



# South East Queensland Horse Trail Network Interim Assessment: Bellthorpe National Park



Queensland  
Government



Prepared by: Ecological Sciences, Queensland Herbarium and Biodiversity Science, Department of Environment and Science

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## Introduction:

Bellthorpe National Park makes up a large area of forested landscape at the southern end of the Conondale Range. A native title claim, Federal court number QUD6128/98 on behalf of the Jinibara people covers Bellthorpe National Park and the determination in November 2012 found that native title exists in parts of the determination area. However the geographic area includes, but is not limited to, the traditional interests of Jinibara and Gubbi Gubbi people (QPWS 2013). Landscapes in this region incorporate both lowland and higher altitude areas. As part of the important Conondale – Jimna complex, the area provides linkages to Maleny and contributes to the viability of this important upland/hinterland conservation area and is recognised as part of the Southeast Queensland biodiversity corridors.

Bellthorpe National Park was gazetted in 2010. It was originally Bellthorpe State Forest prior to its transfer to Bellthorpe Forest Reserve 1 and 2 under the Southeast Queensland Forests Agreement (SEQFA) in 2003. Under this agreement State forests were converted to national park tenure to provide a representation of biodiversity and ecosystems in Queensland. Historical logging, horticultural and grazing activities with the extensive road and track network have impacted on the structure and species composition of the various regional ecosystems that comprise the national park (QPWS 2013).

Horse riding has long been a part of the Queensland lifestyle, and many southeast Queensland forests are valued by horse riders as safe and scenic places to ride, although the number of riders is low (DERM 2011; Rossi *et al.* 2013). The south-east Queensland horse-riding trail network (HTN) includes more than 500km of trails within 29 reserves between Gympie and the State's southern border. The HTN trails link to a broader trail network that includes about 340km of trails in Queensland's forest plantations and at least 470km of trails on other tenures, including several other State Forests (DERM 2010).

Road and trail networks within native forest ecosystems are fundamental in providing access for the purposes of recreational use, extraction of forest products, fire control and routine resource management (Ngugi *et al.* 2014). However disturbance associated with road construction and maintenance, as well as use by vehicles, cyclists, motorbikes, walkers and horses, increase the risk of invasion by non-native (weed) plant species along roads (Potito and Beatty 2005; Ansong and Pickering 2013). Once established in disturbed road verges, some invasive species may colonise adjacent undisturbed native vegetation (Ngugi *et al.* 2014).

Non-native species that become established in natural ecosystems compete with native species for available resources and can replace native species to the detriment of organisms that depend on these

native species (Gower 2008). For example, non-native plant species have rapidly invaded and successfully displaced native species in many conservation areas in Australia (Ngugi and Neldner 2017) and buffel grass (*Cenchrus ciliaris*) forms monocultures in pasture lands of Queensland (Butler and Fairfax 2003).

Multiple vectors including vehicles, machinery, soil movement, animals, wind, water, and humans are involved in the spread of non-native species along forest trails (Ngugi *et al.* 2014). Horses have been implicated as significant vectors in the introduction of plant species observed adjacent to horse trails in nature reserves (Gower 2008). The risks associated with horse riding include seed movements through horse dung, hair, hoof debris, riders, and riding equipment. In a review of world-wide studies analysing the potential dispersal of weeds through horse dung, Ansong and Pickering (2013a) identified 156 naturalised plant species in Australia that germinate from horse dung. Other reported negative impacts from horse use include trampling of vegetation and soils, nutrient addition through urine and dung, introduction of pathogens, as well as enhanced erosion and sediment run-off. All these impacts may trigger changes in species composition of adjacent native ecosystems.

The objective of the Horse Trails Scientific Monitoring Program (DERM 2010) is to monitor horse riding on the Southeast Queensland Horse Riding Trail Network that traverses through Southeast Queensland protected areas, identify any impacts of such use and recommend management actions to address such impacts. Studies relating to the social, erosional and water quality impacts of horses and horse riding are available on the DES website ([Monitoring and managing potential impacts | Parks and forests | Department of Environment and Science, Queensland \(des.qld.gov.au\)](https://www.des.qld.gov.au/monitoring-and-managing-potential-impacts-parks-and-forests)).

This monitoring program was initiated in 2009 and established 52 paired long-term monitoring sites along designated horse trails located in conservation reserves in seven National Parks in southeast Queensland (Figure 1). These monitoring sites examine (1) the invasion and extent of non-native plant species along the management roads designated as horse trails; and (2) changes in BioCondition over time of vegetation adjacent the horse trails.

## Methods:

### ***Study location***

Bellthorpe National Park (NP) covers an area of 7533 ha and was assessed at five sites containing a total of 11 transects in the two most extensive Regional Ecosystems (REs). The two REs are 12.12.2 and 12.12.15 and Technical Descriptions (TDs) for these REs are presented in Appendix 2. The TDs are detailed descriptions of the normal range in structure and floristic composition of remnant regional ecosystems and their component vegetation communities

Table 1. Summary statistics for monitoring sites at Bellthorpe NP arranged by regional ecosystem.

Regional Ecosystem	Extent (ha)	Proportion of park/reserve (%)	No. of transects examined
12.12.2 <i>Eucalyptus pilularis</i> tall open forest on igneous rocks especially granite	1951	26	5
12.12.15 <i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> , <i>E. acmenoides</i> open forest on near coastal hills on igneous rocks	2412	32	6

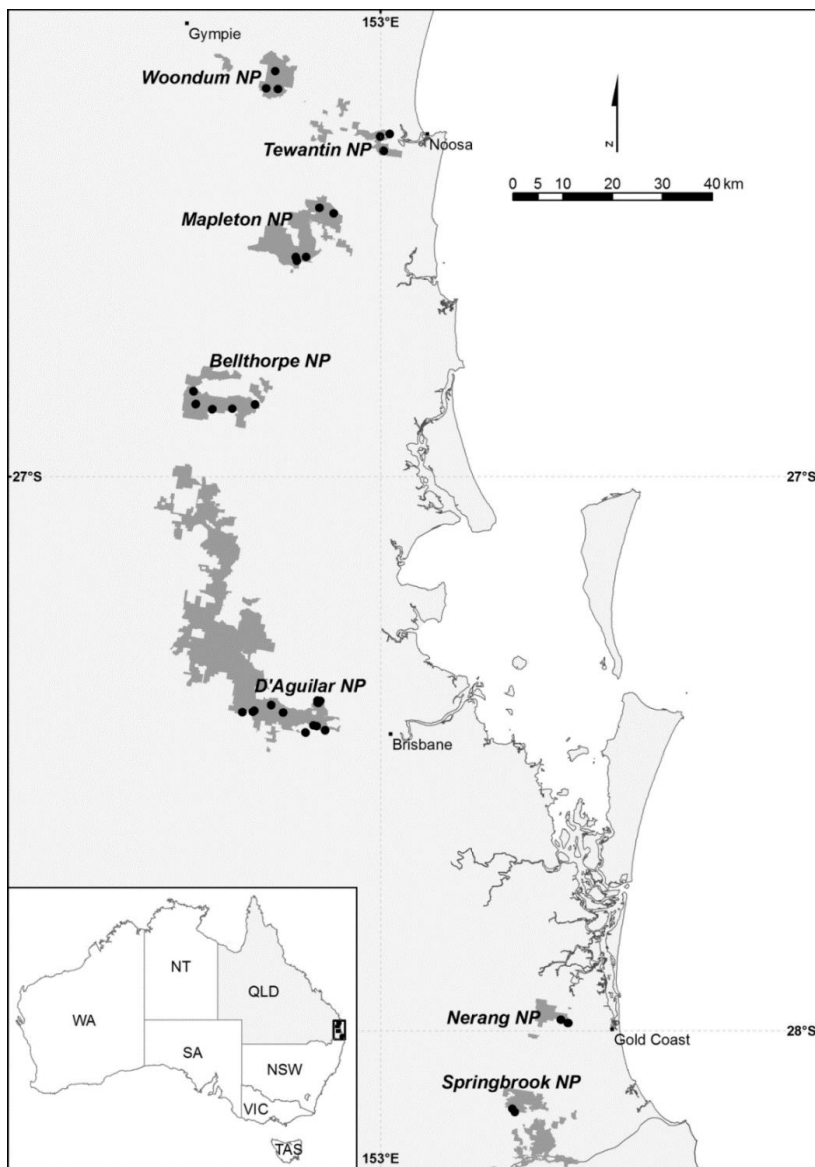


Figure 1. Map of Australia showing Queensland State, location of the seven National Parks (NP) in southeast Queensland that have designated horse trail network, and distribution and location of study sites (Ngugi *et al.* 2014).

### Site selection and Sampling

Permanent sites for vegetation monitoring were established in 2012 and 2013 along the horse trail network in Bellthorpe National Park and monitored in 2017 and 2020. Sites were overlaid where possible on existing ecological research plots used for vegetation mapping and classification purposes (Neldner *et al* 2022), or native forest permanent plots used for long-term monitoring of forest growth (Ngugi *et al.* 2015), allowing surveys to add to existing valuable datasets. The data collection method is described in Ngugi *et al* (2014).

### **1. Assessing impact of non-native species on the vegetation along management roads**

Vegetation growing adjacent to the horse trail network was sampled using 20 m transects laid out perpendicular to the trail edge on both sides of the trail. The trail edge was defined as the shoulder edge of the trail surface where vegetation growth is evident, and from which point vegetation cover continues into the adjacent vegetation. Along each transect a total of eight quadrats were sampled. At the start of the transect five contiguous 1 x 1 m quadrats extending from the trail edge to 5 m into the forest were sampled to estimate spread of non-native species. Contiguous plots were used to accurately determine the distance of influence from the trail edge that was impacted by non-native species. In addition, 1x1 m plots were sampled at 10 m, 15 m, and 20 m along the transect line. In each 1x1 m plot, all plant species were recorded, and the projective foliage cover of each ground layer species (less than 1.5 m in height) was estimated. Cover was also assessed for leaf litter, bare-ground and coarse woody debris (> 10 cm diameter) as a percentage of the total area in each quadrat (1 m<sup>2</sup>). This sampling design is very similar to that used by Potito and Beaty (Potito and Beatty 2005) and Gower (Gower 2008).

### **2. Assessing the condition of the forest regional ecosystems**

To sample the species diversity and cover composition in the relatively less disturbed adjacent native forest at each location, a 50 x 10 m forest transect was established parallel to the horse trail and 25 m from the trail edge. All vascular plant species observed within the transect were recorded and the cover of ground stratum species was assessed in five 1x1 m quadrats along the transect midline. Comprehensive sampling of the structure and floristics of the forests followed the standard Queensland Herbarium vegetation survey methodology (Neldner *et al.* 2022) used for collecting data for the Queensland Biodiversity and Ecology Information System (QBEIS) and allowed each site to be assessed for their BioCondition (Eyre *et al.* 2015).

#### ***Plant species identification and categorisation***

All herbaceous and woody vascular species observed within each plot were identified to species in the field where possible. Where necessary specimens were collected and brought to the Queensland Herbarium for identification. Where available material was insufficient to identify species, identity was recorded at genus level. Nomenclature, and native and non-native status follows the Census of

Queensland Flora 2021 (Brown 2021). Characterisation of species as environmental weeds, weeds of national significance and/ or declared weeds under State legislation was done using the online facility maintained by the Queensland Department of Agriculture, Fisheries and Forestry (QPWS 2022).

## Results:

Bellthorpe National Park was assessed at five sites containing a total of eleven transects across two Regional Ecosystems (RE's). Detailed results for the non-native species richness and vegetation cover, and BioCondition scores for the transects at each site are provided in the report cards in Appendix 1.

A summary of weed species richness and cover in the trail-edge transect is presented in Table 2. The highest observed mean cover of non-native species was 13.7%, and the highest species richness was seven species. Sites in regional ecosystem 12.12.15 consistently showed higher cover and non-native species richness compared to RE 12.12.2a. Within the QBEIS transect, the highest mean cover of non-native species was 22.9% but some sites had very high cover of up to 72% which was mainly composed of *Lantana camara* (Table 2). The highest mean of non-native species richness was five species with majority of QBEIS sites having less than three species (Table 2).

BioCondition score among all the sites ranged from 50 to 100% on a 0 to 100% scale (the higher the score the better the condition) with the lowest mean score of 65% indicating that most sites were in reasonable condition (Table 3). The highest BioCondition scores were recorded in RE 12.12.2a with the mean ranging from 84 to 90%. Sites in RE 12.12.15 were mainly located adjacent the main access route in the NP or near the park boundary where more anthropogenic disturbance was evident.



Table 2. Mean and range of non-native cover\*, and absolute numbers (richness) of non-native species identified per visit at each sampled regional ecosystem within Bellthorpe National Park. Values for both trail-edge and QBEIS transects are shown.

Regional Ecosystem	Sites	Site Visit	TRAIL-EDGE TRANSECTS				QBEIS TRANSECTS			
			Cover mean (%)	Cover range (%)	Species mean (count)	Species range (count)	Cover mean (%)	Cover range (%)	Species mean (count)	Richness range (count)
<b>12.12.15</b> <i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i> , <i>E. siderophloia</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> open forest on Mesozoic to Proterozoic igneous rocks	40872A	1	8.9	4.8 – 14.8	7	3 - 10	2	0 - 30	5	3 - 6
	40875A	2	2.8	0.8 – 8.2	3	1 - 4	22.9	0.6 - 72	3	1 - 4
	DYP183A DYP183B	3	4.7	0.5 – 10.3	3	1 - 6	12.3	0 - 69	3	1 - 4
<b>12.12.15a</b> <i>Eucalyptus grandis</i> and/or <i>E. saligna</i> tall open forest +/- vine forest understorey in wet gullies on Mesozoic to Proterozoic igneous rocks	40872B	1	13.7	3 – 24.4	4	3 – 4	13	0 - 20	2	1 - 2
	40875B	2	3.8	0.5 – 7.2	3	2 – 3	9.1	0 – 17.2	2	1 - 2
		3	1.9	1.5 – 2.3	2	2 – 2	13.4	0 – 26.2	2	1 - 2
<b>12.12.2a</b> <i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks	13948A	1	0.7	0 – 2	2	0 – 3	0	0	2	1 - 2
	13948B	2	0.8	0 – 1.5	1	0 – 2	0.2	0 – 0.6	2	1 - 2
	13948C	3	0.5	0 – 1.5	1	0 - 1	0	0	1	1
	13951A									
	13951B									

\*non-native cover is the sum of weeds recorded in the ground and shrub layers (Eyre et al. 2015)

Table 3. Mean and range of BioCondition scores for the QBEIS (forest) sites summarised by regional ecosystem within Bellthorpe National Park.

Regional Ecosystem	Sites	Sampling Visit	BioCondition Mean (%)	BioCondition Range (%)
<b>12.12.15</b> <i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i> , <i>E. siderophloia</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> open forest on Mesozoic to Proterozoic igneous rocks	40872A, 40875A, DYP183A, DYP183B	1	70	57 - 87
		2	71	50 - 91
		3	72	56 - 84
<b>12.12.15a</b> <i>Eucalyptus grandis</i> and/or <i>E. saligna</i> tall open forest +/- vine forest understorey in wet gullies on Mesozoic to Proterozoic igneous rocks	40872B, 40875B	1	65	65
		2	72	67 – 76
		3	66	66
<b>12.12.2a</b> <i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks	13948A, 13948B, 13948C, 13951A, 13951B	1	85	77 - 92
		2	84	63 - 91
		3	90	80 - 100

## Discussion and Conclusions

This study investigated the impacts of horse riding along horse trails and the risk of horses acting as vectors in the introduction of non-native plant species adjacent protected areas within Bellthorpe National Park in southeast Queensland.

### **Non-native species**

The construction, maintenance and use of horse trail networks that traverse native vegetation may predispose these ecosystems to invasion by non-native plant species (Ngugi *et al.* 2014). Following comprehensive sampling of five sites (11 transects) across three sampling time points (2012/2013, 2017 and 2020), the sites along designated horse trails in Bellthorpe National Park showed a variable degree of invasion by non-native species with some sites exhibiting dense infestation.

There appears to be a distribution pattern of non-native species incursion in this national park, with the greatest species richness of non-native species localised in trail-edge transects, directly adjacent to horse trails (Table 2) – consistent with Ngugi (2014). The QBEIS (forest) transects showed considerably less diversity of non-native species, but still exhibited significant incursion of *Lantana camara*. When *Lantana camara* was found to occur, it was most often localised in the QBEIS (forest) transects (183A, 183B, 13948B, 40872B, 40875A and 40875B), with sites 183A and 40875A showing the greatest infestation by *Lantana camara*, with up to 70% cover at some time points. The only populations of *Lantana camara* associated with trail edge transects were found in 183A, 40872B and 40875B, and all with sparse cover (~5%).

The presence of non-native plants in the QBEIS forest transects that were not observed in the trail-edge transect suggests complex modes of seed dispersal that may not be exclusively dependent on horse trail networks (Ngugi *et al.* 2014). Other such vectors may include mammals and birds (Willson and Crome 1989) and anthropogenic vectors such as clothing and vehicles (Ansong & Pickering., 2014). The limited spread of non-native species from the trail edge incursion area to the adjacent remnant vegetation may be the result of active weed management by National Park authorities that include chemical spraying and the use of fire (QPWS 2012; Ngugi *et al.* 2014).

More broadly, those sites associated with regional ecosystem (RE) 12.12.2 showed comparatively little incursion by non-native species and had consistently low levels through time, both in the forest and trail-edge transects (Table 2). This may be because these sites were located far from the forest edge along a side trail branching off the main forest access trail, that is not regularly used. Interestingly, there was no *Lantana camara* found in these sites since the 2013 sampling. By contrast, RE 12.12.15 was found to

contain *Lantana camara* and several other non-native species in much greater abundance and with greater consistency suggesting that this regional ecosystem may be more susceptible to incursion. In addition, the sites in this RE were located close to the forest boundary and exposed to greater anthropogenic disturbance.

Of the 11 transects assessed in the surveys, only two (183A and 40872A) showed a decrease in non-native species cover and richness over time with the remainder showing mostly consistent levels of non-natives through time. A single site (40875A) showed an increase in *Lantana camara* over time concomitant with a decline in perennial grass cover and grass species richness, outlining the potential deleterious effects to native ecosystems caused by weed incursions.

### **BioCondition scores within the forest transects**

Overall, RE12.12.2 had consistently higher mean BioCondition scores than 12.12.15/12.12.15g (Table 3) in part due to a lower frequency of weed incursions and their location within intact remnant forests. However, other BioCondition attributes, also contributed to this difference, such as the number of large trees. More specifically, Sites 13948A/B/C, 13951A and 40872A all had high BioCondition scores with either steady improvement to benchmark level through time or consistently high scores at all sampling time points. Conversely, sites 183A, 183B, 13951B, 40872B, 40875A and 40875B all showed either moderate or variable BioCondition scores, primarily due to a lack of trees – a legacy of previous logging and disturbance in the area.

### **Conclusion**

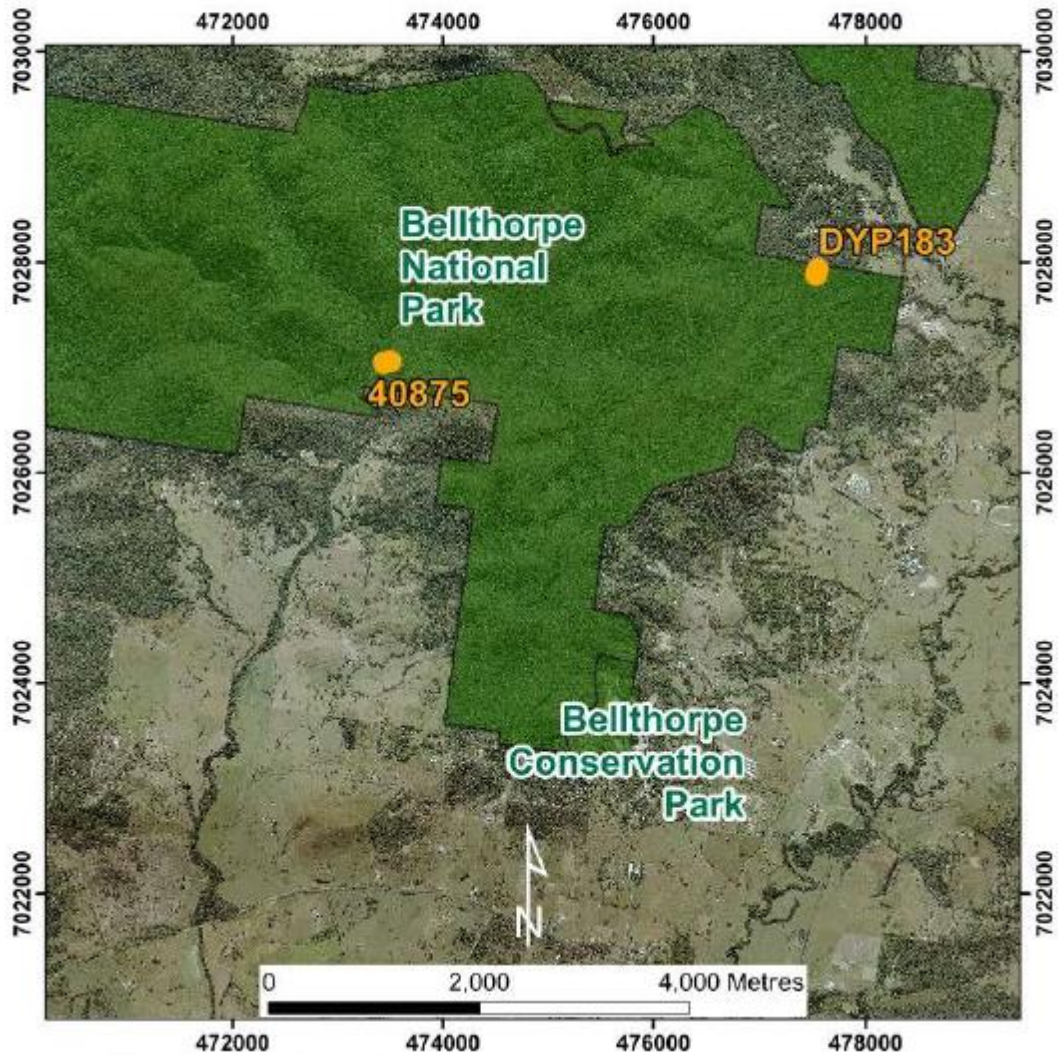
There is a variable degree of incursion of non-native species within Bellthorpe National Park that could not be directly attributed to horse riding. The incursion may be in part due to continued and active usage of trails for recreation and mechanical maintenance of the trails. An illegal trail bike diversion track was found in close association with one of the trail-edge transects, indicating that increased QPWS&P management and trail edge maintenance may be required to help reduce incursion and spread of non-native species in Bellthorpe National Park. The BioCondition scores for RE 12.12.2 were consistently high, while the scores for 12.12.15 and 12.12.15g were moderate and improving indicative of a improvement in previously logged forest.



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## Appendix I. Site report cards



**SEQ Monitoring Report Card**

**Bellthorpe 183A**

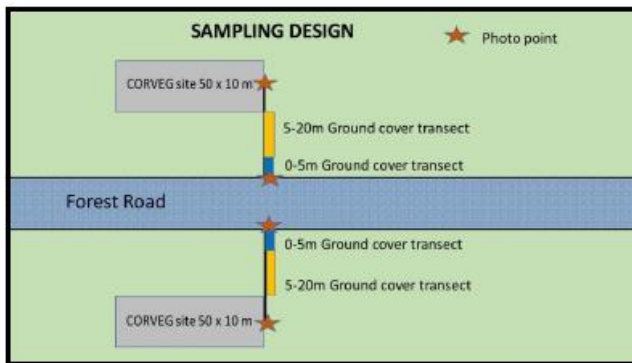
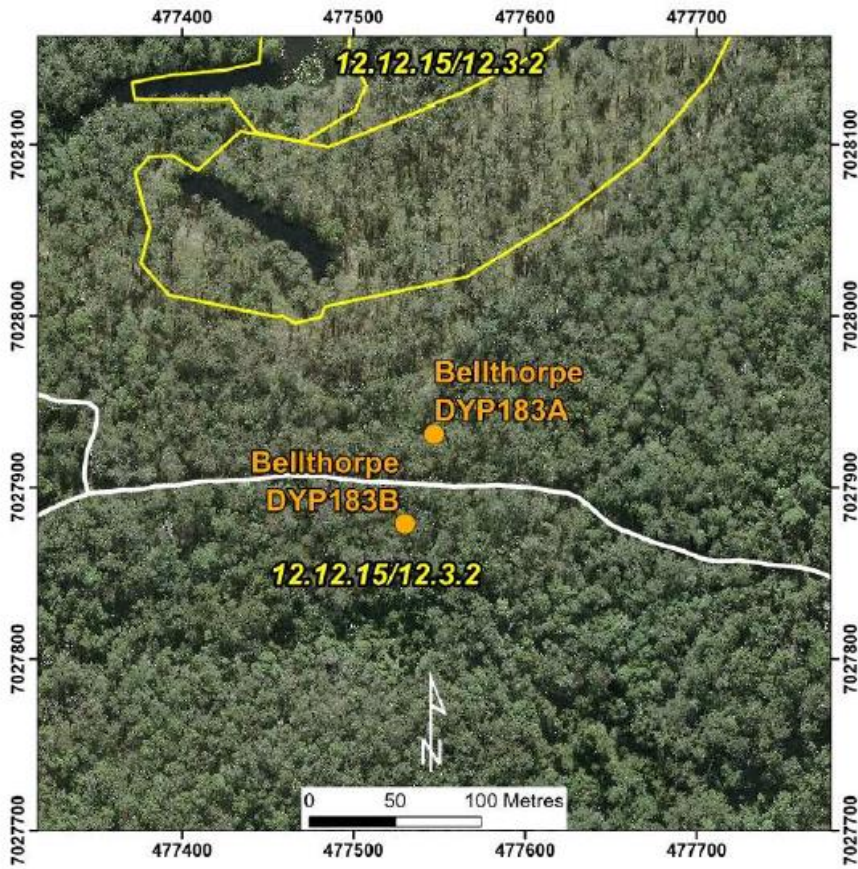
Regional Ecosystem 12.12.15

*Eucalyptus tereticornis*, *Lophostemon suaveolens* open forest

Queensland Herbarium, October 2021

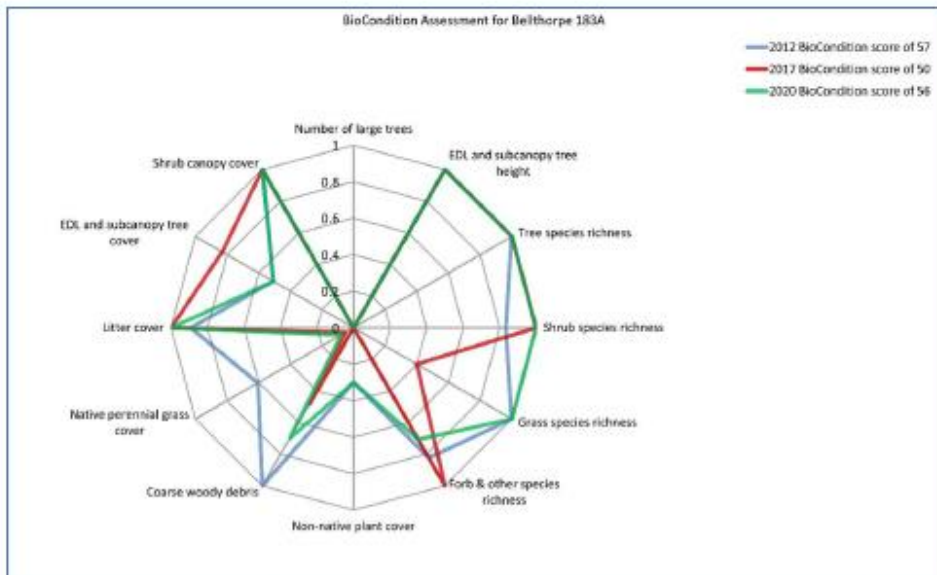


Bellthorpe National Park 183A





## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2012 – 57    2017 – 50    2020 – 56  
 Fire History: No fire data (2012 sample suggests >3yr prior)



Forest monitoring transect October 2017



Forest monitoring transect May 2020

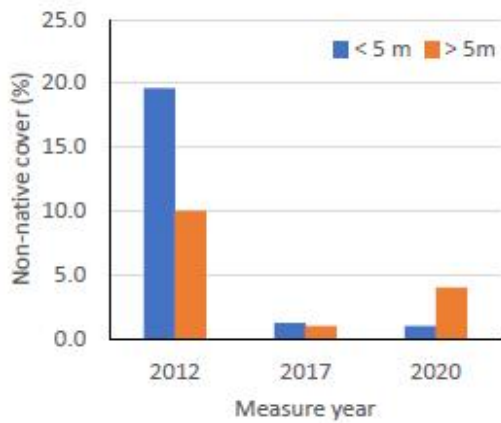
**General Comments:** This site consistently had only a moderate BioCondition score. There were no large trees, the top and subcanopy tree cover was suboptimal, legacy from previous logging. There was a decrease in perennial grass cover and a consistent mid-dense infestation of *Lantana camara* (30 -70% cover) in the shrub layer.

## Trail-edge ground cover transect at Bellthorpe 183A

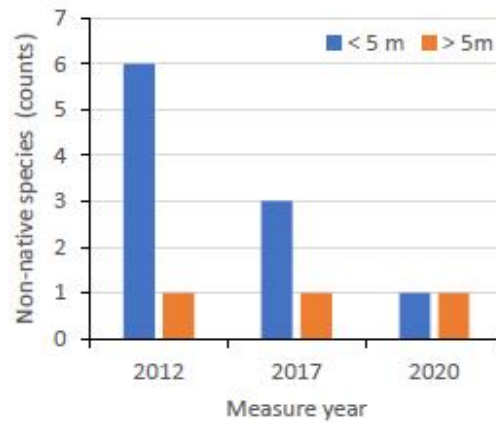


Trail-edge transect October 2017

Trail-edge transect May 2020



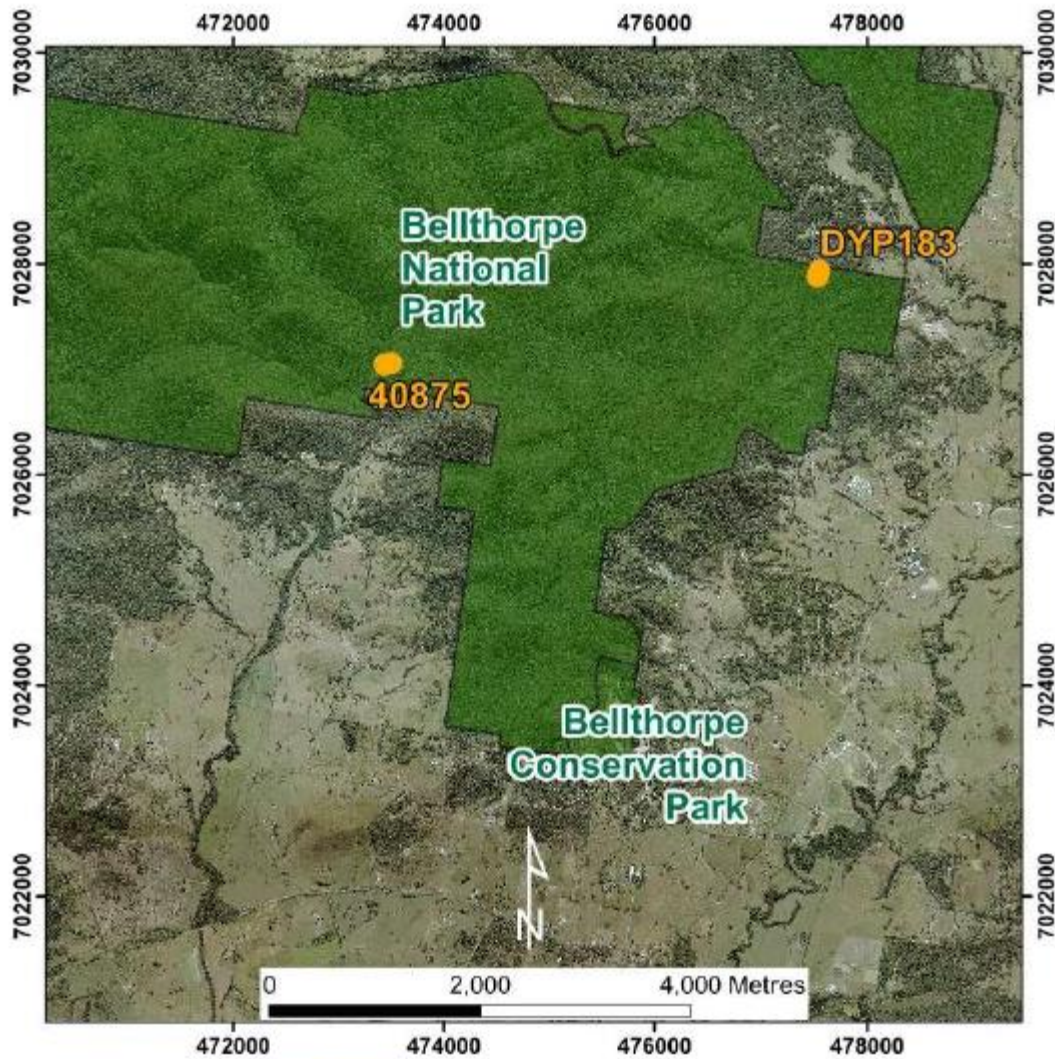
Non-native species cover



Number of non-native species

**General comments:** The trail edge zone has the highest cover and richness of non-native species, and the cover and diversity of non-native species decreased over the time of sampling. The most significant non-native species were *Ageratum houstonianum* and *Ageratina riparia* (2013 only). *Lantana camara*, *A. houstonianum*, *Passiflora suberosa* and *P. subpeltata* were recorded in the QBEIS site as a low cover of 5%.





**SEQ Monitoring Report Card**

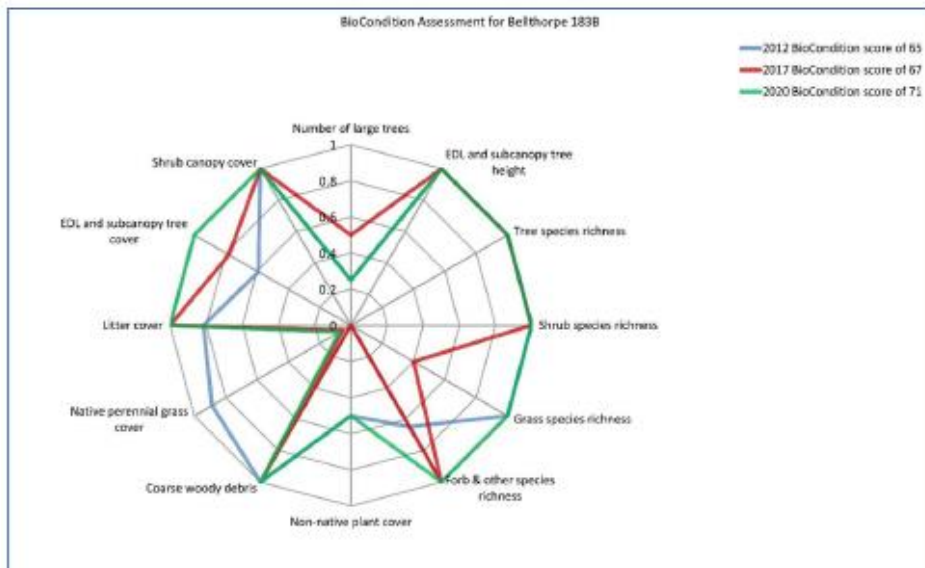
**Bellthorpe 183B**

Regional Ecosystem 12.12.15

*Eucalyptus tereticornis*, *Corymbia intermedia*, *Lophostemon suaveolens*  
open forest

Queensland Herbarium, October 2021

## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2012 – 65    2017 – 67    2020 – 71  
 Fire History: Burnt August 2020 (sample 2012 suggests >3yr prior)



Forest monitoring transect October 2017

Forest monitoring transect May 2020

General Comments: This site consistently had only a moderate BioCondition score. There were limited number of large trees which could be a legacy from previous logging. Native perennial grass cover has decreased with increase in litter cover over the monitoring period. There is low to mid-dense infestation of *Lantana camara* (8-54% cover) in the shrub layer.



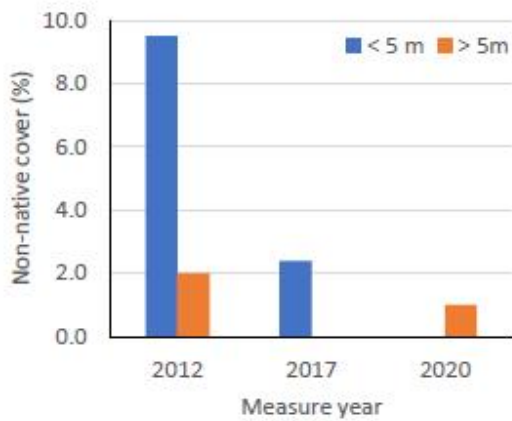
## Trail-edge ground cover transect at Bellthorpe 183B



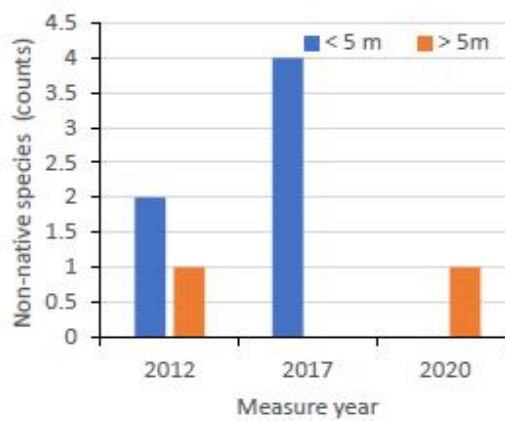
Trail-edge transect October 2017



Trail-edge transect May 2020

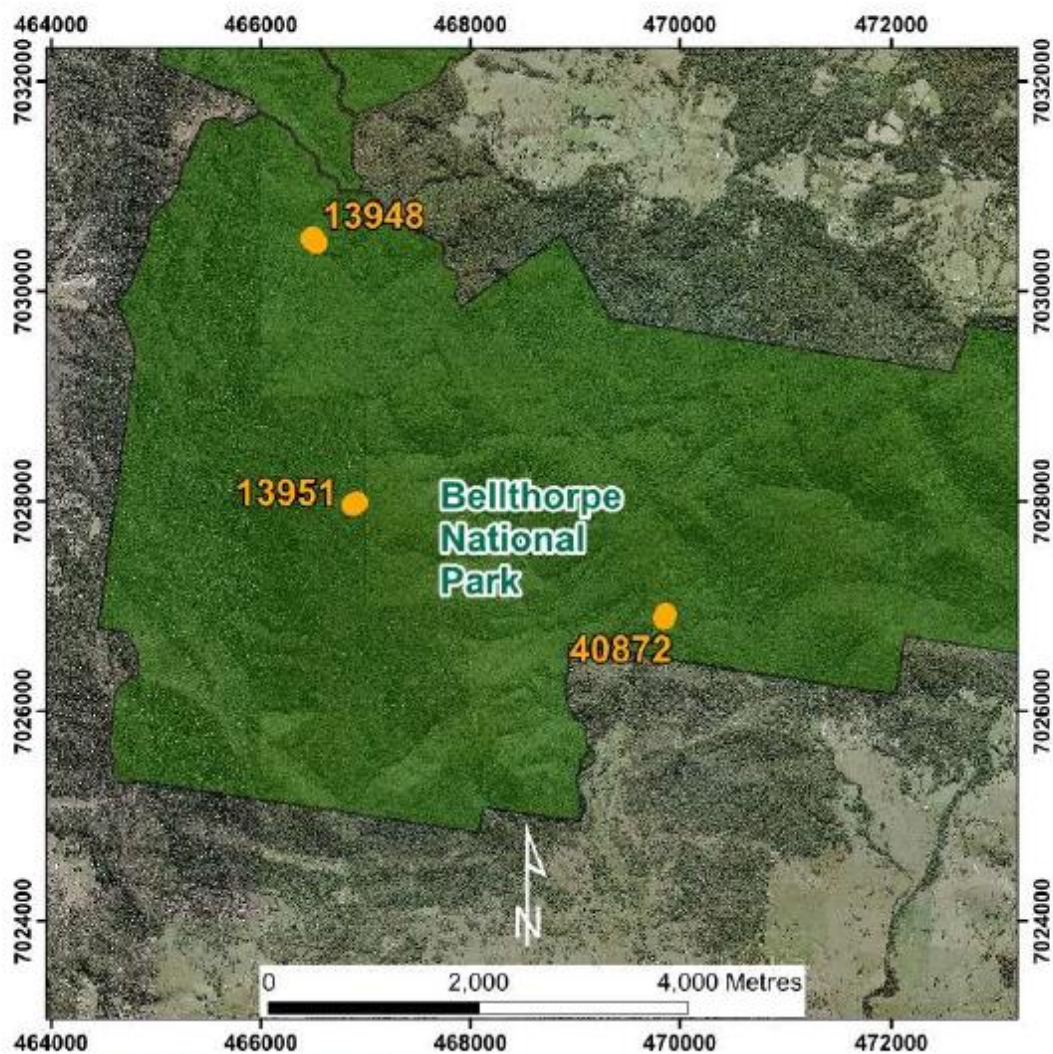


Non-native species cover



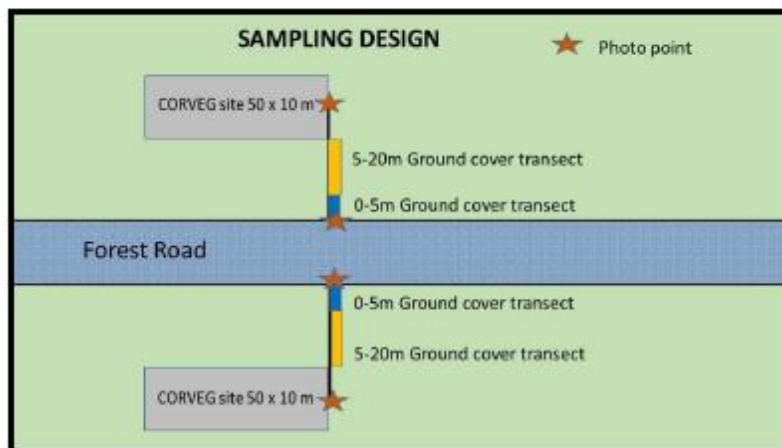
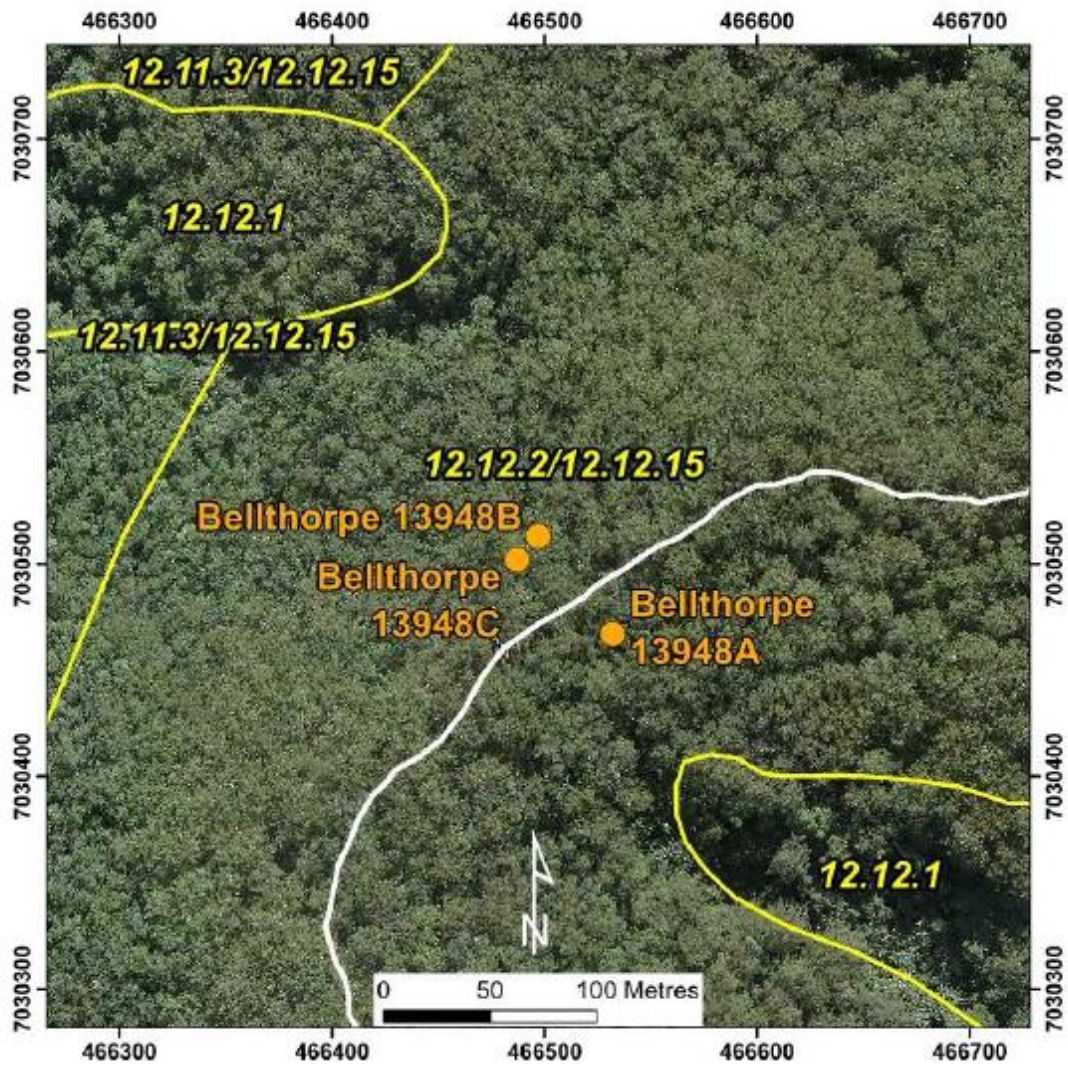
Number of non-native species

**General comments:** The trail-edge zone has the highest cover and richness of non-native species. The non-native species with the highest cover in the trail-edge transect were *Paspalum plicatum* and *Bidens pilosa* (2012 only). *Ageratum houstonianum* was present in 2012 and 2017. *Lantana camara* was recorded consistently in shrub layer in the QBEIS site with cover ranging from 8 to 54%.

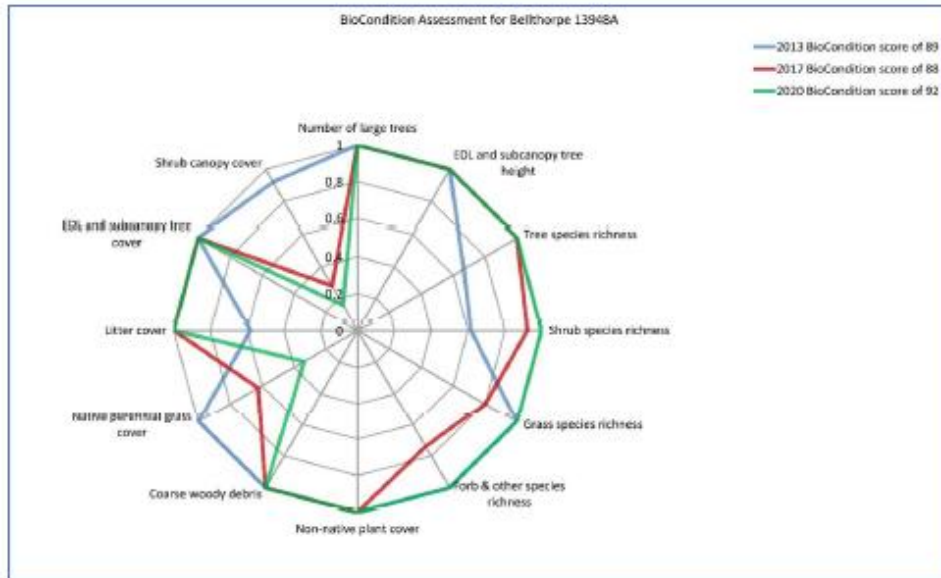


**SEQ Monitoring Report Card**  
**Bellthorpe 13948A**  
Regional Ecosystem 12.12.2  
*Eucalyptus pilularis*, *Eucalyptus microcorys* open forest  
Queensland Herbarium, October 2021





## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 89    2017 – 88    2020 – 92  
 Fire History: Burnt September 2009



Forest monitoring transect August 2017



Forest monitoring transect May 2020

**General Comments:** This site consistently had a high BioCondition score, and no non-native species. The shrub canopy cover and native perennial grass cover are very low and litter cover high possibly because there has not been a recent burn. All other BioCondition scores are trending the Benchmark.

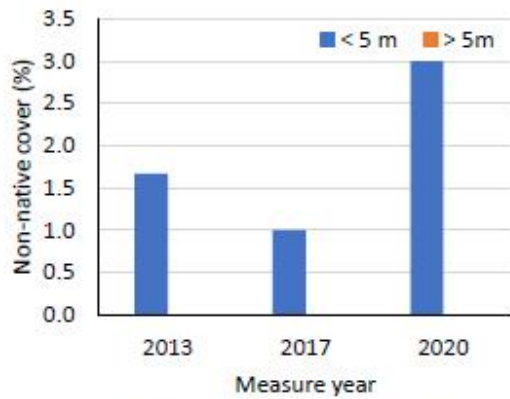


## Trail-edge ground cover transect at Bellthorpe 13948A

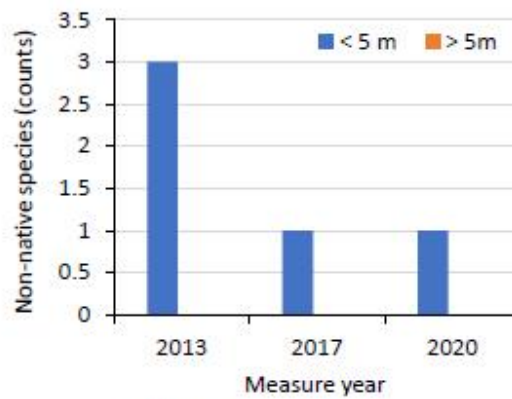


Trail-edge transect August 2017

Trail-edge transect May 2020

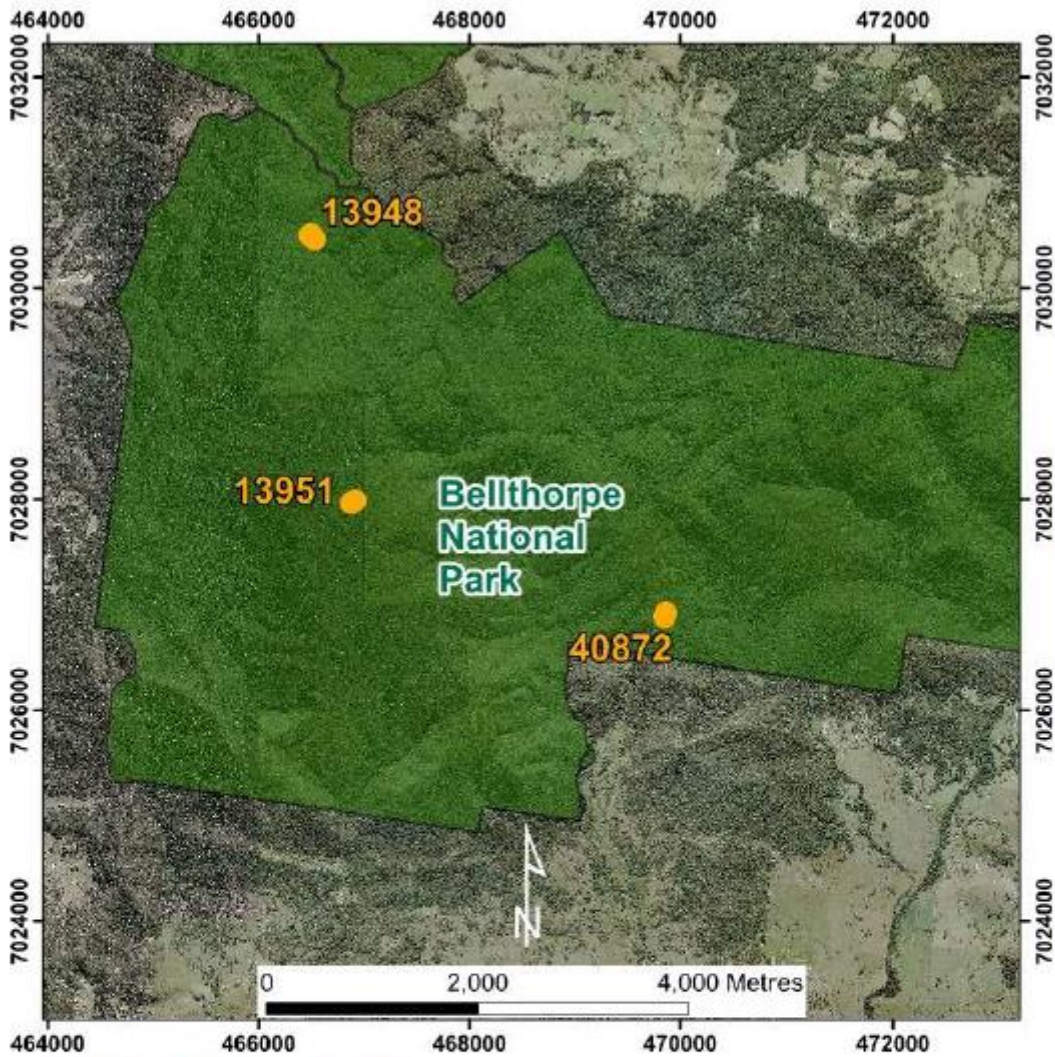


Non-native species cover



Number of non-native species

**General comments:** The only consistently present non-native species was *Hypochaeris radicata*. *Cynodon dactylon*, *Sonchus oleraceus* and *Cyperus laevis* each occurred at only one sampling with low cover. There were no non-native species recorded in the QBEIS site.



**SEQ Monitoring Report Card**

**Bellthorpe 13948B**

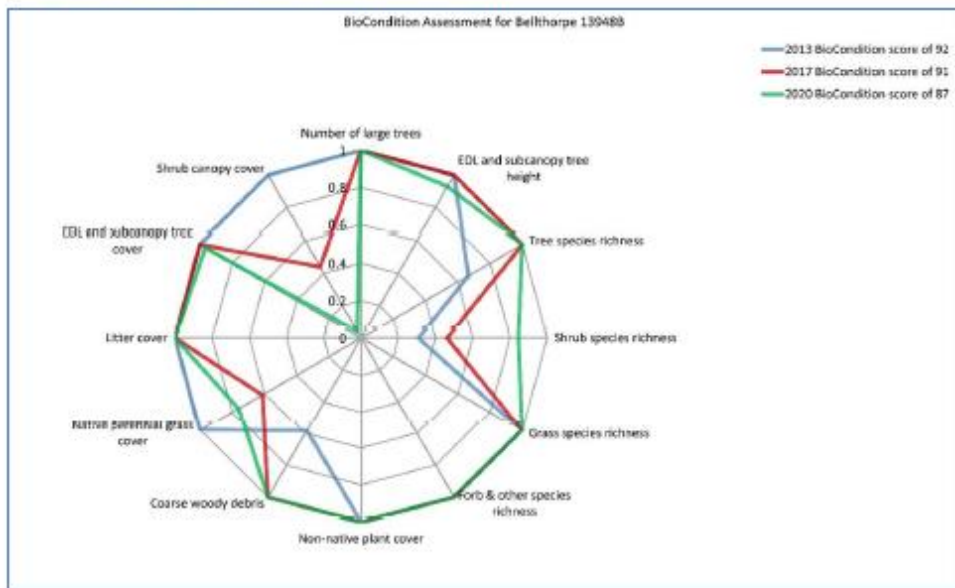
Regional Ecosystem 12.12.2

*Eucalyptus pilularis*, *Eucalyptus saligna*, *Corymbia intermedia* open forest

Queensland Herbarium, October 2021



## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 92 2017 – 91 2020 – 87  
 Fire History: Burnt June 2007 (sample 2013 suggests fire <3yr prior)



Forest monitoring transect August 2017



Forest monitoring transect May 2020

**General Comments:** This site consistently had a high BioCondition score. Shrub cover and shrub species richness, and native perennial grass cover varied with the year of sampling

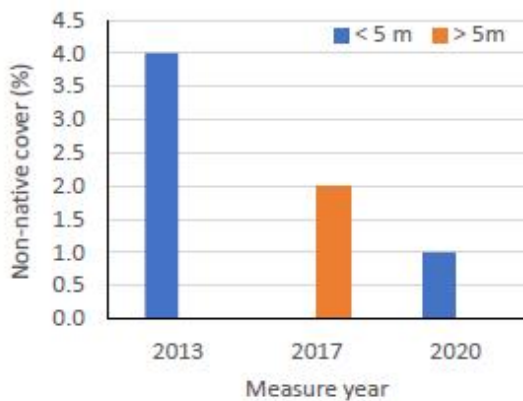
## Trail-edge ground cover transect at Bellthorpe 13948B-C



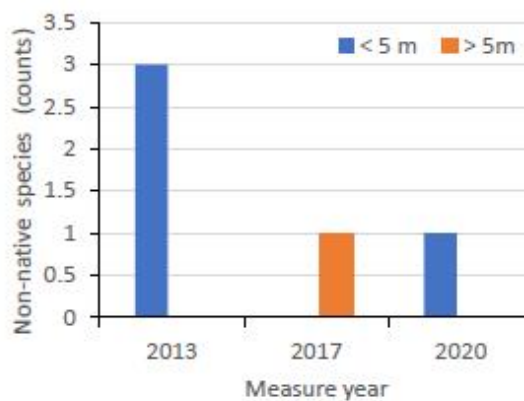
Trail-edge transect August 2017



Trail-edge transect May 2020



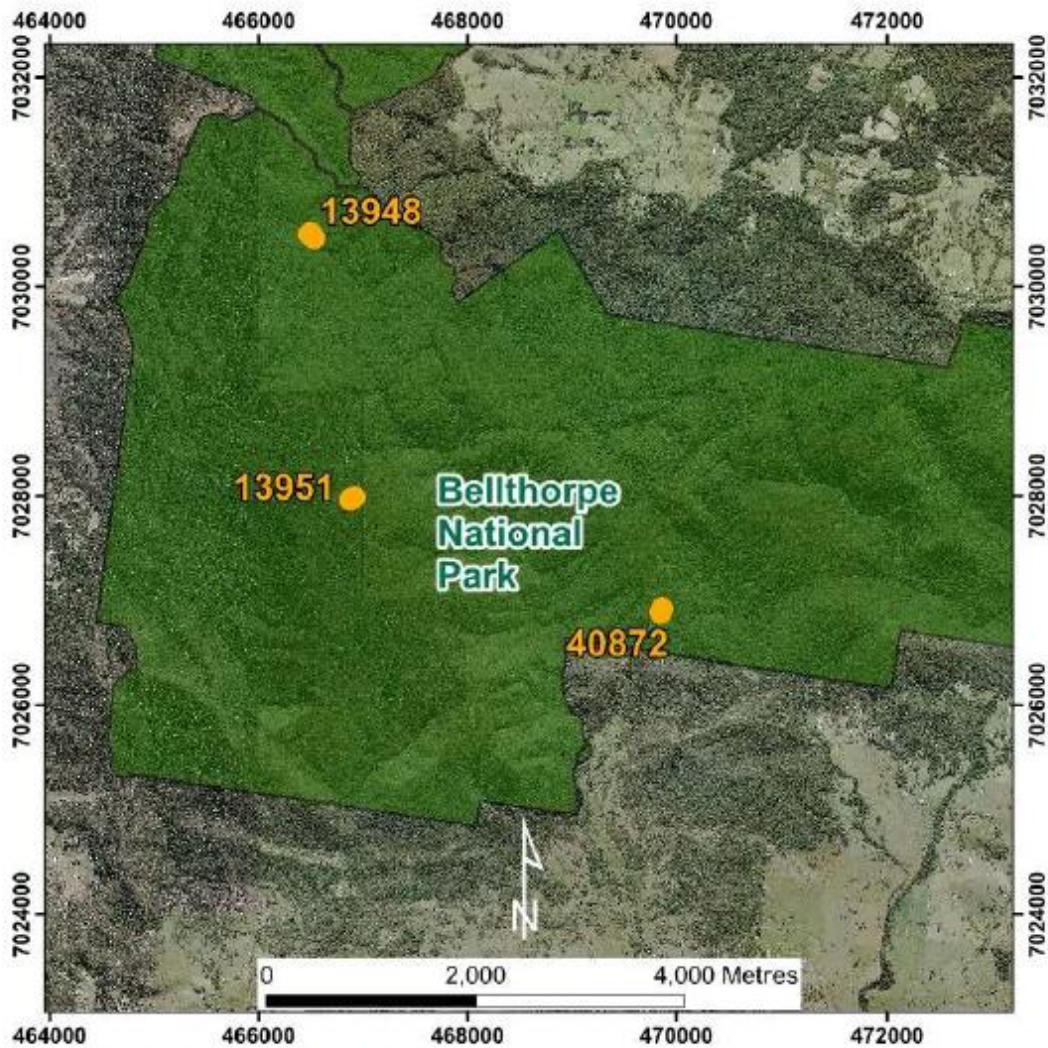
Non-native species cover



Number of non-native species

**General comments:** There were three non-native species with sparse cover recorded in the trail-edge transect, with only *Gamochaeta coarctata* recorded on two occasions. *Hypochaeris radicata* was recorded in the trail edge in 2013 and in the QBEIS site in 2017. *Lantana camara* (2013), *Crassocephalum crepidioides* (2017) and *Cirsium vulgare* (2020) were very sparsely present in the QBEIS site





**SEQ Monitoring Report Card**

**Bellthorpe 13948C**

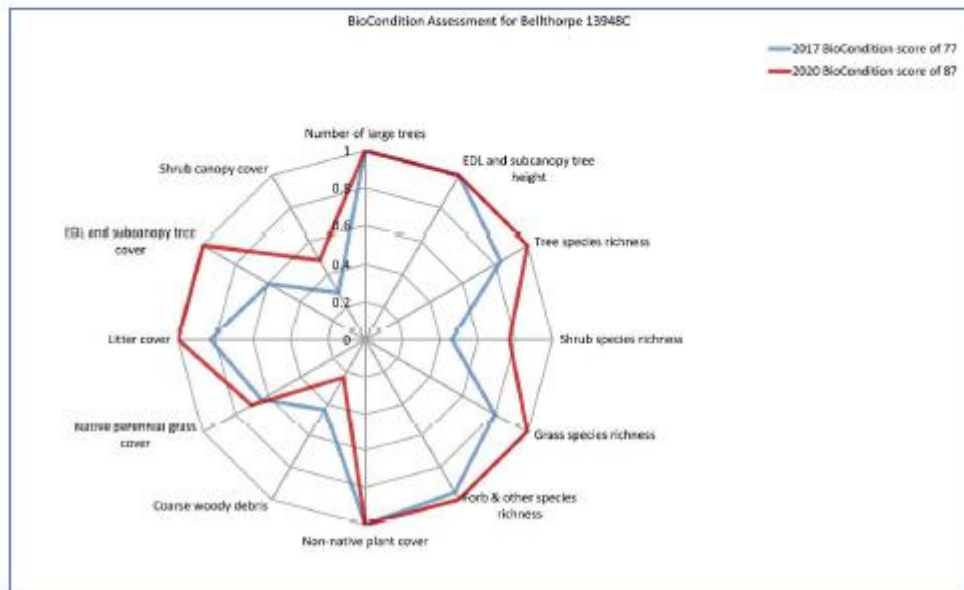
Regional Ecosystem 12.12.2

*Eucalyptus pilularis*, *Eucalyptus saligna*  
open forest

Queensland Herbarium, October 2021



## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2017 – 77    2020 – 87  
 Fire History: Burnt June 2007 (sample 2013 suggests fire <3yr prior)



Forest monitoring transect August 2017

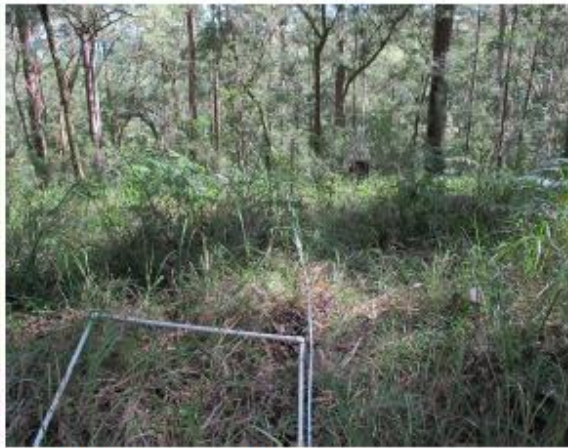
Forest monitoring transect May 2020

**General Comments:** This site had a moderate BioCondition score that improved in most attributes in the 2020 sampling. There was a very sparse cover of *Verbena rigida* at both samplings in the QBEIS site. Some illegal trail bike tracks were noted on this site.

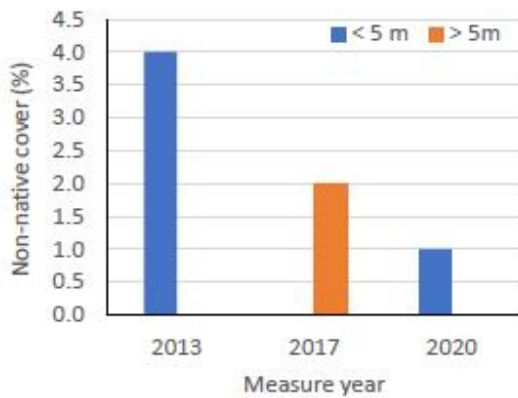
## Trail-edge ground cover transect at Bellthorpe 13948B-C



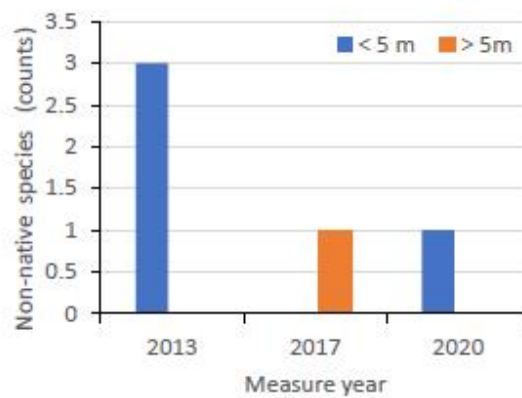
Trail-edge transect August 2017



Trail-edge transect May 2020



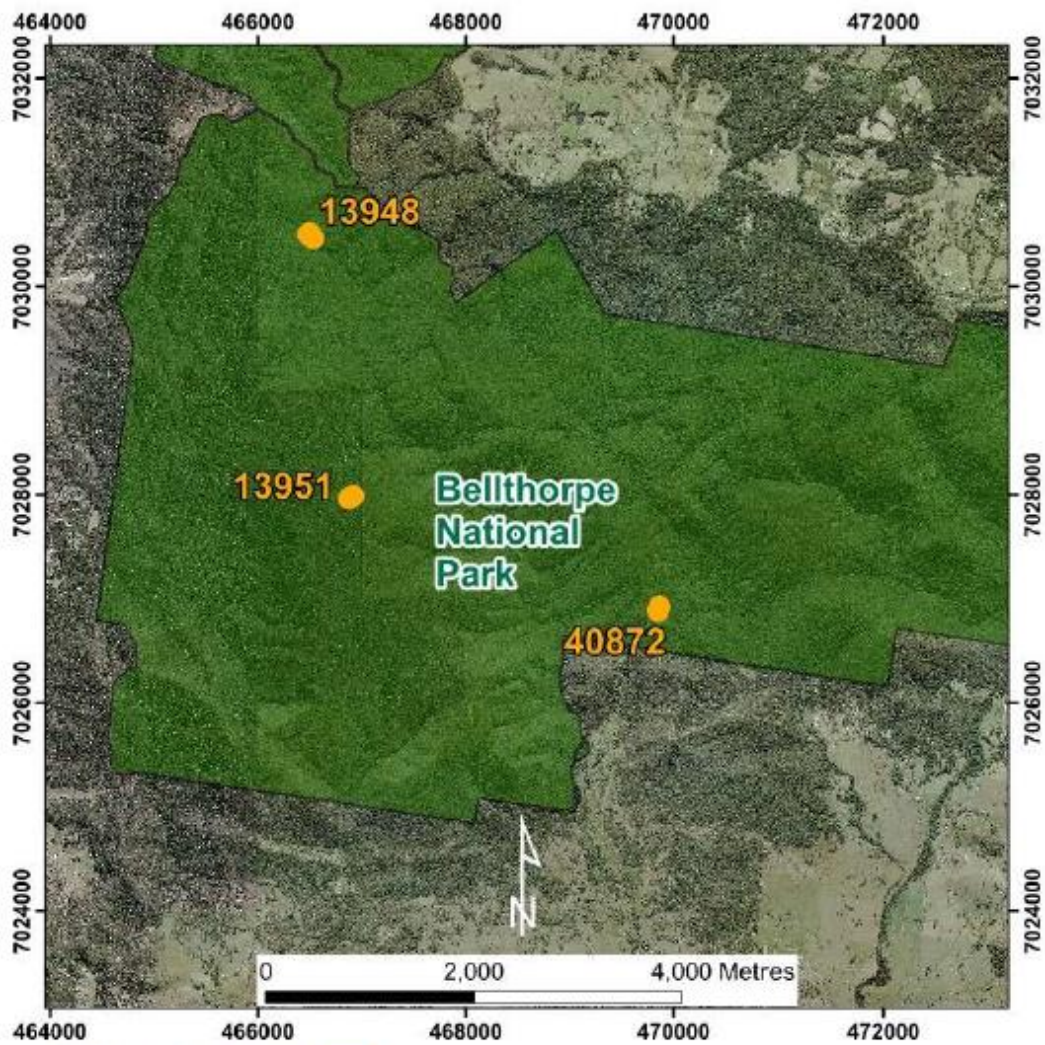
Non-native species cover



Number of non-native species

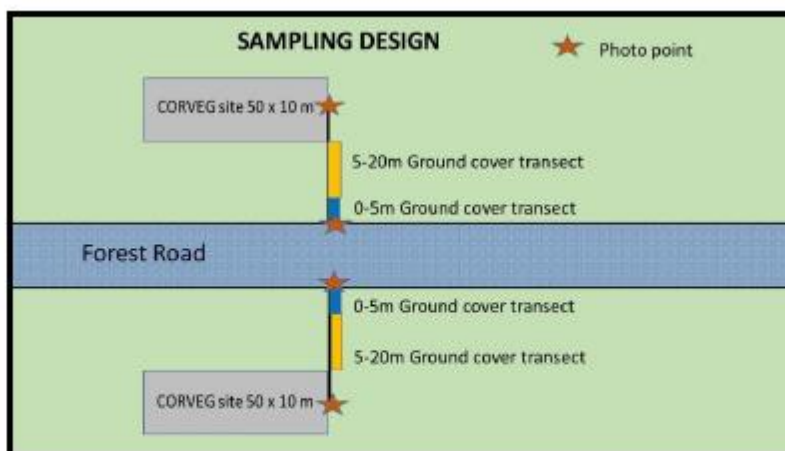
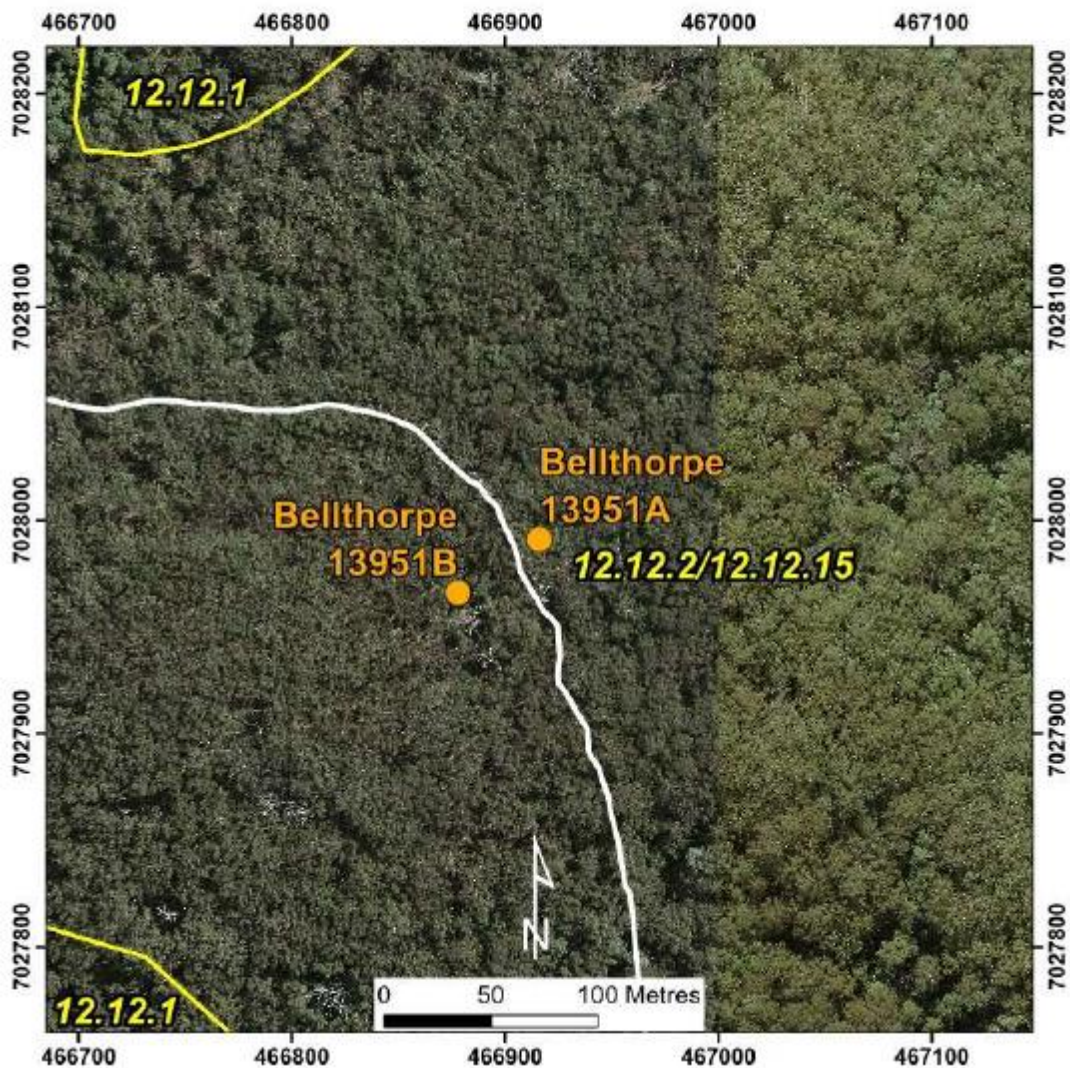
**General comments:** There was only three non-native species with sparse cover recorded in the trail-edge transect, with only *Gamochaeta coarctata* recorded on two occasions.





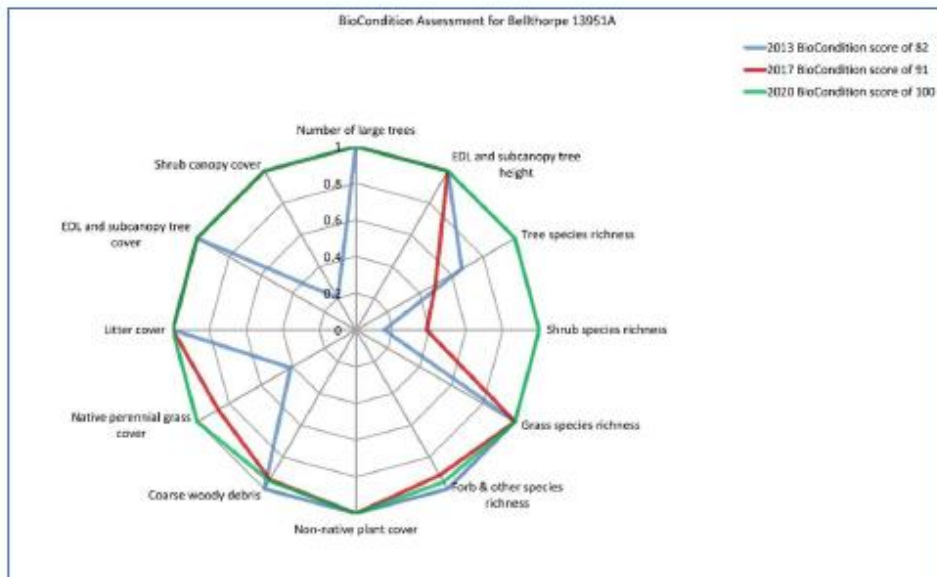
**SEQ Monitoring Report Card**  
**Bellthorpe 13951A**  
Regional Ecosystem 12.12.2  
*Eucalyptus pilularis*, *Eucalyptus racemosa*, *Corymbia intermedia* open forest  
Queensland Herbarium, October 2021







## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 82    2017 – 91    2020 – 100  
 Fire History: Burnt January 2013



Forest monitoring transect August 2017



Forest monitoring transect May 2020

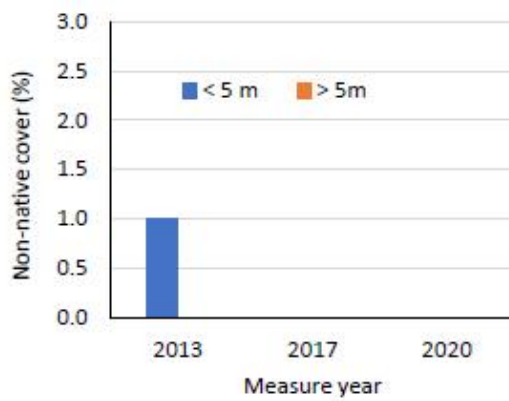
**General Comments:** This site consistently had a high BioCondition score, which improved at each sampling to reach the benchmark values in 2020. The improvements in scores were primarily in shrub species richness and cover and native perennial grass cover.

## Trail-edge ground cover transect at Bellthorpe 13951A

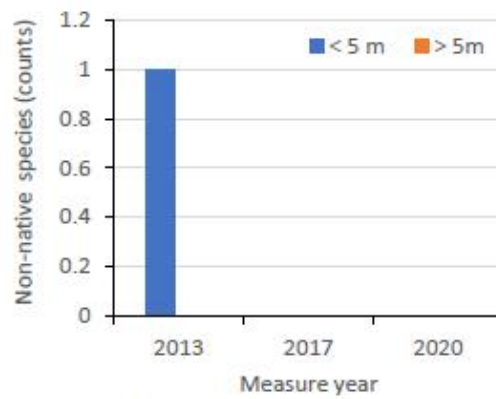


Trail-edge transect August 2017

Trail-edge transect May 2020



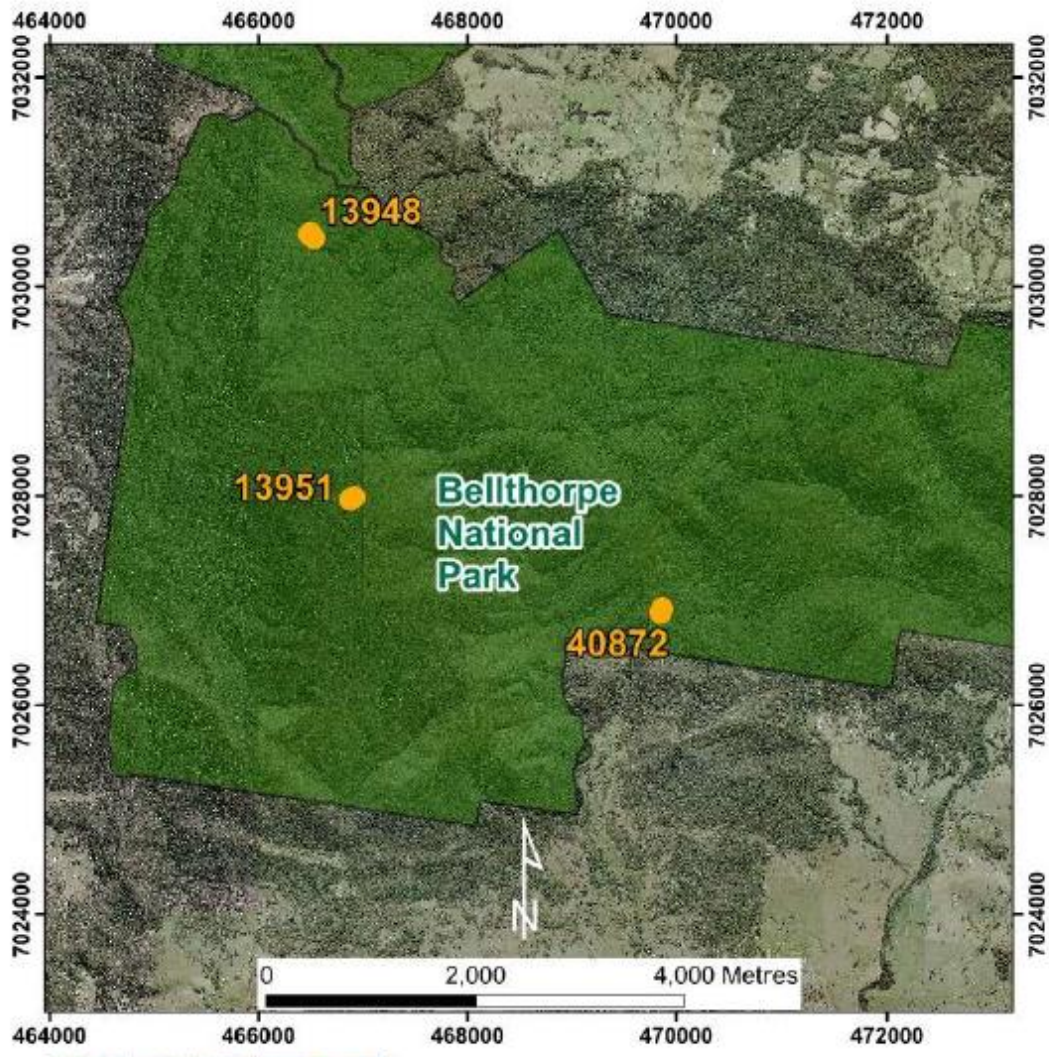
Non-native species cover



Number of non-native species

**General comments:** *Hypochaeris radicata* is the only non-native species present on the trail-edge transect. There were no non-native species recorded in the QBEIS site.

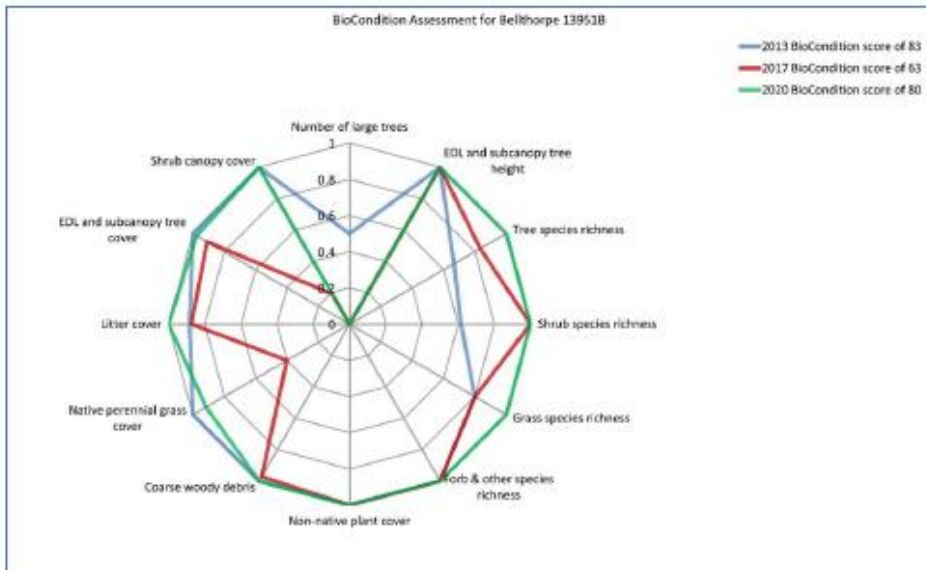




**SEQ Monitoring Report Card**  
**Bellthorpe 13951B**  
Regional Ecosystem 12.12.2  
*Eucalyptus pilularis*, *Eucalyptus racemosa*, *Syncarpia glomulifera* open forest  
Queensland Herbarium, October 2021



## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 83    2017 – 63    2020 – 80  
 Fire History: Burnt November 2016



Forest monitoring transect August 2017

Forest monitoring transect May 2020

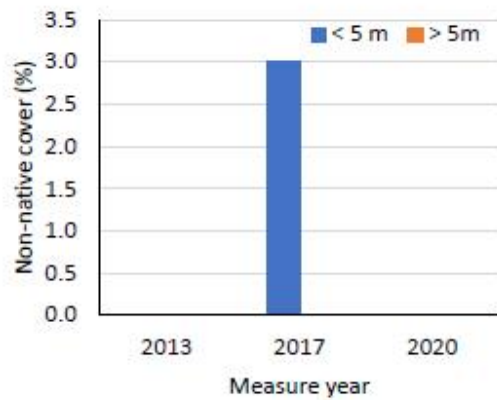
**General Comments:** This site had a variable BioCondition score. There was a deficit in large trees during the sampling period. Native perennial grass cover and shrub canopy cover improved over the sampling period. The only non-native species present in the QBEIS site was *Gomphocarpus physocarpus* in 2020.

## Trail-edge ground cover transect at Bellthorpe 13951B

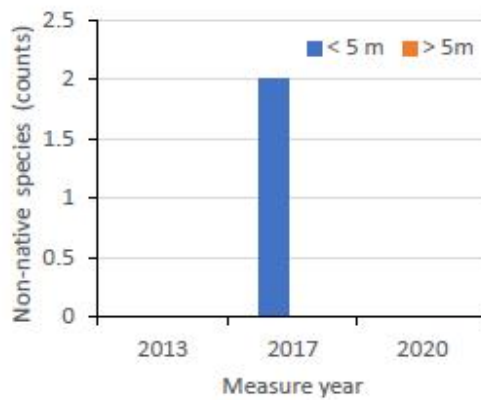


Trail-edge transect August 2017

Trail-edge transect May 2020



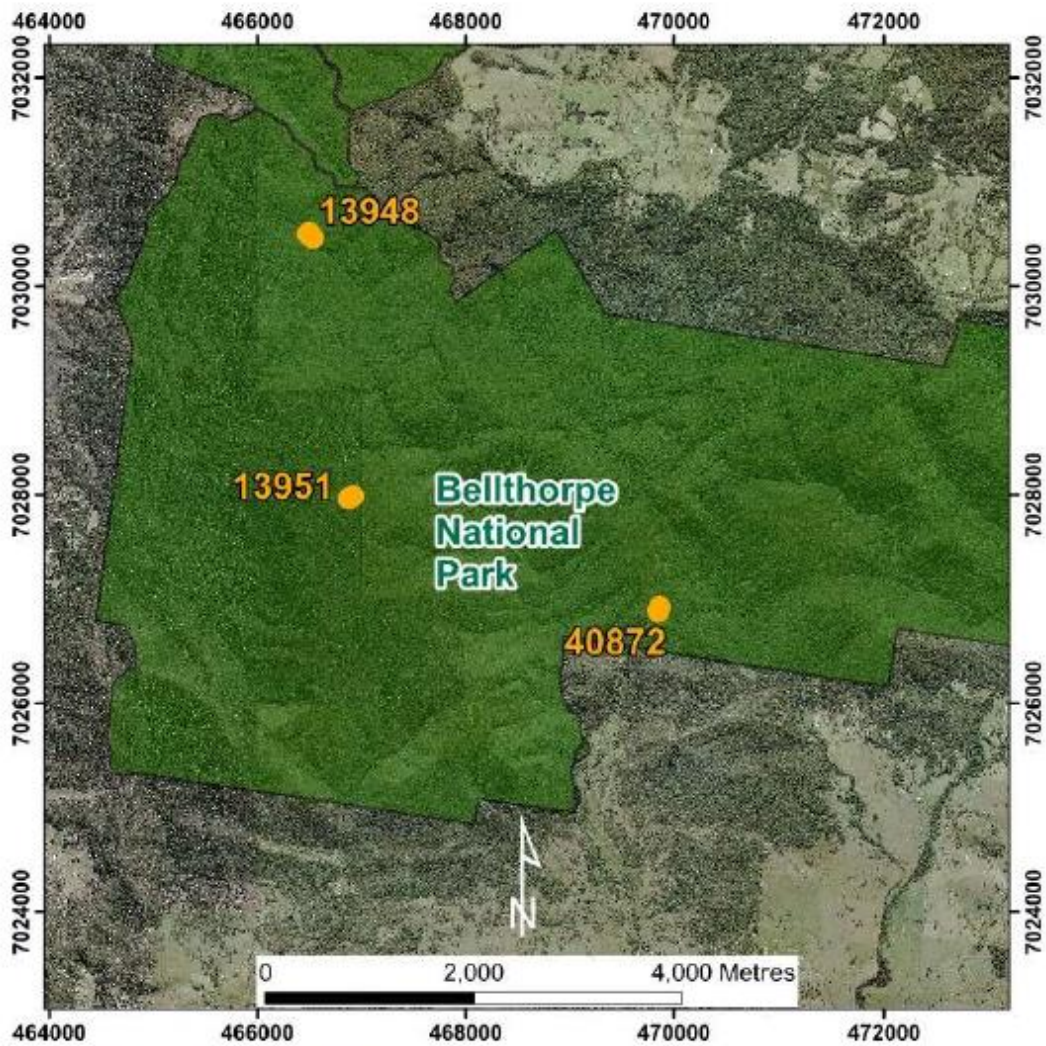
Non-native species cover



Number of non-native species

**General comments:** The only non-native species recorded on the trail-edge transect were *Paspalum urvillei* and *Hypochaeris radicata* in 2017.





**SEQ Monitoring Report Card**

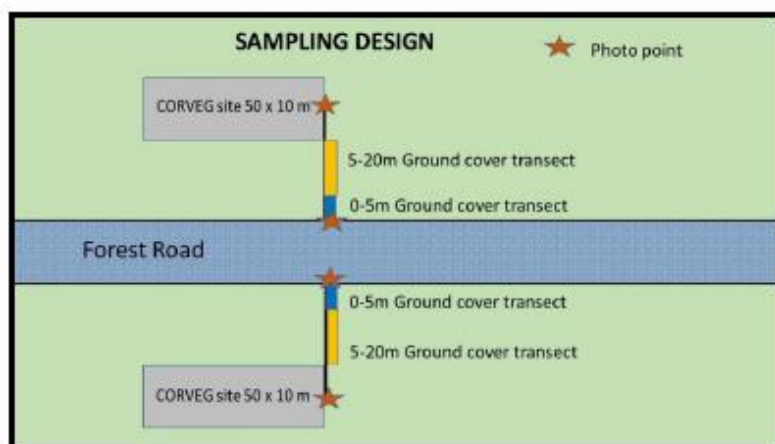
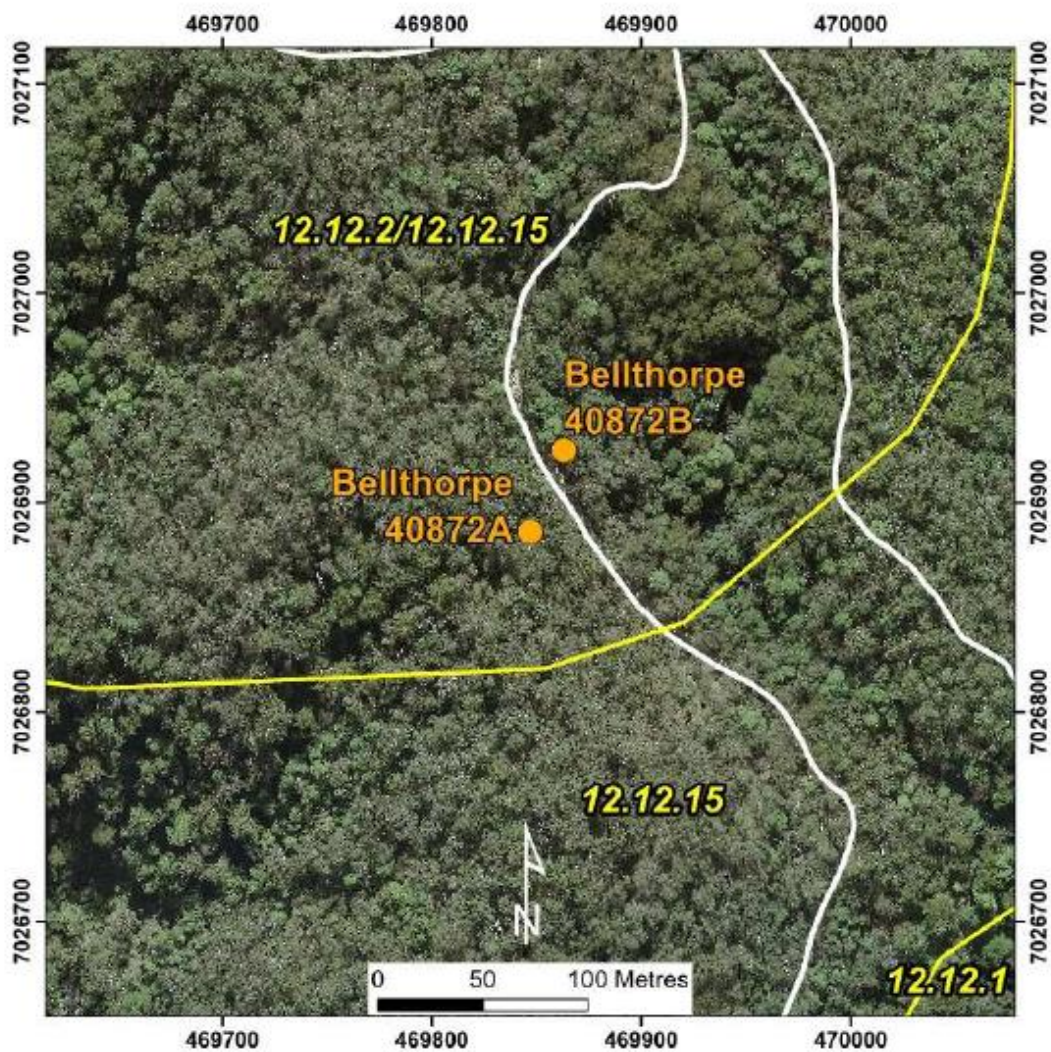
**Bellthorpe 40872A**

Regional Ecosystem 12.12.15

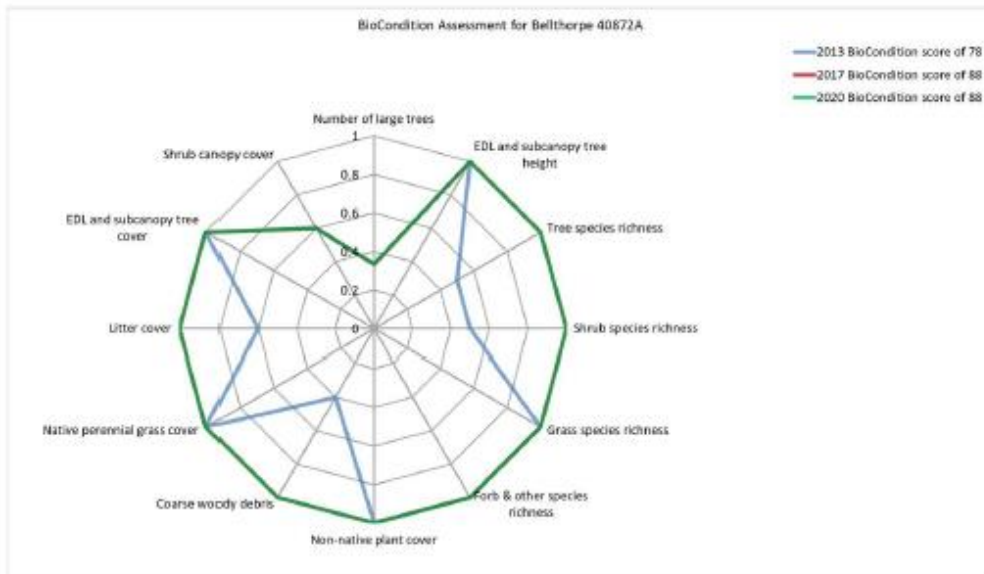
*Corymbia intermedia*, *Eucalyptus microcorys*, *Eucalyptus propinqua*, *Eucalyptus tereticornis* open forest

Queensland Herbarium, October 2021





## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 78    2017 – 88    2020 – 88  
 Fire History: Burnt January 2013



Forest monitoring transect August 2017

Forest monitoring transect May 2020

**General Comments:** This site had a high BioCondition score which improved from 2013 because of increased shrub cover and richness. It was deficient in large trees which lowered the overall score. There was a decreasing number of non-native herbs present - 6 species in 2013, 4 in 2017 and 2 in 2020, but always with less 1% cover overall, and hence the score for non-native plant cover was always top marks.

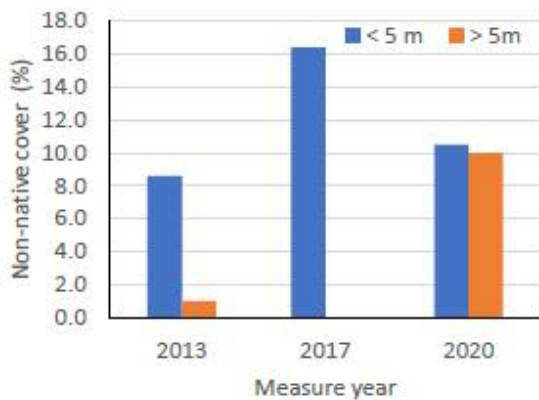


## Trail-edge ground cover transect at Bellthorpe 40872A

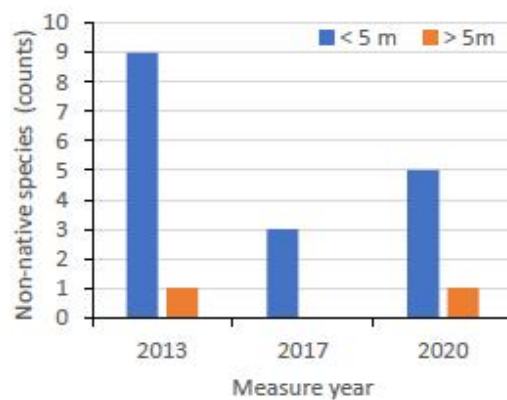


Trail-edge transect August 2017

Trail-edge transect May 2020

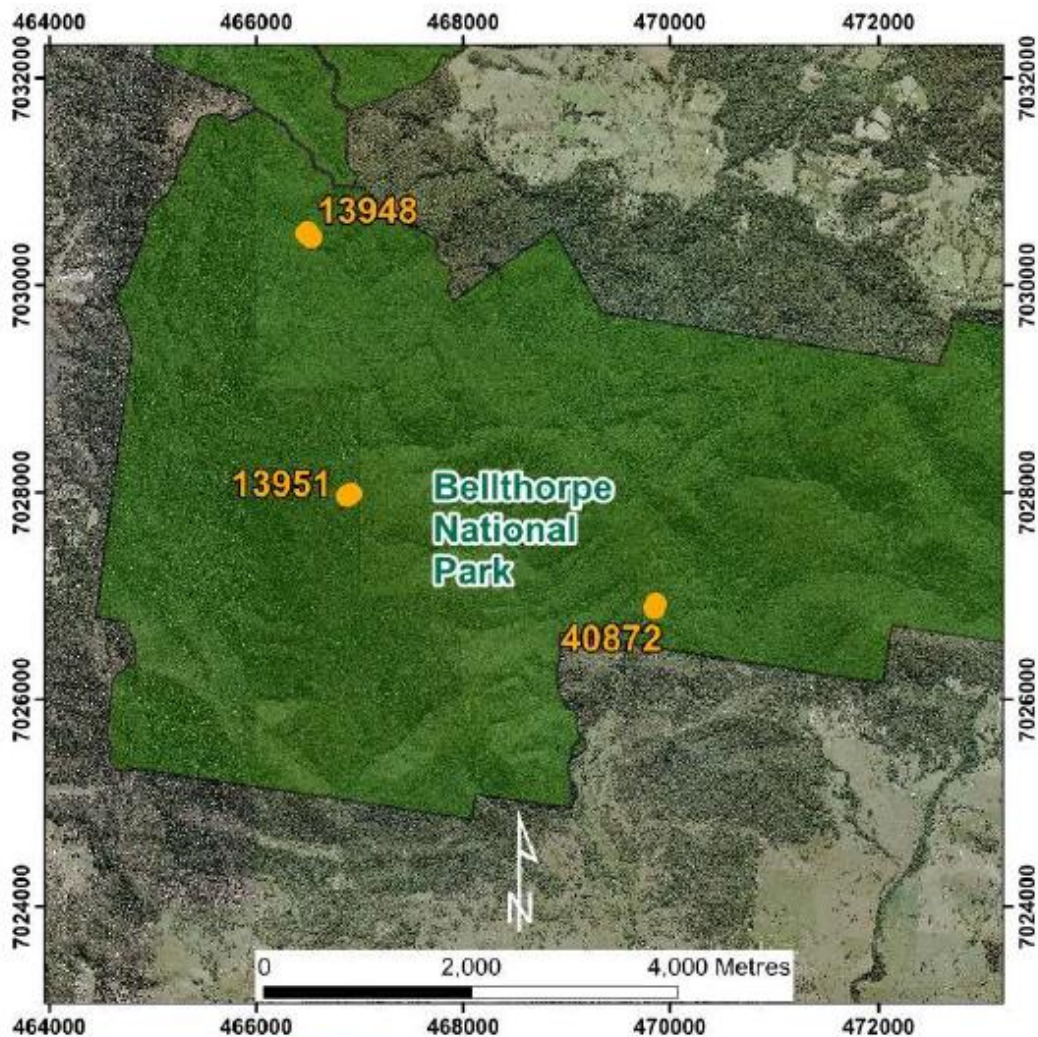


Non-native species cover



Number of non-native species

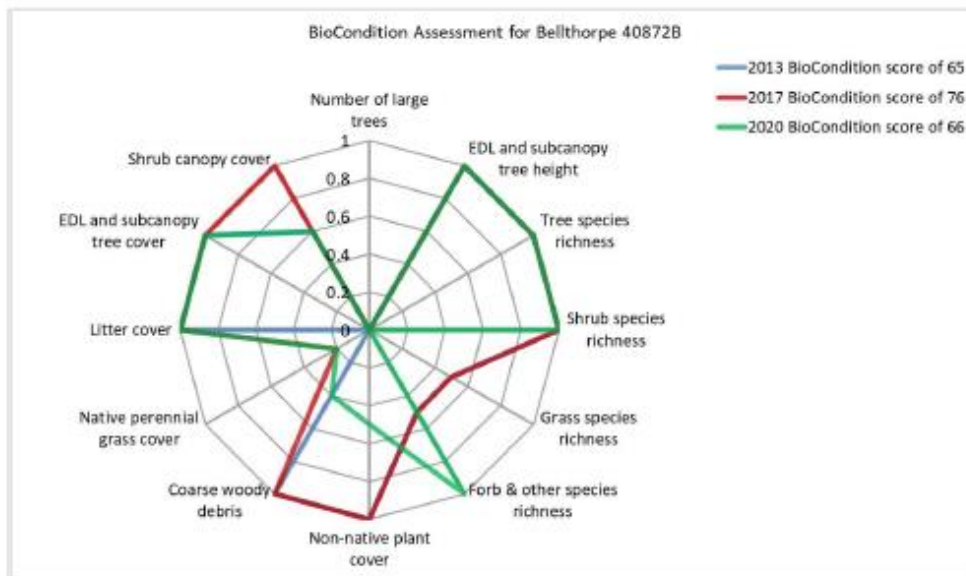
**General comments:** The track zone has the highest cover and richness of non-native species. *Ageratina riparia*, *Bidens pilosa* and *Paspalum urvillei* were consistently present with moderate cover on the embankment next to the road. These species were also recorded in the QBEIS site with sparse cover on at least one occasion. An additional five non-native herbs were recorded in the QBEIS site on at least one occasion with *Verbena rigida* recorded at each sampling.



**SEQ Monitoring Report Card**  
**Bellthorpe 40872B**  
Regional Ecosystem 12.12.15  
*Eucalyptus saligna*, *Eucalyptus microcorys* open forest  
Queensland Herbarium, October 2021



## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 65    2017 – 76    2020 – 66  
 Fire History: Burnt September 2009



Forest monitoring transect August 2017

Forest monitoring transect May 2020

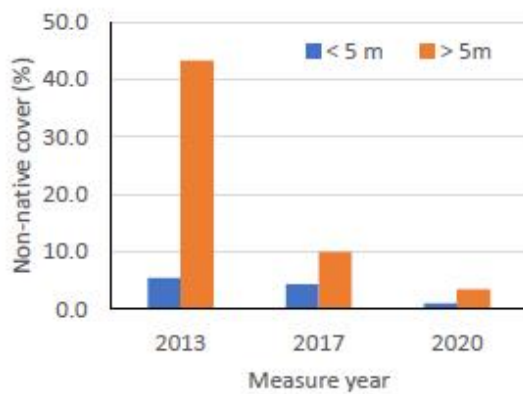
**General Comments:** This site consistently had only a moderate BioCondition score. It was in an ecotone where a number of rainforest species formed the dense subcanopy. There were no large trees present and grass species were generally lacking, probably because of shading. The amount of *Lantana camara* cover varied and altered the score for non-native plant cover.

## Trail-edge ground cover transect at Bellthorpe 40872B

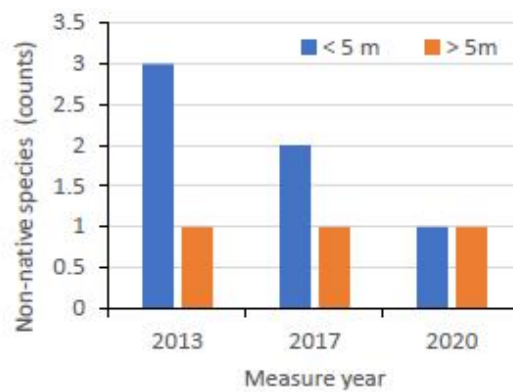


Trail-edge transect August 2017

Trail-edge transect May 2020



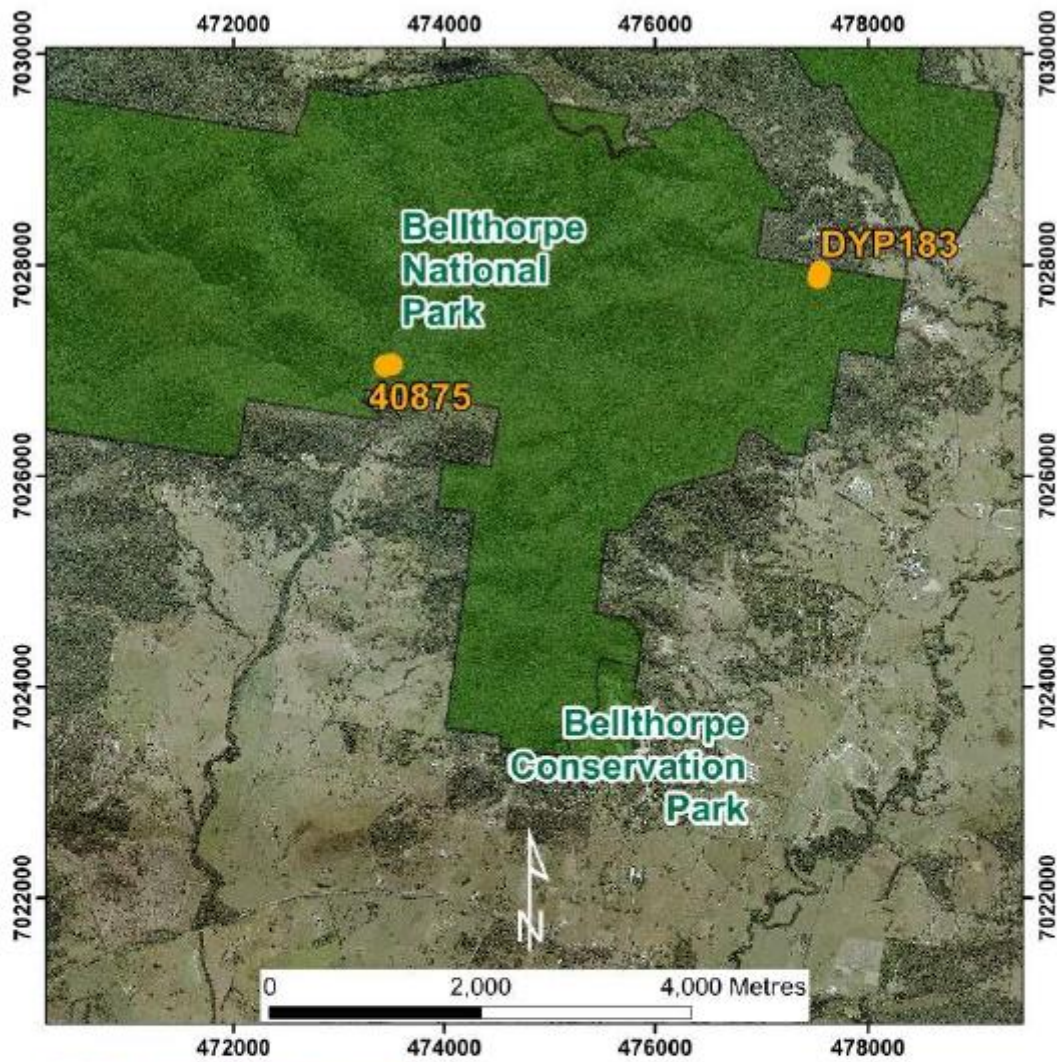
Non-native species cover



Number of non-native species

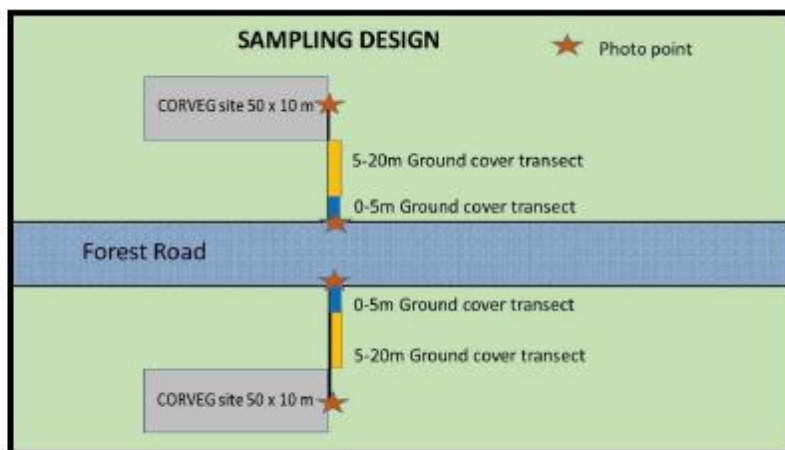
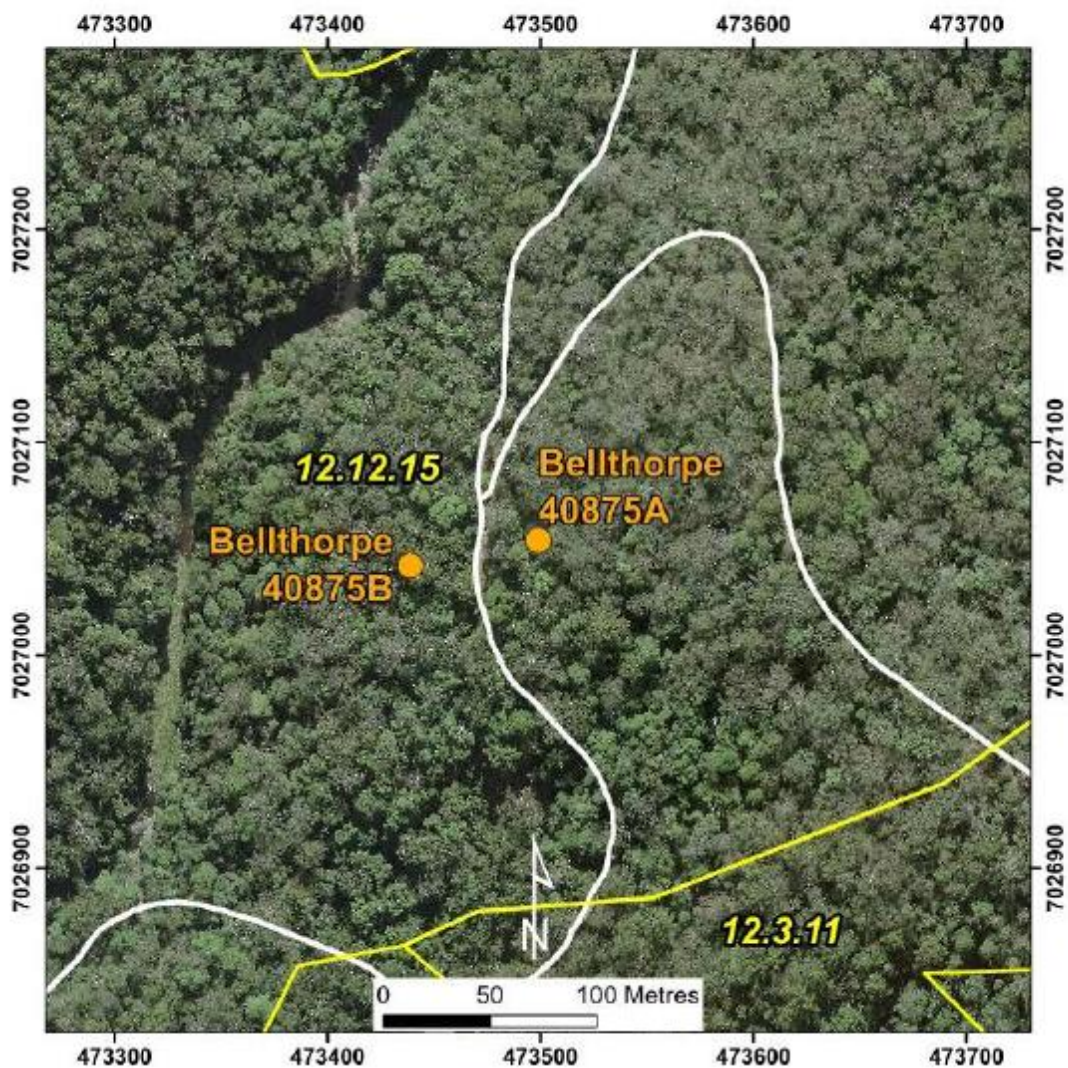
**General comments:** The track zone has *Ageratina riparia*, *Bidens pilosa*, *Erigeron bonariensis* and *Lantana camara* present with sparse cover. *Lantana camara* has high cover at the end of the transect and in the QBEIS site.





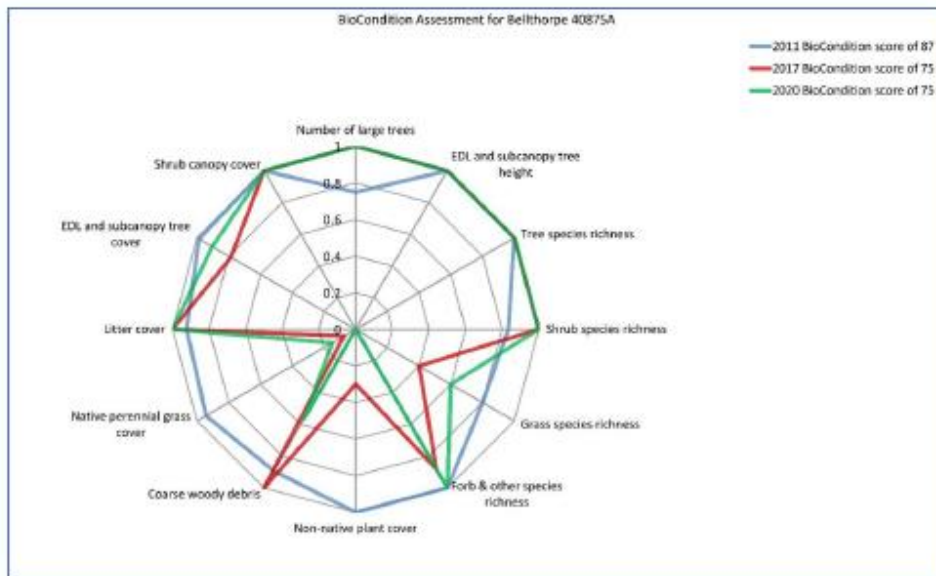
**SEQ Monitoring Report Card**  
**Bellthorpe 40875A**  
Regional Ecosystem 12.12.15  
*Corymbia intermedia*, *Eucalyptus propinqua* open forest  
Queensland Herbarium, October 2021







## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2011 – 87    2017 – 75    2020 – 75  
 Fire History: Burnt October 2008



Forest monitoring transect October 2017

Forest monitoring transect May 2020

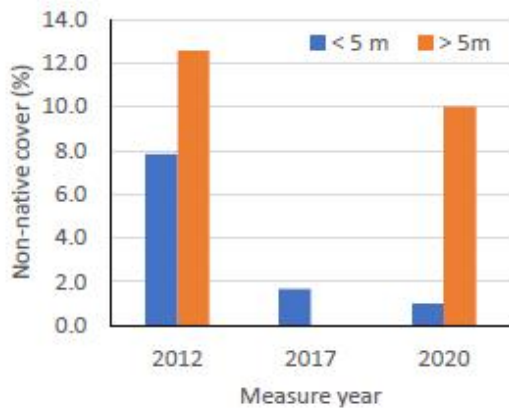
**General Comments:** This site consistently had a declining BioCondition score, mainly due to an increasing cover of *Lantana camara* (2% in 2011, 44% in 2017 and 67% in 2020) and associated decline in perennial grass cover and grass species richness.

## Trail-edge ground cover transect at Bellthorpe 40875A

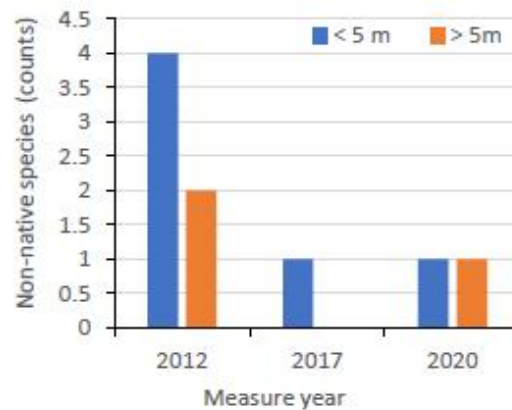


Trail-edge transect October 2017

Trail-edge transect May 2020



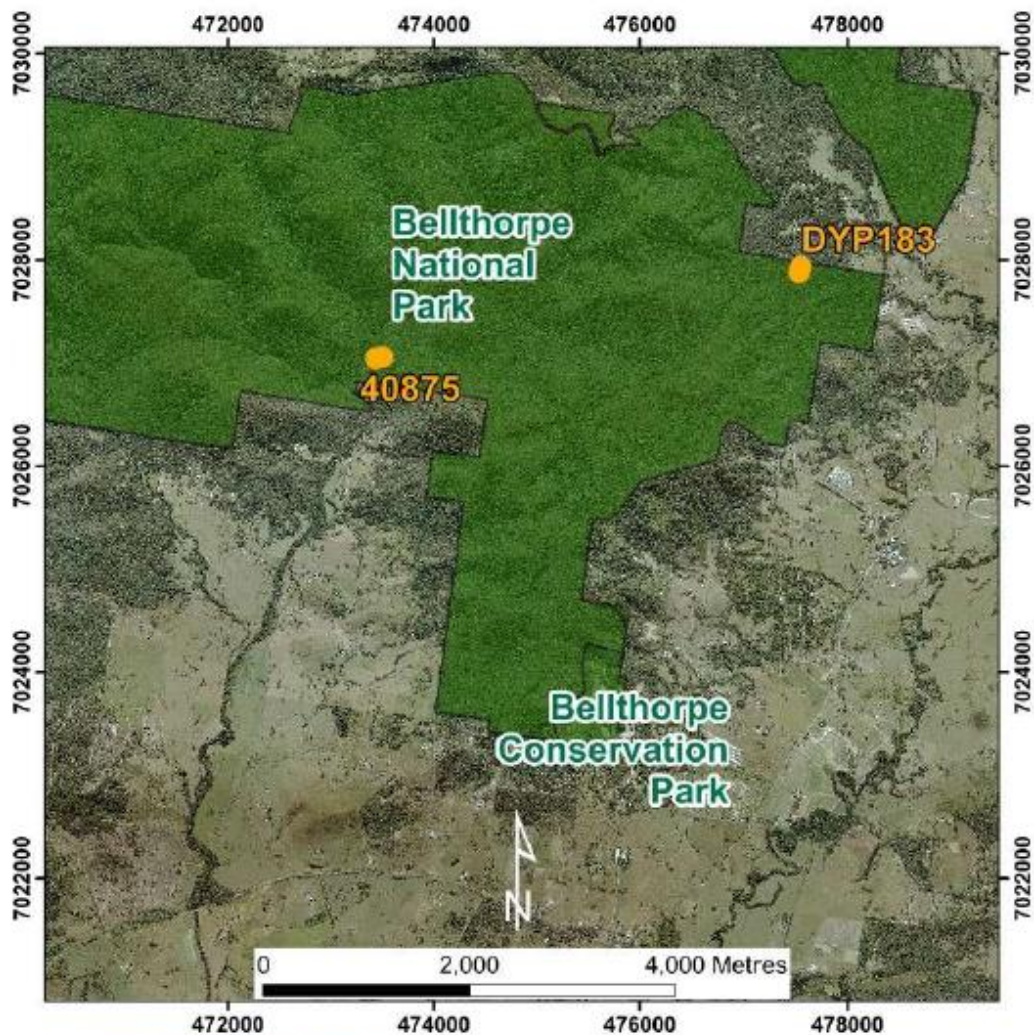
Non-native species cover



Number of non-native species

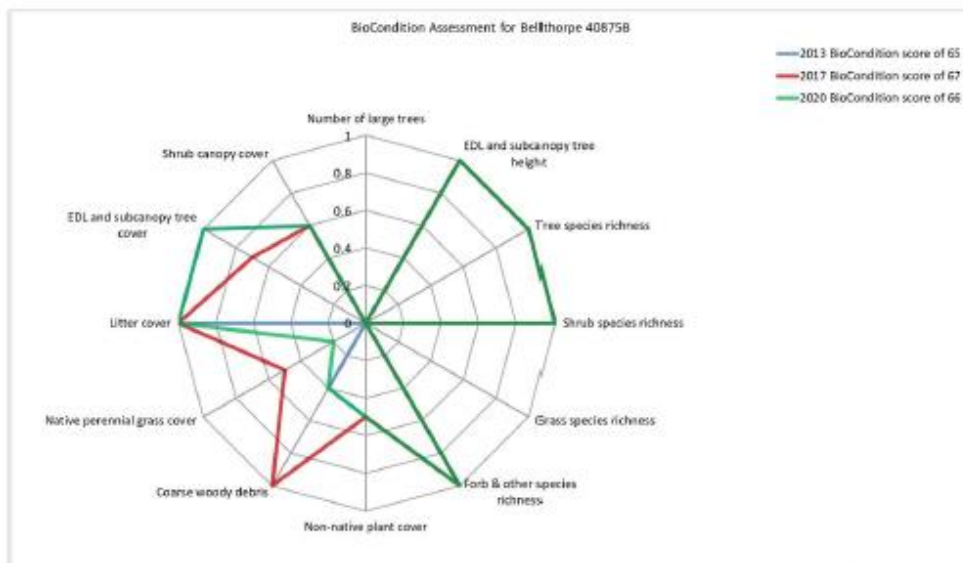
**General comments:** The track zone was disturbed by an illegal trail bike riders diversion track. The daisies *Ageratina riparia*, *Ageratum houstonianum* and *Crassocephalum crepidioides* were present near the road at the first sampling only. *Lantana camara* was consistently present with increasing cover in the QBEIS site.





**SEQ Monitoring Report Card**  
**Bellthorpe 40875B**  
Regional Ecosystem 12.12.15  
*Corymbia intermedia, Lophostemon confertus, Syncarpia glomulifera* open forest  
Queensland Herbarium, October 2021

## QBEIS Site BioCondition monitoring



Radar diagram of BioCondition Scores by attribute and year sampled  
 BioCondition scores: 2013 – 65    2017 – 67    2020 – 66  
 Fire History: Burnt 1993



Forest monitoring transect October 2017

Forest monitoring transect May 2020

**General Comments:** This site consistently had a moderate BioCondition score. The lack of large trees, and grass species consistently reduced the total score. *Lantana camara* had a relatively consistent moderate cover (15-26%) at the three sampling occasions.



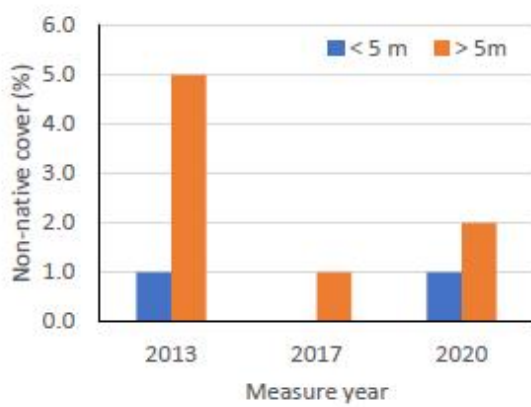
## Trail-edge ground cover transect at Bellthorpe 40875B



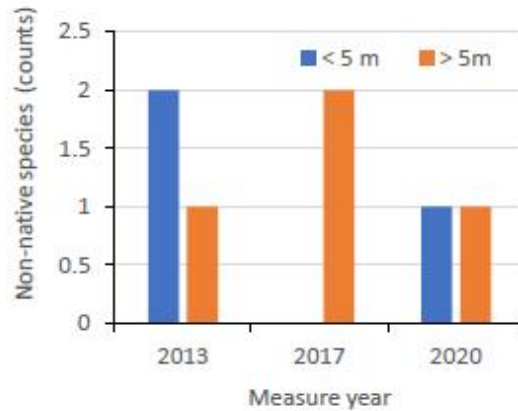
Trail-edge transect October 2017



Trail-edge transect May 2020



Non-native species cover



Number of non-native species

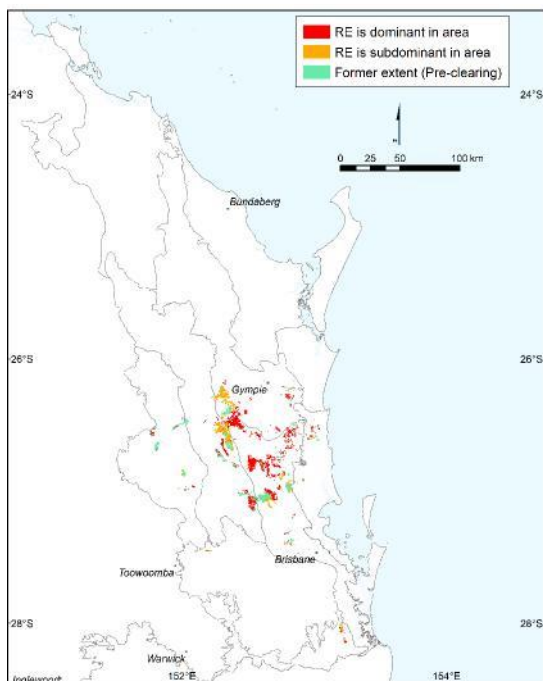
**General comments:** *Lantana camara* was consistently present with sparse cover in trail-edge transect, and was also consistently present in the QBEIS site at moderate cover. Scattered individuals of *Callisia fragrans* in 2013 and *Polygala paniculata* in 2020 were recorded exclusively at the trail edge.

## Appendix II. Technical Descriptions and Benchmarks

Please note that the [Technical Descriptions](#) and [Benchmarks](#) provided here are accurate at the time of publication of this report but may be subject to change over time as new data becomes available. Please refer to the relevant Departmental webpages to ensure you are accessing the most recent versions.



12.12.15: *Corymbia intermedia* +/- *Eucalyptus propinqua*, *E. siderophloia*, *E. microcorys*, *Lophostemon confertus* open forest on Mesozoic to Proterozoic igneous rocks



<b>Mapping data</b>	<b>Pre-clearing area = 77,527.6 ha; Remnant area 2019 = 58,494.6 ha; Remnant percent remaining in 2019 = 75.4 %</b>
<b>Species richness</b>	total: 333 (26 sites); woody: 136 (26 sites); ground: 263 (26 sites); average spp./site: 46.4, standard deviation: 13.5 (26 sites)
<b>Basal area</b>	average/site: 26.1 m <sup>2</sup> /ha; range: 15.0 - 55.0 m <sup>2</sup> /ha; std. deviation: 9.5; (26 sites)
<b>Ecological dominant layer (EDL) height</b>	stratum: tree 1; average/site: 24.87m; range: 18.00 - 31.00m; (26 sites)
<b>Ecological dominant layer (EDL) Crown Cover</b>	stratum: tree 1; average: 60.0%; range: 11.2 - 94.4%; (26 sites)
<b>Structural formation</b>	Open Forest: 53.8 %; Woodland: 26.9 %; Closed Forest: 11.5 %; Tall Open Forest: 7.7 %; (26 sites)
<b>Representative site(s)</b>	1983, 1987, 3087, 3091, 4116, 4461, 6174, 8508, 11815, 13233, 14004, 14994, 15166, 15681, 17213, 17225, 17228, 17318, 17319, 17320, 17333, 17376, 17415, 17475, 17995, 18401

**Stratum: Tree 1 (EDL)**

**Height:** average: 24.87m; range: 18.00 - 31.00m; (26 sites)

**Crown Cover:** average: 60.0%; range: 11.2 - 94.4%; (26 sites)

**Stem Count:** average: 263 stems/ha; range: 60 - 660 stems/ha; std. deviation: 163.9 stems/ha; (25 sites)

**Basal area:** average: 19.6 m<sup>2</sup>/ha; range: 5.0 - 45.0 m<sup>2</sup>/ha; std. deviation: 9.5 m<sup>2</sup>/ha; (26 sites)

**Species list (frequency (%), average cover (%)):**

Most frequent species (up to 6):

*Corymbia intermedia* (88.5, 12.1), *Lophostemon confertus* (61.5, 15.6), *Eucalyptus microcorys* (61.5, 13.8), *Eucalyptus propinqua* (53.8, 13.2), *Eucalyptus siderophloia* (50.0, 7.8), *Eucalyptus acmenoides* (42.3, 24.7)

Additional species:

*Eucalyptus carnea* (34.6, 15.0), *Eucalyptus tereticornis* (23.1, 8.0), *Eucalyptus resinifera* (15.4, 15.8), *Eucalyptus major* (11.5, 14.0), *Angophora subvelutina* (11.5, 9.5), *Corymbia trachyphloia* subsp. *trachyphloia* (7.7, 21.0), *Allocasuarina torulosa* (7.7, 6.5), *Eucalyptus crebra* (7.7, 6.2), *Lophostemon suaveolens* (7.7, 1.0), *Corymbia citriodora* subsp. *variegata* (3.8, 16.0), *Eucalyptus longirostrata* (3.8, 8.0), *Eucalyptus saligna* (3.8, 7.0), *Syncarpia verecunda* (3.8, 7.0), *Eucalyptus helidonica* (3.8, 3.0), *Angophora woodsiana* (3.8, 2.0), *Eucalyptus biturbinata* (3.8, 1.0), *Syncarpia glomulifera* subsp. *glomulifera* (3.8, 1.0), *Eucalyptus grandis* (3.8, 0.0)

## Stratum: Tree 2

**Height:** average: 11.81m; range: 5.00 - 22.00m; (24 sites)

**Crown Cover:** average: 25.9%; range: 0.0 - 80.0%; (24 sites)

**Stem Count:** average: 525 stems/ha; range: 24 - 1,600 stems/ha; std. deviation: 381.4 stems/ha; (24 sites)

**Basal area:** average: 6.9 m<sup>2</sup>/ha; range: 1.0 - 13.0 m<sup>2</sup>/ha; std. deviation: 3.7 m<sup>2</sup>/ha; (22 sites)

### Species list (frequency (%), average cover (%)):

#### Most frequent species (up to 6):

*Corymbia intermedia* (57.7, 4.2), *Lophostemon confertus* (53.8, 11.9), *Allocasuarina torulosa* (38.5, 7.5), *Eucalyptus microcorys* (30.8, 3.8), *Eucalyptus siderophloia* (23.1, 4.2), *Eucalyptus acmenoides* (23.1, 2.8)

#### Additional species:

*Syncarpia glomulifera* subsp. *glomulifera* (19.2, 5.5), *Eucalyptus propinqua* (19.2, 4.5), *Acacia disparrima* subsp. *disparrima* (19.2, 4.3), *Angophora subvelutina* (19.2, 4.3), *Eucalyptus tereticornis* (19.2, 4.0), *Lophostemon suaveolens* (15.4, 13.2), *Allocasuarina littoralis* (15.4, 7.5), *Acacia melanoxylon* (11.5, 15.0), *Melaleuca salicina* (11.5, 13.7), *Alphitonia excelsa* (11.5, 4.2), *Polyscias elegans* (11.5, 4.0), *Cryptocarya microneura* (7.7, 8.0), *Melaleuca quinquenervia* (7.7, 2.0), *Acacia maidenii* (7.7, 1.5), *Eucalyptus camea* (7.7, 1.0), *Acacia penninervis* var. *penninervis* (3.8, 5.0), *Syncarpia verecunda* (3.8, 3.0), *Angophora woodsiana* (3.8, 2.0), *Corymbia trachyphloia* subsp. *trachyphloia* (3.8, 2.0), *Flindersia xanthoxyla* (3.8, 2.0), *Eucalyptus major* (3.8, 1.0), *Trochocarpa laurina* (3.8, 1.0), *Cryptocarya glaucescens* (3.8, 0.5), *Psydrax odorata* forma *australiana* (3.8, 0.5), *Synoum glandulosum* subsp. *glandulosum* (3.8, 0.5), *Zanthoxylum brachyacanthum* (3.8, 0.5), *Amyema congener* (3.8, 0.0), *Eucalyptus longirostrata* (3.8, 0.0), *Glochidion sumatranum* (3.8, 0.0), *Halfordia kendack* (3.8, 0.0), *Platycterium bifurcatum* (3.8, 0.0)

## Stratum: Tree 3

**Height:** average: 5.95m; range: 3.00 - 8.00m; (10 sites)

**Crown Cover:** average: 23.6%; range: 6.0 - 66.6%; (10 sites)

**Stem Count:** average: 1,614 stems/ha; range: 180 - 4,760 stems/ha; std. deviation: 1,758.7 stems/ha; (10 sites)

**Basal area:** average: 3.2 m<sup>2</sup>/ha; range: 1.0 - 5.0 m<sup>2</sup>/ha; std. deviation: 1.8 m<sup>2</sup>/ha; (5 sites)

### Species list (frequency (%), average cover (%)):

#### Most frequent species (up to 6):

*Corymbia intermedia* (26.9, 2.4), *Lophostemon confertus* (19.2, 4.0), *Acacia disparrima* subsp. *disparrima* (19.2, 3.3), *Alphitonia excelsa* (15.4, 9.2), *Eucalyptus siderophloia* (15.4, 0.0), *Euroschinus falcatus* var. *falcatus* (15.4, 0.0)

#### Additional species:

*Allocasuarina torulosa* (11.5, 5.5), *Lophostemon suaveolens* (11.5, 3.7), *Eucalyptus microcorys* (11.5, 3.0), *Polyscias elegans* (11.5, 0.5), *Glochidion ferdinandi* var. *ferdinandi* (7.7, 40.1), *Glochidion sumatranum* (7.7, 29.4), *Allocasuarina littoralis* (7.7, 6.7), *Acacia irrorata* subsp. *irrorata* (7.7, 4.4), *Halfordia kendack* (7.7, 3.6), *Acacia penninervis* var. *penninervis* (7.7, 1.0), *Guioa semiglaucula* (7.7, 0.5), *Acacia maidenii* (7.7, 0.0), *Acacia melanoxylon* (7.7, 0.0), *Eucalyptus acmenoides* (7.7, 0.0), *Lantana camara*\* (7.7, 0.0), *Eucalyptus propinqua* (3.8, 6.0), *Cryptocarya glaucescens* (3.8, 3.0), *Melaleuca salicina* (3.8, 3.0), *Corymbia citriodora* subsp. *variegata* (3.8, 2.0), *Eucalyptus major* (3.8, 1.0), *Melaleuca quinquenervia* (3.8, 1.0), *Acronychia laevis* (3.8, 0.0), *Clematicissus opaca* (3.8, 0.0), *Eucalyptus resinifera* (3.8, 0.0), *Eucalyptus tereticornis* (3.8, 0.0), *Ficus coronata* (3.8, 0.0), *Parsonsia straminea* (3.8, 0.0), *Syncarpia glomulifera* subsp. *glomulifera* (3.8, 0.0), *Trochocarpa laurina* (3.8, 0.0)

## Stratum: Shrub 1

**Height:** average: 1.88m; range: 1.20 - 3.00m; (26 sites)

**Crown Cover:** average: 17.4%; range: 1.0 - 71.4%; (26 sites)

**Stem Count:** average: 2,235 stems/ha; range: 80 - 6,720 stems/ha; std. deviation: 1,916.3 stems/ha; (23 sites)

**Basal area:** average: 2.0 m<sup>2</sup>/ha; range: 2.0 - 2.0 m<sup>2</sup>/ha; std. deviation: 0.0 m<sup>2</sup>/ha; (1 site)

### Species list (frequency (%), average cover (%)):

#### Most frequent species (up to 6):



*Lophostemon confertus* (76.9, 2.8), *Alphitonia excelsa* (61.5, 2.4), *Allocasuarina torulosa* (46.2, 2.1), *Lantana camara*\* (38.5, 17.1), *Acacia disparrima subsp. disparrima* (38.5, 1.5), *Acacia maidenii* (38.5, 1.1)

Additional species:

*Breynia oblongifolia* (38.5, 1.0), *Polyscias elegans* (30.8, 3.0), *Corymbia intermedia* (30.8, 2.0), *Eucalyptus propinqua* (26.9, 6.6), *Acacia melanoxylon* (26.9, 0.9), *Eucalyptus microcorys* (23.1, 7.0), *Glochidion ferdinandi var. ferdinandi* (23.1, 2.6), *Eucalyptus siderophloia* (23.1, 2.0), *Psychotria loniceroides* (19.2, 1.4), *Euroschinus falcatus var. falcatus* (19.2, 0.0), *Xanthorrhoea latifolia subsp. latifolia* (15.4, 10.7), *Eucalyptus acmenoides* (15.4, 4.1), *Astrotricha latifolia* (15.4, 3.0), *Hovea acutifolia* (15.4, 1.0), *Wikstroemia indica* (15.4, 0.2), *Psychotria daphnoides* (15.4, 0.0), *Platylobium formosum* (11.5, 28.3), *Clerodendrum floribundum* (11.5, 4.5), *Allocasuarina littoralis* (11.5, 2.2), *Smilax australis* (11.5, 2.0), *Acacia irrorata subsp. irrorata* (11.5, 1.8), *Angophora subvelutina* (11.5, 1.0), *Jacksonia scoparia* (11.5, 0.8), *Eucalyptus carnea* (11.5, 0.0), *Guioa semiglaucula* (11.5, 0.0), *Piliostigma rhytispermum* (11.5, 0.0), *Denhamia silvestris* (7.7, 2.0), *Dioscorea transversa* (7.7, 2.0), *Persoonia sericea* (7.7, 2.0), *Trochocarpa laurina* (7.7, 1.8), *Banksia integrifolia subsp. compar* (7.7, 1.0), *Cissus antarctica* (7.7, 1.0), *Cordyline petiolaris* (7.7, 0.5), *Dodonaea triquetra* (7.7, 0.5), *Eupomatia laurina* (7.7, 0.5), *Glochidion sumatranum* (7.7, 0.5), *Jagera pseudorhus var. pseudorhus* (7.7, 0.5), *Notelaea longifolia* (7.7, 0.5), *Acrotriche aggregata* (7.7, 0.0), *Carissa ovata* (7.7, 0.0), *Celastrus subspicata* (7.7, 0.0), *Cryptocarya glaucescens* (7.7, 0.0), *Eucalyptus tereticornis* (7.7, 0.0), *Maclura cochinchinensis* (7.7, 0.0), *Mallotus philippensis* (7.7, 0.0), *Rhodamnia rubescens* (7.7, 0.0), *Tetrastigma nitens* (7.7, 0.0), *Zieria smithii* (7.7, 0.0), *Cassinia laevis subsp. rosmarinifolia* (3.8, 4.2), *Cassinia subtropica* (3.8, 3.0), *Daviesia villifera* (3.8, 3.0), *Corymbia citriodora subsp. variegata* (3.8, 2.0), *Acacia penninervis var. penninervis* (3.8, 1.5), *Acacia longissima* (3.8, 1.0), *Acacia oshanesii* (3.8, 1.0), *Corymbia trachyphloia subsp. trachyphloia* (3.8, 1.0), *Elaeocarpus reticulatus* (3.8, 1.0), *Melaleuca quinquenervia* (3.8, 1.0), *Pittosporum multiflorum* (3.8, 1.0), *Pultenaea retusa* (3.8, 1.0), *Acalypha nemorum* (3.8, 0.5), *Acronychia oblongifolia* (3.8, 0.5), *Dysoxylum* (3.8, 0.5), *Heptapleurum actinophyllum* (3.8, 0.5), *Ligustrum sinense\** (3.8, 0.5), *Melastoma malabathricum subsp. malabathricum* (3.8, 0.5), *Pomaderris ferruginea* (3.8, 0.5), *Denhamia* (3.8, 0.2), *Myrsine variabilis* (3.8, 0.2), *Acacia disparrima* (3.8, 0.0), *Acronychia laevis* (3.8, 0.0), *Alpinia caerulea* (3.8, 0.0), *Archirhodomyrtus beckleri* (3.8, 0.0), *Archontophoenix cunninghamiana* (3.8, 0.0), *Cinnamomum camphora\** (3.8, 0.0), *Citrus australis* (3.8, 0.0), *Claoxylon australe* (3.8, 0.0), *Clematicissus opaca* (3.8, 0.0), *Cryptocarya microneura* (3.8, 0.0), *Cryptocarya obovata* (3.8, 0.0), *Cupaniopsis anacardioides* (3.8, 0.0), *Cyclophyllum coprosmoides var. coprosmoides* (3.8, 0.0), *Cymbidium canaliculatum* (3.8, 0.0), *Dendrobium aemulum* (3.8, 0.0), *Denhamia celastroides* (3.8, 0.0), *Eucalyptus crebra* (3.8, 0.0), *Ficus coronata* (3.8, 0.0), *Flindersia xanthoxyla* (3.8, 0.0), *Geitonoplesium cymosum* (3.8, 0.0), *Hardenbergia violacea* (3.8, 0.0), *Indigofera australis* (3.8, 0.0), *Kennedia rubicunda* (3.8, 0.0), *Lophostemon suaveolens* (3.8, 0.0), *Melaleuca salicina* (3.8, 0.0), *Mezoneuron scortechinii* (3.8, 0.0), *Opecularia aspera* (3.8, 0.0), *Ozothamnus diosmifolius* (3.8, 0.0), *Pittosporum revolutum* (3.8, 0.0), *Pittosporum undulatum* (3.8, 0.0), *Platynerium bifurcatum* (3.8, 0.0), *Psyrax odorata forma australiana* (3.8, 0.0), *Rhodosphaera rhodanthema* (3.8, 0.0), *Santalum obtusifolium* (3.8, 0.0), *Scolopia braunii* (3.8, 0.0), *Stephania japonica var. discolor* (3.8, 0.0), *Sterculia quadrifida* (3.8, 0.0), *Syncarpia verecunda* (3.8, 0.0), *Synoum glandulosum subsp. glandulosum* (3.8, 0.0), *Trema tomentosa var. aspera* (3.8, 0.0)

## Stratum: Shrub 2

**Height:** average: 0.68m; range: 0.60 - 0.75m; (2 sites)

**Crown Cover:** average: 8.7%; range: 3.4 - 13.9%; (2 sites)

**Stem Count:** average: 2,100 stems/ha; range: 1,400 - 2,800 stems/ha; std. deviation: 990.0 stems/ha; (2 sites)

**Basal area:** No data available.

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Piliostigma rhytispermum* (3.8, 6.0), *Lantana camara*\* (3.8, 3.0), *Cissus antarctica* (3.8, 1.0), *Corymbia trachyphloia subsp. trachyphloia* (3.8, 1.0), *Dioscorea transversa* (3.8, 1.0), *Dysoxylum* (3.8, 1.0)

Additional species:

*Acacia irrorata subsp. irrorata* (3.8, 0.5), *Acalypha nemorum* (3.8, 0.5), *Alpinia caerulea* (3.8, 0.5), *Eucalyptus siderophloia* (3.8, 0.5), *Macrozamia lucida* (3.8, 0.5), *Styphelia sieberi* (3.8, 0.4), *Acacia disparrima subsp. disparrima* (3.8, 0.2), *Acacia maidenii* (3.8, 0.2), *Allocasuarina torulosa* (3.8, 0.2), *Bursaria spinosa subsp. spinosa* (3.8, 0.2), *Carissa ovata* (3.8, 0.2), *Monotoca scoparia* (3.8, 0.2), *Myrsine variabilis* (3.8, 0.2), *Alphitonia excelsa* (3.8, 0.0), *Embelia australiana* (3.8, 0.0), *Hovea acutifolia* (3.8, 0.0), *Mallotus philippensis* (3.8, 0.0), *Persoonia iogyna* (3.8, 0.0), *Pittosporum multiflorum* (3.8, 0.0), *Smilax australis* (3.8, 0.0), *Solori involuta* (3.8, 0.0), *Wikstroemia indica* (3.8, 0.0), *Zieria minutiflora subsp. minutiflora* (3.8, 0.0)

## Stratum: Ground

Height: average: 0.55m; range: 0.30 - 1.10m; (26 sites)

Projective foliage cover (PFC): average: 34.9%; range: 6.2 - 70.0%; (26 sites)

Species list (frequency (%), average cover (%)):

### Grass - perennial:

Most frequent species (up to 6):

*Imperata cylindrica* (92.3, 7.0), *Themeda triandra* (69.2, 18.7), *Entolasia stricta* (50.0, 2.2), *Digitaria parviflora* (46.2, 5.1), *Oplismenus aemulus* (46.2, 0.4), *Panicum effusum* (30.8, 0.7)

Additional species:

*Ottlochloa gracillima* (26.9, 12.5), *Oplismenus imbecillis* (23.1, 1.3), *Cymbopogon refractus* (19.2, 1.2), *Poa labillardierei* var. *labillardierei* (19.2, 6.2), *Microlaena stipoides* (15.4, 0.8), *Sporobolus laxus* (11.5, 1.0), *Aristida queenslandica* var. *queenslandica* (7.7, 1.0), *Dichelachne micrantha* (7.7, 1.0), *Eremochloa bimaculata* (7.7, 1.8), *Paspalidium distans* (7.7, 0.5), *Alloteropsis semialata* (3.8, 1.0), *Aristida* (3.8, 0.5), *Arundinella nepalensis* (3.8, 6.0), *Capillipedium parviflorum* (3.8, 0.0), *Capillipedium spicigerum* (3.8, 0.2), *Chrysopogon sylvaticus* (3.8, 0.2), *Digitaria minima* (3.8, 0.2), *Eragrostis spartinoides* (3.8, 0.0), *Heteropogon contortus* (3.8, 2.0), *Melinis minutiflora*\* (3.8, 2.0), *Melinis repens*\* (3.8, 0.2), *Ottlochloa nodosa* (3.8, 5.0), *Paspalidium* (3.8, 0.0), *Paspalidium gausum* (3.8, 0.0), *Paspalum scrobiculatum* (3.8, 0.0), *Poa* (3.8, 6.0), *Urochloa decumbens*\* (3.8, 0.0)

### Grass - annual/biennial:

Not present

### Forbs & other:

Most frequent species (up to 6):

*Cyanthillium cinereum* (80.8, 0.2), *Desmodium rhytidophyllum* (76.9, 1.4), *Lomandra longifolia* (76.9, 1.6), *Eustrephus latifolius* (73.1, 0.6), *Dianella caerulea* (69.2, 1.8), *Desmodium gunnii* (65.4, 0.2)

Additional species:

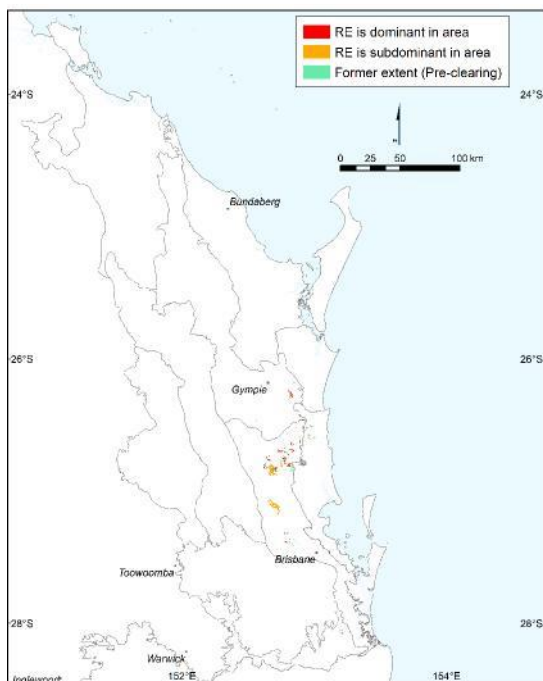
*Pteridium esculentum* (50.0, 4.2), *Hardenbergia violacea* (46.2, 0.0), *Lepidosperma laterale* var. *laterale*\* (42.3, 1.3), *Smilax australis* (42.3, 0.2), *Pilea stellarioides* (38.5, 0.3), *Sigesbeckia orientalis* (38.5, 0.2), *Glycine clandestina* var. *clandestina* (34.6, 0.2), *Coleus australis* (30.8, 0.0), *Kennedia rubicunda* (30.8, 1.5), *Lantana camara*\* (30.8, 1.7), *Lobelia purpurascens* (30.8, 0.6), *Stephania japonica* var. *discolor* (30.8, 0.0), *Breynia oblongifolia* (26.9, 0.0), *Causonis clematidea* (26.9, 1.2), *Cissus antarctica* (26.9, 2.1), *Cissus hypoglauca* (26.9, 0.8), *Brunoniella australis* (23.1, 0.2), *Clematicissus opaca* (23.1, 0.0), *Commelina diffusa* (23.1, 0.2), *Cyperus laevis* (23.1, 0.2), *Drynaria rigidula* (23.1, 4.0), *Glycine tabacina* (23.1, 0.2), *Goodenia rotundifolia* (23.1, 1.1), *Rubus parvifolius* (23.1, 0.5), *Bidens pilosa*\* (19.2, 0.0), *Dioscorea transversa* (19.2, 1.0), *Indigofera australis* (19.2, 0.0), *Lomandra confertifolia* subsp. *pallida* (19.2, 1.3), *Lomandra laxa* (19.2, 1.6), *Lomandra multiflora* subsp. *multiflora* (19.2, 1.2), *Oxalis chnoodes* (19.2, 0.0), *Pseuderanthemum variabile* (19.2, 0.6), *Scleria mackaviensis* (19.2, 0.2), *Teucrium argutum* (19.2, 0.2), *Wikstroemia indica* (19.2, 0.2), *Acacia disparrima* subsp. *disparrima* (15.4, 1.0), *Blechnum cartilagineum* (15.4, 5.5), *Blechnum neohollandicum* (15.4, 13.0), *Blechnum rupestre* (15.4, 0.2), *Calochlaena dubia* (15.4, 6.0), *Centratherum riparium* (15.4, 0.0), *Geitonoplesium cymosum* (15.4, 0.0), *Geranium solanderi* var. *solanderi* (15.4, 1.6), *Myrsine variabilis* (15.4, 0.2), *Passiflora subpeltata*\* (15.4, 0.2), *Phyllanthus virgatus* (15.4, 0.0), *Rubus moluccanus* var. *trilobus* (15.4, 0.0), *Viola hederacea* (15.4, 0.0), *Acacia maidenii* (11.5, 0.0), *Acrotriche aggregata* (11.5, 0.2), *Adiantum aethiopicum* (11.5, 0.0), *Adiantum hispidulum* (11.5, 2.0), *Alphitonia excelsa* (11.5, 0.2), *Astrotricha latifolia* (11.5, 0.0), *Chamaecrista mimosoides* (11.5, 0.0), *Crassocephalum crepidioides*\* (11.5, 0.0), *Cymbidium madidum* (11.5, 0.0), *Hibbertia aspera* (11.5, 0.7), *Hydrocotyle laxiflora* (11.5, 0.0), *Passiflora suberosa*\* (11.5, 0.8), *Platylobium formosum* (11.5, 12.3), *Acalypha nemorum* (7.7, 0.0), *Ageratina riparia*\* (7.7, 0.0), *Ageratum houstonianum*\* (7.7, 0.0), *Alpinia caerulea* (7.7, 1.0), *Aneilema acuminatum* (7.7, 0.0), *Baccharis halimifolia*\* (7.7, 0.0), *Billardiera scandens* (7.7, 0.0), *Blechnum doodianum* (7.7, 0.0), *Carex breviculmis* (7.7, 0.0), *Cassytha filiformis* (7.7, 0.0), *Centella asiatica* (7.7, 0.0), *Cheilanthes sieberi* (7.7, 0.2), *Cheilanthes tenuifolia* (7.7, 0.5), *Corymbia citriodora* subsp. *variegata* (7.7, 2.0), *Corymbia intermedia* (7.7, 0.6), *Crotalaria montana* (7.7, 0.0), *Cyperus cyperoides* (7.7, 0.0), *Davallia pyxidata* (7.7, 0.0), *Desmodium brachypodium* (7.7, 0.0), *Dianella caerulea* var. *vannata* (7.7, 0.0), *Euroschinus falcatus* var. *falcatus* (7.7, 0.0), *Gomphocarpus fruticosus*\* (7.7, 0.0), *Grewia latifolia* (7.7, 0.0), *Guioa semiglauca* (7.7, 0.0), *Gymnostachys anceps* (7.7, 0.5), *Hibbertia stricta* (7.7, 0.0), *Jagera pseudorhus* var. *pseudorhus* (7.7, 0.0), *Lobelia gibbosa* (7.7, 0.0), *Lomandra* (7.7, 0.4), *Lophostemon confertus* (7.7, 3.6), *Lordhowea amygdalifolia* (7.7, 2.0), *Macrozamia lucida* (7.7, 0.5), *Myrsine angusta* (7.7, 0.0), *Olea paniculata* (7.7, 0.0), *Phyllanthus gunnii* (7.7, 0.2), *Pilidistigma rhytispermum* (7.7, 0.2), *Pittosporum revolutum* (7.7, 0.0), *Plantago debilis* (7.7, 0.0), *Psychotria loniceroides* (7.7, 0.2), *Pultenaea retusa* (7.7, 0.0), *Sceptridium australe* (7.7, 0.0), *Secamone elliptica* (7.7, 0.0), *Solanum densevestitum* (7.7, 0.0), *Tetrastigma nitens* (7.7, 1.0), *Verbena rigida*\* (7.7, 0.0), *Xanthorrhoea latifolia* subsp. *latifolia* (7.7, 2.5), *Zieria minutiflora* subsp. *minutiflora* (7.7, 0.0), *Zieria smithii* (7.7, 0.0), *Acacia leiocalyx* subsp. *leiocalyx* (3.8, 0.0), *Acacia longissima* (3.8, 2.0), *Acacia melanoxylon* (3.8, 0.0), *Acomis acoma* (3.8, 0.5), *Acronychia laevis* (3.8, 0.0), *Ajuga australis* (3.8, 0.0), *Allocasuarina littoralis* (3.8, 0.2), *Allocasuarina torulosa* (3.8, 0.5), *Amyema congener* (3.8, 0.0), *Amyema miquelii* (3.8, 0.0), *Anisomeles moschata* (3.8, 0.0), *Archidendron grandiflorum* (3.8, 0.0), *Aristolochia meridionalis* (3.8, 0.0), *Austrosteenisia blackii* (3.8, 0.0), *Banksia integrifolia* subsp. *compa* (3.8, 0.0), *Carex declinata* (3.8, 0.0), *Carex inversa* (3.8, 0.0), *Cassytha glabella* forma *glabella* (3.8, 2.0), *Cassytha pubescens* (3.8, 0.0), *Celastrus subspicata* (3.8, 1.0), *Chamaecrista nomame* var. *nomame* (3.8, 0.0), *Cinnamomum camphora*\* (3.8, 0.2), *Clematis glycinoides* (3.8, 0.0), *Clerodendrum*



*floribundum* (3.8, 0.0), *Commelina lanceolata* (3.8, 0.6), *Cordyline congesta* (3.8, 0.0), *Crotalaria lanceolata* subsp. *lanceolata*\* (3.8, 0.2), *Cryptocarya glaucescens* (3.8, 0.2), *Cryptocarya microneura* (3.8, 0.0), *Cyperus enervis* (3.8, 0.0), *Decaneuropsis obovata* (3.8, 0.0), *Dendrobium aemulum* (3.8, 0.0), *Denhamia celastroides* (3.8, 0.0), *Desmodium microphyllum* (3.8, 0.0), *Desmodium nemorosum* (3.8, 0.0), *Desmodium varians* (3.8, 0.0), *Dianella caerulea* var. *assera* (3.8, 0.5), *Dianella revoluta* (3.8, 0.0), *Dichondra repens* (3.8, 0.0), *Dockrillia linguiformis* (3.8, 0.0), *Drypetes deplanchei* (3.8, 0.0), *Emilia sonchifolia*\* (3.8, 0.2), *Erigeron* (3.8, 0.0), *Erigeron bonariensis*\* (3.8, 0.0), *Eucalyptus microcorys* (3.8, 3.0), *Eupomatia bennettii* (3.8, 0.0), *Eupomatia laurina* (3.8, 0.0), *Euroschinus falcatus* (3.8, 0.0), *Fimbristylis dichotoma* (3.8, 0.0), *Flagellaria indica* (3.8, 0.0), *Flemingia parviflora* (3.8, 0.0), *Gahnia aspera* (3.8, 0.5), *Glochidion ferdinandi* var. *ferdinandi* (3.8, 0.0), *Glycine clandestina* (3.8, 0.4), *Glycine tomentella* (3.8, 0.0), *Gomphocarpus physocarpus*\* (3.8, 0.0), *Hackelia suaveolens* (3.8, 0.0), *Hibbertia aspera* subsp. *aspera* (3.8, 1.6), *Hibbertia dentata* (3.8, 0.0), *Hibbertia scandens* (3.8, 0.0), *Hibbertia vestita* (3.8, 0.0), *Hovea acutifolia* (3.8, 0.0), *Hydrocotyle paludosa* (3.8, 0.0), *Hypericum gramineum* (3.8, 0.0), *Hypochaeris radicata*\* (3.8, 0.0), *Hypoxis pratensis* (3.8, 0.0), *Ipomoea plebeia* (3.8, 0.0), *Jacksonia scoparia* (3.8, 0.0), *Leichhardtia coronata* (3.8, 0.0), *Leichhardtia fraseri* (3.8, 0.0), *Leichhardtia lloydii* (3.8, 0.0), *Lespedeza juncea* subsp. *sericea* (3.8, 9.0), *Lobelia trigonocaulis* (3.8, 0.6), *Lomandra filiformis* subsp. *filiformis* (3.8, 0.0), *Lomandra hystrix* (3.8, 1.0), *Maclura cochinchinensis* (3.8, 0.0), *Melastoma malabathricum* subsp. *malabathricum* (3.8, 0.0), *Melodinus australis* (3.8, 0.0), *Ochna serrulata*\* (3.8, 0.0), *Olearia nemstii* (3.8, 0.0), *Oxalis rubens* (3.8, 0.0), *Pandorea pandorana* (3.8, 0.0), *Parsonsia straminea* (3.8, 0.0), *Passiflora aurantia* (3.8, 0.0), *Passiflora foetida*\* (3.8, 0.0), *Persoonia sericea* (3.8, 0.2), *Pigea enneasperma* (3.8, 0.0), *Platynerium bifurcatum* (3.8, 0.0), *Polygala japonica* (3.8, 0.0), *Polyscias sambucifolia* (3.8, 0.0), *Poranthera microphylla* (3.8, 0.0), *Psilotum nudum* (3.8, 0.0), *Psychotria daphnoides* (3.8, 0.0), *Pterostylis nutans* (3.8, 0.0), *Pyrrosia confluens* (3.8, 0.0), *Ranunculus lappaceus* (3.8, 0.0), *Rhodamnia rubescens* (3.8, 0.0), *Scleria brownii* (3.8, 0.0), *Senecio pinnatifolius* (3.8, 0.0), *Solanum americanum*\* (3.8, 0.0), *Sterculia quadrifida* (3.8, 0.0), *Styphelia sieberi* (3.8, 0.0), *Telmatoblechnum indicum* (3.8, 0.0), *Tephrosia filipes* (3.8, 0.0), *Tephrosia rufula* (3.8, 0.0), *Thysanotus tuberosus* (3.8, 0.0), *Trachymene procumbens* (3.8, 0.5), *Trema tomentosa* var. *aspera* (3.8, 0.0), *Trochocarpa laurina* (3.8, 0.0), *Veronica plebeia* (3.8, 0.0), *Vigna vexillata* (3.8, 0.0), *Viola banksii* (3.8, 1.0), *Viola betonicifolia* (3.8, 0.0), *Xanthorrhoea johnsonii* (3.8, 0.0), *Zornia dyctiocarpa* (3.8, 0.0)

Species list: Frequency (percent of total sites) and cover (average of species cover across sites where that species is present). Ordered by decreasing frequency. Naturalised species have an asterisk (\*) after the name. indet. after listed name if indeterminate species or genus.

**12.12.15a: Eucalyptus grandis and/or E. saligna tall open forest +/- vine forest understory in wet gullies on Mesozoic to Proterozoic igneous rocks**



<b>Mapping data</b>	<b>Pre-clearing area = 10,530.6 ha; Remnant area 2019 = 6,265.6 ha; Remnant percent remaining in 2019 = 59.5 %</b>
<b>Species richness</b>	total: 167 (5 sites); woody: 97 (5 sites); ground: 104 (5 sites); average spp./site: 52.2, standard deviation: 18.4 (5 sites)
<b>Basal area</b>	average/site: 39.4 m <sup>2</sup> /ha; range: 21.0 - 76.0 m <sup>2</sup> /ha; std. deviation: 21.6; (5 sites)
<b>Ecological dominant layer (EDL) height</b>	stratum: tree 1; average/site: 34.80m; range: 29.00 - 50.00m; (5 sites)
<b>Ecological dominant layer (EDL) Crown Cover</b>	stratum: tree 1; average: 56.1%; range: 25.0 - 85.2%; (5 sites)
<b>Structural formation</b>	Open Forest: 40.0 %; Tall Open Forest: 40.0 %; Tall Woodland: 20.0 %; (5 sites)
<b>Representative site(s)</b>	3092, 3763, 17314, 17317, 17375

**Stratum: Tree 1 (EDL)**

**Height:** average: 34.80m; range: 29.00 - 50.00m; (5 sites)

**Crown Cover:** average: 56.1%; range: 25.0 - 85.2%; (5 sites)

**Stem Count:** average: 107 stems/ha; range: 60 - 160 stems/ha; std. deviation: 50.3 stems/ha; (3 sites)

**Basal area:** average: 20.4 m<sup>2</sup>/ha; range: 7.0 - 37.0 m<sup>2</sup>/ha; std. deviation: 10.8 m<sup>2</sup>/ha; (5 sites)

**Species list (frequency (%), average cover (%)):**

Most frequent species (up to 6):

*Lophostemon confertus* (100.0, 15.8), *Eucalyptus microcorys* (80.0, 12.7), *Eucalyptus grandis* (60.0, 37.0), *Corymbia intermedia* (60.0, 17.9), *Eucalyptus propinqua* (40.0, 6.2), *Eucalyptus saligna* (20.0, 14.0)

Additional species:

*Eucalyptus siderophloia* (20.0, 0.0), *Syncarpia glomulifera subsp. glomulifera* (20.0, 0.0)



## Stratum: Tree 2

**Height:** average: 20.00m; range: 15.00 - 27.00m; (5 sites)

**Crown Cover:** average: 34.1%; range: 13.0 - 81.0%; (5 sites)

**Stem Count:** average: 520 stems/ha; range: 360 - 720 stems/ha; std. deviation: 183.3 stems/ha; (3 sites)

**Basal area:** average: 14.8 m<sup>2</sup>/ha; range: 10.0 - 33.0 m<sup>2</sup>/ha; std. deviation: 10.2 m<sup>2</sup>/ha; (5 sites)

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Lophostemon confertus* (60.0, 12.5), *Syncarpia glomulifera* subsp. *glomulifera* (60.0, 4.7), *Allocasuarina torulosa* (40.0, 8.0), *Archontophoenix cunninghamiana* (40.0, 3.1), *Eucalyptus grandis* (40.0, 3.0), *Synoum glandulosum* subsp. *glandulosum* (20.0, 20.0)

#### Additional species:

*Cryptocarya microneura* (20.0, 17.0), *Dysoxylum mollissimum* subsp. *molle* (20.0, 17.0), *Schizomeria ovata* (20.0, 8.0), *Austrocallerya megasperma* (20.0, 7.6), *Gmelina leichhardtii* (20.0, 5.0), *Sloanea woollsii* (20.0, 5.0), *Cryptocarya glaucescens* (20.0, 4.0), *Diploglottis australis* (20.0, 4.0), *Elatostachys nervosa* (20.0, 3.9), *Acronychia pubescens* (20.0, 3.0), *Mischarytera lautereriana* (20.0, 3.0), *Sarcopteryx stipata* (20.0, 3.0), *Eucalyptus microcorys* (20.0, 2.0), *Calamus muelleri* (20.0, 1.0), *Eucalyptus resinifera* (20.0, 1.0), *Flindersia schottiana* (20.0, 1.0), *Corymbia intermedia* (20.0, 0.0), *Cymbidium canaliculatum* (20.0, 0.0), *Endiandra pubens* (20.0, 0.0), *Neolitsea dealbata* (20.0, 0.0), *Polyscias elegans* (20.0, 0.0)

## Stratum: Tree 3

**Height:** average: 6.00m; range: 3.00 - 9.00m; (5 sites)

**Crown Cover:** average: 32.7%; range: 19.0 - 51.8%; (5 sites)

**Stem Count:** average: 1,373 stems/ha; range: 520 - 2,080 stems/ha; std. deviation: 790.3 stems/ha; (3 sites)

**Basal area:** average: 4.0 m<sup>2</sup>/ha; range: 1.0 - 7.0 m<sup>2</sup>/ha; std. deviation: 2.2 m<sup>2</sup>/ha; (5 sites)

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Neolitsea dealbata* (80.0, 15.9), *Glochidion ferdinandi* var. *ferdinandi* (60.0, 10.0), *Alphitonia excelsa* (60.0, 5.7), *Polyscias elegans* (60.0, 2.8), *Archontophoenix cunninghamiana* (60.0, 2.4), *Schizomeria ovata* (40.0, 16.0)

#### Additional species:

*Elaeocarpus reticulatus* (40.0, 6.0), *Euroschinus falcatus* (40.0, 3.0), *Acronychia pubescens* (40.0, 2.0), *Synoum glandulosum* subsp. *glandulosum* (40.0, 2.0), *Syncarpia glomulifera* subsp. *glomulifera* (40.0, 0.0), *Endiandra pubens* (20.0, 7.2), *Elatostachys nervosa* (20.0, 6.0), *Guioa semiglaucula* (20.0, 5.0), *Cryptocarya macdonaldii* (20.0, 4.4), *Allocasuarina torulosa* (20.0, 4.0), *Cryptocarya microneura* (20.0, 3.0), *Lophostemon confertus* (20.0, 3.0), *Calamus muelleri* (20.0, 2.0), *Mischarytera lautereriana* (20.0, 2.0), *Palmeria foremanii* (20.0, 2.0), *Dysoxylum mollissimum* subsp. *molle* (20.0, 1.4), *Acronychia* (20.0, 1.0), *Callicoma serratifolia* (20.0, 1.0), *Cordylina rubra* (20.0, 1.0), *Dysoxylum rufum* (20.0, 1.0), *Litsea leefeana* (20.0, 1.0), *Notelaea longifolia* (20.0, 1.0), *Acacia penninervis* var. *longiracemosa* (20.0, 0.0), *Archirodomyrtus beckleri* (20.0, 0.0), *Canarium australasicum* (20.0, 0.0), *Corymbia intermedia* (20.0, 0.0), *Diploglottis australis* (20.0, 0.0), *Elaeocarpus grandis* (20.0, 0.0), *Eucalyptus siderophloia* (20.0, 0.0), *Ficus coronata* (20.0, 0.0), *Hibiscus heterophyllus* (20.0, 0.0), *Hovea acutifolia* (20.0, 0.0), *Lantana camara*\* (20.0, 0.0), *Livistona australis* (20.0, 0.0), *Olea paniculata* (20.0, 0.0), *Parsonsia straminea* (20.0, 0.0), *Passiflora edulis*\* (20.0, 0.0), *Pilidostigma rhytispermum* (20.0, 0.0), *Piper hederaceum* var. *hederaceum* (20.0, 0.0), *Pittosporum revolutum* (20.0, 0.0), *Platynerium bifurcatum* (20.0, 0.0), *Tabernaemontana pandacaqui* (20.0, 0.0), *Trochocarpa laurina* (20.0, 0.0), *Trophis scandens* subsp. *scandens* (20.0, 0.0)

## Stratum: Shrub 1

**Height:** average: 1.34m; range: 1.00 - 1.50m; (5 sites)

**Crown Cover:** average: 15.7%; range: 2.0 - 29.5%; (5 sites)

**Stem Count:** average: 2,880 stems/ha; range: 1,840 - 4,240 stems/ha; std. deviation: 1,231.6 stems/ha; (3 sites)

**Basal area:** average: 1.0 m<sup>2</sup>/ha; range: 1.0 - 1.0 m<sup>2</sup>/ha; std. deviation: 0.0 m<sup>2</sup>/ha; (1 site)

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Lantana camara*\* (60.0, 13.6), *Eupomatia laurina* (60.0, 3.0), *Neolitsea dealbata* (60.0, 2.0), *Glochidion ferdinandi* var. *ferdinandi*

(40.0, 6.0), *Archontophoenix cunninghamiana* (40.0, 3.0), *Calamus muelleri* (40.0, 1.5)

Additional species:

*Pittosporum multiflorum* (40.0, 1.2), *Alpinia caerulea* (40.0, 1.0), *Smilax australis* (40.0, 1.0), *Cordyline rubra* (40.0, 0.5), *Endiandra discolor* (40.0, 0.0), *Mallotus philippensis* (40.0, 0.0), *Synoum glandulosum* subsp. *glandulosum* (40.0, 0.0), *Mallotus claoxyloides* (20.0, 6.0), *Tasmannia insipida* (20.0, 4.0), *Cryptocarya microneura* (20.0, 3.0), *Palmeria foremanii* (20.0, 2.0), *Schizomeria ovata* (20.0, 2.0), *Acronychia pubescens* (20.0, 1.0), *Drypetes deplanchei* (20.0, 1.0), *Flagellaria indica* (20.0, 1.0), *Melodinus australis* (20.0, 1.0), *Mischarytera lautereriana* (20.0, 1.0), *Pilidiostigma rhytispermum* (20.0, 1.0), *Psychotria loniceroides* (20.0, 1.0), *Acronychia* (20.0, 0.5), *Coelospermum paniculatum* var. *paniculatum* (20.0, 0.5), *Cryptocarya glaucescens* (20.0, 0.5), *Linospadix monostachyos* (20.0, 0.5), *Trophis scandens* subsp. *scandens* (20.0, 0.5), *Acacia melanoxydon* (20.0, 0.0), *Acronychia oblongifolia* (20.0, 0.0), *Asplenium australasicum* (20.0, 0.0), *Beilschmiedia elliptica* (20.0, 0.0), *Capparis arborea* (20.0, 0.0), *Cissus antarctica* (20.0, 0.0), *Cordyline petiolaris* (20.0, 0.0), *Corymbia intermedia* (20.0, 0.0), *Cryptocarya erythroxydon* (20.0, 0.0), *Cryptocarya macdonaldii* (20.0, 0.0), *Cryptocarya sclerophylla* (20.0, 0.0), *Dioscorea transversa* (20.0, 0.0), *Diospyros pentamera* (20.0, 0.0), *Diploglottis australis* (20.0, 0.0), *Dysoxylum mollissimum* subsp. *molle* (20.0, 0.0), *Elatostachys nervosa* (20.0, 0.0), *Embelia australiana* (20.0, 0.0), *Endiandra muelleri* (20.0, 0.0), *Eucalyptus microcorys* (20.0, 0.0), *Euroschinus falcatus* (20.0, 0.0), *Ficus coronata* (20.0, 0.0), *Geitonoplesium cymosum* (20.0, 0.0), *Hibiscus heterophyllus* (20.0, 0.0), *Hovea acutifolia* (20.0, 0.0), *Ixora beckleri* (20.0, 0.0), *Macrozamia lucida* (20.0, 0.0), *Myrsine subsessilis* subsp. *subsessilis* (20.0, 0.0), *Myrsine variabilis* (20.0, 0.0), *Notelaea longifolia* (20.0, 0.0), *Parsonsia straminea* (20.0, 0.0), *Planchonella australis* (20.0, 0.0), *Sarcopteryx stipata* (20.0, 0.0), *Solori involuta* (20.0, 0.0), *Sterculia quadrifida* (20.0, 0.0)

## Stratum: Ground

**Height:** average: 0.51m; range: 0.30 - 1.00m; (5 sites)

**Projective foliage cover (PFC):** average: 22.3%; range: 7.0 - 54.2%; (5 sites)

**Species list (frequency (%), average cover (%)):**

**Grass - perennial:**

Most frequent species (up to 6):

*Ottochloa gracillima* (60.0, 2.1), *Entolasia stricta* (20.0, 0.0), *Oplismenus imbecillis* (20.0, 0.0), *Ottochloa nodosa* (20.0, 0.0),

Additional species:

**Grass - annual/biennial:**

Not present

**Forbs & other:**

Most frequent species (up to 6):

*Pseuderanthemum variabile* (80.0, 0.3), *Alpinia caerulea* (60.0, 0.2), *Blechnum cartilagineum* (60.0, 3.0), *Cissus antarctica* (60.0, 0.6), *Dioscorea transversa* (60.0, 0.2), *Macrozamia lucida* (60.0, 1.0)

Additional species:

*Neolitsea dealbata* (60.0, 0.2), *Adiantum formosum* (40.0, 0.0), *Aneilema acuminatum* (40.0, 1.0), *Archontophoenix cunninghamiana* (40.0, 0.5), *Calamus muelleri* (40.0, 3.6), *Dianella caerulea* (40.0, 0.4), *Embelia australiana* (40.0, 0.0), *Geitonoplesium cymosum* (40.0, 0.0), *Gymnostachys anceps* (40.0, 0.0), *Lantana camara*\* (40.0, 0.0), *Pandorea pandorana* (40.0, 0.2), *Pellaea paradoxa* (40.0, 0.0), *Rubus moluccanus* var. *trilobus* (40.0, 0.0), *Scleria sphacelata* (40.0, 6.0), *Solori involuta* (40.0, 0.4), *Stephania japonica* (40.0, 0.0), *Abutilon oxycarpum* (20.0, 0.0), *Acalypha nemorum* (20.0, 0.0), *Acmena smithii* (20.0, 0.0), *Ageratina riparia*\* (20.0, 0.0), *Ageratum houstonianum*\* (20.0, 0.0), *Arachniodes aristata* (20.0, 0.0), *Austrocallerya megasperma* (20.0, 0.4), *Blechnum neohollandicum* (20.0, 18.0), *Blechnum rupestre* (20.0, 0.2), *Breynia oblongifolia* (20.0, 0.0), *Brunoniella australis* (20.0, 0.0), *Calochlaena dubia* (20.0, 44.8), *Causonis clematidea* (20.0, 0.0), *Cephalalaria cephalobotrys* (20.0, 0.0), *Clematis glycinoides* (20.0, 0.0), *Coelospermum paniculatum* var. *paniculatum* (20.0, 0.0), *Cordyline petiolaris* (20.0, 0.0), *Cordyline rubra* (20.0, 1.0), *Croton verreauxii* (20.0, 0.0), *Cryptocarya erythroxydon* (20.0, 0.4), *Cryptocarya glaucescens* (20.0, 0.0), *Cupaniopsis serrata* (20.0, 0.0), *Cyperus laevis* (20.0, 0.4), *Cyperus tetraphyllus* (20.0, 0.0), *Desmodium gunnii* (20.0, 0.0), *Dysoxylum mollissimum* subsp. *molle* (20.0, 0.0), *Endiandra pubens* (20.0, 0.0), *Eupomatia bennettii* (20.0, 0.0), *Eupomatia laurina* (20.0, 0.0), *Euroschinus falcatus* (20.0, 0.0), *Eustrephus latifolius* (20.0, 0.0), *Gahnia aspera* (20.0, 0.0), *Gahnia clarkii* (20.0, 3.0), *Geranium solanderi* var. *solanderi* (20.0, 0.0), *Glochidion sumatranum* (20.0, 0.0), *Glycine clandestina* (20.0, 0.0), *Gmelina leichhardtii* (20.0, 0.0), *Gossia hillii* (20.0, 0.0), *Gossia lewisensis* (20.0, 0.0), *Hodgkinsonia ovatiflora* (20.0, 0.0), *Homalanthus populifolius* (20.0, 0.0), *Hovea acutifolia* (20.0, 0.0), *Jagera pseudorhus* var. *pseudorhus* (20.0, 0.0), *Juncus usitatus* (20.0, 0.0), *Lepidosperma laterale* var. *laterale*\* (20.0, 1.0), *Lomandra longifolia* (20.0, 0.0), *Lophostemon confertus* (20.0, 2.0), *Maclura cochinchinensis* (20.0, 0.0), *Mallotus philippensis* (20.0, 0.0), *Melodinus australis* (20.0, 0.5), *Myrsine variabilis* (20.0, 0.0), *Notelaea longifolia* (20.0, 0.0), *Palmeria foremanii* (20.0, 1.0), *Parapolytichum munitum* (20.0, 3.0), *Parsonsia* (20.0, 0.0), *Passiflora subpeltata*\* (20.0, 0.0), *Pilidiostigma rhytispermum* (20.0, 0.0), *Polyscias elegans* (20.0, 0.0), *Pseudoweinmannia lachnocarpa* (20.0, 0.0), *Psychotria daphnoides* (20.0, 0.0), *Psychotria loniceroides* (20.0, 0.0), *Pteridium esculentum* (20.0, 0.0), *Rhodamnia rubescens* (20.0, 0.0), *Rhodomyrtus psidioides* (20.0, 0.0), *Ripogonum elseyanum* (20.0, 0.0), *Rubus rosifolius* (20.0, 0.0), *Sarcopetalum harveyanum* (20.0, 1.0), *Scolopia braunii* (20.0, 0.0), *Senna septemtrionalis*\* (20.0, 0.0), *Sigesbeckia orientalis* (20.0, 0.0), *Solanum*



*opacum* (20.0, 0.0), *Sterculia quadrifida* (20.0, 0.0), *Syzygium australe* (20.0, 0.0), *Tabernaemontana pandacaqui* (20.0, 0.0), *Tetrastigma nitens* (20.0, 0.2), *Trema tomentosa* var. *aspera* (20.0, 0.0), *Viola banksii* (20.0, 0.0), *Viola hederacea* (20.0, 0.0)

Species list: Frequency (percent of total sites) and cover (average of species cover across sites where that species is present). Ordered by decreasing frequency. Naturalised species have an asterisk (\*) after the name. indet. after listed name if indeterminate species or genus.

12.12.2a: *Eucalyptus pilularis* tall open forest on Mesozoic to Proterozoic igneous rocks



<b>Mapping data</b>	No data available.
<b>Species richness</b>	total: 344 (37 sites); woody: 162 (37 sites); ground: 263 (36 sites); average spp./site: 42.5, standard deviation: 7.9 (36 sites)
<b>Basal area</b>	average/site: 25.8 m <sup>2</sup> /ha; range: 16.0 - 41.0 m <sup>2</sup> /ha; std. deviation: 6.2; (37 sites)
<b>Ecological dominant layer (EDL) height</b>	stratum: tree 1; average/site: 32.96m; range: 18.00 - 50.00m; (37 sites)
<b>Ecological dominant layer (EDL) Crown Cover</b>	stratum: tree 1; average: 59.1%; range: 25.0 - 100.0%; (37 sites)
<b>Structural formation</b>	Tall Open Forest: 64.9 %; Open Forest: 21.6 %; Woodland: 8.1 %; Tall Woodland: 2.7 %; Tall Closed Forest: 2.7 %; (37 sites)
<b>Representative site(s)</b>	1982, 3089, 3090, 3093, 3225, 3236, 3238, 3747, 3760, 5465, 6160, 6173, 6179, 6181, 12243, 12437, 13626, 13858, 14884, 15101, 16177, 16872, 17229, 17307, 17309, 17322, 17389, 17392, 17394,

**Stratum: Tree 1 (EDL)**

**Height:** average: 32.96m; range: 18.00 - 50.00m; (37 sites)

**Crown Cover:** average: 59.1%; range: 25.0 - 100.0%; (37 sites)

**Stem Count:** average: 155 stems/ha; range: 40 - 280 stems/ha; std. deviation: 60.5 stems/ha; (26 sites)

**Basal area:** average: 20.3 m<sup>2</sup>/ha; range: 12.0 - 36.0 m<sup>2</sup>/ha; std. deviation: 5.5 m<sup>2</sup>/ha; (37 sites)

**Species list (frequency (%), average cover (%)):**

Most frequent species (up to 6):

*Eucalyptus pilularis* (100.0, 44.5), *Eucalyptus microcorys* (37.8, 8.4), *Corymbia intermedia* (29.7, 8.4), *Syncarpia glomulifera subsp. glomulifera* (21.6, 12.5), *Eucalyptus saligna* (18.9, 9.8), *Eucalyptus racemosa subsp. racemosa* (16.2, 13.9)

Additional species:

*Corymbia trachyphloia subsp. trachyphloia* (13.5, 3.5), *Angophora woodsiana* (10.8, 6.5), *Corymbia gummifera* (8.1, 13.3), *Eucalyptus tindaliae* (8.1, 5.7), *Eucalyptus carnea* (5.4, 16.5), *Lophostemon confertus* (5.4, 8.0), *Allocasuarina torulosa* (5.4, 5.0), *Eucalyptus resinifera* (5.4, 5.0), *Eucalyptus helidonica* (5.4, 2.0), *Amyema miquelii* (5.4, 0.0), *Eucalyptus siderophloia* (2.7, 30.0), *Eucalyptus propinqua* (2.7, 10.0), *Eucalyptus biturbinata* (2.7, 8.0), *Eucalyptus acmenoides* (2.7, 5.0), *Syncarpia verecunda* (2.7, 5.0), *Angophora subvelutina* (2.7, 0.0)

## Stratum: Tree 2

**Height:** average: 14.62m; range: 5.00 - 28.00m; (33 sites)

**Crown Cover:** average: 25.4%; range: 0.0 - 74.4%; (33 sites)

**Stem Count:** average: 423 stems/ha; range: 140 - 1,280 stems/ha; std. deviation: 280.8 stems/ha; (23 sites)

**Basal area:** average: 5.9 m<sup>2</sup>/ha; range: 1.0 - 15.0 m<sup>2</sup>/ha; std. deviation: 3.4 m<sup>2</sup>/ha; (28 sites)

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Allocasuarina torulosa* (70.3, 6.2), *Eucalyptus pilularis* (48.6, 21.3), *Syncarpia glomulifera subsp. glomulifera* (35.1, 23.9), *Corymbia intermedia* (29.7, 3.8), *Lophostemon confertus* (18.9, 2.2), *Eucalyptus microcorys* (16.2, 12.9)

Additional species:

*Eucalyptus saligna* (13.5, 15.2), *Eucalyptus racemosa subsp. racemosa* (13.5, 11.0), *Syncarpia verecunda* (10.8, 5.8), *Schizomeria ovata* (5.4, 29.2), *Angophora woodsiana* (5.4, 9.5), *Alphitonia excelsa* (5.4, 7.6), *Acacia maidenii* (5.4, 3.0), *Elaeocarpus reticulatus* (5.4, 2.0), *Synoum glandulosum subsp. glandulosum* (5.4, 2.0), *Banksia integrifolia subsp. compar* (5.4, 1.5), *Glochidion ferdinandi var. ferdinandi* (5.4, 0.5), *Callicoma serratifolia* (2.7, 25.0), *Acacia melanoxylon* (2.7, 6.2), *Corymbia gummifera* (2.7, 5.0), *Leptospermum trinervium* (2.7, 5.0), *Acacia irrorata subsp. irrorata* (2.7, 3.0), *Eucalyptus siderophloia* (2.7, 2.0), *Rhodamnia rubescens* (2.7, 2.0), *Trochocarpa laurina* (2.7, 2.0), *Acronychia pubescens* (2.7, 1.0), *Cryptocarya microneura* (2.7, 1.0), *Eucalyptus biturbinata* (2.7, 1.0), *Eucalyptus resinifera* (2.7, 1.0), *Corymbia trachyphloia subsp. trachyphloia* (2.7, 0.5), *Amyema congener* (2.7, 0.0), *Cryptocarya glaucescens* (2.7, 0.0), *Cymbidium madidum* (2.7, 0.0), *Elaeocarpus eumundi* (2.7, 0.0), *Eucalyptus carnea* (2.7, 0.0), *Parsonsia straminea* (2.7, 0.0), *Platyterium bifurcatum* (2.7, 0.0), *Syzygium oleosum* (2.7, 0.0)

## Stratum: Tree 3

**Height:** average: 5.94m; range: 3.50 - 10.00m; (16 sites)

**Crown Cover:** average: 26.4%; range: 0.0 - 69.8%; (16 sites)

**Stem Count:** average: 871 stems/ha; range: 140 - 3,000 stems/ha; std. deviation: 784.0 stems/ha; (13 sites)

**Basal area:** average: 3.8 m<sup>2</sup>/ha; range: 1.0 - 11.0 m<sup>2</sup>/ha; std. deviation: 3.6 m<sup>2</sup>/ha; (8 sites)

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Allocasuarina torulosa* (35.1, 13.6), *Lophostemon confertus* (21.6, 7.7), *Syncarpia glomulifera subsp. glomulifera* (18.9, 24.5), *Elaeocarpus reticulatus* (16.2, 3.8), *Eucalyptus pilularis* (16.2, 2.9), *Cryptocarya glaucescens* (13.5, 3.1)

Additional species:

*Corymbia intermedia* (10.8, 6.6), *Eucalyptus microcorys* (10.8, 4.9), *Synoum glandulosum subsp. glandulosum* (8.1, 10.4), *Schizomeria ovata* (8.1, 4.8), *Cryptocarya macdonaldii* (5.4, 9.8), *Alphitonia excelsa* (5.4, 8.4), *Syzygium oleosum* (5.4, 3.4), *Acacia maidenii* (5.4, 2.4), *Hakea eriantha* (5.4, 1.6), *Parsonsia straminea* (5.4, 0.0), *Acacia melanoxylon* (2.7, 5.6), *Callicoma serratifolia* (2.7, 5.6), *Alsophila australis* (2.7, 0.0), *Archontophoenix cunninghamiana* (2.7, 0.0), *Canarium australasicum* (2.7, 0.0), *Cinnamomum oliveri* (2.7, 0.0), *Cissus hypoglauca* (2.7, 0.0), *Dodonaea triquetra* (2.7, 0.0), *Endiandra sieberi* (2.7, 0.0), *Eucalyptus racemosa subsp. racemosa* (2.7, 0.0), *Eucalyptus saligna* (2.7, 0.0), *Hovea acutifolia* (2.7, 0.0), *Sloanea woollsii* (2.7, 0.0)

## Stratum: Shrub 1

**Height:** average: 1.82m; range: 1.00 - 3.50m; (37 sites)

**Crown Cover:** average: 22.2%; range: 0.0 - 81.0%; (37 sites)

**Stem Count:** average: 4,807 stems/ha; range: 400 - 17,500 stems/ha; std. deviation: 5,041.1 stems/ha; (23 sites)

**Basal area:** average: 1.4 m<sup>2</sup>/ha; range: 1.0 - 2.0 m<sup>2</sup>/ha; std. deviation: 0.6 m<sup>2</sup>/ha; (5 sites)

### Species list (frequency (%), average cover (%)):

Most frequent species (up to 6):

*Allocasuarina torulosa* (62.2, 2.0), *Lophostemon confertus* (56.8, 2.6), *Acacia maidenii* (51.4, 1.7), *Elaeocarpus reticulatus* (48.6, 3.6), *Breynia oblongifolia* (37.8, 0.7), *Hovea acutifolia* (35.1, 8.9)



Additional species:

*Platylobium formosum* (32.4, 6.8), *Lomatia silaifolia* (32.4, 2.8), *Syncarpia glomulifera* subsp. *glomulifera* (29.7, 3.4), *Eucalyptus pilularis* (29.7, 1.5), *Dodonaea triquetra* (27.0, 25.3), *Synoum glandulosum* subsp. *glandulosum* (27.0, 4.0), *Glochidion ferdinandi* var. *ferdinandi* (27.0, 3.5), *Cissus hypoglauca* (27.0, 1.0), *Acacia melanoxylon* (24.3, 2.0), *Acrotriche aggregata* (24.3, 1.9), *Pultenaea retusa* (21.6, 1.7), *Cryptocarya glaucescens* (18.9, 3.1), *Astrotricha latifolia* (18.9, 2.2), *Acacia myrtifolia* (18.9, 1.4), *Corymbia intermedia* (18.9, 1.4), *Hibbertia aspera* subsp. *aspera* (18.9, 0.4), *Alphitonia excelsa* (16.2, 4.7), *Acacia irrorata* subsp. *irrorata* (16.2, 4.0), *Alpinia caerulea* (16.2, 2.0), *Hakea eriantha* (16.2, 1.9), *Eupomatia laurina* (16.2, 1.0), *Xanthorrhoea latifolia* subsp. *latifolia* (13.5, 5.0), *Ptiliostigma rhytispermum* (13.5, 4.0), *Pultenaea villosa* (13.5, 3.4), *Eucalyptus microcorys* (13.5, 2.2), *Smilax glycyphylla* (13.5, 1.0), *Pimelea linifolia* subsp. *linifolia* (13.5, 0.9), *Trochocarpa laurina* (13.5, 0.9), *Banksia integrifolia* subsp. *compar* (13.5, 0.8), *Ozothamnus diosmifolius* (10.8, 3.5), *Pultenaea flexilis* (10.8, 3.5), *Acacia penninervis* var. *penninervis* (10.8, 1.2), *Macrozamia lucida* (10.8, 1.0), *Rubus moluccanus* var. *trilobus* (10.8, 1.0), *Austromyrtus dulcis* (10.8, 0.0), *Geitonoplesium cymosum* (10.8, 0.0), *Acacia longissima* (8.1, 9.5), *Baccharis halimifolia*\* (8.1, 6.0), *Billardiera scandens* (8.1, 2.0), *Seringia arborescens* (8.1, 2.0), *Archontophoenix cunninghamiana* (8.1, 1.2), *Monotoca scoparia* (8.1, 1.2), *Cinnamomum camphora*\* (8.1, 1.0), *Podolobium ilicifolium* (8.1, 1.0), *Schizomeria ovata* (8.1, 1.0), *Trema tomentosa* var. *aspera* (8.1, 1.0), *Xanthorrhoea johnsonii* (8.1, 1.0), *Hibbertia aspera* (8.1, 0.8), *Cryptocarya macdonaldii* (8.1, 0.6), *Commersonia bartramia* (8.1, 0.0), *Eustrephus latifolius* (8.1, 0.0), *Leptospermum trinervium* (5.4, 4.5), *Banksia spinulosa* var. *collina* (5.4, 4.0), *Rubus rosifolius* (5.4, 2.0), *Persoonia iogyna* (5.4, 1.5), *Denhamia silvestris* (5.4, 1.2), *Indigofera australis* subsp. *australis* (5.4, 1.0), *Notelaea ovata* (5.4, 1.0), *Polyscias sambucifolia* (5.4, 1.0), *Psychotria loniceroides* (5.4, 1.0), *Acacia disparrima* subsp. *disparrima* (5.4, 0.8), *Hakea florulenta* (5.4, 0.5), *Dioscorea transversa* (5.4, 0.0), *Elaeocarpus obovatus* (5.4, 0.0), *Eucalyptus racemosa* subsp. *racemosa* (5.4, 0.0), *Eucalyptus saligna* (5.4, 0.0), *Exocarpos cupressiformis* (5.4, 0.0), *Hibbertia dentata* (5.4, 0.0), *Lantana camara*\* (5.4, 0.0), *Persoonia sericea* (5.4, 0.0), *Polyscias elegans* (5.4, 0.0), *Zieria minutiflora* subsp. *minutiflora* (5.4, 0.0), *Zieria smithii* (5.4, 0.0), *Acacia penninervis* var. *longiracemosa* (2.7, 30.0), *Daviesia villifera* (2.7, 7.0), *Daviesia ulicifolia* (2.7, 6.0), *Goodia lotifolia* (2.7, 5.0), *Rhodamnia rubescens* (2.7, 5.0), *Banksia oblongifolia* (2.7, 3.0), *Leucopogon pimeleoides* (2.7, 2.6), *Xanthorrhoea* (2.7, 2.4), *Daviesia wyattiana* (2.7, 2.0), *Imperata cylindrica* (2.7, 2.0), *Syncarpia verecunda* (2.7, 2.0), *Abrophyllum omans* (2.7, 1.0), *Acacia complanata* (2.7, 1.0), *Acronychia pubescens* (2.7, 1.0), *Banksia spinulosa* var. *spinulosa* (2.7, 1.0), *Cryptocarya microneura* (2.7, 1.0), *Gahnia sieberiana* (2.7, 1.0), *Hibiscus heterophyllus* (2.7, 1.0), *Leucopogon affinis* (2.7, 1.0), *Persoonia stradbrogensis* (2.7, 1.0), *Jagera pseudorhus* var. *pseudorhus* (2.7, 0.6), *Acacia implexa* (2.7, 0.5), *Choretrum candollei* (2.7, 0.5), *Corymbia trachyphloia* subsp. *trachyphloia* (2.7, 0.5), *Eucalyptus siderophloia* (2.7, 0.5), *Eucalyptus tereticornis* (2.7, 0.5), *Gymnostachys anceps* (2.7, 0.5), *Persoonia* (2.7, 0.5), *Geranium solanderi* var. *solanderi* (2.7, 0.2), *Acacia falcata* (2.7, 0.0), *Acmena hemilampra* (2.7, 0.0), *Alsophila australis* (2.7, 0.0), *Callicoma serratifolia* (2.7, 0.0), *Canarium australasicum* (2.7, 0.0), *Cassia* (2.7, 0.0), *Cassinia* (2.7, 0.0), *Cassinia laevis* subsp. *rosmarinifolia* (2.7, 0.0), *Cissus antarctica* (2.7, 0.0), *Cissus oblonga* (2.7, 0.0), *Cordyline rubra* (2.7, 0.0), *Corymbia gummifera* (2.7, 0.0), *Desmodium gunnii* (2.7, 0.0), *Duboisia myoporoides* (2.7, 0.0), *Elaeocarpus eumundi* (2.7, 0.0), *Endiandra discolor* (2.7, 0.0), *Endiandra sieberi* (2.7, 0.0), *Euroschinus falcatus* (2.7, 0.0), *Glochidion sumatranum* (2.7, 0.0), *Guioa semiglauca* (2.7, 0.0), *Litsea leefeana* (2.7, 0.0), *Lordhowea amygdalifolia* (2.7, 0.0), *Melodinus australis* (2.7, 0.0), *Myrsine variabilis* (2.7, 0.0), *Neolitsea dealbata* (2.7, 0.0), *Pandorea pandorana* (2.7, 0.0), *Persoonia virgata* (2.7, 0.0), *Petrophile canescens* (2.7, 0.0), *Pinus elliotii*\* (2.7, 0.0), *Pittosporum revolutum* (2.7, 0.0), *Psychotria daphnoides* (2.7, 0.0), *Pultenaea petiolaris* (2.7, 0.0), *Sambucus australasica* (2.7, 0.0), *Smilax australis* (2.7, 0.0), *Styphelia biflora* (2.7, 0.0), *Wikstroemia indica* (2.7, 0.0)

## Stratum: Shrub 2

**Height:** average: 1.47m; range: 1.20 - 2.00m; (3 sites)

**Crown Cover:** average: 22.0%; range: 8.0 - 48.0%; (3 sites)

**Stem Count:** average: 760 stems/ha; range: 760 - 760 stems/ha; std. deviation: 0.0 stems/ha; (1 site)

**Basal area:** No data available.

**Species list (frequency (%), average cover (%)):**

### Most frequent species (up to 6):

*Hovea acutifolia* (5.4, 7.5), *Lophostemon confertus* (5.4, 5.0), *Platylobium formosum* (5.4, 2.5), *Podolobium ilicifolium* (5.4, 2.0), *Daviesia villifera* (2.7, 20.0), *Austromyrtus dulcis* (2.7, 7.0)

Additional species:

*Xanthorrhoea latifolia* subsp. *latifolia* (2.7, 5.0), *Banksia spinulosa* var. *collina* (2.7, 3.0), *Acrotriche aggregata* (2.7, 1.0), *Bursaria spinosa* subsp. *spinosa* (2.7, 1.0), *Acacia longissima* (2.7, 0.0), *Acacia maidenii* (2.7, 0.0), *Astrotricha latifolia* (2.7, 0.0), *Hakea florulenta* (2.7, 0.0), *Litsea leefeana* (2.7, 0.0)

## Stratum: Ground

**Height:** average: 0.62m; range: 0.30 - 1.50m; (36 sites)

**Projective foliage cover (PFC):** average: 40.6%; range: 0.0 - 81.0%; (36 sites)

**Species list (frequency (%), average cover (%)):**

### Grass - perennial:

Most frequent species (up to 6):

*Imperata cylindrica* (80.6, 9.8), *Entolasia stricta* (61.1, 2.3), *Themeda triandra* (52.8, 12.6), *Digitaria parviflora* (47.2, 1.5), *Oplismenus aemulus* (33.3, 1.2), *Panicum effusum* (25.0, 0.9)

Additional species:

*Ottlochloa gracillima* (16.7, 1.8), *Ottlochloa nodosa* (16.7, 17.6), *Poa labillardierei* var. *labillardierei* (16.7, 4.8), *Cymbopogon refractus* (13.9, 2.0), *Dichelachne micrantha* (11.1, 4.3), *Aristida calycina* var. *calycina* (8.3, 0.8), *Echinopogon ovatus* (5.6, 1.0), *Entolasia marginata* (5.6, 2.0), *Oplismenus imbecillis* (5.6, 0.0), *Sporobolus laxus* (5.6, 0.0), *Alloteropsis semialata* (2.8, 0.0), *Capillipedium spicigerum* (2.8, 0.0), *Echinopogon caespitosus* var. *caespitosus* (2.8, 8.0), *Eragrostis* (2.8, 0.0), *Eremochloa bimaculata* (2.8, 0.5), *Microlaena stipoides* (2.8, 0.0), *Paspalidium distans* (2.8, 0.0), *Paspalum scrobiculatum* (2.8, 0.0), *Poa* (2.8, 1.0), *Poa sieberiana* (2.8, 0.0), *Poaceae* (2.8, 0.0), *Sporobolus* (2.8, 1.0), *Sporobolus creber* (2.8, 0.0)

### Grass - annual/biennial:

Not present

### Forbs & other:

Most frequent species (up to 6):

*Pteridium esculentum* (91.7, 6.6), *Lomandra longifolia* (72.2, 0.4), *Goodenia rotundifolia* (58.3, 1.1), *Desmodium rhytidophyllum*

(55.6, 1.1), *Blechnum cartilagineum* (50.0, 2.8), *Calochlaena dubia* (50.0, 19.0)

Additional species:

*Dianella caerulea* (50.0, 0.8), *Eustrephus latifolius* (50.0, 0.8), *Glycine clandestina* var. *clandestina* (47.2, 0.6), *Cissus hypoglauca* (44.4, 1.5), *Lepidosperma laterale* var. *laterale*\* (44.4, 1.0), *Billardiera scandens* (41.7, 0.7), *Smilax glycyphylla* (41.7, 0.7), *Cyanthillium cinereum* (36.1, 1.0), *Hardenbergia violacea* (36.1, 0.7), *Kennedia rubicunda* (36.1, 1.0), *Platylobium formosum* (36.1, 3.0), *Desmodium gunnii* (33.3, 0.3), *Breynia oblongifolia* (30.6, 0.6), *Hibbertia aspera* (30.6, 1.6), *Lobelia purpurascens* (30.6, 0.6), *Pimelea linifolia* subsp. *linifolia* (30.6, 0.6), *Acacia maidenii* (27.8, 0.2), *Hibbertia dentata* (27.8, 1.8), *Viola hederacea* (27.8, 0.2), *Hibbertia aspera* subsp. *aspera* (25.0, 1.6), *Rubus moluccanus* var. *trilobus* (25.0, 1.0), *Archontophoenix cunninghamiana* (22.2, 0.0), *Geitonoplesium cymosum* (22.2, 0.0), *Lomandra multiflora* subsp. *multiflora* (22.2, 0.7), *Pultenaea retusa* (22.2, 0.9), *Rubus parvifolius* (22.2, 1.3), *Oxalis chnoodes* (19.4, 0.0), *Zieria minutiflora* subsp. *minutiflora* (19.4, 0.6), *Acrotiche aggregata* (16.7, 3.0), *Elaeocarpus reticulatus* (16.7, 0.6), *Geranium solanderi* var. *solanderi* (16.7, 2.1), *Lomandra hystrix* (16.7, 0.2), *Pigea stellarioides* (16.7, 0.3), *Viola betonicifolia* (16.7, 0.0), *Acacia myrtifolia* (13.9, 0.0), *Allocasuarina torulosa* (13.9, 0.6), *Alphitonia excelsa* (13.9, 0.0), *Astrotricha latifolia* (13.9, 0.0), *Austromyrtus dulcis* (13.9, 1.1), *Cassytha filiformis* (13.9, 0.4), *Dioscorea transversa* (13.9, 0.2), *Gahnia aspera* (13.9, 0.4), *Gonocarpus humilis* (13.9, 0.2), *Gymnostachys anceps* (13.9, 0.0), *Hydrocotyle laxiflora* (13.9, 0.0), *Lindsaea microphylla* (13.9, 3.0), *Smilax australis* (13.9, 1.2), *Tetralochea thymifolia* (13.9, 2.2), *Xanthorrhoea latifolia* subsp. *latifolia* (13.9, 2.0), *Coleus australis* (11.1, 0.0), *Comesperma hispidulum* (11.1, 1.0), *Corymbia intermedia* (11.1, 0.3), *Cryptocarya glaucescens* (11.1, 0.6), *Dodonaea triquetra* (11.1, 3.0), *Eupomatia laurina* (11.1, 0.0), *Hovea acutifolia* (11.1, 0.3), *Patersonia glabrata* (11.1, 0.0), *Senecio distallobatus* (11.1, 0.4), *Teucrium argutum* (11.1, 0.4), *Trachymene procumbens* (11.1, 0.2), *Brunoniella australis* (8.3, 0.0), *Cissus antarctica* (8.3, 0.0), *Dianella caerulea* var. *vannata* (8.3, 0.0), *Gomphocarpus fruticosus*\* (8.3, 0.5), *Hakea eriantha* (8.3, 1.0), *Hypochaeris radicata*\* (8.3, 0.6), *Indigofera australis* subsp. *australis* (8.3, 0.7), *Lomatia silaifolia* (8.3, 3.3), *Lophostemon confertus* (8.3, 0.0), *Nephrolepis cordifolia* (8.3, 0.0), *Poranthera microphylla* (8.3, 0.2), *Rubus rosifolius* (8.3, 1.4), *Schizomeria ovata* (8.3, 0.2), *Wikstroemia indica* (8.3, 0.5), *Xanthorrhoea johnsonii* (8.3, 10.0), *Zieria smithii* (8.3, 0.0), *Acacia disparrima* subsp. *disparrima* (5.6, 0.0), *Baccharis halimifolia*\* (5.6, 0.0), *Cassinia* (5.6, 0.0), *Centella asiatica* (5.6, 0.2), *Chrysocephalum apiculatum* (5.6, 0.0), *Cinnamomum camphora*\* (5.6, 0.0), *Cirsium vulgare*\* (5.6, 0.5), *Clerodendrum floribundum* (5.6, 0.0), *Commersonia bartramia* (5.6, 0.0), *Conyza*\* (5.6, 0.0), *Cryptocarya macdonaldii* (5.6, 0.6), *Dampiera sylvestris* (5.6, 0.2), *Dianella* (5.6, 1.0), *Dipodium variegatum* (5.6, 0.0), *Endiandra sieberi* (5.6, 0.2), *Eucalyptus pilularis* (5.6, 0.0), *Euchiton involucreatus* (5.6, 0.2), *Gleichenia dicarpa* (5.6, 12.5), *Glochidion ferdinandi* var. *ferdinandi* (5.6, 0.0), *Gompholobium pinnatum* (5.6, 0.0), *Haloragis heterophylla* (5.6, 0.0), *Hibbertia linearis* var. *obtusifolia* (5.6, 0.0), *Hibbertia scandens* (5.6, 0.0), *Hypericum gramineum* (5.6, 0.0), *Lantana camara*\* (5.6, 0.0), *Lobelia gibbosa* (5.6, 0.0), *Macrozamia lucida* (5.6, 0.0), *Melichrus adpressus* (5.6, 0.0), *Mentha satuireioides* (5.6, 0.0), *Monotoca scoparia* (5.6,

1.0), *Neolitsea dealbata* (5.6, 0.0), *Notelaea longifolia* (5.6, 0.0), *Ozothamnus diosmifolius* (5.6, 0.0), *Parsonsia straminea* (5.6, 0.0), *Persoonia sericea* (5.6, 0.5), *Pomax umbellata* (5.6, 0.0), *Pseuderanthemum variable* (5.6, 0.3), *Pultenaea petiolaris* (5.6, 0.0), *Schizaea bifida* (5.6, 0.0), *Schoenus melanostachys* (5.6, 9.7), *Sigesbeckia orientalis* (5.6, 0.4), *Stephania japonica* var. *discolor* (5.6, 0.0), *Sticherus lobatus* (5.6, 7.6), *Stylidium graminifolium* (5.6, 0.0), *Styphelia sieberi* (5.6, 0.0), *Syncarpia glomulifera* subsp. *glomulifera* (5.6, 0.0), *Synoum glandulosum* subsp. *glandulosum* (5.6, 0.0), *Syzygium oleosum* (5.6, 0.0), *Tetrastigma nitens* (5.6, 0.0), *Trochocarpa laurina* (5.6, 0.0), *Xanthosia pilosa* (5.6, 1.0), *Abrophyllum omans* (2.8, 0.0), *Acacia melanoxylon* (2.8, 0.0), *Acmena smithii* (2.8, 0.0), *Acronychia laevis* (2.8, 0.0), *Adiantum* (2.8, 0.0), *Alphitonia petriei* (2.8, 0.0), *Alpinia caerulea* (2.8, 0.0), *Araujia sericifera*\* (2.8, 0.0), *Astrotricha umbrosa* (2.8, 0.0), *Blechnum rupestre* (2.8, 0.0), *Bossiaea heterophylla* (2.8, 0.0), *Callicoma serratifolia* (2.8, 0.0), *Carex* (2.8, 0.0), *Carex breviculmis* (2.8, 0.0), *Cassytha pubescens* (2.8, 0.5), *Caustis flexuosa* (2.8, 5.0), *Celastrus subspicata* (2.8, 0.0), *Centratherum punctatum*\* (2.8, 0.0), *Chamaecrista nomame* var. *nomame* (2.8, 0.0), *Clematis glycinoides* (2.8, 1.0), *Comesperma volubile* (2.8, 0.0), *Cordyline rubra* (2.8, 0.0), *Coronidium elatum* subsp. *elatum* (2.8, 0.0), *Crassocephalum crepidioides*\* (2.8, 0.2), *Crassula sieberiana* (2.8, 0.0), *Crotalaria montana* (2.8, 4.0), *Cryptocarya microneura* (2.8, 0.0), *Cryptostylis erecta* (2.8, 0.0), *Cryptostylis subulata* (2.8, 0.0), *Cyanothamnus polygalifolius* (2.8, 0.0), *Cymbidium madidum* (2.8, 0.0), *Cyperus esculentus*\* (2.8, 0.0), *Cyperus gracilis* (2.8, 0.0), *Dendrobium kingianum* subsp. *kingianum* (2.8, 0.0), *Denhamia celastroides* (2.8, 0.0), *Denhamia silvestris* (2.8, 0.0), *Desmodium brachypodum* (2.8, 0.0), *Desmodium varians* (2.8, 0.0), *Dianella brevipedunculata* (2.8, 0.0), *Dianella longifolia* (2.8, 0.0), *Dianella rara* (2.8, 0.5), *Dianella revoluta* (2.8, 0.0), *Dichondra repens* (2.8, 0.0), *Dicranopteris linearis* var. *linearis* (2.8, 0.0), *Endiandra discolor* (2.8, 0.0), *Erigeron primulifolius*\* (2.8, 0.0), *Eucalyptus microcorys* (2.8, 0.0), *Eucalyptus saligna* (2.8, 0.2), *Eupomatia bennettii* (2.8, 0.0), *Fimbristylis dichotoma* (2.8, 0.0), *Gahnia melanocarpa* (2.8, 0.0), *Gahnia sieberiana* (2.8, 1.0), *Galium leptogonium* (2.8, 0.0), *Geodorum densiflorum* (2.8, 0.0), *Gomphocarpus physocarpus*\* (2.8, 0.0), *Gomphrena celosioides*\* (2.8, 0.0), *Gonocarpus* (2.8, 0.0), *Gonocarpus tetragynus* (2.8, 0.0), *Gonocarpus teucrioides* (2.8, 0.0), *Goodenia grandiflora* (2.8, 0.0), *Grewia latifolia* (2.8, 1.0), *Guioa acutifolia* (2.8, 0.0), *Hibbertia diffusa* (2.8, 0.2), *Hibbertia sericea* (2.8, 0.0), *Hibbertia vestita* (2.8, 1.0), *Hypoxis pratensis* (2.8, 0.0), *Juncus continuus* (2.8, 0.0), *Lagenophora sublyrata* (2.8, 0.0), *Lespedeza juncea* subsp. *sericea* (2.8, 0.0), *Lomandra* (2.8, 0.0), *Lomandra filiformis* (2.8, 0.0), *Marsdenia* (2.8, 0.2), *Murdannia graminea* (2.8, 0.0), *Myrsine variabilis* (2.8, 0.0), *Notelaea ovata* (2.8, 3.0), *Opercularia hispida* (2.8, 0.0), *Persoonia stradbrogensis* (2.8, 0.0), *Persoonia tenuifolia* (2.8, 0.0), *Petrophile canescens* (2.8, 0.0), *Pigea enneasperma* (2.8, 0.0), *Pimelea altior* (2.8, 1.0), *Pittosporum* (2.8, 0.0), *Psychotria daphnoides* (2.8, 0.0), *Psychotria loniceroides* (2.8, 0.0), *Pterostylis* (2.8, 0.0), *Pterostylis nutans* (2.8, 0.0), *Rostellularia adscendens* (2.8, 0.0), *Sarcopetalum harveyanum* (2.8, 0.0), *Senecio pinnatifolius* (2.8, 0.0), *Sticherus flabellatus* var. *flabellatus* (2.8, 3.0), *Telmatoblechnum indicum* (2.8, 0.0), *Thysanotus tuberosus* (2.8, 0.5), *Tristaniopsis laurina* (2.8, 0.0), *Verbena bonariensis*\* (2.8, 0.0), *Verbena rigida*\* (2.8, 0.0), *Veronica plebeia* (2.8, 0.0), *Viola silicestrus* (2.8, 0.2), *Wahlenbergia gracilis* (2.8, 0.0), *Woollsia pungens* (2.8, 0.2), *Youngia japonica* (2.8, 0.4), *Zornia dyctiocarpa* (2.8, 0.0)

Species list: Frequency (percent of total sites) and cover (average of species cover across sites where that species is present). Ordered by decreasing frequency. Naturalised species have an asterisk (\*) after the name. indet. after listed name if indeterminate species or genus.