Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Nomination *(to be completed by nominator)*

Current conservation status				
Name of ecological community:	Lesueur-Coomallo floristic community A1.2 as originally described by Griffin and Hopkins (1990).			
Other names:	Lesueur A1.2			
Description:	The community is known from Warradarge. It comprises a species-rich heath with emergent *Hakea obliqua* on sand with faithful species of *Hakea obliqua* and *Beaufortia elegans* and constant species of *Dasypogon bromeliifolius* and *Stirlingia latifolia* over well-drained grey sand over pale yellow sand on lateritic uplands. Associated species include *Allocasuarina humilis*, *Calothamnus sanguineus*, *Hibbertia hypericoides*, *Hypocalymma xanthopetalum* and *Schoenus subflavus.* The community was originally described by Griffin E.A. and Hopkins A.J.M. in the vegetation chapter (pp. 25-38) in Burbidge A.A., Hopper S.D. and van Leeuwen S. (eds.) (1990) "Nature conservation, landscape and recreation values of the Lesueur area" (A report to the Environmental Protection Authority from the Department of Conservation and Land Management. Bulletin 424, Environmental Protection Authority, Perth).			
Nomination for:	Listing ☐	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	06/11/2001	Endangered	B) ii)
	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 B1c; B2c
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 criteria A, the ecosystem is assumed collapsed when the mapped distribution declines to zero. • A: No available evidence supports an inference that a minimum 30% reduction in geographic distribution has or will occur over any 50-year period, or a 50% reduction since ~1750 (ie. the minimum thresholds to meet the category VU under criterion A). • **Does not meet criterion A.**
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 criteria B, the ecosystem is assumed collapsed when the mapped distribution declines to zero. • B1: EOO is 0.0394 km^2 (≤2,000km^2, which is the threshold for CR). • B2: AOO occupies one 10 x 10 km^2 grid cell (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): Known from a single occurrence. Threats are inferred and potential only and are considered 'trivial' as there is no evidence of measurable impacts from any known threat. (additional information on threatening processes is available in Appendix 1). • c): Community occurs at one threat-defined location based on inferred threats from too frequent or intense fire, dieback disease caused by *Phytopthora* spp., weed invasion, introduced grazers and drying climate. A mining tenement

		exists over the area ([redacted][1] and [redacted][2] *pers comm.*) (Threshold for CR is one and for EN is 5 threat-defined locations). • B3: The community is known from one threat-defined location and is susceptible to stochastic events within a very short time period in an uncertain future (disease and altered fire regimes). • **Meets criteria for critically endangered B1c; B2c.** • **Meets criteria for vulnerable B3.**
C.	Environmental degradation of abiotic variable *(Evidence of decline over 50-year period)*	☐ **C1** ☐ **C2** ☐ **C3**
	Justification of assessment under Criterion C.	For criterion C, collapse of the community is defined as a fire regime of annual or very frequent intense fires. It is assumed that this will result in loss of fire sensitive shrubs and potentially other species that are key to the structure and composition of the community. There are no data available to link the frequency or severity of fire to compositional or structural changes in the community. • C1, C2: Fire frequency and severity are likely to increase with increased temperatures and decreased rainfall with drying climate. No data available 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. • **Does not meet 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.	For criterion D, collapse of this community is defined as 100% loss of dieback sensitive species in the community. It is assumed that this would result from very severe infestation and impacts of disease caused by *Phytopthora* species. • D1, D2: The disease is a serious potential threat as there are a high number of susceptible species in and surrounding the community ([redacted] *pers comm.*). *Phytophthora citricola* occurs in Lesueur National Park (Mills 1992) to the north of the occurrence, while three other

[1] Acting Nature Conservation Coordinator, Moora District
[2] Acting Flora Conservation Officer, Moora District

		species of *Phytophthora*, including the virulent *P. cinnamomi*, are known from within 30 km of the Park (Hamilton-Brown, 2002). At present there is no evidence of weed invasion in the community, but proximity to a gravel road increases the risk (Hamilton-Brown 2002). Rabbits (*Oryctolagus cuniculus*), foxes (*Vulpes vulpes*) and kangaroos (*Macropus fuliginosus*) occur nearby and may have an impact through disturbance of soil, increased nutrient levels and the introduction of weeds (Hamilton-Brown 2002). All these changes in biotic variables have the potential to negatively affect the community, however the level of threat is currently considered 'trivial' as there is no evidence of measurable impacts from any known threat. There is no quantitative evidence to show 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. • **Does not meet 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 Endangered 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	0.0394 km^2	AOO	1
No. occurrences	1	Severely fragmented (justification below)	Yes ☐ No ☒ Unknown ☐
Justification	Only one occurrence known.		
Current known area			0.0394 km^2
Pre-industrialisation extent or its former known extent (if known)			No evidence indicates decline in extent
Estimated percentage decline			No evidence indicates decline

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	-	• No evidence available to support ranking under A3.
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	-	• EOO is ≤2,000km^2. • Threats from disease, drying and warming climate, altered fire regimes, introduced fauna and weed invasion are considered 'trivial' as no available evidence of measurable impacts. • Does not meet criterion for CR as threats are considered 'trivial'.
B1c	CR	• EOO is ≤2,000km^2. • Ecosystem exists at one threat-defined location. • Meets criterion for CR.
B2a	-	• AOO is one grid cell. • No available data to indicate decline in spatial extent, environmental quality and disruption to biotic interactions to support ranking under B2a. • Does not meet criterion.
B2b	-	• AOO is one grid cell. • Inferred impacts from disease, drying and warming climate, altered fire regimes, introduced fauna and weeds. Threats are considered 'trivial' as no available evidence of measurable impacts. • Does not meet criterion.
B2c	CR	• AOO is one grid cell. • Ecosystem exists at one threat-defined location. • Meets criterion for CR.
B3	VU	• Known from one threat-defined location. • Prone to stochastic events within a very short time period in an uncertain future (disease and fire). • Meets criterion for VU.
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 B1c; B2c

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GOVERNMENT OF WESTERN AUSTRALIA

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	Threats *(note if past, present or future)*	Specific management actions
A1-2	Lesueur National Park	December 1987 (Martinick and Associates, 1989)	100% excellent	3.94 ha	Clearing for resource extraction projects (*past*) Altered fire regimes (*past, present*, *future*) Diseases (*future*) Weed invasion (*future*) Animal pests (*past, present*, *future*) Warming and drying climate (present, *future*)	Design and implement a program for monitoring the flora and impact of threats. Liaise with surrounding landholders to manage their properties in ways sympathetic to the park. Erect environmental markers on road reserve Design fire response plan.

*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 occurrence that has been surveyed for 'Lesueur-Coomallo floristic community A1.2 as originally described by Griffin and Hopkins (1990)'.

Condition Ranking (Keighery 1994) from Government of Western Australia 2000	**Hectares**	**IUCN Criteria condition ranking**	**Hectares**
Pristine	0	**Good**	3.94
Excellent	3.94		
Very Good	0		
Good	0	**Medium**	0
Degraded	0	**Poor**	0
Completely degraded	0	**Beyond recovery**	0
Total	3.94	**Total**	3.94

REFERENCES

Government of Western Australia (2000). Bush Forever. Department of Environmental Protection, Perth.

Griffin, E. A. and Hopkins, A. J. M. (1990). Vegetation. In: Burbidge, A. A., Hopper, S. D. and van Leeuwen, S. (eds.).

Hamilton-Brown, S. (2002). Lesueur-Coomallo Floristic Community A1.2 Interim Recovery Plan No. 106. Department of Conservation and Land Management, Western Australia.

Hobbs, R. J. and Mooney, H. A. (1993). Restoration ecology and invasions. In Saunders, D. A., Hobbs, R. J. and Ehrlich, P. R. (eds). Nature Conservation 3: Reconstruction of Fragmented Ecosystems, pp 127-133. Surrey Beatty and Sons: NSW.

Keighery, B.J. (1994). Bushland Plant Survey. A Guide to Plant Community Survey for the Community. Wildflower Society of Western Australia (Inc.), Nedlands, Western Australia.

Martinick, W. G. and Associates Pty Ltd. (1989). Hill River Project Biological Studies: Vegetation of the Project Area in a Regional Context. Unpublished Report.

Mills, C. H. (1992). The Northern Sandplains Dieback Working Party. In: Freeman, M. J., Hart, R. and Ryall, M. (eds.). Dieback – What is the Future? The Northern Sandplains Dieback Working Party: Perth.

Shearer, B. F. and Batini, F. E. (1990). *Phytophthora* and other fungal plant diseases. In: Burbidge, A. A. and van Leeuwen, S. (eds.). The Hill River Project and the proposed conservation reserve at Lesueur. pp43-48. A report to the Environmental Protection Authority from the Department of Conservation and Land Management. Occasional Paper 1/90. Department of Conservation and Land Management.

Sudmeyer, R., Edward, A., Fazakerley, V., Simpkin, L. and Foster, I. (2016). Climate change: impacts and adaptation for agriculture in Western Australia. Bulletin 4870, Department of Agriculture and Food, Western Australia, Perth.

Western Australia Department of Conservation and Land Management, Burbidge, A. A., Hopper, S. D., van Leeuwen, S. and Western Australia Environmental Protection Authority (1990). Nature conservation, landscape and recreation values of the Lesueur area: a report to the Environmental Protection Authority from the Department of Conservation and Land Management. Environmental Protection Authority, Perth, W. A.

APPENDIX 1 THREATS

Land clearing and resource extraction projects

The community is bordered by private property ([redacted] *pers comm*.). Maintenance work has recently been completed adjacent to the community on Banovich Road. The road was not widened; however, drainage and runoff infrastructure were upgraded. Mining was considered the main threatening process in the immediate area in 2002 (Hamilton-Brown 2002). This threat has declined significantly as a mine proposed at that time was not approved. In addition, freehold land to the southwest ([redacted]) has been transferred to the Conservation Commission and is intended as national park. A mining tenement exists over the area.

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.

Altered fire regimes

Fire can influence species composition by increasing the weed invasion. An increase in the fire frequency can prevent species from completing growth and reproductive cycles. In particular, *Hakea obliqua* was identified as one of the most vulnerable species affected by frequent fire. Information on fire regimes was sourced, as there have been a series of major fires in the general area caused by lightning strikes in summer (Hamilton-Brown 2002). According to DBCA records, the location was last burnt in February 2011.

Disease

Dieback disease caused by the *Phytophthora* sp. plant pathogens is a potential threat as there are a high number of susceptible species in the community. *Phytophthora citricola* already occurs in the park (Mills 1992), although it is not known if occurs in the immediate vicinity of the community. Three other species of *Phytophthora*, including the virulent *P. cinnamomi*, are also known from within 30 km of the Park. The community is very close to a gravel road which could serve as an infection pathway for disease. Other disease-causing pathogens such as *Armillaria luteobubulina* and the canker-causing fungus *Botryosphaeria ribis* are known from the northern kwongan and have the potential for significant impacts. *Botryosphaeria ribis* has been found in cankers of *Banksia attenuata* and *Banksia menziesii* on the gravel road that runs adjacent to the community (Shearer and Batini 1990).

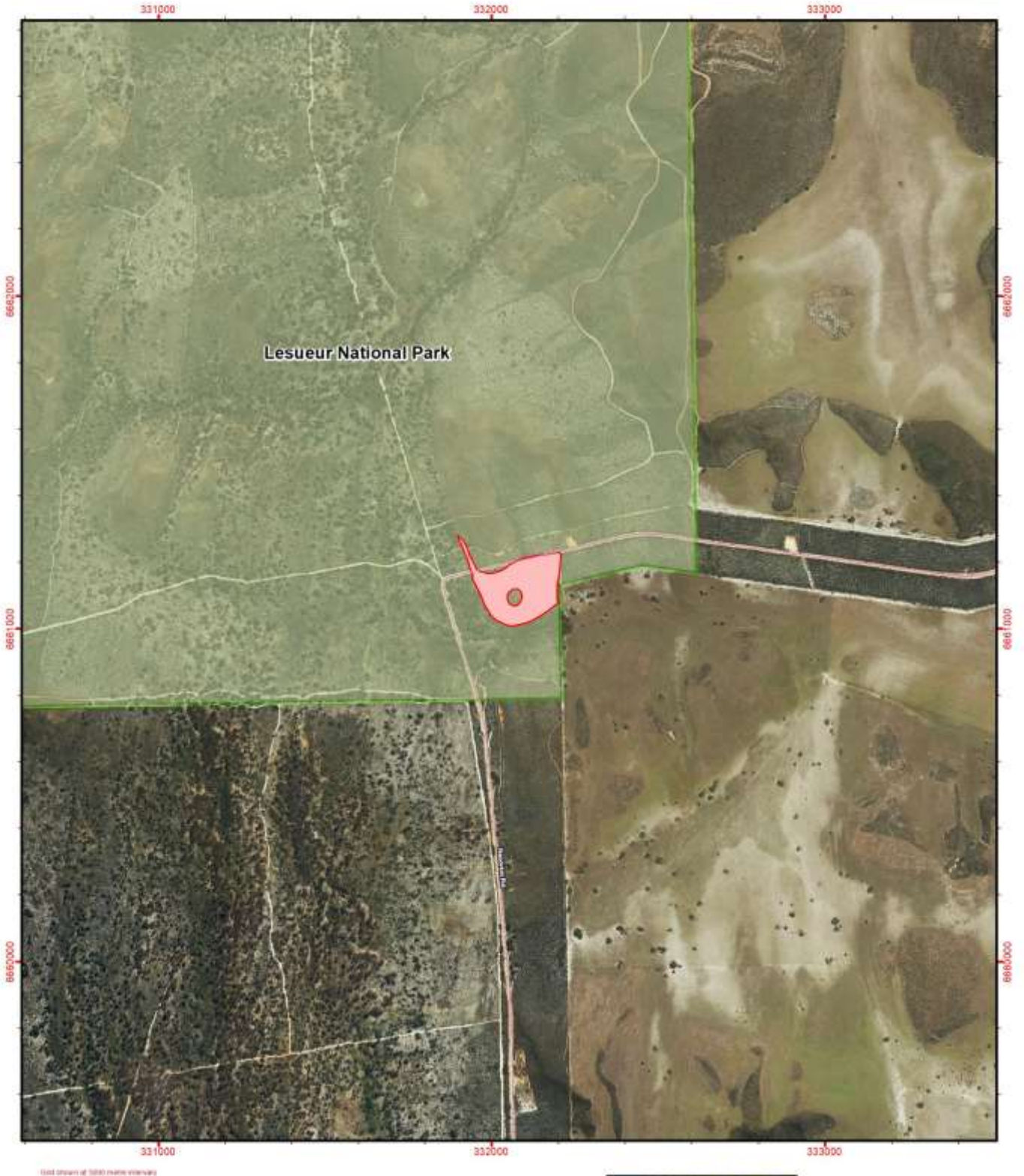
Weed invasion

Weeds can have significant impacts on a community through competition with native species, inhibiting regeneration and increasing fire risk (Hobbs and Mooney 1993). Disturbances such as fires, grazing and death through disease can predispose areas to weed invasion if weed propagules are present. There was no evidence of weed invasion in the community in 2002, but its proximity to a gravel road increases the risk (Hamilton-Brown 2002).

Animal pests

Rabbits (*Oryctolagus cuniculus*), foxes (*Vulpes vulpes*) and kangaroos (*Macropus fuliginosus*) may impact the community through disturbance of soil by rabbit warren and fox den construction, increased nutrient levels from their droppings and the introduction of weeds (Hamilton-Brown 2002).

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