



Government of **Western Australia**
Department of **Environment and Conservation**

INTERIM RECOVERY PLAN NO. 332

BODDINGTON SPIDER ORCHID

(Caladenia sp. Quindanning)

INTERIM RECOVERY PLAN

2013–2017



January 2013
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: 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.

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.

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 taxa, within one year of endorsement of that rank by the Minister.

This plan will operate from January 2013 to December 2017 but will remain in force until withdrawn or replaced. It is intended that, if the species is still ranked as Critically Endangered, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 12 October 2012 and was approved by the Director of Nature Conservation on 30th January 2013. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this plan was accurate at January 2013.

PLAN PREPARATION

This plan was prepared by Robyn Luu¹ and Andrew Brown².

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ACKNOWLEDGMENTS

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

Jessica Donaldson	Threatened Flora Database Technical Officer, DEC Species and Communities Branch
Catherine Page	Conservation Officer (Flora), DEC Perth Hills District
Ryan Phillips	Research Scientist, Botanic Gardens and Parks Authority

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information.

Cover photograph by Andrew Brown.

CITATION

This plan should be cited as:

Department of Environment and Conservation (2012) Boddington Spider Orchid (*Caladenia* sp. Quindanning) Interim Recovery Plan 2013–2017. Interim Recovery Plan No. 332. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific name:	<i>Caladenia</i> sp. Quindanning	Common name:	Boddington Spider Orchid
Family:	Orchidaceae	Flowering period:	late September to October
DEC region:	Swan	DEC district:	Perth Hills
Shire:	Boddington	NRM region:	South West
IBRA region:	Jarrah Forest	Recovery team:	Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT)
IBRA subregion:	Northern Jarrah Forest		

Distribution and habitat: *Caladenia* sp. Quindanning is endemic to Western Australia where it is found over a small geographic range near Quindanning, growing in *Eucalyptus wandoo* woodland on the margins of seasonal creeks and swamps with *Melaleuca viminea*, *Chorizandra enodis*, *Craspedia variabilis* and other orchid species including *C. longicauda* subsp. *redacta*, *Diuris laxiflora* and *Prasophyllum gracile* (Brown and Brockman in draft, Brown *et al.* 2008).

Habitat critical to the survival of the species, and important populations: *Caladenia* sp. Quindanning is ranked as CR in WA and it is considered that all known habitat for wild populations is habitat critical to the survival of the species, and all wild populations are important populations. Habitat critical to the survival of *C. sp.* Quindanning 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* sp. Quindanning is declared as rare flora (DRF) under the Western Australian *Wildlife Conservation Act 1950* and is ranked as Critically Endangered in WA under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v);C1 due to its extent of occurrence being less than 100km²; there being severe fragmentation of populations; a continuing decline in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or subpopulations and number of mature individuals; total population size estimated to number less than 250 mature individuals and an estimated continuing decline of at least 25 per cent within three years or one generation whichever is the longer. The extent of occurrence is 7.5km² and the area of occupancy is 0.151km². The species is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: The main threats to the species are hydrological changes, grazing, trampling, inappropriate fire regimes, recreational activities and mining operations.

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. Surveys have been undertaken for *Caladenia* sp. Quindanning by staff from the Botanic Gardens and Parks Authority (BGPA), DEC and members of the West Australian Native Orchid Study and Conservation Group (WANOSCG), with one new population found in 2011.
2. BGPA has one vial of seed from *Caladenia* sp. Quindanning.
3. DEC, with assistance from the SRTFCRT, is overseeing the implementation of threatened flora recovery/management in Swan Region, which will also incorporate implementation of this plan.

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

Recovery criteria

Criteria for success: At least one additional population is discovered or established and/or the number of mature individuals has increased by 10 per cent or more over the term of the plan.

Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by 10 per cent or more over the term of the plan.

Recovery actions

1. Coordinate recovery actions
2. Install protective cages and fencing where required
3. Monitor populations
4. Monitor hydrology

5. Undertake surveys
6. Restrict access
7. Ensure long-term protection of habitat
8. Collect and store seed
9. Obtain biological and ecological information
10. Develop and implement a fire management strategy
11. Develop and implement a translocation proposal
12. Liaise with land managers and Indigenous communities
13. Map habitat critical to the survival of *Caladenia* sp. Quindanning
14. Promote awareness
15. Nominate *Caladenia* sp. Quindanning for listing under the Commonwealth EPBC Act
16. Review this plan and assess the need for further recovery actions

1. BACKGROUND

History

Caladenia sp. Quindanning was discovered near Quindanning by Keith Smith in 2004 and collected by Pat Johns. Further collections were made from the Quindanning area in 2006 and 2008. The species has been extensively surveyed by staff from the Botanic Gardens and Parks Authority (BGPA), DEC and members of the West Australian Native Orchid Study and Conservation Group (WANOSCG), with just one new population discovered in a nature reserve north of Quindanning in 2011. The species is known from four populations comprising 94 plants. The largest population has undergone a decline of 90% from 200 plants recorded in 2009 to 22 plants in 2011. Although three of the populations are located in a timber reserve vested in the Conservation Commission, all are subject to possible future mining.

Description

Caladenia sp. Quindanning (*C. sp.* Boddington in some publications) grows to 35cm high and has one to four yellowish to creamy-white flowers to 6cm across. It was initially thought to be a form of *C. dorrienii* (a member of the *Caladenia filamentosa* complex) but has four or more rows of calli on its labellum rather than two, placing it in the *C. longicauda* complex (Brown *et al.* 2008). It is distantly related to *C. uliginosa* but is distinguished from that species by its broader leaf, shorter petals and sepals, and broader, flattened labellum with short, sparse, fringe segments. The species occasionally hybridises with *C. longicauda* subsp. *redacta* (Brown and Brockman in draft).

Illustrations and/or further information

Brown, A., Dundas, P., Dixon, K. and Hopper, S. (2008) *Orchids of Western Australia*. University of Western Australia Press, Crawley, Western Australia; Western Australian Herbarium (1998–) *FloraBase – The Western Australian Flora*. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/>.

Distribution and habitat

Caladenia sp. Quindanning is endemic to Western Australia where it is found over a small geographic range near Quindanning, growing in *Eucalyptus wandoo* woodland on the margins of seasonal creeks and swamps with *Melaleuca viminea*, *Chorizandra enodis*, *Craspedia variabilis* and other orchid species including *C. longicauda* subsp. *redacta*, *C. flava*, *C. splendens*, *Diuris laxiflora*, *Thelymitra annulifera* and *Prasophyllum gracile* (Brown and Brockman in draft, Brown *et al.* 2008).

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

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1. N of Quindanning	Perth Hills	Boddington	Conservation Commission of Western Australia	Timber reserve	DEC
2. NW of Quindanning	Perth Hills	Boddington	Conservation Commission of Western Australia	Timber reserve	DEC
3. NW of Quindanning	Perth Hills	Boddington	Conservation Commission of Western Australia	Timber reserve	DEC
4. N of Quindanning	Perth Hills	Boddington	Conservation Commission of Western Australia	Nature reserve	DEC

Biology and ecology

Caladenia sp. Quindanning flowers between late September and October with fruit set between late October and mid November. The number of flowering plants is lower in years of poor rainfall. Based on the biology of other closely related species of *Caladenia*, it is likely that *C. sp.* Quindanning attracts nectar foraging insects through a prominent floral display but does not provide nectar (Phillips *et al.* 2009).

Based on the presence of some plants growing in clumps, the species is likely to occasionally be clonal. The species does not require disturbance such as fire to flower. Germination of its very small seed requires the presence of mycorrhizal fungi and, based on observations of other *Caladenia* species, it is likely that the fungus is specific. Specificity for a specialized rare fungus may be the cause of the orchid's rarity (Swarts *et al.* 2010).

Conservation status

Caladenia sp. Quindanning is declared as rare flora (DRF) under the Western Australian *Wildlife Conservation Act 1950* and is ranked in WA as Critically Endangered under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v);C1 due to its extent of occurrence being less than 100km²; severe fragmentation of populations; a continuing decline in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or subpopulations, and number of mature individuals; population estimated to number less than 250 mature individuals and an estimated continuing decline of at least 25% within three years or one generation whichever is the longer. The extent of occurrence is 7.5km² and the area of occupancy is 0.151km². The species is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

Threats

The main threats to the species are:

- **Hydrological changes** have the potential to alter the species habitat. Increased water levels are damaging the habitat at Population 1. The soil is now water-logged and semi-saline, and a number of dead trees are evident. The higher water levels may be due to the removal of trees on farmland upslope from the nearby creekline.
- **Grazing and trampling** by feral pigs, kangaroos and rabbits is a threat to all populations. Feral pigs can remove or damage the plants when digging in search of food. They may also introduce weed seeds and added nutrients.
- **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 plants. Fire appears to also facilitate weed invasion and, when it occurs, should be followed up with appropriate weed control.
- **Recreational activities** including rubbish dumping, campfires and vehicle access are a threat to Populations 1 to 3.
- **Mining operations.** An active mineral extraction lease (AM70/258 BHP Billiton; Japan Alumina Associates; Sojitz Alumina) covers the site of Populations 1 to 3 and future mining has the potential to severely impact on the species and its habitat.

The intent of this plan is to provide actions that will deal with immediate threats to *Caladenia* sp. Quindanning. 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

Pop. no. & location	Land status	Year / no. of plants	Current condition (habitat)	Threats
1. N of Quindanning	Timber reserve	2009 200 2010 38 2011 22	Moderate to poor	Grazing, hydrological changes (water logging, salinity), fire, mining, pigs, recreational activities (4WDs)
2. NW of Quindanning	Timber reserve	2009 40 2011 47	Good	Pigs, recreational activities (vehicles, rubbish dumping, campfires), mining, fire
3. NW of Quindanning	Timber reserve	2009 2 2011 14	Good	Grazing, recreational activities, mining, fire
4. N of Quindanning	Nature reserve	2011 11	Excellent	Grazing, fire

Populations in **bold text** are considered to be important populations.

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* sp. Quindanning should be subject to an assessment of potential environmental impacts.

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

Caladenia sp. Quindanning is ranked in WA as CR, and as such 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 *C. sp. Quindanning* includes the area of occupancy of the 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* sp. Quindanning will also improve the status of associated native vegetation. No threatened or priority species, or threatened ecological communities occur within or adjacent to populations of the species.

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.

Indigenous consultation

A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register revealed 17 sites of Aboriginal significance adjacent to and within the area of populations of *Caladenia* sp. Quindanning. Input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests with respect to management for this species at these sites. Indigenous 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 3. Aboriginal heritage sites occurring adjacent and within populations of *Caladenia* sp. Quindanning.

<i>Caladenia</i> Population number	Aboriginal site number	Site name	Site type
1	4150	Quindanning Forest 07	Artefacts
1	4152	Quindanning Forest 09	Artefacts
1	4153	Quindanning Forest 10	Artefacts

1	4154	Quindanning Forest 11	Artefacts
1	4155	Quindanning Forest 12	Artefacts
1	4156	Quindanning Forest 13	Artefacts
1	4157	Quindanning Forest 14	Artefacts
1	4158	Quindanning Forest 15	Artefacts
1	4159	Quindanning Forest 16	Artefacts
1	4160	Quindanning Forest 17	Artefacts
1	4200	Quindanning Forest 04	Artefacts
1	4202	Quindanning Forest 06	Artefacts
2	4052	Wilson Brook	Artefacts
2	4168	Quindanning Forest 25	Artefacts
2	4169	Quindanning Forest 26	Artefacts
2	4171	Quindanning Forest 28	Artefacts
3	4136	Quindanning Farms 23	Artefacts

Social and economic impacts

The implementation of this recovery plan may result in some social and economic impacts. As all populations are on land under the management responsibility of DEC the implementation of this recovery plan may cause some economic impact through restrictions imposed on the management of the land and through the cost of implementing recovery actions. For areas subject to mineral exploration leases (Populations 1 to 3) this may be through the loss of land available for development. Some 17 sites of Aboriginal significance also occur in the areas of Populations 1 to 3 and recovery actions may require consideration of Indigenous interests.

Affected interests

The protection of the species impacts on DEC as known populations occur in a timber reserve and a nature reserve for which DEC has primary management responsibility. The orchid's habitat is also subject to Aboriginal interests and mining tenement holders BHP Billiton, Japan Alumina Associates and Sojitz Alumina may be affected by actions referred to in this plan should mining go ahead.

Evaluation of the plan's performance

DEC, with assistance from the Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT), 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

Objective

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

Recovery criteria

Criteria for success: At least one additional population is discovered or established and/or the number of mature individuals has increased by 10 per cent or more over the term of the plan.

Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by 10 per cent or more over the term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

Surveys have been conducted for *Caladenia* sp. Quindanning by the BGPA, DEC and members of the WANOSCG, with one new population found in 2011.

BGPA has one vial of seed from *Caladenia* sp. Quindanning.

DEC with assistance from the SRTFCRT is overseeing threatened flora recovery/management in Swan Region, which will also incorporate implementation of this plan

Future recovery actions

Where recovery actions are implemented on lands other than those managed by DEC, 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

DEC with assistance from the SRTFCRT will coordinate recovery actions for *Caladenia* sp. Quindanning and will include information on progress in annual reports to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: DEC (Perth Hills District) with assistance from the SRTFCRT
Cost: \$6,000 per year

2. Install protective cages and fencing where required

To protect plants from grazing and damage from recreational impacts, protective cages and/or fencing will be installed where required.

Action: Install protective cages and fencing where required
Responsibility: DEC (Perth Hills District)
Cost: \$5,000 per year, as required

3. Monitor populations

Monitoring of factors such as grazing, weed invasion, population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. Members of WANOSCG will assist in the monitoring.

Action: Monitor populations
Responsibility: DEC (Perth Hills District) and WANOSCG
Cost: \$5,000 per year

4. Monitor hydrology

Waterlogging and an increase in salinity have resulted in the death of a number of trees at Population 1. Monitoring is required to determine if these changes are a continuing threat.

Action: Monitor hydrology
Responsibility: DEC (Perth Hills District, Science Division)
Cost: \$10,000 per year

5. Undertake surveys

It is recommended that areas of potential suitable habitat be surveyed for the presence of *Caladenia* sp. Quindanning during its flowering period between late September and October.

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

Action: Undertake surveys
Responsibility: DEC (Perth Hills District) and WANOSCG
Cost: \$5,000 per year

6. Restrict access

To restrict vehicle access to Populations 1–3, barriers such as bollards or fencing may be needed. Signs indicating the significance of the area may also need to be introduced to prevent trampling and erosion.

Action: Restrict access
Responsibility: DEC (Perth Hills District)
Cost: \$10,000 in year 1

7. Ensure long-term protection of habitat

One population is located on a nature reserve. While the other three populations are on a reserve vested in the Conservation Commission, its purpose is timber reserve, and is thus not explicitly reserved for conservation, even though its management is primarily for conservation. DEC will investigate having this timber reserve converted to a nature reserve to reflect this management purpose.

Action: Ensure long-term protection of habitat
Responsibility: DEC (Perth Hills District, SCB), Department of Mines and Petroleum (DMP)
Cost: \$3,000 per year

8. Collect and store seed

It is recommended that seed be collected and stored at the 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).

Action: Collect and store seed
Responsibility: DEC (Perth Hills District) and BGPA
Cost: \$5,000 per year

9. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Caladenia* sp. Quindanning will provide a better scientific basis for management of the wild populations and should include research on:

1. the species' pollination biology, identification of pollinators and their habitat requirements
2. seed viability and conditions necessary for germination
3. longevity of plants and time taken to reach maturity
4. species response to disturbance such as fire, and
5. the identification of the fungal symbiont associated with *Caladenia* sp. Quindanning and its distribution in the wild.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division and Perth Hills District) and BGPA

Cost: \$10,000 per year

10. Develop and implement a fire management strategy

Caladenia sp. Quindanning is thought to be killed by fire if it occurs while the plant is in active growth and before a new tuber is formed. It is important therefore that a fire regime with appropriate fire frequency, intensity and season be applied to areas occupied by the species to maximise population size and health and minimise damage. The development of a fire management strategy including recommendations on prescribed fire frequency, intensity and seasonality, precautions to prevent wildfire and strategies for reacting to wildfire, and consideration regarding the need, method of construction, and maintenance of firebreaks is recommended.

Action: Develop and implement a fire management strategy

Responsibility: DEC (Perth Hills District)

Cost: \$10,000 in year 1; and \$2,000 in years 2-5

11. Develop and implement a translocation proposal if required

Translocation may be deemed desirable for the conservation of this species if surveys fail to locate new populations and population sizes continue to decline. If deemed necessary, a translocation proposal will be developed, suitable translocation sites selected and the translocation implemented if necessary. Information on the translocation of threatened plants and animals in the wild is provided in DEC'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 DEC's Director of Nature Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action: Develop and implement a translocation proposal if required

Responsibility: DEC (Perth Hills District) and BGPA

Cost: \$5,000 in year 4

12. Liaise with land managers and Indigenous communities

Staff from DEC's Perth Hills District will liaise with appropriate land managers to ensure that populations of *Caladenia* sp. Quindanning are not accidentally damaged or destroyed. Indigenous consultation will take place to determine if there are any issues or interests in areas that are habitat for *C. sp.* Quindanning.

Action: Liaise with land managers and Indigenous communities

Responsibility: DEC (Perth Hills District)

Cost: \$2,000 per year

13. Map habitat critical to the survival of *Caladenia* sp. Quindanning

Although habitat critical to the survival of the species is alluded to in Section 1, it has not yet been mapped and will be addressed under this action. If additional populations are located, then habitat critical to their survival will be determined and mapped for these locations also.

Action: Map habitat critical to the survival of *Caladenia* sp. Quindanning

Responsibility: DEC (SCB and Perth Hills District)

Cost: \$6,000 in year 2

14. Promote awareness

The importance of biodiversity conservation and the protection of *Caladenia* sp. Quindanning will be promoted to the public. This will be achieved through an information campaign using local print and

electronic media and by setting up poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: DEC (Perth Hills District, SCB and Corporate Relations) with assistance from the SRTFCRT
Cost: \$4,000 in year 1 and \$2,000 in years 2-5

15. Nominate *Caladenia* sp. Quindanning for listing under the Commonwealth EPBC Act

Staff from DEC's SCB will develop a Species Profile and Threats (SPRAT) and/or EPBC Act nomination for this species. The nomination will be forwarded to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities for referral to the Commonwealth Threatened Species Scientific Committee (TSSC) for subsequent listing under the EPBC Act by the Minister.

Action: Nominate *Caladenia* sp. Quindanning for listing under the Commonwealth EPBC Act
Responsibility: DEC (SCB)
Cost: \$3,000 in year 1

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

If *Caladenia* sp. Quindanning is ranked as Critically Endangered at the end 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: DEC (SCB and Perth Hills District)
Cost: \$3,000 in year 5

Table 4. Summary of Recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	DEC (Perth Hills District) with assistance from the SRTFCRT	Ongoing
Install protective cages and fencing where required	High	DEC (Perth Hills District)	2017
Monitor populations	High	DEC (Perth Hills District) with assistance from the SRTFCRT	Ongoing
Monitor hydrology	High	DEC (Perth Hills District, Science Division)	Ongoing
Undertake surveys	High	DEC (Perth Hills District) with assistance from the SRTFCRT and volunteers	Ongoing
Restrict access	High	DEC (Perth Hills District)	2013
Ensure long-term protection of habitat	High	DEC (Perth Hills District, SCB Nature Conservation Covenant Program and Land Unit), DoP and DMP	Ongoing
Collect and store seed	High	DEC (Perth Hills District) and BGPA	2017
Obtain biological and ecological information	High	DEC (Science Division and Perth Hills District) and BGPA	2017
Develop and implement a fire management strategy	High	DEC (Perth Hills District)	Developed by 2013 with implementation ongoing
Develop and impliment a translocation proposal	Medium	DEC (Perth Hills District) and BGPA	2016
Liaise with land managers and Indigenous communities	Medium	DEC (Perth Hills District)	Ongoing
Map habitat critical to the survival of <i>Caladenia</i> sp. Quindanning	Medium	DEC (SCB and Perth Hills District)	2014
Promote awareness	Medium	DEC (Perth Hills District, SCB and Corporate Relations) and with assistance from the SRTFCRT	Ongoing

Nominate <i>Caladenia</i> sp. Quindanning for listing under the Commonwealth EPBC Act	Medium	DEC (SCB)	2013
Review this plan and assess the need for further recovery actions	Medium	DEC (SCB and Perth Hills District)	2017

4. TERM OF PLAN

This plan will operate from January 2013 to December 2017 but will remain in force until withdrawn or replaced. If the species is still ranked Critically Endangered after five years, the need for further recovery actions will be determined.

5. REFERENCES

- Brown, A.P. and Brockman, G. (in draft) New taxa of *Caladenia* (Orchidaceae) from south-west Western Australia.
- Brown, A., Dundas, P., Dixon, K. And Hopper, S. (2008) *Orchids of Western Australia*. University of Western Australia Press, Crawley, Western Australia.
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- Phillips, R.D., Faast, R., Bower, 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, 287-306.
- Smith, M. (2012) *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Perth, Western Australia.
- Swarts, N.D., Sinclair, E.A., Francis, A. and Dixon, K. (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 Environment and Conservation. <http://florabase.dec.wa.gov.au/>.

6. TAXONOMIC DESCRIPTION

Draft description for *Caladenia* sp. Quindanning by A.P. Brown and G. Brockman.

Plant solitary or in small clumps. Leaf 8–16cm x 7–11mm, slightly incurved to flattened, erect, pale green, basal third irregularly blotched with red-purple. Scape 14–18cm tall. Flowers 1 to 4, c. 4–5cm across, creamy-yellow with faint maroon lines; floral odour unknown. Sepals and petals linear-lanceolate in basal third to half, then abruptly narrowing to a yellowish-brown, densely glandular, short-acuminate, filamentous apex lacking a tumescent osmophore, glandular hairs elongate, cylindrical. Dorsal sepal 2.5–4cm x 2–3mm, erect. Lateral sepals 3–4.5cm x 4–5mm, spreading obliquely downwards for 2–3cm then hanging (when fresh), often crossing at their tips. Petals 2.5–3cm x 2.5–3mm, spreading for 2–3cm then hanging downwards, often incurved at their tips. Labellum white, stiffly articulated on a claw c. 1–2mm wide; lamina 12–17 x 8–10mm, narrowly triangular to triangular in outline when flattened, obscurely 3-lobed, erect with entire margins only near the base, nearly horizontal in middle third, apical third sharply recurved, transverse cross-section at widest point in front view curved upwards and terminated by short, sparse, serrate, forward facing, white to deep brown, fringe segments, decrescent towards the apex; lamina calli maroon, paler and

glossy on top, hockey-stick shaped, the longest c. 1mm tall, in four to six rows extending about half the length of the labellum, slightly decrescent distally. Column 12–14 x 5–7mm, narrowly winged, opaque cream with pale maroon spots and blotches, sparsely hirsute with short glandular hairs on outer surface. Anther c. 2 x 3mm, greenish-yellow. Pollinia c. 2–3mm long, kidney-shaped, flat, yellow, mealy. Stigma c. 1.5–2.5mm wide. Capsule not seen.