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 vestitum***
Nomination for (addition, deletion, change)**:**	**Addition**
Nominated conservation category and criteria:	**CR: B1ab(iii,v)+B2ab(iii,v)**

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 vestitum*			
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	2010	Endangered	B1ab(iii,v)+B2ab(iii,v)
		5/4/2017	Critically Endangered	B1ab(iii,v)+B2ab(iii,v)
	2.			

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 2011, 2015 and 2016 and the number of mature individuals declined from approximately 14,600 to approximately 5,320 over that period.
• 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:	The number of mature individuals has declined from approximately 14,600 in the period between 2006 and 2009 to approximately 5,320 in 2015/16, a decline of 64%, principally over the 5 year period from 2011-2016. The habitat of the subpopulations is highly threatened from dieback disease. Without ongoing management a projected decline is expected. Now considered one location as effect of threatening process (dieback) applies to all subpopulations. Now meets criteria CR: B1ab(iii,v)+B2ab(iii,v).
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?	**CR: B1ab(iii,v)+B2ab(iii,v)**	
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 number of mature individuals has declined from approximately 14,600 in 2008/9 to approximately 5,320 in 2015/16 (64% decline) due to effect of *Phytophthora* and potentially fire. Annual monitoring was not undertaken, however, the main period of decline appears to be the 5 year period from 2011 to 2016. The total number of individuals is an estimate as counts were estimated due to the large area and difficulty in accessing, and only a partial survey was undertaken for one subpopulation. • **Unable to accurately assess**
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	• (B1) EOO <100km^2 (8 km^2 based on AOO). • (B2) AOO <10 km^2 (estimated 8 km^2 using the 2km x 2km grid method). • (a) Known from two subpopulations 2.2km apart within the Stirling Range National Park. These subpopulations are considered a single location as they are subject to the same threatening processes and a single fire event is likely to affect both subpopulations. • (b) Continuing decline observed and projected: • (iii) (v) The habitat is highly threatened and has been modified by *Phytophthora cinnamomi* and fire. The species is suspected to have suffered a historical reduction in its area of occupancy, based on evidence from other dieback infested areas, as it is absent from ridge tops and northern slopes where it is highly likely that it would have previously occurred. Plant deaths in association with the disease have been observed and it is suspected that infestations may directly and indirectly contribute to a continuing decline in the area and quality of habitat in each subpopulation and the total number of plants. • **Meets criteria for Critically Endangered B1ab(iii,v)+B2ab(iii,v)**
C.	Small population size and decline (population size, distribution and evidence of decline)	• Known from approximately 5,320 mature individuals. • (C1) The number of mature individuals has declined from an estimated 14,600 in 2008/9 to 5,320 in 2015/16 (64% decline in 7 years, with the main decline appearing to have occurred in the 5 year period from 2011). The total number of individuals is an estimate as counts were estimated due to the large area and difficulty in accessing, and only a partial survey was undertaken for one subpopulation. However, the observed decline exceeds 10% in 10 years.

		• **Meets criteria for VU: C1**
D.	Very small or restricted population (population size)	• (D) Known from approximately 5,320 mature individuals. • **Does not meet criterion D**
E.	Quantitative analysis (statistical probability of extinction)	• No information to assess.

Summary of assessment information

EOO	8 km^2 based on AOO (1 km^2 based on MCP calculation)	AOO	8 km^2 (2 km x 2 km grid). Mapped area of subpopulations <0.073 km^2	Generation length	Unknown

No. locations	1	Severely fragmented	Yes ☐ No ☒ Unknown ☐
No. subpopulations	2	No. mature individuals	5,320 (estimate)

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)*
Phytophthora dieback • *Phytophthora cinnamomi* kills plants and degrades associated habitat. The species has been tested and was found to be susceptible to dieback disease. Both subpopulations are infested and plant deaths have been observed. Past, current and future	Whole population	Catastrophic
Altered fire regimes • The species is likely to be sensitive to inappropriate fire regimes due to its preferred aspect 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
Small population size • The species is only known from a single location, placing it under serious threat from a single threatening process. Current, future	Whole population	Catastrophic

Drought • This is a threat to the species if it occurs over a number of years. Climate change modelling for the south west region 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. 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.

- Monitoring and surveys have been carried out to determine plant numbers and impact of threats;
- Seed has been collected and stored at Parks and Wildlife 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

- Monitor subpopulations for evidence of changes in plant or site health;
- Develop and implement a fire management strategy, including the need for, and method of, the construction and maintenance of firebreak;
- Undertake surveys in areas of potentially suitable habitat;
- Continue to follow dieback hygiene measures;
- Apply phosphite to assist in managing *Phytophthora* impacts;
- Establish new subpopulations through translocation into disease free areas.

Research

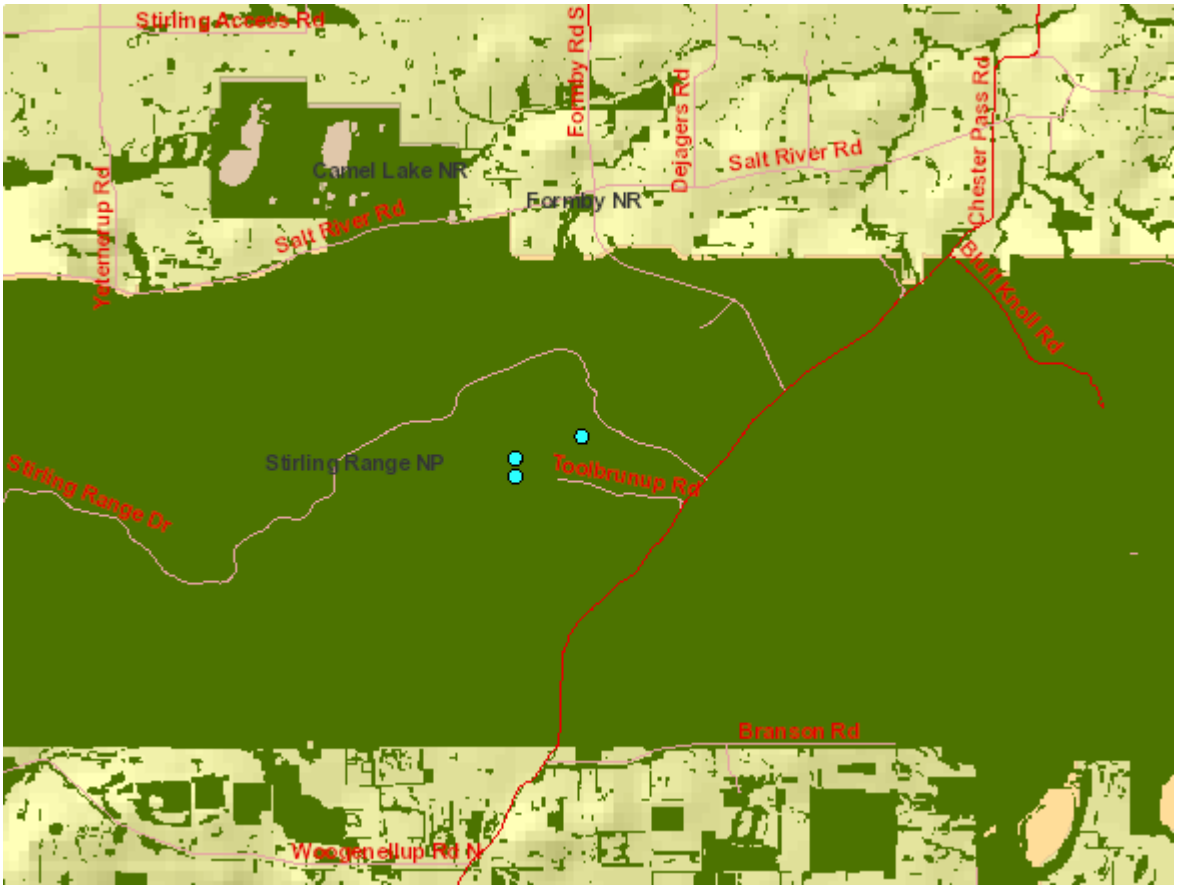
Research biology and ecology of the species including:

- a study of the soil seed bank dynamics and the role of various factors including disturbance, competition, drought and inundation in recruitment and seedling survival;
- determination of reproductive strategies, phenology and seasonal growth;
- investigation of the mating system and pollination biology;
- investigation of population genetic structure, levels of genetic diversity and minimum viable population size; and
- the impact of changes in hydrology in the habitat.

Nomination prepared by:	
Contact details:	

Date submitted:	31/10/2016
If the nomination has been refereed or reviewed by experts, please provide their names and contact details:	

Location of *Gastrolobium vestitum* with remnant vegetation and conservation estate



Summary of subpopulation information *(detailed information to be provided in the relevant sections of the form)*						
Location or Subpopulation *(include coordinates)*	Land tenure	Survey information: Date of survey and No. mature individuals	Area of subpopulation	Site / habitat Condition	Threats *(note if past, present or future)*	Specific management actions
Subpopulation 1a: Toolbrunup Peak, SE aspect, Stirling Range National Park	National park	2009: ~5,600 2011: ~5,600 (2% dead) 2015: ~2,320 (partial survey)	5.8 ha	Moderate. Habitat infested with dieback disease	Phytophthora dieback (past, present, future) Fire (past, present, future) Small population size (past, future) Drought (future)	Apply phosphite Develop a fire management plan Collect seed and test viability, conduct regeneration trials Implement disease hygiene measures Implement translocations
Subpopulation 1b: south of Toolbrunup Peak in major gullies, Stirling Range National Park	National park	2006: ~4,000 2015: ~2,000	Not recorded	Moderate. Habitat infested with dieback disease	Phytophthora dieback (past, present, future) Fire (past, present, future) Small population size (past, future) Drought (future)	Apply phosphite Develop a fire management plan Collect seed and test viability, conduct regeneration trials Implement disease hygiene measures Implement translocations
Subpopulation 2: Mount Hassell, Stirling Range National Park	National park	2008: ~5,000 2010: ~5,000 2011: ~5,000 (2% dead) 2016: ~1,000	1.5 ha	Moderate. Habitat infested with dieback disease	Phytophthora dieback (past, present, future) Fire (past, present, future) Small population size (past, future) Drought (future)	Apply phosphite Develop a fire management plan Collect seed and test viability, conduct regeneration trials Implement disease hygiene measures Implement translocations

Department of Environment and Conservation

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

To fill out this form you must refer to the Guidelines. Incomplete forms may result in delays in assessment, or rejection of the nomination.

Answer all relevant sections, filling in the white boxes and indicating when there is no information available. To mark boxes with a **cross** ☒: on the **View** menu, point to **Toolbars**, and then click **Forms**. Click **Protect Form**, then check the box. Unlock the form by clicking and you will then be able to type text in the white table cells.

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".

SECTION 1. NOMINATION			
1.1. Nomination information			
Flora ☒	**Fauna** ☐	**Nomination for: Addition** ☒	**Change of category** ☐ **Delisting** ☐
Gastrolobium vestitum (Domin) G.Chandler & Crisp			
1.2. Common Name **If the species has a generally accepted common name, please show it here. This name will be used on all official documentation.**			
None			
1.3. Current Conservation Status. If none, type 'None'.			
International IUCN Red List Category and Criteria applicable to the highest rank category only e.g. Vulnerable (B1ab(iv);D(1))	None		
National EPBC Act 1999 Category	None		
State of WA Wildlife Conservation Notice Schedule	Endangered		
State of WA IUCN Category	B1ab(iii,v)+B2ab(iii,v)		
State of WA Priority	None		
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** ☐			

1.4. Nominated Conservation Status. Type one category for each of the fields. If none, write 'None'.	
International IUCN Red List Category and Criteria applicable to the highest rank category only e.g. Vulnerable (B1ab(iv);D(1))	
National EPBC Act 1999	Critically Endangered B1ab(iii,v)+B2ab(iii,v)
State of WA Wildlife Conservation Notice Schedule	Schedule 1
State of WA IUCN Category	Critically Endangered B1ab(iii,v)+B2ab(iii,v)
State of WA Priority	None

1.5. 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.

- *Gastrolobium vestitum* is only known from only 2 subpopulations located within the Stirling Range National Park (SRNP). The number of mature individuals has declined from *14,600 in 2008/09 to 5,320 in 2015/16 (64% decline). (*this includes a further subpopulation of 4**,**000 plants which was not included in the initial assessment in 2009, but based on the later decline due to dieback infestation in the nearby subpopulations, it has been assumed that this population count can be applied to the 2008/9 time period with confidence). Now meets criteria CR: B1ab(iii,v)+B2ab(iii,v).

- The species is susceptible to *Phytophthora cinnamomi* and the habitat of both subpopulations is infested by the pathogen *P. cinnamomi.* Inappropriate fire regimes may also have contributed to a continuing decline in the area, extent and quality of habitat for the species.

- The species occurs on mountain summits in the Stirling Range National Park. Parks and Wildlife staff have surveyed potential habitat for the species since 1996. Despite extensive survey, no additional populations have been located.

- The current occurrence of two subpopulations with a very small area of occupancy renders the species vulnerable to extinction through catastrophic or other unpredictable environmental events.

- The species meets the IUCN category and criteria:

- **<u>Critically Endangered B1ab(iii,v)+B2ab(iii,v)</u>**

  B1. Extent of occurrence < 100km2
  B2. Area of occupancy <10km2
  (a) # of locations = 1
  (b) Continuing decline in (iii) area, extent and/or quality of habitat and (v) number of mature individuals.

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 vestitum was first collected by A. Morrison in 1902. The species was described by Karel Domin in 1923 as *Nemcia vestita* from specimens collected by A.A. Dorrien-Smith at "Pass in the Stirling Range, East of Mt Toolbrunup" (Domin 1923).

Chandler *et al*. (2002) published a monograph of *Gastrolobium* in which they synonymised *Nemcia* under *Gastrolobium* and as a result, changed the generic and specific epithets of *Nemcia vestita* to *Gastrolobium vestitum.*

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** ☒

n/a

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

None known.

2.2. Description

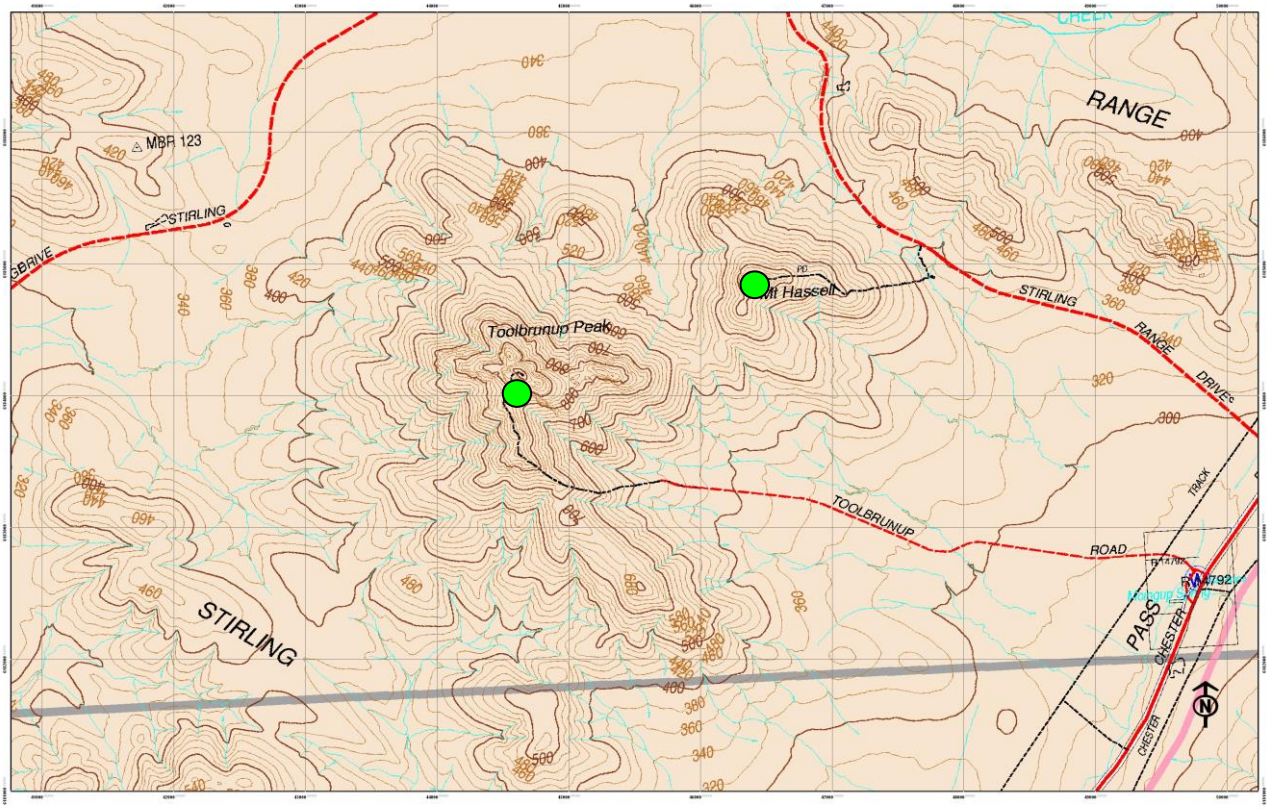
Describe the physical appearance, habit, behaviour/dispersion and life history. Include anatomy or habit (e.g. size and/or weight, sex and age variation, social structure) and dispersion (e.g. solitary, clumped or flocks etc), and life history (eg short lived, long lived, geophytic, etc).

A member of the family Papilionaceae, *Gastrolobium vestitum* is an upright shrub to 1-3 m tall with thick branches and dark grey-green leaves. The leaves are opposite with strongly recurved margins, elliptic to rhombic in shape and 3 - 4.5 cm long and 2.5-3.5 cm wide. The underside of the leaf is covered in soft hairs. The inflorescences are axillary and contain 4 yellow-red flowers (Chandler *et al*. 2002).

The species is similar to *Gastrolobium luteifolium, G. leakeanum, G. mondurup* and *G. rubrum* but differs from all these species in its fleshy petals, rhombic leaves, recurved leaf margins and is generally more hairy (Chandler *et al.* 2002).

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

Gastrolobium vestitum is endemic to south west Western Australia. It is currently known from two subpopulations (one location), one on Toolbrunup Peak and the other on the adjacent Mt Hassell, within the Stirling Range National Park. The linear range of the species is approximately 2 km.



Gastrolobium vestitum subpopulations

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

Gastrolobium vestitum grows in skeletal peaty loam over phyllite schist on the summits and mid-slopes of Toolbrunup Peak and the adjacent Mt Hassell.

Biological habitat

Gastrolobium vestitum has been recorded growing in shrubland/heathland communities. Associated species include; *Platysace* sp. Stirling Range, *Velleia foliosa, Thomasia* sp. Toolbrunup, *Sollya drummondii, Lasiopetalum dielsii, Calothamnus crassus, Actinotus rhomboideus* and *Acacia veronica*.

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?

Yes. *Gastrolobium vestitum* is associated with *Deyeuxia drummondii* (VU), *Leucopogon gnaphalioides* (CR) and *Sphenotoma drummondii* (EN).
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?**
Gastrolobium vestitum has been recorded flowering from August to October. It is considered to have a juvenile period of approximately 4 years (S. Barrett pers. comm.) and is likely to be bird pollinated (G. Keighery pers. comm.). Little else is known of the species' reproductive biology.
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).**
Insufficient information. The species in an obligate seeder with a soil-stored seed bank and a primary juvenile period of 4 to 5 years (based on 50% of population flowering).
Questions 2.7 and 2.8 apply to <u>fauna</u> 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 a 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 <u>Australia</u> and in <u>other countries</u>.
3.1. Distribution **Describe the global distribution.**
Endemic to south west Western Australia
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).

In 2009 the total number of mature individuals was approximately 14,600 (initially recorded as 10,600). Since 2007 ongoing scattered deaths have been observed but not quantified in the subpopulations due to *Phytophthora cinnamomi*, until higher rates of death were noted from 2011 on. *G. vestitum* is persisting in shaded gullies and southern slopes. What is apparent is the marked absence of *G. vestitum* and other *Phytophthora* susceptible species from the ridge tops and northern slopes where it is assumed the species would have previously occurred. This is associated with the higher impact of *P. cinnamomi* in this more exposed habitat and a considerable reduction in population size and area has occurred at both populations.

In 2011, approximately 2% plant deaths observed due to dieback disease. The number of mature individuals has declined further to approximately 5,320 in 2015/16 (64% decline).

It is possible that inappropriate fire intervals and *Phytophthora cinnamomi* infestation may lead to further reduction in the total population size.

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?

N/A

How many locations do you consider the species occurs in and why? Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

Two. The species is currently known from two populations consisting of approximately 10,600 mature plants that occupy an area of approximately 6.5 ha.

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

Location	Land status	Date of most recent survey	Number of individuals at location	Area of occupancy at location	Condition of site
Subpopulation #1a Toolbrunup Peak, SE aspect (SRNP)	National Park	2009 2011 2015	~5,600 ~5,600 (2% dead) ~2,320 (partial survey)	5.5 ha 5.8 ha 5.8 ha	Moderate
Subpopulation #1b Toolbrunup Peak, major gullies (SRNP)	National Park	2006 2015	~4,000 ~2,000	Not recorded	Moderate
Subpopulation #2 Mount Hassell (SRNP)	National Park	2008 2010 2011 2016	~5,000 ~5,000 ~5,000 (2% dead) ~1,000	1 ha 1.5 ha 1.5 ha 1.5 ha	Moderate

Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.
The number of individuals in the subpopulations has been estimated. Subpopulation 1 was assessed by firstly defining the perimeter of the population (marking with a GPS) then recording the number of individuals contained within a virtual 10 X 10m plot. Several replicates were made and an average of plants per 10,000m^2 was calculated. The subpopulation boundary was then plotted using ArcGis to establish the area occupied by the species and the individuals per 10,000m^2 calculation applied to determine an estimate of the total plants within the given area.
Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.
There has been no known reduction in the number of locations since first recorded. It is suspected that inappropriate fire regimes and/or the spread of *Phytophthora cinnamomi* throughout the species habitat will cause a decline in the number of locations in which *Gastrolobium vestitum* occurs.
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 current estimated extent of occurrence is 1 km^2 (based on the minimum convex polygon encompassing the subpopulations). The current known area of occupancy for the species is approximately 0.073km^2 with the estimated AOO using the 2x2km grid method being 8km^2.
Is the distribution of the species severely fragmented? Why?
The species is currently known from 2 subpopulations that are small and isolated, but this is presumed to be a natural situation, and the intervening area is vegetated. The subpopulations are separated by 2km in distance. Following an extinction event, these populations have a reduced probability of recolonisation due to the unique landform type on which they occur.
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 subpopulations are considered necessary for the long-term survival of the species.
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.**
Gastrolobium vestitum is a medium to large shrub and that is easily recognisable, even when not flowering. Searches are best concentrated on mountain slopes and summits within the Stirling Range.
Provide details on the distinctiveness and detestability of the species, or the distinctiveness of its habitat, that would assist survey success.
Gastrolobium vestitum is a medium to large shrub and that is easy to recognise, even when not flowering. When flowering, the species has bright red/yellow flowers which are easily spotted over a considerable distance. The species is distinguished from the closely related *Gastrolobium luteifolium, G. leakeanum, G. mondurup* and *G. rubrum* by its fleshy petals, strongly recurved leaf margins and rhombic-shaped leaves (Chandler *et al.* 2002).
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.

Gastrolobium vestitum has been well surveyed. The species was first collected in 1902 by A. Morrison. The species was then collected several times from both Toolbrunup Peak and Mt Hassell in the subsequent century. In 1996 six peaks in the Stirling Range National Park were surveyed as part of the 'Biological Survey of Mountains in southern Western Australia' project, but no new populations of *G. vestitum* were found (Barrett 1996).

Despite extensive survey of potential habitat since 1996, a total of only two subpopulations have been recorded. Even if more plants were found, the species range is unlikely to be extended more than a few kilometres and it is believed that the current known distribution is close to, if not the actual distribution (S. Barrett pers. com). Furthermore, the area of suitable habitat for the species is very limited and fragmented due to inappropriate fire regimes and *Phytophthora* dieback.

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?).

Two subpopulations with very small area of occupancy – actual threat.

a) *Gastrolobium vestitum* occurs in only two subpopulations with a very small area of occupancy. It is considered to be highly vulnerable to random loss of a subpopulation through catastrophic or other unpredictable environmental events.
b) Insufficient information
c) All subpopulations are small and have a very small area of occupancy.
d) The suspected effect of catastrophic or unpredictable environmental events on these populations could be potentially disastrous and result in the extinction of the species.

Phytophthora dieback (*Phytophthora cinnamomi*) – actual threat

a) Assessment of *G. vestitum*'s habitat since 2000 revealed that both populations are infested by *Phytophthora cinnamomi*. Dead plants in subpopulation 2 (2007) have sampled positive for *P. cinnamomi* and as such the pathogen is considered an actual threat to the species. The cooler southerly 'gully' conditions of the habitat that the species currently occupies may have resulted in a somewhat less aggressive impact of the pathogen in this environment. It is likely that occurrences on ridgelines and northerly slopes have undergone significant declines in the past.

b) Plant deaths in association with *Phytophthora cinnamomi* have been observed. It is suspected that infestation by *Phytophthora cinnamomi* may be directly and indirectly contributing to a decline in the area of occupancy of each population.

c) Inoculation in a shade house has confirmed its susceptibility to *Phytophthora cinnamomi.* Using a predictive *P. cinnamomi* risk-assessment tool, Barrett *et al.* (2008) have ranked the species with a very high risk of extinction due to the impacts of *Phytophthora* and the interaction of the pathogen with other threatening processes.

d) This threat affects all subpopulations.

e) The impact of *Phytophthora cinnamomi* throughout the species habitat will cause further decline in the area of occupancy and number of *Gastrolobium vestitum* individuals.

Inappropriate fire regimes - actual threat

a) In both subpopulations, plants are found in areas that would be expected to act as refugia during most wildfires. This indicates that *Gastrolobium vestitum* is likely to be sensitive to inappropriate fire regimes. Increased fire intervals may cause a decline in numbers/area of occupancy, with fires in short succession capable of killing live plants and rapidly depleting the soil seed bank. Therefore inappropriate fire regimes are considered an actual threat to the species.

b) It is suspected that inappropriate fire regimes and the interaction of fire and *Phytophthora* dieback may be contributing to the small area of occupancy of each subpopulation.

c) Insufficient information

d) This threat affects all subpopulations.

e) It is suspected that increased fire intervals may cause a decline in numbers/area of occupancy, with fires in short succession capable of killing live plants and rapidly depleting the soil seed bank.

If possible, provide information threats for each occurrence/location:				
Location	**Past threats**	**Current threats**	**Potential threats**	**Management requirements (see section 4.4)**
Subpopulation #1 Toolbrunup Peak (SRNP)	Population with very small area of occupancy vulnerable to random catastrophic events. Inappropriate fire regimes. *Phytophthora* dieback (*Phytophthora cinnamomi*).	Population with very small area of occupancy vulnerable to random catastrophic events. Inappropriate fire regimes. *Phytophthora* dieback (*Phytophthora cinnamomi*).	Population with very small area of occupancy vulnerable to random catastrophic events. Inappropriate fire regimes. *Phytophthora* dieback (*Phytophthora cinnamomi*).	Fire management. Application of phosphite.
Subpopulation #2 Mt. Hassell (SRNP)	Population with very small area of occupancy vulnerable to random catastrophic events. Inappropriate fire regimes. *Phytophthora* dieback (*Phytophthora cinnamomi*).	Population with very small area of occupancy vulnerable to random catastrophic events. Inappropriate fire regimes. *Phytophthora* dieback (*Phytophthora cinnamomi*).	Population with very small area of occupancy vulnerable to random catastrophic events. Inappropriate fire regimes. *Phytophthora* dieback (*Phytophthora cinnamomi*).	Fire management. Application of phosphite.

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.

Insufficient information.

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 for this species.

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

No. However, *Leucopogon gnaphalioides* (DRF/CR), *Sphenotoma drummondii* (DRF) *Deyeuxia drummondii* (DRF), Montane Mallee Thicket (TEC) and several Priority flora occur in the vicinity of the species that may provide management benefits to this species.

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

Gastrolobium vestitum occurs in two subpopulations within the Stirling Range National Park. The DRF species within the park are actively managed.

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

Collection of data on conservation biology and ecology.

Management recommendations include:

- Apply phosphite to assist in managing *Phytophthora* impacts;
- 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 grazing impacts, or changes in plant or site health;
- Continue to follow dieback hygiene measures;
- 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;
- Establish new subpopulations through translocation into disease free area;
- Map habitat critical to the survival of the species to facilitate its protection and appropriate management;
- 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.

4.5. Other

Is there any additional information that is relevant to consideration of the conservation status of this species?

No.

SECTION 5. NOMINATOR

Nominator(s) name(s)	
Organisation(s)	
Address(s)	
Telephone number(s)	
Email(s)	
Date	August 2009 Updated 31/10/2016

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

Barrett, S. (2009) Personal Communication 2nd July 2009. Dept. of Environment and Conservation, W.A.

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.

Barrett, S. (1996) Biological survey of mountains in southern Western Australia. Environment Australia. (Department of Conservation and Land Management: Perth).

Barrett, S., Shearer B., Crane C. and Cochrane, A. (2008) An extinction-risk assessment tool for flora threatened by *Phytophthora cinnamomi. Australian Journal of Botany* 56 pp: 477-486.

Chandler, G.T., Crisp, M.D., Cayzer, L.W. and Bayer, J.R (2002) Monograph of Gastrolobium (Fabaceae: Mirbeliaceae) *Australian Systematic Botany* 15: 619-739.

Domin, K. (1923) *Nemcia*, a new genus of the Leguminosae. *Preslia* 2:27-28

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