Department of Biodiversity, Conservation and Attractions

Nomination *(to be completed by nominator)*

Current conservation status				
Name of ecological community:	*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain (floristic community type 30a as originally described in Gibson *et al.* 1994).			
Other names:	Floristic community type (FCT) 30a, Swan Coastal Plain community type 30a (SCP30a)			
Description:	The community is located on calcareous sandy soils of the Quindalup Dunes generally occurring between Trigg and Point Peron, and on the Swan River in Peppermint Grove. The community also occurs on Garden Island and Rottnest Island. Typical and common native taxa in the community are: *Callitris preissii, Melaleuca lanceolata*, *Spyridium globulosum*, *Acanthocarpus preissii*, *Rhagodia baccata*, *Austrostipa flavescens* and *Trachymene pilosa*. The community is also known as "floristic community type 30a" as originally described in Gibson N., Keighery B.J., Keighery G.J., Burbidge A.H. and Lyons M.N. (1994) "A floristic survey of the southern Swan Coastal Plain" (unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.)).			
Nomination for:	Listing under BC Act ☒	Change of status ☒	Delisting ☐	

1. *Is the ecological community 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	**List or Act name**	**Date listed or assessed (or N/A)**	**Listing category eg. critically endangered (or none)**	**Listing criteria eg. B1ab(iii)+2ab(iii) (or none)**
National	EPBC Act	N/A	none	none
Western Australia	Current ranking under WA Minister ESA list in policy	21/11/2001	Vulnerable	B)
	Priority list	N/A	1 ☐ 2 ☐ 3 ☐ 4 ☐	
Other State/Territory		N/A	none	none

Nominated conservation status: category and criteria (include recommended status for deleted ecological communities)				
Critically endangered (CR) ☒	Endangered (EN) ☐	Vulnerable (VU) ☐	Collapsed (CO) ☐	
Priority 1 ☐	Priority 2 ☐	Priority 3 ☐	Priority 4 ☐	None ☐

What criteria support the conservation status category for listing as a threatened ecological community or collapsed ecological community? *Refer to Section 32 of the Biodiversity Act 2016 for definition of 'Collapsed', and Appendix 3 table 'IUCN Red List Criteria for ecosystems version 2.2'.*		CR B1b
Eligibility against the criteria		
*Provide justification for the nominated conservation status; is the ecological community eligible or ineligible for listing against the five criteria. For **delisting**, provide details for why the ecological community no longer meets the requirements of the current conservation status.*		
A.	Reduction in geographic distribution *(evidence of decline)*	☐ **A1** ☐ **A2a** ☐ **A2b** ☒ **A3**
	Justification of assessment under Criterion A.	For criterion A, the ecosystem is assumed collapsed when the mapped distribution declines to zero. • A1, A2a, A2b: In the past 50 years, there has been a minimal decline with five occurrences having been cleared (MYGI05, 06, 07, 08 and 11), equating to a 2% decline. Even though there is very limited information regarding the future changes in distribution for this community, all locations are in urban areas and are subject to the ongoing pressures and disturbances associated with proposed clearing, trampling, weed invasion, pollution and hydrological changes. No available evidence supports an inference that a minimum 30% reduction in geographic distribution has or will occur over any 50-year period (ie. the minimum thresholds to meet the category VU under criterion A). • A3: Historically, Callitris forests were cut for timber and firewood (Pryde 2007) with clearing for ongoing urban sprawl a more recent process that has further reduced the community's extent. The Callitris community would have been more common along the coastline, but only relatively small occurrences in Trigg, Woodman Point and Point Peron now remain as a consequence of historical clearing and too frequent fires since 1750 (DPaW 2014). It is estimated that the former extent was between 3000 and 4500 ha, therefore the community has declined by approximately 70 to 85% since ~1750 (Beard 1979; DBCA TEC database). • **Meets criterion for endangered A3.**
B.	Restricted geographic distribution *(EOO and AOO, number of locations and evidence of decline)*	☒ **B1** (specify at least one of the following): ☐ **a)(i)** ☐ **a)(ii)** ☐ **a)(iii)** ☒ **b)** ☐ **c);** ☒ **B2** (specify at least one of the following): ☐ **a)(i)** ☐ **a)(ii)** ☐ **a)(iii)** ☒ **b)** ☐ **c);** ☐ **B3 (only for Vulnerable Listing)**
	Justification of assessment under Criterion B.	For criterion B, the ecosystem is assumed collapsed when the mapped distribution declines to zero. • B1: EOO is 690 km^2 (≤2,000km^2, which is the threshold for CR). • B2: AOO occupies eight 10 x 10 km^2 grid cells (threshold for EN is £20, and for CR is £2 grid cells).

		• a): Insufficient data available to indicate a decline in spatial extent, environmental quality or disruption to biotic interactions to support ranking under B1a) or B2a). • b): Ongoing land clearing, weed invasion, grazing, too frequent fire and hydrological changes are likely to cause continuing declines in geographic distribution and environmental quality within the next 20 years (DPaW 2014) (additional information on threatening processes is available in Appendix 1). • c): The community occurs in more than 10 threat-defined locations (the threshold for VU). Does not meet B1c) or B2c). • B3: The community is known from >5 threat-defined locations. Does not meet B3. • **Meets criteria for critically endangered B1b** • **Meets criteria for endangered B2b.**
C.	Environmental degradation of abiotic variable *(Evidence of decline over 50-year period)*	☐ **C1** ☐ **C2** ☐ **C3**
	Justification of assessment under Criterion C.	Too frequent and intense fires are a significant threat to the community. For criterion C, collapse of the community is defined as a fire regime of very frequent intense fires. It is assumed that this will result in loss of fire sensitive shrubs including the Callitris that is often key to the structure of the community. • C1, C2: Fire frequency and severity are likely to increase with increased temperatures and decreased rainfall with drying climate. No systematically collected data were sourced that link the frequency or severity of fire to compositional and structural changes in the community. No available evidence indicates the community meets the minimum proportion of the extent (≥30%) or proportional severity of disruption of abiotic processes (≥30%) over any 50-year period to meet criteria C1 or C2. • C3: No available data indicate that the community meets the threshold proportion of extent (≥50%) or severity of disruption of abiotic processes (≥50%) since ~1750 to meet VU. • **No available data indicate that the community meets criterion C.**
D.	Disruption of biotic processes or interactions *(Evidence of decline over 50-year period)*	☐ **D1** ☐ **D2** ☐ **D3**
	Justification of assessment under Criterion D.	Weed invasion is a very significant threat to the community as it is highly vulnerable to weed invasion with its simple understorey that is readily replaced by weeds following disturbance. The severity of weed invasion associated with collapse is uncertain, but it is assumed conservatively that the community reaches a collapsed state when only 10% (plausible range 0–20%) of its plant species are native. • D1, D2: This community is highly susceptible to weed invasion following disturbance (DPaW, 2014). There are few quantitative data available for invasion levels and therefore insufficient evidence to indicate that the community meets the minimum proportion of the extent (≥30%) or proportional severity of

		disruption of abiotic processes (≥30%) over any 50-year period to meet criteria D1 or D2. • D3: No data available indicate that the community meets the minimum proportion of the extent (≥50%) or proportional severity of disruption of abiotic processes (≥50%) since ~1750. • **No data available to indicate the community meets criterion D.**
E.	Quantitative analysis *(statistical probability of ecosystem collapse)*	• No quantitative estimates of the risk of ecosystem collapse. • **Unable to assess criterion E.**

Reasons for change of status

Genuine change ☐ New knowledge ☐ Previous mistake ☐ Review/Other ☒

Provide details: The community was initially ranked as Vulnerable using ranking criteria developed in WA that differ to those in the IUCN Red List Criteria for Ecosystems (version 2.2).

Summary of assessment information *(provide detailed information in the relevant sections of the nomination form)*

EOO	690	AOO	8
No. occurrences	50	Severely fragmented (justification below)	Yes ☒ No ☐ Unknown ☐
Justification	Only relatively small occurrences in Trigg, Woodman Point and Point Peron now remain as a consequence of historical clearing and following too frequent fires since European settlement (DPaW 2014). Keighery *et al*. (1997) also note that a general feature of current reserves is a lack of large areas in which natural ecological processes would be expected to continue.		
Current known area			639 ha
Pre-industrialisation extent or its former known extent (if known)			3000-4500 ha (Beard 1979; DBCA TEC database)
Estimated percentage decline			70-85%

Summary assessment against IUCN RLE Criteria

Criterion	Rank indicated	Overall conclusion
A1	-	• No evidence available to support ranking under A1.
A2a	-	• No evidence available to support ranking under A2a.
A2b	-	• No evidence available to support ranking under A2b.
A3	EN	• Estimated 70-85% decline since ~1750. • Meets criterion for EN.
B1a	-	• EOO is ≤2,000km^2. • No available data indicate measurable decline in spatial extent, environmental quality or disruption to biotic interactions to support ranking under B1a. • Does not meet criterion.
B1b	CR	• EOO is ≤2,000km^2. • Threats from land clearing, weed invasion, grazing, too frequent fire and hydrological changes are likely to cause continuing declines in geographic distribution and environmental quality within the next 20 years. • Meets criterion for CR.
B1c	-	• EOO is ≤2,000km^2. • Ecosystem exists at more than 10 threat-defined locations. • Does not meet criterion.
B2a	-	• AOO is 8 grid cells. • No data available to indicate decline in spatial extent, environmental quality and disruption to biotic interactions to support ranking under B2a. • Does not meet criterion.
B2b	EN	• AOO is 8 grid cells. • Threats from land clearing, weed invasion, grazing, too frequent fire and hydrological changes are likely to cause continuing declines in geographic distribution and environmental quality. • Meets criterion for EN.
B2c	-	• AOO is 8 grid cells. • Ecosystem exists at more than 10 threat-defined locations. • Does not meet criterion
B3	-	• Does not meet criterion
C1	-	• No evidence available to support ranking under C1.
C2	-	• No evidence available to support ranking under C2.
C3	-	• No evidence available to support ranking under C3.
D1	-	• No evidence available to support ranking under D1.
D2	-	• No evidence available to support ranking under D2.
D3	-	• No evidence available to support ranking under D3.
E	NA	• No quantitative estimates of the risk of ecosystem collapse.
		Meets CR under B1b and EN under A3; B2b. *The highest risk category obtained by any of the assessed criteria will be the overall risk status of the ecosystem'* (IUCN RLE Guidelines V1.1 page 42). **Meets CR B1b.**

Summary of location (occurrence) information *(provide detailed information in the relevant sections of the nomination form)*						
Occurrence	Land tenure	Survey information: date of survey	Condition*	Area of occurrence (ha)	Threats *(note if past, present or future)*	Specific management actions
Occurrence 1 (MYWOODPT01)	Conservation park, recreation, marina, navigation aid	2012	10% very good 90% good	5.56	Too frequent fire (past, present, future) Weed invasion (past, present, future) Grazing (past, present, future)	Develop fire management strategy; control weeds control; maintain fencing
Occurrence 2 (PEPGR01, 02)	Recreation, landscape protection	1995	20% excellent 80% good	3.15	Too frequent fire (past, present, future) Weed invasion (past, present, future)	Develop fire management strategy; control weeds
Occurrence 3 (MYGI01)	Naval Base	2006	100% excellent	0.85	Too frequent fire (past, present, future)	Develop fire management strategy
Occurrence 4 (MYGI02)	Naval Base	2006	100% excellent	1.26	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	Develop fire management strategy; control weeds
Occurrence 5 (MYGI03)	Naval Base	2012	100% excellent	16.19	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 6 (MYGI04)	Naval Base	2006	100% excellent	2.47	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 7 (MYGI05)	Naval Base	2006	Cleared	Cleared		
Occurrence 8 (MYGI06)	Naval Base	2006	Cleared	Cleared		

Occurrence 9 (MYGI07)	Naval Base	2006	Cleared	Cleared		
Occurrence 10 (MYGI08)	Naval Base	2006	100% excellent	Unknown	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 11 (MYGI09)	Naval Base	2006	100% excellent	0.95	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 12 (MYGI10)	Naval Base	2006	95% excellent 5% very good	16.68	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 13 (MYGI11)	Naval Base	2006	Cleared	Cleared		
Occurrence 14 (MYGI12)	Naval Base	Not surveyed	n/a	1.71	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 15 (MYGI13)	Naval Base	Not surveyed	n/a	0.78	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 16 (MYGI14)	Naval Base	Not surveyed	n/a	1.80	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 17 (MYGI15)	Naval Base	2006	100% excellent	7.99	Too frequent fire (past, present, future)	As above

					Weed invasion (past, present, future) Clearing (past, present, future)	
Occurrence 18 (MYGI16)	Naval Base	2006	100% excellent	4.29	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 19 (MYGI17, 19, 49)	Naval Base	2006	100% excellent	9.51	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 20 (MYGI18)	Naval Base	2006	100% excellent	7.52	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 21 (MYGI20)	Naval Base	2006	100% excellent	5.51	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 22 (MYGI21)	Naval Base	2012	100% excellent	17.29	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 23 (MYGI22)	Naval Base	2006	100% excellent	5.41	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 24 (MYGI23)	Naval Base	Not surveyed	n/a	1.08	Too frequent fire (past, present, future) Weed invasion (past, present, future)	As above

					Clearing (past, present, future)	
Occurrence 25 (MYGI24)	Naval Base	2006	100% excellent	8.03	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 26 (MYGI25)	Naval Base	2006	100% excellent	0.57	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 27 (GARD04)	Naval Base	2012	100% excellent	3.5	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 28 (GARD09, MYG27, 32, 36)	Naval Base	2012	100% excellent	35.38	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 29 (GARD06, 07, MYG28, 29, 30, 31, 33, 34, 35)	Naval Base	2012	100% excellent	79.57	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 30 (GARD01, 03, GI-01 PLOT)	Naval Base	2012	90% excellent 10% very good	196.38	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 31 (MYGI38)	Naval Base	2006	90% excellent 10% very good	4.97	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above

Occurrence 32 (MYGI39)	Naval Base	2006	90% excellent 10% very good	5.34	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 33 (MYGI40)	Naval Base	2006	90% excellent 10% very good	2.21	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 34 (MYGI41)	Naval Base	2006	90% excellent 10% very good	5.31	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 35 (MYGI42)	Naval Base	2006	70% excellent 30% very good	1.72	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 36 (MYGI43)	Naval Base	2006	100% excellent	0.97	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 37 (MYGI44)	Naval Base	2006	95% excellent 5% very good	1.51	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 38 (MYGI45)	Naval Base	2006	100% excellent	6.18	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above

Occurrence 39 (MYGI46)	Naval Base	2006	100% excellent	0.82	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 40 (MYGI47)	Naval Base	Not surveyed	n/a	0.74	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 41 (MYGI48)	Naval Base	2006	100% excellent	1.94	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	As above
Occurrence 42 (MYWOODPT02, WOODP01)	Conservation; Fauna; Protection of flora; Reserve, Marina, Recreation, Amenities, Caravan park, Jetty, Quarters	2016	100% very good	103.37	Too frequent fire (past, present, future) Weed invasion (past, present, future) Grazing (past, present, future)	Develop fire management strategy; weed control; maintain fencing
Occurrence 43 (MYWOODPT03)	Recreation; Jetty; Quarters	1996	100% good	1.57	Too frequent fire (past, present, future) Weed invasion (past, present, future) Grazing (past, present, future)	As above
Occurrence 44 (PtPeron01, 02)	Rockingham Lakes Regional Park Recreation	2012	100% excellent	3.61	Too frequent fire (past, present, future) Weed invasion (past, present, future)	As above
Occurrence 45 (MYWOODP04)	Recreation, Shipyard	2012	90% excellent 10% very good	10.51	Too frequent fire (past, present, future) Weed invasion (past, present, future) Grazing (past, present, future)	As above

Occurrence 46 (Rottnest01)	Government requirements	2006	100% excellent	7.85	Grazing by Quokka (past, present, future) Trampling (present, future) Uncertainty if the community still occurs here due to plantings and restoration work.	Weed control; fencing
Occurrence 47 (Rottnest02)	Government requirements	Not surveyed	n/a	19.66	Grazing by Quokka (past, present, future) Trampling (present, future) Uncertainty if the community still occurs here due to plantings and restoration work.	Weed control; fencing
Occurrence 48 (TRIGG02)	Conservation, Dune Protection, Education Purposes, Recreation	2012	90% excellent 10% very good	16.41	Too frequent fire (past, present, future) Trampling (present, future) Weed invasion (past, present, future)	Develop fire strategy; weed control; fencing
Occurrence 49 (SWAN01 PLOT)	Department of Defence	2012	70% excellent 30% very good	0.17	Trampling (present, future) Weed invasion (past, present, future)	Weed control; maintain fencing
Occurrence 50 (Swan02, Swan02b)	Department of Defence	2012	100% very good	0.34	Trampling (present, future) Weed invasion (past, present, future)	Weed control; maintain fencing
Occurrence 51 (Scarbr01)	Reserve	2017	80% excellent 20% very good	1.00	Too frequent fire (past, present, future) Weed invasion (past, present, future) Clearing (past, present, future)	Develop fire management strategy; weed control; fencing
Occurrence 52 (Craigie01)	Conservation area	2016	50% very good 50% good	3.35	Too frequent fire (past, present, future) Trampling (present, future) Weed invasion (past, present, future)	Develop fire strategy; weed control; fencing
Occurrence 53 (Buckland01)	Recreational park	2017	100% good	5.19	Too frequent fire (past, present, future)	Develop fire management

					Trampling (present, future) Weed invasion (past, present, future) Clearing (past)	strategy; fencing
Occurrence 54 (Rham, SDL10, SDL11)	Rockingham Lakes Regional Park Recreation	2018	100% very good	0.69	Too frequent fire (past, present, future) Weed invasion (past, present, future)	Develop fire management strategy; weed control

*For the purposes of relating condition to IUCN Criteria, condition categories from (Keighery (1994) Vegetation Condition Scale (Government of WA 2000)) are defined below:

Good ('Pristine', 'Excellent', 'Very Good' using Bush Forever (Government of WA 2000) scale): This includes vegetation ranging from 'Pristine' - with no obvious signs of disturbance, to 'Excellent' - Vegetation structure intact, with disturbance only affecting individual species, weeds are non-aggressive species and 'Very Good' - Vegetation structure altered, obvious signs of disturbance eg: from repeated fires, dieback, logging, grazing.

Medium ('Good' using Bush Forever (Government of WA 2000) scale): This includes vegetation categorised as 'Good' - Vegetation structure altered but retains basic vegetation structure or ability to regenerate it, obvious signs of disturbance are present, from activities including partial clearing, dieback and grazing.

Poor ('Degraded' using Bush Forever (Government of WA 2000) scale): This includes vegetation ranging from 'Degraded' Basic vegetation structure severely impacted by disturbance, the vegetation requires intensive management, and disturbance such as partial clearing, dieback, logging and grazing, to 'Completely Degraded' where vegetation structure is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native shrubs and trees.

Beyond recovery ('Completely degraded' using Bush Forever (Government of WA 2000) scale): Vegetation structure is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native shrubs and trees.

Table 1. Known condition of occurrences of the *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain.

Condition Ranking (Keighery 1994) from Government of Western Australia 2000	**Hectares**	**IUCN Criteria condition ranking**	**Hectares**
Pristine	0	**Good**	596
Excellent	465.21		
Very Good	132.42		
Good	41.73	**Medium**	41.73
Degraded	0	**Poor**	0
Completely degraded	0	**Beyond recovery**	0
Total	639	**Total**	639

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APPENDIX 1 THREATS

Altered fire regimes

Fire can modify species composition by increasing the weed invasion. An increase in the fire frequency can prevent species from completing growth and reproductive. The genus *Callitris* is particularly sensitive to fire and may only occur where the previous fire frequency has been relatively infrequent such as where vegetation has been afforded protection between sand dunes. McArthur (1990) noted that *Callitris preissii* and *Melaleuca lanceolata* trees can live for more than 100 years and both species are killed by fire. McCaw (2007) noted there was little seedling regeneration of *Callitris preissii* four years after fire. Nine years post-fire, regeneration of the taxon was found to be more substantial and seedlings were producing cones. *Melaleuca lanceolata* is fire-sensitive but regenerates readily from seed after fire (McArthur 1990). These two species reproduce only by seed, and fire response needs to be taken into account when determining an appropriate inter-fire period. *Banksia sessilis* and *Templetonia retusa* are other serotinous taxa that occur in the community and are killed by fire and reproduce only from seed. Regeneration is poor with frequent fire and high levels of weed invasion. It is likely that weed invasion following fire inhibits regeneration.

Weed invasion

Weeds can have significant impacts on a community through competition with native species, inhibiting regeneration and increasing fire risk. Disturbances such as fires and grazing can predispose areas to weed invasion if weed propagules are present. All of the occurrences of this community are close to weed sources such as urban or residential areas and would be vulnerable to weed invasion following any disturbance. Survey data indicate that this community is highly susceptible to weed invasion following disturbance, and this appears to relate to its naturally low species diversity in the understorey.

Land clearing

Clearing of vegetation is a major threat that impacts this community. Occurrences on land whose purpose is not primarily conservation are at greatest risk of being impacted by clearing. Mainland occurrences are very close to or surrounded by highly urbanised areas. Recent expansion of Department of Defence infrastructure at Garden Island has resulted in clearing of several hectares of the community and further clearing is planned for this purpose.

Hydrological changes

There have not been any detailed groundwater studies completed for this community, but it is believed that this community is at least a partially groundwater dependent ecosystem. Developments with potential to alter water quality or levels in the habitat of this community have potential to impact on the community (DPAW 2014).

Grazing

Grazing causes alterations to species composition by the selective removal of edible species and the introduction and encouragement of weeds by the addition of dung, and through trampling and general disturbance. Keighery *et al.* (1997) note that grazing by tammars on Garden Island, by quokkas on Rottnest and by exotic herbivores can significantly impact regeneration of *Callitris preissii*. They also note that grazing and clearing account for loss of extensive stands of *Callitris preissii*. Shedley (2007) notes that regeneration of *Callitris preissii* and *Melaleuca lanceolata* on Rottnest Island was largely prevented by overgrazing by quokkas during the 1930s to 1950s. Exclosure experiments have shown few seedlings of *Melaleuca* or *Callitris* can survive large populations of native grazers such as quokkas, and that grazing by native animals such as tammars or quokkas after fire may have greater impact on vegetation than fire.

Warming and drying climate

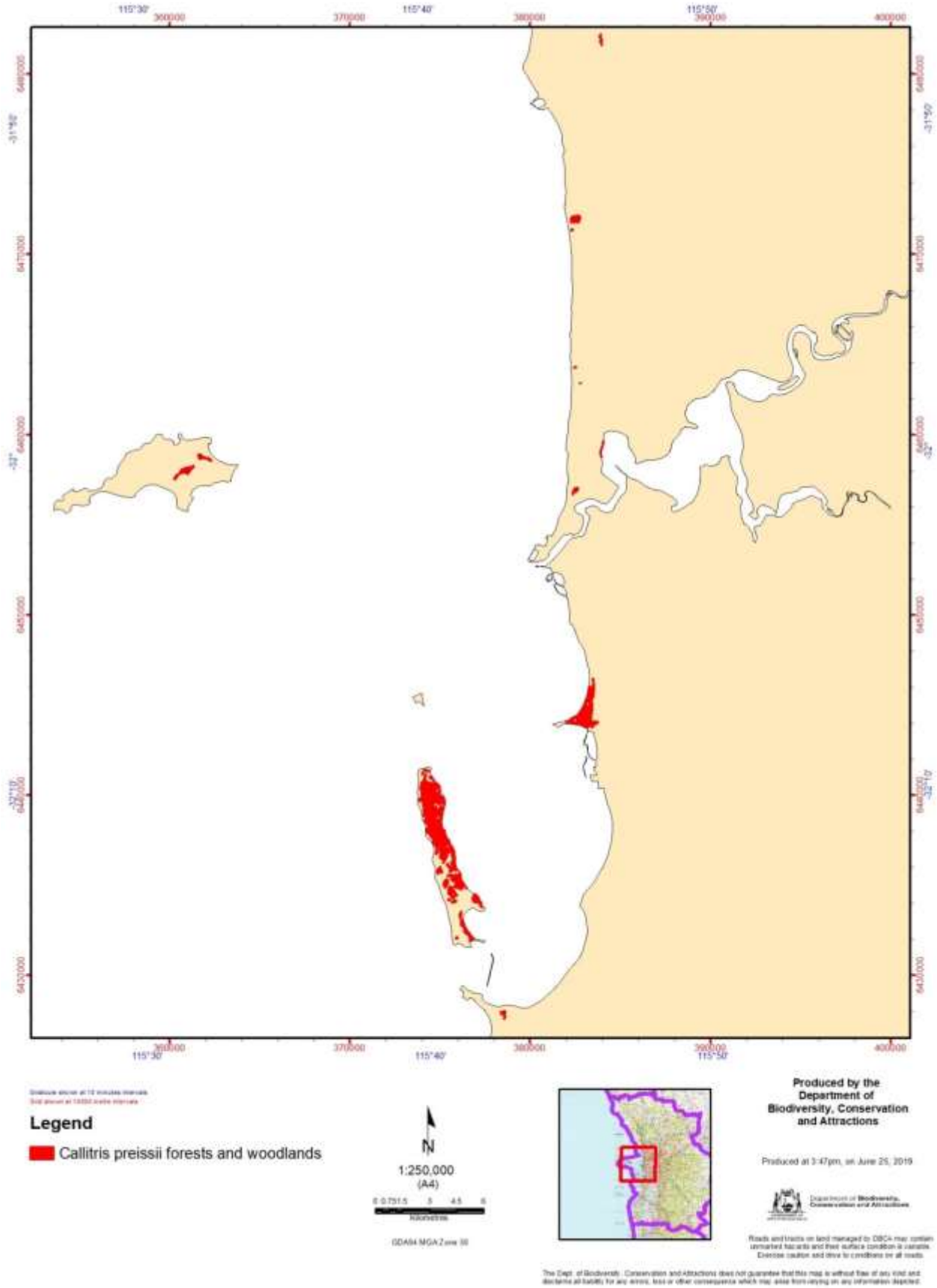
The community is at risk from a drying and warming climate resulting from a decline in rainfall and increased temperatures in the south west of the state. The tolerance of particular species to changes that may occur in association with climate change, including changes in rainfall and temperatures, is generally unknown. According to the 2016 study by Sudmeyer and colleagues, climate change predictions for the south west of WA are as follows:

- By 2030, mean annual temperature is projected to increase by 0.5–1.2°C.
- Reduction in rainfall by 2030 by 2-14%, the southwest to predicted to experience some of the largest reductions in rainfall in all of Australia.
- Reduction in runoff by 10-42% (median 24%) by 2030.
- Decline in groundwater levels by 2030 (extractive yields may decrease by a third to a half in some areas).
- Increase in the intensity and frequency of bushfires.

The community is highly susceptible to more severe fires that may occur as a consequence of climate drying and warming. A major component of the community, *Callitris preissii*, is killed by hot fires and requires sufficient inter-

fire intervals to regenerate from seed. In addition, the understorey is simple, with low species richness, and the native flora are readily replaced by weeds following disturbances such as fire.

APPENDIX 2 MAP



APPENDIX 3 IUCN Red List Criteria for ecosystems (version 2.2) (IUCN 2017)

A. Reduction in geographic distribution over ANY of the following time periods:

		CR	EN	VU
A1	Present (over the past 50 years).	≥ 80%	≥ 50%	≥ 30%
A2a	Future (over the next 50 years).	≥ 80%	≥ 50%	≥ 30%
A2b	Future (over any 50 year period including the present and future).	≥ 80%	≥ 50%	≥ 30%
A3	Historic (since 1750).	≥ 90%	≥ 70%	≥ 50%

B. Restricted geographic distribution indicated by EITHER B1, B2 or B3:

		CR	EN	VU
B1	Extent of a minimum convex polygon enclosing all occurrences (Extent of Occurrence)	≤ 2,000 km^2	≤ 20,000 km^2	≤ 50,000 km^2
	AND at least one of the following (a-c):			
	(a) An observed or inferred continuing decline in **EITHER**:			
	i. a measure of spatial extent appropriate to the ecosystem; **OR**			
	ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR**			
	iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem.			
	(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.			
	(c) Ecosystem exists at …	1 location	≤ 5 locations	≤ 10 locations
B2	The number of 10 × 10 km grid cells occupied (Area of Occupancy)	≤ 2	≤ 20	≤ 50
	AND at least one of a-c above (same sub-criteria as for B1).			
B3	A very small number of locations (generally fewer than 5) **AND** prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and thus capable of collapse or becoming Critically Endangered within a very short time period (B3 can only lead to a listing as VU).			VU

C. Environmental degradation over ANY of the following time periods:

C1 The past 50 years based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 80	≥ 50	≥ 30
≥ 80	CR	EN	VU
≥ 50	EN	VU	
≥ 30	VU		

C2 The next 50 years, or any 50-year period including the present and future, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	≥ 80	≥ 50	≥ 30
≥ 80	CR	EN	VU
≥ 50	EN	VU	
≥ 30	VU		

C3 Since 1750 based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	≥ 90	≥ 70	≥ 50
≥ 90	CR	EN	VU
≥ 70	EN	VU	
≥ 50	VU		

D. Disruption of biotic processes or interactions over ANY of the following time periods:

D1 The past 50 years based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 80	≥ 50	≥ 30
≥ 80	CR	EN	VU
≥ 50	EN	VU	
≥ 30	VU		

D2	(D2a) The next 50 years, or (D2b) any 50-year period including the present and future, based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table: OR		≥ 80	≥ 50	≥ 30
		≥ 80	CR	EN	VU
		≥ 50	EN	VU	
		≥ 30	VU		
D3	Since 1750, based on a change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:		≥ 90	≥ 70	≥ 50
		≥ 90	CR	EN	VU
		≥ 70	EN	VU	
		≥ 50	VU		
E. Quantitative analysis					
			CR	EN	VU
… that estimates the probability of ecosystem collapse to be:			≥ 50% within 50 years	≥ 20% within 50 years	≥ 10% within 100 years