

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>Stylidium coroniforme</i> subsp. <i>coroniforme</i>
Nomination for (addition, deletion, change):	Taxonomic change and criteria
Nominated conservation category and criteria:	EN B1ab(iii,v)+2ab(iii,v); C2a(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:	<i>Stylidium coroniforme</i> subsp. <i>coroniforme</i>			
Common name:	Wongan Hills Triggerplant			
Family name:	Stylidiaceae	Fauna <input type="checkbox"/>	Flora <input checked="" type="checkbox"/>	
Nomination for:	Listing <input type="checkbox"/>	Change of status/criteria <input checked="" 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)			Endangered (as <i>S. coroniforme</i>)	
State/ Territory	1. WA	2006	Endangered	B2ab(iii,v)
		5/4/2017	Endangered	B1ab(iii,v)+2ab(iii,v); C2a(i)
	2.			
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 survey occurred from 2008 to 2012. The total number of mature individuals declined from 2,959 from 1999 to 2007, to 466 from 2008 to 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:	<i>Stylidium coroniforme</i> is listed at the species level under the EPBC Act. When first listed, <i>Stylidium coroniforme</i> was originally known only from the Wongan Hills area. It was subsequently found near Maya, 120km north of Wongan Hills. DNA sequence data later found that the Maya subpopulations were genetically distinct. More recently, further collections were made near Quairading, 130km SSE of Wongan Hills, which had morphologically unique leaves. Based on differences in features of leaf and bract morphology, the taxon was separated into two subspecies <i>S. coroniforme</i> subsp. <i>coroniforme</i> and <i>S. coroniforme</i> subsp. <i>amblyphyllum</i> , and a third new species <i>S. amabile</i> . This			

		<p>nomination seeks to amend the listing of <i>Stylidium coroniforme</i> to <i>S. coroniforme</i> subsp. <i>coroniforme</i>. Other nominations seek to separately list the other taxa: <i>S. coroniforme</i> subsp. <i>amblyphyllum</i> and <i>S. amabile</i> to provide a comprehensive assessment of each of the derived taxa.</p> <p>Since the WA assessment of <i>S. coroniforme</i> subsp. <i>coroniforme</i> in 2006, a population reduction of >80% has been directly observed within a generation, which is suspected to be 5 to 15 years. A decline in habitat quality from stock, vehicle access, grazing, drought, fire and a drying climate has also been observed and is expected to continue without ongoing management. Criteria C2a(i) now also applies.</p>
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?		EN: B1ab(iii,v)+2ab(iii,v); C2a(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"> Since the assessment in 2006, there has been an 84% decline in the number of individuals from 2,959 (counts undertaken 1999 to 2007) to 466 mature individuals (counts undertaken 2008 to 2012). Ongoing threats to habitat quality from stock, vehicle access, grazing, drought, fire and a drying climate have been observed and are expected to continue without ongoing management. However, the subspecies is a disturbance opportunist, and the decline in numbers in some undisturbed locations may reflect a transfer between life stages (standing plant and seedbank), and thus a fluctuation related to the life history of the subspecies. Without population estimates at comparable stages in the fire cycle, it is thus uncertain what the real longer term decline in the number of mature individuals is. Unable 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 (MCP) the EOO is approximately 22.4 km² which was calculated by drawing a polygon around the plants. (B2) Area of Occupancy is <500 km² based on area occupied of 20 km² using the 2km x 2km grid method, or mapped area of 0.058 km² or 5.8 hectares. (a) Known from five locations in the Wongan Hills area, northeast of Perth based on geographical occurrences and land tenure which affect the risk factors for the main threatening processes of grazing, fire and infrastructure maintenance. (b) Continuing decline observed and projected: (iii) Ongoing threats to habitat quality from stock, vehicle access, grazing, drought, fire and a drying climate.

		<ul style="list-style-type: none"> (v) Subpopulations showed a significant decline in the number of mature individuals from 2006 to 2012. It is likely that a disturbance event is needed to stimulate recruitment, but some areas of declining habitat may have a declining number of mature individuals. An inferred continuing decline in the number of mature individuals is expected without ongoing management. Meets criteria for Endangered 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"> (C) Known from 466 mature individuals in total. (C1) The decline observed in the number of mature individuals may not be a true reflection of the real rate of decline in the species due to the life history characteristics of the species. There is insufficient information to assess criterion C1. (C2) (a) A decline in the number of mature individuals has been observed. A continuing decline in the number of mature individuals is expected without ongoing management. (i) Each subpopulation contains <250 mature individuals. (ii) Subpopulation 6 contains 236 (51%) of the total number of individuals. Meets criteria for Endangered C2a(i)
D.	Very small or restricted population (population size)	<ul style="list-style-type: none"> (D) There are approximately 466 mature individuals in total. Meets Vulnerable D
E.	Quantitative analysis (statistical probability of extinction)	<ul style="list-style-type: none"> No information to assess.
Summary of assessment information		
EOO	22.4 km ² (MCP)	AOO 20 km ² (2 km x 2 km grid). Mapped area of subpops. is 0.058 km ² .
No. locations	5	Severely fragmented Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/>
No. subpopulations	10	No. mature individuals 466
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>
<p>Altered fire regimes</p> <ul style="list-style-type: none"> The species appears to require fire to stimulate germination. However frequent fire would deplete the soil seed store. Fire is likely to facilitate weed invasion and should be followed up with appropriate weed control. <p>Past, current and future</p>	Whole population	Severe
<p>Grazing (rabbits and kangaroos)</p> <ul style="list-style-type: none"> Grazing of flowering scapes impacting on the establishment of seedlings and thereby limiting natural recruitment. Disturbance to plants and roots from rabbit diggings. <p>Past, current and future</p>	Whole population	Severe
<p>Grazing and trampling (stock)</p> <ul style="list-style-type: none"> Fences are in disrepair allowing stock to access habitat. Stock cause direct physical damage to plants, degrade habitat through grazing and trampling of associated vegetation, erosion and introduction of weeds. <p>Past, current and future</p>	Subpopulations 1 and 11	Severe
<p>Maintenance activities</p> <ul style="list-style-type: none"> Threats include grading, chemical spraying, and earth movement undertaken during track, firebreak, powerline and water pipeline maintenance. <p>Past, current and future</p>	Subpopulations 2, 5, 6, 11 and 12	Severe
<p>Poor recruitment</p> <ul style="list-style-type: none"> The species appears to require a disturbance to recruit, but if disturbance is too frequent, occurs at the wrong time of the year or is followed by a drought, then the subpopulations are likely to be severely impacted. <p>Past, current, future</p>	Whole population	Severe
<p>Vehicle access</p> <ul style="list-style-type: none"> Trail-bike riders and vehicles using tracks threaten subpopulations through direct physical contact and habitat modification (soil compact and erosion). <p>Past, current and future</p>	Subpopulations 2 and 5	Severe

<p>Gravel extraction</p> <ul style="list-style-type: none"> Subpopulations 2 and 7 are located in disused gravel pits. Any future extraction would result in damage or destruction of the subspecies and its habitat. <p>Potential</p>	Subpopulations 2 and 7	Catastrophic
<p>Weeds</p> <ul style="list-style-type: none"> Weeds suppress plant growth by competing for light, soil moisture, nutrients and pollinators. They also exacerbate grazing pressure and increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species. <p>Current, future</p>	Subpopulations 7, 11 and 13	Severe
<p>Drought</p> <ul style="list-style-type: none"> Equivalent to a major disturbance. May delay surveys for additional subpopulations given that plants are unlikely to flower and be more difficult to detect. Climate change modelling for the south west predicts a decline in rainfall, and some seasonal shift to summer rainfall events, which is likely to increase the potential impact of drought on the species. <p>Past, current and future</p>	Whole population	Severe
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>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).</p> <ul style="list-style-type: none"> Stack, G., Willers, N. and Brown, A. (2003) Wongan Hills Triggerplant (<i>Stylidium coroniforme</i>) Interim Recovery Plan 2003–2008. Interim Recovery Plan No. 149. Department of Conservation and Land Management, Western Australia. 		
<p>List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.</p> <ul style="list-style-type: none"> Monitoring and surveys have been carried out to determine plant numbers and impact of threats; Protecting the sites from fire unless required for ecological reasons, and implemented early intervention in any wildfires which may threaten the site; Surveying for additional subpopulations; Undertaking a rehabilitation project at a gravel pit at Subpopulation 2 using funding contributed by Main Roads WA including restricting access, such the closing of access tracks with padlocked gates, press releases to raise public awareness of the rehabilitation work and collection of seed from local native species; Propagation of the species by plant division (50% success) and cuttings (85%) by Botanical Gardens and Parks Authority (BGPA); Collection of seed from Subpopulations 1 and 5 in December 1992 and 1993 for storage at Parks and Wildlife's Threatened Flora Seed Centre. 		

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.

Management

- Monitoring the subpopulations for evidence of kangaroo, rabbit or weed impacts, or changes in plant or site health;
- Install fencing/caging at subpopulations to protect from grazing when required;
- Ongoing liaison with private property owners to ensure that subpopulations of the subspecies are not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species;
- Upgrade fencing at Subpopulation 1 to protect from stock;
- Control rabbits through scatter baiting;
- 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;
- Develop a translocation proposal and select a disease free translocation site;
- Map habitat critical to the survival of the subspecies to facilitate its protection and appropriate management;
- Liaise with Department of Lands and Shire of Wongan-Ballidu to ensure no further gravel extraction occurs;
- Install threatened flora markers where required;
- Ensure security of tenure through land acquisition and/or conservation covenants;
- Undertake weed control where required.

Research

- Research biology and ecology of the species, with a focus on pollination effectiveness, seed viability, conditions required for natural germination, response to threats and disturbances and reproductive biology.
- Improve understanding of the species responses to fire frequency, severity and season to inform the preparation of a fire management strategy.

Nomination prepared by:

Contact details:

Date submitted:

28/3/2017

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
Subpopulation 1: NW of Wongan Hills	Private property	1994: 28 [2 dead] 1995: 23 [5 dead] 2001: 25 [11 dead] 2010: 0	0	Very degraded habitat. High rabbit activity, stock, kangaroos.	Grazing and trampling (stock, kangaroos, rabbits (past, present, future) Poor recruitment (past, present, future) Fire (past, present, future) Drought (past, present, future) Climate change (future)	Upgrade fencing Develop a fire management plan Undertake baiting for rabbits Collect seed and test viability, conduct regeneration trials Undertake baiting for rabbits Liaise with private property owners Establish new populations through translocation
Subpopulation 2: NE of Wongan Hills	Department of Lands	1992: 250 1993: 199 1994: 123 1995: 37 2000: 5 [5 dead] 2011: 1	0.0001 ha	Moderate, subpopulation declining.	Track use/maintenance (past, present, future) Gravel extraction (future) Vehicle access (past, present, future) Grazing (kangaroos) Poor recruitment (past, present, future) Fire (past, present, future) Drought (past, present, future) Climate change (future)	Install markers Restrict access Install fencing/caging Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with Department of Lands and Shire of Wongan- Ballidu
Subpopulation 5: N	Conservation	1994: 151	0	Poor condition.	Powerline maintenance (past,	Restrict access

of Wongan Hills	park	1995: 108 2000: 46 [3 dead] 2002: 20 [29 dead] 2009: 0 2011: 0 2012: 0			future) Vehicle access (past, present, future) Poor recruitment (past, present, future) Fire (past, present, future) Drought (past, present, future) Climate change (future)	Install fencing/caging Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with Western Power
Subpopulations 6a-e: NW of Wongan Hills	Nature reserve	1999: 67 1999/2000: 143 2001: 204 [2 dead] (partial survey) 2000-01: 282 2011/12: 236	0.885 ha	Healthy. No recruitment observed.	Firebreak/track maintenance (past, future) Poor recruitment (past, present, future) Fire(past, present, future) Drought (past, present, future) Climate change (future)	Install markers Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation
Subpopulation 7: NNW of Wongan Hills	Conservation park	2000: 1 2001: 2 2009: 0 2011: 3 2012: 1	0.04m ²	Partially degraded shrubland.	Gravel extraction (future) Poor recruitment (past, present, future) Grazing (rabbits) (past, present, future) Weeds (future) Fire (past, present, future) Drought (past, present, future) Climate change (future)	Install fencing/caging Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with Shire of Wongan Hills Undertake baiting for rabbits Control weeds
Subpopulation 8: NW of Wongan Hills	Conservation park	2000: 1 2001: 1,700 (new	4.9 ha	Healthy	Grazing (rabbits, kangaroos) Poor recruitment (past, present,	Install fencing/caging Develop a fire management

		plants discovered) 2011: 109 2012: 107			future) Fire (past, present, future) Drought (past, present, future) Climate change (future)	plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Undertake baiting for rabbits
Subpopulation 10: W of Wongan Hills	Private property	2001: 50 2010: 0	0	Healthy. Site previously disturbed by water pipeline installation.	Pipeline maintenance (future) Fire (past, present, future) Poor recruitment (past, present, future) Drought (past, present, future) Climate change (future)	Install markers Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with private property owners
Subpopulation 11a- b: NW of Wongan Hills	Private property, nature reserve	2007: 74 2010: 35 2011: 13 2012: 9	0.004 ha	Plant recruitment after fenceline cleared in 2005. Private property fence in disrepair. Plants grazed by kangaroos, rabbits and sheep.	Grazing (stock, kangaroos, rabbits) Poor recruitment (past, present, future) Firebreak maintenance (past, future) Weeds (past, present, future) Drought (past, present, future) Climate change (future)	Replace/repair fence Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with private property owners Undertake baiting for rabbits Control weeds
Subpopulation 12: NW of Wongan Hills	Private property	2008: 56	0.015 ha	Regrowth from clearing 2005.	Vegetation clearing (past) Firebreak maintenance (past, present, future)	Develop a fire management plan Collect seed and test viability,

					Drought (past, present, future) Climate change (future)	conduct regeneration trials Establish new populations through translocation Liaise with private property owners
Subpopulation 13a-b: W of Wongan Hills	Private property	2009: 56	0.007 ha	Healthy. Plants not grazed.	Poor recruitment (past, present, future) Weeds (past, present, future) Drought (past, present, future) Climate change (future)	Control weeds Develop a fire management plan Collect seed and test viability, conduct regeneration trials Establish new populations through translocation Liaise with private property owners



Department of
Parks and Wildlife



Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2017.

SECTION 1. NOMINATION					
1.1. Nomination for:					
Flora <input checked="" type="checkbox"/>	Fauna <input type="checkbox"/>	as: Threatened / DRF <input checked="" type="checkbox"/> Taxonomic Change <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 possible.					
<i>Stylidium coroniforme</i> (F.L.Erickson & J.H.Willis) subsp. <i>coroniforme</i>					
1.3. Common Name If the species has a generally accepted common name, please show it here.					
Wongan Triggerplant (proposed)					
1.4. Family Name					
Stylidiaceae					
1.5. Current Conservation Status. If none, type 'None'.					
	IUCN Red List Category e.g. Vulnerable		IUCN Red List Criteria e.g. B1ab(iv); D1		
International IUCN Red List	None		None		
National EPBC Act 1999	Endangered (as <i>S. coroniforme</i>)				
State of Western Australia	Endangered		B2ab(iii,v)		
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. Nominated Conservation Status.					
	IUCN Red List Category e.g. Vulnerable		IUCN Red List Criteria e.g. B1ab(iv); D1		
State of Western Australia	Endangered		B1ab(iii,v)+2ab(iii,v); C2a(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"/>
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"/> Details:					
1.7. Reasons for the Nomination. Briefly summarise the reasons for the nomination in dot points. Please include details relevant to the IUCN Category and each Criteria.					
<i>Stylidium coroniforme</i> is listed at the species level under the EPBC Act. When first listed, <i>Stylidium coroniforme</i> was originally known only from the Wongan Hills area. It was subsequently found near Maya, 120km north of Wongan Hills. DNA sequence data later found that the Maya subpopulations were genetically distinct. More recently, further collections were made near Quairading, 130km SSE of Wongan Hills, which had morphologically unique leaves. Based on differences in features of leaf and bract morphology, the taxon was separated into two subspecies <i>S. coroniforme</i> subsp. <i>coroniforme</i> and <i>S. coroniforme</i> subsp. <i>amblyphyllum</i> , and a third new species <i>S. amabile</i> . This nomination seeks to amend the listing of <i>Stylidium coroniforme</i> to <i>S. coroniforme</i> subsp.					

coroniforme. Other nominations seek to separately list the other taxa: *S. coroniforme* subsp. *amblyphyllum* and *S. amabile*.

S. coroniforme subsp. *coroniforme* is confined to shallow yellow sand over laterite on open scrub and heath in Western Australia in the Wongan Hills area.

Ten subpopulations are known, of which five are on private property (one extends onto the adjacent nature reserve), one in UCL, three in a conservation park, and one in a nature reserve.

The EOO is c. 22.4km², the mapped AOO is 0.058km² and the total number of individuals is approximately 466, with subpopulations varying in size from 0 to 236 individuals.

Current and future threats are grazing by stock, kangaroos and rabbits, vehicle access, inappropriate fire regimes, poor recruitment, weeds, maintenance activities and drought.

This subspecies was listed in 2006 as Endangered under IUCN criteria B2ab(iii,v) as there were 2,959 mature individuals known; AOO was <500km²; number of locations ≤5; and there was a continuing decline in the number of individuals and quality of habitat, particularly due to poor rainfall and grazing.

Since the previous assessment, a population reduction of >80% (2,959 to 466 mature individuals) has been directly observed, within a generation (suspected to be 5 to 15 years), however the percentage reduction is not able to be applied with confidence as the species responds to disturbance and the magnitude of this decline may be due to that. A decline in habitat quality from stock, vehicle access, grazing, drought, fire and a drying climate has been observed and is expected to continue without ongoing management which infers that there is some level of population decline being experienced. There are currently 466 mature individuals known, with each subpopulation containing <250 mature individuals. Criteria B1ab(iii,v)+2ab(iii,v); C2a(i) now applies.

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.

Stylidium coroniforme was first collected from the Wongan Hills area in 1964 by M. Rogers. Further collections were made near Maya, 120km north of Wongan Hills. This collection had close morphological affinity to the Wongan Hills subpopulations but DNA sequence data (Coates 1992) found that the Maya populations were genetically distinct. More recently, further collections were made near Quairading, 130km SSE of Wongan Hills, which had morphologically unique leaves. Based on differences in features of leaf and bract morphology, the taxon was separated into two subspecies *S. coroniforme* subsp. *coroniforme* and *S. coroniforme* subsp. *amblyphyllum*, and a third new species *S. amabile* was described (Wege and Coates 2007).

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 ☒

Stylidium coroniforme subsp. *coroniforme* is recognised on Western Australia's vascular plant census and is represented by five voucher specimens at the Western Australian Herbarium (Western Australian Herbarium 1998–).

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

No hybrids have been documented; hybridisation is rare in *Stylidium*.

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).

Perennial herb 7–20cm high, with compact to shortly elongated stems becoming shallowly buried as the plants age. Leaves are oblanceolate, the apex conspicuously mucronate, and are 1.5 to 4cm long and 1.2 to 2.5mm wide. The floral bracts are mucronate, with the mucro 0.2 to 1mm long. Long lateral appendages are present (Wege and Coates 2007).

The lifeform of *Stylidium coroniforme* subsp. *coroniforme* is comparable to subspecies *amblyphyllum* and *S. amabile* which, like many triggerplants, are known disturbance opportunists (Coates 1992; Chant and Page 2010). Fire response is unknown: it is not inconceivable that individuals where stem tissue is buried may be able to resprout following fire.

2.3. Distribution

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

Stylidium coroniforme subsp. *coroniforme* is endemic to the Avon Wheatbelt in the south-west of Western Australia, occurring in the Wongan Hills area (see below).

Stylidium coroniforme subsp. *coroniforme*

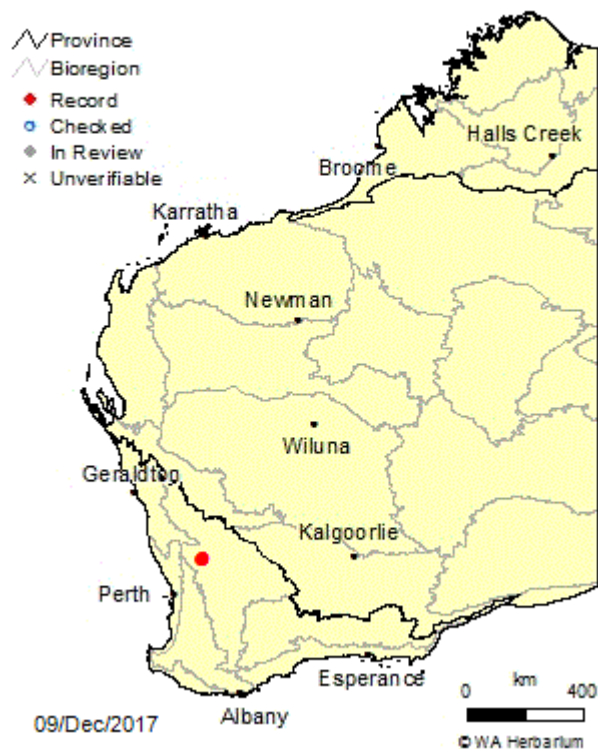


Figure 1. Location of *Stylidium coroniforme* subsp. *coroniforme* (from Western Australian Herbarium (1998–)).

2.4. Habitat

Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. vegetation 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. Note if the habitat has a special defining characteristic. If possible estimate the area of habitat, or the relative abundance of the habitat, and note if a critical habitat requirement (eg breeding habitat) is restricted in its availability to the species.

Non-biological habitat

Shallow yellow sand over laterite on open areas in low scrub and heath.

Biological habitat

Upland habitats consisting of <i>Allocasuarina</i> and <i>Dryandra</i> shrubland and mallee woodland.
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
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><i>Stylidium coroniforme</i> subsp. <i>coroniforme</i> flowers from mid-September to November. Like many other perennial triggerplants, it is unlikely to flower under drought conditions. Individuals produce 1–c. 20 flowering scapes and each scape produces c. 5–75 flowers. Like other triggerplants, it affects pollen transfer via a mobile floral column. While this promotes cross pollination, geitonogamy (resulting in self-pollination) is likely to occur. Self-pollination is likely to result in significantly higher levels of postzygotic seed abortion than cross pollination due to recessive lethal factors (James 1979). Specific pollinators have not been documented, but a bombyllid fly was observed visiting flowers at a subpopulation (Stace and Coates 1995).</p> <p>Seed appears to germinate following habitat disturbance with young plants recorded following fire, roadworks, gravel extraction and powerline maintenance. Populations of these taxa (and many other perennial triggerplants) typically go through bottleneck-flush cycles associated with temporary habitat perturbations such as fire, resulting in extreme fluctuations in the number of individuals (Coates 1992; Stace and Coates 1995).</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). Estimate generation length.
Individual plants may live between five and 15 years with seed thought to persist for a number of years germinating after the soil has been disturbed (Stace and Coates 1995).
Questions 2.7 and 2.8 apply to fauna nominations only
2.7. Feeding Summarise food items or sources and timing/availability.
n/a
Briefly describe feeding behaviours, including those that may make the species vulnerable to threatening processes.
n/a
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.
n/a
SECTION 3. INTERNATIONAL CONTEXT
For species that are distributed both in Australia and in other countries.

3.1. Distribution**Describe the global distribution.**

n/a

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?

n/a

SECTION 4. CONSERVATION STATUS AND MANAGEMENT

Conservation status and management information is required for the national extent of the species, however, greater detail is expected for the WA occurrences. If the taxon is considered to be endemic to Western Australia, please provide supporting evidence.

4.1. Population

What is the total national/State population size in terms of number of mature individuals? Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals. 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).

Note: The term 'population' is used in a specific sense in the Red List Criteria that is different to its common biological usage. Population is here defined as the total number of mature individuals of the taxon. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used. (IUCN 2001)

The total population (i.e. number of mature individuals) is 466.

How many subpopulations or locations do you consider the species occurs in and why?

Note: 'Subpopulations' are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less). 'Locations' are defined as a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat. (IUCN 2001) Refer to Red List Guidelines 9.0

The number of subpopulations is 10 (see below) (determined as 5 locations based on the clustered arrangement of the subpopulations).

Provide locations of: captive/propagated occurrences or *ex situ* collections; recent re-introductions or introductions to the wild; and sites for proposed re-introductions or introductions. Have these sites been identified in recovery plans?

n/a

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. More specific detail is expected for WA occurrences for taxa that are not endemic to WA.

Location description (include coordinates of the site)	Land status	Number of mature individuals at location	Area of occupancy at location (hectares)	Condition of site
Subpopulation 1: NW of Wongan Hills	Private property	1994: 28 1995: 23	0	Very degraded habitat. High rabbit activity,

		2001: 25 2010: 0		stock, kangaroos.
Subpopulation 2: NE of Wongan Hills	Department of Lands	1992: 250 1993: 199 1994: 123 1995: 37 2000: 5 2011: 1	0.0001 ha	Moderate, subpopulation declining
Subpopulation 5: N of Wongan Hills	Conservation park	1994: 151 1995: 108 2000: 46 2002: 20 2009: 0 2011: 0 2012: 0	0	Poor
Subpopulation 6a-e: NW of Wongan Hills	Nature reserve	1999: 67 1999/2000: 143 2001: 204 (partial survey) 2000-01: 282 2011/12: 236	0.885 ha	Healthy. No recruitment observed.
Subpopulation 7: NNW of Wongan Hills	Conservation park	2000: 1 2001: 2 2009: 0 2011: 3 2012: 1	0.04 m ²	Partially degraded shrubland
Subpopulation 8a-b: NW of Wongan Hills	Conservation park	2000: 1 2001: 1,700 (new plants discovered) 2011: 109 2012: 107	4.9 ha	Healthy
Subpopulation 10: W of Wongan Hills	Private property	2001: 50 2010: 0	0	Healthy. Site previously disturbed by water pipeline installation.
Subpopulation 11a-b: NW of Wongan Hills	Private property, nature reserve	2007: 74 2010: 35 2011: 13 2012: 9	0.004 ha	Poor. Plants grazed by kangaroos, rabbits and sheep. Plant

				recruitment after fenceline cleared in 2005. Private property fence in disrepair.
Subpopulation 12: NW of Wongan Hills	Private property	2008: 56	0.015 ha	Regrowth from clearing 2005.
Subpopulation 13a-b W of Wongan Hills	Private property	2009: 56	0.007 ha	Healthy. Plants not grazed.
What is the total area of occupancy (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. Where separate breeding habitat is applicable, if possible, also provide area of breeding habitat.				
Estimated AOO 20km ² using the 2km x 2km grid system. Actual area of occupied habitat = 0.058km ² calculated using data estimated during surveys by foot.				
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.				
EOO = c. 22.4km ² (calculated from an ArcGIS polygon that encompassed all known subpopulations).				
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.				
All occurrences are important in view of the reduced number of individuals known.				
Is the distribution of the species severely fragmented? Why?				
The individuals occur in small and isolated subpopulations resulting in an increased extinction risk. This is in part due to clearing for agriculture and grazing of stock (mostly sheep), but also due to their specific habitat preference. These subpopulations are not considered severely fragmented as >50% of its distribution occurs in areas of sufficient habitat to maintain the population, even though the reserves the subspecies occurs in are isolated.				
Is the taxon subject to extreme fluctuations? If so, provide evidence.				
Unknown.				
Has there been any known decline in the species within WA or nationally, or is this likely in the future? – provide details in relation to the elements detailed below, including how the decline has been measured or inferred. Is there a presumption of continuing decline? If so, provide details of the decline and how it relates to the specific Red List Categories and Criteria version 3.1.				
Note: A continuing decline is a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this. (IUCN 2001) Refer to Red List Guidelines 9.0				

A future decline is likely in response to climate change, poor recruitment, inappropriate fire regimes, grazing by rabbits, kangaroos and stock, vehicle access, gravel extraction and drought.
Has there been a decline in the size of the population (number of mature individuals)?
Yes the number of individuals has declined from 2,959 from 1999 to 2007 to 466 from 2008 to 2012.
- can the rate of population size reduction be determined over the last 10 years or 3 generations (whichever is the longer)? If so, state whether the determination is based on quantitative data (observed), estimated (provide data and calculations), inferred or suspected.
A decline of 84% has been observed within 6 years or one generation (5 to 15 years for one generation). This may be an over-estimate given the life history of the subspecies, but it is still likely to be >20%.
- can the rate of population size reduction be estimated for the next 10 years or 3 generations and in any 10 year or 3 generation period (up to a maximum of 100 years into the future)? If so, state how the reduction is estimated (provide data and calculations), inferred or suspected.
A continuing decline in the number of mature individuals is expected without ongoing management due to ongoing threats to habitat quality from stock, vehicle access, grazing, drought, fire and a drying climate. The subspecies is also a disturbance opportunist, and the decline in numbers in some undisturbed locations may be a natural part of the life history of the subspecies. It is thus uncertain what the real longer term decline in the number of mature individuals is.
Has there been a decline in the number of locations, extent of occurrence or area of occupancy?
Unknown.
Has there been a decline in the area or quality of habitat?
Yes, possibly due to grazing and trampling by stock, grazing by kangaroos and rabbits, vehicle access, gravel extraction, weeds and drought.
4.2. Survey effort Describe the methods to conduct surveys. For example, season, time of day, weather conditions; length, intensity and pattern of search effort (including where species not encountered); any limitations and expert requirements.
Surveys have been conducted via foot and in areas of suitable habitat during the taxon's flowering time to maximise detection.
Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.
The subspecies occurs in a highly specific habitat and has distinctive basal leaves which are unique in the genus, this allowing for a good level of detectability and field identification.
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.
Yes. A new location consisting of approximately 1,000 individuals was discovered by Parks and Wildlife, Wildlife Officer Phil Roberts in 1982, in a water reserve. This location was then resurveyed in 1994 by consultant Anne Kelly and was found to consist of two subpopulations (2 and 5). Subpopulation 6 was discovered in a nature reserve in 1999 by Parks and Wildlife staff from the Wheatbelt Region. Subpopulations 7 and 8 in a conservation park (then water reserve) were discovered by staff from Parks and Wildlife Wheatbelt Region staff. Subpopulation 10 on private property was discovered in 2001 by Parks and Wildlife staff and volunteers from the Toodyay Naturalists Club. Surveys in 2007 to 2009 by Joel Collins from Parks and Wildlife Wheatbelt Region resulted in the

discovery of Subpopulations 11, 12 and 13 in private property and an adjacent nature reserve.

Further surveys were undertaken from 2009 to 2012 by Parks and Wildlife staff from the Wheatbelt Region.

4.3. Threats

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

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

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

Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)
All subpopulations	Poor recruitment	Poor recruitment		
All subpopulations	Inappropriate fire regimes	Inappropriate fire regimes		
Subpopulations 1 and 11	Grazing and trampling (stock)	Grazing and trampling (stock)		
All subpopulations	Grazing, disturbance by rabbits and kangaroos (particularly the flowering scapes)	Grazing, disturbance by rabbits and kangaroos (particularly the flowering scapes)		
Subpopulations 2, 5, 6, 11 and 12	Maintenance activities (track, firebreak, powerline and water pipeline maintenance)	Maintenance activities (track, firebreak, powerline and water pipeline maintenance)		
Subpopulations 2 and 5	Vehicle access (trail bike riders, 4WD's)	Vehicle access (trail bike riders, 4WD's)		
Subpopulations 2 and 7			Gravel extraction	
Subpopulations 7, 11 and 13		Weeds	Weeds	
All subpopulations	Drought	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.

Like *Stylidium coroniforme* subsp. *amblyphyllum*, and the allied species *S. amabile*, *S. coroniforme* subsp. *coroniforme* is likely to be a disturbance opportunist with subpopulations going through bottleneck-flush cycles associated with temporary habitat perturbations such as fire. A lack of

disturbance is likely to result in poor recruitment and subpopulation decline (Coates 1992).

4.4. Management

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

An Interim Recovery Plan (Stack *et al.* 2003) and a Recovery Plan (Stace and Coates 1995) exists for *Stylidium coroniforme*.

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

n/a

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

Of the 10 known subpopulations, two occur in nature reserves, three in a conservation park, one on land vested with the Department of Lands, and the remainder on private property.

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

Protection of plants from grazing and protection of habitat (see Coates 1992; Stack *et al.* 2003). Chant and Page (2010) report on the success of burn trials in increasing the number of mature individuals of the allied taxon *S. amabile*.

Management requirements to include:

- Ongoing liaison with Western Power, Water Authority and private property owners to ensure that subpopulations of the subspecies are not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species;
- Install fencing/caging at subpopulations to reduce grazing and trampling by rabbits and kangaroos and allow recruitment within a larger area of habitat;
- Upgrade fencing at Subpopulation 1 to protect from stock;
- Monitor the subpopulations for evidence of kangaroo, rabbit, or weed impacts, or changes in plant or site health;
- Control rabbits through scatter baiting;
- Protect the sites from fire unless required for ecological reasons, and implement early intervention in any wildfires which may threaten the site;
- Collect and store seed;
- Survey any newly identified areas of suitable habitat;
- Establish new subpopulations in more secure locations, if a suitable location can be found;
- Install threatened flora markers where required;
- Liaise with Department of Lands and Shire of Wongan-Ballidu to ensure no further gravel extraction occurs;
- Research biology and ecology of the species, with a focus on pollination effectiveness, seed viability, conditions required for natural germination, response to threats and disturbances and reproductive biology;
- Undertake weed control where required;
- Improve security through placement of conservation covenants;
- Undertake systematic monitoring of populations to determine population trends.

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	14/03/2017
If the nomination has been refereed or reviewed by experts, provide their names and contact details.	
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.	
<p>Chant, A. and Page, C. (2010) <i>Stylidium amabile</i> disturbance trial. <i>WATSNU</i> 16(1): 4–5.</p> <p>Coates, D.J. (1992) Genetic consequences of a bottleneck and spatial genetic structure in the triggerplant <i>Stylidium coroniforme</i> (Stylidiaceae). <i>Heredity</i> 69: 512–520.</p> <p>James S.H. (1979) Chromosome numbers and genetic systems in the triggerplants of Western Australia (<i>Stylidium</i>; Stylidiaceae). <i>Australian Journal of Botany</i> 27: 17–25.</p> <p>Stace H.M. and Coates, D.J. (1995) Wongan Hills Triggerplant Recovery Plan. Wildlife Management Program No. 15. Department of Conservation and Land Management, WA.</p> <p>Stack, G., Willers, N. and Brown, A. (2003) Wongan Hills Triggerplant (<i>Stylidium coroniforme</i>) Interim Recovery Plan No. 149, 2003–2008. Department of Conservation and Land Management, WA.</p> <p>Wege, J.A. and Coates, D.J. (2007) Observations on the rare triggerplant <i>Stylidium coroniforme</i> (Stylidiaceae) and the description of two allied taxa of conservation concern. <i>Nuytsia</i> 17: 433–444.</p> <p>Western Australian Herbarium (1998–) <i>FloraBase</i>—the Western Australian Flora. Department of Parks and Wildlife. http://florabase.dpaw.wa.gov.au.</p>	