure. However, an estimate of reproductive success in 2012 indicated fruit set to be approximately 25% at Population 1 (Cheyne Beach). The pollinator is common in the area of this population, suggesting that fruit set is likely to be common in most years (R.D. Phillips, unpublished data). The pollinator has also been recorded at several sites in Waychinnicup National Park.

*Caladenia* plants are not killed by summer fire which can enhance the flowering of some species the following growing season. However, winter and early spring fires, when the plants' leaf is present and the new tuber is being formed, can be detrimental and may kill the plant. Fire is not required for the flowering of this species.

## Conservation status

*Caladenia granitora* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Endangered (EN) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criterion D due to their being fewer than 250 mature individuals known. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

## Threats

- **Recreational activities.** Destruction of habitat by 4WD vehicles and track maintenance is a threat to Subpopulation 1a. The subpopulation is located within a recreation reserve and adjoins a parking area and track. The margins of the parking area and track have been gradually expanding, destroying orchid habitat. Recent works have been carried out on the track, upgrading and resurfacing it to discourage vehicles running off its edge.
- **Road maintenance.** Threats to Subpopulation 1b include grading, chemical spraying, construction of drainage channels and the slashing of roadside vegetation.
- **Altered fire regimes.** Fire during the summer when plants are dormant has no known detrimental impact on the species. However, fire during late autumn, winter and early spring may adversely affect the viability of populations by directly killing plants and also preventing seed set. Most orchid species emerge from the soil by mid-April and dehisce their seed by late November. The optimum time for fire is therefore between December and mid-April. In some circumstances, when it is deemed unavoidable, fire may be implemented as early as mid-October. This will affect seed production, but is not expected to kill plants as the replacement tuber would be sufficiently mature for generation the following year. Fire may facilitate weed invasion and when it occurs should be followed up with appropriate weed control.
- **Small population size.** As *Caladenia granitora* is known from less than 100 plants, and its habitat is limited to a few coastal granites, the likelihood of the species falling victim to a chance demographic or environmental event is high.

The intent of this plan is to provide actions that will mitigate immediate threats to *Caladenia granitora*. Although climate change and drought may have a long-term effect on the species, actions taken directly to prevent their impact are beyond the scope of this plan.



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

TPFL population number & location	Land status	Year/no. mature plants		Condition		Threats
				Plants	Habitat	
<b>1a. Cheyne Beach</b>	Shire recreation reserve	1999	40	Moderate	Good/part degraded	Recreational activities, track maintenance
		2009	56*			
		2013	53 (3) [1]*			
		2014	20*			
		2015	50*			
<b>1b. Cheyne Beach</b>	Shire road reserve	2009	56*	Moderate	Good/part degraded	Recreational activities, road maintenance
		2013	53 (3) [1] *			
		2014	20*			
		2015	50*			
<b>1c. Cheyne Beach</b>	Shire recreation reserve	2009	56*	Moderate	Good/part degraded	Recreational activities
		2011	22 [6]			
		2012	20 (1)			
		2013	53 (3) [1]*			
		2014	20*			
		2015	50*			
<b>2. Mt Manypeaks</b>	Nature reserve	1987	10	Healthy	Good	Fire
		2015	2 (leaves only)			
<b>3. Mt Manypeaks</b>	Nature reserve	1987	8	Healthy	Good	Fire
<b>4. SW of Cheyne Beach</b>	Geodetic station	2002	12	Healthy	Good	Fire
		2015	13			

**Note:** all populations (**bold text**) are considered to be important populations; \* = total for subpopulations 1a, b and c combined; ( ) = number of seedlings/juveniles; [ ] = number plants dead.

## Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land clearing in the immediate vicinity of *Caladenia granitora* may require assessment. Actions that result in any of the following may potentially have a significant impact on the species:

- Damage or destruction of associated habitat.
- Reduction of pollinator habitat.
- Alteration of the local surface hydrology or drainage.
- Altered fire regimes.
- Reduction in population size.

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

Given that *Caladenia granitora* is ranked as EN, it is considered that all known habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *C. granitora* includes the area of occupancy of populations and areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the species or be

suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

## Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Caladenia granitora* will also improve the status of associated native vegetation. Two threatened and three Priority flora taxa occur within 500m of the species (see Table 3).

**Table 3. Conservation-listed flora species occurring within 500m of *Caladenia granitora***

Species name	Conservation status (WA)	Conservation status (EPBC Act 1999)
<i>Banksia verticillata</i>	DRF (CR)	Vulnerable
<i>Daviesia ovata</i>	DRF (CR)	-
<i>Stylidium articulatum</i>	Priority 2	-
<i>Leucopogon altissimus</i>	Priority 3	-
<i>Pomaderris grandis</i>	Priority 4	-

For a description of conservation codes for Western Australian flora and fauna see [http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation\\_code\\_definitions\\_18092013.pdf](http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf)

*Caladenia granitora* also benefits from the protection of habitat containing the threatened fauna species - Noisy Scrub-bird, Western Bristlebird, Western Whipbird and Carnaby's Cockatoo.

## 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 not listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES), and this plan does not affect Australia's obligations under any other international agreements.

## Aboriginal consultation

A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Sites Register revealed no registered Aboriginal sites adjacent to populations of *Caladenia granitora*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and DAA to determine if there are any issues or interests with respect to management for this species. Opportunity for future involvement in the implementation of the recovery plan is included as an action in the plan. Aboriginal involvement in management of land covered by an agreement under the Western Australian *Conservation and Land Management Act 1984* is also provided for under the joint resting and joint management arrangements in that Act, and will apply if an agreement is established over any lands reserved under the Act on which this species occurs.

## Social and economic impacts

The implementation of this recovery plan may result in some social and economic impact through restrictions imposed on the management of land on which the species occurs, including maintenance of fences and firebreaks, road infrastructure and future development and asset protection.

## Affected interests

City of Albany, particularly on land that is not specifically managed for conservation. Recovery actions refer to continued liaison between affected stakeholders.

## Evaluation of the plan's performance

Parks and Wildlife, with assistance from the Albany District Threatened Flora and Communities Recovery Team (ADTFCRT), will evaluate the performance of this 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

### Plan objective

The objective of this plan is to abate identified threats and maintain or enhance extant populations to ensure the long-term conservation of the species in the wild.

### Recovery criteria

**Criteria for recovery success:** The plan will be considered a success if one or more of the following occur.

- No important populations have been lost and the number of mature plants within those populations has remained within a 15% range or has increased by >15% over the term of the plan from 63 to 72 or more; or
- New populations have been found, increasing the number of known populations from four to five or more over the term of the plan with no net loss of mature plants; or
- The area of occupancy has increased by >15% over the term of the plan with no net loss of mature plants.

**Criteria for recovery failure:** The plan will be considered a failure if one or more of the following occur.

- Important populations have been lost; or
- The number of mature plants has decreased by >15% from 63 to 54 or less; or
- The area of occupancy has decreased by >15% over the term of the plan with a net loss of mature plants.

## 3. Recovery actions

### Existing recovery actions

Land managers (City of Albany) have been notified of the location and threatened status of *Caladenia granitora*. Notifications detail their legal obligations in regards to its protection.

Seed collected by the Botanic Gardens and Parks Authority (BGPA) from Population 1 is in long term storage.

Surveys undertaken in the Albany region over the last 25 years (see below) have not yielded any new populations of *Caladenia granitora*.

Surveys include:

- Between 1987 and 2013, Stephen Hopper (UWA, formerly CALM) and Andrew Brown (Parks and Wildlife) searched for *Caladenia granitora* between Beaufort Inlet and Albany. Members of Western Australian Native Orchid Study and Conservation Group (WANOSCG) also searched for the species during this period.
- Volunteers in the "Adopt an Orchid Project" have extensively surveyed for *Caladenia granitora* over the past four years.
- In 2001 Sarah Barrett surveyed for *Caladenia granitora* at the east end of Normans Beach near Mount Manypeaks.
- Between 2009 and 2013, Keith Smith of Formosa Flora (a consultant specialising in orchid work) dedicated a total of 130 hours searching for *Caladenia granitora*, including searches of coastal granites at Torbay, Cape Riche, West Cape Howe, Albany/Torndirrup, Cheyne Beach, Two Peoples Bay and Betty Beach.
- Between 2011 and 2013, Trevor Cunningham (Adopt an Orchid Project) undertook detailed surveys for *Caladenia granitora*, with plants found only in Population 1.
- Other skilled amateur orchidologists have also been intensively searching the Albany district for *Caladenia granitora* without locating any new populations of the species. Of particular note is the late Ron Heberle, an authority on orchids of this region, who surveyed around Albany for over 50 years.

### Future recovery actions

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 recovery action if funding is available and other opportunities arise. Where these recovery actions are implemented on lands other than those managed by Parks and Wildlife, permission has been or will be sought from the appropriate land managers prior to actions being undertaken.

## 1. Coordinate recovery actions

Parks and Wildlife with assistance from the ADTF CRT will coordinate the implementation of this plan and include information on progress in annual reports.

<b>Action:</b>	Coordinate recovery actions
<b>Responsibility:</b>	Parks and Wildlife (Albany District), with assistance from the ADTF CRT
<b>Cost:</b>	\$8,000 per year

## 2. Monitor populations

Monitoring of *Caladenia granitora* populations and habitat should be undertaken to identify trends or potential management requirements. Population monitoring should record the health and expansion or decline in the population, and other observations such as pollinator activity or seed production. Site monitoring should include observations of grazing, habitat degradation including weed invasion, and hydrological status (inundation and drought). Specific monitoring of hydrology and activities relating to research into the biology and ecology of *C. granitora* are included in other recovery actions detailed below.

<b>Action:</b>	Monitor populations
<b>Responsibility:</b>	Parks and Wildlife (Albany District), with assistance from the ADTF CRT and WANOSCG
<b>Cost:</b>	\$8,000 per year

## 3. Rehabilitate habitat adjacent to the track through Subpopulation 1a

Four wheel drive access will be managed by confining vehicles to the track through Subpopulation 1a. Rehabilitation will be undertaken in degraded areas alongside the track.

<b>Action:</b>	Rehabilitate habitat adjacent to the track through Subpopulation 1a
<b>Responsibility:</b>	Parks and Wildlife (Albany District), City of Albany
<b>Cost:</b>	\$10,000 in years 1 and 2

## 4. Collect and store seed and fungal isolates

To guard against the extinction of natural *Caladenia granitora* populations it is recommended that seed along with samples of the orchid's symbiotic fungus be collected and stored at the Botanic Gardens and Parks Authority (BGPA). Collections should aim to sample and preserve the maximum range of genetic diversity possible (which should be determined by an appropriate molecular technique such as genetic fingerprinting if feasible).

<b>Action:</b>	Collect and store seed and fungal isolates
<b>Responsibility:</b>	Coordinated by Parks and Wildlife (Albany District), implemented by BGPA
<b>Cost:</b>	\$5,000 per year

## 5. Develop and implement a translocation proposal

Translocations may be required for the long term conservation of *Caladenia granitora* if natural populations decline.

Information on the translocation of threatened plants and animals in the wild is provided in Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015a), Parks and Wildlife Corporate Guideline No. 36 (DPaW 2015c) and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al.* 2004). The 2004 guidelines state that a translocation may be needed when a species is represented by few populations and the creation of additional self-sustaining, secure populations may decrease its susceptibility to catastrophic events and environmental stochasticity. For small populations which may be declining in size or subject to high levels of inbreeding, successful population enhancement may increase population stability and hence long-term viability. Translocation is not an alternative to *in situ* conservation and is not a suitable ameliorative, compensatory, or mitigating measure for development and should be considered as a last resort when all other options are deemed inappropriate or have failed (Vallee *et al.* 2004).

Depending on the characteristics of the species, Vallee *et al.* (2004) suggest a minimum viable population size estimated between 50 and 2,500 individuals will be required. Suitable translocation sites may include where the taxon occurs, where it was known to have occurred historically and other areas that have similar habitat (soil, associated vegetation type and structure, aspect etc.), within the known range of the taxon (Vallee *et al.* 2004).

All translocation proposals require endorsement by the department's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

<b>Action:</b>	Develop and implement a translocation proposal
<b>Responsibility:</b>	Parks and Wildlife (Science and Conservation Division, Albany District), BGPA
<b>Cost:</b>	\$42,000 in years 1 and 2; and \$26,500 in subsequent years as required

## 6. Develop and implement a fire management strategy

*Caladenia granitora* is thought to be killed by fire if it occurs while the plant is in active growth. It is important therefore that a fire regime with appropriate fire frequency, intensity and seasonality be applied to areas occupied by the species. The development of a fire management strategy, in consultation with land managers, including recommendations on prescribed fire frequency, intensity and seasonality, strategies for reacting to and preventing wildfire, and consideration regarding the need, method of construction, and maintenance of firebreaks is recommended.

<b>Action:</b>	Develop and implement a fire management strategy
<b>Responsibility:</b>	Parks and Wildlife (Albany District)
<b>Cost:</b>	\$10,000 in year 1, and \$6,000 in years 2–5

## 7. Obtain biological and ecological information

Research on the biology and ecology of *Caladenia granitora* will include:

1. Identification of the fungal symbiont associated with the species and its distribution in the wild.
2. Identification of pollinators and their habitat requirements.
3. Seed viability.
4. Conditions necessary for natural germination.
5. Response to disturbance, competition, drought, inundation and grazing.
6. Longevity of plants, time taken to reach maturity, and minimum viable population size.

<b>Action:</b>	Obtain biological and ecological information
<b>Responsibility:</b>	Parks and Wildlife (Science and Conservation Division, Albany District), BGPA
<b>Cost:</b>	\$50,000 in years 1–3

## 8. Undertake surveys

Surveys for *Caladenia granitora* should be undertaken in areas of potentially suitable habitat. Where feasible, volunteers from WANOSCG, landcare groups, wildflower societies and naturalists clubs will be encouraged to participate. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and prevent duplication of effort.

<b>Action:</b>	Undertake surveys
<b>Responsibility:</b>	Parks and Wildlife (Albany District), with assistance from the ADTFCRT and volunteers
<b>Cost:</b>	\$10,000 per year

## 9. Ensure long-term protection of habitat

Parks and Wildlife will investigate ways and means of improving the security of *Caladenia granitora* habitat. This may include vesting change, acquiring land or developing management plans in consultation with land managers.

<b>Action:</b>	Ensure long-term protection of habitat
<b>Responsibility:</b>	Parks and Wildlife (Albany District, Species and Communities Branch (SCB)), City of Albany, in consultation with Department of Lands (DOL)
<b>Cost:</b>	\$4,000 per year

## 10. Liaise with land managers and Aboriginal communities

Staff from Parks and Wildlife Albany District will liaise with land managers to ensure that populations of *Caladenia granitora* are not accidentally damaged or destroyed and its habitat is maintained in suitable condition for the conservation of the species. Aboriginal consultation will take place to determine if there are any issues or interests in areas that are habitat for the species.

<b>Action:</b>	Liaise with land managers and Aboriginal communities
<b>Responsibility:</b>	Parks and Wildlife (Albany District)
<b>Cost:</b>	\$4,000 per year

## 11. Map habitat critical to the survival of *Caladenia granitora*

Although habitat critical to the survival of *Caladenia granitora* is alluded to in Section 1, it has not yet been mapped. If additional populations are located, habitat critical to their survival will also be determined and mapped.

<b>Action:</b>	Map habitat critical to the survival of <i>Caladenia granitora</i>
<b>Responsibility:</b>	Parks and Wildlife (SCB, Albany District)
<b>Cost:</b>	\$6,000 in year 2

## 12. Promote awareness

The importance of biodiversity conservation and the protection of *Caladenia granitora* will be promoted to the public. Formal links with local naturalist groups and interested individuals will also be encouraged.

<b>Action:</b>	Promote awareness
<b>Responsibility:</b>	Parks and Wildlife (Albany District, SCB, Public Information and Corporate Affairs (PICA)), with assistance from the ADTFCRT
<b>Cost:</b>	\$7,000 in years 1 and 2; \$5,000 in years 3–5

## 13. Review this plan and assess the need for further recovery actions

If *Caladenia granitora* is still ranked as EN at the end of the five year term of this plan, the plan will be reviewed and the need for further recovery actions assessed.

<b>Action:</b>	Review this plan and assess the need for further recovery actions
<b>Responsibility:</b>	Parks and Wildlife (SCB, Albany District)
<b>Cost:</b>	\$6,000 at the end of year 5



**Table 4. Summary of recovery actions**

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Albany District), with assistance from the ADTFCRT	Ongoing
Monitor populations	High	Parks and Wildlife (Albany District), with assistance from the ADTFCRT	Ongoing
Rehabilitate habitat adjacent to the track through Subpopulation 1a	High	Parks and Wildlife (Albany District), City of Albany	2018
Collect and store seed and fungal isolates	High	Coordinated by Parks and Wildlife (Albany District), implemented by BGPA	2021
Develop and implement a translocation proposal	High	Parks and Wildlife (Science and Conservation Division, Albany District), BGPA	2021
Develop and implement a fire management strategy	High	Parks and Wildlife (Albany District)	Developed by 2016, implementation ongoing
Obtain biological and ecological information	High	Parks and Wildlife (Science and Conservation Division, Albany District), BGPA	2019
Undertake surveys	High	Parks and Wildlife (Albany District), with assistance from the ADTFCRT and volunteers	Ongoing
Ensure long-term protection of habitat	High	Parks and Wildlife (Albany District, SCB), City of Albany, in consultation with DOL	2021
Liaise with land managers and Aboriginal communities	High	Parks and Wildlife (Albany District)	Ongoing
Map habitat critical to the survival of <i>Caladenia granitora</i>	Medium	Parks and Wildlife (SCB, Albany District)	2018
Promote awareness	Medium	Parks and Wildlife (Albany District, SCB, PICA), with assistance from the ADTFCRT	2021
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, Albany District)	2021

## 4. Term of plan

This plan will operate from March 2016 to February 2021 but will remain in force until withdrawn or replaced. If *Caladenia granitora* is still ranked EN after five years, the need for further recovery actions will be assessed and a revised plan prepared if necessary.

## 5. References

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## 6. Taxonomic description

***Caladenia granitora*** Hopper & A.P.Br.

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* 14(1–2): 27–314.

*Plant* solitary, rarely in loose clumps. *Leaf* erect, linear, 10–18cm x 6–8mm, pale green, basal third usually irregularly blotched with red-purple. *Scape* 20–35cm tall. *Flowers* 1 or 2, c. 3–5cm across, predominantly yellowish-green to white with variable suffusions, lines and spots of maroon to pinkish-maroon; floral odour absent. *Sepals and petals* stiffly held, linear-lanceolate in basal half to a third, then abruptly narrowing to a long-acuminate apex; osmophore slightly tumescent, 6–10mm long on sepals, absent from petals, light golden brown, consisting of minute densely packed globular sessile glandular cells. *Dorsal sepal* erect and slightly incurved, 3–4.5cm x 2.0–2.5mm. *Lateral sepals* obliquely downcurved, 3.5–4cm x 3.0–3.5mm. *Petals* horizontal to obliquely downcurved, 3.0–3.5cm x 2.5–3mm. *Labellum* obscurely 3-lobed, prominently 2-coloured, white or greenish-cream sometimes with pinkish maroon radiating stripes and suffusions confined to outer marginal areas of the lateral lobes near fringing calli, terminating in a uniformly dull maroon recurved apex usually occupying less than half the midlobe, stiffly articulate on a claw c. 1.5mm wide; lamina linear-cordate to cordate in outline when flattened, 18–22 x 11–13mm, basal quarter curving from erect to oblique, middle half slightly curved to horizontal and flattened laterally, apical quarter sharply downcurved with margins so as to be channelled medially, almost forming a funnel, margins at widest point flattened and terminated by slightly ascending calli; lateral lobes erect with entire margins near the claw, becoming fimbriate with slender acuminate linear pinkish-maroon white-tipped calli to 4mm long which are abruptly decrescent near midlobe; midlobe margins with short broad slightly forward-facing obtuse sometimes hooked calli decrescent towards the apex. *Lamina calli* in 4 rows extending 1/3–1/2 the length of the labellum, cream, golf stick-shaped, the longest c. 1.5mm tall, slightly decrescent towards apex. *Column* 12–15 x 6–8mm, broadly winged, creamy yellow. *Anther* c. 2–2.5 x 2–2.5mm, yellowish green. *Pollinia* c. 2mm long, yellow. *Stigma* c. 2–2.5mm wide, dark yellowish brown. *Capsule* not seen.