

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this conservation advice and included this species in the Critically Endangered category, effective from 11/05/2018.

Conservation Advice

Conospermum galeatum

Summary of assessment

Conservation status

Conospermum galeatum has been found to be eligible for listing in the Critically Endangered category as outlined in the attached assessment.

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of information provided by Western Australia as part of the Common Assessment Method process, to systematically review species that are inconsistently listed under the EPBC Act and relevant state/territory legislation or lists.

More information on the Common Assessment Method is available at:

<http://www.environment.gov.au/biodiversity/threatened/cam>

The information in this assessment has been compiled by the relevant state/territory government. In adopting this assessment under the EPBC Act, this document forms the Approved Conservation Advice for this species as required under s266B of the EPBC Act.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 32 business days between 16 August 2017 and 29 September 2017. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Recovery plan

A recovery plan for this species under the EPBC Act is not recommended, because the Approved Conservation Advice provides sufficient direction to implement priority actions and mitigate against key threats. The relevant state/territory may decide to develop a plan under its equivalent legislation.

Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Critically Endangered category:
Conospermum galeatum
- (ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

20 November 2017

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

Current conservation status				
Scientific name:	<i>Conospermum galeatum</i>			
Common name:	None			
Family name:	Proteaceae	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	A2a; B1ab(iii,iv)+ B2ab(iii,iv); C2a(ii); D
	2. WA	28/9/2016	Critically Endangered	B1ab(iii,iv)+B2ab(iii,iv); D
	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:	Further surveys were undertaken in 2011 and 2012. The total number of mature individuals increased from 14 in 2010 to 30 in 2012.			
<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:	Assessment is consistent with 2012 assessment, however, criteria A2(a) and C2a(ii) may no longer apply as there has been an increase in the number of mature individuals from 2010 to 2012. Historically there has been a decline in the species distribution overall from 5 locations to one, however, it is unknown if this is within 3 generations. Monitoring has recorded a continuing death of plants despite the overall increase in numbers. Habitat condition and extent is threatened by fire, weeds, grazing, rubbish dumping, illegal vehicle access and a drying climate. Therefore criteria B1ab(iii,iv)+B2ab(iii,iv) still applies. Criterion D also still applies. New assessment endorsed WA TSSC			

28/9/2016.

Nominated national conservation status: category and criteria

Presumed extinct (EX) Critically endangered (CR) Endangered (EN) Vulnerable (VU)

None (least concern) Data Deficient Conservation Dependent

What are the IUCN Red List criteria that support the recommended conservation status category?

B1ab(iii,iv)+B2ab(iii,iv); D

Eligibility against the IUCN Red List criteria (A, B, C, D and E)

*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.*

A.	Population size reduction (evidence of decline)	<ul style="list-style-type: none"> There has been an increase in the number of mature individuals at the subpopulation with 14 recorded in 2010, 24 in 2011 and 30 in 2012, despite also recording dead plants. Insufficient data to assess
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	<ul style="list-style-type: none"> (B1) Using Minimum Convex Polygon the EOO is approximately 0.045 km² which was calculated by drawing a polygon around the plants. (B2) Area of Occupancy is estimated as 4 km² using the 2km x 2km grid method. (a) Known from one location. (b) Continuing decline observed and projected: (iii) Ongoing threats to habitat condition and extent from fire, weeds, rubbish dumping, illegal vehicle access and a drying climate. (iv) Historically known from 5 locations in the Shires of Bruce Rock, Narembeen, Kellerberrin, Quairading and Tammin. Currently only one location in the Shire of Quairading contains extant plants. Meets criteria for Critically Endangered B1ab(iii,iv)+B2ab(iii,iv)
C.	Small population size and decline (population size, distribution and evidence of decline)	<ul style="list-style-type: none"> Known from 30 mature individuals (100% in one subpopulation) in total. The number of mature individuals at the subpopulation has increased since initially surveyed in 2010 from 14 to 30 in 2012, although continuing death of plants occurring it is less than the level of recruitment. Does not meet criteria
D.	Very small or restricted population (population size)	<ul style="list-style-type: none"> (D) There are approximately 30 mature individuals in total. Meets criteria for Critically Endangered D
E.	Quantitative analysis (statistical probability of extinction)	<ul style="list-style-type: none"> No information to assess.

Summary of assessment information					
EOO	0.045 km ² (MCP) – calculated to 4 km ² based on the AOO estimation	AOO	4 km ² (2 km x 2 km grid), mapped area of subpopulation 0.045 km ²	Generation length	-
No. locations	1	Severely fragmented	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/>		
No. subpopulations	1	No. mature individuals	30		
Percentage global population within Australia			100		
Percentage population decline over 10 years or 3 generations			Unknown		
Threats (detail how the species is being impacted)					
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>		
Altered fire regimes <ul style="list-style-type: none"> The species is likely to require infrequent fire to stimulate germination of soil-stored seed. Frequent fire however may result in a reduced seed bank if it occurs before plants reach maturity. Past, current and future	Whole population		Severe		
Poor recruitment <ul style="list-style-type: none"> The subpopulation of the species is showing little natural recruitment with large numbers of dead plants present. Past, present, future	Whole population		High		
Weeds <ul style="list-style-type: none"> Weeds suppress early plant growth by competing with germinants for soil moisture, nutrients and light. They also increase the fire hazard due to the high fuel loads that are produced annually by many grass weed species. Past, current and future	Whole population		Severe		
Rubbish dumping <ul style="list-style-type: none"> Subpopulation is located near the townsite rubbish tip. Therefore rubbish including garden refuse and other material is often dumped. Past, current and future	Whole population		Severe		
Illegal vehicle access <ul style="list-style-type: none"> Trail bikes are using the reserve containing the species and causing soil erosion from the creation of tracks as well as damage to plants. Past, present, future	Whole population		Severe		

<p>Rabbits</p> <ul style="list-style-type: none"> Grazing impacts on the establishment of seedlings and thereby limiting natural recruitment. Disturbance to plants and roots from rabbit diggings. No rabbit activity was observed in 2012 survey. <p>Past and future</p>	<p>Whole population</p>	<p>Severe</p>
<p>Small population size</p> <ul style="list-style-type: none"> The species is only known from a single subpopulation, placing it under serious threat from a single threatening process. <p>Future</p>	<p>Whole population</p>	<p>Catastrophic</p>
<p>Drought</p> <ul style="list-style-type: none"> Equivalent to a major disturbance. <p>Past, present, future</p>	<p>Whole population</p>	<p>Severe</p>
<p>Management and Recovery</p>		
<p>Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?</p>		<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>
<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 DRAFT) <i>Conospermum galeatum</i> Interim Recovery Plan 2012–2016. Interim Recovery Plan No. #. 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"> Monitoring and surveys have been carried out to determine plant numbers and impact of threats; Liaison with local shire to minimise disturbance to remnant vegetation from controlled burns; Protecting the sites from fire unless required for ecological reasons, and implemented early intervention in any wildfires which may threaten the site; Monitoring the populations for evidence of weed and rabbit impacts, or changes in plant or site health; Surveying 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"> Ongoing monitoring and observations of subpopulation and threats; Collect and store seed to guard against the extinction of the natural subpopulation. Collections should aim to sample and preserve the maximum range of genetic diversity possible; Develop and implement a fire management strategy, including associated weed control measures and the need for and method of the construction and maintenance of firebreak; Install gates/bollards at subpopulation to prevent illegal use by trail bike riders; Remove rubbish; Control weeds; 		

- Develop a translocation proposal and select a disease free translocation site;
- Map habitat critical to the survival of the species to facilitate its protection and appropriate management;
- Improve security through converting the portion of Unallocated Crown Land into a conservation reserve;
- Promote awareness of the species with general public.

Research

- Research biology and ecology of the species, with a focus on pollination effectiveness, seed viability, conditions required for natural germination, seedling survivorship, response to threats and disturbances and reproductive biology.
- Investigate generation length.

Nomination prepared by:

Contact details:

Date submitted:

19/9/2016

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	Year/no. mature individuals	Area of subpopulation	Site / habitat Condition	Threats (note if past, present or future)	Specific management actions
Subpopulation 1: Quairading	Crown Reserve; Unallocated Crown Land	2010: 14 (4 dead) 2011: 24 (17 juveniles; 23 dead) 2012: 30 (10 juveniles; 25 dead)	4.5 ha	Plants healthy to moderate, habitat degraded	Fire (past, present, future) Rabbits (past, future) Weeds (past, present, future) Rubbish dumping (past, present, future) Illegal vehicle access (past, present, future) Lack of recruitment (past, present, future) Small population size (future) Climate change (future)	Develop a fire management plan Control grazing when required Manage recreational impacts Remove rubbish Control weeds Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with local Shire Improve security of tenure of Unallocated Crown Land



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 checked="" 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>Conospermum galeatum</i>				
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.				
none				
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		None	
National EPBC Act 1999	None		None	
State of Western Australia	Critically Endangered		A2a; B1ab(iii,iv)+2ab(iii,iv); C2a(ii); D	
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 Yes

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 Yes

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	Critically Endangered	B1ab(iii, iv)+B2ab(iii,iv);D
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.

- Currently known from 1 subpopulation. The number of mature individuals increased from 14 in 2010 to 30 in 2012. Therefore criteria A2(a) and C2a(ii) may no longer apply.
- All other past recorded locations (4 sites) and adjoining sites with similar soils have been extensively surveyed over the last 3 years with no other plants found.
- Its typical habitat (deep yellow and white sand) is extensively cleared within the Central Wheatbelt and remaining remnants are highly fragmented and those remaining are in decline.
- The habitat condition and extent continues to decline from fire, weeds, rubbish dumping, illegal vehicle access and drought.

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.

The species was named by EM Bennett and PM McCarthy in 1995 from a specimen collected between Bruce Rock and Narembeen by William Blackall in 1929.

Is distinguished from other local *Conospermum* species by its slightly incurved thread like leaves which ends in a sharp point are about 30 to 60 mm long by 0.2 to 0.8mm wide and characterised by longitudinal grooves.

Ref: B. Lullfitz et al (2008) Threatened and poorly known flora of the Yilgarn Region. Department of Environment and Conservation.

The type specimen details:

PERTH 06230970

[Conospermum galeatum E.M.Benn.](#)
Proteaceae

Locality: Between Bruce Rock and Narembeen **State:** WA
Collector: W.E. Blackall s.n.
Collection Date: September 1929
Conservation Status: P1

ID by: K. Knight **Date:** 3 July 2002
Origin: BLACKALL.
Type Status: Holotype

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 Yes

Describe any known hybridisation with other species in the wild, indicating where this occurs and how frequently.

None known

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).

It forms an open shrub 0.5 to 1m tall. Inflorescences form on diversely branching flower clusters on stems that are extensions of the branch. The perianth is predominately white with a blue upper lip, is woolly in appearance, about 5 to 8mm long and forms a hairy tube. The flowering period is between August and September. The leaves are slender, thread like and slightly incurved.

It has been found in the Shires of Bruce Rock, Narembeen, Kellerberrin, Quairading and Tammin growing in white or yellow sand.

Little is known on the life history of the species other than it has been noted as being common after fire.

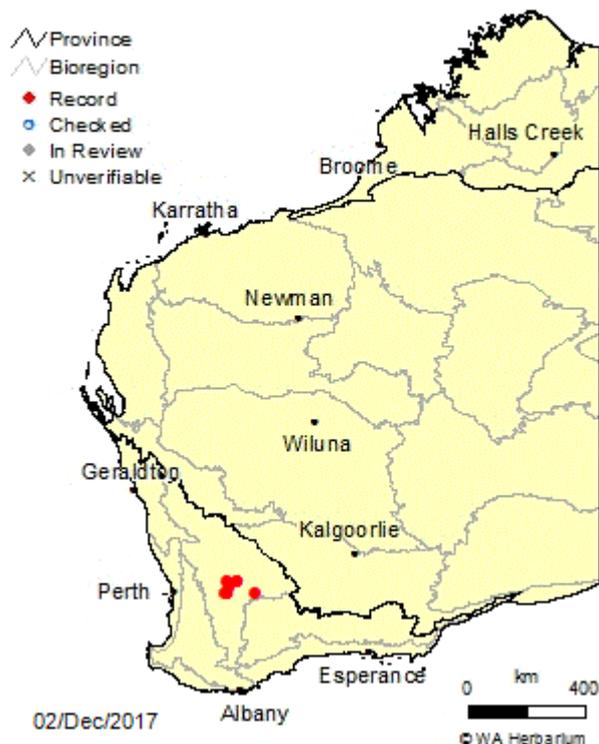
Circumstantial evidence indicates that it is relatively short lived < 15yrs and may have problems with seed set as it is likely that they rely on a specific native pollinator (due to flower shape). These pollinators are likely to have become very rare due to lack of habitat and suitable food resources. (pers.comm G. Keighery)

2.3. Distribution

Describe the distribution of the species in Australia and, if possible, provide a map.

It has been found in the Shires of Bruce Rock, Narembeen, Kellerberrin, Quairading and Tammin. The only current population known is a new population in the Shire of Quairading (see map below from Western Australian Herbarium (1998–) for current and historic locations.

Conospermum galeatum



<p>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.</p>
<p>Non-biological habitat Only known from sandy (yellow and white) substrates.</p>
<p>Biological habitat Associated species are <i>Xylomelum angustifolium</i>, <i>Banksia prionotes</i>, <i>Adenanthos cygnorum</i>, <i>Acacia pulchella</i>, <i>Grevillea levis</i>, <i>Nuytsia floribunda</i>, <i>Leptospermum erubescens</i>, <i>Conospermum stoechadis</i>.</p>
<p>Does the (fauna) species use refuge habitat e.g. in times of fire, drought or flood? Describe this habitat.</p>
<p>Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?</p>
<p><i>Banksia prionotes</i> and <i>Xylomelum angustifolium</i> low woodlands on transported yellow sand (P1 Priority Ecological Community). <i>Banksia prionotes</i> and <i>Xylomelum angustifolium</i> Low Woodlands on large yellow sands dunes (formed from sheets of transported sand in the valleys) on the Ulva Landform Unit. The community has a species rich understorey consisting of <i>Grevillea eriostachya</i>, <i>Melaleuca leptospermoides</i>, <i>Verticordia roei</i>, <i>Calytrix leschenaultii</i>, <i>Dampiera</i> spp., <i>Baeckea preissiana</i> and <i>Borya constricta</i>.</p>
<p>2.5. Reproduction Provide an overview of the breeding system. For fauna: 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 flora: 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>Flowering period is between August and September. Seeds have set by November/December. Viability is currently being investigated from the first seed collection made for the species in 2010. Pollination mechanics are largely unknown but may rely on specific native bee/wasp pollinators who in turn are in low numbers due to over clearing of their habitat and lack of food resources. The genus <i>Conospermum</i> is well known as a fire disturbance specialist and this species has been noted as abundant (Florabase species records, Keighery 1998) after fire. However it is unknown if germination can occur in the absence of fire.</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>The population dynamics of this species is largely unknown. The 14 live known plants are > 3 years old and are all mature specimens. Within this population area there are 4 dead plants. In 2012, 25 dead plants were recorded.</p>
<p>It is thought that plants may live between 10-15 years (G. Keighery pers comm.)</p>
<p>Questions 2.7 and 2.8 apply to <u>fauna</u> nominations only</p>

2.7. Feeding Summarise food items or sources and timing/availability.
Briefly describe feeding behaviours, including those that may make the species vulnerable to threatening processes.
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.
SECTION 3. INTERNATIONAL CONTEXT
For species that are distributed both in <u>Australia</u> and in <u>other countries</u>.
3.1. Distribution Describe the global distribution.
Only known population is within the Shire of Quairading, Western Australia. There are historical collections made from the Shire of Narembeen, Kellerberrin, Tammin, Brookton and Bruce Rock.
Provide an overview of the global population size, trends, threats and security of the species outside of Australia.
n/a
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?
100% of population found within Australia. Global and local drying trend seems to be affecting the vigour of surviving plants.
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).
Only 14 mature individual plants known (30 in 2012) from one location on the outskirts of Quairading in a Crown Reserve and UCL. Other sites with viable soil stored seed populations may be present but will only reliably detectable for after fire.
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?
n/a
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.

All 4 known historical locations have been greatly compromised through extensive weed invasion, road maintenance activities, nutrient runoff, over spray from surround paddocks, and grazing by rabbits or complete clearing.

The species may still occur in these sites as soil stored seed but we have no information at present to indicate how long the seed remains viable. If fire were introduced it is unknown if any plants would germinate but given that natural wildfire events are increasingly rare events within the region, germination of soil stored seeds becomes increasingly remote. Application of prescribed fire is possible at one location but low resources within the region make this an unlikely option without specific funding. The other sites being unspecific in their exact locations, being narrow weedy road side verges or within the townsite of Kellerberrin are considered to be unsuitable for prescribed burning due to high risk of failure due to current environmental pressures as mentioned above.

For flora, and where applicable, for fauna, detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known date, location or occurrence.

Date of survey	Location	Land status	Number of individuals at location	Area of occupancy at location	Condition of site
2010	Quairading Shire Reserve (recorded location details don't match locality description)	Shire Reserve	0	unknown	reasonable
9/2009 11/2010	W of Tammin (landscape has been highly modified & degraded since time of collection)	Crown Reserve	0	unknown	High rabbit numbers and weed invasion on edges of reserve. Medium level of disturbance.
8/2009 11/2010	Between Bruce Rock and Narembeen (landscape has been highly degraded since time of collection)	Shire & MRD road verge	0	unknown	Sections highly disturbed, fragmented and impacted by rabbits.
8/2009 11/2010	Kellerberrin (landscape has been highly modified & degraded and largely cleared since time of collection)	Shire	0	unknown	No remnant left (location coincides with Shire oval)
2010 2011 2012	New Population Quairading Shire Reserve; Unallocated Crown Land	Shire	14 (4 dead) 24 (23 dead) 30 (25 dead)	<1km ² (4.5 ha in 2012)	reasonable

Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.
Individuals have been counted.
Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.
There has been an increase in recorded populations (by 1 in 2010) but a decrease in populations with living plants since time of original collections.
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.
Current known extent is < 1 km ² Past Extent was approx 100km ²
Is the distribution of the species severely fragmented? Why?
Yes due to early European settlement preferential clearing of these soils for farming purposes.
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.
unknown
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.
Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.
The species is easy to detect in the field in all seasons as the form of the leaves is unique and very distinct.
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 very well surveyed during 2009-11, with ongoing work continuing in Quairading. The first recorded collection of this species was in 1897 by R.B. Leake who noted the locality as “Kellerberrin”. It was collected again by M. Leake in the same locality in 1901. Remnant vegetation with deep sand near Kellerberrin has been searched by experienced DEC Conservation Officers and highly experienced volunteers (Fred and Bert Hort) in 2009 and 2010 for *C. galeatum* however no plants were found. An accumulative effort of approximately 70 hrs has been spent searching for the species over 3 years.

It is highly likely that the current known population of 14 plants (30 in 2012) is a reflection of the actual numbers of live plants remaining. The total population size is difficult to determine due to the likelihood of viable *C. galeatum* seed stored in soils in other recorded populations and within the known population. They are likely to remain dormant until the next fire event. How long the seeds will remain viable in the soil is unknown but suspected to be a significant factor in determining the recovery and maintenance of viability 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?).

Past Threats – none recorded

Current Threats

Weeds are present at the site. Weeds suppress compete with germinants for soil moisture, nutrients and light and also increase the fire hazard.

Rabbits – rabbits are present at all recorded sites. They pose a threat through direct grazing on plants especially seedlings and introduction/spread of weeds at the site through dung heaps.

Lack of disturbance – especially that of fire. Only 3 sites are known to have been burnt within the last 50yrs. For a species in a genus of well described fire specialists it is expected that this aspect is likely to be affecting the viability and sustainability of all populations of this species.

Rubbish dumping – garden refuse and other material is dumped at the reserve.

Illegal vehicle access – trail bike riders use the reserve causing soil erosion from the creation of tracks and damage to the plants.

Lack of knowledge – at present very little is known of the biological life history of the plants, pollination ecology and seed dynamics in the soil. This means we are not able to advise on effective burning regimes and other active management options for this species.

Future Threats

Clearing (especially of roadsides)

Small population size

Climate change

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

Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)

Quairading	unknown	Lack of fire management, rabbits, weed invasion, illegal rubbish dumping, illegal vehicle access	Continued dry seasons Rabbits Incorrect fire regime	
------------	---------	--------------------------------------------------------------------------------------------------	-----------------------------------------------------------	--

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.

Not enough is known about the species to identify biological characteristics that may be threatening its survival. But it is likely that the relationship of the morphology of the flowers and specific native pollinators are threatening its long term survival. More research is needed to clarify and identify the species of pollinators and the parameters that define seed set for the species.

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

None written

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

May benefit in some locations where active management of P1 Priority Ecological Community (see above) might include weed and rabbit control and the introduction of fire.

How well is the species represented in conservation reserves or covenanted land? Which of these are actively managed for this species? Provide details.

The 1 known location is in a Shire managed conservation reserve and on Unallocated Crown Land but it is not actively managed for this species or any of the other Declared Rare Flora which also are found in this location.

There is however a land acquisition in progress to give this reserve over to DEC. Once this process is complete DEC will then be able to have more control over the management of the many values within this reserve.

Are there any management or research recommendations that will assist in the conservation of the species? Provide details.

Funding for patch burning and monitoring of the historical collection location in Tammin may also yield important information as well as successfully induce recruitment of live plants.

Other management requirements include:

- Ongoing monitoring and observations of subpopulation and threats, including rabbits;
- Liaison with local shire to minimise disturbance to remnant vegetation from controlled burns;
- Determine the longevity of the species and how long plants continue to flower and produce seed;
- Undertake trials to gain information on seed germination requirements, including required disturbance regime for recruitment and how long seed remains viable in the soil;
- Undertake weed control at subpopulation;
- Remove rubbish from area;
- Develop and implement a fire management strategy, including associated weed control measures and the need for and method of the construction and maintenance of firebreak;
- Restrict access to subpopulation through the installation of barriers such as bollards or fencing;
- Collect and store seed to guard against the extinction of natural populations. Collections should aim to sample and preserve the maximum range of genetic diversity possible;
- Undertake surveys in areas of potentially suitable habitat;
- Develop a translocation proposal and select a disease free translocation site;
- Map habitat critical to the survival of the species to facilitate its protection and appropriate management;
- Improve security through converting the portion of Unallocated Crown Land into a conservation reserve;
- Promote awareness of the species with general public.

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	7 January 2011 (updated 19/9/2016)

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

J. Collins, DEC Northam
 G Keighery, DEC Kensington
 M. Smith, DEC Kensington

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.

- B. Lullfitz et al (2009) Threatened Flora of the Yilgarn Region. DEC publication

-
- Florabase Descriptions and map by the Western Australian Herbarium, Department of Environment and Conservation. Text used with permission (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Thursday, 6 January 2011.

- G. Keighery, B Keighery, N Gibson & A Gunness (2001). The vegetation and flora of the Quairading Nature Reserve, Shire of Quairading. A report for the Wildflower Society of WA(Inc), Nedlands, Western Australia.
-