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)**:**	***Gastrolobium humile***
Nomination for (addition, deletion, change)**:**	**Addition**
Nominated conservation category and criteria:	**EN: B1ab(iii,iv)+B2ab(iii,iv)**

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 ☐ No ☐
A.	Population size reduction	•	
B.	Geographic range	•	
C.	Small population size and decline	•	
D.	Very small or restricted population	•	
E.	Quantitative analysis	•	

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

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

Current conservation status				
Scientific name:	*Gastrolobium humile*			
Common name:	None			
Family name:	Fabaceae	Fauna ☐	Flora ☒	
Nomination for:	Listing ☒	Change of status/criteria ☐	Delisting ☐	
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	Endangered	B1ab(iii,iv)+B2ab(iii,iv)
	2.			
	3.			

Consistent with Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding, it is confirmed that:	
• 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 ☒ No ☐
Comments:	
• surveys of the species were adequate to inform the assessment;	Yes ☒ No ☐
Comments:	Further surveys were undertaken in 2013, 2014 and 2015. The total number of mature individuals declined from 2,600 in 2011 to 2,510 in 2014/15. A new subpopulation was discovered in 2014 consisting of 15 plants.
• 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 ☒ No ☐
Comments:	Assessment is consistent, and criteria remains current.

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?		**EN: B1ab(iii,iv)+B2ab(iii,iv)**
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)	• The total number of mature individuals has declined in 2 subpopulations from 2,600 in 2011 to 2,510 in 2014/15, but this may be due to monitoring variation. A new subpopulation located in 2014 consisting of 15 mature individuals increased to 20 in 2015. A percentage population reduction cannot be determined. • **Unable to assess**
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	• (B1) Using Minimum Convex Polygon (MCP) the EOO is approximately 11.5 km^2 which was calculated by drawing a polygon around the plants. • (B2) Area of Occupancy is estimated 12 km^2 using the 2km x 2km grid method with a mapped area of subpopulations of 0.188 km^2 or 18.8 hectares. • (a) Only known from three locations, northeast of the Stirling Range National Park. • (b) Continuing decline observed and projected: • (iii) (iv) The habitat is being degraded through grazing, fire, weeds and road maintenance. The species has suffered a historical reduction in its area of occupancy with at least one historic collection in the South Stirling area now extinct. • **Meets criteria for Endangered B1ab(iii,iv)+B2ab(iii,iv)**
C.	Small population size and decline (population size, distribution and evidence of decline)	• Known from approximately 2,510 mature individuals. • The total number of mature individuals declined by 3% from 2,600 in 2011 to 2,510 in 2014/15, but this may be due to monitoring variation. • 2,400 mature individuals (96%) occur in one subpopulation. • **Does not meet criterion C**
D.	Very small or restricted population (population size)	• (D) Known from approximately 2,510 mature individuals. • **Does not meet criterion D**
E.	Quantitative analysis (statistical probability of extinction)	• No information to assess.

Summary of assessment information					
EOO	11.5 km^2 (MCP)	AOO	12 km^2 (2 km x 2 km grid), with mapped area of	Generation length	-

			subpopulations <0.188 km^2		

No. locations	3	Severely fragmented	Yes ☐ No ☒ Unknown ☐
No. subpopulations	3	No. mature individuals	2,510

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 *(describe the threat and how it impacts on the species. Specify if the threat is past, current or potential)*	Extent *(give details of impact on whole species or specific subpopulations)*	Impact *(what is the level of threat to the conservation of the species)*
Road maintenance • Threats include grading, chemical spraying, construction of drainage channels and slashing of road vegetation. Past, current and future	Whole Subpopulation 2	Severe
Grazing (rabbits, kangaroos) • Grazing impacts on the establishment of seedlings and thereby limiting natural recruitment. • Disturbance to plants and roots from rabbit diggings. Current and future	Whole population	Severe
Weeds • Weeds, such as Bridal Creeper, suppress early plant growth by competing for soil moisture, nutrients and light. They also increase the fire hazard. At present they are considered a minor threat. Current and future	Whole population	Severe
Altered fire regimes • The species is likely to be sensitive to inappropriate fire regimes due to its preferred habitat in areas that act as refuge during wildfires. If fire frequency is increased the soil seed bank could be depleted before juvenile plants have reached maturity. Past, current and future	Whole population	Severe
Drought • This is a threat to the species if it occurs over a number of years. Future	Whole population	Severe

Management and Recovery

Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?	Yes ☐ No ☒

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).

List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.

- Warning markers have been installed on the road reserve at Subpopulation 2;
- The area of remnant vegetation on private property containing Subpopulation 2 of the species has been fenced;
- Liaison with private property owners to ensure protection of remnant vegetation;
- Monitoring and surveys have been carried out to determine plant numbers and impact of threats.

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

- Monitor subpopulations for evidence of grazing impacts, weeds, or changes in plant or site health;
- Liaise with local shire to ensure that subpopulation of the species is not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species;
- Collect and store seed to guard against the extinction of the natural subpopulations. Collections should aim to sample and preserve the maximum range of genetic diversity possible;
- Develop and implement a fire management strategy, including the need for, and method of, the construction and maintenance of firebreaks;
- Control weeds;
- Control rabbits through scatter baiting if required;
- Investigate formal conservation arrangement, management agreement and covenant on private land, and investigate inclusion in reserve tenure if possible;
- Undertake surveys in areas of potentially suitable habitat;
- Continue to follow dieback hygiene measures;
- Establish new subpopulations through translocation into disease free areas.

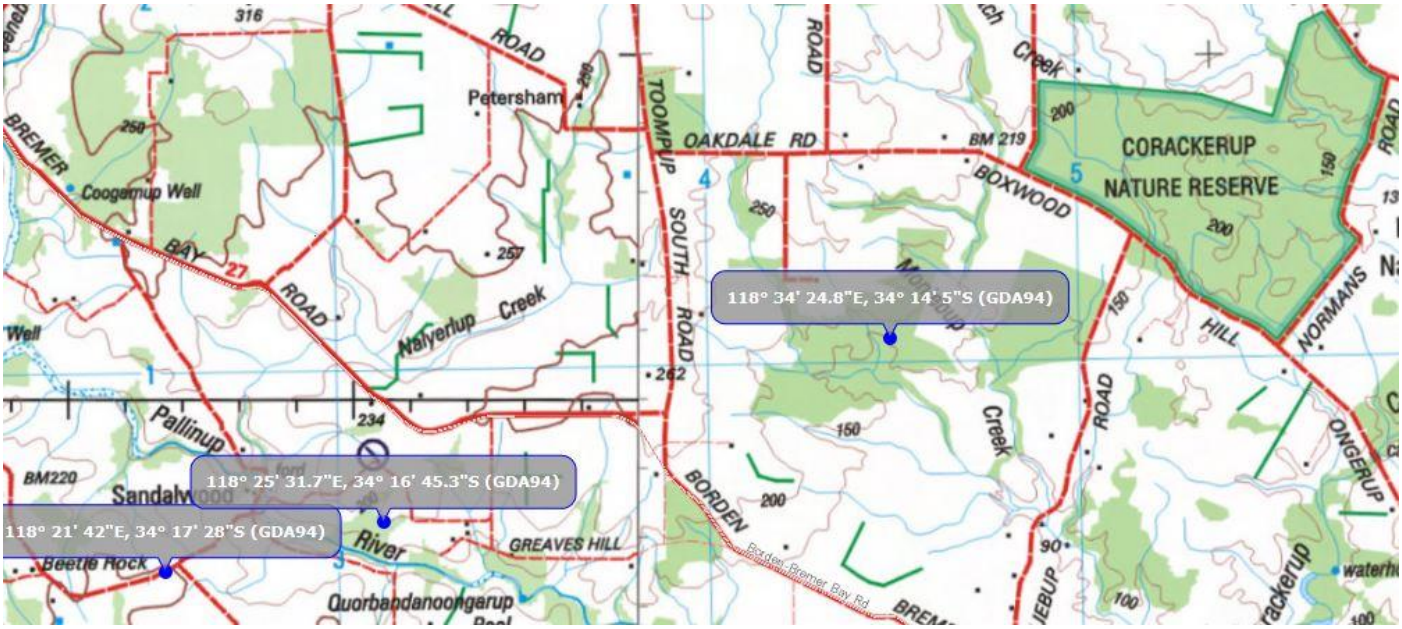
Research

- Research biology and ecology of the species, with a focus on pollination effectiveness, seed viability, conditions required for natural germination, response to threats (particularly dieback disease) and disturbances and reproductive biology.

Nomination prepared by:	
Contact details:	
Date submitted:	22/9/2016

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

Location of *Gastrolobium humile* with remnant vegetation



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: Locations 1868 and 623, 5km NE of Pallingup River	Private property	2011: ~2,500 2014: ~2,400	15 ha	Poor, population heavily grazed and subject to drought stress. Previously partly cleared.	Clearing (past, future) Grazing (kangaroos, rabbits) (present, future) Fire (past, present, future) Weeds (present, future) Phytophthora dieback (future) Climate change (future)	Fence remnant vegetation Control rabbits Control weeds if required Develop a fire management plan Liaise with private property owners Collect seed and test viability, conduct regeneration trials Implement disease hygiene measures Implement translocations Improve security of tenure through conservation covenant
Subpopulation 2: Southern verge Sandalwood Rd, 400m west of Gnowellen Rd and in Lot 5988.	Shire road reserve, private property	2011: ~100 2013: ~100 2014: 90	0.4 ha	Poor, plants are stressed with limb death observed (?drought stress)	Road maintenance (past, present, future) Weeds (future) Fire (past, present, future) Phytophthora dieback (future) Climate change (future)	Install markers Fence remnant vegetation Control weeds Develop a fire management plan Liaise with private property owners and local shire Collect seed and test viability,

						conduct regeneration trials Implement disease hygiene measures Improve security of tenure through conservation covenant Implement translocations
*Subpopulation 3: Kent Lot 1928, Schmedge Rd, Yarraweyah Falls *new subpopulation	Private property	2014: 15 2015: 20	3.4 ha	Moderate. Some plants heavily grazed in past	Grazing (kangaroos, rabbits) (past, present, future) Fire (past, present, future) Phytophthora dieback (future) Climate change (future)	Cage/fence plants Develop a fire management plan Liaise with private property owners Collect seed and test viability, conduct regeneration trials Implement disease hygiene measures Implement translocations Improve security of tenure through conservation covenant

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 ☒	**Fauna** ☐	**Threatened / DRF** ☒	**Change of category** ☐	**Delisting** ☐	
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.**					
Gastrolobium humile G Chandler & Crisp					
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.**					
No common name.					
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	Endangered	B1ab(iii,iv)+B2ab(iii,iv)

State of WA Priority	1☐	2☐	3☐	4☐	5☐

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)**
National EPBC Act 1999	**Endangered**	**B1ab(iii,iv)+B2ab(iii,iv)**
State of Western Australia	Endangered	B1ab(iii,iv)+B2ab(iii,iv)

State of WA Priority	1☐	2☐	3☐	4☐	5☐

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.

- Prior to 2010, *G. humile* was known from two herbarium specimens collected by pastoralist Mr F Counsel in 1967 from the South Stirling area.
- The species was listed as Priority 1 (State of WA) on 6/12/2005.
- The type location was surveyed in 2006 in conjunction with pastoralist Mr B Counsel; the under-storey vegetation had been 'grubbed out' in this area.
- Subsequent surveys have not re-located the type subpopulation or any other subpopulations in the South Stirling area.
- *Gastrolobium humile* was re-located in 2010 near the Pallinup River with a second subpopulation located nearby in 2011. A third subpopulation was located on private property in 2014.
- Surveys have targeted similar geological types, soil landscapes and known locations of associated species across the South Stirling - Pallinup area.
- The species was known from **two subpopulations** in the Pallinup River corridor with a linear range of only 6.5 km (see attached map) and a total of 2,600 mature and 2,550 juvenile plants. An additional subpopulation consisting of 15 mature individuals was located in 2014 and the species is now known from three subpopulations, with a linear range of 20.6 km, and a total of 2,510 mature individuals. Despite the new subpopulation there is a 3% decline overall in the number of mature individuals, but this may be due to monitoring variation.
- The species is restricted to shallow soils over granite/ gneiss and occurs in a distinctive plant community.
- All three subpopulations occur on private property, with one extending onto a shire road verge. Threats include grazing, road-works and fire.
- The species is nominated as Endangered as it satisfies the IUCN criteria B1ab (iii,iv)+B2ab(iii,iv) because it is known from <5 locations, has a very restricted extent (11.5 km^2) and area of occupancy (18.8 ha), its habitat is degrading, and a decline has been observed in the number of locations as at least one subpopulation in the South Stirling area is now extinct.

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.

Gastrolobium humile was described by G Chandler & M Crisp M 2000 (revision of genus, Chandler *et al*. 2002).

Distinguishing features of *Gastrolobium humile* are: long stipules (4-8 mm) which are partly fused and triangular, and its relatively long many-flowered raceme. These features distinguish it from *G, stowardii*, which it resembles. However, there does not appear to be an overlap in the range of these species.

The type specimen: Perth 01051660

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** ☒

This taxon is currently accepted on the Western Australian Census of Vascular Plants and is represented by the following two voucher specimens held at the Western Australian Herbarium (PERTH): FL Counsel s.n (Perth 01051660) and FL Counsel s.n (Perth 01051679).

An additional 2 vouchers have been submitted to the Perth Herbarium – S Barrett 2060; S. Barrett & A. Cochrane 2061.

A specimen from Subpopulation 1 has been examined and confirmed by Mike Hislop WA Herbarium

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

Two other species from the genus *Gastrolobium* are known to co-occur with *G. humile – G. retusum* and *G. spinosum. Gastrolobium humile* can be readily distinguished from these species. No hybridisation has been observed although it is noteworthy that a difference in the leaf indumentum in plants of *G. retusum* was observed in a subpopulation of *G. retusum* growing between Subpopulations 1 and 2.

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).

The following description is sourced from Chandler *et al.* (2002).

Description: Low shrub, *branchlets* ascending, angular to terete, densely pubescent. Petioles terete continuous with branches. *Leaves* spreading to ascending, opposite, cuneiform 8-11 x 4-6 mm, upper surface glabrous, lower densely villous, venation reticulate, apex truncate to bilobed, weakly mucronate, recurved, margins irregularly recurved, base rounded. *Stipules* erect, partly fused behind axillary bud, triangular with long acuminate apex 4-8 mm long moderately pubescent. *Inflorescences* terminal racemes, 15 to > 30-flowered densely pubescent, rachis 20-45 mm long... *Peduncle* 4-10 mm long, *pedicels* terete densely pubescent. *Calyx* campanulate, *c*. 4 mm long moderately to densely pubescent. *Style* long incurved, pubescent in lower third. *Ovary* densely pubescent. 4-3.5 mm. *Pod* ovoid, densely pubescent.

Flowering (S Barrett pers observation) Sept-Oct

Life History: Plants in Population 1 occur in a range of size class distributions which is largely related to grazing (kangaroos, rabbits). However, some plants appear to be juvenile suggestive of recent inter-fire recruitment from seed.

Fire Response: Not observed.

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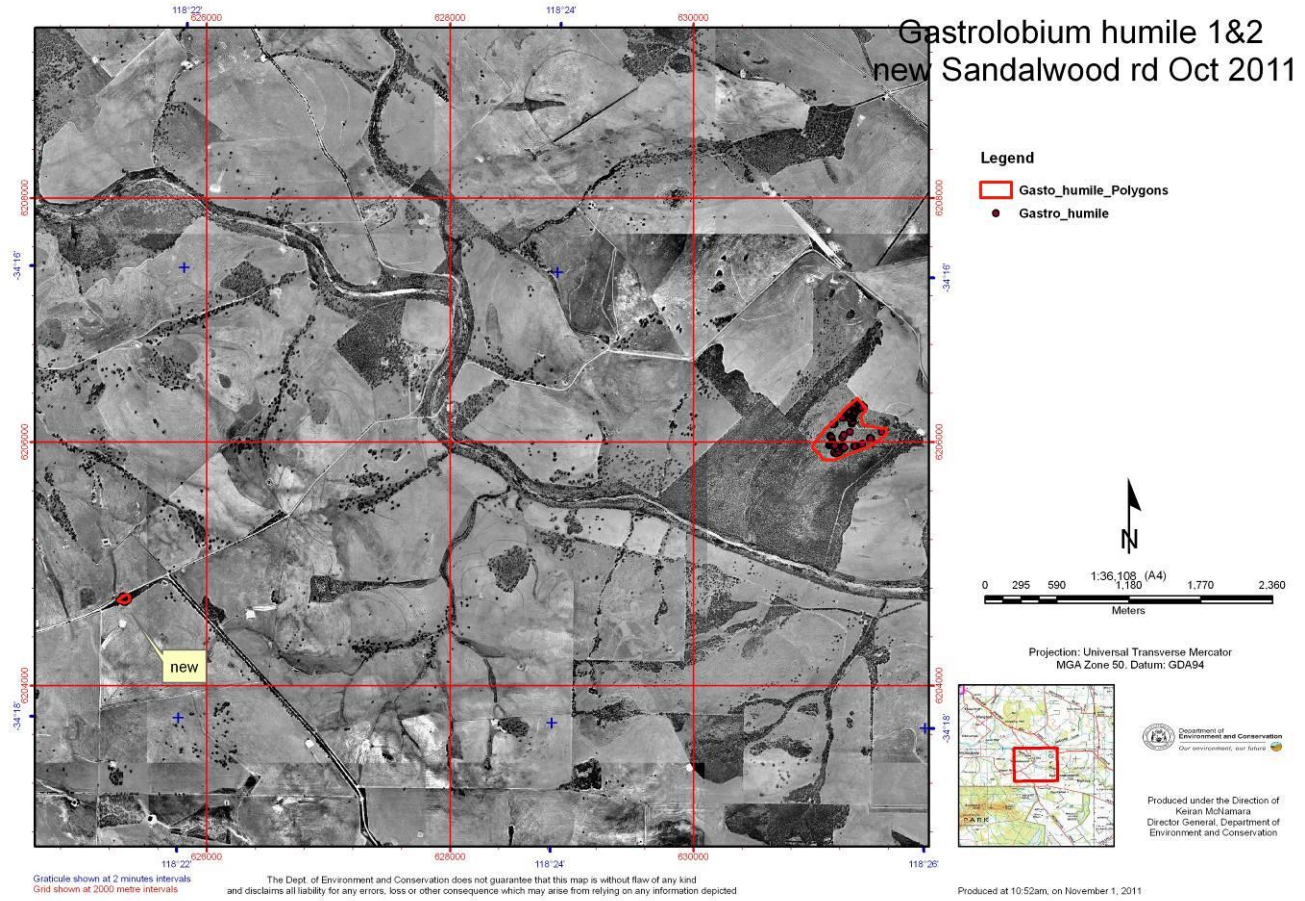
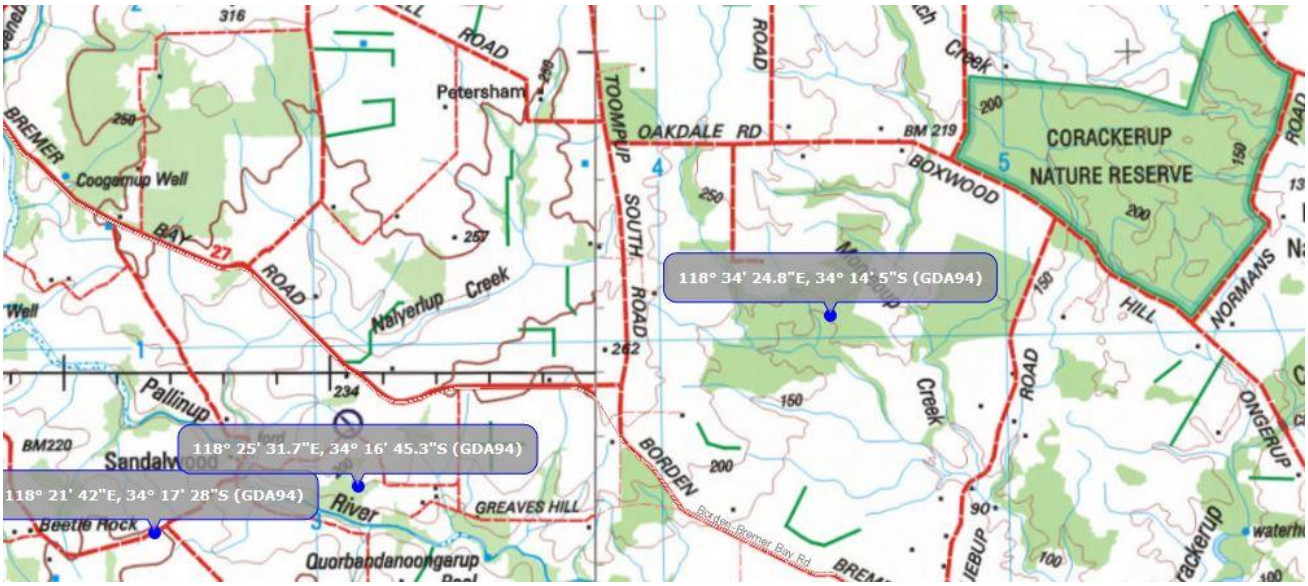
2.3. Distribution

Describe the distribution of the species <u>in Australia</u> and, if possible, provide a map.

Gastrolobium humile was only known from two subpopulations from the Pallinup River area. A third subpopulation was discovered in 2014. The subpopulations extend across a range of 20.6 km with the mapped area of subpopulations estimated to be 18.8 ha.





Distribution of *Gastrolobium humile*

2.4. Habitat

Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. forest type, associated species, sympatric species). If the species occurs in various habitats (e.g. for different activities such as breeding, feeding, roosting, dispersing, basking etc) then describe each habitat.

Non-biological habitat

Only known from the Pallinup River area on shallow brown sandy-loam soil over granite/ gneiss in open sheoak (*Allocasuarina huegeliana*) woodland over low heath.

Due to the restricted geographical range of *Gastrolobium humile*, all subpopulations are subjected to the similar climatic conditions with an average annual rainfall of 420 mm.

Biological habitat

Gastrolobium humile occurs in:

Emergent woodland: *Allocasuarina huegeliana*

Shrub 1-1,5 m: *Calothamnus quadrifidus; Allocasuarina* sp clonal (Subpopulation 1 only)

Shrub 0.5- 1m : *Calytrix tetragona, Acacia sulcata, Melaleuca villiosepala, Gastrolobium retusum, G. spinosum, Kunzea micrantha, Hemigenia incana, Leucopogon denticulatus, Banksia arctotidis, Verticordia endlicheriana, Petrophile crispata, Verticordia pennigera, Olax benthamii, Hakea marginata, Jacksonia condensata,* [Subpopulation 1 – *Grevillea maxwellii*]

Sedge: *Anarthria polyphylla* (dominant), *Lepidosperma* sp.

Herb: *Borya sphaerocephala, Dianella revoluta, Opercularia ? vaginata, Neurachne alopecuroidea*

Gastrolobium humile is present in the low shrub stratum of this vegetation community, with a foliage cover of approximately 10-20% but in a patchy distribution.

Habitat of type location South Stirling: Emergent woodland: *Allocasuarina huegeliana*

Shrub layer: *G. spinosum, Hakea marginata, Melaleuca* spp, *Rinzia* sp, *Astroloma* sp

Sedge: *Harperia lateriflora*

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?

G humile occurs with EPBC listed *Grevillea maxwellii (*Critically Endangered in WA) at Subpopulation 1.

It does not occur within a PEC or TEC

2.5. Reproduction

Provide an overview of the breeding system.

For <u>fauna</u>: Provide an overview of the breeding system and breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process?

For <u>flora</u>: When does the species flower and set fruit? Is the seed produced viable? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, ground disturbance) in order to reproduce?

There is very limited data available regarding the reproductive biology of this taxon. It is known to flower from September to October. Seed has not been collected to date.

It is likely that *Gastrolobium humile* is a relatively long-lived taxon. It is known to occur within vegetation that is long unburnt (estimated 30+/ years). However, it does appear to be more abundant along an old fence-line within Subpopulation 1, Sandalwood Farms. This subpopulation appears to have undergone physical disturbance within the last 20-30 years.

The species appears, from observations of very young plants in Subpopulation 1 and 2, to be a re-seeder. There appears to have been some recruitment of plants in the absence of fire in this subpopulation. A number of seedlings were also noted in Subpopulation 2 in December 2011 in the apparent absence of disturbance and may have germinated in response to substantial spring rainfall.

The available information therefore suggests that this taxon is a relatively long-lived species that may be a disturbance opportunist potentially capable of regenerating successfully following fire but also capable of some inter-fire recruitment.

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).

Subpopulation 1 is ‘long unburnt’, however from aerial photography it is apparent that the northeast portion of the remnant, within which *G. humile* occurs, was physically disturbed some years ago (estimated 20-30) when an attempt was made to clear the remnant for farming.

All plants in Subpopulation 2 are in healthy condition (2011), this site appears to be ‘long-unburnt’, no disturbance was evident.

The life expectancy of this taxon is unknown; the available evidence suggests it may be a relatively long-lived species.

Within Subpopulations 1 and 2 small plants appear to be recent recruits from seed in the absence of fire.

No resprouting from grazing (Subpopulation 1) from the base has been observed which would be consistent with a fire-tolerant root-stock.

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.

This taxon does not occur outside of Australia. It is restricted to the Esperance Biogeographic Region of south-west Western Australia (Thackway & Creswell 1995), with a range of less than 7 km and an area of occupancy of <16 ha.

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

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).

The total population of *Gastrolobium humile* is estimated to be 2,600 mature and 2,550 non-reproductive plants. Population estimates in the larger Subpopulation 1 were based on densities of at least 5 per $10m^2$ with this density occurring predominantly within a 1 ha area with sparser densities in the remainder of the subpopulation.

Grazing appears to be causing decline in Subpopulation 1, the total number of subpopulations has declined with at least one subpopulation now extinct.

The type subpopulation has not been relocated despite extensive survey. It is known from talking to Mr F Counsel's son, that as a young boy he was paid to scrub out *Gastrolobium* on their property, this may have resulted in subpopulation extinction. The origin vouchers were lodged when M Counsel's father was seeking information re 'poison plant'.

The extant subpopulations have an extremely limited mapped area of occupancy (18.8 hectares). Consequently, any future impacts have the potential to seriously threaten the survival of this taxon.

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

No recovery plans are currently available.

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.

Gastrolobium humile is only known from three subpopulations separated by 20.6 km. Extensive targeted surveys by DEC have not re-located the type subpopulation.

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
26/10/2011 2014	Location 6238 &1868 Sandalwood Farms 5 km NE of NE corner SRNP	Private Property	Estimated plants 5000 (2,500 mature, 2,500 non-reproductive) ~2,400 mature	15 ha	Very good in 2011: generally healthy vegetation but subject to drought stress from previous observations of co-occurring DRF *G. maxwellii*. Past disturbance – part clearing - evident in areas which are more open. Rated as poor in 2014.
26/10/2011 2013 2014	Lot 5988 and Sandalwood Rd, 3 km north of SRNP, 400 m west of Gnowellen Rd	Private property and Rd verge Shire	Estimated 150 plants (100 mature, 50 seedlings) ~100 mature 90 mature	0.4 ha	Excellent (2011) Poor (2014), plants are stressed with limb death observed
2014 2015	Kent Lot 1928, Schmedge Rd, Yarraweyah Falls	Private property	15 mature 20 mature	3.4 ha	Moderate. Some plants heavily grazed in past.

Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.

The population size is estimated to be 2,510 mature individuals in 2015. The size of the subpopulations was estimated by recording plant density (i.e. number of plants within a $100m^2$ area) and extrapolating across the known area of each sub-population.

Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.

Gastrolobium humile occurs historically in an area that has been impacted by clearing for agriculture resulting in the loss of at least one subpopulation.

What is the extent of occurrence (in km^2) for the species; explain how it was calculated and datasets used. If an accurate estimate is unavailable, provide a range of values or a minimum or maximum area estimate. Include estimates of past, current and possible future extent of occurrence. If available, include data that indicates the percentage decline over 10 years or 3 generations (whichever is longer) that has occurred or is predicted to occur.

The extent of occurrence is 11.5 km^2 (2015). This has been calculated by measuring the area of a polygon that contains all the sub-populations of *Gastrolobium humile*. Within this current extent of occurrence, approximately 70% of vegetation has been cleared for agriculture.

Is the distribution of the species severely fragmented? Why?

This species is currently known from a small range and is therefore not severely fragmented. However, its past distribution would be considered to be severely fragmented with the type location 55 km from extant subpopulations. The Pallinup Sandplain area has undergone extensive clearing (*ecologia* 2007).

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.

Considering the small extent of occurrence and area of occupancy, the three subpopulations are critically important for the long-term survival of this species, in particular the larger Subpopulation 1.

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.

The optimal survey time is September to October to coincide with flowering. However this taxon is readily distinguished from other *Gastrolobium* species from the region and can be identified by a field botanist at any time of the year once its key features are known.

Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.

Gastrolobium humile is distinctive and detectable at any time of year by a field botanist once its diagnostic features are known due to its characteristic stipules. See description above.

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, this species has been well surveyed with surveys commencing in 2006, since then several flora staff based in DEC Albany have been aware of this species and the need to re-locate it. These surveys have initially targeted similar habitats in the South Stirling area and more recently the Pallinup Sandplain and Pallinup River corridor area.

Regional surveys to date have targeted:

- Type location based on conversations with Mr B Counsel and surrounding area (E.M Sandiford 2006 unpublished data)
- Areas of Proterozoic gneiss/ similar habitat in South Stirling area (geology of type location) (S Barrett 2006, 2011) including detailed survey Plantagenet Location 5561(E.M Sandiford 2006 unpublished data). Note: this geology is uncommon in South Stirling area.
- Habitat of all known subpopulations of Threatened flora *Grevillea maxwellii* (key species Subpopulation 1) which is restricted to Pallinup corridor (S Barrett 2011 pers. obs). No subpopulations of *Grevillea maxwellii* have not been burnt in last 20+/- years.
- Area of migmatite (granoblastic/gneissic rock)/ similar habitat in Pallinup corridor e.g. Greaves Hill NR, Pallinup NR (S Barrett 2011 pers. obs). The Pallinup River corridor was intensively surveyed for *G. maxwellii* 1999-2011 resulting in five new subpopulations. Therefore, areas of suitable habitat are well known.
- Additional 'granite habitat' occurs east of Pallinup Corridor in the Corackerup area and has not been surveyed specifically for *G. humile* however similar vegetation on granite has not been noted. Much of this vegetation has not been burnt since the 1960s.
- Extensive searched by G Chandler & M Crisp in South Stirling area (Chandler *et al.* 2002)
- Species was not located during Southdown's survey (Pallinup Sandplain) (*ecologia* 2007)
- Species does not occur in Stirling Range NP (adjacent to Subpopulation 2).

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?).

If possible, provide information threats for each current occurrence/location:				
Location	**Past threats**	**Current threats**	**Potential threats**	**Management requirements (see section 4.4)**
Location 623 &1868 Sandalwood Farms 5 km NE of NE corner SRNP	clearing	Grazing by kangaroo &/or rabbit, weeds (minor at present)	Disease, weeds, climate change	Establish monitoring, consider fencing, collect seed
Lot 5988 and Sandalwood Rd, 4km north of SRNP, 400 m west of Gnowellen Rd		Road-works	Disease, weeds, climate change	collect seed, install rare flora markers
Kent Lot 1928, Schmedge Rd, Yarraweyah Falls		Grazing (kangaroos, rabbits), fire	Disease, weeds, climate change	Establish monitoring, consider fencing, collect seed

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.

Unknown.

4.4. Management

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

There are no management documents or action plans for this species, there is an IRP of co-occurring *Grevillea maxwellii*.

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

One sub-population of *Gastrolobium humile* occurs with the Threatened flora *Grevillea maxwellii* which is monitored regularly.

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

It is not currently represented within the conservation estate.

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

Research into seed germination biology, population dynamics and impacts of grazing and dieback susceptibility is recommended.

Other management recommendations include:

- Liaison with private property owners to ensure protection of remnant vegetation;
- Liaise with local shire to ensure that subpopulation of the species is not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species;
- Protecting the sites from fire unless required for ecological reasons, and implemented early intervention in any wildfires which may threaten the site;
- Monitoring the subpopulations for evidence of weed and rabbit impacts, or changes in plant or site health;
- Surveying for additional subpopulations;
- Collect and store seed to guard against the extinction of the natural subpopulations. 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;
- Control rabbits if required;
- 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;
- Investigate formal conservation arrangement, management agreement and covenant on private land, and investigate inclusion in reserve tenure if possible;
- Promote awareness of the species with general public;
- 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.

SECTION 5. NOMINATOR

Nominator(s) name(s)	
Organisation(s)	
Address(s)	
Telephone number(s)	
Email(s)	
Date	10/12/2011 Updated 22/9/2016 by Species and Communities Branch, Department of Parks and Wildlife

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

This nomination has been reviewed by the following:

- Mike Hislop – Science Division Taxonomist, Western Australian Herbarium.
- Anne Cochrane Science Division Manager TFSC
- Andrew Brown – SCB

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.

Chandler GF, Crisp MD, Cayter LW, Bayer RJ (2002). Monograph of *Gastrolobium* (Fabaceae: Mirbelieae). *Australian Systematic Botany* **15**: 619-739

Ecolgia (2007) Southdowns Magnesite Proposal: Assessment of Flora and Vegetation.

Thackway, R. & Cresswell, I.D. (1995). *An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program, Version 4.0*. Australian Nature Conservation Agency, Canberra.

Muhling PC, Brackel AT (1985). Mount Barker-Albany WA 1:250,00 Geological Series. Geological Survey of Western Australia, Perth.