

Abridged Threatened Species Nomination Form

For nominations/assessments under the Common Assessment Method (CAM) where supporting information is available, but not in a format suitable for demonstrating compliance with the CAM, and assessment against the IUCN Red List threat status.

Cover Page *(Office use only for Assessment)*

Species name (scientific and common name):	<i>Caladenia hopperiana</i>
Nomination for (addition, deletion, change):	Addition
Nominated conservation category and criteria:	EN: B1ab(iii,v)+ 2ab(iii,v); C2(a)(i)

Scientific committee assessment of eligibility against the criteria:		
This assessment is consistent with the standards set out in Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding.		Yes <input type="checkbox"/> No <input type="checkbox"/>
A.	Population size reduction	•
B.	Geographic range	•
C.	Small population size and decline	•
D.	Very small or restricted population	•
E.	Quantitative analysis	•

Outcome:			
<i>Scientific committee Meeting date:</i>			
<i>Scientific committee comments:</i>			
<i>Recommendation:</i>			
<i>Ministerial approval:</i>		<i>Date of Gazettal/ Legislative effect:</i>	

Nomination/Proposal summary *(to be completed by nominator)*

Current conservation status				
Scientific name:	Caladenia hopperiana			
Common name:	Boddington Spider Orchid			
Family name:	Orchidaceae	Fauna <input type="checkbox"/>	Flora <input checked="" type="checkbox"/>	
Nomination for:	Listing <input checked="" type="checkbox"/>	Change of status/criteria <input type="checkbox"/>	Delisting <input type="checkbox"/>	
1. Is the species currently on any conservation list, either in a State or Territory, Australia or Internationally? 2. Is it present in an Australian jurisdiction, but not listed?		Provide details of the occurrence and listing status for each jurisdiction in the following table		
Jurisdiction	State / Territory in which the species occurs	Date listed or assessed (or N/A)	Listing category i.e. critically endangered or 'none'	Listing criteria i.e. B1ab(iii)+2ab(iii)
International (IUCN Red List)				
National (EPBC Act)				
State / Territory	1. WA	2012	Critically Endangered	B1ab(ii,iii,iv,v)+2ab(ii,iii,i v,v)
	2. WA	2016	Endangered	B1ab(iii,v)+ 2ab(iii,v); C2(a)(i)
	3.			
Consistent with Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding, it is confirmed that:				
<ul style="list-style-type: none"> this assessment meets the standard of evidence required by the Common Assessment Method to document the eligibility of the species under the IUCN criteria; 			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Comments:				
<ul style="list-style-type: none"> surveys of the species were adequate to inform the assessment; 			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Comments:	Additional surveys undertaken in 2011, 2012, 2013, 2014, 2015 with two new populations (one new location) found in 2011 and 2013, consisting of 206 plants.			
<ul style="list-style-type: none"> the conclusion of the assessment remains current and that any further information that may have become available since the assessment was completed supports or is consistent with the conclusion of the assessment. 			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Comments:	Since the assessment in 2011, a new location has been discovered, and a new subpopulation of 195 plants found in the original location. The habitat of the original location is still in decline due to salinity, timber extraction, feral pigs and weed invasion, and the observed reduction in plant numbers in two subpopulations in that location has not abated. The species' conservation status			

now meets Endangered criteria B1ab(iii,v)+2ab(iii,v) and C2(a)(i). This revised category and criteria were endorsed by the WA TSSC in July 2016.		
Nominated national conservation status: category and criteria		
Presumed extinct (EX) <input type="checkbox"/> Critically endangered (CR) <input type="checkbox"/> Endangered (EN) <input checked="" type="checkbox"/> Vulnerable (VU) <input type="checkbox"/>		
None (least concern) <input type="checkbox"/> Data Deficient <input type="checkbox"/> Conservation Dependent <input type="checkbox"/>		
What are the IUCN Red List criteria that support the recommended conservation status category?	B1ab(iii,v)+B2ab(iii,v); C2(a)(i)	
Eligibility against the IUCN Red List criteria (A, B, C, D and E)		
<i>Provide justification for the nominated conservation status; is the species eligible or ineligible for listing against the five criteria. For delisting, provide details for why the species no longer meets the requirements of the current conservation status.</i>		
A.	Population size reduction (evidence of decline)	<ul style="list-style-type: none"> Monitoring has shown a decline in the number of observed plants at two subpopulations, but there is insufficient data to determine rate of decline. Results from 2011 and 2013 survey show there has been an increase in plant numbers.
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	<ul style="list-style-type: none"> Known from five subpopulations, at two locations north and northwest of Quindanning over a range of 10 km². The locations are separated by cleared paddock, but the species is naturally fragmented, occurring in creek systems. The extent of occurrence is 18 km². The area of occupancy using the 2x2 km² grid system is 20 km². Additional surveys located a new population (location) consisting of 11 plants in 2011 in a nature reserve and another new subpopulation consisting of 195 plants in 2013 in a timber reserve (existing location). Despite the increase in plant numbers two subpopulations have declined. There has also been an ongoing decline in condition of habitat due to salinity, timber extraction, feral pigs and weed invasion. The area is also under potential threat from mining. Meets EN:B1ab(iii,v)+ 2ab(iii,v)
C.	Small population size and decline (population size, distribution and evidence of decline)	<ul style="list-style-type: none"> Known from 282 mature plants at two locations, north and northwest of Quindanning over a range of 10 km. Monitoring has shown a decline in the number of observed plants at two subpopulations (and a decline in habitat condition), but there is insufficient data to determine rate of decline. The largest subpopulation is 195 mature plants. Meets EN: C2(a)(i)
D.	Very small or restricted population (population size)	<ul style="list-style-type: none"> 282 mature plants. Meets VU: D1

E.	Quantitative analysis (statistical probability of extinction)	<ul style="list-style-type: none"> No data 			
Summary of assessment information					
EOO	18 km ²	AOO	20 km ² (2x2 grid method)	Generation length	-
No. locations	2	Severely fragmented	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/>		
No. subpopulations	5	No. mature individuals	282		
Percentage global population within Australia			100		
Percentage population decline over 10 years or 3 generations			unknown		
Threats (<i>detail how the species is being impacted</i>)					
Threat <i>(describe the threat and how it impacts on the species. Specify if the threat is past, current or potential)</i>		Extent <i>(give details of impact on whole species or specific subpopulations)</i>		Impact <i>(what is the level of threat to the conservation of the species)</i>	
Refer to table at end.					
Management and Recovery					
Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?				Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
<p><i>List all relevant recovery or management plans (including draft, in-preparation, out-of-date, national and State/Territory recovery plans, recovery plans for other species or ecological communities, or other management plans that may benefit or be relevant to the nominated species).</i></p> <ul style="list-style-type: none"> Department of Environment and Conservation (2012) Boddington Spider Orchid (<i>Caladenia</i> sp. Quindanning) Interim Recovery Plan 2013–2017. Interim Recovery Plan No. 332. Department of Environment and Conservation, Western Australia. 					
<p><i>List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.</i></p> <ul style="list-style-type: none"> Monitor the populations for evidence of rabbit, kangaroo, or pigs, or changes in plant or site health; Protect the sites from fire unless required for ecological reasons, and implement early intervention in any wildfires which may threaten the sites; Survey for additional populations. 					
<p><i>List further recommended management or research actions, if any, that would benefit the conservation of the species. Please ensure that this section addresses all identified threats.</i></p> <p>Management</p> <ul style="list-style-type: none"> Manage groundwater at sites through monitoring of waterlogging and salinity; Erect barriers if recreational activities continue to threaten populations within State forest; Ensure future mining operations do not impact on the species, its habitat and the hydrology of the area; Ensure timber harvesting does not occur within the sites; Control rabbits if evidence of a rabbit population or herbivory noted; Control infestations of weeds that might impact the species and its habitat; 					

- Control feral pigs if herbivory or damage to plants is observed;
- Erect protective fencing or caging if herbivory and/or trampling is noted as a significant threat;
- Collect seed and mycorrhizal fungi for storage and *ex situ* propagation;
- Establish new populations on secure tenure with appropriate mycorrhizal fungi through implementation of translocations.

Research

- Determine species pollination ecology, seed germination requirements and viability, and longevity;
- Identify the fungal symbiont associated with the species and its distribution in the wild;
- Determine fire response of the species.

Nomination prepared by:

Contact details:

Date submitted:

4/7/2016

If the nomination has been refereed or reviewed by experts, please provide their names and contact details:

Summary of subpopulation information (detailed information to be provided in the relevant sections of the form)						
Location (include coordinates)	Land tenure	Survey information: Date of survey and No. mature individuals	AOO	Site / habitat Condition	Threats (note if past, present or future)	Specific management actions
Timber reserve 17125, NW of Quindanning	Timber reserve	2009: 242 2010: 38 2011: 83 2012: 56 2013: 248+* *includes new population of 195 plants recorded also within Timber reserve	<4 ha	Generally good, although drought has impacted on the habitat. Some weeds encroaching along creekline. Part of creekline also under threat from salinity and waterlogging.	Past <ul style="list-style-type: none"> Land clearing for agriculture Current <ul style="list-style-type: none"> Fire Inundation of low lying plants Salinity Grazing and trampling (kangaroos, rabbits, pigs) Recreational activities (rubbish, campfires, vehicles) Weeds Drought Future <ul style="list-style-type: none"> Timber extraction Small population size Mining Poor recruitment Weeds Changing groundwater levels Drought/ climate change 	As above

<p>**Western boundary of Mooradung Nature Reserve, north of Quindanning</p> <p>**new population</p>	Nature reserve	<p>2011: 11</p> <p>2012: 9</p> <p>2014: 39</p>	0.9 ha	Excellent	<p>Past</p> <ul style="list-style-type: none"> • Land clearing for agriculture <p>Current</p> <ul style="list-style-type: none"> • Fire • Grazing and trampling (kangaroos, rabbits, pigs) • Drought <p>Future</p> <ul style="list-style-type: none"> • Small population size • Poor recruitment • Drought/ climate change 	As above
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Department of Environment and Conservation

Our environment, our future



Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2011 (Updated 2016).

NOTICE: Incomplete forms may result in delays in assessment, or rejection of the nomination. To fill out this form you must refer to the Guidelines and contact the relevant Officer in the DEC Species and Communities Branch. DEC staff can advise you on how to fill out the form and may be able to supply additional, unpublished information.

Answer all relevant sections, filling in the white boxes and indicating when there is no information available. **Note**, this application form applies to both flora and fauna species, and hence some questions or options may not be applicable to the nominated species – for these questions, type “N/A”.

To mark boxes with a **cross**, double click the box and select not checked or checked.

SECTION 1. NOMINATION					
1.1. Nomination for:					
Flora <input checked="" type="checkbox"/>	Fauna <input type="checkbox"/>	Threatened / DRF <input checked="" type="checkbox"/> Change of category <input type="checkbox"/> Delisting <input type="checkbox"/>			
1.2. Scientific Name This name will be used to identify the species on all official documentation. Use the approved name used by the Western Australian Museum or Herbarium. If this is not possible, use unpublished names or numbers of voucher specimens.					
<i>Caladenia hopperiana</i> (previously <i>C. sp.</i> Quindanning (K. Smith & P. Johns 231))					
1.3. Common Name If the species has a generally accepted common name, please show it here. This name will be used on all official documentation.					
Boddington Spider Orchid					
1.4. Current Conservation Status. If none, type 'None'.					
	IUCN Red List Category e.g. Vulnerable		IUCN Red List Criteria e.g. B1ab(iv);D(1)		
International IUCN Red List	None				
National EPBC Act 1999	None				
State of Western Australia	Critically Endangered (2012)		B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v) (2012)		
State of WA Priority	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Is the species listed as 'Threatened' in any other Australian State or Territory? If Yes, list these States and/or Territories and the status for each.					
No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>					
Does the species have specific protection (e.g. listed on an annex or appendix) under any other legislation, inter-governmental or international arrangements e.g. CITES? If Yes, please provide details.					
No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>					

1.5. Nominated Conservation Status.					
	IUCN Red List Category e.g. Vulnerable			IUCN Red List Criteria e.g. B1ab(iv);D(1)	
State of Western Australia	Endangered			B1ab(iii,v) + 2ab(iii,v), C2(a)(i)	
State of WA Priority	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
1.6. Reasons for the Nomination.					
Briefly summarise the reasons for the nomination in dot points. Please include details relevant to the IUCN Categories and Criteria where appropriate.					
<ul style="list-style-type: none"> • Since its discovery in 2004 the species has been extensively surveyed by K Smith (Formosa Flora/ Botanic Gardens and Parks Authority) and members of the West Australian Native Orchid Study and Conservation Group (WANOSCG). While suitable habitat is very limited in the Quindanning area where subpopulations are currently known, apparently suitable habitat occurs to the north and south of this region. This habitat has been surveyed extensively by members of the WANOSCG and members of the Department of Environment and Conservation while conducting surveys for other rare orchids with no new subpopulations of <i>Caladenia hopperiana</i> being found. • The species has only been recorded historically from one location and 3 subpopulations (two locations, five subpopulations, 2016). It is no longer known from two of these subpopulations [in 2010] and has undergone a 90% decline in population size at the largest subpopulation. • Although subpopulations occur in areas of State Forest all are subject to possible future mining. • The species meets [in 2011] Critically Endangered under IUCN criteria B1ab(i,ii,iii,iv,v) + 2ab(i,ii,iii,iv,v), C1 as it has undergone a >25% decline in population size in one generation, has an extent of occurrence of less than 100km² and area of occupancy of less than 10km² and has exhibited a continuing decline in extent of occupancy and occurrence, quality of habitat, number of subpopulations and number of individuals. • Since 2011, a new location has been discovered, and a new subpopulation of 195 plants found in the original location. The habitat of the original location is still in decline due to salinity, timber extraction, feral pigs and weed invasion, and the observed reduction in plant numbers in two subpopulations in that location has not abated. The species' conservation status now meets Endangered criteria B1ab(iii,v)+2ab(iii,v) and C2(a)(i). 					
SECTION 2. SPECIES					
2.1. Taxonomy.					
Describe the taxonomic history, using references, and describe the key distinguishing features that can be used to separate this taxon from closely related taxa. Include details of the type specimen, changes in taxonomy, scientific names and common names used for the species.					
<p><i>Caladenia hopperiana</i>, which was first collected and recognised as distinct in 2004 [and was formally named <i>Caladenia hopperiana</i> (Brown and Brockman 2015)]. The species was illustrated and briefly described in Brown <i>et al.</i> (2008). <i>C. hopperiana</i> is a distinctive member of the <i>C. longicauda</i> complex that appears to have no close relatives. Unlike any other member of <i>Caladenia</i> subgenus <i>Calonema</i>, the lateral sepals and petal project outwards before hanging downwards, sometimes with incurved tips. It is distantly related to <i>C. uliginosa</i> but is distinguished from that species by its broader leaf, shorter petals and broader, flattened labellum with short, sparse, marginal calli. It bears a superficial resemblance to <i>C. dorrienii</i> (a member of the <i>Caladenia</i> subgenus <i>phlebochilus</i>) but, unlike it, has four or more rows of labellum lamina calli. <i>C. hopperiana</i> differs from all other <i>Caladenia</i> species by its prominently branched inflorescence.</p>					
Is this species conventionally accepted? If no, explain why. For example, is there any controversy about the taxonomy? For undescribed species, detail the location of voucher specimens (these should be numbered and held in a recognised institution and be available for reference purposes).					
No <input type="checkbox"/> Yes <input checked="" type="checkbox"/>					
Yes, collections are held in the Western Australian Herbarium. Brown <i>et al.</i> (2008) cite specimen PERTH 07240031 (P. Johns 231) as a voucher specimen of this species.					

Describe any known hybridisation with other species in the wild, indicating where this occurs and how frequently.
Occasional hybrids have been recorded with <i>Caladenia longicauda</i> subsp. <i>redacta</i> .
2.2. Description Describe the physical appearance, habit, behaviour/dispersion and life history. Include anatomy or habit (e.g. size and/or weight, sex and age variation, social structure) and dispersion (e.g. solitary, clumped or flocks etc), and life history (eg short lived, long lived, geophytic, etc).
Herbaceous perennial geophyte to 30 cm. Occurs singularly or as small groups of scattered individuals. Flowers in spring (late September to October). Leaf green and hairy, originating from the base of the scape; flowers 1-4, 4-5 cm across; creamy yellow perianth segments spreading widely and hanging downwards, often incurved towards their tips; 4-6 rows of calli on the labellum (Brown & Brockman, in preparation; Figure 1).
2.3. Distribution Describe the distribution of the species in Australia and, if possible, provide a map.
Known from 3 subpopulations (one extant) near Quindanning over an area of 7.5 km ² , in 2011. Now known from 5 subpopulations at two locations (2106).
2.4. Habitat Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. forest type, associated species, sympatric species). If the species occurs in various habitats (e.g. for different activities such as breeding, feeding, roosting, dispersing, basking etc) then describe each habitat.
Non-biological habitat
A small subpopulation occurred (no longer extant at this site) in gravel over brown sand in a slight depression. Larger subpopulations occur in moist, brown clay loams on the margins of winter-wet creeklines.
Biological habitat
A small subpopulation occurred in <i>Eucalyptus wandoo</i> and <i>Eucalyptus marginata</i> woodland with <i>Xanthorrhoea preissii</i> , <i>Bossiaea eriocarpa</i> , <i>Banksia lindleyana</i> , <i>Leschenaultia biloba</i> and <i>Conostylis setigera</i> . This subpopulation has not been sighted since 2004. The largest subpopulation occurs on the ecotone between a creekline containing <i>Melaleuca viminea</i> , <i>Chorizandra enodis</i> and dead <i>Eucalyptus wandoo</i> and open woodland containing live <i>Eucalyptus wandoo</i> , <i>Hakea varia</i> and <i>Caladenia longicauda</i> subsp. <i>redacta</i> (Figure 2,3). The medium sized subpopulation occurs in <i>Eucalyptus wandoo</i> woodland with <i>Chorizandra enodis</i> , <i>Lepidosperma</i> sp., <i>Sowerbaea laxiflora</i> and <i>Loxocarya flexuosa</i> .
Does the (fauna) species use refuge habitat e.g. in times of fire, drought or flood? Describe this habitat.
N/A
Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?
N/A

<p>2.5. Reproduction Provide an overview of the breeding system. For <u>fauna</u>: Provide an overview of the breeding system and breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process? For <u>flora</u>: When does the species flower and set fruit? Is the seed produced viable? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, ground disturbance) in order to reproduce?</p>
<p>Flowers late September – October. Seed set occurs from late October to mid November. There is no information available on the levels of seed viability. Flowering and subsequent seed set are much lower in dry years (K. Smith, pers. comm.). Based on observations of related species, <i>C. hopperiana</i> is likely to attract pollinators through a prominent visual display luring nectar-foraging insects (Stoutamire 1983; Phillips <i>et al.</i> 2009). Based on the presence of some clumps, it is likely that <i>C. hopperiana</i> is clonal, but not vigorously so. Mycorrhizal fungi are required for germination and annual growth. Disturbance is not required for flowering and in some cases may be detrimental.</p>
<p>2.6. Population dynamics Provide details on ages of sexual maturity, extent of breeding success, life expectancy and natural mortality. Describe population structure (presence of juveniles/seedlings, mature and senescing individuals).</p>
<p>No information is available on demographic parameters, except that during spring 2010 surveys fruit set was approximately 5%, a value considerably lower than most <i>Caladenia</i> pollinated by food-foraging insects (Phillips <i>et al.</i> 2009). Most plants identified in the 2010 survey were adults, but identification of juvenile leaves is problematic due to the co-occurrence of other species of spider orchids.</p>
<p>Questions 2.7 and 2.8 apply to <u>fauna</u> nominations only</p>
<p>2.7. Feeding Summarise food items or sources and timing/availability.</p>
<p>N/A</p>
<p>Briefly describe feeding behaviours, including those that may make the species vulnerable to threatening processes.</p>
<p>N/A</p>
<p>2.8. Movements Describe any relevant daily or seasonal pattern of movement for the species, including relevant arrival/departure dates if migratory. Provide details of home range/territories.</p>
<p>N/A</p>
<p>SECTION 3. INTERNATIONAL CONTEXT</p>
<p>For species that are distributed both in <u>Australia</u> and in <u>other countries</u>.</p>
<p>3.1. Distribution Describe the global distribution.</p>
<p>Known from a 7.5 km² [20km² 2016] area near Quindanning in south-western Australia.</p>
<p>Provide an overview of the global population size, trends, threats and security of the species outside of Australia.</p>
<p>Not present outside Australia.</p>
<p>Explain the relationship between the Australian population and the global population. What percentage of the global population occurs in Australia? Is the Australian population distinct, geographically separate or does part, or all, of the population move in/out of Australia's jurisdiction? Do global threats affect the Australian population?</p>
<p>The entire global population occurs in south-western Australia.</p>

SECTION 4. CONSERVATION STATUS AND MANAGEMENT					
4.1. Population					
What is the total population size in terms of number of mature individuals? Has there been any known reduction in the size of the population, or is this likely in the future? – provide details. Are there other useful measures of population size and what are they? Or if these are unavailable, provide an estimate of abundance (e.g. scarce, locally abundant etc).					
When the species was first discovered in 2003, approximately 2,000 plants occurred across 3 subpopulations. In 2008 and 2009 approximately 230 plants were located across two subpopulations. Detailed surveys in spring 2010 located just 38 plants. [Currently known from 282 plants (2016) with discovery of new occurrences.]					
Provide locations of: captive/propagated occurrences or <i>ex situ</i> collections; recent re-introductions to the wild; and sites for proposed re-introductions. Have these sites been identified in recovery plans?					
Seed has been collected by Kings Park and Botanic Gardens for <i>ex situ</i> preservation. There are no specimens of <i>C. hopperiana</i> currently grown <i>ex situ</i> . There have been no recovery plans detailing sites for potential re-introductions.					
How many locations do you consider the species occurs in and why? Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.					
3 locations. The Quindanning and adjacent regions (including mining tenements) have been the subject of detailed surveys for this species by K. Smith from 2004-2010 (Formosa Flora/ Kings Park and Botanic Gardens). Areas of similar habitat to the north and south of this region contain rare and priority orchids and have been the subject of detailed surveys by members of the West Australian Native Orchid Study and Conservation Group. Staff from DEC have also conducted surveys for the species. No new subpopulations have been found.					
For <u>flora</u> , and where applicable, for <u>fauna</u> , detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known date, location or occurrence.					
*New subpopulations and more recent surveys have been added to table below.					
Date of survey	Location	Land status	Number of individuals at location	Area of occupancy at location	Condition of site
2/10/2013	Track running S off Morgan Rd in the Quindanning Forest Block	State forest	10 (2010: 0 2009: 2)	0.8 ha	good
17/10/2012	Creekline parallel to Page Rd, starting around 150m E of the Pinjarra-Williams Rd	State forest	5 (not full survey) (2010: 0 2009: 40)	18 ha	good
1/10/2013	Creekline crossing Page Rd	State forest	38 2010: 38 2009: 200)	0.01 ha	degraded
2/10/2013	South of Page Road, 1 km to creekline	State Forest	195	2.45 ha	Excellent

28/9/2014	Along drainage line, Mooradung Nature Reserve	Nature reserve	39	0.09 ha	Excellent
Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.					
38 individuals were counted during spring 2010 surveys. Approximately 240 individuals were recorded during the wetter 2008/2009 surveys. During these surveys, surveyors walked the periphery of creeklines known to harbour the species and intensively searched in areas where the species had been originally observed in good numbers.					
Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.					
Of the three known locations, one of them appears to no longer hold <i>C. hopperiana</i> . One of the other locations is becoming rapidly more degraded and based on the current decline (90% population reduction in six years) may cease to support this species.					
What is the extent of occurrence (in km²) for the species; explain how it was calculated and datasets used. If an accurate estimate is unavailable, provide a range of values or a minimum or maximum area estimate. Include estimates of past, current and possible future extent of occurrence. If available, include data that indicates the percentage decline over 10 years or 3 generations (whichever is longer) that has occurred or is predicted to occur.					
The extent of occurrence is 18 km ² . This was calculated based on a polygon estimated from the geographic position of the five known occurrences. The actual area of occupancy is 0.049 km ² or using the 2x2 km ² grid system is 20 km ² .					
Is the distribution of the species severely fragmented? Why?					
The subpopulations are naturally fragmented by the species preference for the margins of winter-wet creeklines.					
Identify important occurrences necessary for the long-term survival and recovery of the species? This may include: key breeding populations, those near the edge of the range of the species or those needed to maintain genetic diversity.					
Preservation of both surviving subpopulations.					
4.2. Survey effort					
Describe the methods to conduct surveys. For example, (e.g. season, time of day, weather conditions); length, intensity and pattern of search effort (including where species not encountered); any limitations and expert requirements.					
All surveys conducted during the flowering period during late September – October. Surveyors walk transects following the habitat of this species around the margin of creeklines.					
Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.					
The species is highly distinctive and combined with the relatively open nature of its habitat, relatively easy to detect. Ideal habitat is winter wet creeklines and their margins in <i>Eucalyptus wandoo</i> woodland.					
Has the species been reasonably well surveyed? Provide an overview of surveys to date (include surveys of known occurrences and surveys for additional occurrences) and the likelihood of its current known distribution and/or population size being its actual distribution and/or population size. Include comments on potential habitat and surveys that were conducted, but where the species was not present/found.					

The species has been exceptionally well surveyed for. The Quindanning and adjacent regions (including mining tenements) have been the subject of detailed surveys for this species by K. Smith from 2004-2010 (Formosa Flora/ Kings Park and Botanic Gardens). Areas of similar habitat to the north and south of this region contain rare and priority orchids and have been the subject of detailed surveys by members of the Department of Environment and Conservation and the Western Australian Native Orchid Study and Conservation Group (WANOSCG). Areas of similar habitat to the east of Collie have been surveyed during searches for *Diuris micrantha* (listed as Declared Rare Flora) by DEC. Areas of similar habitat in the Brookton Hwy region have been surveyed for orchids endemic to this region by members of the WANOSCG including A. Brown, G. Brockman, C. French, F. Hort and J. Hort.

The habitat of *C. hopperiana* is relatively rare in the Quindanning area. Much of what did exist of this habitat appears to have been cleared for agriculture (Figure 4, 5). Given that paucity of available habitat and the detailed surveys for this species, it is highly likely that the current estimates of distribution and population size are a close reflection of the actual status of the species.

4.3. Threats

Identify past, current and future threats indicating whether they are actual or potential. For each threat describe:

- a). how and where they impact this species
- b). what the effect of the threat(s) has been so far (indicate whether it is known or suspected)
- c). present supporting information/research
- d). does it only affect certain populations?
- e). what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations?).

*Refers to more recent population data that has been added to the table.

If possible, provide information threats for each current occurrence/location:

Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)
Morgan Rd		Reduced rainfall	Timber extraction	See below
		Winter, Spring burning	Small population size	
			Mining	
			Poor recruitment	
Creekline crossing Page Rd	Clearing for agriculture	Reduced rainfall	Trampling	
		Winter, Spring burning	Weeds	
		Inundation of low lying plants	Small population size	
		Reduced rainfall	Poor recruitment	
		Salinity	Mining	
		Feral pigs		

Creekline parallel to Page Rd, starting around 150m E of the Pinjarra-Williams Rd		Reduced rainfall	Groundwater extraction	
		Feral pigs	Trampling	
		Winter, Spring burning	Small population size	
			Poor recruitment	
			Mining	
*South of Page Road, 1 km to creekline	Clearing for agriculture	Fire	Timber extraction	
		Salinity/inundation	Small population size	
		Grazing and trampling (kangaroos, pigs, rabbits)	Mining	
		Recreational activities	Poor recruitment	
		Weeds	Weeds	
		Drought	Changing groundwater levels	
			Drought	
*Mooradung Nature Reserve	Clearing for agriculture	Fire	Small population size	
		Grazing, trampling (pigs, rabbits, kangaroos)	Poor recruitment	
		Drought	Drought	

Identify and explain why additional biological characteristics particular to the species are threatening to its survival (e.g. low genetic diversity). Identify and explain any models addressing the survival of the species.

The species has a naturally small distribution and occurs in a habitat that was targeted for clearing for agriculture. It is reliant on seasonally moist sites leaving it vulnerable to (i) long-term decreases in groundwater levels from water extraction and a drying climate (ii) short-term increases in groundwater levels from vegetation removal.

4.4. Management

Identify key management documentation for the species e.g. recovery plans, conservation plans, threat abatement plans etc.

No management documentation exists. [An interim recovery plan was prepared in 2012]

Does this species benefit from the management of another species or community? Explain.

No. These sites are not being managed for the specific benefit of another species of community.

How well is the species represented in conservation reserves or covenanted land? Which of these are actively managed for this species? Provide details.	
<i>C. hopperiana</i> is not represented in a conservation reserve [2011]. All sites are in state forest subject to possible mining. None of these sites are actively managed for the species. [2011 a subpopulation was discovered in Mooradung Nature Reserve.]	
Are there any management or research recommendations that will assist in the conservation of the species? Provide details.	
<p>Management requirements:</p> <ul style="list-style-type: none"> • Management of groundwater at the larger Page Rd subpopulation. Currently low lying plants are at risk from salinity and water logging. Plants higher in the landscape are receiving less moisture through drier winters. Resultantly only a narrow band around the margin of the creekline is habitable. • Establishment of new subpopulations in areas of suitable habitat. • Weed control at the larger Page Rd subpopulation. • Feral pig control to prevent the large amount of soil disturbance currently occurring at the two Page Rd subpopulations. • Rabbit control if evidence of a rabbit population or herbivory is noted. • Erect protective fencing or caging if herbivory and/or trampling is noted as a significant threat. • Erect barriers if recreational activities with state forest continue to threaten the species. • Prevention of alteration of groundwater levels by potential mining operations. • Prevention of winter and spring burns within the areas of subpopulations. • Development of an <i>ex situ</i> collection of plants. • Prevention of planned timber harvesting adjacent to the Morgan Rd site. • Protection from future mining operations. <p>Research requirements:</p> <ul style="list-style-type: none"> • Determine species pollination ecology, seed germination requirements and viability, and longevity. • Identify the fungal symbiont associated with the species and its distribution in the wild. • Determine fire response of the species. 	
4.5. Other	
Is there any additional information that is relevant to consideration of the conservation status of this species?	
SECTION 5. NOMINATOR	
Nominator(s) name(s)	
Organisation(s)	
Address(s)	
Telephone number(s)	
Email(s)	
Date	
If the nomination has been refereed or reviewed by experts, provide their names and contact details.	
Kingsley Dixon, Kings Park and Botanic Gardens	
SECTION 6. REFERENCES	
What references or sources did you use to prepare your nomination? Include written material, electronic sources and verbal information. Include full references, address of web pages and the names and contact details of authorities with whom you had verbal communications.	

Brown, A.P., Brockman, G. (2015) New taxa of *Caladenia* (Orchidaceae) from south-west Western Australia. *Nuytsia* 25:81-83

Brown, A.P., Dundas, P., Dixon, K.W. & Hopper, S.D. (2008) *Orchids of Western Australia*. University of Western Australian Press, Perth.

Phillips, R.D., Faast, R., Bower, C.C., Brown, G.R. & 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.

Stoutamire, W.P. (1983) Wasp-pollinated species of *Caladenia* (Orchidaceae) in South-western Australia. *Australian Journal of Botany*, 31, 383-394.



Figure 1: *Caladenia hopperiana*, the Boddington spider orchid.



Figure 2: A large patch of *Caladenia hopperiana* prior to the 90% decline in population size witnessed at this site.



Figure 3: Habitat of *Caladenia hopperiana* at its largest known subpopulation. Preferred habitat is in the moist margins of winter wet creeklines in wandoo woodland. Note the dead *Eucalyptus wandoo* from salinity and/or water logging.



Figure 4: Location of all known subpopulations of *Caladenia hopperiana*. Other areas of potentially suitable habitat are likely to have occurred in the now extensively cleared region to the east. [Note, new

subpopulation in Mooradung Nature Reserve is located in the large remnant at the top centre of the image.]



Figure 5: Locations of all known subpopulations of *Caladenia hopperiana* showing their preference for drainage lines.