Abridged Threatened Species Nomination Form

For nominations 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)*

Species name (scientific and common name)**:**	***Grevillea thelemanniana* subsp. *thelemanniana***
Nomination for (addition, deletion, change)**:**	**Addition**
Nominated conservation category and criteria:	**Critically Endangered A2ac, B1ab(i,ii,iii,iv,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 summary *(to be completed by nominator)*

Current conservation status				
Scientific name:	*Grevillea thelemanniana* subsp. *thelemanniana*			
Common name:	Spider net grevillea			
Family name:	Proteaceae	Fauna ☐	Flora ☒	
Nomination for:	Listing ☒	Change of 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	03/11/2015	Critically Endangered	A2ac, B1ab(i,ii,iii,iv,v) & B2ab(i,ii,iii,iv,v)
	2. WA	29/9/2016	Critically Endangered	A2ac, B1ab(i,ii,iii,iv,v)
	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:	Targeted surveys were undertaken between August 2013 and January 2015 for all known locations of the species except within four of the private properties. For the four properties that were not surveyed, population sizes were estimated using aerial photographs and knowledge of habitat preferences, habitat condition and patterns of plant distribution. Area of available habitat is limited and hence species is deemed to be well surveyed.
• 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 species was nominated and accepted for listing by the WA TSSC at the May 2015 meeting. There is no further information that has come available since the assessment, however,

	reinterpretation of the 'Guidelines for Using the IUCN Red List Categories and Criteria' has changed the assessment under criterion B2.

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?	**A2ac, B1ab(i,ii,iii,iv,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)	• (A2) Clearing of 79% of the historical extent of occurrence has occurred since the date of original collections in the early 1900's. Population reduction of this extent is estimated (using current average plant numbers per square metre of critical habitat) at 148,561 plants or 89%. Plant numbers will almost certainly reduce in the future, taking into account the proposal for industrial development in the Maddington, Kenwick Strategic Area (Tauss & Weston 2010). • **Meets criteria for Critically Endangered A2(ac)**
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	• (B1) EOO is 3.208 km^2 • The AOO using 2kmx2km grids is 12km^2, with the combined area of the populations being 0.836km^2. • (a) The habitat is severely fragmented with landholdings under a number of different tenures and purposes. Occurs in one location. • (b) It is likely that there will be a continuing decline in the EOO, AOO, area, extent and/or quality of habitat, number of locations or subpopulations and the number of mature individuals. • **Meets criteria for Critically Endangered B1ab(i,ii,iii,iv,v)**
C.	Small population size and decline (population size, distribution and evidence of decline)	• Number of mature individuals extrapolated to be 18,121 (i.e. >10,000) • Does not meet criteria
D.	Very small or restricted population (population size)	• Number of mature individuals extrapolated to be 18,121 (i.e. >1,000) • Does not meet criteria
E.	Quantitative analysis (statistical probability of extinction)	• No information to assess

Summary of assessment information					
EOO	3.208 km^2	AOO	12 km^2 (2kmx2km grid) Mapped area of subpopulations = 0.836 km^2	Generation length	Unknown

No. locations	1	Severely fragmented	Yes ☒ No ☐ Unknown ☐
No. subpopulations	5	No. mature individuals	18,121 (extrapolated)

Percentage global population within Australia	100%
Percentage population decline over 10 years or 3 generations	89% decline since early 1900s; high possibility of a further 10% decline in the next 10 years.

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)*
Recreation vehicles • 4WD vehicles and motorbikes have been observed within a number of Lots and have damaged habitat. • Past, present and future	UWA and Private Property	Moderate
Vegetation clearing for and maintenance of boundary and internal firebreaks • Reduction of critical habitat and plant numbers • Past, present and future	Entire (except not a current or future threat on DPaW land)	Moderate-Severe
Vegetation clearing for rural, urban, horticultural or industrial uses • Fragmentation of the critical habitat has impacted on the species by reducing the habitat area and plant numbers • 79% of the EOO has been cleared or disturbed and the Kenwick Strategic Area proposed industrial project is likely to involve further vegetation clearing and fragmentation. • Past and future	Entire in the past, currently only Private Property	Severe-Extreme
Vegetation clearing for and maintenance of road and rail reserves • Reduction of critical habitat and plant numbers with ongoing degradation of potential habitat. • Past, present and future	Road and rail reserves	Moderate-Severe
Stock grazing • No grazing on the species has been observed/recorded; however, the negative impacts of keeping stock within	Entire in the past, currently only Private Property	Moderate

intact vegetation are well documented. Illegal horse agistment has affected some of the species' habitat. • Past and present		
Weed invasion • Dense weed patches have been observed. The species is lignotuberous and therefore can persist under unfavourable conditions, with plants recorded as persisting amongst weeds in degraded areas. However, they are only in very few numbers. Continued competition for resources and negative impacts on recruitment is likely. • Resources and funds are not available to control the current weed cover. Combined with the potential of further clearing (proposed industrial project), the likelihood of further impacts by weeds is high. • Past, present and future	Entire	Severe
Water stress • Due to drying climate trends and water drawdown from local bores. • It is suspected that some areas of weed invasion and fragmented heathland are due water drawdown from local bores. • Small areas have been observed to be affected by salinity, and the number of sites that are showing extreme plant stress is increasing. It is likely suspected that salinity and other hydrological changes (exacerbated by the proposed industrial project) will continue to cause extreme plant stress and habitat degradation. • Past, present and future	Entire	Extreme
Repeated short interval fires (prescribed burning and wildfire) • The species regenerates and recruits post-fire. However, the appropriate interval between burning (to prevent depletion of resources and soil seed stores) is unknown. Repeated fires will also exacerbate weed competition and invasion. • Future	Entire	Unknown – possibly 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).

- Department of Environment and Conservation (2012). *A guide to managing and restoring wetlands in Western Australia*. Perth, WA: DEC.
- Environmental Protection Authority (2004). *Environmental protection of wetlands: Position Statement No. 4.* Available from: http:// http://edit.epa.wa.gov.au/EPADocLib/1034_PS4.pdf

- Department of Parks and Wildlife (2015). *Interim Recovery Plan No. 354: Clay pans of the Swan Coastal Plain (Community types 7, 8, 9 and 10a – Gibson* et. al. *1994 and Clay pans with mid dense shrublands of* Melaleuca lateritia *over herbs) 2015-2020.* Available from: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans
- Department of Conservation and Land Management (2000). *Interim Recovery Plan No. 57: Shrubland and woodlands on Muchea limestone 2000-2003*. Available from: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans
- Department of Environment and Conservation (2006). *Interim Recovery Plan No. 228: Slender andersonia (*Andersonia gracilis) *2006-2011.* Available from: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans
- Department of Conservation and Land Management (2004). *Interim Recovery Plan No. 180: Swan starflower (*Calytrix breviseta *subsp.* breviseta*) 2004-2009.* Available from: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans
- Department of Environment and Conservation (2007). *Interim Recovery Plan No. 236: Selena's synaphea (*Synaphea *sp. Fairbridhe Farm) 2007-2012.* Available from: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans
- Department of Parks and Wildlife (2015 DRAFT). *Interim Recovery Plan No. #:* Austrostipa bronwenae *2015-2020*.

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

- A recent PhD project through UWA conducted a taxonomic analysis of the *Grevillea thelemanniana* group (date).
- The community group 'Friends of the Brixton Street Wetlands' conduct conservation activities within the Kenwick/Brixton St Wetlands, and the University of Western Australia uses a portion of the wetlands for botanical research and teaching.
- The Kenwick/Brixton St Wetlands are protected as a Class A Nature Reserve. The establishment of this nature reserve is preventing further fragmentation. The wetlands are also listed on the Directory of Important Wetlands in Australia and on the Register of the National Estate, and are a *Bush Forever* site.
- Any management and research actions conducted within the species habitat as part of ecological community or flora Interim Recovery Plans (see list above).
- Land owners and managers are notified of the presence of the species on their land to ensure that their operations do not disturb or destroy any plants.

List further recommended management or research actions, if any, that would benefit the conservation of the species.

- Develop management documentation (e.g. Recovery Plan)
- Research to determine appropriate fire intervals, and research seed viability and recruitment requirements
- Seed collection from a number of locations to determine genetic diversity
- Test the species susceptibility to dieback

Nomination prepared by:	
Contact details:	
Date submitted:	29/9/2016

If the nomination has been refereed or reviewed by experts, please provide their names and contact details:
Greg Keighery (Senior Principal Research Scientist, Dept. of Parks and Wildlife)

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	Area of subpopulation	Site / habitat Condition	Threats *(note if past, present or future)*	Specific management actions
Kenwick Wetlands (i.e. Brixton St Wetlands) 115.9852, -32.018	Nature Reserve	2014-15: 5909 individuals	0.2297873 km^2	Generally excellent to very good, some areas degraded	Past: vegetation clearing, stock grazing, weed invasion, boundary and firebreak maintenance, recreation vehicles Present: weed invasion and competition, water stress Future: repeated short interval fires, weed invasion and competition, water stress	Weed control Establishment of suitable fire regimes
Kenwick – Department of Planning land	Department of Planning	2013 and 2015: 4365 individuals	0.359398 km^2	Varies between excellent, very good, good and degraded	Past: vegetation clearing, stock grazing, weed invasion, boundary and firebreak maintenance, recreation vehicles Present: weed invasion and competition, water stress, boundary and firebreak maintenance Future: repeated short interval fires, weed invasion and competition, water stress, boundary and firebreak maintenance	Weed control Establishment of suitable fire regimes Ensure land managers are aware of the species' presence on their land to help minimise disturbances
Kenwick – UWA land	UWA	2013: 5505 individuals	0.100972 km^2	Excellent to very good, disturbance mostly confined to property boundary	Past: vegetation clearing, stock grazing, weed invasion, boundary and firebreak maintenance, recreation vehicles Present: weed invasion and competition, water stress, boundary	Weed control Establishment of suitable fire regimes Ensure land managers are aware of the species'

					and firebreak maintenance, recreation vehicles Future: repeated short interval fires, weed invasion and competition, water stress, boundary and firebreak maintenance, recreation vehicles	presence on their land to help minimise disturbances
Kenwick – Brook Rd, Bickley Rd, Boundary Rd, Brentwood Rd, Row Hwy and Rail	Road and Rail Reserves	2013 and 2015: 286 individuals	0.005249 km^2	Mostly degraded with localised patches in good condition	Past: vegetation clearing, stock grazing, weed invasion, road and rail reserve maintenance, recreation vehicles Present: weed invasion and competition, water stress, road and rail reserve maintenance, recreation vehicles Future: vegetation clearing, repeated short interval fires, weed invasion and competition, water stress, road and rail reserve maintenance	Weed control Establishment of suitable fire regimes Ensure land managers are aware of the species' presence on their land to help minimise disturbances
Kenwick – Private properties	Private property	2012-2015: 1446 individuals	0.046140 km^2	Various between very good and degraded, depending on the property	Past: vegetation clearing, stock grazing, weed invasion, boundary and firebreak maintenance, recreation vehicles Present: vegetation clearing, stock grazing, weed invasion and competition, water stress, boundary and firebreak maintenance, recreation vehicles Future: vegetation clearing, stock grazing, repeated short interval fires, weed invasion and competition, water stress, boundary	Weed control Establishment of suitable fire regimes Ensure land managers are aware of the species' presence on their land to help minimise disturbances

					and firebreak maintenance, recreation vehicles	

Department of
Parks and Wildlife

Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2015.

SECTION 1. NOMINATION

1.1. Nomination for:

Flora ☒ | **Fauna** ☐ | as: **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 possible.

Grevillea thelemanniana Endl. subsp. *thelemanniana*

1.3. Common Name
If the species has a generally accepted common name, please show it here.

Spider Net Grevillea

1.4. Family Name

Proteaceae

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		
National EPBC Act 1999		
State of Western Australia	Critically Endangered	A2ac; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

State of WA Priority	1☐	2☐	3☐	4☐	5☐

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	Critically Endangered	A2ac; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

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** ☐ **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.

Grevillea thelemanniana subsp. *thelemanniana* is only known from one location in Kenwick, Western Australia. The one population occurs across numerous landholdings with different land management practices, which has resulted in a fragmented wetland area.

While a number of the land holdings have been acquired for conservation (refer table in section 4.1) and some are now amalgamated into Crown Reserves, there is an industrial development proposed for the area, which has the potential to impact on subpopulations currently on

Freehold tenures through possible clearing and effects associated with nearby industry. Listed below are the relevant criteria details:

A. An observed, estimated, inferred or projected population size reduction of >50% over the last 10 years or three generations, whichever is the longer where the causes of reduction may not have ceased.

Population reduction estimated, inferred and projected in the past where the causes of reduction may not have ceased. Clearing of 79% of the historical extent of occurrence has occurred since the date of original collections in the early 1900's. Population reduction of this extent is estimated (using current average plant numbers per square metre of critical habitat) at 148,561 plants or 89%. Plant numbers will almost certainly reduce in the future, taking into account the proposal for industrial development in the Maddington, Kenwick Strategic Area (Tauss & Weston 2010).

B. Geographic range in the form of extent of occurrence or area of occupancy. The current Extent of Occurrence is 3.208 km^2 and the Area of Occupancy is 0.836 km^2. The habitat is severely fragmented with landholdings under a number of different tenures and purposes. A continuing decline in the area of occupancy and the area, extent and/or quality of habitat is likely.

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.

Grevillea thelemanniana Huegel ex Endl. Nov. Stirp. Dec 1:6 (1-May-1839). Described from a specimen in Baron von Huegel's garden in Vienna, now lost. A neotype Brook Road, Wattle Grove, R. Coveny 8130 has been designated.

The *Grevillea thelemanniana* complex has been variously treated. Originally described as a series of species, all were combined under *G. thelemanniana* by MacGillivray, D.J (1986) as a series of informal "variants". This was followed in MacGillivray, D.J. and Mackinson, R.O. (1993), although some "variants" were treated as allopatric subspecies in *Grevillea thelemanniana*. Most were elevated to specific status by Olde, P.M. and Marriott, N.R. (1995) and this treatment was followed by Mackinson (2000). At present the complex consists of a series of closely related allopatric species and several allopatric subspecies. The species are generally ecologically separated as well.

Reviews of *Grevillea thelemanniana* by G. and B. Keighery led to the separation of the northern populations as subspecies Cooljarloo and the Perth populations as subsp. *thelemanniana* and the separation of the population near Gillingarra as sp. Gillingarra.

A recent study of the *Grevillea thelemanniana* group was undertaken as part of a PhD project by Tanya Hevroy at the University of Western Australia. This included an analysis of the genetic similarities and differences within and between all taxa of the group including the proposed subspecies of *Grevillea thelemanniana* (*G. thelemanniana* subsp. *thelemanniana* and *G. thelemanniana* subsp. Cooljarloo). She found that the two subspecies were differentiated at the species level and should be recognised as separate species, not subspecies. The northern subspecies was genetically more closely related to several taxa confined to the Lesueur area and to *Grevillea preissii* than to the southern subspecies. The southern subspecies is closely related to *Grevillea obtusifolia*. The PhD has been examined and accepted and several papers are proposed on the group, including formal taxonomic recognition of the results.

Leaves are simple, 10.5-23 mm long overall; lamina 1-1.5 mm wide, usually dissected into 3 lobes (sometimes further divided i.e. subpinnatisect or pinnatifid), but never with secondary divisions. Lobes are 2.8 mm long, elliptic and/or linear, not further divided. Leaf lobes apiculate 2-18 mm long and 1-2 mm wide; densely sericeous abaxially becoming rust coloured when dried, simple white

hairs on the adaxial surface. Leaf margins are curved downwards, partly enclosing the lower surface of the leaf blade, forming two grooves with the midvein clearly visible.

Inflorescences are terminal or axillary, 20-50 mm long with a raceme of red flowers. Fruit is ellipsoidal, glabrous 12-13 mm long.

Grevillea thelemanniana differs from other members of the complex in having both entire and dissected flat leaves, never secondarily divided, with the lower surface of the leaf visible, never enclosed by the revolute margin. It is distinguished from its closest relative, *Grevillea obtusifolia*, in having a lignotuber, the presence of some divided leaves, the lack of a visible midvein on the upper leaf surface and the narrower leaf lamina (<2 mm wide).

Is this species conventionally accepted? If no, explain why. For example, is there any controversy about the taxonomy? For undescribed species, detail the location of voucher specimens (these should be numbered and held in a recognised institution and be available for reference purposes).

No ☐ Yes ☒

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

None known.

2.2. Description

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

G. thelemanniana subsp. *thelemanniana* is an erect to spreading lignotuberous shrub that can grow to 1.2 m in height and 5 x 5 m in size. The leading stems are mostly prostrate and can be buried in the topsoil but do not produce adventitious roots. Plants regenerate after disturbance i.e. slashing, clearing for firebreaks and post-fire. It also recruits from seed the first year after fire (Anne Harris *pers. comm.* 11/2014).

Plants bear numerous nectar filled flowers that attract honeyeaters which pollinate the flowers. Largely outcrossing, seed set is highly variable in the wild. It is most likely that the species is largely self-incompatible and obligately outbreeding. However, some plants will set some seed in isolation in cultivation, suggesting they are capable of being at least partially self-fertile. Plants are long lived in cultivation and presumably so in the wild as they are not killed by fire.

Seeds are relatively large with a narrow wing. They have no obvious means of dispersal and are shed when the follicle matures.

2.3. Distribution

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

G. thelemanniana subsp. *thelemanniana* has a restricted distribution of 3.2089 km^2 in the south-eastern suburbs of Perth Western Australia (Map 1). The majority of the plants are within an area known as the Greater Brixton St. wetlands.

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

G. thelemanniana subsp. *thelemanniana* occurs on sandy clay soil in flat seasonally wet damplands. Limestone soils are associated with some of the sites. The climate is warm Mediterranean with a long-term (1944-2015) average annual rainfall of 770 mm (BOM 2015).

Biological habitat

Essentially, *G. thelemanniana* subsp. *thelemanniana* prefers Tall Open Shrubland to Tall Open Scrub of all or a subset of *Viminaria juncea, Callitris pyramidalis, Melaleuca acutifolia, M. viminea* over Open to Closed Heath of all or a subset of *Hypocalymma angustifolium* (swamp form), *Acacia lasiocarpa, Verticordia densiflora* subsp*. densiflora, Grevillea thelemanniana* subsp*. thelemanniana, Melaleuca brevifolia, Melaleuca seriata, Calothamnus hirsutus, Banksia telmatiaea, Calytrix breviseta* subsp*. breviseta* (T) over Open Sedgeland of *Meeboldina cana, Gahnia trifida, Schoenus subfascicularis, S. rigens, Lepidosperma rostratum* (T), and Herbland of *Centrolepis aristata, Drosera menziesii, Philydrella pygmaea, Tribonanthes australis, Burchardia bairdiae.*

It also occurs within and along the edges of firebreaks and tracks where slashing or scarifying has occurred and can persist (although in very low numbers) within areas of dense Poaceae and Iridaceae spp. weeds in Disturbed to Degraded sites (State of WA 2000).

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. thelemanniana subsp. *thelemanniana* has been recorded within and/or on the edges of the following claypan Threatened Ecological Communities (TECs):

- SCP07 – Herb rich saline shrublands in clay pans (listed as Vulnerable [WA] and Critically Endangered [EPBC]).
- SCP08 – Herb rich shrublands in claypans (listed as Vulnerable [WA] and Critically Endangered [EPBC]).
- SCP10a – Shrublands on dry clay flats (listed as Endangered [WA] and Critically Endangered [EPBC]).
- Muchea Limestone – Shrublands and woodlands on Muchea Limestone (listed as Endangered, [WA] and Endangered [EPBC]). (All listings correct as at March 2013).

Although *G. thelemanniana* subsp. *thelemanniana* shares the same biological niche as the TECs, it can persist in more disturbed areas (although in very few numbers) and is therefore not reliant on the TECs.

Taxa of Threatened (T) flora that occur within the habitat are:

- *Andersonia gracilis* (listed as Vulnerable [WA] and Endangered [EPBC]).
- *Austrostipa bronwenae* (listed as Critically Endangered [WA])
- *Calytrix breviseta* subsp. *breviseta* (listed as Critically Endangered [WA] and Endangered [EPBC]).
- *Lepidosperma rostratum* (listed as Threatened [WA] and Endangered [EPBC]).
- *Diuris purdiei* (listed as Endangered, [WA] and Endangered [EPBC]).
- *Eremophila glabra* subsp. *chlorella* (listed as Critically Endangered [WA]).
- *Ptilotus pyramidatus* (listed as Critically Endangered [WA] and Critically Endangered [EPBC]).
- *Synaphea* sp. Fairbridge Farm (D. Papenfus 696) (listed as Critically Endangered [WA] and Critically Endangered [EPBC]).

Taxa of Priority (P) flora that occur within or near the habitat are:

- *Aponogeton hexatepalus* (P4).
- *Byblis gigantea* (P3).
- *Comesperma rhadinocarpum* (P2).
- *Drosera occidentalis* subsp. *occidentalis* (P4).
- *Hydrocotyle lemnoides* (P4).

- *Ornduffia submersa* (P4).
- *Verticordia lindleyi* subsp. *lindleyi* (P4).

Conservation Significant taxa under threat and in need of further study that occur within the habitat are:

- *Conospermum undulatum* hybrid

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?

Grevillea thelemanniana subsp. *thelemanniana* flowers from May to November. During targeted survey in 2014 and 2015, few flowers were observed in comparison to the size of many plants. Even fewer fruits were produced that had mostly dehisced by mid-December. (This may not be a true characteristic of the plant, as there is a trend for lower rainfall in the SW of WA over last 15 years).

Seeds produced are viable and seedlings were recorded for a site that was recently burnt. However, the predominant method of growth after disturbance was observed to be regeneration of the rootstock.

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.

Juveniles of *Grevillea thelemanniana* subsp. *thelemanniana* were observed within 9 of the 'subpopulations' (34.6%) surveyed and ranged from 0.26% to 8.56% of the subpopulation. Juveniles were differentiated on size combined with a lack of flowers.

In cultivation plants will flower within two seasons from planting seed in autumn, but the closely related *Grevillea obtusifolia* took three seasons after a summer fire killed all adults at Timaru Nature Reserve. It is probable that plants take 3-4 years to flower in the wild depending on the seasonal rainfall.

Most plants were large, sprawling and in good condition. Years since last fire throughout the current extent of occurrence ranged from 8 to >20 years, which indicates that plants are long-lived. The predominant method of growth is for regeneration, which also indicates that the plants can persist through harsher conditions.

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

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).

The total population size of mature individuals is 18,121 based on a mixture of actual and extrapolated counts.

Initial surveys were undertaken using Digital GPS units to accurately record each plant's location and gain information on habitat preferences and growth habits. The method was soon recognised as being too onerous and time-consuming a task for the number of plants existing and the amount of damage it would do to the Heathland communities it occurred in. Therefore, the actual count was undertaken only within parcels of land (Lots) that contained smaller areas of Heathland or had larger areas of disturbed vegetation.

Transects ~50m apart or transects dissecting population boundaries were then undertaken and the plants rooted within a 3m wide area were counted, again using a Digital GPS. The resulting shapefiles were analysed in Esri ArcMap10.1. Total areas of transects, population 'polygons' and Lots were calculated. Plant numbers were then extrapolated for the total area surveyed.

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

Recent studies confirmed that *Grevillea thelemanniana* subsp. *thelemanniana* is genetically distinct from the other subspecies (2.1 Taxonomy). Surveys have determined that this subsp. occurs only in a few southern suburbs of Perth and predominantly within the area known as the Greater Brixton St. Wetlands. This area is made up of a mixture of Conservation Reserves and Freehold Lots.

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?

Grevillea thelemanniana forms have been propagated and sold through nurseries and used extensively for horticultural purposes over many years. There are no official sites of introduction or re-introduction for conservation purposes.

For <u>flora</u>, and where applicable, for <u>fauna</u>, detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known date, location or occurrence. More specific detail is expected for WA occurrences for taxa that are not endemic to WA.

All the surveys undertaken from August 2013 – January 2015 targeting *Grevillea thelemanniana* subsp. *thelemanniana* are listed in the table below. Four Freehold properties were unable to be accessed. For these properties a mid-range figure of 610 plants has been estimated to occur on ~43950 m^2 (based on knowledge gained about habitat likely to contain plants, condition of habitat and patterns of plant distribution).

Sub population /Location	Date of survey	Land status	Number of mature individuals at location	Area of occupancy at location	Condition of site (State of WA 2000)
1D	Dec-14-Jan-15	**Dept. Parks and Wildlife** **CR50529**	1113	186100 m^2	Generally Excellent –Very Good , some areas of degradation
1S	Nov-14		1446	13500 m^2	Generally Excellent –Very Good, some areas of degradation
1T			50	17322 m^2	Generally Very Good, some areas of degradation
1G	Sept-14		3300	80951 m^2	Generally Excellent –Very Good with some areas of degradation
Sub-Total			**5909**	**297873 m^2**	
1A	Aug-Sep-13	**Dept. of Planning**	2909	280267 m^2	Excellent-Degraded generally Very Good
1F	Jan-15		67	2283 m^2	Good
1H	Nov-13		875	40475 m^2	Very Good - Excellent
1I	Jan-15		336	18000 m^2	Degraded -Good
1J	Jan-15		2	20 m^2	Degraded -Good
1O	Jan-15		176	18353 m^2	Good - Degraded
Sub-Total			**4365**	**359398 m^2**	
1C	Oct-Dec-13	**University of Western Australia**	5316	93000 m^2	Excellent – Very Good, disturbance mostly confined to property boundary
Lot 77 & 78	Aug-13		189	7972 m^2	Very Good
Sub-Total			**5505**	**100972 m^2**	
Brook Rd	Jan-15	**Road and Rail**	160	3236 m^2	Degraded
Bickley Rd	Jan-15		1	10 m^2	Degraded
Boundary Rd	Jan-15		115	1893 m^2	Degraded
Brentwood Rd	Jan-15		1	10 m^2	Degraded
Roe Hwy	Jan-15		1	20 m^2	Good (localised patch only)
Rail	Aug-13		8	80 m^2	Good
Sub-Total			**286**	**5249 m^2**	
1B	Sep-12	**Private Property**	90	2210 m^2	Very Good
1M	Oct13		825	40475 m^2	Very Good. Viewed from boundary. Aerial shows similar vegetation to adjacent property where 1H occurs.
1N	Jan-15		490	27040 m^2	Very Good. Viewed from boundary. Aerial shows similar vegetation to nearby property where 1H

					occurs.
1V	Oct-14		8	2100 m^2	Degraded - Good
L70 Brook	Dec-14		25	1230 m^2	Excellent in localised patches where plants occurred. Viewed from property boundary.
L73 Brook	Jan-15		4	40 m^2	Good. Viewed from Brook Rd. reserve.
L6 Boundary	Not accessed		1	10 m^2	Appears to be Degraded from the aerial view.
L137 Brentwood	Not accessed		3	30 m^2	Surveyed in 2012 for other T flora. Very Good.
Sub-Total			**1446**	**46140 m^2**	
Total			**17511**	**836622 m^2**	

What is the total area of occupancy (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. Where separate breeding habitat is applicable, if possible, also provide area of breeding habitat.

0.88055 km^2. (Sum of 0.8366 km^2 from the table above and 0.04395 km^2 from the estimation of property area not accessed).

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.

The current extent of occurrence is 3.2089 km^2 (Map 2). This was calculated by determining the locations of extant 'subpopulations' and using Quantum GIS v1.8.0 to map a minimum convex hull to calculate the area.

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 of the occurrences are necessary. The entire known area, which constitutes one population of *G. thelemanniana* subsp. *thelemanniana,* is important.

Is the distribution of the species severely fragmented? Why?

Within the known area of occurrence for *G. thelemanniana* subsp. *thelemanniana*, the habitat has been quite fragmented over time. The entire area was divided into Freehold Lots (Map 3) that were used for a mixture of purposes ranging from residential to industrial. Many of the Lots were used to keep livestock.

Some of the Lots were kept in mostly intact condition and a number of these have been purchased by Western Australian Planning Commission (managed by Department of Planning) for conservation and have been amalgamated over the years by the Department (DEC and DPaW) to avoid further impacts of fragmentation (Map 3).

Is the taxon subject to extreme fluctuations? If so, provide evidence.

There is no evidence that the species is prone to extreme fluctuations. However, it was noted in a number of Lots that the impacts of water stress are more noticeable. If the trend for lower rainfall continues, combined with potential harmful impacts of the proposed Industrial estate, further decline in the habitat and plant numbers may occur.

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.

Clearing has occurred within the known habitat and therefore, an historical decline is definite (Maps 2 and 3).

It is almost assured that plant numbers will reduce in the future, considering the still active proposals for industrial development in the Maddington, Kenwick Strategic Area.

Has there been a decline in the size of the population (number of mature individuals)?

There has been a 79% reduction in the extent of occurrence (using convex hull measurements) based on the historical sites from previous surveys where *G. thelemanniana* subsp. *thelemanniana* occurred (Map 2).

Twenty six percent of the current extent of occurrence contains a total of 18,121 plants. The remaining 74% of the extent is either cleared, degraded or is not critical habitat.

Being precautionary, and inferring that ~50% of the current extent was suitable habitat prior to clearing and degradation, a total of 34,752 plants may have occurred. This is a decline in the size of the population by 16,631 plants or 47.8%.

- **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.**

If the same inference is made (as above) for the historical extent of occurrence, a total of 166,682 plants may have occurred. This is an historical decline in the size of the population of 148,561 plants or 89%.

- **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.**

Approximately 10% of the current known plants occur on private property with no formal protection. The proposed industrial project within the Maddington, Kenwick Strategic area has the potential for negative impacts on the population. Habitat decline was also noted in several sites throughout the population, likely due to water stress. Therefore, there is a possibility of 10% reduction in the population size over the following 10 years.

Has there been a decline in the number of locations, extent of occurrence or area of occupancy?

As detailed above, there has been a 79% reduction in the extent of occurrence of sites where *G. thelemanniana* subsp. *thelemanniana* occurred.

Has there been a decline in the area or quality of habitat?

Yes. The entire area was divided into Freehold Lots (Map 3) that were used for a mixture of purposes ranging from residential to industrial. Many of the Lots were used to keep livestock. This has resulted in a number of Lots containing vegetation considered to be in Disturbed or Degraded condition (State of WA 2000).

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.

Initial surveys were undertaken from late winter through to early summer during daylight hours and in all weather conditions to benefit from the known peak flowering period. Surveys in the latter stages of the project continued into late summer as *G. thelemanniana* subsp. *thelemanniana* was easily recognisable.

The intensity of the initial surveys was high, when counts of individual plants were undertaken, that involved separating entwining stems to determine single plants. This method was extremely time consuming, and was therefore changed to recording actual counts within Lots that contained small areas of remnant vegetation. Within Lots containing large areas of remnant vegetation, transects dissecting mapped population boundaries and also various length transects, 50m apart and 3m

wide, were undertaken (also detailed above in 4.1 Population).

Limitations are:

- A number of Lots within the known area of extent were not able to be surveyed due to access permission not being granted.
- Total plant numbers not exact due to lack of access permission, time restrictions and a recognition that more intense survey in shorter spaced transects would have a high negative impact on the Heathland vegetation community.

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

Grevillea thelemanniana differs from other members of the complex in having both entire and dissected flat leaves, never secondarily divided, with the lower surface of the leaf visible, never enclosed by the revolute margin.

As much of the preferred habitat (seasonally inundated Heathland on sandy clay soils) has been cleared within the wider area, it is distinctive.

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 the species has been well surveyed (also see 4.2 Survey Effort).

Where access was granted, sites of *Grevillea thelemanniana* subsp. *thelemanniana* recorded in the Departments Threatened and Priority Flora database (TPFL) were surveyed. The majority of these were within the Greater Brixton St. Wetlands, Kenwick. All but two sites recorded plants as being present. The two sites not containing plants were and found to be either totally cleared or degraded by long-term stock use.

Sites from previously known records where access was not granted were checked from the boundaries to ascertain if *Grevillea thelemanniana* subsp. *thelemanniana* was present (Map 3). An estimation of plant numbers was given at the end of the project, based on knowledge gained about habitat likely to contain plants, condition of habitat and patterns of plant distribution.

Sites of previously vouchered records obtained from Florabase (2015) were visited to establish if the population was still extant. Listed below are the locations where *Grevillea thelemanniana* subsp. *thelemanniana* was not found or the recorded co-ordinates did not match with the on-ground site description.

- PERTH 0110911, PERTH 1109162 (1976 collections)

Co-ordinates pinpoint a site along Woodlupine Brook in Wattle Grove (a nearby suburb). No *G. thelemanniana* subsp. *thelemanniana* were found. The site description states “University Reserve near Cannington, known as Cannington Swamp”. This depicts the area of University of WA managed bushland in Kenwick (also a nearby suburb to Cannington) where a known population occurs. To further complicate matters a site known as Tomah Swamp is close to Woodlupine Brook and requires investigation into the proprietor for future survey as the habitat appears to be suitable.

- PERTH 02282895 (1976 collection)

Co-ordinates pinpoint an urban site in-between Kenwick and Bickley Rds that has been cleared and replanted with non-indigenous species. No *G. thelemanniana* subsp. *thelemanniana* were found. The site description states “1km S along Brook Rd from Welshpool Rd, Wattle Grove” where a known population occurs.

- PERTH 01938967, 01938932, 01938940, 01938983, 01845586, 01938959 (collection range 1901-1953)

Co-ordinates pinpoint the northern side of drainage flat between the Canning River and the Kent St weir. No *G. thelemanniana* subsp. *thelemanniana* were found. Searches of the southern side

have also not found any plants (G. Keighery *pers. comm*.)

- PERTH 01109170, 01109154, 01035762 (collection range 1898-1966)

Co-ordinates pinpoint a residential area with no remnant vegetation in East Cannington. No *G. thelemanniana* subsp. *thelemanniana* were found. A nearby park did have plantings of *G. obtusifolia*. The site description states “Cannington” or “Cannington, Lower Canning R.”

Sites of previously vouchered records obtained from Florabase (2015) where plants are most likely to be *Grevillea preissii* subsp. *preissii* (G. Keighery *pers. comm*.) are listed below. These sites were not visited during this project.

- PERTH 01939009 (collection 1934)

Site description is “Near Canning Dam”.

- PERTH 01938991 PERTH 01939017 (collection range 1899-1901)

Site description is “Lower Canning River”, but the co-ordinates pinpoint the location as Canning River Rd. Mt Cooke, near Monadnocks Conservation Reserve.

4.3. Threats

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

a). how and where they impact this species

b). what the effect of the threat(s) has been so far (indicate whether it is known or suspected

c). present supporting information/research

d). does it only affect certain populations?

e). what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations?).

Past threats (actual, known and observed) are:

- Clearing for rural, urban, horticultural or industrial uses (fragmentation of the critical habitat has impacted on the species by reducing the habitat area and plant numbers). Seventy-nine percent of the area of extent has been cleared or disturbed (Map 2).
- Clearing for and maintenance of boundary and internal firebreaks (reduction of critical habitat and plant numbers).
- Clearing for road and rail line construction and of road reserves (reduction of critical habitat and plant numbers).
- Maintenance operations along road and rail reserves (impacts continue to degrade potential habitat).
- Stock grazing (no grazing of *G. thelemanniana* subsp. *thelemanniana* was observed or has been recorded, however the negative impacts of keeping stock within intact vegetation is well documented)
- Weed invasion (the presence and impacts of weeds post clearing is known and observed. Plants have been recorded as persisting amongst weeds in Degraded areas, however only in very few numbers).
- Water stress (due to drying climate trends and water drawdown from local bores-suspected. Two small areas were observed to be affected by salinity. It is suspected that some of the areas of weed invasion and fragmented Heathland within individual Lots are due to local drawdown over time).
- Recreational vehicles (it was observed within a number of Lots that 4WD and motorbikes have been damaging the habitat).

Current threats (actual, known and observed) are:

- Maintenance operations along road and rail reserves (impacts continue to degrade potential habitat).
- Stock grazing (illegal horse agistment has affected the habitat of Population 1K and 1J).
- Weed invasion (dense weed patches were recorded and observed within a number of Lots on the edges and inside known critical habitat. Although *G. thelemanniana* subsp. *thelemanniana* is lignotuberous and can persist within unfavourable conditions, the

continued competition for resources and negative impacts on recruitment is likely).

- Water stress (due to drying climate trends and water drawdown from local bores-suspected. The number of sites that were observed showing extreme plant stress is increasing).

Future threats (actual and potential) are:

- Maintenance operations along road and rail reserves (impacts continue to degrade potential habitat).
- Impacts on the habitat of the Maddington, Kenwick Strategic Area proposed Industrial project (this is likely to involve further clearing and fragmentation).
- Weed invasion (resources and funds are not available to control the current weed cover, combined with the potential for further clearing due to the proposed industrial project the likelihood of further impacts of weeds is high).
- Water stress (due to drying climate trends and water drawdown from local bores-suspected. The areas affected by salinity and extreme plant stress may increase. There is also potential for further hydrological changes due to the proposed industrial project).
- Repeated short interval fires (either prescribed burning or wildfire). *G. thelemanniana* subsp. *thelemanniana* is known to regenerate and recruit post-fire. However, the appropriate interval between burning is unknown to avoid continued depletion of resources and soil seed stores. Repeated fires will also exacerbate weed competition and invasion.

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

Sub population /Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)
1D, 1S, 1T, 1G (CR 50529) Dept. of Parks and Wildlife	Clearing, stock grazing, weed invasion, maintenance of boundary and internal firebreaks, recreational vehicles	Weed competition, drying climate, water drawdown	Repeated short-interval fires, weed competition, drying climate, water drawdown	Management documentation is required.
1A, 1F, 1H, 1I, 1J, 1O (Freehold) Dept. of Planning & Infrastructure	Clearing, stock grazing, weed invasion, maintenance of boundary and internal firebreaks, recreational vehicles	Weed competition, drying climate, water drawdown, maintenance of boundary and internal firebreaks	Repeated short-interval fires, weed competition, drying climate, water drawdown, maintenance of boundary and internal firebreaks	Management documentation is required
1C – fenced (Freehold) University of Western Australia	Clearing, stock grazing, weed invasion, maintenance of boundary and internal firebreaks, recreational vehicles	Weed competition, drying climate, water drawdown, maintenance of boundary and internal firebreaks	Repeated short-interval fires, weed competition, drying climate, water drawdown, maintenance of boundary and internal firebreaks	Management documentation is required
1C - unfenced (Freehold) University of Western Australia	Clearing, stock grazing, weed invasion, maintenance of	Weed competition, drying climate, water drawdown,	Repeated short-interval fires, weed competition, drying climate,	Management documentation is required

	boundary and internal firebreaks, recreational vehicles	maintenance of boundary and internal firebreaks, recreational vehicles	water drawdown, maintenance of boundary and internal firebreaks, recreational vehicles	
Brook, Bickley, Boundary, Brentwood Rds & Roe Hwy (Road and Rail Reserves)	Clearing, stock grazing, weed invasion, maintenance of road and rail reserves, recreational vehicles	Weed competition, drying climate, water drawdown, maintenance of road and rail reserves, recreational vehicles	Clearing, repeated short-interval fires, weed competition, drying climate, water drawdown, maintenance of road and rail reserves	Management documentation is required
1B, 1M, 1N, 1V, L70 & L73 Brook Rd, L6 & L137 Brentwood Rd (Freehold) Private property	Clearing, stock grazing, weed invasion, maintenance of boundary and internal firebreaks, recreational vehicles	Clearing, stock grazing, weed invasion, maintenance of boundary and internal firebreaks, recreational vehicles, drying climate, water drawdown	Clearing, stock grazing, weed invasion, maintenance of boundary and internal firebreaks, recreational vehicles, drying climate, water drawdown, recreational vehicles	Management documentation is required

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

The number of flowers and fruits observed and recorded during the surveys within the appropriate season was low. The main method of survival observed was that of persistence and regeneration of canopy via the lignotuber. Considering this, the likelihood of further clearing and the very small extent of occurrence (3.208 km^2), inbreeding depression is possible.

4.4. Management

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

There are no management plans for the species or for the Nature Reserves where *G. thelemanniana* subsp. *thelemanniana* occurs.

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

Yes. A number of the Lots where 'subpopulations' of *G. thelemanniana* subsp. *thelemanniana* occurs also contain TECs and Threatened Flora (2.4 Habitat). Although the species is not reliant on the TECs or Threatened Flora, the protection and management operations afforded also benefits *G. thelemanniana* subsp. *thelemanniana.*

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

There are 5,909 plants occurring within Lots that are currently managed as Nature Reserves and 4,365 plants occurring in Lots that are in the process of being changed to the purpose of conservation. None of these areas are being actively managed for *G. thelemanniana* subsp. *thelemanniana*. They have been recognised for other attributes (e.g. TECs, T and P flora), which have identified the need for conservation management.

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

- Research to determine appropriate fire intervals.
- Seed collection from a number of 'subpopulations' to obtain genetic diversity.
- Research into seed viability and recruitment requirements (recruitment via seed was only rarely observed).
- Testing of *G. thelemanniana* subsp. *thelemanniana* for its susceptibility to *Phytophthora* spp. Although the critical habitat for the species is on damplands low in the landscape (generally categorised as Uninterpretable) it is unknown how the plants are impacted by the fungus.

4.5. Other

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

Cat predation on pollinating birds on or near ground is also an issue. Birds may not spend enough time to adequately pollinate plants. This happened to *Blancoa canescens* in small remnants in the Armadale-Jandakot area, where they set virtually no seed because of cats.

Hybridization with related Grevillea species planted along roads or in nearby gardens could be a future issue if honeyeaters need to forage outside the reserved area.

SECTION 5. NOMINATOR

Nominator(s) name(s)	
Organisation(s)	
Address(s)	
Telephone number(s)	
Email(s)	
Date	30 January 2015

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

Greg Keighery (Senior Principal Research Scientist)

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.

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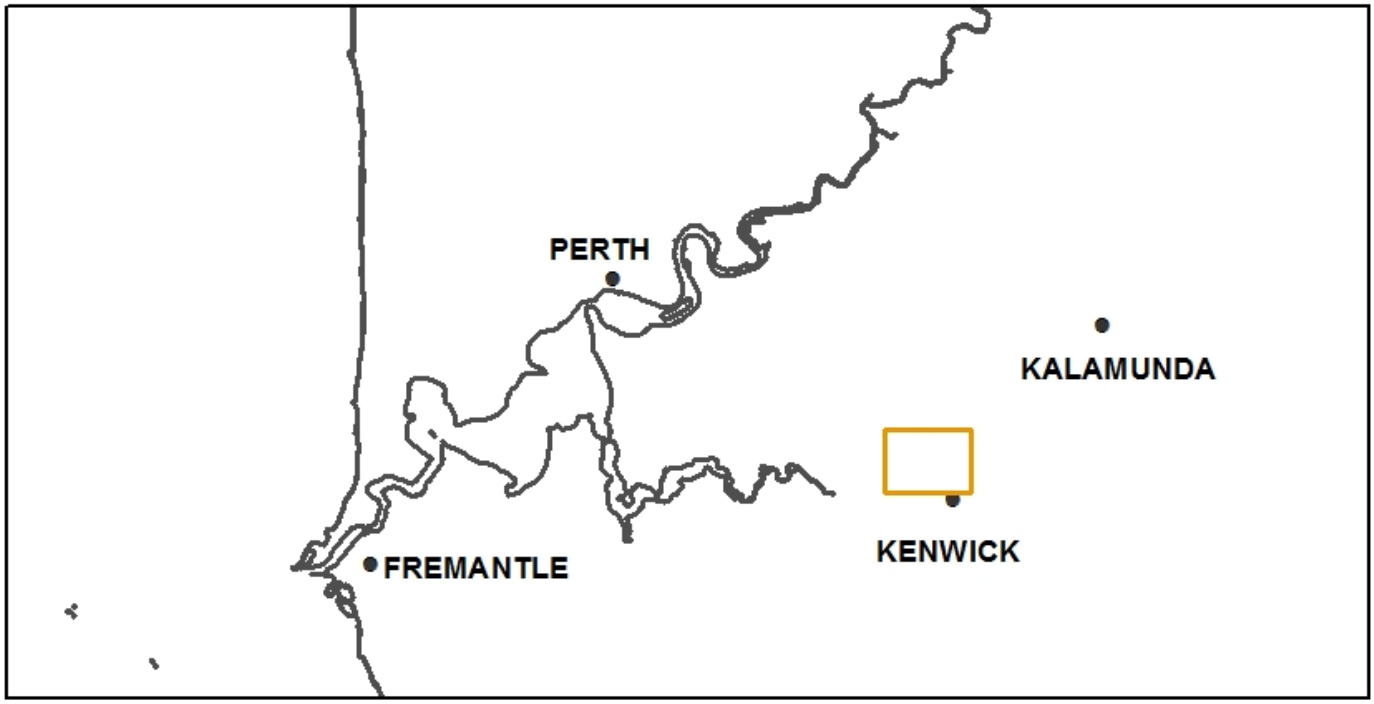
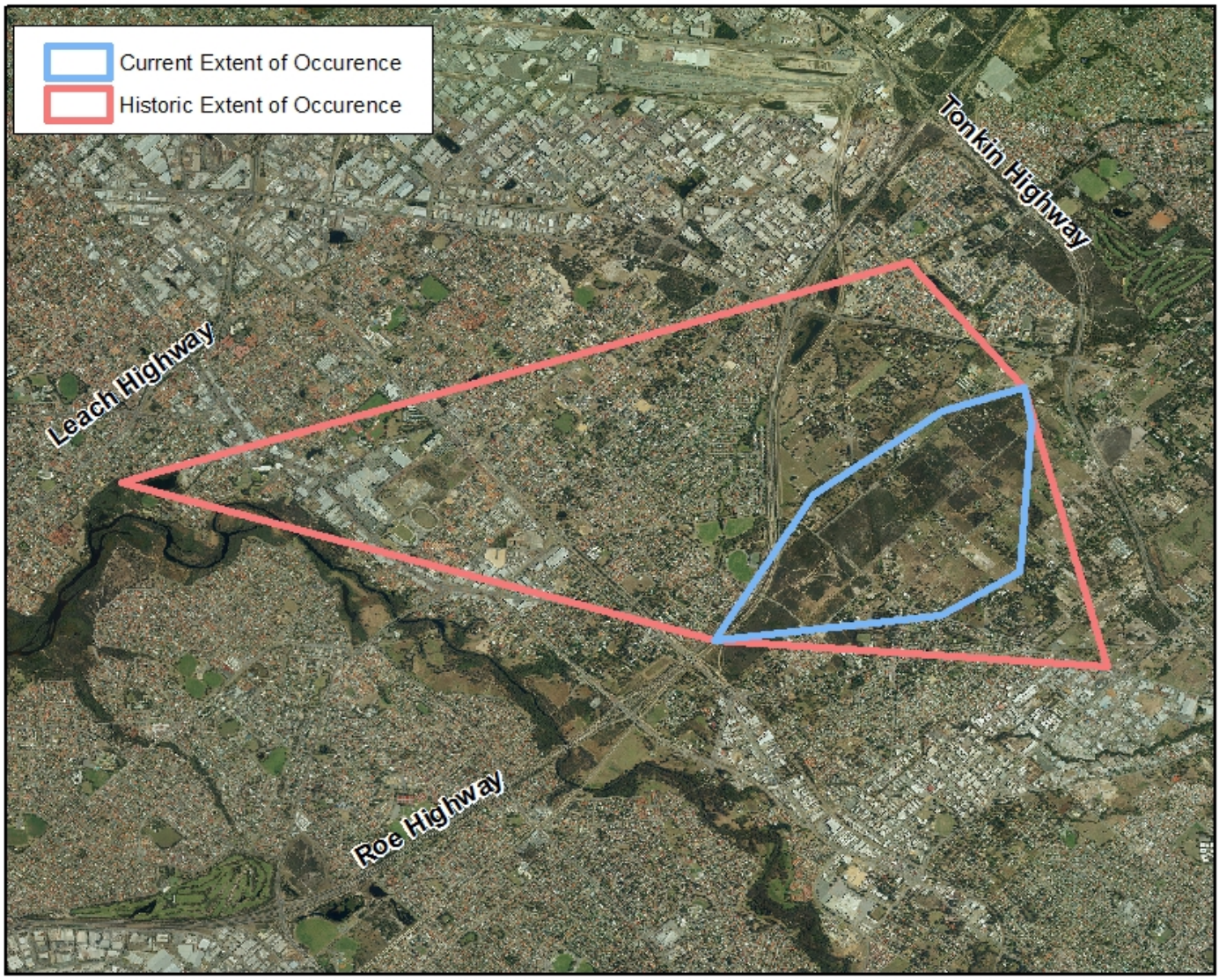
Map 1 Locality Map for Grevillea thelemanniana subsp. thelemanniana



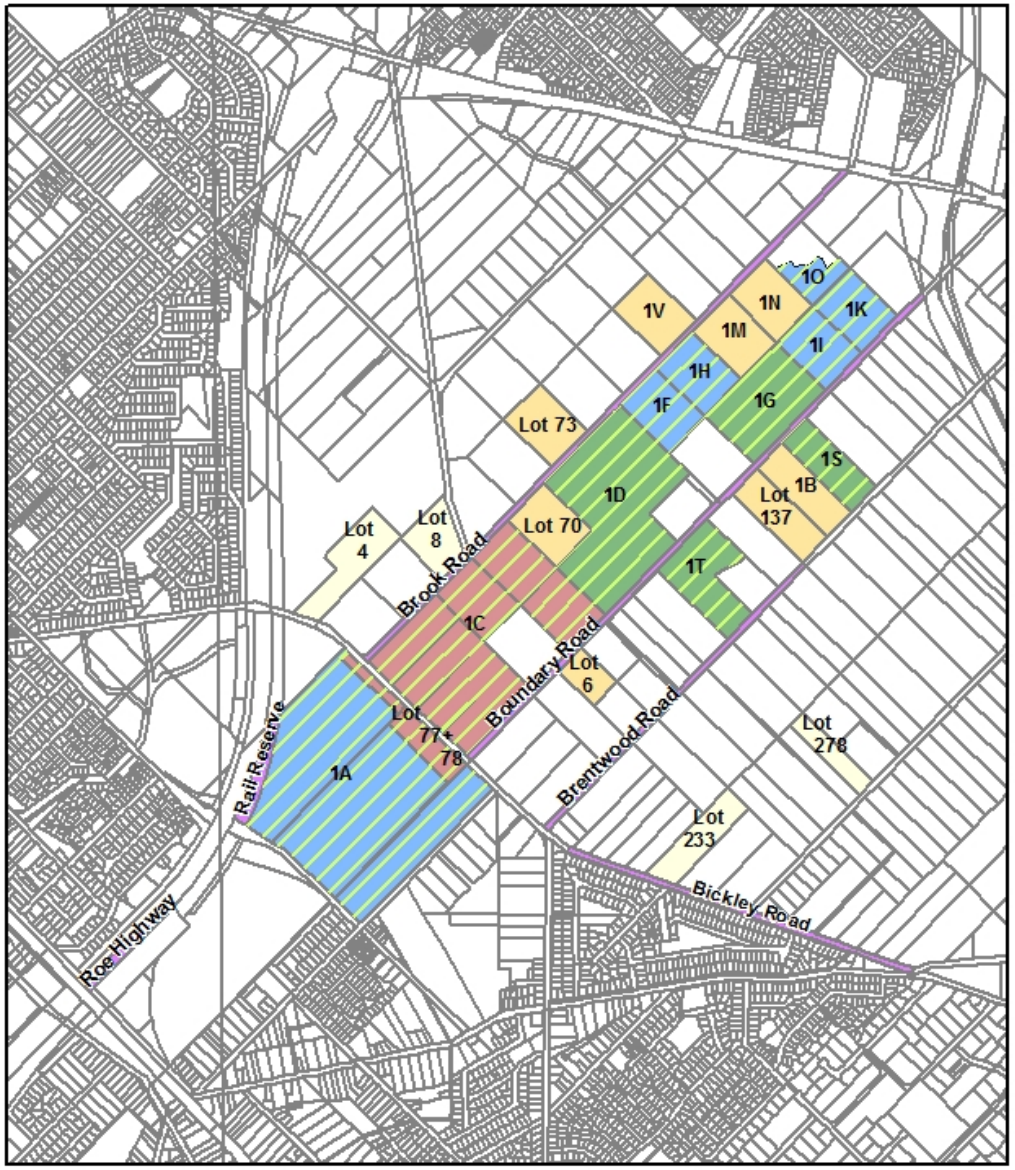
Map 2 Extent of Occurence for Grevillea thelemanniana subsp. thelemanniana



Produced by Fiona Felton of the Department of Parks and Wildlife

Produced at 4:25pm, on Jan 15, 2015

Map 3 - Lots Containing Grevillea thelemanniana subsp. thelemanniana



Lots Managed for Conservation

Cadastre (Land Parcels)

Lots containing G. thelemanniana subsp. thelemanniana by Tenure

- Nature Reserve - Parks and Wildlife
- Department of Planning
- University of Western Australia
- Private Property
- Private - Unconfirmed, no access
- Road or Rail Reserve

0 0.5 1 Kilometers

Produced by Fiona Felton of the Department of Parks and Wildlife

N

Produced at 4:25pm, on Jan 15, 2015