Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Nomination *(to be completed by nominator)*

Current conservation status				
Name of ecological community:	Assemblages of Walcott Inlet rainforest swamps			
Other names:				
Description:	The occurrences of the community occur on the extensive floodplain that fringes a tidal mudflat in the Walcott Inlet in the north-west Kimberley (see Appendix 2 for map). The community is focused on swampy rainforests, but associated swamp and woodland communities are included in the boundaries where they are closely linked with the rainforest. The vegetation structure varies with hydrology and includes dense rainforest to dense woodland, open savanna woodland, *Melaleuca* or grassy swamps and occasional open water. The rainforest vegetation comprises closed-canopy rainforest to 30 m in height, and is dominated by *Ficus* spp., *Nauclea orientalis* (Leichhardt pine), *Celtis strychnoides* (hackberry), and *Acrostichum speciosum* (mangrove fern). Eight priority flora occur in the community, including two not found anywhere else in Western Australia. Five threatened or endemic fauna including the northern quoll (*Dasyurus hallucatus* (endangered)) also occur. The tree *Cordia subcordata* and the snail *Torresitrachia* sp. were recorded at one patch of the community. The camaenid land snail assemblage distinguishes this community. The community was originally described in McKenzie N.L., Johnston R.B. and Kendrick P.G. (eds) (1991) "Kimberley rainforests of Australia" (Surrey Beatty & Sons, Chipping Norton, NSW, in association with the Department of Conservation and Land Management and Department of Arts, Heritage and Environment, Canberra).			
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			
Western Australia	TEC list: WA Minister ESA list in policy	18/9/2000	Vulnerable	B)
	Priority list		1 ☐ 2 ☐ 3 ☐ 4 ☐	
Other State/Territory				

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 4 table 'IUCN Red List Criteria for ecosystems version 2.2'.*		**VU B3**
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 and B, the ecosystem was assumed to collapse when the mapped distribution declines to zero. • A: There is no information to support an inference that a ≥30% reduction at least in geographic distribution has or will occur over any 50-year period, or a ≥50% reduction since 1750 (ie. the minimum requirements 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.	• B1: EOO is 52km^2 (≤2,000km^2, which is the threshold for CR). • B2: AOO is three 10x10 km grid cells (threshold for EN is 20, and for CR is two grid cells) • a): Inadequate data are available to indicate decline in spatial extent, environmental quality or disruption to biotic interactions to support ranking under B1 or B2a). • b): Historically, decline was observed from the impacts of cattle. Currently threat from cattle is minimal and condition had improved when surveyed in 2016. Current observed threats are damage by feral pigs, late season fire and inferred future changes to the hydrological regime associated with

		groundwater abstraction (see Appendix 1 for further information on threats). • c): Ecosystem exists at three threat-defined locations based on the number of individual occurrences, the distance between occurrences and presence of intact vegetation between them (threshold for CR is 1 and for EN is 5 'threat-defined locations' ie *a geographically or ecologically distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type*). • B3: Known from three threat-defined locations and prone to relatively low level impacts of changes in hydrology, frequent fire and impacts of feral animals. Current level of threat is considered trivial however, community is considered prone to effects of human activities or stochastic events within a very short time period in an uncertain future and thus capable of collapse or becoming CR within a very short time period (meets VU as <5 threat defied locations). • **Plausibly meets criteria for Critically Endangered under B1b, and Endangered under B1c, B2b, B2c. Rank of Vulnerable under B3 considered to be most plausible due to the a relatively low level of threat from introduced fauna and other issues that is currently considered to be 'trivial'.**
C.	Environmental degradation of abiotic variable *(Evidence of decline over 50-year period)*	☐ **C1** ☐ **C2** ☐ **C3**
	Justification of assessment under Criterion C.	• C1, C2: Inappropriate fire regimes are a significant abiotic variable that threatens the community. Collapse in this context is loss of all overstorey components (trees) as a consequence of an inappropriate fire regime (generally, too frequent late season severe fires). Currently 99.75% of the area of the community is in Excellent condition, with the remainder in Very Good Condition (see definitions of condition categories under descriptions of locations - Table 2). No available data support an inference that the community meets the minimum thresholds for proportion of the extent (≥30%) or proportional severity of degradation (≥30%) over any 50-year period to meet VU. • C3: No available information indicates that the community meets the minimum thresholds for proportion of the extent (≥50%) or proportional 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.	• D1, D2: The most significant biotic variable affecting the community is considered to be physical impacts of grazing and trampling by invasive herbivores (pigs and cattle). Collapse under criterion D is defined as a decline in vegetation condition to totally degraded (Bush Forever

		scales; ie beyond recovery) as a consequence of grazing and trampling by introduced fauna. It is estimated that 99.75% of the community is in Excellent Condition, with the remainder in Very Good Condition (refer Table 3 below). The community is therefore considered to have <1% of its extent subject to disruption of biotic processes with a significant and measurable level of severity in relation to collapse. The community therefore does not meet the minimum thresholds to meet vulnerable under criterion D: ie 30% % of the extent of the community affected to at least 30% severity over any 50-year period. • D3: Does not meet the minimum proportion of the extent (≥50%) or proportional severity of disruption of biotic 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**

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	52 km^2	AOO	Three 10x10km grid cells
No. occurrences	3	Severely fragmented	Yes ☒ No ☐ Unknown ☐
Justification	The community is naturally fragmented as it only occurs on the extensive floodplain that fringes a tidal mudflat in the Walcott Inlet. Native vegetation occurs between occurrences.		
Current known area			154 ha
Pre-industrialisation extent or its former known extent (if known)			~154ha
Estimated percentage decline			<1% decline. Considered to occupy most or all of its former extent

Table 1: Summary assessment against IUCN RLE Criteria

Criterion	Rank indicated	Overall conclusion
A1	-	• Available data do not indicate community meets criterion
A2a	-	• Available data do not indicate community meets criterion
A2b	-	• Available data do not indicate community meets criterion
A3	-	• Available data do not indicate community meets criterion
B1a	-	• EOO is ≤2,000km^2 • No available data indicate decline in spatial extent, environmental quality or disruption to biotic interactions that would meet lowest thresholds of the criterion (VU) • Does not meet criterion
B1b	-	• EOO is ≤2,000km^2 • Threat from feral cattle and pigs, weed invasion, late season fire; and inferred future changes to hydrology is considered 'trivial' • Does not meet CR B1b, as overall threats are considered 'trivial'.
B1c	-	• EOO is ≤2,000km^2 • Ecosystem exists at three threat defined locations based on total of 3 occurrences that are prone to impacts of feral cattle and pigs, weed invasion, late season fire, and inferred future changes to hydrology • Does not meet EN B1c, as overall threats are considered 'trivial'.
B2a	-	• AOO is three grid cells • No data available that indicate decline in spatial extent, environmental quality and disruption to biotic interactions that meets minimum thresholds of the criterion (VU) • Does not meet criterion
B2b	-	• AOO is three grid cells • Threat from feral cattle and pigs, weed invasion, late season fire, and inferred future changes to hydrology are considered 'trivial' • AOO indicates rank EN is plausible however overall level of threat is considered 'trivial'
B2c	-	• AOO is three grid cells • Ecosystem exists at three threat-defined locations based on total of three separate occurrences that are prone to impacts of feral cattle and pigs, weed invasion, late season fire, and inferred future changes to hydrology • Does not meet EN B2c, as overall threats are considered 'trivial'.
B3	VU	• Known from 3 threat-defined locations • Prone to the effects resulting from feral animals, frequent fire, and changes in hydrology • Meets criterion for VU
C1	-	• Does not meet the minimum thresholds for proportion of the extent (≥30%) or proportional severity of degradation (≥30%) over past 50 years to meet VU.
C2	-	• Does not meet the minimum thresholds for proportion of the extent (≥30%) or proportional severity of degradation (≥30%) over any 50-year period to meet VU.
C3	-	• Does not meet the minimum thresholds for proportion of the extent (≥50%) or proportional severity of disruption of abiotic processes (≥50%) since 1750 to meet VU.
D1	-	• Does not meet the minimum thresholds for proportion of the extent (≥30%) or proportional severity of disruption of biotic processes (≥30%) over past 50 years to meet VU.
D2	-	• Does not meet the minimum thresholds for proportion of the extent (≥30%) or proportional severity of disruption of biotic processes (≥30%) over any 50-year period to meet VU.
D3	-	• Does not meet the minimum thresholds for proportion of the extent (≥50%) or proportional severity of disruption of biotic processes (≥50%) since 1750 to meet VU.
E	NA	• No quantitative estimates of the risk of ecosystem collapse.

		Plausibly meets criteria for Critically Endangered under B1b, and Endangered under B1c, B2b, B2c. Rank of Vulnerable under B3 considered to be most plausible due to the a relatively low level of threat from introduced fauna and other issues that is currently considered to be 'trivial'. **Meets VU under B3**

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Table 2: Summary of location (occurrence) information *(provide detailed information in the relevant sections of the nomination form)*						
Occurrence ID	Land tenure	Survey information: date of survey	Condition*	Area of occurrence	Threats *(note if past, present or future)*	Specific management actions
Walcott1(19/2)	Unallocated Crown land	2016	100% excellent	123 ha	Pigs, fire, weeds (*past, present, future*) Myrtle rust, cane toads (*future*)	Monitor impact of introduced herbivores.
Walcott2(18/4)	Unallocated Crown land	2016	5% very good 95% excellent	7.6 ha	Pigs, fire, weeds (*past, present, future*) Myrtle rust, cane toads (*future*)	As above
Walcott3(21/4)	Crown reserve 19751 vested with Department of Indigenous Affairs	2016	100% excellent	23.5ha	Pigs, fire, weeds (*past, present, future*) Myrtle rust, cane toads (*future*)	As above

*Vegetation condition categories as they relate to Keighery (1994) in Government of WA (2000) are defined below:

Good ('Pristine', 'Excellent', 'Very Good' using Bush Forever (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 (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 (2000) scale): Basic vegetation structure severely impacted by disturbance such as partial clearing, dieback, logging and grazing. Scope for regeneration but not to a state approaching good condition without intensive management.

Beyond recovery ('Completely degraded' using Bush Forever (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 3. Known vegetation condition of occurrences that have been surveyed (3) of the Walcott Inlet assemblage

Condition Ranking (Keighery 1994 in Government of Western Australia 2000)	Hectares	IUCN Criteria condition ranking	Hectares
Pristine	0	**Good**	154.1
Excellent	153.72		
Very Good	0.38		
Good	0	**Medium**	
Degraded	0	**Poor**	
Completely degraded	0	**Beyond recovery**	
Total	154.1	**Total**	154.1

APPENDIX 1 THREATS

Introduced herbivores

The main threat to the community that was reported in the late 1980s was the widespread and severe impacts of cattle. Ongoing cattle control to the north of the community has reduced numbers within the area and in 2016 cattle damage was noted to have declined greatly and the impacts of all threats appeared minimal. Ongoing control in the future is recommended to continue to minimise cattle. Feral pigs are able to access the more impenetrable rainforest areas and are currently deemed a greater threat than cattle. Pigs are causing physical damage to the vegetation and wetlands through trampling and digging (diggings observed in Walcott1(19/2) up to 50cm deep in 2016); as well as grazing the vegetation, altering the species composition by selectively removing edible species, and opening of the vegetation canopy which may lead to grass and/or weed invasion and increase susceptibility to fire damage.

The impact from introduced fauna may result in changes in the vegetation assemblage over time. Vegetation cover change was assessed in the southernmost and largest occurrence (see Appendix 3). A plot of total 'cover' over time showed a drop in vegetation cover occurred in the mid to early 1990s and then again in 2019. It is not certain what caused the decline in cover and a number of factors such as cattle, fire, storm/cyclone damage, and rainfall may have contributed.

Weed invasion

Weeds displace native plants and compete with them for light, nutrients and water. Weeds can also prevent recruitment, cause changes to soil nutrients, and affect abundance of native fauna. They can also impact on other conservation values by harbouring pests and diseases, and increasing the fire risk. *Euphorbia hirta* (asthma plant), *Passiflora foetida* var. *hispida*, *Triumfetta pentandra* and *Sida acuta* were recorded in low numbers in the community in 2016 (Barrett and Corey 2016). *Passiflora foetida* var. *hispida* in particular is a highly invasive species and should be carefully monitored and controlled as it could potentially become a major threat to the community unless managed.

Hydrological changes

Hydrological processes including water depth and seasonality support swamp assemblages. Spring upwelling may provide additional water to some of the swamps. One occurrence is fed by streams from sandstone hills and appears to be part of a broad watercourse. Water drains from the swamp towards the tidal mud flats. Free water to at least 30 cm deep has been recorded in the central part of one swamp. There is no available information available about the aquifer that supports the ecosystem, or about the spring's ecological water requirements. Increasing future extraction of groundwater for domestic and industrial use has the potential to impact the community due to drawdown, and extraction proposals an important consideration for future management.

Fire

Rainforests are particularly vulnerable to and are degraded by intense fires late in the dry season. Cool burns may also lead to a build-up of long grass in the swampy areas that ultimately lead to an increase in fire intensity of late season burns. An increase in the fire frequency within the community may alter the structure and composition, remove vegetation, and increase the spread of weeds. This was evident at Walcott1(19/2) and Walcott2(18/4) in 2016 where the woodland vegetation surrounding the rainforest was less dense, even after a significant burn ~10 to 20 years prior. Walcott3(21/4) is more open and exposed and was burnt previously in late 2017. The small patch size and their discrete nature of the rainforest pockets, and the lack of clear protective boundaries makes them particularly vulnerable to fire damage and weed invasion, and potentially eventual retreat of the rainforest margin (Barrett and Corey 2016).

Myrtle rust

Although no evidence of the disease was observed in 2016, myrtle rust has the potential to significantly damage dominant *Melaleuca* and *Syzgium* species in the community (Barrett and Corey 2016).

Cane toads

The cane toad (*Rhinella marina*) or giant toad is native to south and central America and has been introduced to northern and eastern Australia, now occurring in the Kimberley district. It is a declared pest under the *Biosecurity and Agriculture Management Act 2007* in Western Australia (from https://www.agric.wa.gov.au/amphibians-and-reptiles/cane-toad?page=0%2C0). Cane toads may threaten populations of endemic camaenid land snails given these snails exhibit restricted geographic distributions, low vagility and 'slow' life-histories, and cane toads see the snails as potential prey (Pearson *et al*. 2009).

References

Barrett, M. and Corey, B. (2016) Flora and fauna surveys of the Walcott River Threatened Ecological Community Rainforest Swamp. WA Department of Parks and Wildlife, Kununurra.

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

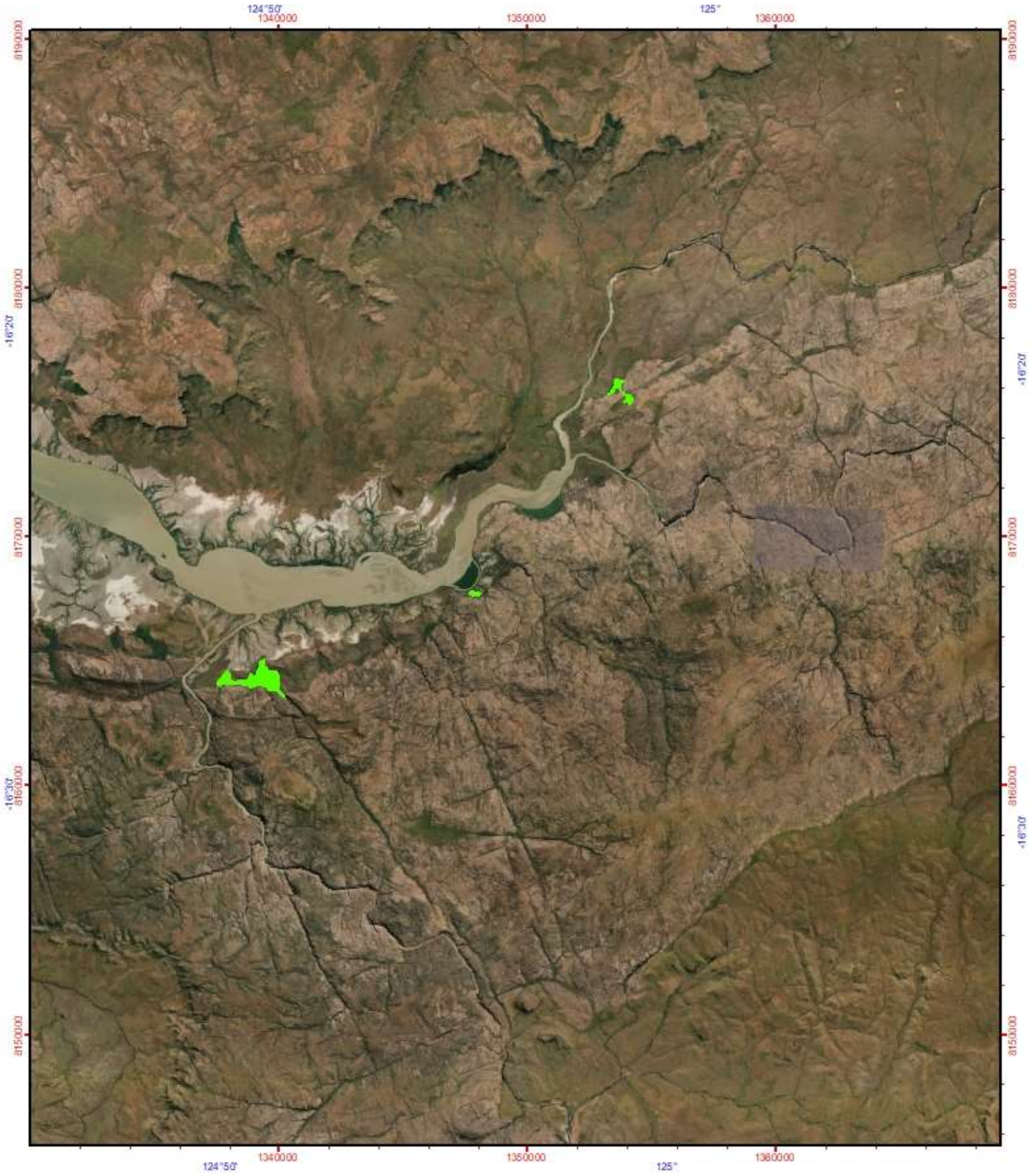
Keighery, B.J. (1994) Bushland Plant Survey. A Guide to Plant Community Survey for the Community. Wildflower Society of Western Australia (Inc.), Nedlands, Western Australia.

McKenzie N.L., Johnston R.B. and Kendrick P.G. (eds) (1991) Kimberley rainforests of Australia. Surrey Beatty & Sons, Chipping Norton, NSW, in association with the Department of Conservation and Land Management and Department of Arts, Heritage and Environment, Canberra.

Pearson, D., Greenlees, M., Ward-Fear, G. and Shine, R. (2009) Predicting the ecological impact of cane toads (*Bufo marinus*) on threatened camaenid land snails in north-western Australia. *Wildlife Research* 36: 533-540.

Van Dongen, R. (2020) Assemblages of Walcott Inlet rainforest swamps: Vegetation cover change assessment using satellite imagery for Robyn Luu. DBCA, WA.

APPENDIX 2 Location of the assemblages of Walcott Inlet rainforest swamps community (green)



APPENDIX 3 Assemblages of Walcott Inlet rainforest swamps: Vegetation cover change assessment using satellite imagery for Robyn Luu

By Ricky van Dongen. 3/2/2020

Aim

The aim of this assessment is to analyse changes in vegetation cover within the "Assemblages of Walcott Inlet rainforest swamps" TEC, using Landsat and Sentinel satellite imagery.

Figure 1: Walcott Inlet TEC locations.

Cover change assessment

Vegetation cover change was assessed using Sentinel satellite imagery captured 12/11/2016 and 12/11/2019. The normalised vegetation cover index (NDVI) was used as an indicator of vegetation cover. Within the southernmost, and largest patch large areas where the NDVI had declined were identified.

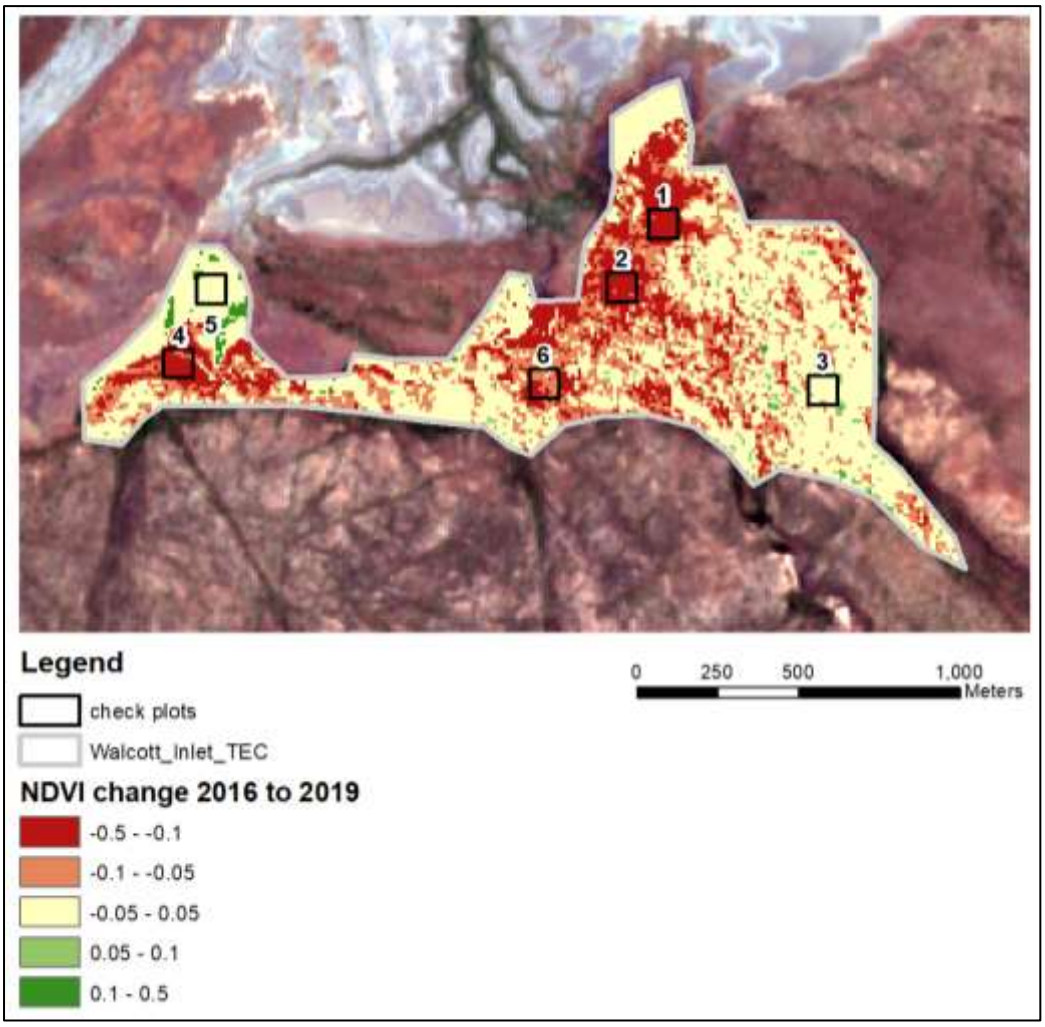


Figure 2: NDVI change and check point locations within the TEC.

Vegetation cover was calculated from 22 sites within the TEC using aerial photography. Examples of these are shown below.

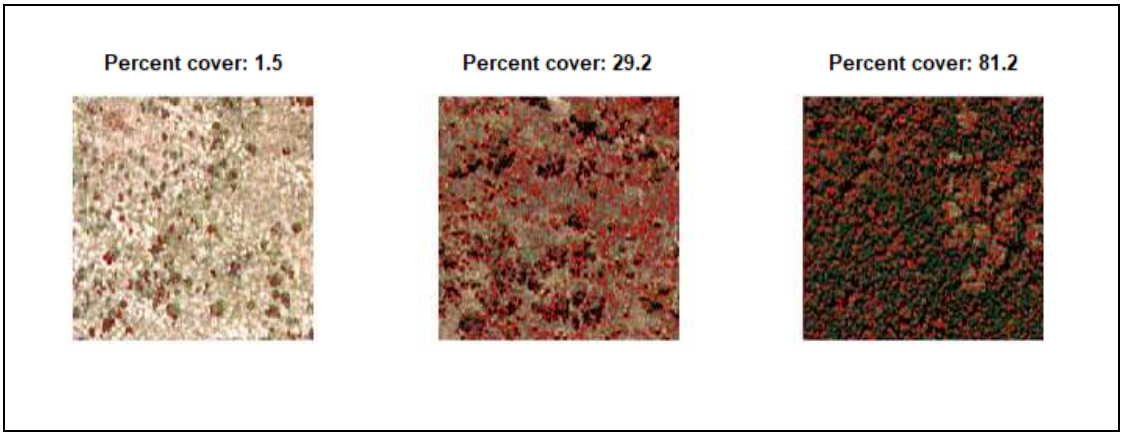


Figure 3: Vegetation cover calculations from aerial photography.

The cover values were regressed against several indices calculated from Landsat satellite imagery. The index with the highest correlation was the i35 index (r^2 = 0.889).

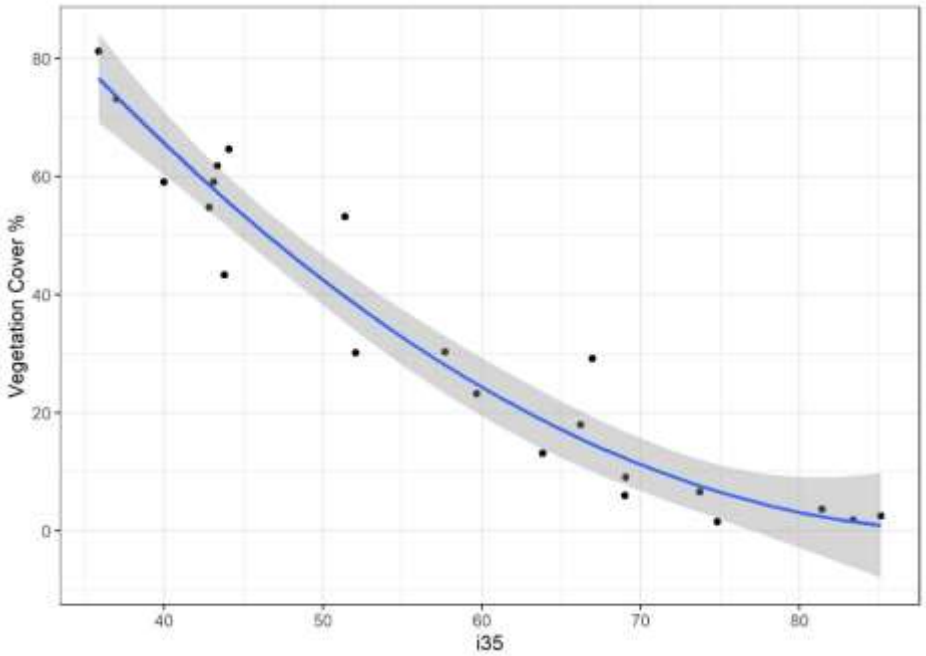
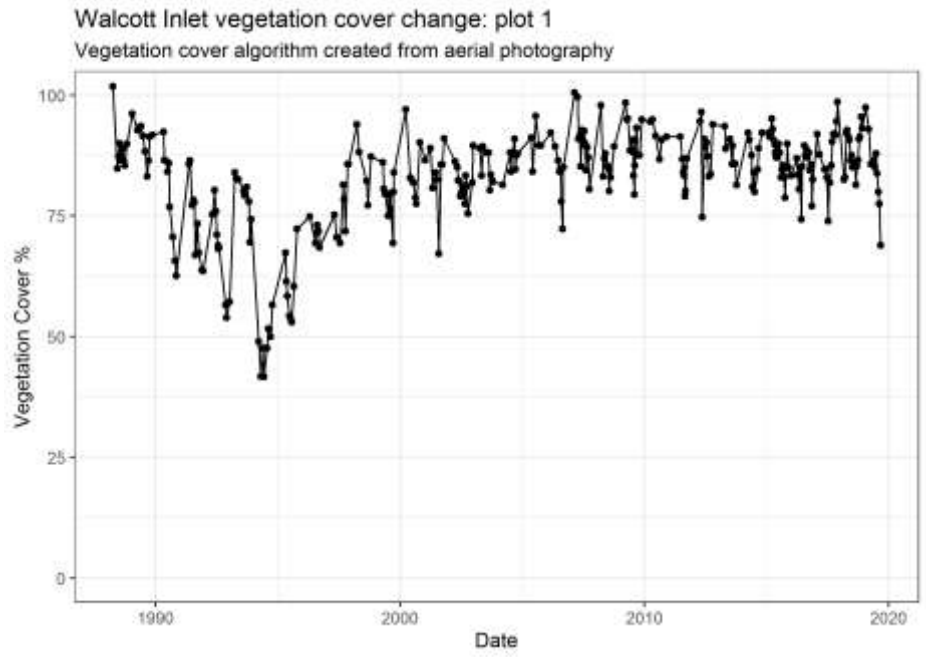
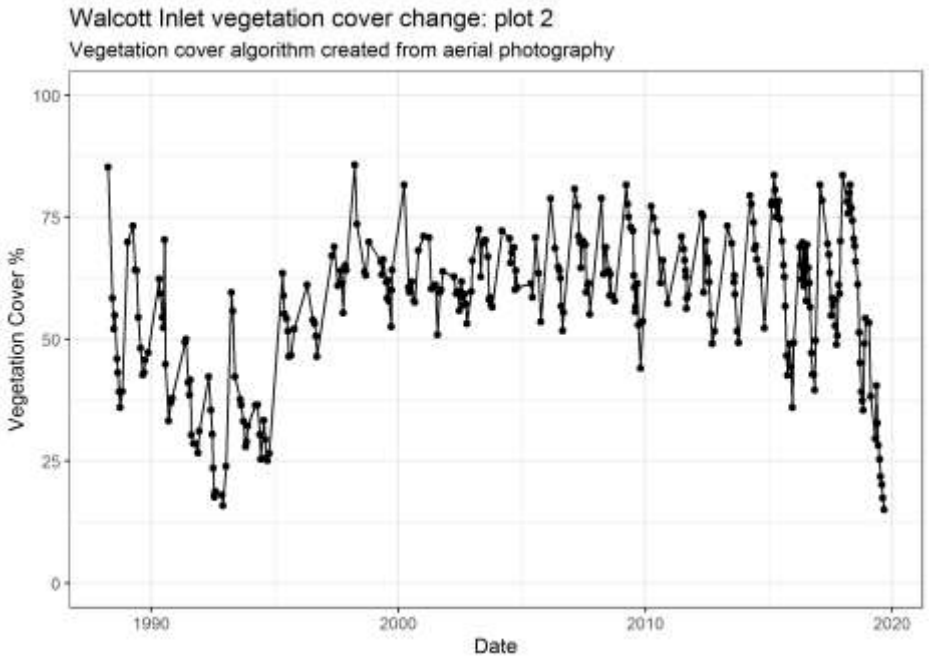
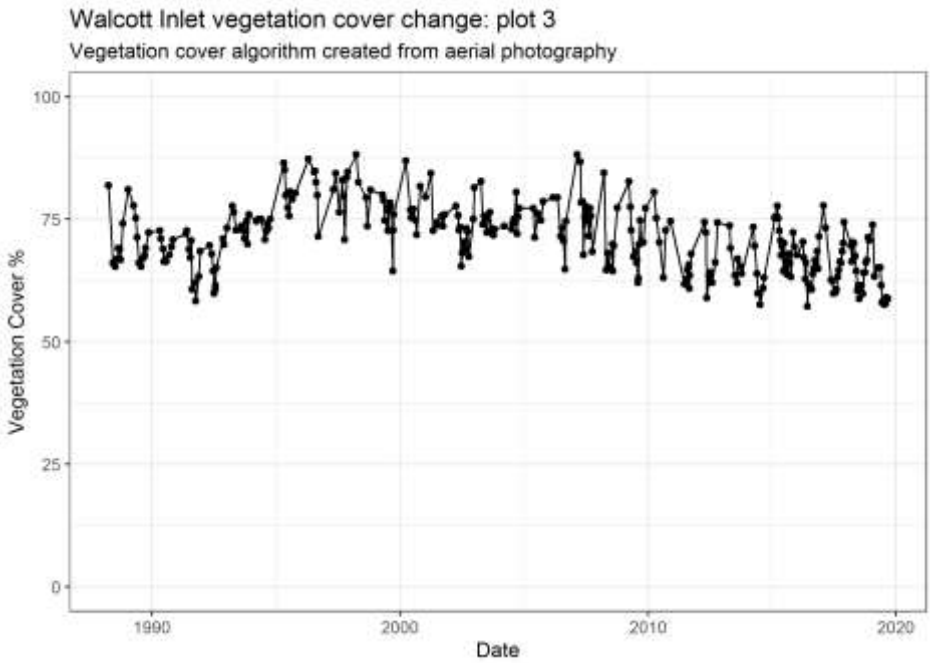


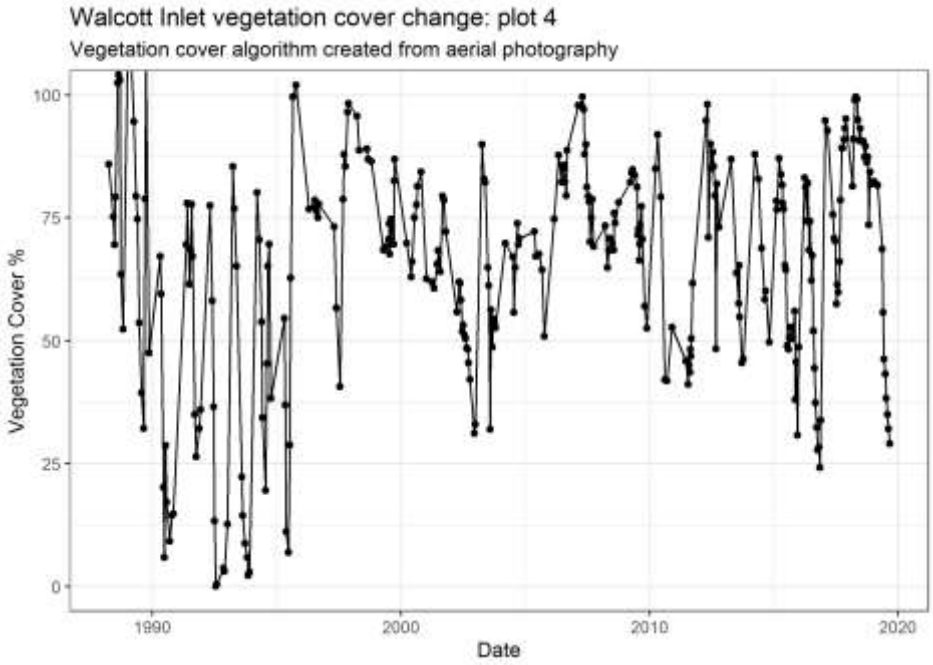
Figure 4: Regression of vegetation cover and the i35 index.

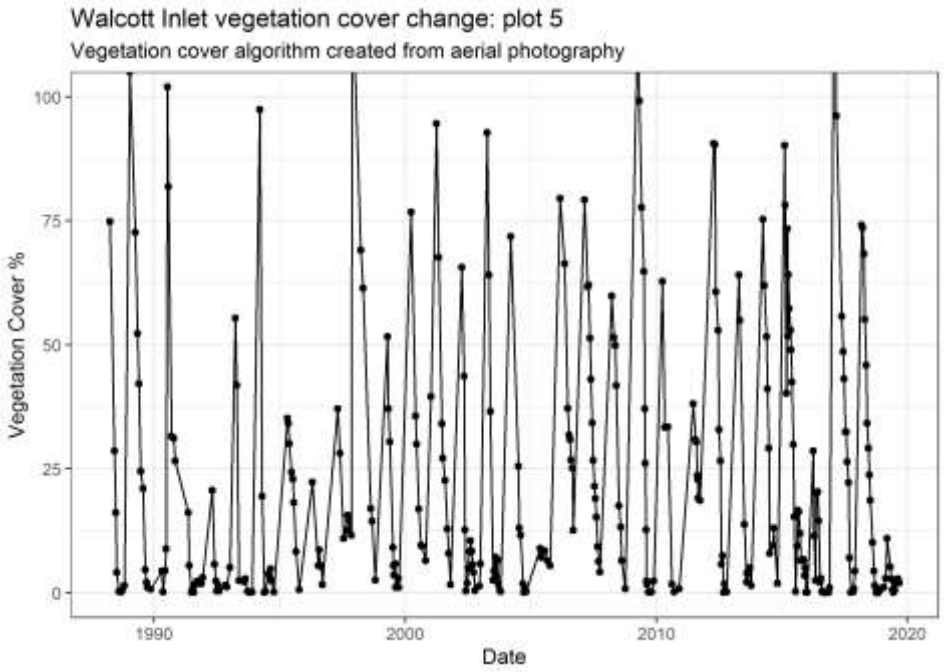
Index values from all available Landsat satellite imagery were extracted for each check point. The formula from the quadratic line in figure 4 was applied to index values which were then graphed. From the following graphs it can be seen that even though the drop in cover around 2019 is substantial, a similar drop occurred in the early to mid-1990s. This is especially the case with check plots 2 and 6.

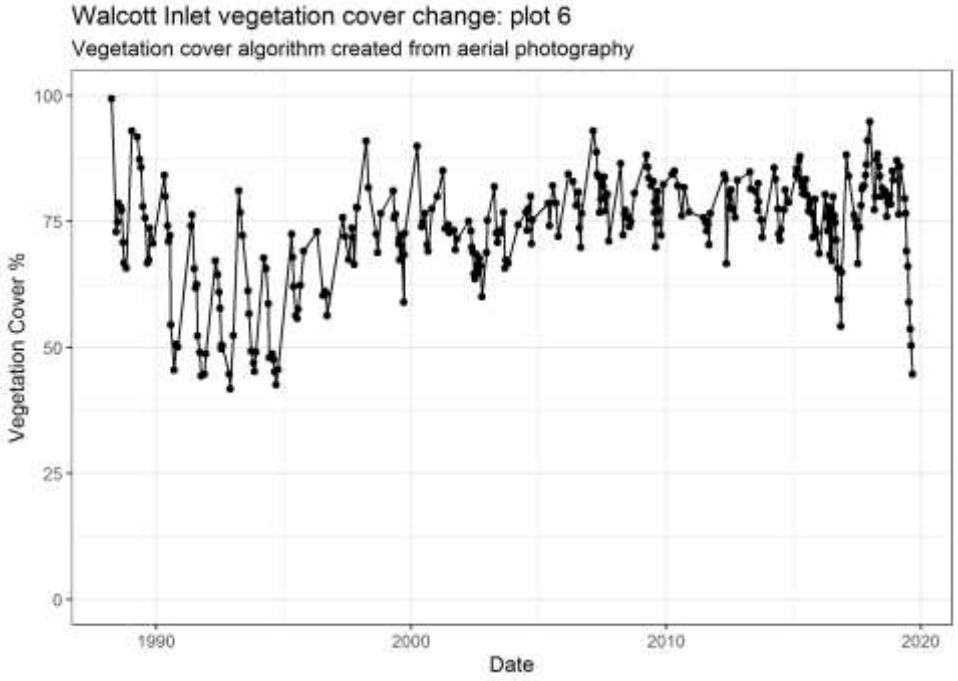



Walcott Inlet vegetation cover change: plot 2
Vegetation cover algorithm created from aerial photography
Vegetation Cover %
100
75
50
25
0
1990
2000
2010
2020
Date


Walcott Inlet vegetation cover change: plot 3
Vegetation cover algorithm created from aerial photography
Vegetation Cover %
100
75
50
25
0
1990
2000
2010
2020
Date


Walcott Inlet vegetation cover change: plot 4
Vegetation cover algorithm created from aerial photography
Vegetation Cover %
100
75
50
25
0
1990
2000
2010
2020
Date


Walcott Inlet vegetation cover change: plot 5
Vegetation cover algorithm created from aerial photography
Vegetation Cover %
100
75
50
25
0
1990
2000
2010
2020
Date


Walcott Inlet vegetation cover change: plot 6
Vegetation cover algorithm created from aerial photography
Vegetation Cover %
100
75
50
25
0
1990
2000
2010
2020
Date

APPENDIX 4 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 km²	≤ 20,000 km²	≤ 50,000 km²
	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:

	≥ 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:

	≥ 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

	≥ 80	≥ 50	≥ 30

	(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	CR	EN	VU
		≥ 50	EN	VU	
		≥ 30	VU		
			≥ 90	≥ 70	≥ 50
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	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