



Department of
Parks and Wildlife



Interim Recovery Plan No. 342

Lodge's Spider Orchid (*Caladenia lodgeana*)

Interim Recovery Plan
2014–2019



Department of Parks and Wildlife, Western Australia

June 2014

List of Acronyms

The following acronyms are used in this plan:

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
DAA	Department of Aboriginal Affairs
DEC	Department of Environment and Conservation
DPaW	Department of Parks and Wildlife (also shown as Parks and Wildlife)
DRF	Declared Rare Flora (also shown as Threatened)
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
ERGA	Environmental Research Group Augusta
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
NRM	Natural Resource Management
PICA	Public Information and Corporate Affairs
PEC	Priority Ecological Community
RDL	Department of Regional Development and Lands
SCB	Species and Communities Branch (Parks and Wildlife)
SCD	Science and Conservation Division
SWALSC	South West Aboriginal Land and Sea Council
SWRTFCRT	South West Region Threatened Flora and Communities Recovery Team
TEC	Threatened Ecological Community
UCL	Unallocated Crown Land
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 Policy Statements Nos. 44 and 50 (CALM 1992; CALM 1994). Note: The Department of Conservation and Land Management (CALM) formally became the Department of Environment and Conservation (DEC) in July 2006 and the Department of Parks and Wildlife in July 2013. Plans 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.

Parks and Wildlife 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, within one year of endorsement of that rank by the Minister.

This plan will operate from June 2014 to May 2019 but will remain in force until withdrawn or replaced. It is intended that, if the species is still ranked as CR in Western Australia, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 10 June 2014 and was approved by the Director of Science and Conservation on 25 June 2014. 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 June 2014.

Plan preparation: This plan was prepared by:

Robyn Luu	Project Officer, Parks and Wildlife Species and Communities Branch, Locked Bag 104, Bentley
Andrew Brown	Threatened Flora Coordinator, Parks and Wildlife Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, Western Australia, 6983.

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

Ben Lullfitz	Flora Conservation Officer, Parks and Wildlife Blackwood District
Belinda Newman	Research Scientist, Botanic Gardens and Parks Authority (BGPA)
Ryan Phillips	Research Scientist, BGPA, the Australian National University
Andrew Webb	Regional Flora Conservation Officer, Parks and Wildlife South West Region

Thanks also to the staff of the Western Australian Herbarium for providing access to Herbarium databases and specimen information.

Cover photograph by Andrew Brown.

Citation: This plan should be cited as:

Department of Parks and Wildlife (2014) Lodge's Spider Orchid (*Caladenia lodgeana*) Interim Recovery Plan 2014–2019. Interim Recovery Plan No. 342. Department of Parks and Wildlife, Western Australia.

Summary

Scientific name: *Caladenia lodgeana*
Family: Orchidaceae
DPaW region: South West
Shire: Augusta-Margaret River
IBRA region: Warren
IBRA subregion: Warren WAR01

Common name: Lodge's Spider Orchid
Flowering period: late October–early December
DPaW district: Blackwood
NRM region: South West Catchment Council
Recovery team: SWRTFCRT

Distribution and habitat: *Caladenia lodgeana* is currently known from a single population at Augusta, growing under low scrub of *Dodonaea ceratocarpa*, *Melaleuca* and *Leptospermum* spp. with occasional emergent *Corymbia calophylla* in seasonally moist to wet clay soil on the margins of low granite outcrops (Hopper and Brown 2001).

Habitat critical to the survival of the species, and important populations: Given that *Caladenia lodgeana* is ranked as Critically Endangered (CR), 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. lodgeana* includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), 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 lodgeana* is specially protected under the Western Australian *Wildlife Conservation Act 1950* and is ranked as CR in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria B2ab(ii,iii,v) due to its area of occupancy being less than 10km²; it is only known to occur in a single location; and a there being a projected continual decline in the area of occupancy, area, extent or quality of habitat and number of mature individuals. The species is listed as CR under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: The main threats to the species are possible future clearing, inappropriate fire regimes, 4WD access, picking and trampling, grazing, weeds 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. Parks and Wildlife placed a cage over one plant of *Caladenia lodgeana* in 2007 to prevent it being grazed.
2. Small portions of leaf material collected from mature *Caladenia lodgeana* plants by the Botanic Gardens and Parks Authority (BGPA) are stored in dry silica gel for future genetic analysis.
3. Numerous surveys have been undertaken for *Caladenia lodgeana*.
4. *Caladenia lodgeana* pollination studies were undertaken by BGPA at 27 baiting sites (moving picked flowers to new sites) in 2009 and 2012.
5. Environmental Research Group Augusta (ERGA) installed signage at Population 2 in September 2013.

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

Recovery criteria

Criteria for recovery success:

- The number of extant populations has increased from one to two or more over the term of the plan and/or
- The number of mature individuals has increased by 20% or more over the term of the plan from 62 plants to 74 or more.

Criteria for recovery failure:

- The number of populations has decreased from one population to none over the term of the plan and/or
- The number of mature individuals has decreased by 20% or more over the term of the plan from 62 plants to 50 or less.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Control access to Population 2
4. Ensure long-term protection of habitat
5. Investigate options to reduce impact from herbivores
6. Develop and implement a fire management strategy
7. Collect and store seed and fungal material
8. Undertake surveys
9. Undertake weed control

10. Obtain biological and ecological information
11. Develop and implement translocations
12. Liaise with land managers and Aboriginal communities
13. Promote awareness
14. Map habitat critical to the survival of *Caladenia lodgeana*
15. Review this plan and assess the need for further recovery actions

1. Background

History

The first collection of *Caladenia lodgeana* was made in Leeuwin-Naturaliste National Park south of Augusta by Eric Chapman in 1984. A single mature plant was then found at Margaret River by Stephen Hopper in 1987. Despite numerous searches by Parks and Wildlife and members of the Western Australian Native Orchid Study and Conservation Group (WANOSCG), no plants have been located at either of these sites since the original collections. A third population found near Augusta remains the only one currently known to contain extant plants.

Caladenia lodgeana was formally described in 2001, the species being named in honour of Harry Lodge, a foundation member of the Western Australian Native Orchid Study and Conservation Group (WANOSCG).

In 2008, Eleanor Bennett collected a plant near Collie, some 140km north of the previous known distribution of the species that was initially thought to be *Caladenia lodgeana*. However, taxonomic studies (Brown *et al.* in prep) have revealed that the Collie taxon is an undescribed species now listed on the Herbarium census as *Caladenia* sp. Collie (E. Bennett s.n. PERTH 08396051). Searches between these two areas have not located any other populations.

Description

Caladenia lodgeana is a late flowering spider orchid 200 to 400mm high with a single, erect, hairy leaf 100 to 200mm long by 5 to 10mm wide. It has up to two cream to creamy-yellow, red marked flowers 50 to 100mm across with spreading, narrowly-clubbed petals and lateral sepals and a white labellum with long fringe segments and four or more rows of pale red calli. The species is distinguished from the similar *C. serotina* by its narrowly-clubbed petals and sepals and slightly earlier flowering period (Brown *et al.* 2013; Hopper and Brown 2001).

Caladenia lodgeana belongs to the *C. huegelii* complex which is characterised by having clubbed sepals and shortened petals. *Caladenia lodgeana* lacks a dark maroon apex typical of most members of the *huegelii* complex, with only the closely related *C. busselliana*, *C. interjacens* and *Caladenia* sp. Collie (E. Bennett s.n. PERTH 08396051) sharing this feature. *Caladenia lodgeana* differs from these taxa in its later flowering period and confinement to the Augusta area.

Illustrations and/or further information

Brown, A., Dixon, K., French, C. and Brockman, G. (2013) Field Guide to the Orchids of Western Australia: the definitive guide to the native orchids of Western Australia. Simon Nevill Publications, Floreat, Western 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 lodgeana is known historically from three populations between Augusta and Margaret River. However, no recent sightings have been made at two of these (Margaret River and south of Augusta) and they now appear to be extinct. The extant population in Augusta grows under low scrub of *Dodonaea ceratocarpa*, *Melaleuca* and *Leptospermum* spp. with occasional emergent *Corymbia calophylla* in seasonally moist to wet clay soil on the margins of low granite outcrops (Brown *et al.* 2013; Hopper and Brown 2001).

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

Population number & location	Parks and Wildlife district	Shire	Vesting	Purpose	Manager
1. S of Augusta	Blackwood	Augusta-Margaret River	CCWA	National park	Parks and Wildlife
2. N of Augusta	Blackwood	Augusta-Margaret River	Non vested	UCL	RDL
3. Margaret River	Blackwood	Augusta-Margaret River	LGA	Town reserve	Shire

Biology and ecology

Caladenia lodgeana appears to be pollinated by a single undescribed species of wasp belonging to the genus *Thynnoides* (pers. comm. R. Phillips).

Fruit set is mid to late December. Based on an estimate for the similarly sized *Caladenia arenicola*, seed capsules contain approximately 30,000 seeds which are wind dispersed (Batty 2001). There are no estimates of seed viability available for *Caladenia lodgeana*, however, in other *Caladenia* species seed viability is approximately 60 to 90% (Swarts 2007).

It is expected that *Caladenia lodgeana* will reach reproductive maturity about three years following germination, as evident in studies of *C. huegelii* (Swarts 2007). Estimates for other *Caladenia* species have shown that they can live in excess of 30 years (K. Dixon, unpublished observation).

Related species of *Caladenia* 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).

Summer fire can enhance flowering of some species in the following growing season. However, winter and early spring fires, when the leaf is present and the new tuber is being formed, can be detrimental and may kill the plant. Neither fire nor disturbance is required for the flowering of this species.

Conservation status

Caladenia lodgeana is specially protected under the Western Australian *Wildlife Conservation Act 1950* and is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria B2ab(ii,iii,v) due to its area of occupancy being less than

10km²; only known to exist in a single location; and a projected continual decline in the area of occupancy, area, extent or quality of habitat and number of mature individuals. The species is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as CR.

Threats

- **Clearing** of bushland for development. The site containing Population 2 may be subject to future clearing proposals.
- **Inappropriate fire regimes** during winter and spring, when the leaf is present and the new tuber is being formed, can be detrimental and may possibly kill the plant.
- **4WD access.** Population 2 occurs in an area where off road vehicles frequently damage habitat. Vehicular access increases the risk of directly damaging plants and may also encourage the spread of disease.
- **Picking and trampling.** As Population 2 is located in an area that is well known to orchid enthusiasts and is frequently used by the general public for recreation, illegal collection and accidental trampling is a potential threat.
- **Grazing,** likely by kangaroos, is a threat to Population 2. Grazing of two plants was observed in 2012.
- **Weeds,** including a small infestation of *Watsonia* and *Leptospermum laevigatum* (Coast Teatree), are a threat to Population 2.
- **Lack of biological and ecological information.** Knowledge crucial to the species conservation such as identification of a fungal symbiont, identification of the pollinator species and its habitat requirements, conditions necessary for germination, germination success, time till maturation, seed viability, response of the species to disturbances such as fire, and other life history traits are currently unknown.
- **Small population size.** As *Caladenia lodgeana* is known from a single population, the likelihood of the species falling victim to chance demographic or environmental events such as wildfire is greatly increased.

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

Table 2. Summary of population information and threats

Population number & location	Land status	Year / no. of plants	Current condition		Threats
			Plants	Habitat	
1. S of Augusta	National park	2007 1 2008 0 2010 0 2012 0	Extinct?	Excellent	Grazing, fire
2. N of Augusta	UCL	2006 17 2007 32 2008 33 2010 14 2012 62	Healthy	Excellent	Recreation (4WD access), fire, weeds, clearing, trampling, picking, hydrological changes
3. Margaret River	LGA	1987 1 2012 0	Extinct?	Good	Possible future clearing, fire

Note: Populations in **bold text** are considered to be important populations. Only flowering individuals are included in plant counts as non flowering plants (leaves) are generally not discernible from related orchid taxa.

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 lodgeana* may require assessment.

Actions that could result in any of the following may potentially result in a significant impact on the species:

- Damage or destruction of occupied or potential habitat.
- Alteration of the local surface hydrology or drainage.
- Reduction in population size.
- A major increase in disturbance in the vicinity of a population.

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

Given that *Caladenia lodgeana* is ranked as CR in Western Australia, 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 *Caladenia lodgeana* includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), 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 lodgeana* will also improve the status of associated native vegetation. One Declared Rare Flora (DRF) species and three Priority flora species occur in habitat within 500m of *C. lodgeana*. These species are listed in the table below:

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

Species name	Conservation status (WA)	Conservation status (EPBC Act)
<i>Kennedia lateritia</i>	EN	EN
<i>Bossiaea disticha</i>	Priority 4	-
<i>Caladenia abbreviata</i>	Priority 3	-
<i>Hemiandra</i> sp. Windy Harbour (B.J. Conn & J.A. Scott BJC 3344)	Priority 3	-

For a description of conservation codes for Western Australian flora see http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf

One rare fauna species, Baudin's cockatoo (*Calyptorhynchus baudinii*) (Endangered), also occurs within the range of populations and will benefit from management of *Caladenia lodgeana* and its habitat.

Caladenia lodgeana does not occur in association with any Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

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 one site of Aboriginal significance adjacent to Population 2 of *Caladenia lodgeana*. This site is listed in the table below. 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 in the vicinity of these sites. Opportunity for future involvement in the implementation of the plan is included as an action in the plan. Aboriginal involvement in management of land covered by an agreement under the *Conservation and Land Management Act 1984* is also provided for under the joint management arrangements in that Act, and will apply if an agreement is established over any reserved lands on which this species occurs.

Table 4. Site of Aboriginal significance adjacent to *Caladenia lodgeana*

Site identification	Access	Restriction	Site name	Site type
20434	open	none	Blackwood River	Mythological

Social and economic impacts

Population 2 occurs on Unallocated Crown Land (UCL) and some social and economic impact may occur due to restrictions imposed on the management of the land, including maintenance of road infrastructure and future development and asset protection at this site.

Affected interests

The implementation of this plan has some implications for the Department of Regional Development and Lands (RDL), where populations occur on land not specifically managed for conservation.

Evaluation of the plan's performance

Parks and Wildlife, in conjunction with the South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT) 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 four years of implementation.

2. Recovery objective and criteria

Plan objective

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

Recovery criteria

Criteria for recovery success:

- The number of extant populations has increased from one population to two or more over the term of the plan and/or
- The number of mature individuals has increased by 20% or more over the term of the plan from 62 plants to 74 or more.

Criteria for recovery failure:

- The number of populations has decreased from one population to none over the term of the plan and/or
- The number of mature individuals has decreased by 20% or more over the term of the plan from 62 plants to 50 or less.

3. Recovery actions

Existing recovery actions

Parks and Wildlife placed a cage over one plant of *Caladenia lodgeana* in 2007 to prevent it from being grazed.

Leaf material collected from *Caladenia lodgeana* by BGPA is stored in dry silica gel for future genetic analysis.

Numerous surveys have been undertaken for *Caladenia lodgeana* and include surveys conducted by:

- Bennett Environmental Consulting.
- Bushland Native Seeds.
- Keith Smith of Formosa Flora (a consultant specialising in orchid work).
- Members of WANOSCG.
- Staff from Parks and Wildlife
- BGPA.

Pollination research was undertaken at 27 sites (moving picked flowers to new sites) by BGPA in 2009 and 2012.

Environmental Research Group Augusta (ERGA) installed signage at Population 2 in September 2013. The signage was funded by Parks and Wildlife and is aimed at raising awareness of the importance of the site.

Future recovery actions

Parks and Wildlife is overseeing the implementation of this plan and, with the assistance of the SWRTFCRT, will include information on progress in annual reports to Parks and Wildlife's Corporate Executive and funding bodies. Where 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. 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.

1. Coordinate recovery actions

Parks and Wildlife with assistance from the SWRTFCRT will oversee the implementation of the recovery actions for *Caladenia lodgeana* and will include information on progress in their annual report to Parks and Wildlife's Corporate Executive and funding bodies.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (South West Region), with assistance from the SWRTFCRT
Cost:	\$8,000 per year

2. Monitor populations

Monitoring of grazing, weed invasion, habitat degradation, hydrology (inundation and drought) and population stability (expansion or decline), pollinator activity, seed production, recruitment and longevity is essential. Where possible, the population will be inspected annually.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Blackwood District), with assistance from the SWRTFCRT
Cost:	\$10,000 per year

3. Control access to Population 2

To control access to Population 2, barriers such as bollards or fencing may be needed. These will be placed strategically to stop vehicle damage to the habitat but still allowing access to established tracks.

Action:	Control access to Population 2
Responsibility:	Parks and Wildlife (Blackwood District), RDL
Cost:	\$10,000 in years 1 and 2

4. Ensure long-term protection of habitat

Ways and means of improving the security of the known population and its habitat will be investigated.

Action:	Ensure long-term protection of habitat
Responsibility:	Parks and Wildlife (South West Region, SCB)
Cost:	\$4,000 per year

5. Investigate options to reduce impact from herbivores

When monitoring ascertains that the impact of herbivores is high protective measures should be considered.

Action:	Investigate options to reduce impact from herbivores
Responsibility:	Parks and Wildlife (Blackwood District)
Cost:	\$15,000 in years 1, 3 and 5

6. Develop and implement a fire management strategy

Caladenia lodgeana 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 season be applied to areas occupied by the species. The development of a fire management strategy including recommendations on 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.

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

7. Collect and store seed and fungal material

Preservation of genetic material is essential to guard against extinction of the species if the wild population is lost. It is recommended that seed be collected and stored at BGPA along with samples of the orchid's symbiotic fungus. 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).

Action:	Collect and store seed and fungal material
Responsibility:	Coordinated by Parks and Wildlife (Blackwood District), implemented by BGPA
Cost:	\$10,000 per year

8. Undertake surveys

It is recommended that areas of potentially suitable habitat be surveyed for the presence of *Caladenia lodgeana* during its flowering period.

All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and reduce unnecessary duplication of surveys. Where possible, volunteers from the local community, WANOSCG, Landcare groups, wildflower societies and naturalists' clubs will be encouraged to become involved.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Blackwood District), with assistance from the SWRTFCRT
Cost:	\$10,000 per year

9. Undertake weed control

Weeds are a threat to the extant population and the following actions will be implemented:

1. Determine which weeds are present.
2. Control invasive weeds by hand removal and/or spot spraying when weeds first emerge.
3. Revegetation with site-specific species is required (in autumn) to maintain low weed levels.
4. Monitor the success of the treatment on weed death, and the tolerance of *Caladenia lodgeana* and associated native plant species to the weed control treatment.
5. Report on the method and success of the treatment, and effect on *Caladenia lodgeana* plants and associated species.

Action:	Undertake weed control
Responsibility:	Parks and Wildlife (Blackwood District), RDL, Shire of Augusta-Margaret River
Cost:	\$10,000 per year, as required

10. Obtain biological and ecological information

Improved knowledge of the biology and ecology of the species will provide a scientific basis for management of *Caladenia lodgeana* in the wild and will include:

1. Identification of the fungal symbiont associated with *Caladenia lodgeana* and its distribution in the wild.
2. Investigation into the species' pollination biology, identification of pollinators and their habitat requirements.
3. Investigation of seed viability.
4. Investigation of conditions necessary for germination (required prior to undertaking translocation).
5. Investigation into the species response to factors including disturbance, competition, drought, inundation and grazing in recruitment and seedling survival.
6. Longevity of plants, time taken to reach maturity, and minimum viable population size.

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

11. Develop and implement translocations

If required, a translocation proposal will be developed and suitable translocation sites selected. Information on the translocation of Threatened plants and animals in the wild is provided in Parks and Wildlife's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna* (CALM 1995), and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al.* 2004). All translocation proposals require endorsement by Parks and Wildlife's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action:	Develop and implement translocations
Responsibility:	Parks and Wildlife (SCD, Blackwood District), BGPA
Cost:	\$42,000 in years 1 and 2; and \$26,500 in years 3–5 as required

12. Liaise with land managers and Aboriginal communities

Staff from Parks and Wildlife's Blackwood District will liaise with land managers to ensure that the extant population of *Caladenia lodgeana* is not accidentally damaged or destroyed, and its habitat is maintained in a suitable condition for the conservation of the species. Consultation with the Aboriginal community will take place to determine if there are any issues or interests in areas that are habitat for the species.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Blackwood District)
Cost:	\$4,000 per year

13. Promote awareness

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

Action:	Promote awareness
Responsibility:	Parks and Wildlife (South West Region, SCB and Public Information and Corporate Affairs (PICA)), with assistance from the SWRTFCRT
Cost:	\$7,000 in years 1 and 2; \$5,000 in years 3–5

14. Map habitat critical to the survival of *Caladenia lodgeana*

Although spatial data relating to habitat critical to the survival of *Caladenia lodgeana* 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.

Action:	Map habitat critical to the survival of <i>Caladenia lodgeana</i>
Responsibility:	Parks and Wildlife (SCB, South West Region)
Cost:	\$6,000 in year 2

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

If *Caladenia lodgeana* is still ranked as CR at the end of the fifth year of the five-year term of this plan, the need for further recovery actions, or a review of this plan will be assessed and a revised plan prepared if necessary.

Action:	Review this plan and assess the need for further recovery actions
Responsibility:	Parks and Wildlife (SCB, South West Region)
Cost:	\$6,000 in year 5

Table 5. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (South West Region), with assistance from the SWRTFCRT	Ongoing
Monitor populations	High	Parks and Wildlife (Blackwood District), with assistance from the SWRTFCRT	Ongoing
Control access to Population 2	High	Parks and Wildlife (Blackwood District), RDL	2016
Ensure long-term protection of habitat	High	Parks and Wildlife (South West Region, SCB Nature Conservation Covenant Program and Land Unit)	Ongoing
Investigate options to reduce impact from herbivores	High	Parks and Wildlife (Blackwood District), RDL	Ongoing
Develop and implement a fire management strategy	High	Parks and Wildlife (Blackwood District)	Developed by 2015 with implementation ongoing
Collect and store seed and fungal material	High	Coordinated by Parks and Wildlife (Blackwood District), implemented by BGPA	Ongoing
Undertake surveys	High	Parks and Wildlife (Blackwood District), with assistance from the SWRTFCRT	2019
Undertake weed control	High	Parks and Wildlife (Blackwood District), RDL, Shire of Augusta-Margaret River	Ongoing
Obtain biological and ecological information	High	Parks and Wildlife (SCD, Blackwood District), BGPA	2017
Develop and implement translocations	High	Parks and Wildlife (SCD, Blackwood District), BGPA	2019
Liaise with land managers and Aboriginal communities	Medium	Parks and Wildlife (Blackwood District)	Ongoing
Promote awareness	Medium	Parks and Wildlife (South West Region, SCB and PICA), with assistance from the SWRTFCRT	Ongoing
Map habitat critical to the survival of <i>Caladenia lodgeana</i>	Medium	Parks and Wildlife (SCB, South West Region)	2016
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, South West Region)	2019

4. Term of plan

This plan will operate from June 2014 to May 2019 but will remain in force until withdrawn or replaced. If the species is still ranked CR after five years, the need for further recovery actions will be determined.

5. References

- Batty, A.L. (2001) The role of symbiotic seed germination in the conservation of selected Western Australian terrestrial orchids. PhD thesis, The University of Western Australia.
- Brown, A., Dixon, K., French, C. and Brockman, G. (2013) Field Guide to the Orchids of Western Australia: the definitive guide to the native orchids of Western Australia. Simon Nevill Publications, Floreat, Western Australia.
- Brown A.P., Phillips, R. and Brockman, G. (in ed.) New taxa of *Caladenia* (Orchidaceae) from south-west Western Australia.
- Department of Conservation and Land Management (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1994) Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1995) Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
- Government of Australia (1999) Environment Protection and Biodiversity Conservation Act.
- 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.
- Phillips, R.D., Faast, R., Bower, C.C., Brown, G.R. and Peakall, R. (2009) Implications of pollination by food and sexual deception for pollinator specificity, fruit set, population genetics and conservation of *Caladenia* (Orchidaceae). *Australian Journal of Botany* 57(4): 287–306.
- Ramsay, R.R., Dixon, K.W., Sivasithamparam, K. (1986) Patterns of infection and endophytes associated with Western Australian orchids. *Lindleyana* 1: 203–214.
- Stoutamire, W.P. (1983) Wasp-pollinated Species of *Caladenia* (Orchidaceae) in South-western Australia. *Australian Journal of Botany* 31(4): 383–394.
- Swarts, N.D. (2007) Integrated Conservation of the Rare and Endangered Terrestrial Orchid *Caladenia huegelii* H.G. Reichb. PhD thesis, The University of Western Australia.
- Swarts, N.D., Sinclair, E.A., Francis, A. and Dixon, K.W. (2010) Ecological specialization in mycorrhizal symbiosis leads to rarity in an endangered orchid. *Molecular Ecology* 19: 3226–3242.
- Vallee, L., Hogbin, T., Monks, L., Makinson, B., Matthes, M. and Rossetto, M. (2004) Guidelines for the Translocation of Threatened Australian Plants. Second Edition. *The Australian Network for Plant Conservation*. Canberra, Australia.
- Western Australian Herbarium (1998–) *FloraBase– the Western Australian Flora*. Department of Parks and Wildlife. <http://florabase.dpaw.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

Description of *Caladenia lodgeana* by Hopper and Brown (2001).

Plant solitary or in loose clumps. *Leaf* 10–20cm x 5–10mm, linear, erect, pale green, basal third usually irregularly blotched with red-purple. *Scape* 20–40cm tall. *Flowers* one or two, c. 5–10cm across, creamy yellow with occasional suffusions, lines and spots of dull maroon to pink; floral odour absent. *Sepals and petals* stiffly held, linear-lanceolate in basal third, then abruptly narrowing to a long-acuminate apex with a narrowly tumescent light brown osmophore 3–35mm long, consisting of minute densely packed globular sessile glandular cells. *Dorsal sepal* 5–7cm x 2–3mm, erect and slightly incurved, osmophore 15–35mm long. *Lateral sepals* 5.5–7.5cm x 4–6mm, spreading and downcurved, osmophore 15–35mm long. *Petals* 3.5–6.5cm x 2–4mm, osmophore 3–10mm long, horizontal to somewhat downcurved. *Labellum* obscurely 3-lobed, uniformly coloured except basal lamina occasionally suffused pink, with pink to red radiating stripes, stiffly articulated on a claw c. 1.5–2mm wide; lamina 18–25 x 11–15mm, narrowly cordate in outline when flattened, basal third curving from erect to horizontal, middle third nearly horizontal, apical third sharply recurved, transverse cross-section at widest point in front view moderately curved upwards and terminated by obliquely to vertically ascending margins and calli; lateral lobes erect with entire margins within 4mm of the claw, becoming fimbriate with slender clubbed narrowly fusiform cream to dark maroon white-tipped calli to 8mm long which are abruptly decrescent near midlobe; midlobe margins with short narrow forward-facing obtuse calli decrescent towards the apex. *Lamina calli* in four rows extending at least two-thirds the length of the labellum, pink, sometimes white at base, golf stick-shaped, the longest c. 2mm tall, decrescent towards apex and becoming sessile. *Column* 18–20 x 6–10mm, broadly winged, creamy yellow with prominent pink blotches. *Anther* c. 3 x 3mm, pale yellowish pink. *Pollinia* c. 3mm long, boomerang-shaped, flat, yellow. *Stigma* c. 3mm wide, yellow-green. *Capsule* not seen.